



BASELINE STUDY REPORT

Philippine Cold Chain Project

Submitted by:

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LIST OF ACRONYMS

AdN	Agusan del Norte
AdS	Agusan del Sur
AHPNS	Acute Hepatopancreatic Necrosis Syndrome
BAFPS	Bureau of Agriculture and Fisheries Product Standards
BAS	Bureau of Agricultural Statistics
BBTV	Banana Bunchy Top Virus
BFAR	Bureau of Fisheries and Aquatic Resources
CSU	Caraga State University
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
EMS	Early Mortality Syndrome
FAO	Food and Agriculture Organization
FLA	Fishpond Lease Agreement
FOB	Freight on Board
GMP	Good Manufacturing Practice
Ha	Hectare
HACCP	Hazard Analysis and Critical Control Points
HH	Household
HVCDP	High Value Crop Development Program
INTAQ	Integrated Aquaculture Specialist
KG	Kilogram
LGU	Local Government Unit
LRFF	Live Reef Food Fish
MINDA	Mindanao Development Authority
MT	Metric Tons
NEDA	National Economic Development Authority
NSO	National Statistics Office
NVC	National Vegetable Congress
PCAARRD	Philippine Council for Agriculture, Aquatic and Natural Resources Research And Development
PCIC	Philippine Crop Insurance Corporation
PhP	Philippine Peso
RAFC	Regional Agriculture and Fisheries Council
RFU	Regional Field Unit (of the Department of Agriculture)
SdN	Surigao del Norte
SdS	Surigao del Sur
SEAFDEC-AQD	Southeast Asian Fisheries Development Center – Aquaculture Department

SPF	Specific Pathogen Free
SPR	Specific Pathogen Resistant
TWG	Technical Working Group
UN-FAO	United Nations - Food and Agricultural Organization
WSSV	White Spot Syndrome Virus

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1. EXECUTIVE SUMMARY

Under the United States Department of Agriculture (USDA) 2013 Food for Progress (FFPr) program, Winrock International Institute of Agriculture Development (Winrock) will be implementing a four-year agriculture development project in the Caraga Region Philippines called the Philippines Cold Chain Project (PCCP).

PCCP will primarily focus on providing benefits at the producer level to improve production, inputs, technology and practices at the farm level. Collaborating with producer groups, intermediate organizations, and larger scale cold chain related business, PCCP will assist farm families increase income, improve nutrition and food security, and provide higher value agricultural products to new markets that require a cold chain.

In collaboration with Philippine government agencies, intermediate organizations will be strengthened to meet consumer demand and international regulations, while developing improved capacity to create new opportunities for cold chain related markets and to assist producer groups. Businesses and consumers will be able to access new sources of quality and high value food products that meet international quality standards.

PCCP has two overall strategic objectives:

Objective 1: Increased Agricultural Productivity: PCCP will improve the productivity of select high-value commodities, such as high-value vegetables, bananas, livestock, and fisheries; in terms of yield/harvest per unit area and scope of production area.

Objective 2: Expand Trade of Agricultural Products: PCCP will ensure production of high quality products in order to maintain competitive market prices as well as meet all food safety standards in order for the producers to be competitive in outside markets. This objective focuses on the end of the value chain and includes off farm activities up until the product hits a fork (i.e., adding value to products, opening up markets, facilitating exchange of goods, etc.)¹

Comprehensive monitoring and evaluation will be an essential element of PCCP as increases in productivity, income and improvements in post-harvest handling as well as marketing through the cold-chain, credit utilization, food safety, food security, and nutrition will be tracked and measured. It is therefore necessary to establish the baseline at the start of the project to be able to gauge progress periodically and make before-and-after project comparisons.

After a competitive bidding process, the service of conducting the baseline study was awarded by Winrock International, the project's lead implementer, to Balay Mindanaw Foundation, Inc. (BMFI), a recognized Mindanao-based NGO.

The baseline study area consisted of 40 barangays drawn from the list of barangays recommended for project coverage by the project's prospective partner agencies and local government units.

This baseline study report aims to;

- Provide a more precise definition and understanding of the socio-economic status and vulnerability of potential project participants;
- Identify and recommend opportunities and synergies for better results, leverage, and linkages;
- Identify problems and constraints that may occur during project implementation; and

¹ FY 2014 Food Aid Proposal Guidance, Annex II

- Provide actionable recommendations and improvements to project implementation

Further, the study will provide guidance on better selection of barangays to be covered by the project.

The baseline study employed three main methodologies, the following:

- The value chain which primarily organized information describing the beginning status of the project's output and outcome indicators and provided context to the household survey;
- A household survey which presented a picture of the socio-economic status and vulnerability of potential project participants and provided details to the value chain; and
- Secondary research which provided initial and supplementary information to both value chain and household survey.

The baseline study showed that the farming and fishing households in the baseline study area are much poorer than the general population. Based on a poverty line of P96,182 per household in Caraga, the poverty incidence among farming and fishing households is 61.3% (compared to 31.9% among the general population).

Only 46.1% of the farming and fishing households have at least one member who is employed; only 17% of the labor force (aged 18 to 64) are actually employed. Average income from employment is P86,253 per year.

Lack of education is a limiting factor for opportunities in employment. Only 7.1% of the population over 21 years old have finished a four-year course (or longer) in college. The attrition on the path to college is high. Although 93.7% of children aged 6 and 7 enter grade-school, only 76.9% finish grade school and only 42.1% finish high-school.

A much higher proportion (87.3%) of the target households have at least one member who is self-employed, involving 46.7% of the labor force. But the average income from self-employment is lower at P50,706.

Access to formal credit is low. Although 58.0% of the households have borrowed money, only 34.2% have access to banks, cooperatives, lending agencies, and government agencies.

Capability building in terms of agricultural technology is relatively low. Of the targeted households, only 23.4% have at least one member who has undergone training.

The household survey component of the baseline study has revealed that the poverty incidence among farming and fishing households in Caraga Region is high and that the targeted project participants are highly vulnerable. The lack of access to improved technologies, market, credit, processing facilities and information are among the hindering factors faced by farmers and fishers.

The value chain mapping component of the baseline study for the selected commodities was able to pinpoint the inequitable distribution of cost and margin among the players in the value chain. The value chain analyses highlight the trend that farmer producers are among those who get the lesser share of the benefit pie while having a larger share of the cost in production and product transformation. The determinants relate back to low productivity, low quality of produce, poor product handling, absence of quality inputs, less adoption of appropriate technologies and lack of opportunity to participate in the marketing of their products.

The Philippine Cold Chain Project, which strategically aims to increase agricultural productivity and expand trade of agricultural products will be an important contributor in alleviating the overall socio-economic status of its targeted project participants directly in selected sites. Corollary to that, the Project will serve as catalyst in realizing the redound of benefits indirectly to the greater portion of the population of Caraga Region in form of food security as result of increases in agricultural productivity and the emergence of better economic opportunities, job creation and increase in household income as result of the expansion of trade of agricultural products.

From the viewpoint of the study team, the PCCP needs to efficiently link together the value chain players and enablers in a common framework of improving processes, putting in place enabling policies, and ensuring fair and equitable access to benefits. In so doing, the PCCP should focus on identifying the gaps and resort to addressing issues in all nodes of the value chain.

The Project strategy of having a market driven approach to productivity enhancement within the confines of international standards and the strategy to provide the necessary infrastructures to improve the supply chain, post-harvest and processing in the context of cold chain will be more effectively put forward to work if it leverages resources of the private sector and government.

2. INTRODUCTION

The Philippines Cold Chain Project (PCCP) aims to increase agricultural productivity and expand trade of agricultural products. In the Caraga Region in Northeast Mindanao, PCCP will focus on the horticulture, meat, and fish sectors. PCCP will help producers improve inputs and technology; then it will help these producers, through their organizations, to reach new markets that require a cold chain. In the process PCCP will collaborate with government agencies, cold chain related businesses, and other concerned stakeholders. It is hoped that, with better capacity and opportunities, the producers will be able to increase their income and improve their nutrition and food security. PCCP will have an impact on 137,500 people during its 4-year term.

Comprehensive monitoring and evaluation will be an essential element of PCCP as increases in productivity and income and improvements in post-harvest handling, marketing through the cold-chain, credit utilization, food safety, food security, and nutrition will be tracked and measured. It is therefore necessary to establish the baseline at the start of the project to be able to gauge progress periodically and make before-and-after project comparisons.

After a bidding process, the service of conducting the baseline study was awarded by Winrock International, the project's lead implementer, to Balay Mindanaw Foundation, Inc. (BMFI), a recognized Mindanao-based NGO. BMFI now presents the result of the baseline study.

The baseline study area consisted of 40 barangays drawn from the list of barangays recommended for project coverage by the project's prospective partner agencies and local government units.

This baseline study report aims to;

- Provide a more precise definition and understanding of the socio-economic status and vulnerability of potential project participants;
- Identify and recommend opportunities and synergies for better results, leverage, and linkages;
- Identify problems and constraints that may occur during project implementation; and
- Provide actionable recommendations and improvements to project implementation

Further, the study will provide guidance on better selection of barangays to be covered by the project.

3. STUDY METHODOLOGY

The three main methodologies employed in the baseline study were:

- The value chain which primarily organized information describing the beginning status of the project's output and outcome indicators and provided context to the household survey;
- A household survey which presented a picture of the socio-economic status and vulnerability of potential project participants and provided details to the value chain; and
- Secondary research which provided initial and supplementary information to both value chain and household survey.

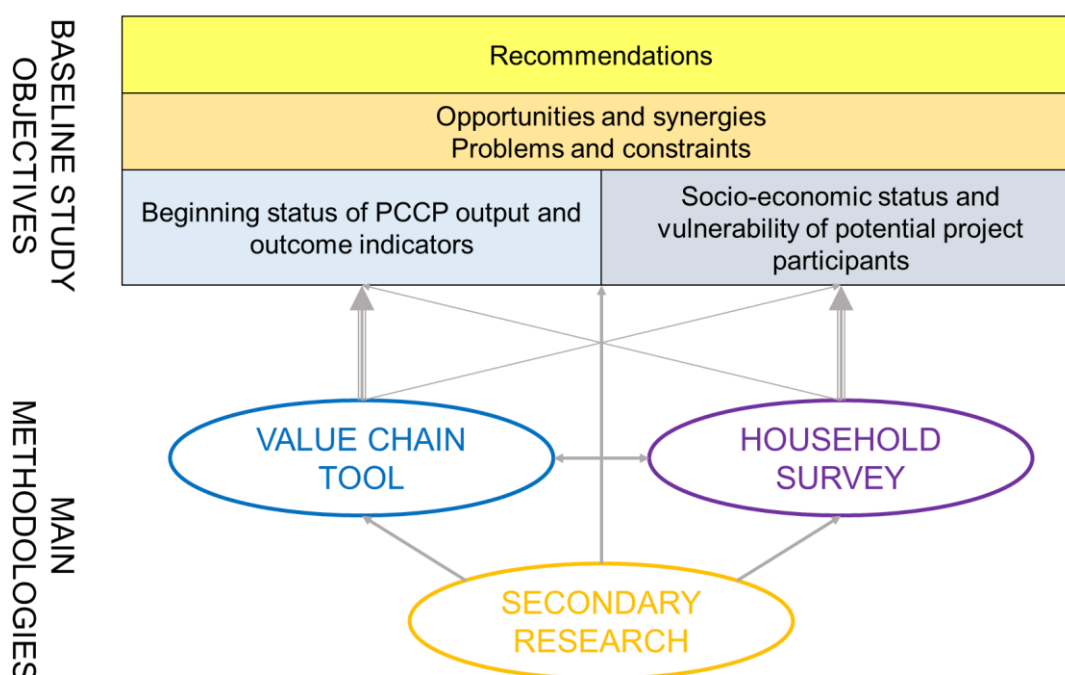


Figure 3-1 Main Methodologies

The proposal to use the value chain tool stemmed from the realization that the result/outcome and output indicators of the project could be arranged like a value chain².

The value chain tool focused on six (6) commodity classes from which the project would choose its indicator agricultural products:

- Fruits: banana (*saba* or *cardava*) and mango (*carabao*)
- Vegetables: *ampalaya* (bitter gourd), cucumber, eggplant, okra, pole *sitao* (string beans), squash, and tomato
- Livestock and poultry: pork, chicken meat, and eggs
- Prawn
- Cultured fish
- Captured fish

²Using the broad definition of value chain as a range of activities by different actors from the conceptualization to the final use/consumption of the product. Michael E. Porter calls this the value system, preferring to apply value chain to a single firm. The broad definition will be used throughout this report.

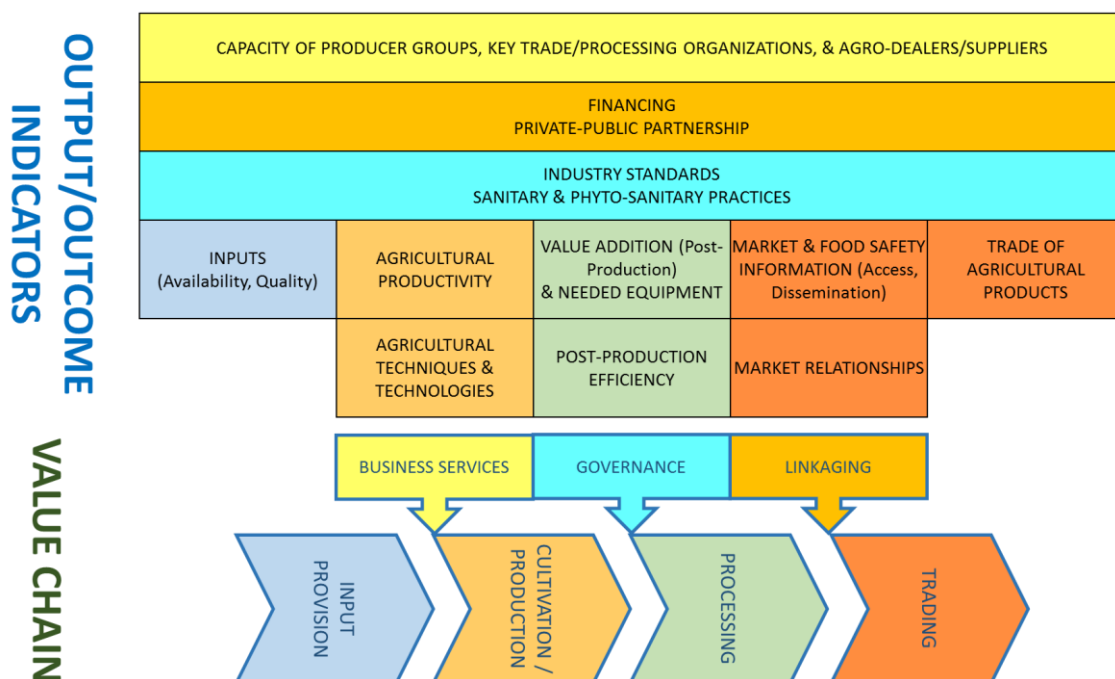


Figure 3-2 Output/Outcome Indicators and the Value Chain

The application of the value chain tool for the purpose of establishing baseline consisted of the following steps:

- a. Value chain tracing/mapping

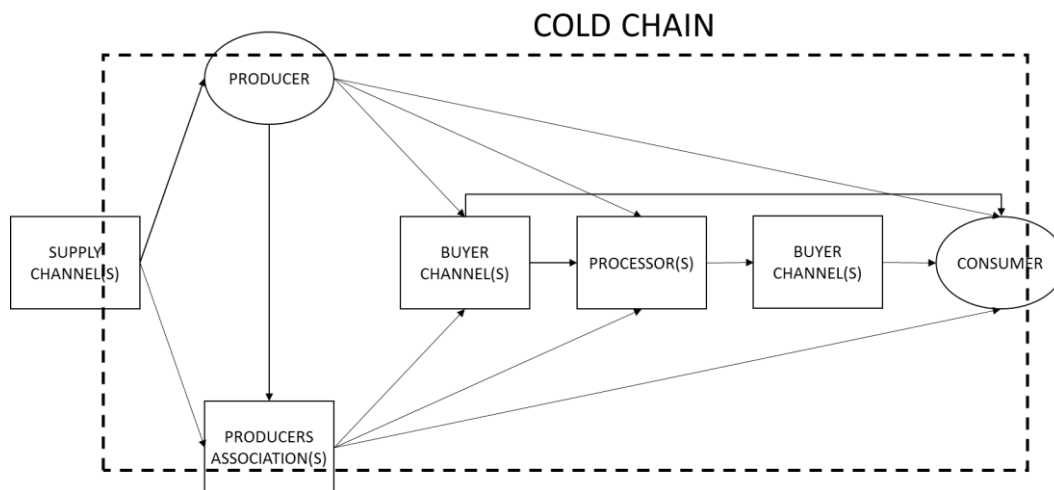


Figure 3-3 Value Chain Actors

- b. Overview of industry
- c. Technology assessment
- d. Cost and margin analysis
- e. Overview of governance issues

The following table on data gathering and analysis protocols shows where these steps were applied:

Table 3-1 Protocols for Establishing Baseline of Project Results

PROJECT RESULTS	DATA GATHERED	MEANS OF GATHERING DATA	WAY OF ANALYZING DATA
Increased agricultural productivity	- Production output (unit yield) - Production area - Seeding rate - Environmental impact - Assistance extended by service providers	HH survey, FGD (farmers, fishers), KII (agriculturists), secondary research	- Mean, range, mode - Triangulation, comparison with industry benchmark - Value chain – business services
Increased access to improved market information	- Indicated source of information - Name & location of buyer or supplier - Buying/selling price - Volume of demand/supply - Assistance extended by service providers	- HH survey, FGD, KII (DTI) - Validation via FGD	- Percentage - Triangulation - Value chain – industry overview, tracing (linkages)
Increased availability of improved inputs	- Supply channels - Seasonality of supply - Incidence of shortage - Involvement of men and women - Assistance extended by service providers	FGD, KII (supplier)	Value chain – tracing (linkages), descriptive analysis of supply channels, business services
Increased farmers' knowledge about improved agricultural techniques and technologies	- Farmers' current production techniques/technology - Technical trainings attended - Equipment - Participation/role of women	HH survey – checklist of improved techniques	- Percentage - Value chain – descriptive analysis of technology, business services
Expanded trade of agricultural products (domestic, regional and international)	- Regional trade volume - Peso value of trade - Aggregate production data	Secondary research, KII (trader, DTI)	- Traded volume as percentage of aggregate production - Value chain – tracing (linkages), industry overview

Improved capacity of key organizations in the trade and processing sectors	- Name & location of organization - Organizational history - Marketing/Trading scheme	Secondary research, KII (DTI, DA), FGD	- Growth in sales - Value chain – tracing
Increased value added to post production agricultural products	- Product forms - Selling price of raw product - Selling price of processed product - Processing cost - Assistance extended by service providers	FGD, KII (processor, trader), secondary research	- Value chain – cost and margin analysis, business services - Triangulation
Improved quality of post-production agricultural products	- Volume of processed products sold - Awareness of product standards - Post-harvest handling and storage	KII (processor, trader, DTI)	Percentage of processed versus raw
Increased adoption of established standards by industry	- Awareness of standards - Food inspection system	FGD, KII (supplier, producer, trader, processor, DTI, DA)	Percentage
Increased efficiency of post-production processes	- Volume of inputs - Volume of outputs - Cost of production - Sales	KII (processor), secondary research	- Input-output analysis - Value chain – cost and margin analysis
Increased use of improved post-production processing and handling practices	- Market preference - Processor's current technology - Equipment - Technical trainings attended	KII (processor), secondary research	Value chain – descriptive analysis of technology, business services
Agricultural producer groups or cooperatives created and/or strengthened	Name and location of existing association in sample area Nature of business	Secondary research, FGD, KII (barangay secretary)	Totals by type and area
Agricultural producers, producer groups, and private enterprises	Practices adopted	Secondary research, FGD, HH survey	Percentage of adoption

trained in sanitary and phytosanitary issues			
Develop agro-dealers and other input suppliers to provide improved inputs and technical recommendations	Assistance extended by service providers List of suppliers	Secondary research	
Provide financial services to producer association members	Number of producers borrowing Amount borrowed Lending institution Interest rate and fees	Secondary research, KII (key association officer, financial institution), HH survey	Totals and comparison of rates Percentage of members borrowing
Create new and strengthen existing trade associations to create new markets	Name and location of existing trade associations in Project area Name and location of buyers Assistance extended by service providers	Secondary research, KII (key association officer, DTI)	Listing
Develop new and strengthen existing market relationships	Buyer/Market channels Relationship issues	FGD, KII (producer, processor)	Value tracing Descriptive analysis of market relationship
Facilitate private public partnerships	List of relevant private-public partnerships in Project area	Secondary research	Listing

4. SAMPLING DESIGN

4.1. Purposive Sampling in Application of Value Chain Tool

Table 4-1 Summary of Focus Group Discussions and Key Informant Interviews Conducted

	ADN	ADS	DII	SDN	SDS
FGD: Producer Associations	10	1	2	4	4
FGD: Producers (unaffiliated)				1	
KII: Major Producer	6	8		2	2
KII: Suppliers	7	1	6		1
KII: Traders, Consolidators	5	3	2	2	1
KII: Retailers	21	43	2	10	14
KII: Cold-Chain Facility Operator		1		1	
KII: Processor	3	1			2
KII: Slaughterhouse Manager	1	1		1	1

4.2. Stratified Systematic Sampling for Household Survey

The Project aims to cover fifty barangays in each of the five provinces in the Caraga Region. This means that around 7,500 households will participate in the Project. At a confidence level of 95% and a confidence interval of 3%, the minimum sample size was computed at 1,068.

Necessary Sample Size = $(Z\text{-score})^2 * \text{StdDev} * (1 - \text{StdDev}) / (\text{margin of error})^2$

At 95% confidence level, the Z-score was 1.96. StdDev was assumed to be 0.5 to ensure that the sample size was large enough.

The sample size of 1,068 had to be adjusted though because the total number of households (assumed to be 7,500) was less than 50,000. The adjustment was done by dividing Necessary Sample Size (NSS) by a factor equal to $1 + (\text{NSS}-1)/\text{Population}$. This gave a new sample size of 935 households.

The first stratification was done to determine the sample per province. Because the number of barangays that would be covered by the project was uniform at 50 per province, the sample size of 935 was divided evenly among the 5 provinces. This meant a sample size of 187 per province.

The second stratification was done to determine how the sample would be divided among farming and fishing households. Per the 2012 census of agriculture and fisheries, the ratio between farmers and fishers nationwide was 76:24. Absent actual data from Caraga, this ratio was used to give a sample size of 142 farming households per province; correspondingly, the sample size of fishing households was 45 per province.

All the coastal barangays to be covered by the Project were identified and numbered. (The term “coastal barangays” did not refer to barangays along the seashore only but was taken to include, for convenience, barangays along lakeshore and marsh as well. Thus in Agusan de Sur which is a landlocked province there were 2 “coastal” sample barangays; they were actually along the edge of the Agusan Marsh).

A random number generator was used to select 2 coastal barangays per province, with 2 alternates. (In Agusan de Sur, only 2 fishing barangays would be covered by the Project so they were automatically selected, with no alternates). The total number of coastal sample barangays was ten (10).

The same was done with non-coastal and thus predominantly farming barangays. In this case, 6 barangays were randomly selected per province, with 3 alternates. The total number of non-coastal sample barangays was thirty (30).

The actual sample size per barangay was proportionate to its population (which was assumed to be proportionate to the number of households).

The number of households to be surveyed from each barangay was determined by the use of systematic sampling as this was easier to determine but still had a precision equivalent to simple random sampling. The starting point was chosen randomly.

After the processing of 25% of filled-up questionnaires, it was seen that types of producers (of the 6 classes of indicator agricultural products) were adequately represented. In the case of mango, however, it was decided to add another barangay in Agusan del Norte because this province accounted for 91% of the mango production in Caraga. But the 25 samples from this barangay were processed separately from the original 935 samples.

As already indicated, the population from which the study sample was drawn from the list of barangays recommended by the project's prospective partner agencies and local government units. During the time of the baseline study the list was not yet final. The barangays covered by the study are sample communities taken from the initial list of barangays recommended by the project partner agencies and local government units that may or may not be included in the 250 barangays to be covered by PCCP.

Identification of the final target barangays will be done in coordination with project partners and local government units, using guidelines and parameter that the study will help to provide

In fact it was understood that among the possible outcome of the baseline study might be recommendations on better project site selection and indicated strategies on how to broaden project outreach. Once the 250 target barangays are identified, PCCP will conduct and develop a barangay profile, and participant's profile. The information in these documents will serve as the baseline data of the Project. The findings and recommendations in this report would be viewed in conjunction with the consolidated barangay profiles of the final project sites.

5. PROJECT COVERAGE

5.1. Brief Description of Project Area

The Project area is in Region XIII, an administrative region in the Philippines, located in the north-eastern portion of the island of Mindanao. Region XIII is more popularly called the Caraga³ Region. It is composed of five provinces: Agusan del Norte, Agusan del Sur, Dinagat Islands, Surigao del Norte, and Surigao del Sur. There are 6 cities and 67 municipalities in Caraga, further subdivided into 1,311 barangays⁴. (The actual Project coverage is 50 barangays per province for a total of 250 barangays or 19% of the barangays in the region. These barangays have been tentatively identified but yet to be finalized.)

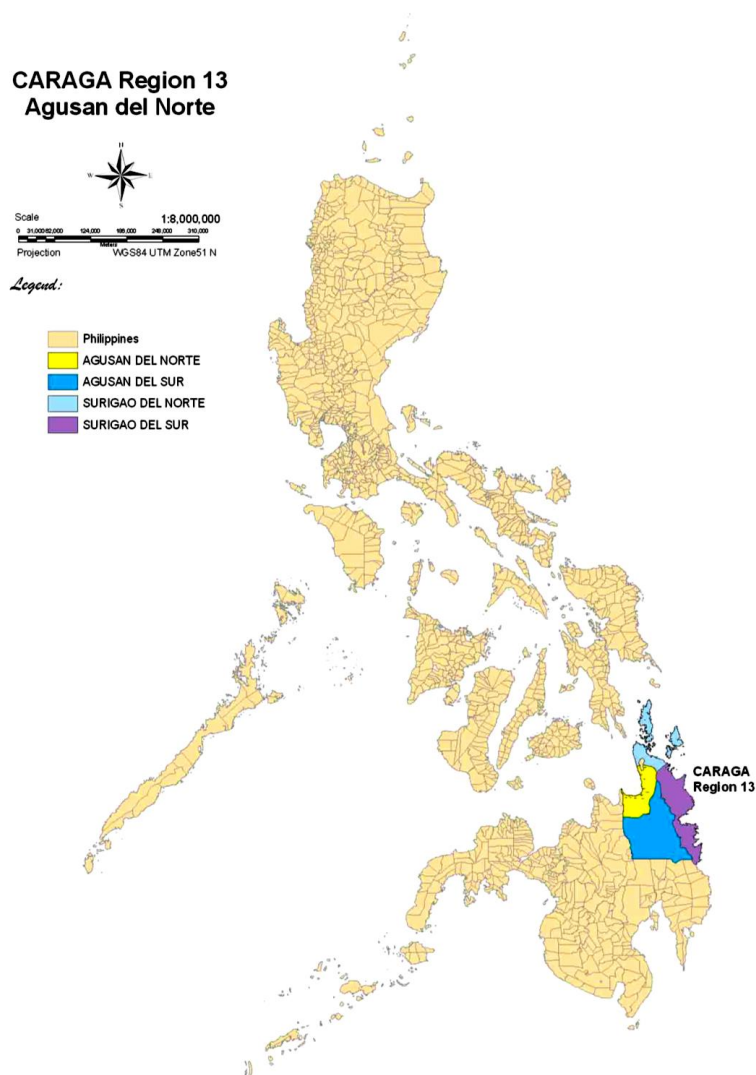


Figure 5-1 Location of Caraga Region in the Philippines
(www.agusandelnorte.gov.ph)

Caraga has a total population of 2,429,224 in 504,257 households. This gives an average barangay population of 1,853 in an average of 385 households.

³After the Kalagan, a fierce pre-colonial tribe.

⁴Villages

Caraga has no distinct dry season as rainfall occurs throughout the year. Conversely, there is no distinct wet season, the rains become relatively heavier from November to January. Rainfall is not uniform in all parts of the region. The Surigao provinces and Dinagat are more exposed to typhoons coming from the Pacific Ocean than the Agusan provinces. But lately, some typhoons have been making landfall farther south thus affecting Agusan del Sur also.

The total land area of Caraga is 1,884,720 hectares, of which 542,447 hectares are classified as alienable and disposable (A&D) which means they can be privately owned. The rest are government-owned which are classified as forest lands, of which 471,474 hectares have been awarded to or reserved for indigenous peoples as their ancestral domain. Overlapping areas have been issued permits or covered by lease agreements for forest plantation and mining.

The region has two large bodies of inland water – Lake Mainit in the north which has an area of 17,340 hectares and Agusan Marsh in the south which has an area of 11,540 hectares.

The primary products of Caraga are timber, wood pulp, gold, silver, nickel, chromite, rice, banana, and coconut.

5.2. Target Project Participant-Producers

The target community-based participants of the Project are farming and fishing households in 250 barangays in the Caraga Region, at 50 barangays per province. A minimum of 30 households per barangay (for a total of 7,500 households) are expected to directly participate in the project.

Based on the baseline household survey, farming and fishing household are distributed as shown in the table below.

Table 5-1 Percentage of Farming and Fishing Households per Type of Barangay

TYPE OF HOUSEHOLD	TYPE OF BARANGAY		
	Coastal	Non-Coastal	Both
Farming	33.0%	58.1%	51.7%
Farming & Fishing	8.2%	1.5%	3.2%
Fishing	8.1%	5.2%	6.0%
Non-Agricultural	50.7%	35.1%	39.1%
	100.0%	100.0%	100.0%

It is expected that 54.9% of the households in the baseline study area are engaged in farming and 9.2% are engaged in fishing. In coastal barangays the percentage of fishing households goes up to 16.3%. As the total number of households in the project coverage area is 69,551 the estimated number of farming households is 38,183 while that of fishing households is 6,399.

Segmenting further the farming and fishing households as to the type of agricultural indicator products they produce gives Table 5-2. Please note that in three product classes the total exceeds 100%; this is because some households are producing more than one type of vegetable, fruit, or chicken, as the case may be.

Table 5-2 Distribution of Households per Type of Agricultural Indicator Product

Farming (54.9%)	"Pinakbet" Vegetables (22.1%)	Ampalaya (8.1%)
		Eggplant (14.1%)
		Okra (12.2%)
		Squash (8.2%)
		String Beans (13.1%)
Farming (54.9%)	Banana (26.7%)	Tomato (3.6%)
		Saba (17.1%)
		Other Banana (16.5%)
		Carabao Mango (5.7%)
		Other Mango (4.2%)
Farming (54.9%)	Mango (9.9%)	Hog (19.5%)
		Chicken (20.0%)
		Broiler (18.5%)
		Layer (6.1%)
		Capture (7.4%)
Fishing (9.2%)	Culture (1.8%)	

5.3. Socio-Economic Situation of Target Farming and Fishing Households

5.3.1. Poverty Incidence

The project's target farming and fishing households are much poorer than the general population. Based on a poverty line of P96,182 per household in Caraga⁵, the poverty incidence among farming and fishing households is 61.3%. This is nearly double the 31.9% poverty incidence among all households in the region.

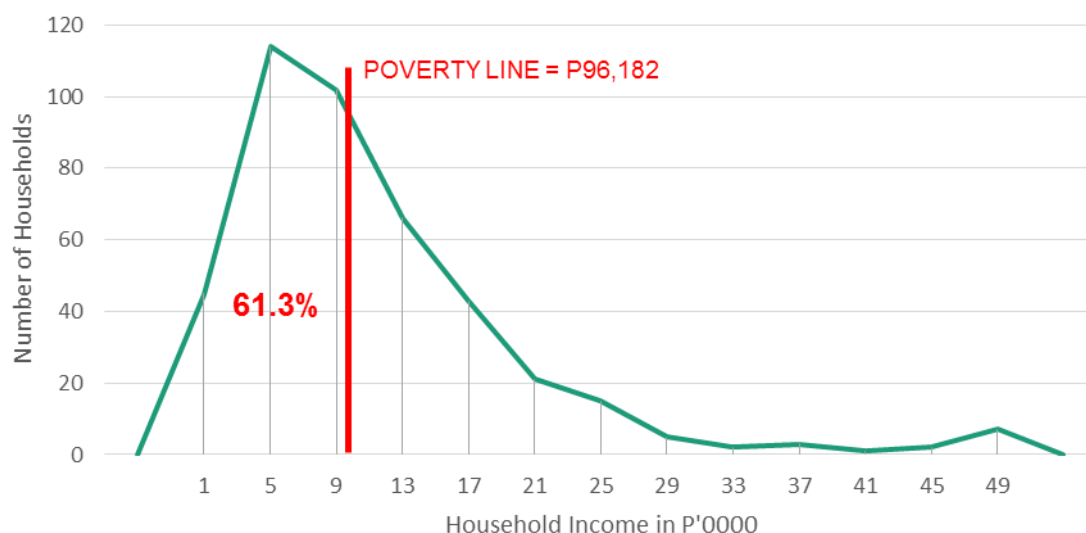


Figure 5-3 Household Income Distribution and Poverty Incidence

The average annual household income is P97,363 while the median is P78,000.

⁵The poverty line for Caraga is P19,629 per capita. Multiplying this by the average household size of 4.9 gives P96,182 as the poverty line per household.

5.3.2. Employment and Self-Employment

There is at least one member employed from 46.10% of the households. But if the entire population aged 18 to 64 is considered only 17.0% of the labor force are actually employed.

Average income from employment is P86,253 per year. With 46.10% of the households involved, the weighted contribution of income from employment to total household income is only P39,763.

Seventeen and a half percent (17.5%) of those employed are in farming while only 0.9% are in fishing, indicating low hiring in fish ponds and commercial fishing boats. On the average, only 3 workers are hired by a fishpond operator.

Table 5-3 Place of Employment

PLACE OF EMPLOYMENT	% OF EMPLOYED POPULATION
Office	27.9%
Plant/Factory	9.9%
Store/Shop	10.7%
Services	33.1%
Farm	17.5%
Boat/Pond	0.9%

The average income from self-employment is P50,706. But a much higher proportion (87.27%) of the target households have at least one member who is self-employed, involving 46.7% of the labor force, so the weighted contribution of income from self-employment is P44,251.

Table 5-4 Sector of Self-Employment

SECTOR	PERCENT OF SELF-EMPLOYED
Farming	68.79%
Fishing	19.71%
Off-Farm Production	2.17%
Trading	10.86%
Services	11.10%



Figure 5-4 Gender Breakdown of Employed and Self-Employed

5.3.3. Income from Other Sources

Some households earn by letting others use their property (such as land, vehicles, and boats) and getting either a fixed rent or a share in the revenue. The income from this is relatively high at P52,997 but as only 2.78% of the households are involved the weighted contribution to average household income is only P1,473.

Around 5.35% of households receive dividends and interest income from their deposits and patronage refunds for their transactions with their cooperatives. But the income from these is small at just P8,699 per year so the weighted contribution to household income is just P465.

In 5.56% of the households there are retirees who receive on the average a monthly pension of around P4,711 for a weighted annual contribution of P3,143 to household income.

Remittance from household members working abroad or in other areas in the country is an important source of income for 36.68% of the households. An average of P22,541 is sent home each year for a weighted contribution of P8,268 to household income.

5.3.4. Summary of Annual Household Income from All Sources

Table 5-5 Average Annual Household Income by Weighted Source

SOURCE OF INCOME	% of HH Reporting	Average Income (in Pesos)	Weighted Contribution
Employment	46.10%	86,253	39,763
Self-Employment	87.27%	50,706	44,251
Rental, share,& the like	2.78%	52,997	1,473
Dividend & the like	5.35%	8,699	465
Pension	5.56%	56,532	3,143
Remittance	36.68%	22,541	8,268
TOTAL			97,363

5.3.5. Household Expenses

Table 5-6 Annual Household Expenses

	PERCENT OF HOUSEHOLDS REPORTING	WEIGHTED ANNUAL EXPENSE
Food	98.7%	54,131
House Repair	47.7%	7,901
Transportation	89.7%	4,991
Fuel, Oil, & Lubricant	36.4%	4,617
Bath/Laundry	98.0%	4,601
School Fees	73.0%	4,168
Hospitalization	27.1%	3,458
Electricity	89.5%	3,085
Medicine	67.1%	2,170
Clothing	86.7%	1,782
Cell phone Fees/Load	73.0%	1,611
Water	61.0%	1,068
Uniform	63.6%	829
Insurance	9.7%	807
Cooking Fuel	30.5%	685
House/Lot Rental	4.7%	87
Cable TV	0.7%	27
Celebration	0.2%	18
Candle/Kerosene	4.6%	18
		96,054

Food accounts for 56.4% of the household expenses.

Transportation and FOL are also major expense items, suggesting more travel by household members to work, to the market, or to school.

Only 30.5% of households reported spending for cooking fuel, suggesting many households still gather wood for fuel. Indeed 97.4% of households use firewood, many of them for free. Charcoal is a far second at 13.6%.

Nearly three-fourths of the households already have a cellular phone. As 75% of the households have a member working in another place, the cellular phone has become an important means of keeping in touch.

5.3.6. Education

The lack of education limits opportunities for employment. Only 7.1% of the population over 21 years old have finished a four-year course (or longer) in college. The attrition on the path to college is high. Although 93.7% of children aged 6 and 7 enter grade-school, only 76.9% finish grade school and only 42.1% finish high-school.

5.3.7. House and Lot

Ninety three and a half percent (93.5%) of the households own their house but only 50.3% own also the lot on which the house stands.

A little over half (51.6%) of the houses are built with permanent materials mostly.

5.3.8. Incidence of Hunger and Malnutrition

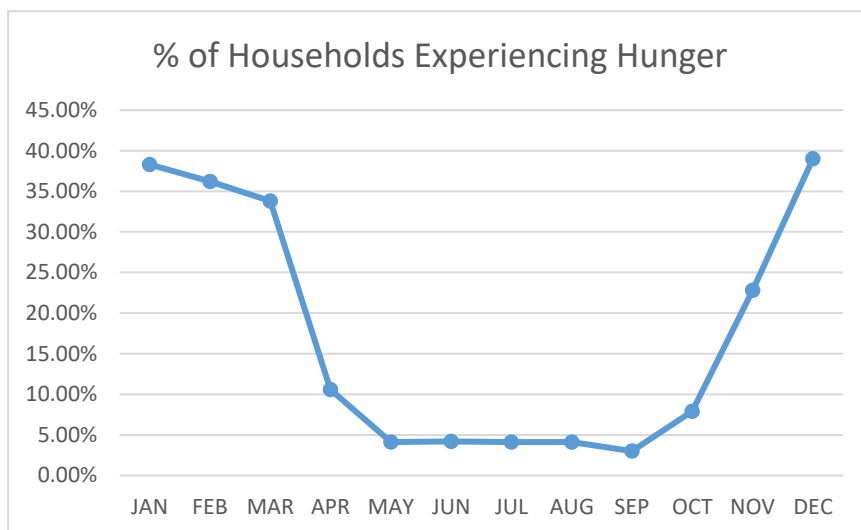


Figure 5-5 Seasonality of Hunger Incidence

Nearly seventy two percent (71.7%) of the households have experienced hunger. This means that even some households with income above the official poverty line still experience hunger occasionally.

Because of climate change, the stronger typhoons⁶ now come in the months of November to January, explaining the peak “hungry” months. On the other hand, rice harvests are from April to May and again from August to September, accounting for the low incidence of hunger during those months.

In the baseline study area 14.9% of children below 6 years old have been found to be malnourished. This is higher compared to the 2013 Operation Timbang⁷ results compiled by the National Nutrition Council where the malnutrition rate ranged from 7.0% (in Agusan del Sur) to 13.0% (in Dinagat).

⁶ Typhoon Auring in January 2013, Yolanda in November 2013, and Agaton in January 2014

⁷ Weighing

5.3.9. Staple Food

Table 5-7 Household Staple

STAPLE FOOD	% OF HH
Rice	92.9%
Corn	28.1%
Rootcrops	52.2%
Banana	25.5%

Rice is the main staple but rootcrops are also important staples for a little more than half of the households. It is worth noting that banana, particularly saba, is also a staple for 25.5% of the households in the baseline study area. Boiled saba can be eaten as is, dipped in fish paste, or mashed with a little muscovado sugar and cooked coconut milk.

5.3.10. Illness and Hospitalization

Around 58.8% of households have had incidence of waterborne disease as 33.7% of the households get water from sources that are not certain to be safe.

Almost 60% of the target households have at least one member suffering from a chronic illness. The most common complaints were about cough and colds but these are symptomatic.

Table 5-8 Households with At Least One Member with Chronic Illness

ILLNESS	% of HH
Hypertension	21.4%
Asthma	17.4%
Ulcer	13.6%
Diabetes	7.1%

Thirty and a half percent (30.5%) of the households has had a member hospitalized but in 79.6% of the cases a greater part, if not all, of the expenses were shouldered by Philhealth, the government's health insurance body. Three-fourths (75%) of the households are covered by Philhealth.

5.3.11. Household Information Appliances

Television (67.3%) has now replaced the radio (33.2%) as the household's primary source of news and entertainment. Around 6.9% of the households have a desktop personal computer, a laptop or netbook, or a tablet.

5.3.12. Mechanized Farm Equipment

Very few of the farming households have mechanized farm equipment.

Table 5-9 Households with Mechanized Farm Equipment

FARM EQUIPMENT	
Tractor	3.7%
Power Tiller	2.1%
Irrigation Pump	0.8%
Seed Drill	0.3%
Thresher	0.2%

5.3.13. Access to Credit

Fifty eight percent (58.0%) of the households have borrowed money and 10.1% have more than one loan, either because one household member has more than one loan (8.8%) or because two or more household members have loans (1.3%).

Table 5-10 Sources of Credit

SOURCE OF CREDIT	% of HH Borrowing	Average Highest Loan (in Pesos)
Relative	14.5%	6,899
Friend	16.8%	13,632
Informal Moneylender	9.6%	4,538
Lending Company	17.5%	9,352
Microfinance Institution	13.8%	6,739
Cooperative	7.9%	9,271
Bank	15.7%	27,325
Government Agency	4.0%	10,101

Table 5-11 Interest and Loan Term

	MONTHLY INTEREST (%)			LOAN TERM (in months)		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Bank	2.47	6.00	0.83	11.0	72	3.00
Cooperative	3.09	7.50	0.75	10.0	48	1.00
Friend ⁸	4.53	40.00	0.42	4.2	12	0.25
Government Agency	1.38	3.00	0.42	18.5	60	6.00
Informal Moneylender	8.38	20.00	1.00	5.7	12	1.00
Lending Company	4.54	20.00	1.00	6.5	36	1.00
Microfinance Institution	3.08	6.00	0.67	6.4	24	2.00
Relative ⁹	3.42	15.00	0.42	6.6	36	0.25

⁸Interest is computed for loans with interest only. Only 38% of loans from friends have interest. Similarly, loan term is computed for loans with fixed loan term only. Only 33.8% of loans from friends have fixed terms; the rest are on “pay-when-able” basis.

⁹Like in the case of loans from friends, only 42% of loans from relatives have interest; only 32% have fixed terms.

5.3.14. Capacity-Building

Around 23.4% of households have at least one member who has undergone training.

Table 5-12 Agricultural Training

TRAINING TOPIC	% of Respondents Trained	Breakdown of Participants by Gender	
		Female	Male
All Topics	23.4%	49.4%	50.6%
Focus Commodities			
Banana	4.8%	37.4%	62.6%
Eggplant	0.1%		100.0%
Mango	3.6%	37.4%	62.6%
Vegetable seed production	0.1%	100.0%	
Vegetables	6.0%	58.2%	41.8%
Artificial insemination	0.1%		100.0%
Coconut	10.8%	54.5%	45.5%
Rice	11.4%	50.6%	49.4%
Other crops	6.0%	47.3%	52.7%
Agriculture/Farming	12.0%	47.3%	52.7%
Natural/Organic farming	9.6%	49.9%	50.1%
Sustainable/Integrated farming systems	7.2%	54.5%	45.5%
Integrated pest management	6.6%	51.1%	48.9%
Pesticides / Pest control	3.6%	23.0%	77.0%
Organic Fertilizer	8.4%	59.9%	40.1%
Vermiculture	3.0%	47.3%	52.7%
Fertilizer application	10.8%	54.5%	45.5%
Seed growing (rice)	3.0%	70.5%	29.5%
Irrigation	4.2%	59.9%	40.1%
Organizational management	7.2%	54.5%	45.5%
Financial Management	0.1%	100.0%	

Among fishing households 15.6% have been trained in fish culture, 4.4% in fish capture, and 2.2% in fishery laws.

Those who have undergone training have cited the following benefits:

Table 5-13 Benefits from Training

	% of Trained Fishing HHs Benefitting	% of Trained Farming HHs Benefitting
Improved Technology	15.2%	26.9%
Improved Product Quality	37.0%	48.8%
Better Management	43.5%	44.4%
Increased Production	56.5%	45.6%
Increased Sales	19.6%	20.0%
others	39.1%	61.9%

5.3.15. Community Participation

Only around 5% of the barangays in the baseline study area do not have a community-based people's organization.

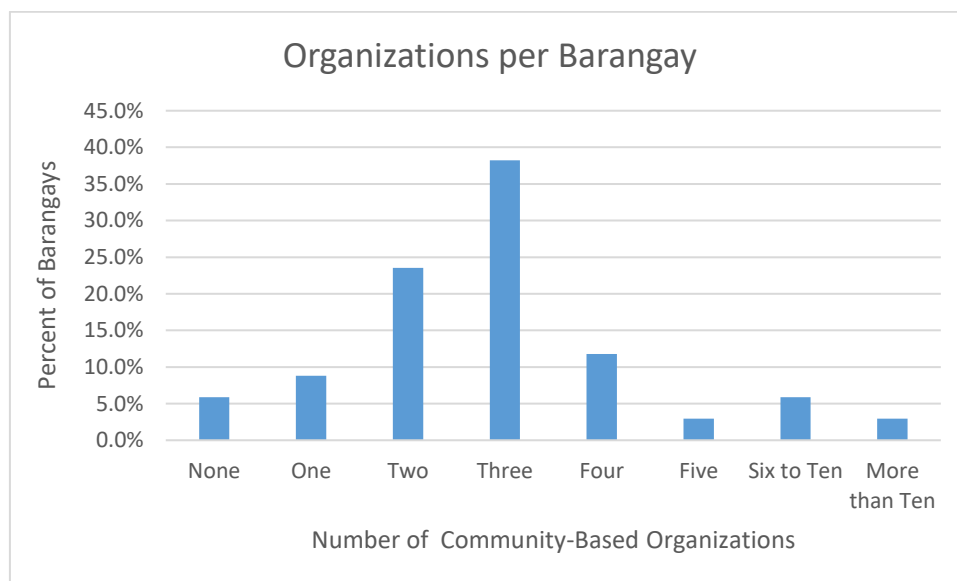


Figure 5-6 Number of Barangay-Based Organizations

The most number of organizations are farmers' organizations, followed by women's organizations.

Table 5-14 Types of Organizations

TYPE OF ORGANIZATION	All Barangays	Coastal Barangays	Non-Coastal Barangays
Farmers	79.4%	55.6%	88.0%
Irrigators	20.6%	11.1%	24.0%
Fishers	38.2%	77.8%	24.0%
Women	73.5%	77.8%	72.0%
Water & Sanitation	11.8%	11.1%	12.0%
Others	11.8%		16.0%

5.4. Baseline of Project Performance Indicators

Number of hectares under improved techniques or technologies	Farm 72 Pond 5
Number of farmers and others who have applied new techniques or technologies	Farmer 824 Fisher 45

Target Households = 7,500

Table 5-15 Number of Hectares and Producers with Improved Technology

COMMODITY	PERCENT OF HOUSEHOLDS PRODUCING	PERCENT TRAINED OR ADOPTING IMPROVED TECHNOLOGY	TOTAL PRODUCERS WITH IMPROVED TECHNOLOGY	AVERAGE PRODUCTION AREA (in Ha)	TOTAL AREA UNDER IMPROVED TECHNOLOGY
Ampalaya	8.1%	6.0%	36	0.0438	1.6
Eggplant	14.1%	6.0%	63	0.0635	4.0
Okra	12.2%	6.0%	55	0.0541	3.0
Squash	8.2%	6.0%	37	0.1728	6.4
String beans	13.1%	6.0%	59	0.0331	2.0
Tomato	3.6%	6.0%	16	0.0329	0.5
Banana (Saba)	17.1%	32.8%	421	0.0746	31.4
Mango (Carabao)	5.7%	32.0%	137	0.1700	23.3
Fish (Cultured)	1.8%	15.6%	21	0.2368	5.0
Fish (Marine Captured)	7.4%	4.4%	24	NA	NA
			869		77.2

Adoption of improved production technology in the case of banana and mango is based on the percentage of household survey respondents following at least two of six recommended practices. For the other commodities, adoption is based on relevant trainings undergone. While actual adoption rate is usually around 55% among training graduates, the study team deems the percentages in the table above to be reasonable, given that farmer-to-farmer or fisher-to-fisher technology transfer makes up for the percentage of training graduates who do not adopt the new technology.

Number of individuals receiving short-term agricultural sector productivity or food security training	Female 870 Male 885
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Target Households = 7,500

Table 5-16 Number of Individuals with Agricultural Training

	PERCENT TRAINED	NUMBER OF INDIVIDUALS TRAINED
Total	23.4%	1,755
Female	11.6%	870
Male	11.8%	885

Value of agricultural and rural loans provided	\$586,534
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Target Households = 7,500
Percent of Households with Productive Loan = 28.1%

Table 5-17 Value of Agricultural Loans Provided

	PERCENT OF BORROWERS	NUMBER OF BORROWERS	AVERAGE LOAN VALUE	TOTAL LOAN VALUE
For Farming	73.8%	1,555	11,539	P17,943,145
For Fishing	26.2%	552	14,427	P7,864,344
				P25,807,489
			@\$1 = P44	\$586,534

Number of private enterprises, producers organizations, women's groups, trade and business associations, water users associations and community- based organizations (CBOs) that applied new technologies or management practices

1

Producers' organizations typically finance the production of individual members. In the barangays visited during the baseline study only one producers' cooperative has been found to be engaged in actual production. Baug CARP¹⁰ Beneficiaries Multi-Purpose Cooperative directly manages 40 hectares of fish pond while the rest of its lease is parcelled into 40 lots of 5 hectares each for its members. As it sells part of its produce to Manila and Japan, it is considered to be applying improved technology and management practices.

Number of public-private partnerships formed

1

Number of jobs

600

Within the project area, there is only one public-private partnership that is relevant to the indicator agricultural products being promoted by the project. This is among the Celebes Agricultural Corporation, the Department of Agriculture (DA), several local government units (LGUs), and a number of banana-farmers' organizations. Celebes provides planting materials to the farmers who in turn are bound to sell their saba banana to Celebes. DA and the LGU provide other assistance (mostly trainings) to the farmers.

Celebes has three processing plants in Mindanao, employing more than 2,000 workers. It can be assumed that the banana-chips plant in Butuan City has at least 600 employees.

Number of policies, regulations, and/or administrative procedures supporting improved industry standards prepared

0

Standards for processed food are set at the national level by the Department of Health (DOH) through the Food and Drugs Administration (FDA). Standards for raw agricultural products are set by DA through its various bureaus (such as the National Meat Inspection Service, the Bureau of Plant Industry, the Bureau of Agriculture and Fisheries Standards, etc.). Local legislative bodies sometimes localize national laws and regulations by passing an ordinance copied from the law or regulation, the only difference being the amount of fines imposed.

Total increase in installed storage capacity (dry or cold storage)

0

Dry storage in the baseline study area is for rice, corn, or copra.

¹⁰Comprehensive Agrarian Reform Program

There are three meat cold storage in Butuan City, one in Surigao City, and one in Bayugan City that are accredited by the National Meat Inspection Service. All five are adjunct to meat shops and at the moment do not offer storage services to farmers.

There is a chicken dressing plants in Butuan City and another in Rosario, Agusan del Sur. The Butuan plant has a chilling room, an ice plant, two 40-footer cold storage, three 10-tonner cold storage insulated panel, two 20-footer container and two 20-footer blasting machine. But both plants are private and exclusive.

Market value increase of agricultural products sold by assisted associations	\$158,863
Number of individuals benefiting directly	40
Number of individuals benefiting indirectly	196
Value (USD) of international trade (exports) for indicator agricultural products (mangoes, cabbage, freshwater prawns, and saltwater prawns) sold	\$16,364

Members = 40

Table 5-18 Market Value of Agricultural Products Sold by Producer Associations

	VOLUME/YR (in kg)	UNIT PRICE (P/kg)	SALES (P/Yr.)	SALES (\$/Yr.)
Prawn	8,000	300	2,400,000	54,545
Milkfish	50,000	90	4,500,000	102,273
Crab	300	300	90,000	2,045
				158,863

Fifteen percent (15%) of the prawn are exported to Japan.

Number of private enterprises, producer organizations, water user associations, women's groups, trade and business associations and community-based organizations that applied new technologies or management practices	69
Number of members of organizations that have applied improved market information	2,754
Number of cooperatives that regularly provide updated market information to their members	69
Number of sources/outlets for agriculture market information	69
Number of agricultural producers who used up-to-date market information and/or good agricultural practices	2,754

Target Households = 69,551

Table 5-19 Number of Organizations with Access to Market Information

	FARMER	FISHER	TOTAL
Number	38,183	6,399	44,582
Percent Accessing Market Info from Organization	4.8%	14.4%	
Number Accessing Market Info from Organization	1,833	921	2,754
Percent Joining Organizations			26.2%
Number Joining Organizations			11,680
Number of Organizations			295
Average Number of Members per Organization			40
Number of Organizations Providing Market Info			69

Number of organizations that have applied gender inclusion at leadership, professional, management and technical levels as a result of USDA assistance 184

Target Barangays = 250

Table 5-20 Number of Organizations

TYPE OF ORGANIZATION	PERCENT OF BARANGAYS WITH ORGANIZATION	NUMBER OF ORGANIZATIONS
Farmers	79.4%	199
Irrigators	20.6%	52
Fishers	38.2%	96
Women	73.5%	184
Water & Sanitation	11.8%	30
Others	11.8%	30
		591

Number of hectares under improved techniques or technologies 5

Number of farmers and others who have applied new techniques or technologies 70

Target Households = 69,551

Table 5-21 Number of Hectares with Improved Inputs

TRAINING SUBJECT	PERCENT TRAINED	NUMBER TRAINED
Integrated Pest Management	6.6%	4,590
Organic Fertilizer	8.4%	5,842
Vermiculture	3.0%	2,087
Vegetable Seed Production	0.1%	70
Pesticides & Pest Control	3.6%	2,504

Irrigation	4.2%	2,921
COMMODITY	AVERAGE FARM AREA	MINIMUM AREA WITH IMPROVED INPUTS
Vegetables	0.0656	4.5920
Banana (Saba)	0.0746	
Mango (Carabao)	0.1700	

Value (USD) of domestic market for indicator agricultural products (mangoes, cabbage, freshwater prawns, and saltwater prawns) sold **\$3,042,977**

Table 5-22 Market Value of Agricultural Products Sold

	PRODUCERS	AREA (in Ha)	YIELD (Ha)	UNIT PRICE	SALES (P)	SALES (\$)
Ampalaya	608	0.0438	5,441	41.56	6,021,878	136,861
Eggplant	1,058	0.0635	6,733	28.13	12,724,413	289,191
Okra	915	0.0541	4,091	23.32	4,722,548	107,331
Squash	615	0.1728	15,995	11.70	19,887,901	451,998
String beans	983	0.0331	5,987	21.30	4,145,036	94,205
Tomato	270	0.0329	3,630	21.50	693,274	15,756
Banana (Saba)	1,283	0.0746	28,200	3.50	9,439,392	214,532
Mango (Carabao)	428	0.1700	4,073	30.63	9,077,246	206,301
	PRODUCERS		YIELD (kg)	UNIT PRICE	SALES (P)	SALES (\$)
Pork	1,462		218.5	96.83	30,932,053	703,001
Broiler	1,388		4.4	149.14	910,828	20,701
Fish (Marine)	555		531.0	86.83	25,589,235	581,574
	PRODUCERS		YIELD (pc)	UNIT PRICE	SALES (P)	SALES (\$)
Eggs	458		166	4.50	342,126	7,776
	PRODUCERS		AVERAGE SALES	UNIT PRICE	SALES (P)	SALES (\$)
Fish (Aquaculture)	95		33,000		3,135,000	71,250
	40		156,750		6,270,000	142,500
Grand Total						3,042,977

Number of private enterprises, producers organizations, women's groups, trade and business associations, water users associations and community- based organizations that applied new technologies or management practices(updated market information and/or good agricultural practices prior to selling) **69**

Number of agriculturalists who have access to current market or good agricultural practices information via media, associations and suppliers **23,814**

Table 5-23 Producers with Market Information from Non-Peer Sources

	FISHERS	FARMERS			
Target Producers	6,399	38,183			
	PERCENT OF FISHERS	PERCENT OF FARMERS	NUMBER OF FISHERS	NUMBER OF FARMERS	TOTAL
Producer Association	14.0%	5.0%	896	1,909	2,805
Buyer	38.0%	56.0%	2,432	21,382	23,814
Government Agency	7.0%	1.0%	448	382	830
Radio/TV/Newspaper	0.0%	2.0%	-	764	764

Number of agricultural producers reporting decreases in post-harvest losses from post-harvest handling techniques and technologies 0

Percentage of decrease of total harvests lost during post-harvest / transit by farmers 0

Table 5-24 Producers with Storage Problem

	FISHERS	FARMERS			
Target Producers	6,399	38,183			
	PERCENT OF FISHERS	PERCENT OF FARMERS	NUMBER OF FISHERS	NUMBER OF FARMERS	TOTAL
Lack of Storage Facility or Poor Storage	19.3%	6.6%	1,235	2,520	3,755

On the average, wastage in fishing amounts to 12% of production, according to the Food and Nutrition Research Institute. For mango, wastage runs to 5%.

6. VEGETABLES

6.1. General Industry Overview

Vegetables are among the more attractive options for farmers in non-coastal areas of the Caraga region despite some of the challenges that vegetable farmers face. These crops enhance food security and contribute to farm income. High value vegetables, in particular, can generate a yearly income of as much as Php200,000-500,000 pesos. They take up relatively small farm space and have short growing times, making them flexible enough for small lots and temporary land arrangements.

The six vegetables included in the project's indicator agricultural products are: ampalaya, eggplant, okra, squash, string beans, and tomato. They are major ingredients of a traditional Filipino dish called "pinakbet" therefore they are aptly called pinakbet vegetables.

Of the six pinakbet vegetables, only okra is a major export commodity. More than 6,000 metric tons of okra (out of a total production of 29,767 MT) were exported to China and Japan in 2012.

The following table shows the production for pinakbet vegetables in Caraga, the neighboring regions of Northern Mindanao and Davao Region, and the whole Philippines:

Table 6-1 Area Planted/Harvested by Crop, Location, and Year (in hectares)

	2009	2010	2011	2012	2013
AMPALAYA					
Philippines	11,038	11,129	10,877	10,893	10,831
Northern Mindanao	489	486	506	517	526
Davao Region	414	414	391	403	426
Caraga Region	158	164	133	139	140
EGGPLANT					
Philippines	21,170	21,423	21,377	21,481	21,236
Northern Mindanao	773	775	795	814	831
Davao Region	1,211	1,219	1,173	1,162	1,174
Caraga Region	571	544	468	499	510
OKRA					
Philippines	3,555	3,570	3,497	3,568	3,586
Northern Mindanao	299	308	309	324	338
Davao Region	184	190	183	197	213
Caraga Region	142	139	106	115	99
SQUASH					
Philippines	13,565	13,427	12,877	12,868	12,759
Northern Mindanao	1,021	1,024	1,069	1,078	1,106
Davao Region	550	562	535	540	556
Caraga Region	349	309	166	170	184
STRINGBEANS					
Philippines	14,832	14,681	14,298	14,200	13,766
Northern Mindanao	326	334	427	442	450
Davao Region	2,671	2,651	2,320	2,301	2,327
Caraga Region	154	170	120	114	117
TOMATO					
Philippines	17,656	17,663	17,556	17,343	17,228
Northern Mindanao	2,807	2,697	2,748	2,727	2,648
Davao Region	652	653	636	644	641
Caraga Region	75	74	55	58	49

Source: Bureau of Agricultural Statistics

The production area for pinakbet vegetables in Caraga decreased during the past five years while that in Northern Mindanao increased (except for tomato).

Data presented during the 2012 Mindanao Vegetable Congress showed that Caraga had 2,341 hectares devoted to vegetable production. The area planted with pinakbet vegetables was 1,095 hectares, which was equivalent to 46.8% of the total area for vegetables.

Caraga Region is deficit in vegetables, as the following table shows:

Table 6-2 Demand for and Supply of Pinakbet Vegetables in Caraga

	Demand (in MT)	Supply (in MT)	Deficit
Ampalaya	2,065	851	58.8%
Eggplant	5,053	3,474	31.2%
Okra	632	504	20.4%
Squash	6,000	2,910	51.5%
Stringbeans	No data	806	No data
Tomato	4,178	234	94.4%

Prepared based on data from the Bureau of Agricultural Statistics

Additional supplies of okra, squash, and tomato come mainly from Northern Mindanao. Eggplant and stringbeans come from Davao Region. Ampalaya is supplied by both regions.

Large establishments such as groceries and commercial retail markets contribute to over-all demand. Usually, these establishments have minimum volume contracts to ensure that they source the most vegetables possible from each supplier. This demand is one that local farmers with limited yields will not be able to meet. The farmers therefore rely on traders, consolidators or *viajedors* to sell their products to large establishments.

No large-scale commercial growers for these vegetables are in direct competition with local growers.

6.2. Overview of Value Chain

The following are illustrations of different value chains for different areas:

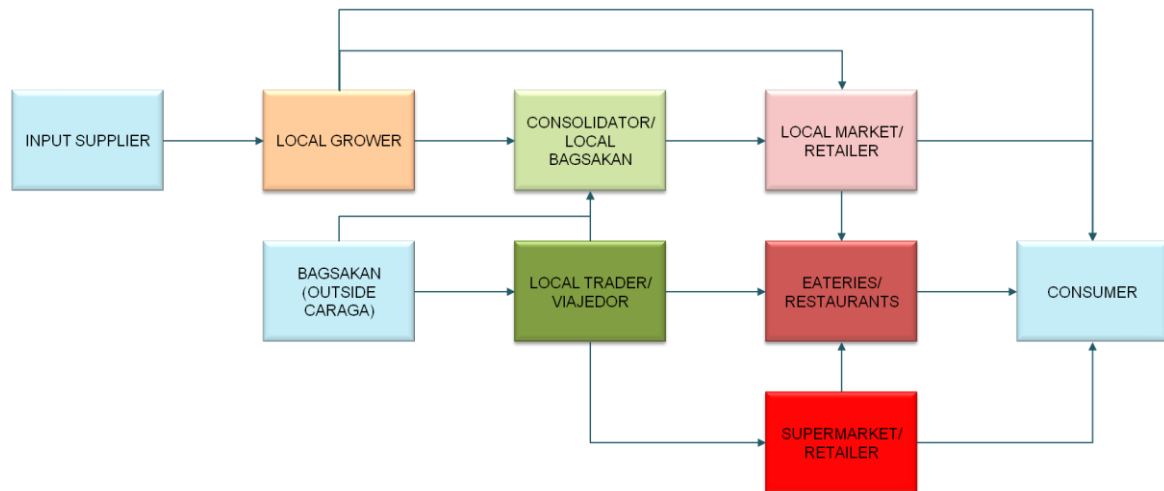


Figure 6-1 General Value Chain for Vegetables



Figure 6-2 General Vegetable Value Chain in Caraga



Figure 6-3 Value Chain in Butuan City, San Francisco, Prosperidad, Bayugan, and Bislig



Figure 6-4 Value Chain in Butuan City, Prosperidad, and Bayugan



Figure 6-5 Value Chain in Bislig, Tandag, Surigao City, and Dinagat

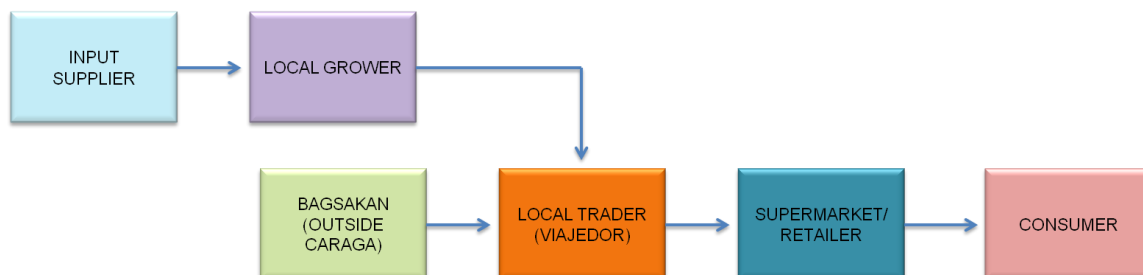


Figure 6-6 Value Chain in Butuan City

6.3. Market Preference

6.3.1. Market Preference and Prices

Buyers prefer undamaged pinakbet vegetables of good quality. Poor quality vegetables can be attributed to pests and diseases, poor soil, lack of fertilizer, poor transportation, and poor handling. All these can all greatly decrease the desirability of the vegetables for the general market.

In some areas, there is also a knowledge gap between the farmers and the market. That is, the farmers are not aware these preferences exist in their end consumer. Therefore, there is not much consciousness to practice measures that ensure that their products fulfil market standards.

However, not all farmers are clueless about buyer preferences. During a focus group discussion, vegetable growers said that a number of traders have given feedback that locally produced vegetables are of inferior quality compared to those from other regions. Hence, they are priced lower. However, this feedback stands in conflict with what retailers in local wet markets had to say. According to them, local vegetables are fresher due to short travel time from the farm to the market. Instead of quality issues, they cited irregularity of the schedule and quantity of supply as well as lack of variety as their key concerns.

As of 2013, the average farm price for the ampalaya is Php 30.01 with a retail price of 59.70. Eggplants sell for about Php 15.76 from farms on average, while they can go for about Php 40.26 on retail. As previously mentioned, this can amount to a yearly income of up to Php 200,000-500,000 when conditions are favorable.

6.3.2. Meeting Buyer Demand

One vegetable trader based in Butuan was interviewed for this research. According to her, local vegetable growers could not be relied upon to provide the 5-10kg per pinakbet vegetable requirements of Puregold and Robinson's supermarkets in Butuan City. In order to keep up with the demands, she has to source out an additional volume of vegetables from Davao in order to comply with the minimum contracted volume of these establishments.

The major external source of vegetables for the southern part of Caraga is the Bankerohan bagsakan¹¹ in Davao City where farmers from Davao, Compostela Valley and Southern Bukidnon bring their products. For the northern part of Caraga, the major source is the Bulua bagsakan in Cagayan de Oro City where farmers from Misamis Oriental and Northern Bukidnon bring their vegetables.

6.4. Input Suppliers

6.4.1. Seeds

There are three main sources of vegetable seeds in the project area: the farmers themselves, government (mainly the Department of Agriculture and the municipal/city/provincial agricultural offices), and seed companies (either directly or through agricultural supply stores).

¹¹ Literally a drop-place or local trading post

Table 6-3 Capacity to Produce Inputs among Vegetable Farmers

INPUT	Self-Produced by Farmer	Sourced Within the Barangay	Sourced Outside the Barangay
Vegetable seeds	25.6%	31.3%	43.1%
Organic fertilizer	55.9%	16.1%	28.0%
Pesticide	11.8%	35.3%	52.9%

Source: Baseline Household Survey

As indicated by the HH survey results, 25.6% of vegetable farmers produce their own seeds, relying mainly on traditional practice as less than 1% of the farmers have been trained in vegetable seed production.

Seeds sourced within the barangay may have been distributed by government, sold or lent by other farmers, or sold by a local store. Seeds sourced outside the barangay come from bigger agricultural stores in town/city centers or, directly, from seed companies.

The major vegetable seed companies operating in Caraga are East West Seeds, Harbest Seeds, and Seminis Vegetable Seeds. East West Seeds is the Philippine's largest hybrid vegetable seed producer; it offers agricultural extension services to farmers who buy its seeds.

Many farmers still hesitate to use commercial seeds, despite the higher yield. They say that plants from commercial seeds yield little or poor seeds, forcing them to buy commercial seeds again for the next crop.

6.4.2. Fertilizer and Pesticides

As shown in Table 6-3 above, 55.9% of vegetable farmers make their own organic fertilizer. The production and use of organic fertilizer stem from both traditional practice and technical training. Twenty one percent (21.0%) of the farmers have been trained in vermiculture, organic fertilizer preparation, and organic farming.

When it comes to pesticides, however, 88.2% of farmers rely on commercial ones. The urge to use pesticides in vegetable production is a strong because traders and consumers relate quality to the appearance of the produce; discoloration, pricks, and wormholes can reduce the price considerably.

6.4.3. Labor

Labor shortages are not a major constraint to productivity improvement as unemployment and underemployment are high in rural areas; but the ability to pay for labor is a key issue.

6.5. Producers

There are 15,371 households in the project area producing at least one kind of pinakbet vegetables. Most produce more than one kind.

Table 6-4 Pinakbet Vegetables Production in Project Area

	Producers in Project Area	Ave. Area (sq.m.)	Yield (kg/Ha)	Compared to Philippine Average Yield
Ampalaya	5,634	438	5,441	65.9%
Eggplant	9,807	635	6,733	65.8%
Okra	8,485	541	4,091	48.5%
Squash	5,703	1,728	15,995	92.1%
Stringbeans	9,111	331	5,987	71.1%
Tomato	2,504	329	3,630	30.3%

Source: Baseline household survey

Producers operate individually. While there are existing farmers' organizations, they do not engage in production, processing, and/or trading as a group. The main reason why most farmers join an organization is to avail of support from government, especially the Department of Agriculture.

There is an existing network of organizations of vegetable growers called CARVEGRON (Caraga Vegetable Growers Network). It hosted the National Vegetable Congress in 2012. But afterwards CarVeGroN experienced some organizational problems. Last February 26, 2014 the network underwent a reorganization and adopted a modified acronym CarVeGrowN. Recently, the network conducted a Vegetable Farmers Market Encounter, in coordination with the Department of Agriculture - Regional Field Unit Caraga (DA-RFU Caraga) and Department of Trade and Industry- Caraga (DTI-Caraga) and the Butuan City Chamber of Commerce and Industry Foundation, Inc. (BCCCCIFI). Members of CarVeGrowN met major retailers (such as VROSS Meatshop and Berry Happy Mart based in Butuan City) to explore possibilities on a regular supply agreement.

6.6. Markets and Marketing Channels

Farmers trade their fresh produce directly to their "suki"¹² retailer, to the bagsakan area in the local market, or to a local trader. In most cases, viajeros¹³/retailers travel to major bagsakan centers (Bankerohan in Davao and Bulua in Cagayan de Oro) outside of the region. Most retailers get their vegetables from the viajeros on a "bayad-utang"¹⁴ scheme. They can get an agreed volume of vegetables on credit for a day. Additional volume can be obtained still on credit only if the previous transaction has been settled. Retail of vegetables also include fresh and ready to cook vegetables (chopped and 3-4 kinds of vegetables mixed) sold for home preparations or to food caterers and carinderias¹⁵.

When prices of vegetables and selected fruits are high, jamboleros (harang)¹⁶ may intercept and purchase produce directly from farmers on their way to the market, saving the farmer time. The jambolero/harangs make a small profit and may speed up or consolidate the market chain while providing additional employment, despite being an additional layer to the chain.

Pricing of vegetables are most of the times dictated by the traders and retailers. Since distribution systems are often inadequate, grade standards are often subjective in size, quality and variety rather than based on clearly defined and uniform criteria. Vegetable growers shared during the FGD that traders often do not follow prices of vegetables previously agreed

¹² Regular and loyal customer

¹³ Means "traveler". A viajero travels from place to place buying (and/or selling) a certain commodity.

¹⁴ Literally means "pay-borrow"

¹⁵ Eateries

¹⁶ Interceptors

upon. There were a number of instances when vegetables were transported by “habalhabal”¹⁷ to the “suki” trader in the wet market only to be told that better quality vegetables had arrived from other growers. The poor grower had to settle for a much lower price. Without any storage facilities in the area, the vegetable grower would lose more if the harvested produce would be transported back to the farm. Traders normally are in collusion with each other at the expense of small vegetable growers.

In the household survey, respondents identified the main factors affecting market prices: poor quality (43.57%); excess supply at the time of harvest (27.90%); poor communication (20.06%) and lack of market information (19.43%). Poor quality could be due to pest and diseases, poor soil, lack of fertilizer, poor transportation (by animal or motorcycle), and poor handling (in big baskets/sacks).

Ninety three percent (93%) of respondents were not aware of the final destination of the products they sold, indicating that they were not very knowledgeable about the industry they were in. It also indicated that farmers/producers were also not aware of and were not practicing measures to ensure standard quality of products which were required by the market. The latter problem was not only among producers; an interviewed vegetable viajera who was also retailing vegetables in Agusan del Sur shared that between 10-50% of the wrapper leaves of cabbages purchased from Davao Bagsakan Center had to be removed before being sold due to poor handling practices during the transit period.

Other major issues in marketing include:

- Inefficient local distribution of more perishable vegetables because of poor roads from the highlands (where most vegetables are grown) to urban centers.
- Vegetable growers had complained during the focus group discussion that a number of vegetable traders maintain that locally produced vegetables are of inferior quality as compared to those from other regions and are thereby priced lower.
- However, a few retailers in the local wet markets shared that locally produced vegetables are fresher due to the short travel time from the farm to the market. The major limitation is the irregularity of supply, the lesser quantity being supplied per delivery, and the variety of vegetables grown by local producers.
- Cold chain handling systems, while available in Region 10 and Region 11, are almost non-existent in Caraga Region. The ways vegetables are kept fresh after harvest therefore are rudimentary.

Table 6-5 Current Farmers Practice in Keeping Vegetables Fresh

WAYS OF KEEPING VEGETABLES FRESH	FARMERS PRACTICING
Sprinkle with water	82.4%
Pack in plastic bag	29.4%
Place in cold storage	2.1%
Chill in refrigerator	1.7%
Wrap with banana leaves	1.3%
Chill in ice box	0.8%
Keep away from sunlight	0.8%
Sell promptly to consumers	0.8%
Wipe carefully	0.4%

Source: Baseline household survey

¹⁷ A motorcycle with outriggers to allow it to carry more passengers and goods.

6.7. Cost and Return

Vegetable production in Caraga is relatively more risky than traditional staple-crop production because of high perishability and low per capita consumption. On the other hand, vegetables have significantly higher returns when compared to staple crops, like rice, corn, and rootcrops.

Table 6-6 Net Profit to Cost Ratio for Selected Vegetables (National 5-Year Average)

	Ampalaya	Eggplant	Stringbeans	Tomato
COSTS				
Seeds / Planting Materials	7,232	1,134	7,541	1,432
Fertilizer	20,612	14,611	14,593	23,345
Pesticides	13,329	7,074	19,713	8,475
Labor	15,787	10,366	13,242	21,057
Transport (of Inputs)	1,694	516	2,097	619
Imputed Costs (Land, Water, Equipment)	77,661	80,655	66,268	68,740
TOTAL COSTS	136,315	114,356	123,453	123,667
Average Yield per Hectare (kg)	8,006	9,828	19,580	11,644
Cost per Kg Produced	17.02	11.63	6.32	10.62
Farm-Gate Price (P/kg)	25.79	16.51	20.29	13.32
GROSS RETURNS	206,587	162,315	397,026	155,075
NET PROFIT	70,272	47,959	273,573	31,408
NET PROFIT TO COST RATIO	0.51	0.41	2.23	0.25

Prepared based on data from the Bureau of Agricultural Statistics

For the Caraga region, it is notable that in 2012 there is a difference of 29.69 between the retail and farm gate prices of ampalaya. This means that the price between the farm gate and the retail center is doubled. For eggplant, the price difference is 24.50, which means that the retail price is about 150% more than the farm gate price. This increase may be partially because of losses due to damaged product.

While there is no available data for the cost and margin per player in the value chain, this represents a significant gap between what the farmers actually earn for their produce versus what consumers are willing to pay for their products.

Table 6-7 Comparative Farm Gate & Retail Prices of Representative Pinakbet Vegetables in CARAGA, NM, and Davao Regions 2009-2013

REGIONS	YEAR	FARMGATE PRICES		RETAIL PRICES	
CARAGA		Ampalaya	Eggplant	Ampalaya	Eggplant
	2009	26.3	15.17	52.55	35.55
	2010	25.25	11.14	54.54	33.19
	2011	29.77	20.49	60.68	45.52
	2012	28.94	16.26	58.67	39.07
	2013	30.01	15.76	59.7	40.26
NORTHERN MINDANAO	2009	17.94	12.7	39.95	28.18
	2010	18.33	12.53	38.96	26.41
	2011	24.34	16.09	45.21	32.09
	2012	19.8	12.26	43.92	29.7
	2013	21.53	12.58	47.64	32.8
DAVAO REGION	2009	17.89	9.2	40.67	28.69
	2010	15.78	8.82	39.95	27.08
	2011	21.54	13.05	49.84	36.25
	2012	18.81	9.98	48.77	30.91
	2013	21.27	10.64	50.04	32.53

Source: <http://countrystat.bas.gov.ph>. 2013. Accessed April 2014

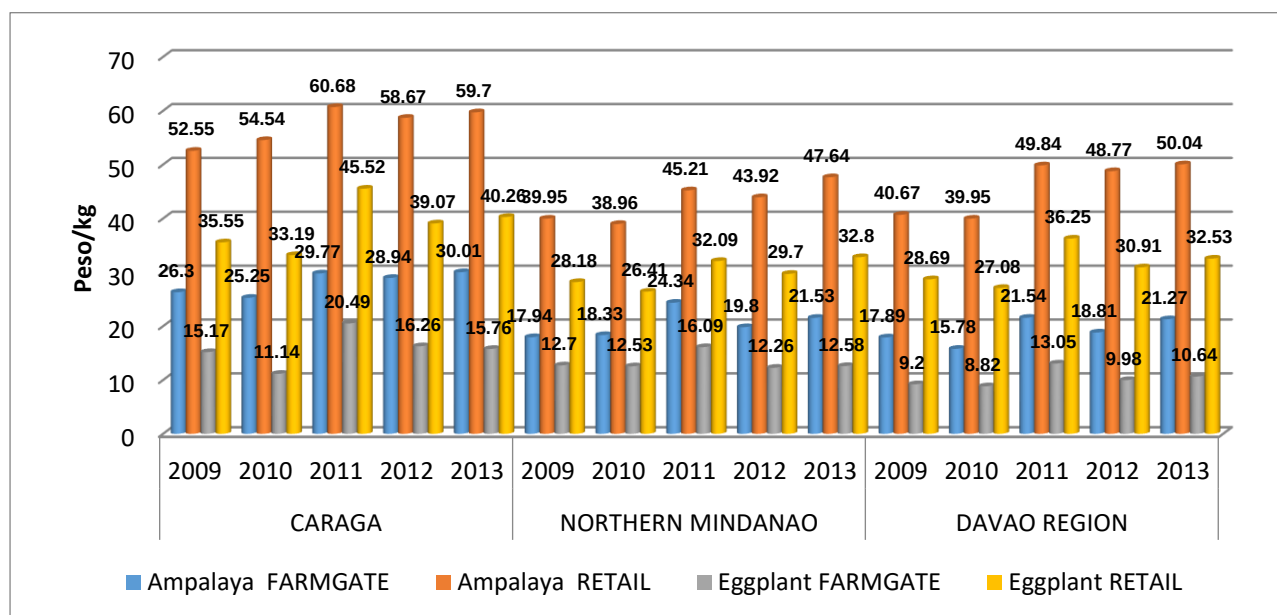


Figure 6-7 Comparative Farm gate& Retail Prices of Representative Pinakbet Vegetables in CARAGA, NM, and Davao Regions 2009-2013

6.8. Other Benefits for Target Farming and Fishing Households

6.8.1. Involvement of women in the value chain

Vegetable production is still an area dominated by males. However, an increasing number of women are now involved in backyard vegetable production. Of special interest is the number of widows in a vegetable association in Bislig. These widows have resorted to backyard vegetable production to support their families.

Women are primarily involved in the retail and trading of fruits and vegetables. In fact, most of the retailers and traders interviewed were women. According to one major female retailer/viajero, fruit and vegetable trading was a means of being financially independent from their husbands.

The labor sector of the supply chain also employs more men. In particular are the “habal-habal” drivers who serve as jamboleros when prices are high and workers in the mango spray contracting business.

6.9. Resource and Industry Governance

Although producers mostly operate individually, some of them joined farmers’ organizations in order to avail of support from the government, especially the Department of Agriculture. These organizations do not usually engage in production, processing and trading as a group, although one exception will be described later.

Producers also exist in competition with suppliers in the Bankerohan bagsakan in Davao City and the Bulua bagsakan in Cagayan de Oro City. This is largely because local vegetable growers cannot be relied upon to supply the minimum contracted volume required by supermarkets and other retail outlets.

The Department of Agriculture – Regional Field Unit (DA-RFU) Caraga and the Department of Trade and Industry (DTI) Caraga recently conducted a Vegetable Farmers’ Market in cooperation with the Butuan City Chamber of Commerce and Industry Foundation, Inc. (BCCCCIFI). During the event, members of the Caraga Vegetable Growers Network (CarVeGrowN) were able to explore the possibility of a regular supply agreement with major retailers such as VROSS Meat shop and Berry Happy Mart in Butuan City. However, this would also entail standard volume and quality of vegetables needed on a daily basis.

Several respondents have also been beneficiaries of previous production-related projects. These beneficiaries identified improvements in production (13.7%), product quality (32.6%), production inputs (62.0%), equipment (32.6%), management (27.4%) and capital (24.21%).

However, the increase in sales rated only 9.7%. This indicates that benefits from the projects cited have not been translated to increase in income of farmer producers. Market-related interventions can therefore be considered positive entry points to optimize project benefits to farmer beneficiaries.

Other aspects that rated poorly were technology (3.16%) and associations (5.26%). These are possible indicators that most of the projects are mere dole-outs, particularly of production inputs. Empowerment and community organization are therefore additional gaps that can be addressed with future projects.

6.10. Summary of Issues for Attention

1. Stakeholders in the vegetable chain supply chain must determine the ultimate consumer's purchase and consumption habits to plan production and marketing strategies better. There is a need for the development of a strong domestic market for vegetables through increase local consumption and better quality management systems to make locally produced vegetables more competitive against imports (from other parts of Mindanao. (www.studymode.com)
2. Hands on training on improved production (e.g. fertilization, irrigation, pruning and bagging and (post-harvest (harvesting, sorting, hot water remedy, packaging and transportation) technologies /practices
3. Insufficient planting materials with high quality, increasing cost of fertilizers and pesticides, needs for standards in farm equipment including labor, inconsistent supply of fruits and vegetables, fragmented production, insufficient marketing systems, inadequate post-harvest and processing facilities and standards inadequate support systems and adverse impact of Climate change in fruit and agricultural industry. (Briones 2013)

7. CARABAO MANGO

7.1. General Industry Overview

Mango is the 3rd most important fruit crop of the country next to banana and pineapple in terms of export volume and value. It has established domestic market and has bright opportunities for the international market (fresh or processed form). The country's export variety, the Carabao, is one of the best varieties in the world. About 73% of the total is planted by small farmers and 24% operates farm sizes 3-9.99 hectares. About 70% of production is consumed locally. Mango industry supports about 2.5M farmers (hvcdp.da.gov.ph).

In 2011, Philippines has an existing production area of 187,073 hectares that has produced a volume of 788,074 MT. Philippines exported volume in 2011 was 21,081 MT for fresh mango worth \$16M million and for dried about 9,464 MT valued at \$79.5M. For fresh mango top major export destination include Hong Kong, Japan, South Korea, Singapore and USA. For dried, top export markets include USA, Japan, Hong Kong, Canada and China (hvcdp.da.gov.ph).

The area (33.83 hectares) and volume (15.5 MT) of mango production in Caraga region in 2010 is rather very low as compared to the other regions in Mindanao. (Table 1a/1b). Average farm size of mango (2 hectares) farms in the region is lesser than in the other regions in Mindanao (>2 hectares) but higher than the regions in Luzon and Visayas. No data is available for the comparative yield of mango trees in different regions.

Table 7-1 Volume of Mango Production, 2009-2012 (in metric tons)

	2009	2010	2011	2012	AAGR (%)
PHILIPPINES	771,441.43	825,676.07	788,073.56	768,234.48	-0.032
MINDANAO	214,536.39	229,447.07	216,373.60	224,280.26	0.031
ZAMBOANGA PENINSULA	57,809.36	74,024.63	78,410.58	80,865.66	0.115
NORTHERN MINDANAO	35,869.17	37,592.67	35,520.63	38,169.19	0.037
DAVAO REGION	37,047.55	33,907.90	29,730.05	31,802.74	-0.031
SOCCKSARGEN	53,654.90	56,263.54	52,329.83	53,404.63	0.032
CARAGA	15,403.60	15,520.49	12,156.18	12,606.56	-0.070
ARMM	14,751.81	12,137.84	8,226.33	7,431.48	-0.094

Source: <http://countrystat.bas.gov.ph/>. 2012. Accessed April 2014

Table 7-2 Area of Mango Production, 2009-2012 (in hectares)

	2009	2010	2011	2012	AAGR (%)
PHILIPPINES	188,139.01	189,436.74	187,072.73	188,616.99	0.003
MINDANAO	76,699.00	76,878.00	75,979.00	76,929.70	0.006
ZAMBOANGA PENINSULA	16,648.00	16,679.00	16,800.00	16,914.00	0.006
NORTHERN MINDANAO	9,598.00	9,597.00	8,751.00	8,742.00	0.005
DAVAO REGION	17,973.00	17,982.00	17,761.00	18,043.00	-0.001
SOCCKSARGEN	16,736.00	16,727.00	16,897.50	16,815.00	0.001
CARAGA	3,382.00	3,383.00	3,257.00	3,454.00	0.006
ARMM	12,362.00	12,510.00	12,512.50	12,961.70	0.029

Source: <http://countrystat.bas.gov.ph/>. 2012. Accessed April 2014

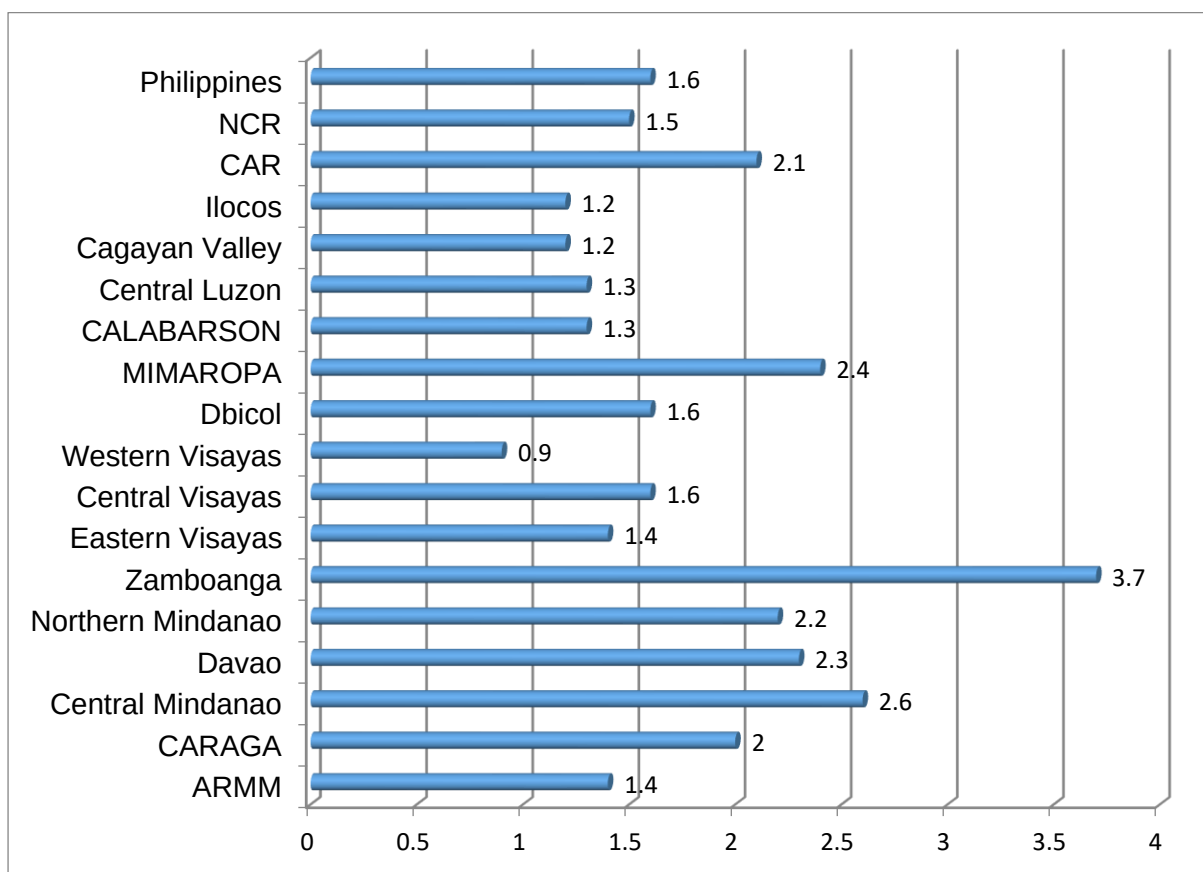


Figure 7-1 Average Farm Size of Mango Farms by Region, 2002. (in hectares)

Source: Census of Agriculture and Fisheries (NSO)

7.2. Overview of Value Chain

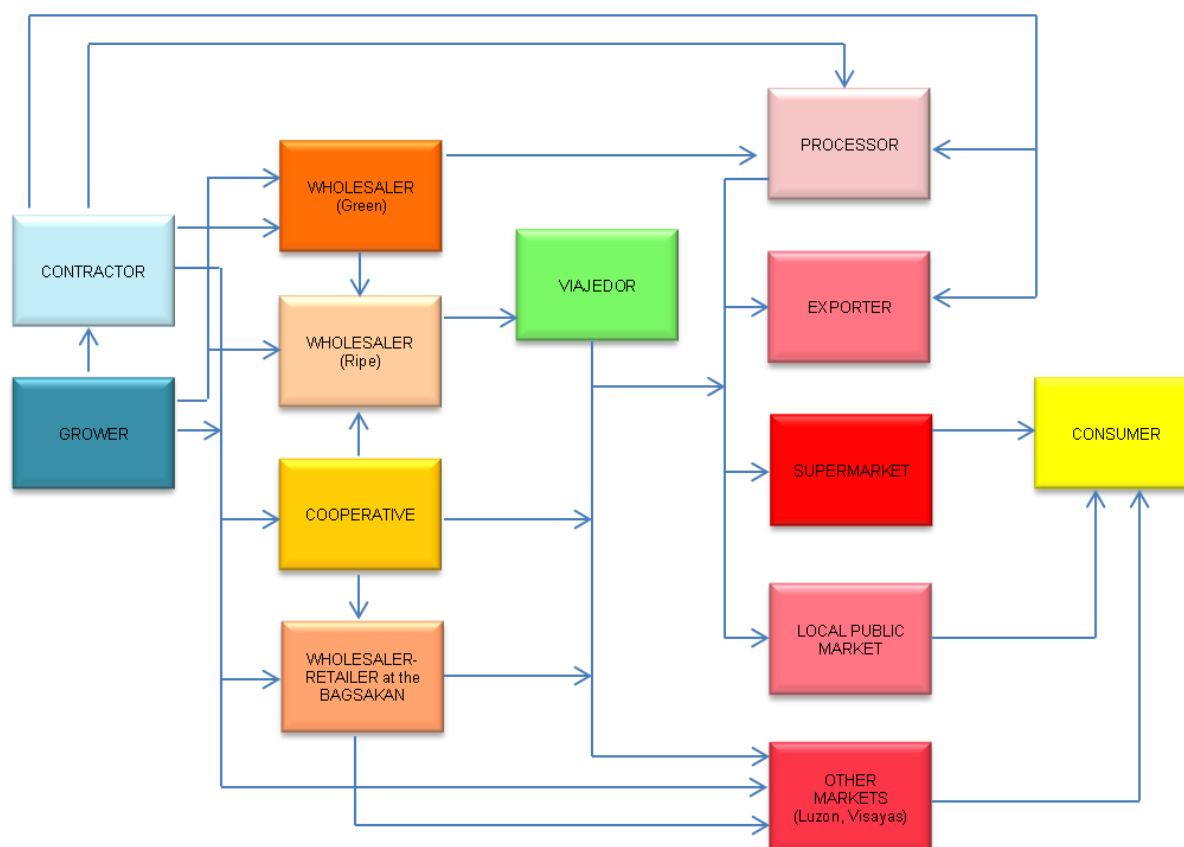


Figure 7-2 General Mango Supply Flow in Caraga region

Carabao mango supply chain is characterized by low productivity and quality of fruits at harvest and along distribution channels. The average actual harvest was 50-75% lower than the average potential harvests of 75-100 kg/tree 12-15 years of age. Fruit quality often deteriorates after harvest in more than half of the fruits. Specifically, 50-68% of the total harvest was afflicted by scab insect damage, wind scars and latex burn. Quality further deteriorated along the supply chain due to poor handling and postharvest diseases. (ACIAR)

The supply chain for mango has been characterized by production-marketing arrangements between growers and sprayers-contractors who also act as traders. Mangoes are sold to wholesale markets, processors, wet retail markets, supermarkets, and exporters. The major cities such as Manila, Cebu, and Davao City are the key trading centers for mangoes that are sold in the local market. In the BueNasCar area the grower-contractor arrangement is the preferred arrangement since it's the spray contractors who have the contacts of Cebu and Manila based processors and exporters.

Farmer's organizations are still weak. Contractor/Flower Inducer have greater influence on marketing contacts than the organization itself. Officers are also one of those who are directly involved in the trading of mango within the area or have control over large number of fruit bearing mango trees. Major sprayer contractors time their flower induction activities so as harvesting coincides with a festival in Hong Kong to ensure premium price for their mango. A processing company from Cebu & Dy Agri Corporation are directly managing leased lands where they are inducing trees to flower eve twice a year to ensure additional volume for their processing plant. The Local Government Unit of Carmen has initiated a small scale mango processing plant. However, processing is hampered by low and irregular supply of raw mangoes.

The Major production areas in the region are Buena Vista, Nasipit and Carmen (BueNasCar) due to prevalence of a distinct dry season. The rest of the Caraga region particularly Agusan Sur and Surigao Sur have the “wet and very wet” type of Climate. The bulk of production from the Buenascar area are contracted and shipped to Cebu or Manila. The remaining volume is traded in the wet market but often times sold as “Davao” mango. Most of carabao mango traded in Agusan del Sur and Surigao del Sur are sourced out by local viajeros from the Bangkerohan bagsakan in Davao.

At most only 32.0% of mango farmers are using improved techniques.

Table 7-3 Farmers Cultivating Mango under Improved Techniques

IMPROVED TECHNIQUES	% OF MANGO FARMERS PRACTICING
Flower Induction	22.7%
Bag and Wrap	32.0%
Bamboo Propping	10.2%
Pruning	16.4%
Desuckering	N.A.
Ripening Induction	7.0%
Cold Storage	0.8%

Source: HH Baseline Survey

7.3. Market Preference/ Export Market requirements

Mangoes being exported to Japan and Korea are being graded and classified according to the following export standard:

1. It must be fully matured (110-125 days from flower induction)
2. Free from defective quality and well clean and properly trimmed
3. Maximum Of 5% on surface area for latex burn
4. No physical and mechanical defects
5. Free from pest disease (insect/worm damaged)
6. Purely Philippine variety of typical shape

Table 7-4 Sizing and Grading of Mangoes

SIZE	WEIGHT/PIECE
Super Small (SS)	150-199 grams/piece
Small (S)	200-249 grams/piece
Medium (M)	250-299 grams/piece
Extra Large (XL)	370 grams and up

Table 7-5 Size classification of carabao mango

SIZE	SUPER SMALL	SMALL	MEDIUM	LARGE	EXTRA LARGE
Label	A	S	M	L	XL
Mass in Grams	160-200	201-240	241-300	301-360	361 and above
Net wt. In Kgs/Box	12	12	12	12	12
Number of pieces per box	64-72	56-60	48	36	32

The Japanese government has specified a protocol for the control of fruit fly and imposed conditions before Philippine mangoes are allowed entry to Japan. The fruits should be subjected to vapor heat treatment (VHT), packed in cartons in an enclosed packaging area, and inspected before shipment by personnel from the Japanese Ministry of Agriculture, Fisheries and Forestry (MAFF). The salary, transportation and accommodation of these quarantine officers are shouldered by the exporters.

7.4. Cost and Margin

Many of the carabao mango trees in the BueNasCar area are already at full bearing stage (more than 8 years old). Therefore the cost of seedlings is no longer a major factor in mango production. The quality and genetics of planting material used is however is still very critical. During the focus group discussion, growers shared that they used grafted mangoes either from Guimaras, established nurseries in Davao or local growers who were the first to establish their carabao mango plantings in the region.

Cost of production and percentage share for mango are presented in Table 7-6. Pesticide (16%) and fertilizers (15%) are the major cost drivers for mango sharing. Labor is employed from planting to harvesting which accounts for 15% for mango production cost. A supply chain assessment study conducted in 2007 showed a return of investment of 134.84 and for mango.

Table 7-6 Cost of Production and Percentage Share of Cost for Mango, 2007 (In Peso or Percent)

ITEM	MANGO	% SHARE
Cost of Production		
Planting Materials		
Fertilizer	8,382.00	16.03
Pesticide	8,009.00	15.41
Hired Labor	8,060.00	15.51
Operator and Family Labor	4,013.00	7.72
Depreciation	7,292.00	14.03
Interest on operating capital	3,912.00	7.53
Repair and Maintenance	1,084.00	2.09
Rental Expenses	1,489.00	2.87
Interest on crop loan	774.00	1.49
Transportation costs	1,249.00	2.40
Miscellaneous Expense	7,694.00	14.81
Total Cost of Production	51,958.00	100.00
Gross Income	122,020.05	
Net Income	70,062.05	
ROI	134.84	
Cost per kilogram (P)	9.35	
Farm gate price (peso/kg)	21.95	
Yield/hectare (Kg)	5,559.00	

Source: A Supply Chain Assessment of the Philippine Fruits Industry: Towards Sustained Profitability, Improved Productivity and Pro-active Response to the Impact of Climate Change

8. “Saba/Cardava” BANANA

8.1. General Industry Overview

Philippines is 3rd largest banana exporter in the world and dominates most Asian Markets. In 2010, the Banana Industry export revenues were worth US\$250M which generated 200,000 jobs to maintain an estimated 60,000 hectares of banana plantings. (Asian Fruit Congress 2010). The fresh banana industry is dominated by big players with Dole as the top banana exporter from the Philippines followed by Del Monte, Chiquita Unifrutti, Sumitomo and Lapanday (Asian Fruit Congress 2010).

One of the most important bananas in the Philippines is saba or cardava. These fruits provide the same nutritional value as potatoes. They can be eaten raw or cooked into various traditional Filipino desserts and dishes like maruya, turon, halo-halo and ginangang. This variety is being promoted as an alternative staple in the Philippines and processed banana has been promoted as a prime export commodity as a healthy snack food. Saba banana ranks second to cavendish in terms of area and volume of production.

Most banana farmers in the area are not aware of the agribusiness potential of saba/cardava banana. For them it is just an alternative food staple. Most of the banana plantings are rarely fertilized, poorly maintained or prone to pests.

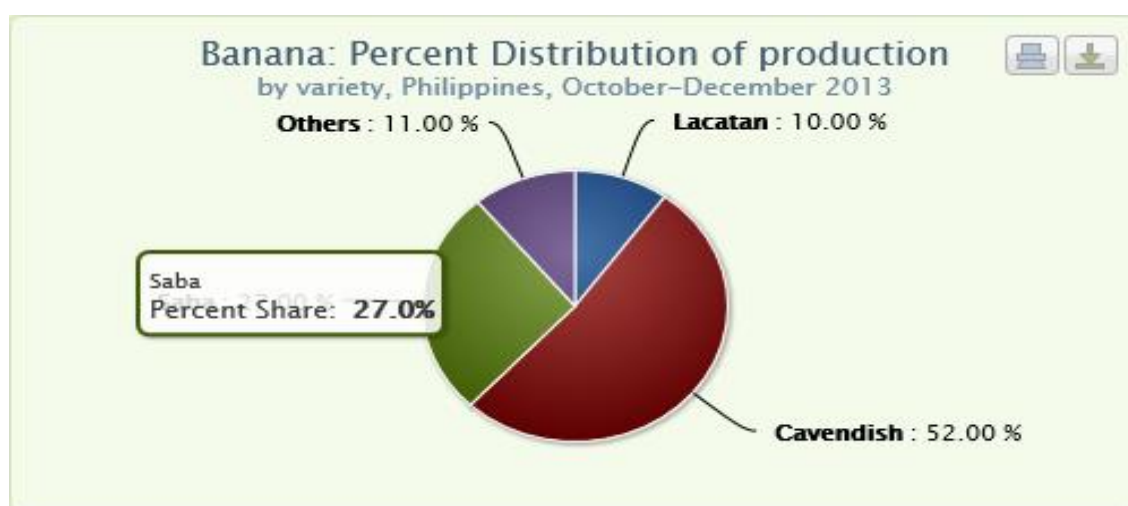


Figure 8-1 Percent distribution of Production the Major Varieties of Bananas in the Philippines

Both local and domestic markets consume a wide variety of banana based products. Philippine banana products for export include fresh cavendish, saba banana chips, frozen saba which is microwavable, banana flour, banana plain paper sheet, banana fiber, banana powder, banana puree and banana syrup. Vacuum fried bananas are also another product being explored for exportation (DTI 2013).

Global snack food market is forecasted to reach US\$380 billion by the year 2017. Banana chips from saba banana can be considered a substitute for potato chips.

The Philippines is the only producer of the saba or cardava variety of banana around the world. As such, the country is emerging as a major producer of world class banana chips reaching \$50 million in 2011. Philippine banana chips are exported to USA, Japan, UK, Germany, Australia, South Korea, China, Vietnam, Russia and former eastern bloc countries

(www.da.gov.ph). Volume of production dipped from 2008 to 2010 and had a slight increase in 2011. The value for the products also increased by as much as 25% (\$40 to \$50M) (Table 8-1).

Table 8-1 Volume and Value of Banana Chip Exports

	2007	2008	2009	2010	2011
Quantity (MT)	32993	33398	30437	28085	30142
F.O.B. USD Value in Thousand	40725	49126	38350	40274	50575

Source: BAS

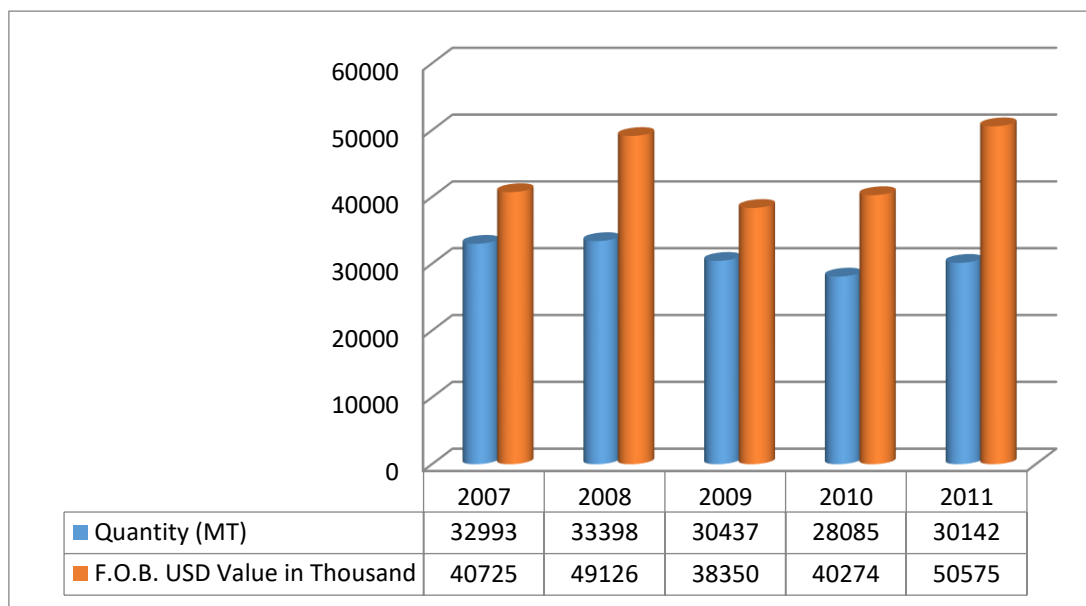


Figure 8-2 Volume and Value of Banana Chip Exports, 2007-2011

Source: BAS

As of 2012, there are 35 local manufacturers of Banana Chips registered with DTI nationwide (Table 6). Celebes Agricultural Corporation is the major banana chip manufacturer located in Agusan Del Norte. However, it markets its products mostly to Manila. Aside from Celebes, there are also other small scale, one-town-one-product or RIC-based banana chip producers scattered all over the banana saba growing areas in the region.

Table 8-2 Number of Local Manufacturers of Banana Chips

AREAS	NO. OF MANUFACTURERS
Luzon	6
Visayas (Cebu)	4
Mindanao	25
Davao Region	21
Other Regions	2
Grand Total	35

Source: DTI 2012

Total volume of saba banana production in the Caraga region is relatively low. The region's average yield of 7Mt/ha/yr yield is much lower compared to that of other regions (12-16 tons). Nevertheless, Banana chip production is still included as a priority industry cluster for the Caraga region.

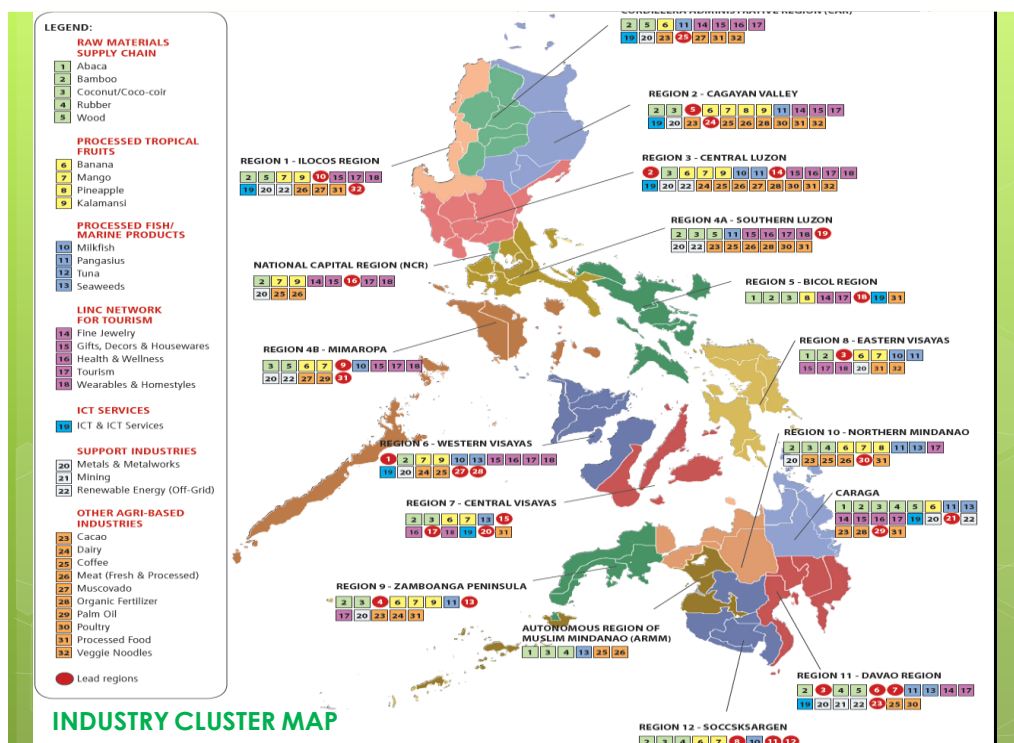


Figure 8-3 Industry Cluster for Convergence

8.2. Overview of Value Chain

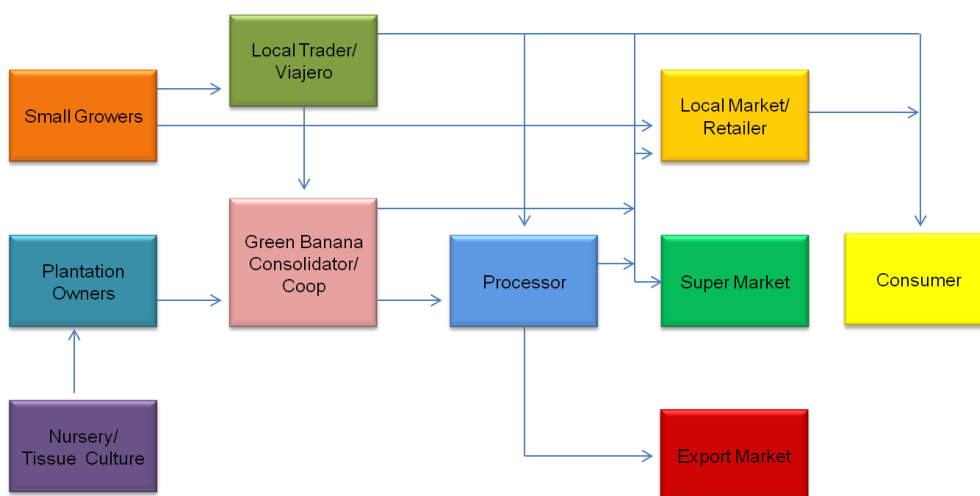


Figure 8-4 General Banana Supply Flow in Caraga (KII)

There is a great variation of the supply flow of saba banana between and among locations within the region depending upon the proximity of the farms to urban/peri-urban centers, presence of small scale banana chips producers and the current relationship of local cooperatives or associations with the major Banana Chips Processor in the region.

Productivity of banana in the Caraga region is relatively low. Production in a number of areas especially in Southern Caraga were adversely affected by typhoon Sendong and Pablo. During an interview with a manager of a local company who is into diversified farming and started to invest in a 20 hectare banana project, he mentioned that “Typhon Sendong flattened their saging (banana) and Typhon Pablo swept them off the ground.”

At most only 32.8% of banana farmers are using improved techniques.

Table 8-3 Farmers Cultivating Banana under Improved Techniques

IMPROVED TECHNIQUES		% OF BANANA FARMERS PRACTICING
Flower Induction		N.A.
Bag and Wrap		17.4%
Bamboo Propping		16.2%
Pruning		32.8%
De-suckering		20.6%
Ripening Induction		9.0%
Cold Storage		0.6%

Source: HH Baseline Survey

Table 8-4 Sector profile of Banana Chips Production

	NUMBER OF ENTERPRISES	EMPLOYMENT
Trading	58	152
Processing 2 nd fry	75	356
Semi processing 1 st fry	42	184
Trading consolidation	14	270
Production	1,548	14,352
Inputs	1 research station; 74 registered fertilizers/ pesticide dealers; 5 laboratories for tissue culture	

Source: MASICAP Study, 2012

8.3. Cost and Margin

Planting materials are major cost drivers in the production of fruits. Many fruit seedlings are provided from BPI crop station with subsidized price to ordinary farmers. Accredited nurseries are also suppliers of seedlings to the farmers. Multinational companies produce seedlings by themselves through modernized laboratories without contamination of virus or diseases.

Planting material for saba banana account to 38% of production cost. Fertilizers and pesticides (increasing trend in prices due to oil price increases and increasing costs of raw material component) – major cost drivers reach up to 55% for banana; for saba banana organic fertilizer (19%) and inorganic fertilizers (15%) of production cost. Pesticide (16%) and fertilizers (15%) are the major cost drivers for mango sharing. Labor is employed from planting to harvesting which accounts for 23% for cardava banana; 15% for mango production cost. A supply chain assessment study conducted in 2007 showed a return of investment of 134.84 and 192 for mango and cardava banana, respectively.

Table 8-5 Cost of Production and Percentage Share of Cost for 2007 Banana(In Peso)

ITEM	BANANA	% SHARE
Cost of Production		
Planting materials	17,600.00	38.18
Fertilizer	15,640.00	33.93
Pesticide		
Hired Labor	10,400.00	22.56
Operator and Family Labor		
Depreciation		
Interest on operating capital		
Repair and Maintenance		
Rental Expenses	1,200.00	2.60
Interest on crop loan		
Transportation costs		
Miscellaneous Expense	1,260.00	2.73
Total Cost of Production	46,100.00	100.00
Gross Income	134,750.00	
Net Income	88,650.00	
ROI	192.30	
Cost per kilogram (P)	1.20	
Farm gate price (peso/kg)	3.50	
Yield/hectare (Kg)	38,500.00	

Source: A Supply Chain Assessment of the Philippine Fruits Industry: Towards Sustained Profitability, Improved Productivity and Pro-active Response to the Impact of Climate Change

Farm gate prices for Caraga bananas are lower than those in Northern Mindanao and Davao. The bulk of the difference between farm gate and retail prices in Caraga is due to high labor and transportation costs.

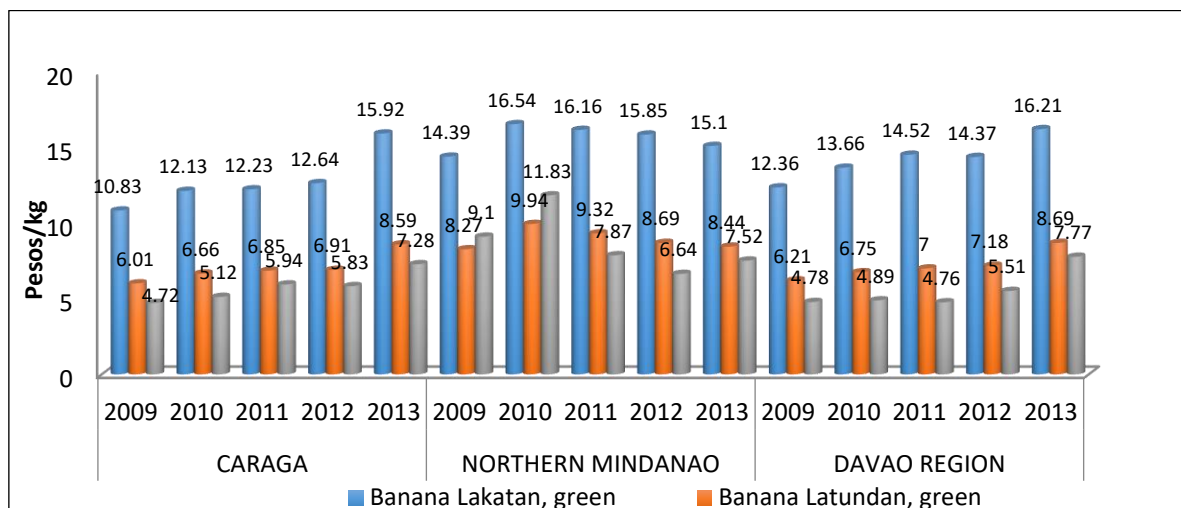


Figure 8-5 Five Year Comparative Farm gate Prices of 3 Banana Varieties in CARAGA, Northern Mindanao, and Davao Regions

Source: <http://countrystat.bas.gov.ph>. 2012. Accessed April 2014

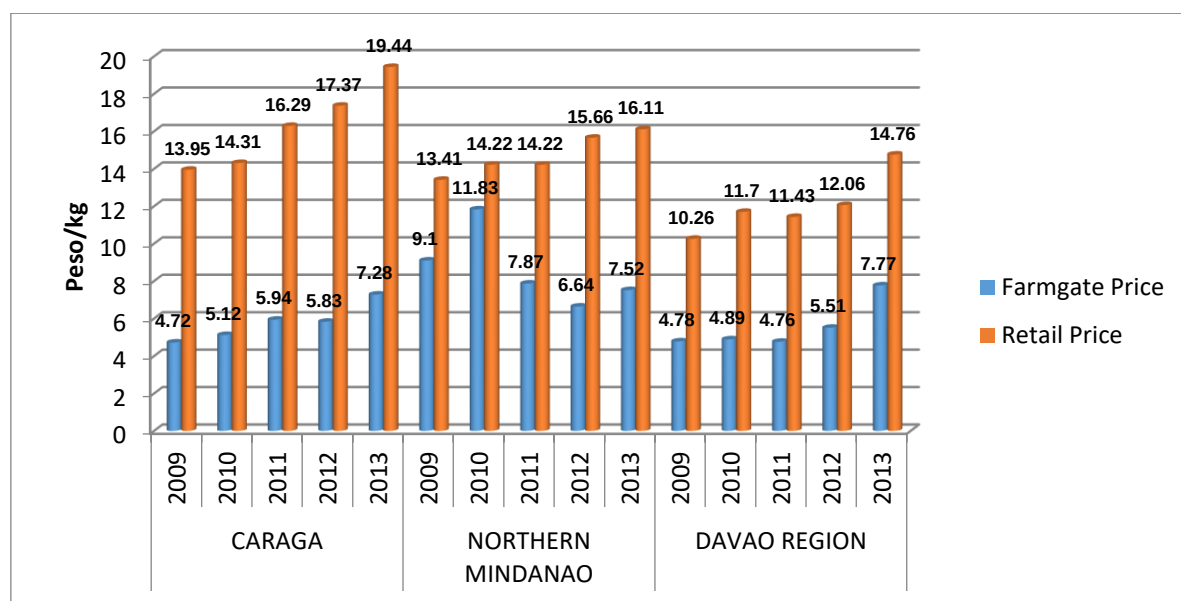


Figure 8-6 Comparative Farm gate and Retail Prices of Saba Banana in CARAGA, NM, and Davao Regions 2009-2013 (Pesos/kg)

Source: <http://countrystat.bas.gov.ph>. 2013. Accessed April 2014

There is an increasing trend for both farm gate and retail prices for cardava banana in between 2009-2012. Farm gate prices in Caraga are lower than in NorMin and Davao region. Paradoxically, retail prices are higher in Caraga than in both regions.

During an interview, farmers even described an incident where the absence of the banana giant Celebes allowed them sell bananas directly to the consumer and therefore to get more for their produce.

8.4. Other Benefits for Target Farming and Fishing Households

Involvement of Indigenous People

A DA-DENR convergence project has supported the Mulanhan- Balatakan-Langanglang Watershed Association in the promotion of an Agroforestry project. This project aimed for the conservation and protection of the said watershed. At the same time it was an alternative means of livelihood for tribal people. One tribal leader who was interviewed is now tilling a 2 hectare banana farm with a modest weekly sale of P600-700 per week. Issues encountered include transportation, which is only through trisikad, and the perennial problem of “bugtok” disease.

A number of farmer cooperatives have raised processor delinquency, particularly that of Celebes, as a problem. Another potential market is the export market. However, the demand is primarily for organically certified products which can be sold at a premium. The recipients were discouraged by the many obstacles in getting organic certification.

8.5. Resource and Industry Governance

To further strengthen the Banana Industry Cluster in the region, the Caraga Roadmap on Banana was drafted. However, during the recent KII conducted with banana growers, Celebes Corp no longer had contacts with the banana farmer associations in Bislig, Surigao Sur and Trento, Agusan Sur. Contracted growers in Placer shared that the Corporation had been delinquent in picking up agreed volume. These were also confirmed by LGU based DA personnel in charge of assisting these banana growers. No representatives from Celebes Corporation were available for a KII.

Table 8-6 Celebes –DA XIII – LGU – Cooperatives Cardava – Expansion Project

LOCATION	HECTARES OF EXPANSION
La Paz, Agusan Del Sur	300
Bunawan, Agusan del Sur	50
Bislig, Surigao Del Sur	112
Las Nieves, Agusan del Norte	20
Loreto, Agusan del Sur	51
Trento, Agusan del Sur	50
San Luis/Talacogon	On going

Source: Caraga Banana Roadmap (2010)

The five year development plan for Banana chips in 2012 covering CY 2012-2016. The recommended plan of action and the corresponding responsible agencies to address the major constraints in the supply chain of banana chips is summarized in table

Table 8-7 Five Year Development plan for Banana Chips Strategic Plan

CONSTRAINTS	RECOMMENDATIONS	RESPONSIBLE AGENCIES
Unpredictable Supply of Banana Cardava	Promotion of “plant now, pay later” plan Develop potential areas for banana cultivation Provision of Appropriate support services and facilities Strengthen research and development on production, post-harvest and processing	LGU, Funding Institution, DA, Farmers

	Improvement of cultural management practices	
Weak Organization of Growers	Capacity building through private business providers, trainings, dialogues Strengthening, membership in the banana industry cluster	DA, DOLE, CDA, LGU and Growers
Unorganized Processors	FDG, Meetings, Strategic planning Organization and institutionalization of banana/exporters, membership in the banana industry cluster	DTI, DA, LGU and Processors

Financial allocations for the implementation of the support programs for the Agricultural sector are specified in DA HVCDP FY2015 Modified Agency Performance Measure. For Caraga Region, DA RFU 13 had appropriations for the following:

- a. 10 Greenhouse, 25 nursery, 11 seed storage, 336 Gulayansa Paaralan /School Garden. Maintenance of 5 tissue culture laboratory
- b. Community based processing facility – one banana chips processing facility and one Vegetable processing facility - veggie juice
- c. Provision and distribution of 30000 Banana planting materials and 62500 saba banana (alternative staple food)
- d. 400 bags flower inducer
- e. VCA on Banana
- f. Monitoring of vegetable pests and mango pulp weevil

These issues had been repeatedly discussed in a number of venues including the yearly National or Regional Industry Congresses (separate congresses for Mango, Banana and Vegetable Industry Clusters). Although financial support has been allocated to support the private sector to develop the High Value Crop Sector, this amount pales in comparison to the allocations of basic staples such as rice and corn.

8.6. Summary of Issues for Attention

Provision of adequate infrastructure and support systems:

1. BAFPS's accreditation of other agencies (DOST), SUCs and private laboratories in the country to improve access to analytical laboratories for pesticide residue and other tests
2. Establishment of strategically located and well-equipped packinghouse that can be accessed by growers and association or cluster of mango growers (SEARCA, Lantican)
3. For the post harvest subsector :
Lack of collection centers or packing houses where preparatory activities such as sorting, trimming, delatexing, disinfection of newly harvested fruits or HWT for disease control, air drying, sizing and grading are done.
4. For the Marketing and trade sub sector :
 - a. Limited supply of quality mangoes for trading in the domestic market (supermarkets, hotels and high end restaurants and export market.
 - b. Stringent quality and safety standards set by importing countries: Japan has tightened its quarantine requirements for Philippines fresh mangoes as residue from synthetic chemicals has become their priority

5. Supply chain inefficiencies of Saba are caused by the prevalence of diseases (BBTV-Bugtok) due to poor cultural management practices of banana farmers and poor marketing practices. To manage these inefficiencies the following should be adopted:
 - a. Establishment of a standard measurement and classification system
 - b. Organize farmers into clusters
 - c. Conduct of trainings and seminars on disease eradication and prevention (www.ejournals.ph)

9. POULTRY AND EGGS

9.1. General Overview

9.1.1. The national and international markets

The Philippine Bureau of Agricultural Research considers chicken broiler and egg production “the most progressive animal enterprises in the Philippines today” (Bureau of Agricultural Research, 2012). This is echoed in a research conducted by Hui-Shung Chang for the University of England on the “Future prospects for smaller Philippine poultry producers: ducks and native chickens” describes the world livestock and poultry market as “highly competitive”. Chang says that, “An important policy question for the policy makers is how to balance the need for developing the country’s own industry and the need to provide cheap and high-quality products to the domestic market”

Chang then says that “That the Philippine broiler industry is less competitive implies that it will face increasing threats from global competition and cheaper imports.” He says that decision makers will have to integrate “backward to produce its own breeding stocks” and “forward into further processing and retailing.”

However, he does identify one advantage of the Philippine poultry industry: it has not been affected by Avian Influenza outbreaks. This, he says, is a marketing advantage at least in the short term that the country can maintain through strict implementation of biosecurity measures.

Despite the challenges that Chang presented, the Philippine poultry subsector has experienced small growths. According to the Bureau of Agricultural Statistics Report on the Performance of Philippine Agriculture from January-December 2013, the poultry subsector produced 4.20% more output than last year, with a 14.76% share in total agricultural production. Chicken, in particular, was the major source of growth, gaining 5.01% during the year and increasing gross earnings by 4.86%. The subsector’s gross value of output at current prices was 174.2 billion, which is up by 4.31% from last year’s records.

This positive growth was attributed to “increased demand from institutional buyers like Mang Inasal for roasted chicken in urban areas in Ilocos Region, Cagayan Valley, Central Luzon and Bicol Region.” In addition, the prices of chicken eggs also went up by 0.53% due to “growing demand from establishments such as bakeries.”

From the level of the farmer, the Bureau of Agricultural Statistics also state that farm gate prices went up by 2.33% during the reference period, and prices in the poultry subsector increased by an average of 0.10%.

Even Chang’s research confirms that the “future outlook is positive for the Philippine Livestock and Poultry industry because the demand for its products can be expected to grow, given the current low level of per capita consumption and the anticipated growth in population and household income. However, given that the Philippine livestock and poultry sector is relatively uncompetitive because of higher input costs, below-par on-farm productivity, and inefficient marketing system, the threat of foreign competition is real and imminent. To survive and grow, the Philippine livestock and poultry industry must strive not only for greater efficiency in production and marketing, but also enhanced product development to meet changing market demand.”

9.1.2. The poultry subsector in CARAGA

Overview of chicken varieties

In order to understand the local market for poultry, it is first necessary to briefly discuss the chicken varieties available. In this report, there are three that are of particular interest: (1) indigenous/native chickens, (2) upgraded chickens, which are generally hybrids of native chickens and commercial varieties, and (3) broiler chickens, which is the common commercial variety.

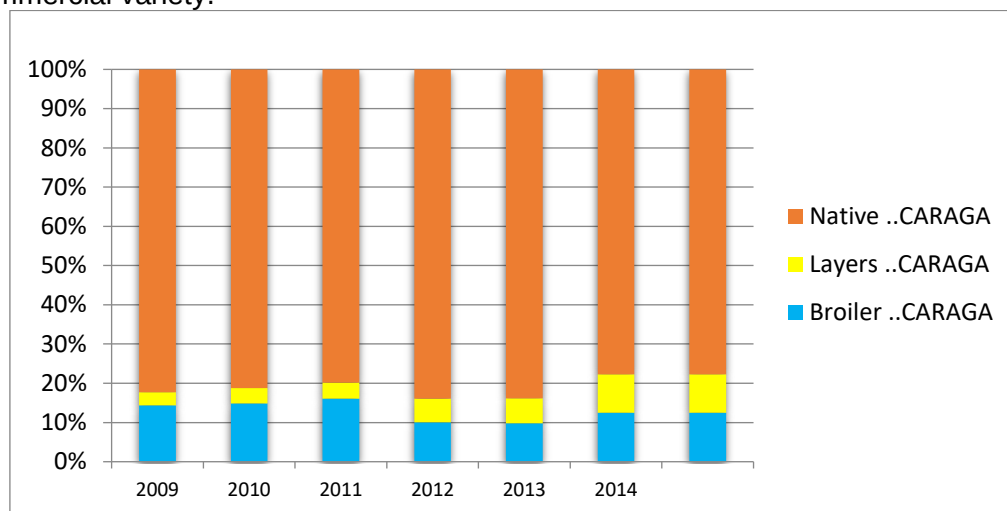


Figure 9-1 Percentage of Poultry Inventory in CARAGA Region

Based on the survey conducted by the researcher in CARAGA, “native” and “upgraded” varieties account for 93.3% of the 268 households who raise chickens. These are mainly kept by farmers and backyard growers for subsistence, celebrations, or to serve to guests. Since they never leave the farm in which they were raised, most of these chickens never enter the value chain. These usually free-range chickens are left to scavenge for insects, green leaves and minerals, and are also given kitchen scraps.

Table 9-1 Breeds owned by smallholder households

TYPE OF CHICKEN	No. of HOUSEHOLD			PERCENTAGE
	CHICKEN	LAYER	TOTAL	
Native	233	78	311	86.6%
Upgraded	15	9	24	6.7%
Hybrid (Broiler)	20	4	24	6.7%
Total	268	91	359	100%

However, broilers were raised by only 7.5% of the households raised broilers for meat and eggs. The farmers interviewed said that the main hindrance to engaging in commercial chicken production are the costs required to start up the venture. Feeds, in particular, were said to be particularly costly. In addition, the profit margin is not that high and if the farm is poorly managed, chick mortality increases. The interviewed farmers from all five provinces said that they preferred to raise layers instead.

Another important factor that discourages broiler production is the local consumer preference for native, or at least organically-raised, chicken. Shortages in supply of broiler chickens in the market encourage the active production of native chickens especially in remote barangays.

Despite this, broiler production has gained popularity in CARAGA over the years. Big food chains such as Jollibee, Mang Inasal and McDonald's maintain regular stocks of chicken primarily for urban markets. Another niche for broiler farmers are local and urban tourist hotels in Butuan and Surigao City.

Egg production is also promising. The supply and demand gap, until now, remains high. The profit margin is quite attractive for households that wish to gain additional income from their farms.

The following figures describe the inventory by type for the region in the past 5 years:

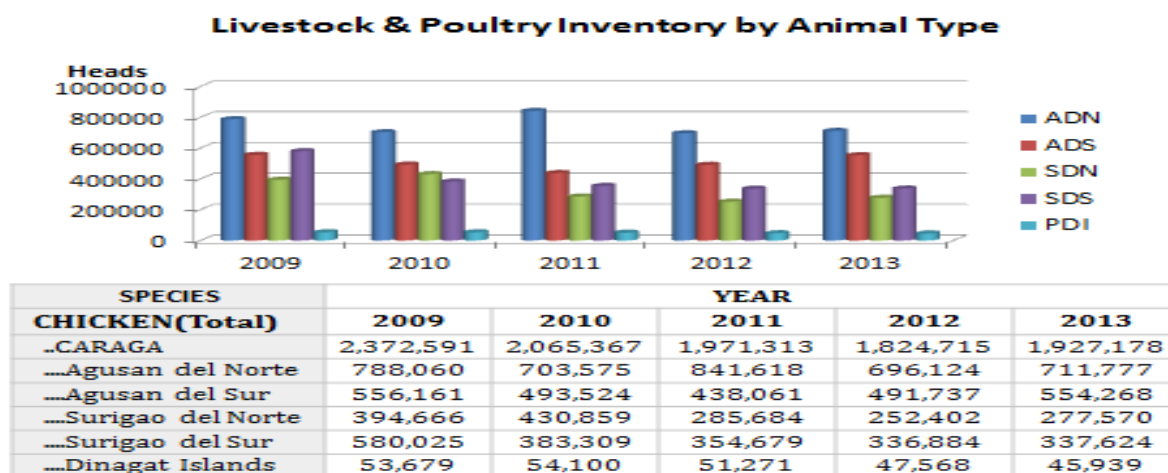


Figure 9-2 Total chicken inventory - CARAGA

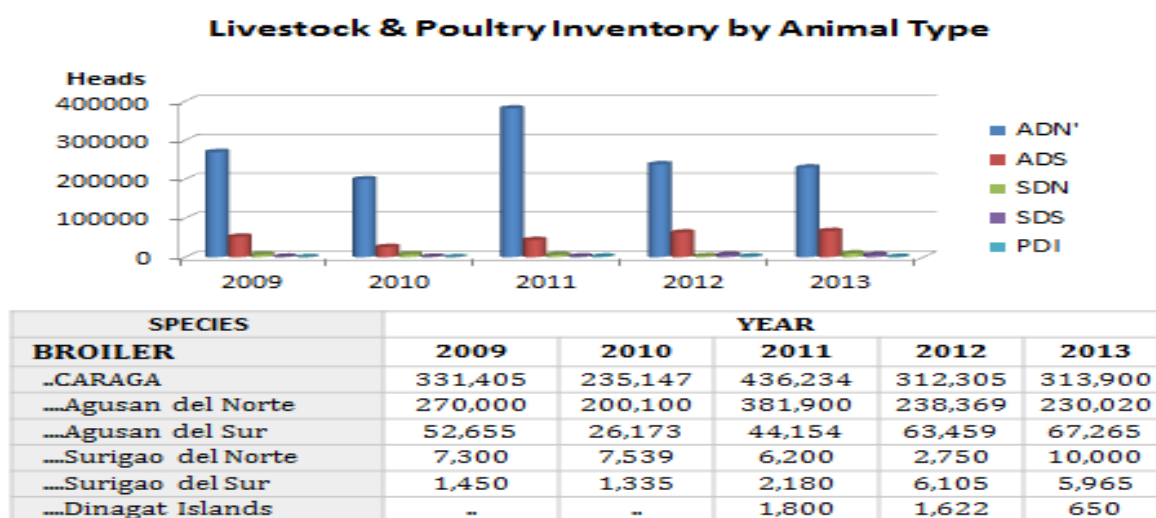


Figure 9-3 Broiler chicken inventory – CARAGA

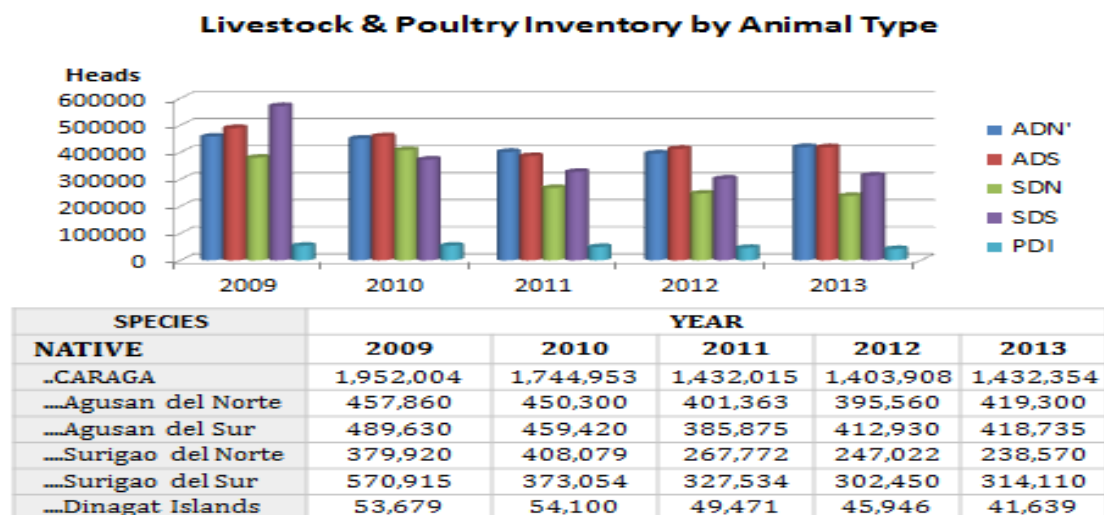


Figure 9-4 Native chicken inventory - CARAGA

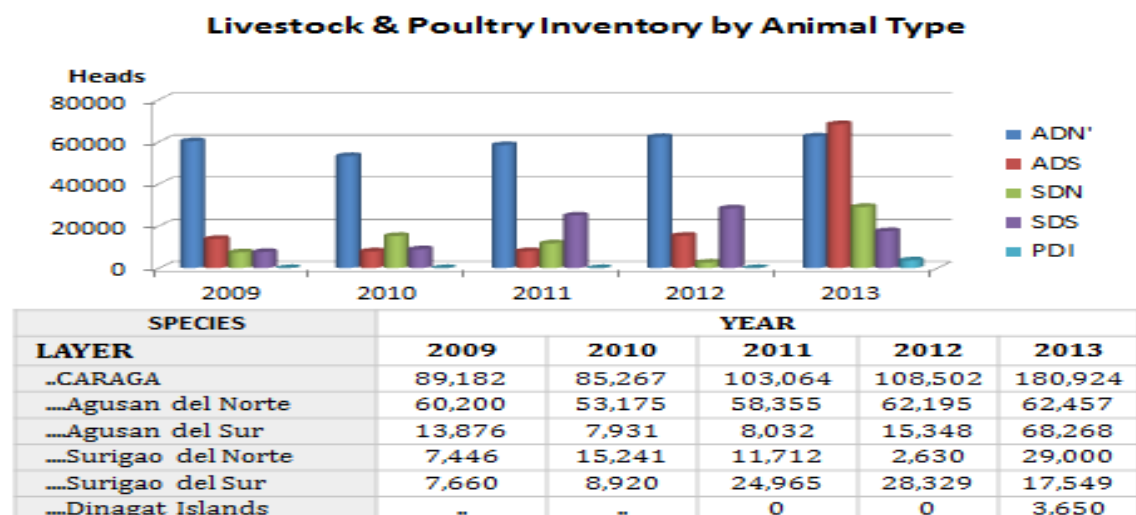


Figure 9-5 Layer chicken inventory - CARAGA

Systems of commercial chicken production

Two systems of commercial poultry production in CARAGA are contract growing and independent production. Under the former, farmers regularly sell a fixed amount of poultry to a major integrator such as San Miguel Corporation, which then takes up most of the value chain. For the latter, independent producers of chicken and eggs for the local market may sell them directly or indirectly to neighbors, local groceries, meat shops, public wet markets and organized food terminals or auction centers known as “tabo”. This will be discussed in further detail in the overview of value chains.

Local overview

In the past five years, there have been no remarkable changes in the growth of broiler production in CARAGA. Based on data gathered during this research, chicken production is still dominated by those raising native or backyard chickens. In the past 3-5 years, there has been no major infusion in the production of broilers. Total broiler inventory between the years

2010 to 2011 has increased by 54% while between 2011-2012 it had decreased by 28%. Between 2012 and 2013, there was only a very slight increase to 0.5%.

This is considerably limited compared to those in the regions of Davao and Northern Mindanao. Only the San Miguel Corporation has large broiler production operations with an estimated volume capacity of 350,000 birds. Another emerging agri-business integrator in the region is the Agusan del Sur-based VPRO farm, which has three meat shop outlets across the province. They operate on an integrated agri-business model involving hog, broiler and layer egg production using their own facilities. These include breeder farms, hatcheries, dressing plants, slaughter houses, cold chain facilities and a feed mill. In Butuan City, there is also another commercial hog production with an in-house commercial feed mill.

However, the volume of eggs produced increased in 2013 by about 66.7% compared to that in 2012. Notable is the 305% increase in volume by producers in the province of Agusan del Sur. Interviews with KII (Mr. Rey Paniza and Joel Benedicto, General Manager VPO Farm) revealed that that Agusan del Norte and Agusan del Sur particularly in the areas of Prosperidad, Rosario and Bayugan are very suitable for the production of layer eggs due to the favorable climate and good farm-to-market road.

Suppliers of feeds, stocks, medicines, vaccines and equipment in the region also play a big role in the industry, setting standards in agri-business that increase farm productivity. These technologies and systems, used primarily by commercial farms, are also shared to smallholders through sales representatives and technicians of their products. These companies tend to be more aggressive than the assigned government agencies on the promotion and upgrading of the knowledge, skills and attitude of smallholders improving the efficiency of poultry production. Hence, small farmers also have access to the best practices and updated technologies of agribusiness in poultry.

With this, the growth and sustainability of the livestock and poultry industry should start with transforming smallholder producers into entrepreneurs with successful and sustainable businesses.

Government, non-government and private organizations could help facilitate the strengthening of smallholders and allowing them to play a big role in the entire value chain of agri-enterprise.

It is a challenge for smallholders and these value chain facilitators alike to seek innovative solutions to the current challenges of the industry such as: high feed cost, high logistical cost, unstable prices of agri-products, and lack of access to financing for daily operation and expansion, climatic and atmospheric irregularity and other cost drivers.

The KII shared that the key to growth and sustainability is cost efficient production that has consistently high quality. In the same FGD, the respondents also shared that a common concern in maintaining this high quality are the inputs, particularly the feeds which can be expensive.

9.2. Overview of Value Chain

9.2.1. Commercial broilers

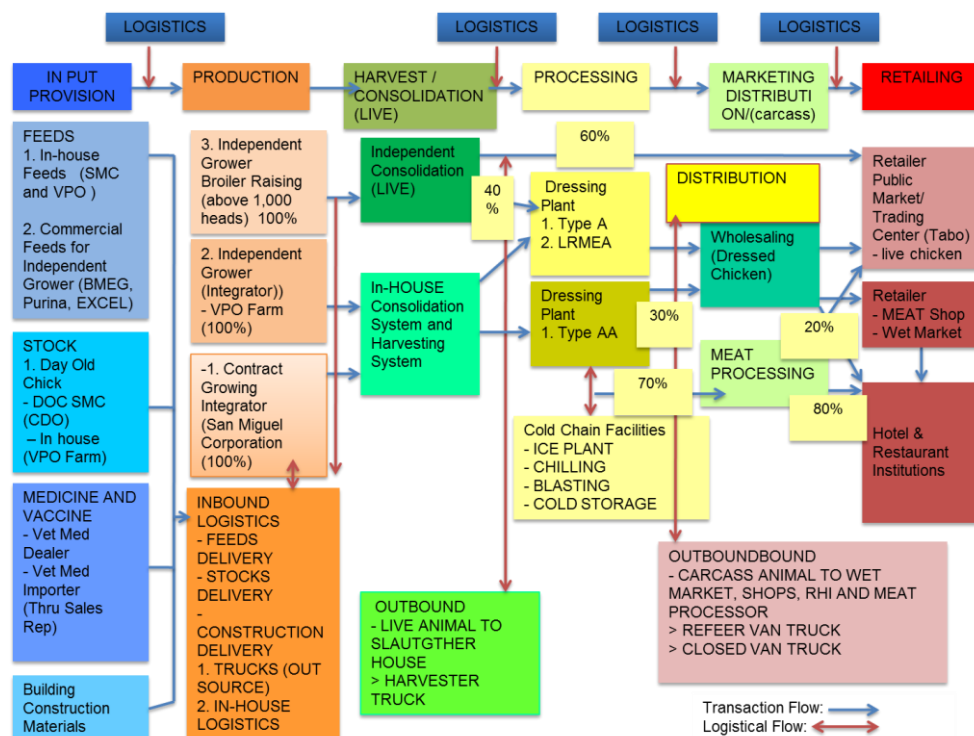


Figure 9-6 Value chain map of broiler production

Broilers are reared for their meat and are sold as either live birds or dressed carcasses. As mentioned earlier, integrators such as the San Miguel Corporation are the primary drivers in the production of broilers in the CARAGA region. These integrators enter into contracts with both farmers, providing them with input such as day-old chick and feeds. They provide all the needed input and make a majority of production decisions, with the farmer providing the production site, housing, labor and management of the birds. For SMC, a farmer must have the capacity to rear 9,000-12,000 birds at any one time. These contracts therefore target primarily large-scale farmers.

Large-scale poultry farmers keep an average of 10,000 birds per 29-to-30-day cycle. Small-scale producers keep only about 100-600 per cycle. These commercial broiler farms follow feeding and vaccination programs recommended by suppliers of the day-old chicks and feeds.

The birds are fed a broiler starter mash from the 1st to the 2nd week. During the 3rd to 4th weeks, broiler finishers, pellets and crumbs are used. Poultry vaccines are administered at set schedules. The birds are vaccinated in the 2nd week against Gumboro, in the 3rd against Newcastle disease, and finally against infectious bronchitis in the 4th week. Vitamins are given 3 times a week until the broilers are sold. Deworming is done every two months.

The farmers also strictly follow standard production and biosecurity procedures, ensuring that the products are of good quality. At the end of the cycle, they then deliver the volume of broiler products agreed upon to the integrator. Farmers receive an average of 12.00 per bird as growers' fee.

Integrators then send the broilers to dressing plants, which also follow standard quality control procedures. These dressing plants usually charge about 8.50 per bird. From this point, the dressed carcasses may then enter one of three steps: First, it may enter cold chain facilities for preservation and storage. Second, the dressed chicken may be wholesaled to retailers or to hotels and restaurants. Traders can collect about a minimum of 2.00 per bird, while public wet market retailers get about 5.00-10.00 in profit. Average logistical charge per bird is about 0.50-1.00. Lastly, the meat may undergo some processing before again being sold to retailers, hotels and restaurants.

This chain primarily caters to high-end markets such as retail supermarkets, tourist hotels and the fast food chain industry. Hence, it tends to be more specific about production practices and quality specifications. To be more competitive, integrators, particularly SMC, have introduced safety protocols that assure product safety “from farm to fork”.

9.2.2. Small-scale chickens

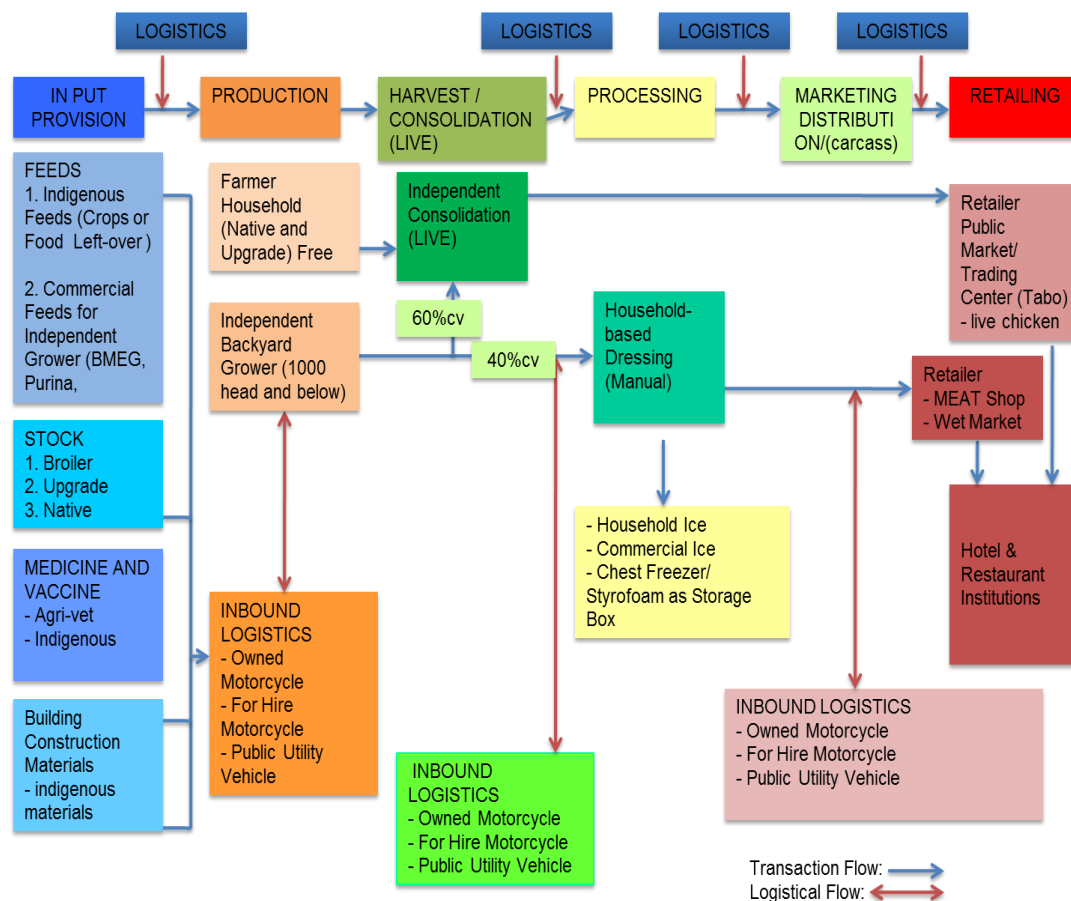


Figure 9-7 Value chain for backyard/small-scale chicken production

The value chain for small-scale farmers is less complicated. Unlike in commercial production, there are no production regulations and no formal contract, therefore the farmer has less a guarantee of selling their product.

In this chain, farmers generally have to provide for all the input. This includes the chicken coop, the medicines, and the feeds. Usually, these are produced using indigenous

materials, although some may also opt to use the more commercial options. The feeds, for instance, may be from local crops or leftover food. Other farmers will use commercial feeds such as the BMEG and Purina. Each farmer may opt to stock broilers, native chicken, or the “upgraded” variety.

Once the chickens are ready for slaughter, the farmer may either dress the chicken at home and utilize whatever cold storage facility is available, or sell the live chickens to independent consolidators. In any case, the birds end up in a number of marketing outlets such as other farmers, consolidators, wholesalers (both urban and rural), retailers (both urban and rural) and consumers. They may be sold by retailers in the public market or the trading center (*tabo*). Retailers then sell these to household consumers, although a bulk also end up in hotels and restaurants.

Another less common path this chain may take is the direct selling of the chicken from the farmer to restaurants or the final consumer. In this case, the farmer and the buyer will make an informal agreement in advance regarding the price, weight and time of sale. Usually, this is done with local restaurants and school cafeterias.

In general, small-scale farmers have more control of the final product and price, although they experience greater risks because they have less volume and less guaranteed buyers.

9.2.3. Commercial layers and eggs

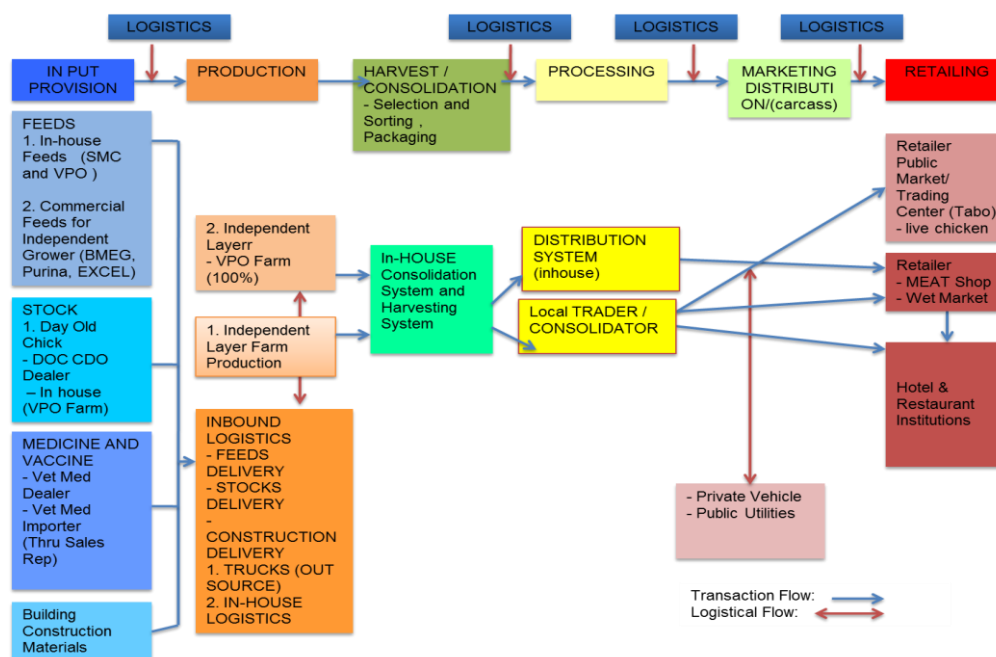


Figure 9-8 Value chain for eggs and culled layers

Production

Layer farms in the CARAGA region mainly produce eggs and culled-layers for the market. Both small-and large-scale commercial egg production occur mostly in Agusan del Norte and Agusan del Sur. The by-product of this process is poultry waste, which is used as farm fertilizer. The main variable inputs in the production process are day-old chicks, feeds, vitamins, de-wormers, disinfectants, charcoal or infra-red with LPG for heating, and vaccines. Fixed inputs are brooders and poultry houses. The main actors in the

commercial layer value chain include producers, hatcheries, traders, final consumers, feed companies, service providers (such as transporters, veterinary doctors and livestock production officers), retailers and processors.

Most of these layer farms produce eggs year-round. One of the KIIs from Prosperidad in Agusan del Sur had a total of 1,000 heads volume capacity, all housed in one building. It is already considered a commercial poultry business, but is still small-scale. In contrast, a large-scale layer commercial layer farm owned by VPO Farm in Rosario, Agusan del Sur has a heads volume capacity of 80,000.

Native chickens are also sources of eggs for direct consumption especially in areas where there is no access to commercial eggs. In fact, the household survey conducted revealed that 86% of respondents consume native eggs. 10% consume eggs from the upgraded variety, whereas only 4% consume those from the hybrid strain.

To ensure consistency in the production of eggs, farmers keep flocks in batches programmed every 6 months. Most small-scale commercial producers keep 100-1,000 birds. A farmer with 1,000 birds may collect an average of 30 trays of eggs (equivalent to a 90% average production rate) per day for the first 15 months. The production, however, decreases to 20 trays per day during the last 2 months. At this point, the birds are then sold as culled layers.

During the KII interview, respondents indicated that they mostly follow the feeding and vaccination program recommended by feed company technicians, veterinary drug company sales representatives, agro-vet store representatives or government extension staff. They also perform routine hygiene and disease control measures. These include cleaning the feeders and drinkers, clearing the bushes around poultry units to keep rodents away, ensuring the presence of disinfectant foot baths, and constructing poultry units away from direct air movement. By following these standards, they say chicken mortality is reduced and egg production per cycle is maximized.

One of the more recent shortcuts developed are Ready-to-Lay (RTL) chickens from layer grow-out farmers. In this scheme, grow-out farmers raise day-old chicks to pullets (ready-to-lay hens). Farmers find this efficient since feed costs and transportations costs in the CARAGA region tend to be higher than those of the neighboring regions. RTLs are 16-17 weeks old, and cost about 300.00 per hen. The grow-out farmers include technical services and feeds as part of the package.

A few of the interviewed farmers in Agusan del Norte and Agusan del Sur have already tried this scheme. They said that the average cost per egg is about 3.50 per egg, and farm-gate prices range from about 4.50-4.65 per bird. Culled layer meat can be sold at about 35.00 per kilo. Using this system, the average net profit for the layer farmer is about 1.00 per egg. Industry standards consider this price already favorable to the producer. In comparison to the regular system, however, RTL is considered capital intensive due to the upfront costs for the RTL hens and the layer house. The farmers also said that daily feeds are not much of an issue as sales occur daily, which enable them to buy feeds.

This scheme of production was recommended for the enterprising poor, given that they be allowed to loan money from a financing institution. Initial capital for the RTL to egg production is about 120.00 per bird, and 300.00 for each bird's housing. Other expenses covering feeds, vaccines and vitamins during the laying stage amount to about 1.50 per bird.

The initial cost to establish an RTL egg production farm would therefore run to up to 84,000 for 200 hens. With this smallholders, especially women, can earn an additional income of 190.00 per day or 5,700.00 per month.

Egg sales

Farmer producers commonly sell eggs directly to retailers or through agents/intermediaries known as traders, both rural and urban. Local traders are usually village assemblers who mediate transactions between the farmer and other market actors, usually through informal agreements. **Most of the transaction is paid at the farm-gate.**

9.2.4. Other value chain actors

The following section covers value chain actors not discussed in detail above, but play important roles in the value chain.

Breeders and Hatcheries

Breeders and hatcheries are among the first steps in the value chain. In the CARAGA region, there are no commercial chicken breeder farms and so day-old chicks may have to be purchased from small local breeders or from commercial ones in Bukidnon and Davao City.

These breeders and hatcheries may source their parent or grandparent stock locally or internationally. Commercial breeders commonly import theirs from the USA. Common breeds in the area are the Cobb and the Babcock.

These stocks may be sold to local agricultural supply stores in the cities of Butuan, Bayugan, Bislig and Surigao, where smallholder farms commonly get their stock.

Poultry and poultry product intermediaries

Because production in the CARAGA region is primarily by independent smallholders, intermediaries are often needed to gather from individual farms. These intermediaries include assemblers, retailers, and wholesalers in the urban and rural settings. They intermediaries serve farmers who are unable to transport live birds and eggs due to high transport costs. Often, these farmers urgently need cash, and cannot wait for market day to sell their produce. In addition, their small inventory or volume makes it difficult for them to sell their products directly to retailers or establishments, who prefer to buy in bulk. Other times, they simply lack information on their buyer options. Since many farmers opt to trade at the farm-gate rather than walk their produce to the market, transaction costs tend to be high.

Most intermediaries have specialized functions in the chain and handle only eggs, live birds and dressed carcasses. Live bird and egg traders more common in the CARAGA region.

Commercial integrators may have exclusive agreements with certain traders or dealers that connect to different distribution channels.

Local or barangay-level live bird intermediaries consolidate the produce of many smallholder or backyard producers, and then sell these to municipal level consolidators. The municipal-level folk then in turn sell these to sellers in the public markets or to hotels and restaurants.

Feed millers

Commercial feed companies that supply the CARAGA region include BMEG, PHILMICO, EXCEL FEEDS, PURINA, BFFI and UNIFEEDS. Most of these companies operate through distributors in the cities of Butuan, Surigao, Bayugan and Bislig. The distributors then channel the feeds either to agri-vet stores or retailers or directly to the farmers.

In the contract farming system, the integrator company provides feeds produced in their own in-house feed mill or outsourced from a second party. San Miguel Corporation and VPO farms are among the companies with their own feed mills, although VPO also outsources because they lack the technology to produce specialized feed formula for brooding chicks.

Another local feed mill is the Balangay Feed Factor, Inc. based in Butuan City. They produce layer feeds exclusively for the owner's layer farm, as well as network farmers. At the time of research, their layer feeds are not yet available commercially but they expressed plans of expanding to the commercial market. However, one of their limitations is the limited availability of quality raw materials, specifically yellow corn, in the area. Hence, they have had to outsource this crop from the provinces of Bukidnon and Cotabato to augment their production requirements. This is seen as an opportunity of the KII to expand the corn production of farmers in Agusan del Norte and Agusan del Sur. Since the demand for meat products in CARAGA is increasing, they see this as a potentially profitable venture.

Poultry Dressing

Most indigenous and backyard poultry farmers slaughter their birds at home or in local slaughterhouses. This is first done by severing the head and draining the blood to the ground. The body is then immersed in hot water, and the feathers are removed by hand-plucking. The waste is often disposed in open pits, left in the slaughterhouse or given to domestic animals. However, some farmers save still-edible "waste" parts such as the head, legs and intestines for consumption. These parts may also be given to the persons hired to do the dressing as part of their pay. The process of household dressing, as well as those being done in unaccredited structures, is unregulated by the NMIS.

Large-scale commercial chicken production by the San Miguel Corporation and VPO Farm use Type AA dressing plants. The VPO Farm Poultry Dressing Plant is located in Agusan del Sur and can handle a maximum of 800 birds per hour. San Miguel outsources its dressing and processing to the accredited 2nd party Green Pine Agri-Development Corporation – Poultry Dressing Plant located in Butuan City. This facility hosts a semi-automatic system with a maximum capacity of 1,500 birds per hour or about 25,000 per day exclusive only for SMC broiler production. It also has complete cold storage facilities, including a chilling room, an ice plant, two 40-footer cold storage facilities, three 10-ton cold storage insulated panels, two 20-foot containers as backup and two 20-foot blasting machine. The facility is also capable of processing chicken into prime cuts, and then marinating them as required by food chains such as Jollibee, Greenwich and McDonald's. Since this establishment is private and exclusive, small-scale commercial producers do not have access to its facilities.

9.3. Cost and Margin

As mentioned earlier, farm gate prices nationwide increased by an average of 2.33%, with the livestock sector recording an average price gain of 6.94%. Prices in the poultry subsector inched up by an average of 0.10 percent. Price of chicken went down by 0.14 percent because of increase in production. Chicken egg was priced higher by 0.53 percent due to growing demand from establishments such as bakeries.

Table 9-2 Value production in agriculture at constant prices

SUBSECTOR	IN MILLION PESOS			GROWTH RATES	
	2011	2012	2013	11-12	12-13
POULTRY	105,379.20	110,149.92	114,779.97	4.53	4.20
CHICKEN	79,823.09	83,499.03	87,679.54	4.61	5.01
DUCK	1,789.31	1,826.55	1,858.92	2.08	1.77
CHICKEN EGGS	22,120.62	23,087.27	23,450.24	4.37	1.57
DUCK EGGS	1,646.18	1,737.08	1,791.26	5.52	3.12

Table 9-3 Percent distribution of value of production in agriculture, Philippines

SUBSECTOR	IN MILLION PESOS			GROWTH RATES	
	2011	2012	2013	11-12	12-13
POULTRY	158,734.92	167,033.71	174,237.43	5.23	4.31
CHICKEN	118,320.34	123,695.14	129,701.72	4.54	4.86
DUCK	2,452.85	2,587.83	2,664.71	5.50	2.97
CHICKEN EGGS	35,046.83	37,555.23	38,346.69	7.16	2.11
DUCK EGGS	2,914.90	3,195.50	3,524.32	9.63	10.29

Table 9-4 Percentage of distribution of production in agriculture, Philippines

SUBSECTOR	IN MILLION PESOS			AT CURRENT PRICES		
	2011	2012	2013	2011	2012	2013
POULTRY	14.10	14.33	14.76	11.39	11.83	11.92
CHICKEN	10.68	10.86	11.27	8.49	8.76	8.88
DUCK	0.24	0.24	0.24	0.18	0.18	0.18
CHICKEN EGGS	2.96	3.00	3.01	2.51	2.66	2.62
DUCK EGGS	0.22	0.23	0.23	0.21	0.23	0.24

Table 9-5 Volume of production in agriculture, Philippines

SUBSECTOR	IN THOUSAND METRIC TONS			GROWTH RATES	
	2011	2012	2013	11-12	12-13
POULTRY	1,414.30	1,479.43	1,553.50	4.61	5.01
CHICKEN	33.16	33.85	34.45	2.08	1.77
DUCK	403.44	421.07	427.69	4.37	1.57

CHICKEN EGGS	37.67	39.75	40.99	5.52	3.12
DUCK EGGS					

Table 9-6 Weighted average farm gate prices in agricultural, Philippines

SUBSECTOR	PESO PER KILOGRAM				GROWTH RATES		
	2000	2011	2012	2013	00-13	11-12	12-13
POULTRY	56.44	83.66	83.61	83.49	47.93	0.67	0.10
CHICKEN	53.96	73.97	76.45	77.35	43.35	-0.06	-0.14
DUCK	54.83	86.87	89.19	89.66	63.52	3.35	1.18
CHICKEN EGGS	43.70	77.38	80.39	85.98	96.75	2.67	0.53
DUCK EGGS						3.89	6.95

9.4. Market Preference and Technology Required

9.4.1. Trends in Supply and Consumption of Chicken Meat and Egg

One way of determining the volume of demand is through the population multiplied by the per capita consumption of a particular commodity such as chicken and egg. Based on the data from the Bureau of Agricultural Statistics (BAS), Table 9-7 shows the per capita consumption of chicken in CARAGA region. It is observed that the per capita in this region is decreasing from 2011 to 2013.

Table 9-7 Per Capita for Chicken Meat and Chicken Egg

PER CAPITA - CARAGA REGION	2009-2011	2012-2013	GAP PERCENTAGE
Chicken (-10.3%)	5.512	4.94	-10.3%
Chicken Egg (-2.89%)	3.588	3.484	-2.89%

Table 9-8 Meat or Egg Consumption based on the Per Capital multiplied by the Population

POPULATION (CARAGA)	2009	2010	2011	2012	2013
Ave. Growth Rate (1.60%)	2,385,991	2,424,788	2,463,585	2,503,002	2,543,050
CHICKEN Meat Consumption (MT)	13,152	13,365	13,579	12,365	12,563
Chicken Consumption(MT) egg	8,561	8,700	8,839	8,720	8,860

The trend shows a demand gap of chicken (meat and egg) production volume with an average of 66% and 252% respectively.

Table 9-9 Supply of Chicken

SUPPLY	2009	2010	2011	2012	2013
Chicken Volume (LIVE) MT	11,454.00	11,604.00	11,258.00	10,019.00	11,901.00
Chicken Meat Supply (70% Ave. Carcass Recovery for both Hybrid and Native)	8,017.80	8,122.80	7,880.60	7,013.30	8,330.70
Surplus/Gap (MT)	(5,133.78)	(5,242.63)	(5,698.68)	(5,351.53)	(4,231.97)
Percentage of Gap (avg. 66%)	-64%	-65%	-72%	-76%	-51%

Table 9-10 Supply of chicken eggs

SUPPLY	2009	2010	2011	2012	2013
Chicken Egg Volume (MT)	2,268	2,325	2,307	2,501	3,222
Surplus/Gap (MT)	(6,293)	(6,375)	(6,532)	(6,219)	(5,638)
Percentage of Gap (avg, 252%)	-277%	-274%	-283%	-249%	-175%

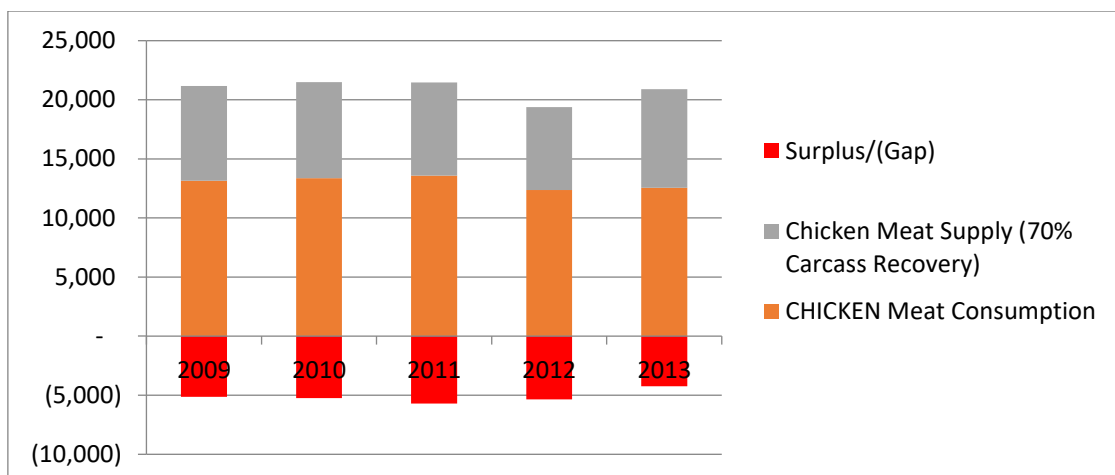


Figure 9-8 Comparative graph of chicken meat supply and consumption

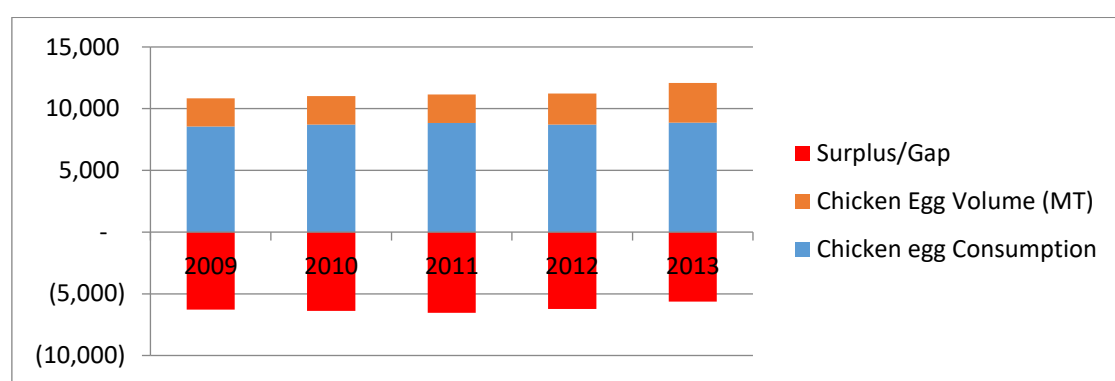


Figure 9-9 Comparative graph of chicken egg supply and consumption

During the KII interviews, the following are the factors that were said by the respondents to affect the demand pattern for chicken meat and egg:

1. Increase in number of tourists in Caraga Region, especially in the province of Surigao del Norte and Sur.
2. Increase in the number of Mining Companies operating the area of Agusan Provinces
3. Increase in the number of Business Centers such as mall and supper market, where prominent Philippine Food Chain is also present in major cities in the region
4. Meat importation, thus local institutional buyers shift to buy cheap imported product and by-products
5. Government policies and government that either decrease or increase the production volume
6. Climate Change phenomenon that totally destroyed the regular patterns and trends of the climatic and atmospheric condition in relation to the total performance of the production system.

9.5. Summary of Issues for Attention

During the focus group discussion, it was determined that small-holder farmers have the potential to engage in the production of broilers or layer eggs due to the high demand gap that is filled by supply shipped from neighbouring regions. The farmers identified that their main limitation is their lack of financial capacity to negotiate contract talks. They also do not have forward integration of sustaining the quality of the product through dressing plants and cold chain facilities.

Other options that the FGD participants throughout the region suggested were:

1. Opportunities to learn improved technologies and gain access to reasonable financial facilities. These could allow farmers to increase their participation in the mainstream industry.
2. Establishment of appropriate centralized, cluster or community-based dressing plant with cold-chain facilities. Private sectors in partnership with the government could help facilitate this process.
3. Exposure and training on the industry-level market system to improve consistency and biosecurity of all levels of the chain, as required by the end consumer.
4. Explore the commercialization of the production of native chicken and their eggs, due to the increasing demand for healthy food options. This may require the development of proper management protocols in order to optimize productivity.
5. Since farmers are limited in their scale, a cluster approach in organizing small-scale farmers to have large-scale power and influence in the industry may be explored.
6. Proactive involvement of enablers such as the private sector and the government in the whole value chain management system of small farmers.

10. SWINE

10.1 General Industry Overview

This value chain analysis of the livestock and poultry subsector in CARAGA Region was carried out by involving different participants along the value chain coming from the key informant individuals, producers, suppliers, traders, consolidators, technicians, logistics, retailers, household (farmers) and government offices. The field work was carried out from March to April 2014. At commencing with field study of livestock and poultry value chain, the team visited the 5 Provinces of CARAGA Region specifically the Capital Cities of each Province and some selected relevant Municipality for the study.

The study team interviewed numerous participants in the chain that these interviews and meetings provided a more focused perspective on top of the framework to help complete the analysis.

Given that there has been a lot of research carried out on the industry; this report will provide an analysis of the livestock and poultry industry in CARAGA Region more specifically on how all the players or actors be more competitive in the industry, thus increasing profitability and attaining sustainability. It will draw out important issues or barriers and will focus on the key issues for different participants in the chain. The output is to discuss the constraints/opportunities and possible intervention to improve the value chain and its productivity for livestock and poultry, which include:

- High production costs and farmers have no appropriate system of production records;
- Inputs of supplies are expensive and producers lack of knowledge in producing in-house feeds using local or available resources;
- Low quality of meat and live products particularly for the small-holder or backyard farms which reflects the difficulties in accessing a good price; low quality output prone to exploitation from the middleman or trader's price dealing
- Mortality rates of swine and chicken are high due to poor quality breeds and/or unavailable of good quality breed and the lack of financing capacities to acquire or purchase medicines and vaccines;
- Inequity price of live pig and chicken especially for backyard farmers given by traders within the vicinity due to lack of market information
- Limited access to veterinary services for the producers or farmers
- Lack of access to financing for daily operations and expansion
- Limited knowledge on swine and chicken meat handling with sanitation in the market, slaughterhouse or dressing plant
- Lack of appropriate cold chain facilities in order to improve or maintain the superior quality of the animal products and by-products
- Lack of Organizational development support for the existing and emerging Community-Based Livestock/Poultry Producers.

10.2 Overview of Value Chain

10.2.1 Swine Production (Commercial): Above 20 Heads

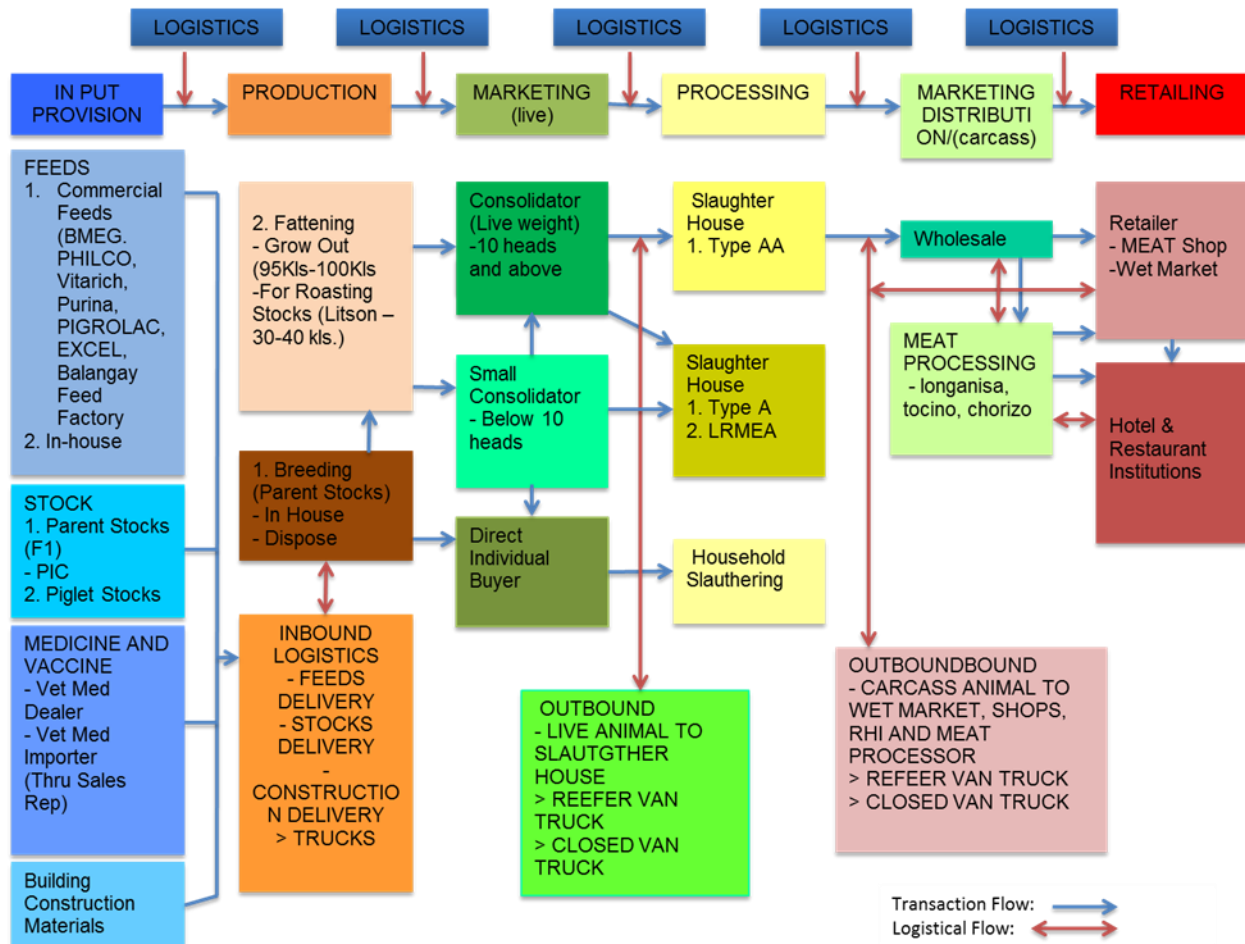


Figure 10-1 Value chain map of commercial swine production in Caraga Region

10.2.2 Hog production (backyard) 20 heads and below

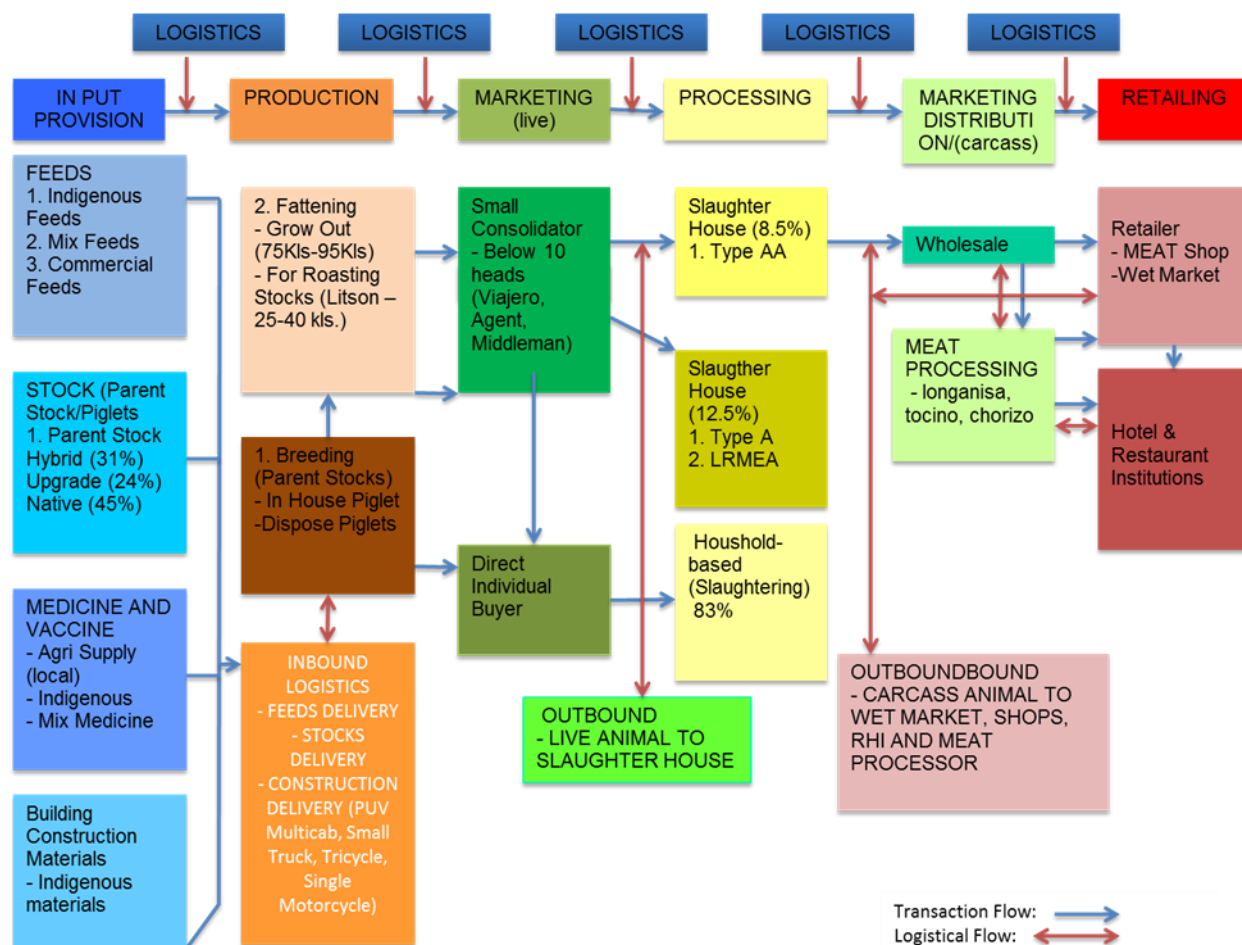


Figure 10-2 Value Chain Map Flow in Caraga Region

10.2.3 Analysis of Product Flows

Production

Swine inventory both for commercial and backyard farming in CARAGA increases year by year, except from 2010 to 2011 by 21% and 2011-2012 by 5%, when there was a huge volume of illegal imported pork in the Philippines. Thus, the price of pork and its by-products were very cheap. In effect, farmers were not able to recover their losses and were discouraged to put up new stocks which led them to close their swine production.

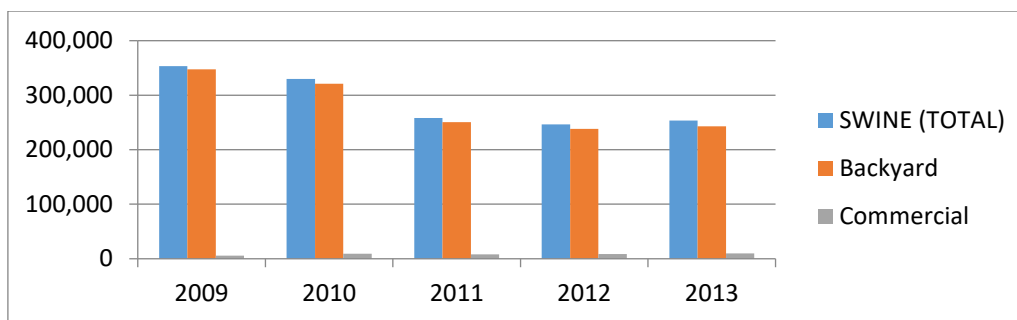


Figure 10-3 Swine Inventories in Caraga (commercial & backyard)

Table 10-1 Swine Inventories in Caraga

SPECIES	YEAR				
SWINE (Total)	2009	2010	2011	2012	2013
CARAGA	353,366	330,092	258,304	246,636	253,261
Agusan del Norte	80,386	78,551	63,305	59,825	65,324
Agusan del Sur	86,256	84,530	64,726	66,154	67,290
Surigao del Norte	79,351	81,884	63,325	54,860	53,969
Surigao del Sur	93,506	76,093	60,540	59,327	59,778
Dinagat Islands	13,867	9,034	6,408	6,470	6,900

Table 10-2 Swine inventory (backyard)

SPECIES	YEAR				
SWINE (Backyard)	2009	2010	2011	2012	2013
CARAGA	347,434	321,066	250,384	237,989	243,200
Agusan del Norte	77,100	74,050	59,840	55,166	60,200
Agusan del Sur	85,495	82,947	62,870	64,320	64,730
Surigao del Norte	78,434	80,510	62,060	53,830	53,000
Surigao del Sur	92,538	74,525	59,206	58,203	58,370
Dinagat Islands	13,867	9,034	6,408	6,470	6,900

Table 10-3 Swine inventory (commercial)

SPECIES	YEAR				
SWINE (Commercial)	2009	2010	2011	2012	2013
CARAGA	5,932	9,026	7,920	8,647	10,061
Agusan del Norte	3,286	4,501	3,465	4,659	5,124
Agusan del Sur	761	1,583	1,856	1,834	2,560
Surigao del Norte	917	1,374	1,265	1,030	969
Surigao del Sur	968	1,568	1,334	1,124	1,408
Dinagat Islands	..	..	..	..	..

The following list describes Swine Production in CARAGA and salient features from 2009-2013:

- Regional Volume: 253,260 Heads (25% compared to Northern Mindanao)
- Backyard – 95%; Commercial – 5%
- CARAGA POPULATION 2013; 2,543,050
- Pork Per Capita: 8.2KL./year (CARAGA)
- Meat Consumption: 20,894 TONS
- Production Volume: 24,189 TONS
- Swine Production Surplus: 2,295 TONS

- The data from BAS indicates a surplus volume of meat produce. There is sufficient supply of pork in CARAGA.

Among smallholders/backyard farmers, 45% produced native breed, 24% upgraded and 31% hybrid. It is noteworthy that backyard producers are now improving their breed stock by increasing use of hybrid pigs to 31%.

Table 10-4 Percentage of HH Engaged in Swine Production by Breed

COUNT OF HH	PIG				PERCENTAGE
	BOAR	SOW	FATTENING	TOTAL	
NATIVE	8	71	118	197	45%
UPGRADED	8	38	58	104	24%
Hybrid	12	48	78	138	31%

Source: Household Survey

In commercial operation, they used Hybrid or Reengineered breed such as Hybrid or stocks coming from PIC. Commercial farms usually buy Parents Stock (F1 - Gilt and Boar). Most of the commercial farms used artificial insemination for their breeding system and management.

Feeds

Based on the household survey, 41% of the household uses mixed type of feeds. It is a combination of commercial feeds and indigenous feeds such as crops, fruit, coconuts and food left-overs. Among the respondents, most small-holder farmers are now surpassing the use of indigenous raw materials for feeds or the traditional way of feed ration. It can be observed that the small farmers have already acquired techniques and technologies on proper hog and swine production which is more profitable and productive. Most common commercial feeds used by the farmers are coming from these major feed companies: BMEG, PURINA, Pigrolac, Greenfield, Excel, BFFI and Philmico. For large operation, shipment and delivery is free and/or included in the agreed price. Backyard operation usually does not receive free delivery.

Table 10-5 Percentage of swine producers using different types of feeds

TYPE OF FEEDS	PIG
Indigenous	19.44%
Commercial	38.59%
Mixed	41.97%

Source: Household Survey

In farming protocol data, most of the farmers now use preventive measures through the use of vaccines. Vitamins (22%) are also very much used as part of management protocol to enhance immunity and strength.

Table 10-6 Percentage of medicine/vaccine used

	PIG
ANTIBIOTIC	20.00%
MULTI-VITAMINS	22.41%
VACCINE	25.86%
ANTI-PARASITE	17.93%
IRON	13.79%

Based on the household survey results, diarrhoea is the most common disease. There are a number of causes of diarrhoea. In small farms, this can be caused by bad quality of feeds, raw materials used for the feeds or contaminated water supply.

Table 10-7 Percent distribution of cases by diseases that struck pigs in 2013

ANIMAL	DISEASES	PERCENTAGE
Pig	Diarrhea	61%
	Pneumonia	10%
	Swine Fever	17%
	Worm Infection	9%
	Cholera	3%
	Total # of HH with Answer	100.00%

It is also noted that most of the farmer respondents used proper waste management by utilizing farm waste into fertilizer for their crop production.

Table 10-8 Percent distribution of waste disposal by type

PIG	
Biogas	0.72%
Fertilizer	99.82%

Construction Materials

1. Commercial farm usually used specific industry standard of the construction pig houses and pens. For high-end, cost of building/pens for grow-out or pig-fattening ranges around 2,000-3,000.
2. Smallholder Farmer/Producers use basic and indigenous materials for pens. For some farmers, they practiced free range type of management.

Seasonality of sales

Seasonality of sales was also determined through the household survey in order to determine the best time to sell or keep the stocks during low farm gate price. There are no significant differences between the months, however, disposal and selling of stocks are best during the months when there is limited supply in the market. The graph shows the months of November, July and January could be good months to dispose of stocks.

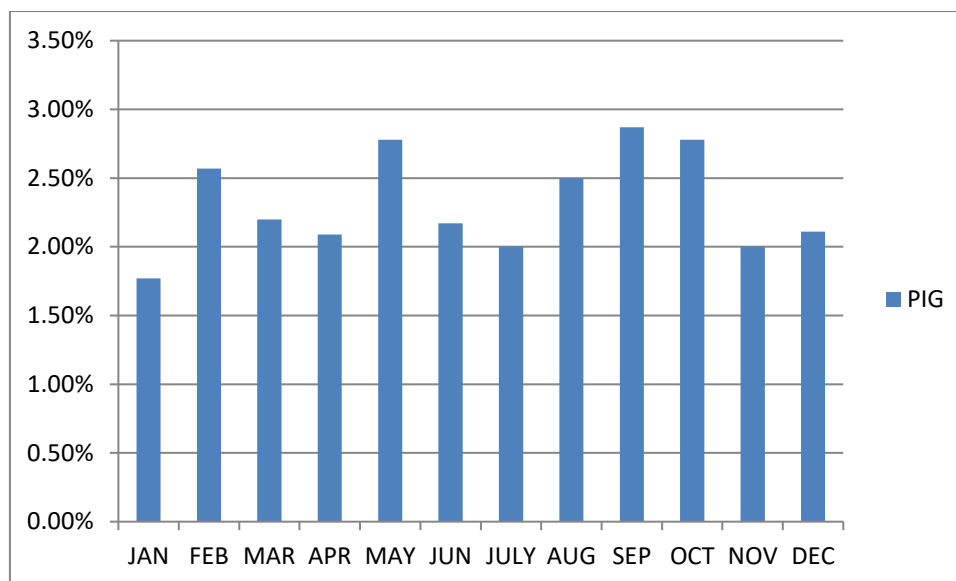


Figure 10-4 Percentage of Pig Sold in a particular Period

Assumptions:

1. Average Live Weight: 95 kg/head
2. Feed Conversion Ratio: 2.6 kg/kg
3. Farm Gate Price: P95.00/kg.
4. Average cost of feeds: P24.00/kg

Table 10-9 Cost and return analysis for pig fattening production

Feeds	5,700.00
Stocks	2,000.00
MED-VAC	50.00
Labor and utilities	600.00
Cost of Money (int. expense)	231.00
Total	8,581.00
Cost per Kilo	90.33
Sales	9,025.00
Gross Profit Margin per Head	444.00

Source: KII

Assumptions:

1. Logistic to consolidator: P2.00/kg
2. Slaughtering: P0.34/kg
3. Carcass recovery: 73%
4. Pork: 76%
5. Feet, skin, bones, entrails: 24%

Table 10-10 Consolidation, Processing and Marketing (Cost and Return)

	DIRECT RETAILING	WHOLESALE
Logistics to consolidation	190.00	190.00
Slaughtering	150.00	150.00
Logistics to Market	100.00	100.00
Rent/Utilities	100.00	100.00

Labor	200.00	100.00
Loan Interest	190.00	190.00
Total	930.00	830.00
Grand Total (+ cost of stocks)	9,511.00	9,411.00
SALES		
Pork	9,223.55	8,322.00
Feet, Skin	1,500.00	1,500.00
entrails and Blood	500.00	500.00
Total	11,223.55	10,322.00
Profit per Day/Transaction	1,712.55	911.00

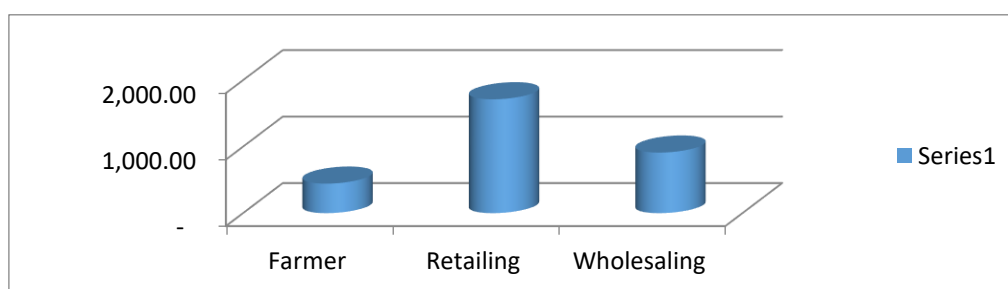


Figure 10-5 Gross Revenue for each Actor (Farmer, Retailing, Wholesaling)

Trading

For commercial, pigs or hogs are bought by the local (big) consolidator as live. Through an in-house or hired logistic at an average charge of Pph. 1.50/km for a long distance delivery will transport the animals to the designated and register Slaughter House at the municipal level.

In backyard farms, trading is usually done by the local Trader/Viajero through motorcycles or small vehicle. Live animals are brought to the LRMEA – Locally Registered Meat Establishment Assistance Services (LRMEA) then distributed to the wholesaler and retailer.

Hogs are not difficult to sell. Small-holders mainly sell their stocks directly to local traders and broker/agents or to the city and provincial traders. Selling the stocks to local trader can be made into two ways: weighing and auction through bargain. The local trader is sometimes a butcher, a wholesaler and a retailer. Hogs are slaughtered by the butcher then sold to retailers in the city or municipal markets. In the case of major cities such as Butuan, Bislig and Surigao, stocks are slaughtered at the type AA slaughter house. Most of the meat are sold as carcasses through distribution to wholesalers and retailers in city markets.

Processing

Caraga region has only three (3) type AA slaughter houses that provide for standards under the supervision of National Meat Inspection Services. Management and Biosecurity protocol based on the systems and provisions under Republic Act 9296 “The Meat Inspection Code of the Philippines” dated May 15, 2013. With the new law, accreditation and supervision of slaughter houses shall be under the Provincial Government Unit except for the Type AAA which deals with the international market. Within the region, there are 34 LRMEAS - Local

Registered Meat Assistance Services which is under the control and management of respective municipal government unit.

Slaughter Houses in Caraga Region

Table 10-11 NMIS Accredited Type AA

CITY / MUNICIPALITY		CATTLE		CARABAO		HOGS	
		HEADS	WT. (KGS.)	HEADS	WT. (KGS.)	HEADS	WT. (KGS.)
	JAN. 1-31, 2013						
1	Bislig City	54	7,998.00			909	51,081.00
2	Cabadbaran City	54	5,282.00			1,004	65,080.00
3	Prosperidad, AgdS	26	2,291.00			310	15,425.00
	TOTAL	134	15,571.00			2,223	131,586.00

Table 10-12 NMIS Accredited LRMEAS

CITY / MUNICIPALITY		CATTLE		CARABAO		HOGS	
		HEADS	WT. (KGS.)	HEADS	WT. (KGS.)	HEADS	WT. (KGS.)
1	Butuan City	231	46,200.00	69	17,250.00	3,802	216,282.00
2	Buenavista, AgdN	12	878.00			370	15,418.00
3	Carmen, AgdN	4	349.00			152	9,712.00
4	Kitcharao, AgdN	9	855.00			132	8,479.40
5	Nasipit, AgdN	16	964.00			225	11,468.00
6	Bayugan City	91	8,877.00			545	36,625.00
7	Bunawan, AgdS					113	4,302.00
8	Esperanza, AgdS					29	1,668.00
9	San Francisco, AgdS	185	20,801.00			810	56,608.00
10	Sta. Josefa, AgdS					185	11,819.00
11	Talacogon, AgdS					95	5,989.00
12	Trento, AgdS	1	150.00			347	15,385.00
13	Bacuag, SdN	2	192.00	1	105.00	55	3,481.00
14	Claver, SdN	1	110.00			35	2,243.50
15	Dapa, SdN	11	3,185.00	22	8,190.00	97	7,994.00
16	Gigaquit, SdN	8	841.00			70	4,431.00
17	Mainit, SdN	9	1,520.00	6	1,395.00	117	9,689.00
18	Placer, SdN	7	735.00			65	4,235.00
19	Surigao City	110	14,662.00	33	6,335.00	1,441	120,351.00
20	Barobo, SdS	16	1,914.00			274	15,970.00

21	Cagwait, SdS			2	350.00	83	9,223.00
22	Cantilan, SdS	4	750.00	11	2,750.00	304	16,720.00
23	Carrascal, SdS					23	1,611.00
24	Hinatuan, SdS	2	257.00	1	167.00	132	9,022.00
25	Madrid, SdS	1	125.00	10	1,750.00	155	9,300.00
26	San Miguel, SdS			1	113.00	91	3,729.00
27	Tago, SdS			4	1,000.00	42	1,002.00
28	Tandag City	50	6,584.00	72	11,431.00	558	30,574.60
29	San Jose, Dinagat					106	11,165.00
30	Tubajon, Dinagat					12	906.00
31	Libjo, Dinagat					26	3,339.00
32	Cagdianao, Dinagat					11	579.00
33	Dinagat, Dinagat					14	1,168.00
34	Basilisa, Dinagat					7	866.00
	TOTAL	770	109,949.00	232	50,836.00	10,523	661,354.50

Retailing

The retailers purchased their pork from the wholesaler or distributor through the slaughter house or LRMEAS in the form of whole carcass. Then, they divided the carcass into different forms of meat with different prices and then sold to the consumers. Retailers are located primarily in the Municipal or City Wet Market and private outlets such as groceries, supermarkets and meat shops.

10.3 Cost and Margin

Based on the computation, retailing has a contribution margin of 1,712.55 pesos per head per day. This is followed by the wholesaler on the daily basis of 911 pesos per head. However the farmer-producer, especially in the backyard operation, has at least a contribution margin of about 5% or 444 pesos per head within the period of 3-4 months. Moreover, retailer and wholesaler have a contribution margin of 18% and 10% respectively. It is noted that the 5% profit within 3 months is very minimal for the farmer producer thus the volume to produce is a critical number for the optimization of farm productivity and target augmentation to increase income. Thus, the ideal number for the backyard level is at least 10 heads for fattening in order to maximize the cost of time, space and investment incurred for production

10.4 Other Benefits

For actors across the value chain and their roles and responsibilities

Stocks (Piglet) supplier

Stocks particularly piglets are produced at different levels with different breeds: small farmer producer and local traders usually produce or sell native, upgraded and hybrid hog while commercial farms produce or sell pure hybrid. At the local trade level, it is unclear whether the piglets are vaccinated or not before selling it to the producer. However, many farmers are part of organized Hog Raiser Associations with vast experiences in the industry. Thus, farmers are already knowledgeable on the protocols of preventive measures. Except for the native breed, vaccination is the usual practice.

The commercial farm produces piglets with high technology, in terms of breed, cost and treatment or care. Thus, the price of piglet is higher than the piglet farmer produce or local trader sell.

Animal feed and medicine supplier

In livestock industry, two of the critical inputs are feeds and stocks (parent stocks and piglets). Commercial feeds are formulated very intensively in order to come up a consistent high quality feeds in the market. Along with the introduction of feeds, Feed Companies also offer a package of technology and technical service as part of their marketing strategies. At the same, their commitment to be part of enhancing the productivity of the whole industry. With the proliferation of large commercial feed company presence in the area, farmer producers have an advantage to choose and select the best feeds, reasonable price and access to full package of other technical services such as provision of access to good quality medicine and vaccines, technical training or seminar.

Parent Stock Producer

Commercially parent stocks produce in a very sophisticated process, wherein technology is owned by foreign company. In Mindanao only Davao City has this facility and most of the commercial farm sourced their parent stock with this supplier.

National and Local Government

National Government such as Department of Agriculture and DTI and its branches such NMIS, Livestock Development Council and Livestock Department are mandated to promote the productivity and competitiveness of all sub-sectors. With this mandate, to some aspect, the government is performing well to assist small farmers. Government programs provided a space for the small farmers to mainstream their product within the value chain especially in production and marketing. Since, for the small farmers, their bottleneck is on how to be efficient at the production level and access to fair market price. Along with this, Government is also trying to organize the Community-based Small Producer in order to have a more systematic consolidation of animal product. Through clustering approach small farmers can also be levelled as commercial and meet required industry's economy of scale.

Local Government Units

- Promotion of livestock development and stocks upgrading
- Veterinary technical services
- Price monitoring

- strengthening of Community-based Livestock Producer Organization
- operate, manage and monitor the local Slaughter House

Financing Institutions (Commercial Banks, Rural Banks, Micro Finance and Cooperative)

- open an access to financial facilities with reasonable interest rate and terms
- Promotion of Small Medium Enterprise including Livestock (Hog Raising)

Non-government Organization (Local and International)

- provide technical support for the Producer
- provide and facilitate for the improvement of stocks particularly for the Parent Stocks
- facilitate the strengthening of Hog Raiser Association
- advocate and facilitate for the organizing of cluster approach for the small farmers

11 FISH CAPTURE

11.1 General Industry Overview

Capture fisheries are the main source of seafood in the CARAGA region. Capture fisheries in the region is also predominantly municipal fishing or that which is being done in municipal waters, or that defined by the Philippine Fisheries Code of 1988 (R.A. 8550) as marine waters 15 km from the coastline, including streams, rivers or fishery reserves within the municipality, except those under NIPAS Law. All these fishery resources within the municipal waters may be utilized under this law by municipal fisher folk and cooperatives/organizations registered with the municipal government.¹⁸

There are less than 500 commercial fishing vessels, or those with gross tonnage of 3 MT and above, operating in Surigao del Norte and Surigao del Sur using pamo fishing gear. This is a small number compared to the majority of fishers in the region, who are municipal fisher folk. These smaller-scale fishers may use motorized or non-motorized *bancas* weighing less than 3 gross tons and employ a wide variety of fishing gear, such as hook and line, long lines, gill net, cast net, jigs, harpoons, and an assortment of traps and pots.

Capture fisheries in all provinces are vulnerable to the weather conditions, limiting the fishing season to certain months. The various fishing municipalities have different peak seasons, from January to June or throughout the year, but are generally affected by the southwest monsoon or *habagat* (from May-June to July-August) and northeast monsoon or *amihan* (from September-October to May-June).

10.1.1 Situation Overview: Agusan Provinces

Marine fishing activities in this area are confined to the municipalities of Carmen, Nasipit, Buena Vista, Tubay, Jabonga, Cabadbaran, and Las Nieves. Major fishing grounds include Butuan Bay, the Bohol Sea, and adjacent coastal areas. Typical fish landed are tuna, sailfish (lipilpan), marlin (malasugi), scads, tamban, bolinao, squid, saminsamin, caraballas, pawayan, cutlass hair tail, mackerel, garfish, parrot fish, fusilier, rabbit fish, grouper, moonfish.

Freshwater/inland fishing activities are also existent in the municipalities of Kitcharao, Santiago, Remedios T. Romualdez (RTR), and Las Nieves, where the usual catch include carp, pantat, tilapia, banak, lambuo, goby, freshwater eel, and ulang. Fishing grounds for freshwater fishery are in Lake Mainit, the Kinalawan River, Agusan River, Lingalao Irrigation Dam/Creek, and Maningalao Creek.

10.1.2 Situation Overview: Surigao Provinces including Dinagat Province

The coastal areas of the Surigao Provinces that face the Pacific Ocean provide marine resources and are the main source of fish in the region, as well as in Northern Mindanao. Virtually all of the municipalities in the Surigao and Dinagat provinces are engaged in capture fisheries. Primary fishing grounds are the Hinatuan Passage, Surigao Strait, Dinagat Sound, Bohol Sea, and Bucas Grande.

Typical fish landed are sapsap, lambay, squid, octopus, parrotfish, siganids, anchovies, sardines, lapu-lapu, lobsters, tulingan, flying fish, malasugue, and tuna.

¹⁸Republic Act 8550. Philippine Fisheries Code of 1988

10.2 Production

Municipal Fisheries is the dominant and most valuable fishery in the region, producing an average of 69,407 MT every year and with an average annual value of P4.55 Billion (see Tables 11-1 and 11-2).

Table 11-1 Volume of Fisheries Production in Caraga, 2008-2012 (metric tons)

Type of Fishery	ANNUAL PRODUCTION (in metric tons)				
	2008	2009	2010	2011	2012
Commercial Fisheries	7,214	6,676	7,221	6,064	5,199
Municipal Fisheries	76,888	70,380	69,069	66,600	64,098
Aquaculture	27,058	26,599	24,899	23,487	24,468
Seaweeds	21,498	22,660	21,454	20,401	21,296
Grand Total	132,660	126,316	122,644	116,554	115,063

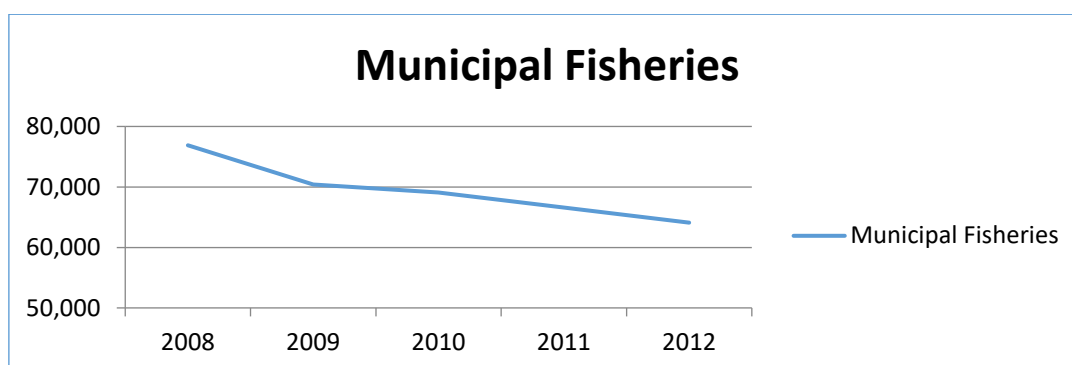


Figure 11-1 Municipal Fisheries (Source, BFAR-Caraga)

Table 11-2 Value of Fisheries Production in Caraga, 2008-2012 (in `000 Php)

Type of Fishery	ANNUAL VALUE OF PRODUCTION, `000 (Php)				
	2008	2009	2010	2011	2012
Commercial Fisheries	444,257	387,721	426,570	405,405	373,451
Municipal Fisheries	4,896,654	4,385,639	4,493,203	4,570,093	4,391,820
Aquaculture	1,041,823	759,198	647,480	601,281	628,124
Grand Total	6,382,735	5,532,559	5,567,253	5,576,780	5,393,396

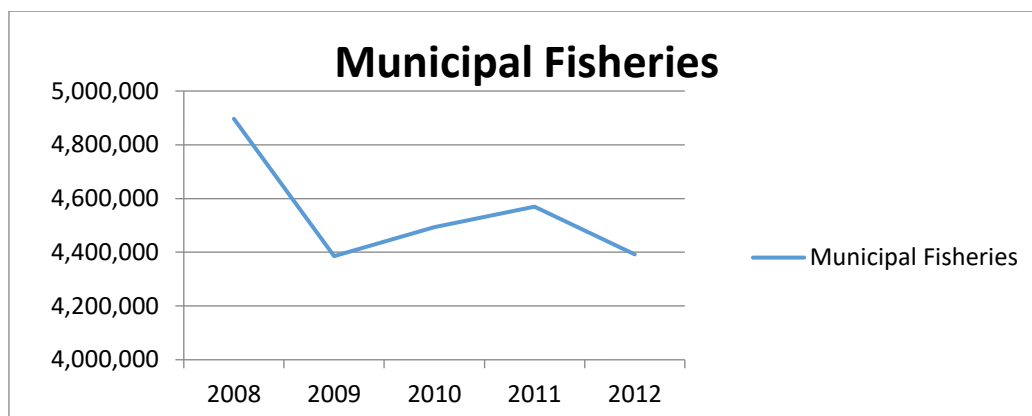


Figure 11-2 Municipal Fisheries (Source, BFAR-Caraga)

Most of municipal fishing output comes from Surigao del Norte (including Dinagat Province). Based on data from 2008-12, this province has 65% share of total production in terms of volume and 66% in value.

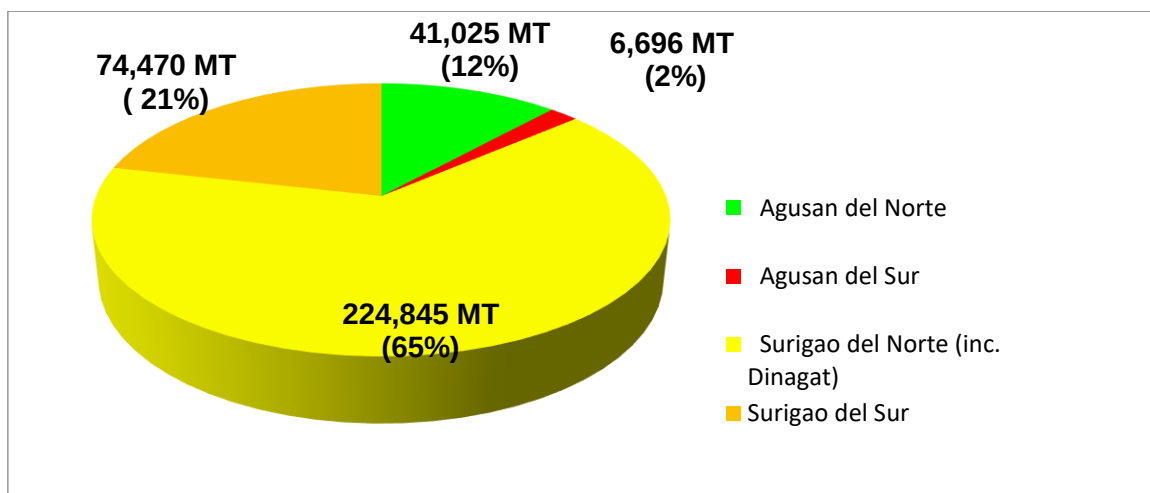


Figure 11-3 Distribution of Municipal Fisheries production in the region (Source: BFAR, Caraga)

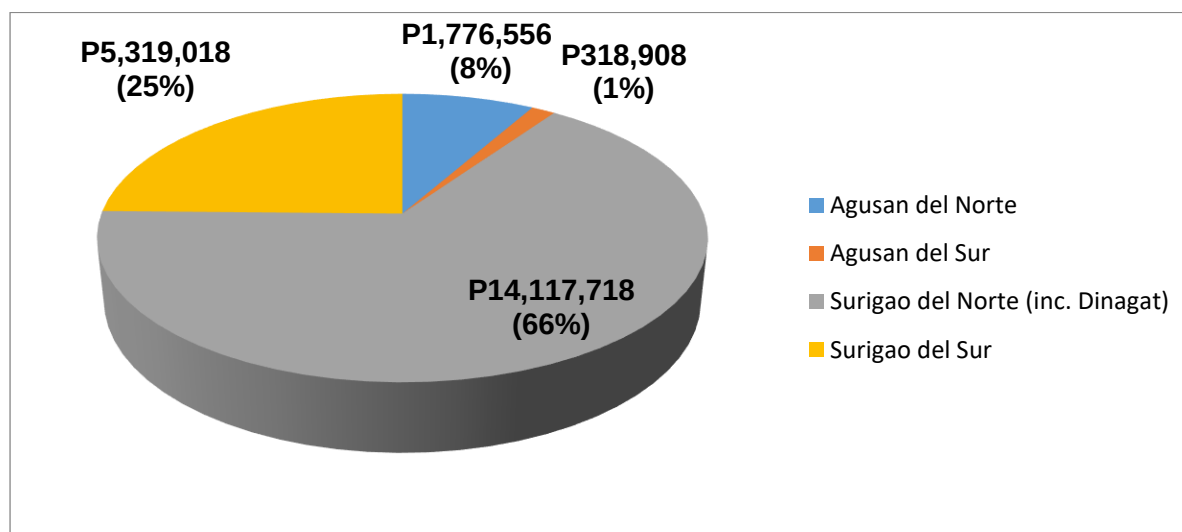


Figure 11-4 Value of Municipal Fisheries Production in the Region (Source: BFAR, Caraga)

Data from the household survey revealed that, municipal fisheries in CARAGA have a collective peak fishing season in April. Estimated total catch during this time often amounts to more than 8,000 kg worth around P675,000. Average price of catch for an entire year is P87.03/kg (see Fig. 11-4).

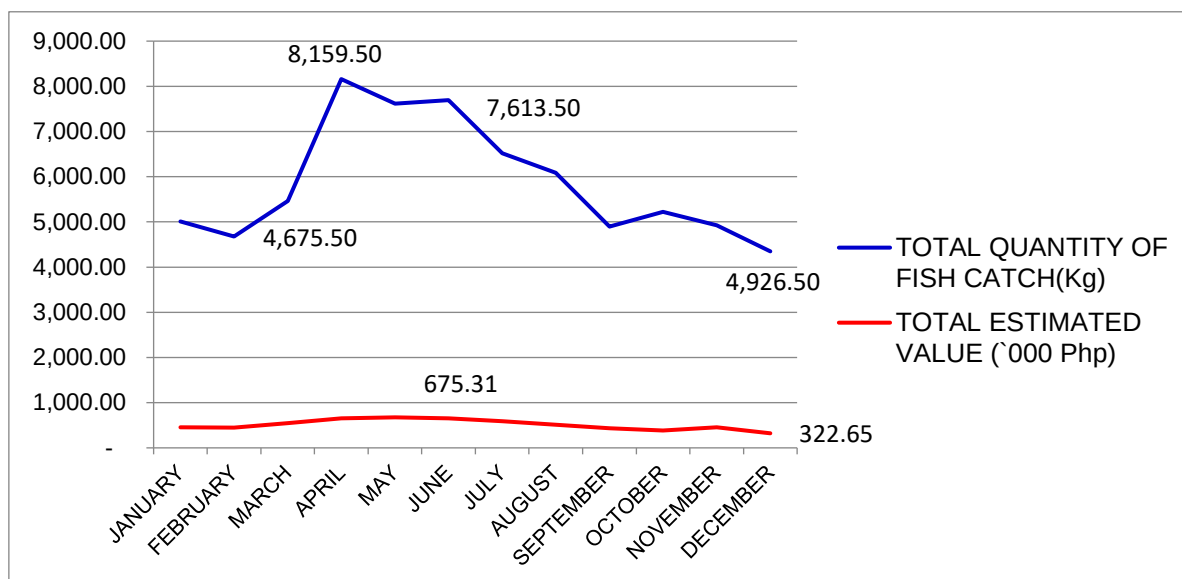


Figure 11-5 Estimated Total Monthly Volume and Value of Fish Catch in Caraga

It was also determined in the same survey that the most common type of fishing gear employed by fisher folk in the region are hook and line (46.33%) and gill net (42.94%).

The overwhelming majority of fish species caught was categorized as “others”. This category has been enumerated by respondents to encompass a wide range of fish, such as goatfish, garfish, parrot fish, rabbit fish, flying fish, various grouper varieties, etc. Aside from fish, squid and octopus, which are highly sought after in the export market, are included in the non-fish species usually caught in the region.

Table 11-3 Percentage of Fishing Gear Used in the Region

FISHING GEAR	%
Hook and Line	46.3%
Gill Net	42.9%
Long Line	17.5%
Spear	12.4%
Fish Pot	4.5%
Beach Seine	2.3%
Crab Life Net	2.3%
Fish Corral	1.7%
Others	9.6%

Source: Household survey

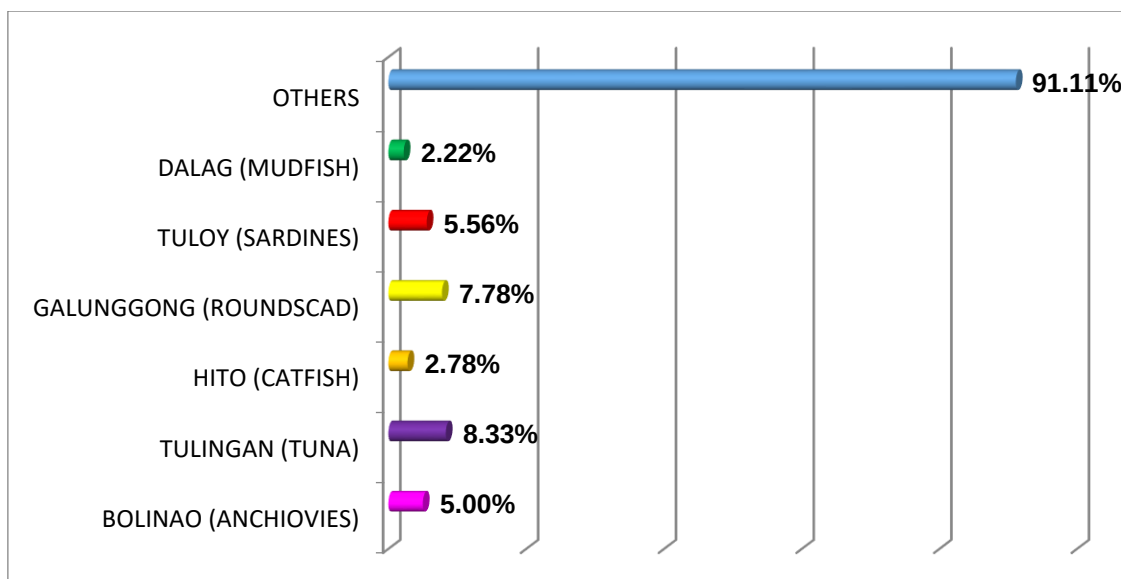


Figure 11-6 Percentage of Fish Catch in the Region (Source: Household survey)

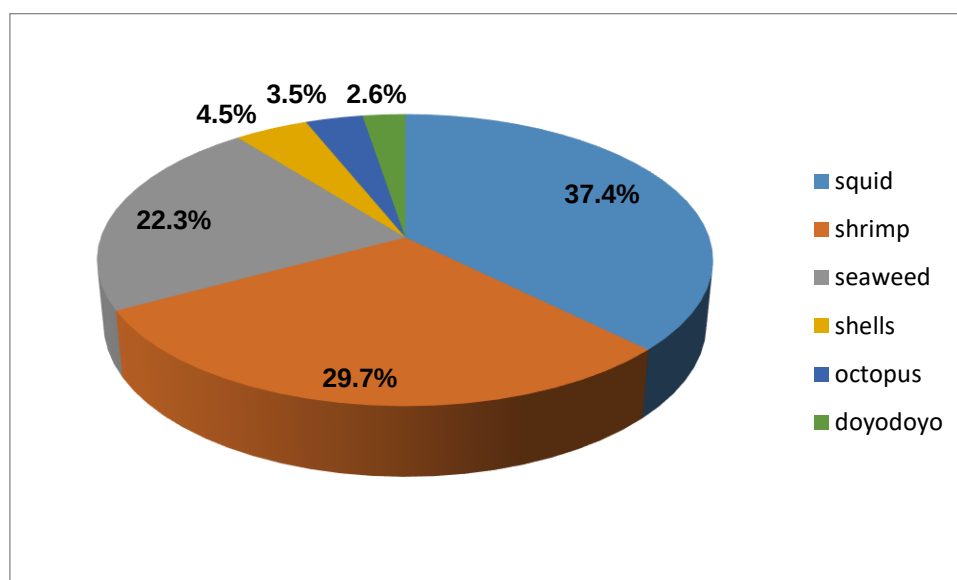


Figure 11-7 Percentage of Non-fish Species Caught in the Region

Source: Household survey

10.3 Market

Most of the fresh catch is sold domestically, either within the region or to other places. Household survey data indicate that most of the catch by fishermen are sold to either buyers/wholesalers or distributors, and to a lesser degree directly to *consignacions*.

Almost all of the catch are sold fresh (96.97%) while a negligible volume are either processed (dried fish), chilled, or in other forms.

Although the region does not have disaggregated data on specific species caught by fish capture and exported, some of the catches do find their way to the international market, through processors and exporters, both local and off-site. Species of particular interest include

octopus, squid, cuttlefish, swimmer or blue crab, and lobster. Most of these are major fishery exports (see Table 11-4).

Table 11-4 Major Philippine Fishery Exports in Terms of Volume (MT) and Value ('000PhP)

Commodity	Quantity (MT)	FOB Value	
		('000\$)	('000 Pesos)
Tuna	76,888	294,114	12,670,439
Seaweeds	46,252	212,125	9,138,326
Octopus	9,577	36,902	1,589,756
Shrimp/Prawn	6,715	60,497	2,606,222
Crabs/crabs fat	6,164	58,228	2,508,479
Grouper	6,023	21,751	937,052
Squid and Cuttlefish	5,704	23,016	991,542
Ornamental Fish, Live	5,503	6,650	286,476

Source: BFAR, 2011

10.4 Major Players

Commercial Operators

The region's fishing sector does not have any truly big players, with the exception of the few commercial fishing boat operators, who do not have any organized fishing fleet.

Municipal Fisher folk

The local fish capture industry is dominated by municipal fisher folk, who may be independent operators or members to any of the numerous fisher folk associations and multi-purpose cooperatives at the barangay-level. It is these cooperatives that have the most influence in the community (fishing village), their economic cluster (municipal fishers), and, to a limited degree, along the value chain (depending on the level of development and size of the cooperative).

Most of the region's municipal fisher folk are low-income earners, with an average annual household income of P70, 000, per household survey results. An active fisherman's daily net income purely from fishing averages P200 per day, although the ones with multiple sources of income (as fish monger, trading, ice distribution, cooperative dividends, and even from allowances and salaries from the government under "bantay dagat" stints) earn much higher (FGD and KII data).

On the average, a fisherman's production assets are limited to one 16-foot non-motorized boat, fishing gear, and accessories, valued at P15,000 to P30,000. More than 80% of the surveyed population possessed just a single boat unit (see Fig. 16).

10.5 Overview of Value Chain

Three categories of the fish capture industry in the Philippines are: (1) Commercial fisheries, (2) Municipal fisheries, and subsumed under municipal fishing (3) Artisanal fisheries. The latter is sometimes treated discretely as its nature is subsistence-oriented and for non-commercial purposes. As such, a general value chain illustration for Capture Fisheries would be as follows:

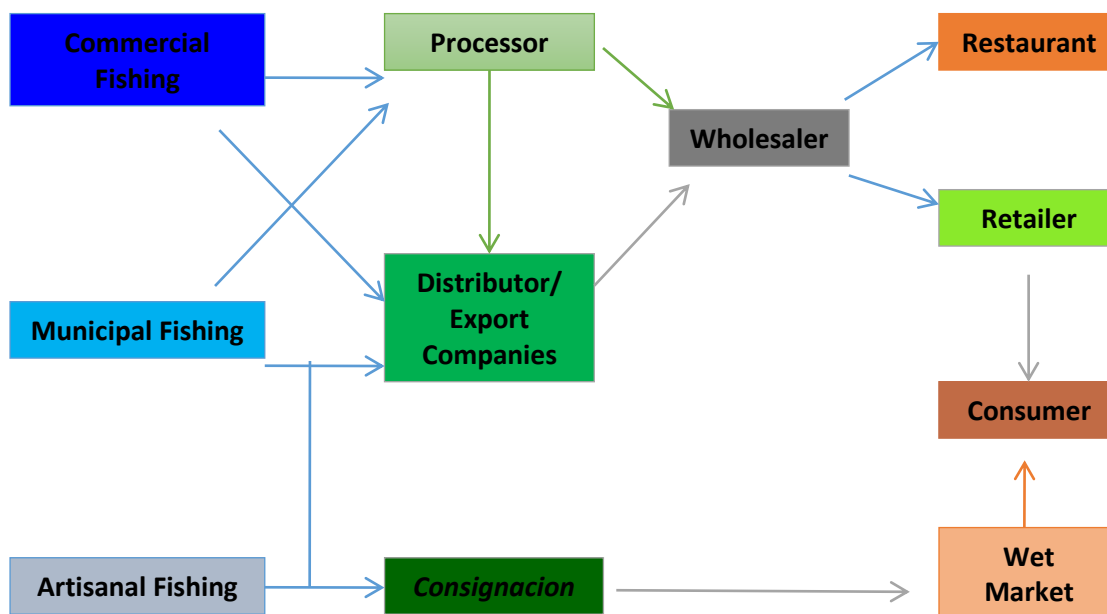


Figure 11-8 Fish Capture Value Chain

This study, however, focuses on municipal fisheries, with municipal fishermen defined by both national policy and socioeconomic category. As such, with municipal fishing operations are situated as the Primary Processing Activity, the value chain could be presented as follows:

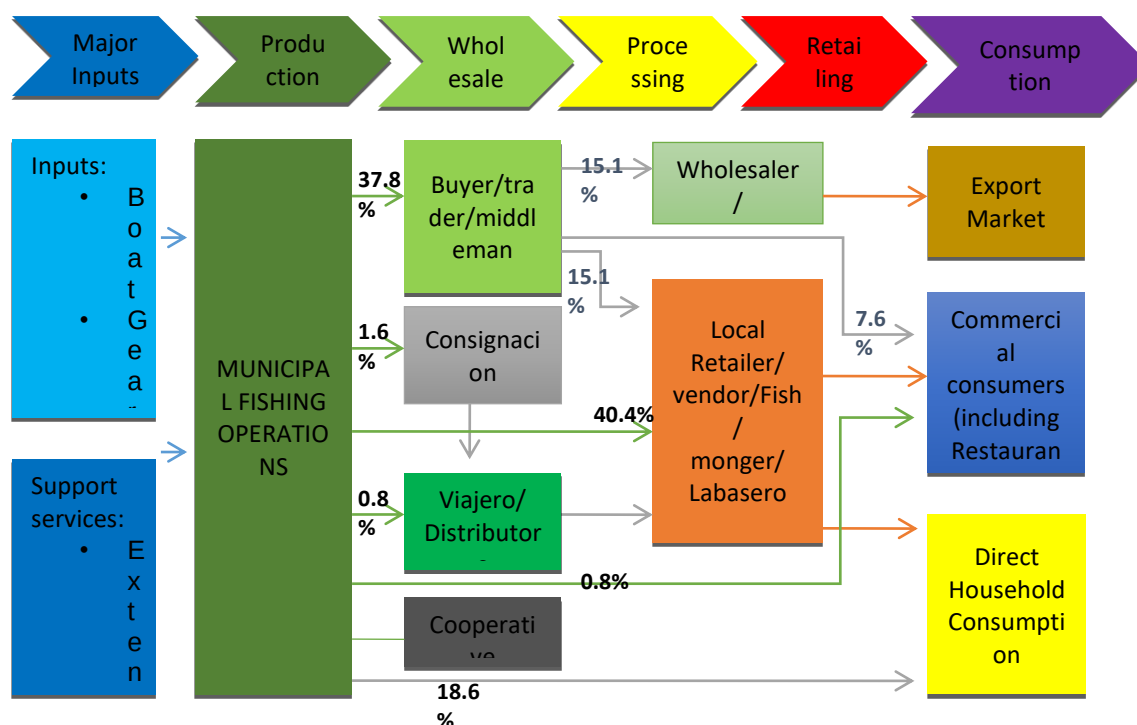


Figure 11-9 Municipal Fishing Value Chain

The buyer channels for Municipal Fisheries follow multiple interconnecting paths. Marketing of fish harvest in the region, be it from inland freshwater or from the sea, confronts challenges that typically impact fisher folk communities.

Fishing villages, especially in far-flung areas, such as the Dinagat Islands, Siargao, and Socorro, generally lack adequate transportation and post-harvest facilities. This is why primary producers often sell to channels and intermediaries, who provide the necessary outbound logistics to get the produce to the market.

Most of the fresh catch is sold locally. The information on distribution of catch in the survey exhibits many different paths. Of the respondent fishermen who marketed their catch, a slight majority (40.4%) sold their catch directly to the market place, 1.6% directly to a *consignacion*, 37.8% to buyers/traders/middlemen, who are usually their “*suki*” or long-time patrons, and 0.8% each directly to *viajeros*/distributors and restaurants (Fig. 14). None of the survey respondents answered that they sell or had sold their catch or a portion thereof to “a cooperative.” As most of them belong to either a cooperative or an association, they were probably also speaking on behalf of their group. KII and FGD data, however, show that many cooperative arrangements in the region engage in the consolidation and collective marketing of members’ catch.

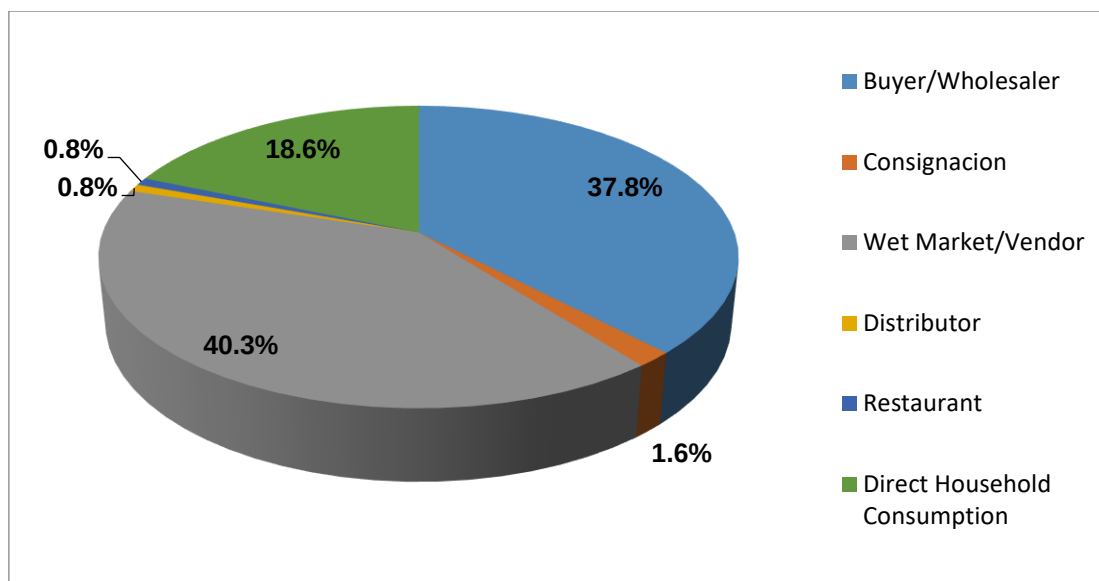


Figure 11-10 Percentage of Distribution of Municipal Catch in Caraga,(Buyer Type)

Source: Household Survey

As earlier mentioned, another noteworthy characteristic of the Municipal Fisheries value chain is that catch is principally sold fresh or as harvested, with virtually no preservation or processing involved (Table 16). A few (1.21%) use ice to chill the catch or freeze the catch (0.61%) prior to selling.

The processing of fish into smoked, salted, or dried products only play a small function in the supply over time. These preservation methods are seasonal activities dependent upon the supply of preferred species and prevailing market prices. The greater the supply of fish and the lower the price, the higher is the tendency for fishermen to smoke, salt, or dry part of the catch. On the other hand, the smaller the supply and the higher the price, the higher is the probability that the cash is sold fresh.¹⁹

Based on household survey, the fishermen's tendency to sell their catch primarily at the production site or just within their barangay is an indication that they are limited by the currently low shelf life of their produce due to lack of refrigeration capabilities.

Table 11-5Percent of Product Form of Sold Catch

PRODUCT FORM	%
As Harvested	96.97%
Chilled	1.21%
Dried	1.21%
Frozen	0.61%
Smoked	0.00%
Boneless	0.00%
Fillet	0.00%
Others	1.82%

Source: Household Survey

¹⁹ Lim, Cristina P. Y. Matsuda and Y. Shigemi. Problems and Constraints in Philippine Municipal Fisheries: the Case of San Miguel Bay, Camarines Sur. Faculty of Fisheries, Kagoshima University, Japan. Published in Environmental Management Vol. 19, No.6, pp.837-852

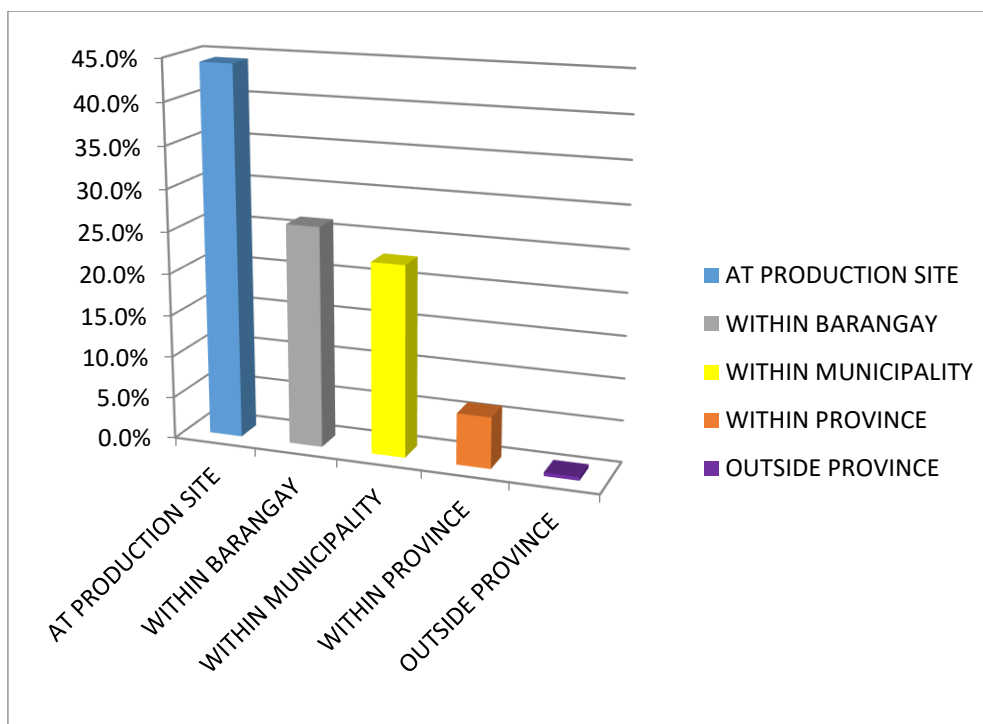


Figure 11-11 Where Municipal Fishermen Sell their Catch

Source: Household Survey

Table 11-6 Fresh catch Value-chain (for the Domestic Market) – through buyer/trader

	Price per Kilo	Margin
Fisher	P150	100% (less 5%)
Buyer/Trade	P177	18% (plus 5%)
Processor/Exporter	P230	30%

According to household survey results, a sizeable percentage of fishers sell their catch to buyers/traders. The typical buyer/trader has a freezer at his station to freeze his purchase.

As revealed by KIIs, the traditional relationship that often exists between the fisher and the buyer, the “*suki*” or patronage system, also takes place among local players. The *suki* system is a system of patronage in which the fisherman is beholden to favor a certain buyer over others, at times to the detriment of the former, who is compelled to accept an unfavorable price dictated by the buyer. This inequitable arrangement exists because a fisherman may have to borrow money from the buyer in order to buy supplies for his fishing trip or have the latter act as a financier. Upon his return, he then repays his loan by deducting from his sales or share of the catch, depending on their arrangement. The patron benefits from such a relationship by an assured supply of catch.

The buyer/trader then sells the fish to either: 1) a processor/exporter (40% of the time), a *lab-asera* or retail vendor / fish monger (40% of the time), or directly to consumers (20% of the time).

Higher value catch, such as squid, octopus, and lobster sold to processors/exporters while more common fish are sold to the *lab-asera*.

Table 11-7 Fresh catch Value-chain (for the Domestic Market) – through consignacion

	Price per Kilo	Margin
Fisher	P86	15% (less 5%)
Consignacion/Broker	P106	18%(plus 5%)
Retailer	P126-130	20%

Similar to aquaculture products, a common conduit for catch that are not bound to a suki is through the *consignacion*, where, as discussed in the section on Aquaculture, "*bulungan*" takes place. Bidding is usually partaken by non-*suki* middlemen.

Transactions through the *consignacion* are made in direct currency. In several instances, however, a third-party registered broker assumes the responsibility of paying the fisherman seller immediately in cash, deducting a "bother" fee of usually 5% from the payment in return for the outright cash disbursement (this occurs when bidders do not have sufficient money to pay the fishermen). This is actually to the detriment of the fisherman seller as the 5% commission of the registered broker is taken from his revenue while the winning bidder, on the other hand, has the advantage of just repaying the registered broker the price of his actual bid, and only after having sold the fish elsewhere. Under the *consignacion* system, fishermen are not only exploited, but are prevented from having direct contact with the final consumer.

10.5.1 Input Supply Value-chain

Going backward to the supply channel, the municipal fisheries sector is supported by various suppliers and service providers.

a. Fishing boats

Local municipal fisher folk traditionally use wooden *bancas*, outfitted with outrigger and, if motorized, engine and propeller assembly. Household survey results, however, show that most of the fisher folk (around 60%) use non-motorized vessels. Moreover, a typical fisher folk household normally owns just one boat (84% of respondents).

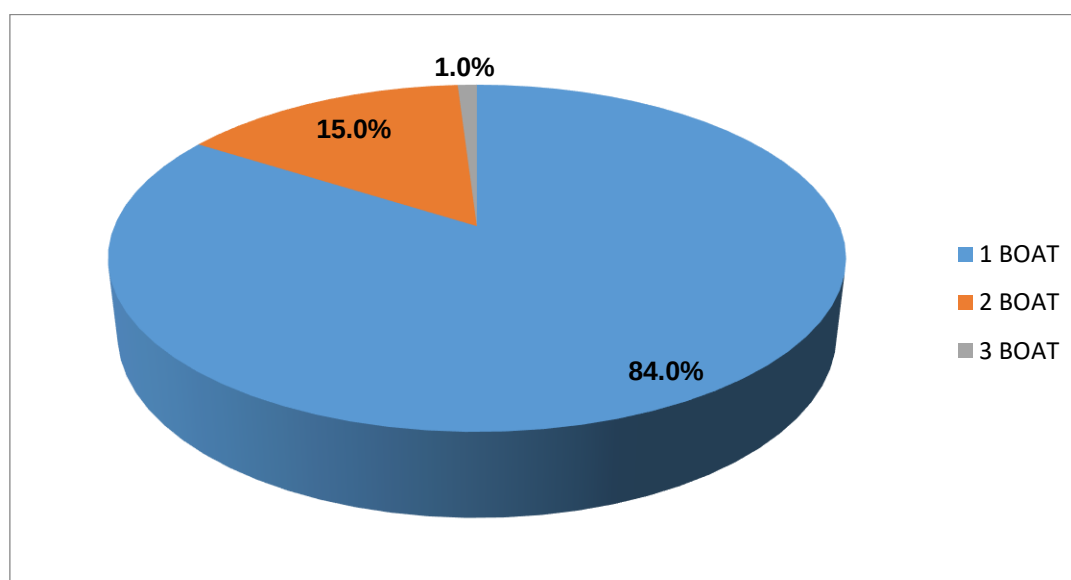


Figure 11-12 Percentage of Number of Boats Owned

Source: Household Survey

Municipal fishing boats are manufactured and supplied by local artisanal boat builders. Boat builders usually charge the following labor rates based on the length of the vessel, to wit: 16 foot at P2,000.00; 24 foot at P5,000.00; 27 foot at P8,000.00, and 35 foot at P12,000.00 (FGD information). Capital investment in the boat building trade are minimal, mainly tools, including electric drill bit, chisel, square, hammer, saw, planer and C-clamp. Material cost for one unit ranges from P8,000 to P18,000, which are usually paid up front by the customer. These rates do not include the cost of engine and propeller assembly. It takes 10-15 days to construct a single unit.

Hence, for the typical non-motorized vessel a municipal fisher uses, the total cost would be P10, 000 per unit, and around P20,000 if retrofitted with 6.5 HP engine and propeller assembly.

b. Fishing gear

Materials used in the manufacture of fishing gear are supplied by local hardware stores and are assembled by the fishermen themselves, such as net sewing and attachment of twine and sinkers for gill and cast nets, etc.

The usual commodity assistance provided by the government, through BFAR, is distribution of free fishing gear to cooperatives for the collective use of members.

c. Ice and Cold Storage

Ice is usually supplied by ice distributors or ice dealers located in public markets that sell on a per block (at P20/block) basis and crushed. Among survey respondents, around half practiced bringing ice on their fishing expeditions to immediately chill their catch.

Fishing communities in the region rarely use or have access to cold storage facilities (CSF), with less than 1% of fishermen surveyed opting to use such facilities. This is either because there are no available facilities nearby or eschews the cost of cold storage and resort to using crushed ice. In any case, cold storage users only store their catch for less than a week at a time.

10.6 Market Preference and Technologies Required

10.6.1 Fresh/chilled Seafood – for most municipal fish catch

Table 11-8 Market Preference (Fresh/Chilled Seafood)

PREFERENCE	FINAL CONSUMER	DESTRIBUTOR
Product form	Fresh, chilled	Fresh, chilled
Desired product quality and characteristics	Fresh, no spoilage	Fresh, no spoilage
Desired packaging	Whole round	Whole round
Desired place of sale and manner of procurement or delivery	Wet market	Consignacion
Buying price	Common = P86-118/kg Squid, octopus- P240/kg, Lobster (live) = P3,800/kg, snapper = P148-220/kg	Common = P60-80/kg Squid, octopus- P150/kg, Lobster (live) = P2,400/kg, snapper = P100-150/kg

Table 11-9 Technology to Meet Market Preference (Fresh/Chilled Seafood)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	N/A	N/A
Packaging technology	Good Manufacture Practice (GMP), Hazard Analysis and Critical Control Points (HACCP)	fishers – none Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Ice slurry, blast freezing	fishers - crushed ice; access to CSF negligible Distributors – crushed ice; access to freezers, CSF
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Cold-chain facilities Sanitary containers	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration	Growers – none Distributors - basic food safety & refrigeration
Others (please specify)		

Based on household survey, the preferred product form is fresh/chilled and frozen, chilled, and dried as the least preferred forms (at 1% each). Based on FGD, KII, and HH survey results, it was determined that most municipal fishermen have not received any sort of post-harvest handling and quality management as the focus of government technical extension has been mostly related to fishing regulations, resource management, and post-harvest processing (drying, salting, smoking). This post-harvest processing has been perceived as not very essential since the preferred product form is fresh. Such processing forms have very little value-added and are conventionally done when there is excess supply.

At the consignacion, brokers and viajeros have access to ice plants and ice-crushing equipment. They are also equipped with sanitary and insulated containers, such as plastic crates, plastic pallets, and styrofoam boxes. Fish cars used by viajeros have either metal plastic bins or styrofoam boxes.

The relatively simple value-chain for fresh/chilled harvest means that fishermen have the capacity to meet consumer requirements, but not the capability since they do not possess the means of marketing and distribution, as well as access to cold-chain facilities. Although not yet the norm, some organized fisher folk cooperatives have effectively moved up the value chain to handle distribution.

10.7 Cost and Margin

Unless their catch is comprised of high-value seafood, like lobster or grouper, margins at the primary processing segment (fishing operations) are relatively low. This is because beach price of catch is equally low. There are myriad factors for the low value of catch, the primary one being oversupply during peak seasons. Another major factor is poor quality, which, when dealing with fresh seafood product is usually an outcome of poor refrigeration and preservation. Related to this is the lack of storage facilities. Although a scant minority of the respondents gave compulsion to repay loans as a factor, the prevailing unfair practices exercised by the *suki* privilege and the *consignacion* system contribute to further depression of value of produce.

Relative to margins along the buyer channel, processors usual enjoy the highest margins. This is because of the cost investment in processing facilities, as well as the large disparity between international market price and local acquisition cost by the processor/exporter.

Margins along the intermediary/middlemen segments are nominal, but are exacerbated by unfair trade practices.

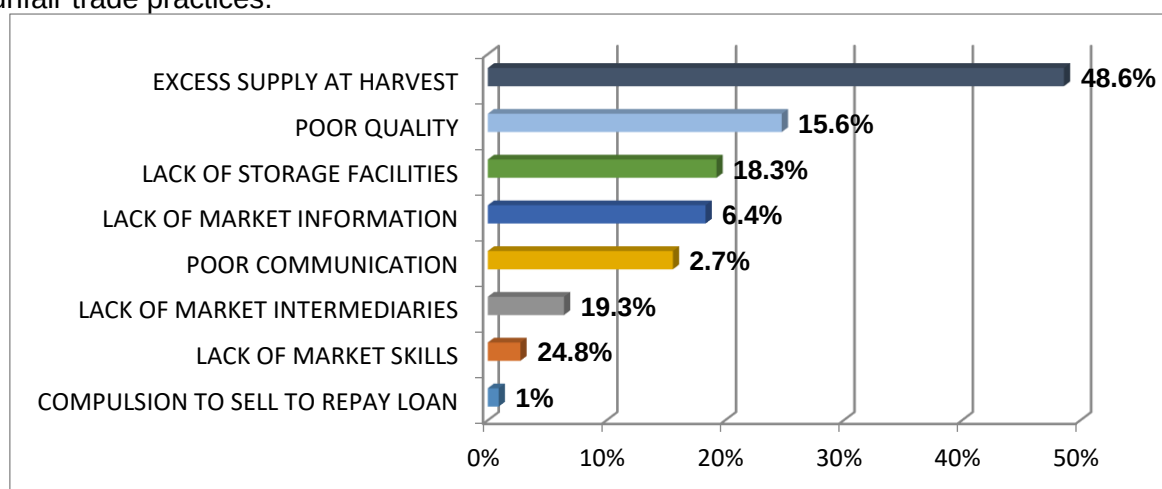


Figure 11-13 Factors Negatively Affecting Beach Price

Source: Household Survey

10.8 Other Benefits for Target Farming and Fishing Households

10.8.1 Employment and consequent benefits

Most fishermen are self-employed and receive no pecuniary benefits that are required by law. In some cases where cooperatives are big enough to hire personnel, some members are employed on a temporary basis to perform ancillary operations, such as net repair while other household members, mostly women, take on support or administrative functions. As such, however, incomes are not substantial, with household survey results showing that their average annual income is only approximately P70, 000 per annum.

10.8.2 Farming/Fishing households as suppliers (of services and goods other than agricultural products) and consequent benefits

Some fishermen and their household members perform non-fishing jobs either as a regular occupation, like boat building or as vendors (for women mostly), or occasionally, like support labor for boat building, net and boat repair, etc.

10.8.3 Access to resource base and consequent benefits

Access to resource base and facilities is high, but collectively (as a member of a cooperative) and limited to small amounts. This enables fishermen to have a more regular means of income without having to invest substantially for operational costs.

Access to production inputs is augmented by periodic government programs, where they distribute means for production, such as nets and gear.

10.8.4 Access to technology/projects/trainings/services and consequent benefits

Access to technology is limited because it is largely dependent on the frequency of government and NGO programs.

10.8.5 Access to information and consequent benefits

Access to information is severely limited because of the lack of facilities that provide information.

Membership in cooperatives facilitates access because such organized structures enable individual fishermen to pool resources and have a continued means of livelihood without having to invest their own resources. This also enables them with access to collective resources to expand to other enterprises and move up the value chain.

Government intervention is also implemented through these cooperatives and associations.

10.9 Resource and Industry Governance

Security of access is tenuous because for the most part, fishermen do not have ownership of the resource base or even the properties where they reside. Furthermore, their resource base is highly vulnerable to factors, such as weather, seasonality, the observed diminishing productivity and abundance of the resource base, and even risk from ever-increasing extreme weather events.

Government programs to regulate fishing activity, as well as maintain and rehabilitate coastal ecosystems, particularly, mangrove areas, coral reefs, and other spawning grounds help mitigate risks and potential loss of livelihood.

10.10 Summary of Issues for Attention

10.10.1 Buyer Channel

In order for primary producers to partake of the high margins in the buyer channels, they have to move up in the value chain. Trimming down marketing layers, through cooperatives, should be encouraged to market production directly to retailers, thereby bypassing the traditional market layers.

For the fresh/chilled market, fishermen that have organized into cooperatives should invest in facilities and equipment that would enable them to market, distribute, and even retail their own product. This would also simplify the supply chain and eliminate antiquated institutions like the *consignacion* and *suki* system, as well as allow them to take on the role of *viajeros*.

Quality can be improved by introducing cold-chain system in the supply chain and enabling growers' access to CSF facilities and capabilities. Equipping municipal fisher folk communities with cold-chain facilities, equipment, and providing training on GMP, HACCP, and Basic Food Handling & Refrigeration would substantially improve the quality of their catch and enable them to impose the higher market value that are currently declared by intermediaries and middlemen. Moreover, CSF facilities would enable them to the option of storing surplus produce during peak seasons.

10.10.2 Input Supply Channel

Aside from buyer channels, fisher folk cooperatives may also extend their operations to the input supply channel, such as boat building, fishing fabrication sale, etc.

A cooperative may explore the possibility of importation and sale of fiberglass boats, which are only more expensive by P5,000 per unit, but quicker to finish and hardier. With the right equipment, the cooperative may later opt to fabricate these boats. The cooperative may then be able to sell boats at a much brisker pace and, if to a member, at a staggered payment basis, as a benefit of membership.

Another potential input supply channel role is in “crushed ice” making and distribution. The cooperative may purchase ice blocks from ice plants and do the crushing locally. This requiring some investment in an ice crusher and small cold storage facility or makeshift refrigerated “bodega” similar to the ones utilized by ice dealers in wet markets.

In this manner, fishermen are encouraged to employ ice regularly as part of their on-board catch stowage and post-harvest process, thereby, promoting quality and freshness of their catch.

10.10.3 Primary Activities / Operations

The diminishing productivity of capture fisheries and the relatively high vulnerability of the resource base, compounded by the general inadequacy of incomes from this livelihood, should be the bases to introduce fishermen to alternative and more lucrative economic activities, particularly, in aquaculture since their proximity to the coast, familiarity with the cultured species, and experience with factors affecting production, such as weather, water parameters, etc. make it possible for them to shift to fish cage farming, with some training and material assistance.

12 THE PRAWN INDUSTRY

12.1 General Industry Overview

The prawn industry is a special subsector of Caraga’s aquaculture industry due to its economic importance and its historical significance to the development of the region’s economy. Focus has been given to this sub-industry likewise upon the instruction of the Philippine Cold Chain Project, which commissioned this study.

Prawn refers primarily to tiger prawn (*Penaeus monodon*), which is produced through inland aquaculture, specifically, in land-based brackish water ponds. In recent years, the prawn industry has come to include the non-native pacific or western white shrimp (*Penaeus vannamei*), which is, on a national level, gradually surpassing tiger prawn in terms of volume of production. To a much lesser degree, the local prawn industry also includes the production of the Indian white shrimp (*P. indicus*).²⁰

In the 1980s, when Philippine Aquaculture was at its height – with tiger prawn as the “darling” of Philippine growers – Agusan del Norte in the Caraga Region was among the areas in Mindanao that experienced much success, along with other prawn-producing provinces in Luzon and the Visayas. However, when the industry crashed in leading high-density production areas in the Philippines, aquaculture in Agusan del Norte crashed along.

This was due to the onslaught of diseases brought about by the unbridled intensive culture and unregulated expansion – first, with the virulent strain of vibriosis and luminous bacterial (*lumbac*) infections in the 1990s and white spot syndrome virus (WSSV)

in the early 2000s, subsequently delaying the industry’s recovery and rendered many production areas still unsuitable for commercial tiger prawn production.²¹

From the third largest producer of tiger prawn in the world in 1993, the Philippines has become very sluggish in its production performance, dropping to the 9th place in 2002, and 10th in recent years, with a measly production share of 1.4%. Production volumes of tiger prawn reached almost 95,000 MT in 1993. However, after the disease outbreaks and crop failures, production dropped dramatically (see Table 12-1).

²⁰ Garcia, 2013. p. 24

²¹ Ilagan, Lauro. 2008. Aquaculture in Mindanao: Transcending the Barriers. Tambara Research Journal. Ateneo de Davao University. Philippines.

Table 12-1 Table 12 1 RP ranking in world prawn production, then and now

WORLD SHRIMP PRODUCTION AND RANKING BY % SHARE, 1993		
Country	Rank	Production (MT)
China	4	87,856
Thailand	1	225,515
Vietnam	7	39,402
Indonesia	2	138,578
Ecuador	5	83,404
India	6	62,000
Mexico	10	11,500
Bangladesh	8	28,525
Philippines	3	95,816
World Shrimp Production and Ranking by % Share, 2002		
China	1	384,141
Thailand	2	162,400
Vietnam	5	67,500
Indonesia	3	159,182
Ecuador	6	60,000
India	4	114,970
Mexico	8	45,853
Brazil	6	60,000
Bangladesh	7	57,581
Philippines	9	37,477
World Shrimp Production and Ranking by % Share, 2010		
China	1	1,100,000
Thailand	2	552,000
Vietnam	3	384,000
Indonesia	4	359,000
Ecuador	5	165,000
India	6	145,000
Mexico	7	99,200
Brazil	8	72,000
Bangladesh	8	72,000
Myanmar	9	66,000
Philippines	10	44,000

Source: FAO *Fishtat Plus and Aquafauna Bio-Marine*, 2012

In 2002, in response to the crisis in the production of tiger prawn, the Philippine government approved the introduction of vannamei for commercial farming.²² Since then, the prawn industry on a national level has shown a radical shift towards the white shrimp as an alternative to tiger prawn production, having shown a resiliency against WSSV.

Due to the high production costs compared to other countries, vannamei distribution is currently limited to the domestic market, estimated at 16,200 MT annually in 2011 (Fig. 12-1). This is lower than the production capacity of existing farms that are able to produce pacific white shrimp at perhaps more than 20,000 MT per year.²³

²² Van Duijn, Arie Pieter, R. Beukers, and W. Van der Pijl. March 2012. The Philippine Seafood Sector: A Value Chain Analysis. Centre for the Promotion of Imports from developing countries (CBI). The Netherlands, p. 11

²³ Ibid

However, the recent global outbreak in 2012 of yet another disease, the Early Mortality Syndrome (EMS) – this time affecting vannamei stocks – has caused a massive decline in world shrimp production, pushing shrimp prices up rapidly.²⁴

The current high world price due to insufficient supply has sent Philippine exporters on a mad scramble for white shrimp, only to find the local production grossly inadequate. Thus, the EMS outbreak has presented an opportunity for the Philippines (which is, fortunately, still EMS-free), causing local farmers to ramp up their production and making new investors come in.²⁵

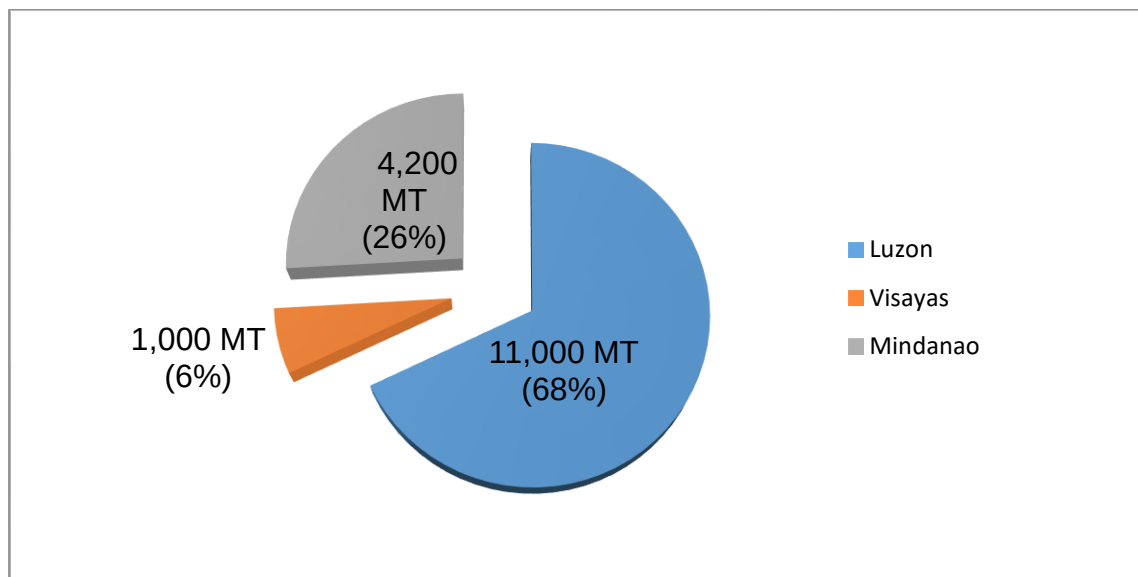


Figure 12-1 Western White Shrimp (*P. vannamei*) Production in the Philippines 2011

²⁶ Source: *Agriculture Monthly*, 2012

12.2 Production

At present, tiger prawn, contributing around 17.5% of total production (Fig. 12-2), is still the second largest aquaculture product in the Caraga region, but remains a significant presence in only three provinces: 1) Agusan del Norte (particularly in Butuan City, and the municipalities of Magallanes and Buena Vista) and partly in the Surigao del Norte (in the municipality of Placer), and as well as in Surigao del Sur (Hinatuan and Bislig).

Locally, though not yet substantial, white shrimp is now being reared in some former prawn areas in Agusan del Norte, particularly, in Magallanes, Buena Vista, and Butuan City, providing 3.85% of total aquaculture production.

²⁴ The FishSite. July 31, 2013. "Shrimp Prices Rise Globally". <http://www.thefishsite.com/fishnews/20877/shrimp-prices-rise-globally#sthash.mQQY7w74.dpuf>

²⁵ Cabrera, Daniel. *Penaeus vannamei*: Finally Taking Off in the Philippines? *Tateh Aquaculture News*. October 30, 2013. Philippines.

²⁶ Guerrero, Rafael. Update on White Shrimp Farming. *Agriculture Monthly*, vol. XVI, October 2012. Philippines

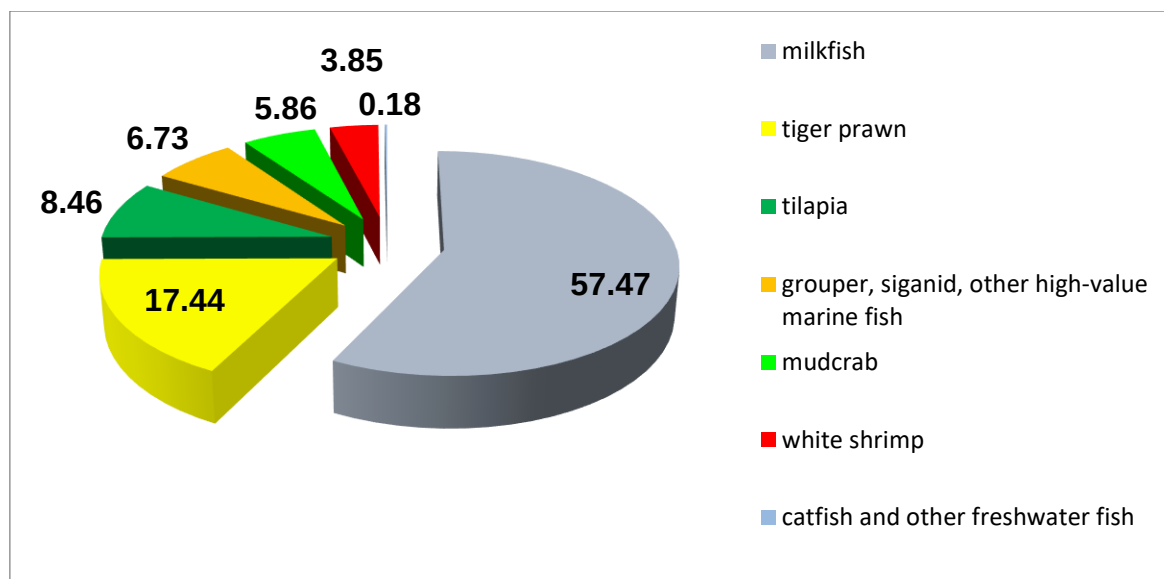


Figure 12-2 Percent Share of Aquaculture Production in Caraga Region, by Commodity

Source: BFAR, 2011

The value of production obtained from the Prawn Industry of the region reached a gross value of P2.15Billion for the period 2008-2012, posting a share of 58.45%. The Province of Surigao del Sur garners the highest value for prawn production at a total of P1.26 Billion (2008-12) and accounts for nearly 60% of total brackish water production in the region, as compared to P631.88 Million and P262.69 Million gross value, with corresponding share of 29.35% and 12.20% for Agusan del Norte and Surigao del Norte, respectively. The Surigao provinces (including Dinagat Island), however, show declining production trends for the period 2008-2012 as this could be attributed to the declining utilization of productive fishpond areas for production (see Table 12-2).

Table 12-2 Annual Value of Aquaculture Production in Caraga, per Province

Area	ANNUAL VALUE OF PRODUCTION `000 Pesos				
	2008	2009	2010	2011	2012
CARAGA					
Aquaculture	1,041,823.88	759,198.28	647,480.34	601,281.65	628,124.77
*Brackish water FP	621,926.01	400,760.25	399,828.32	369,273.75	361,333.05
Agusan del Norte					
Aquaculture	322,219.33	170,708.29	151,586.14	137,093.74	168,544.30
Brackish water FP	236,392.30	85,657.26	107,136.39	92,407.19	110,290.51
Agusan del Sur					
Aquaculture	15,814.25	13,347.55	10,294.87	10,450.33	13,001.09
Brackish water FP					
Surigao del Norte*					
Aquaculture	214,072.46	198,184.52	128,383.65	90,997.20	92,087.49
Brackish water FP	58,858.38	61,129.85	66,360.84	40,973.00	35,369.67
Surigao del Sur					
Aquaculture	489,717.84	376,957.92	357,215.68	362,740.49	354,491.89
Brackish water FP	326,675.33	253,973.14	226,331.09	235,893.56	215,672.87

*Brackish water fishpond is part of aquaculture

* Including Dinagat Island

Source: BFAR, Caraga

12.3 Market Demand

The prawn sub-sector is still reeling from the onslaught of diseases. Notwithstanding the country's diminished performance in prawn production, this commodity still ranks third in total fishery products exported with a total value of P2.6 Billion (see Table 12-3).

Table 12-3 Major Philippine Fishery Exports

COMMODITY	QUANTITY (MT)	FOB VALUE	
		('000\$)	('000 Pesos)
Tuna	76,888	294,114	12,670,439
Seaweeds	46,252	212,125	9,138,326
Shrimp/Prawn	6,715	60,497	2,606,222
Crabs/crabs fat	6,164	58,228	2,508,479
Octopus	9,577	36,902	1,589,756
Grouper	6,023	21,751	937,052
Squid and Cuttlefish	5,704	23,016	991,542
Ornamental Fish, Live	5,503	6,650	286,476

Source: BFAR, 2011

Table 12-4 Export markets for frozen shrimp (MT and US\$)

	EU		US		JAPAN		OTHERS	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
2006	369	3,077	2,439	12,763	9,175	46,960	6,758	95,441
2007	330	3,092	1,444	7,834	7,524	41,505	5,741	81,760
2008	336	3,017	948	5,396	6,376	37,167	4,217	65,763
2009	372	2,461	1,194	4,983	7,776	36,080	3,790	51,904
2010	219	1,483	1,467	6,874	7,066	33,581	3,331	50,103

Source: ITC (2011)

Prawns are one of the major high-valued transnational agro-food commodities, with a total annual production worth over US\$10 Billion at the farm gate and over US\$60 Billion at the point of retail. It is the most popular seafood in North America and other developed nations.

Frozen head-on, head-off, and peeled shrimp were the major products for export to the main markets, namely, the USA, EU and Japan (Table 11). Later, value-added products, such as microwavable or ready-to-cook *tempura*, *sushi*, *shaomei*, *hargao*, and other preparations have become more popular. Chilled product, which is sold in domestic markets, is generally non-exportable grade and shares less than 10% of all markets. Live product, which is mainly for domestic Chinese restaurants with some exports to Hong Kong and China, also shares less than 2%. In general, *P. monodon* is the most prominent farmed crustacean product in international trade and has driven a significant expansion in aquaculture in many developing countries in Asia, including the Philippines.²⁷

Around 2011, however, a hitherto unknown disease of cultured shrimp commonly known as early mortality syndrome (EMS) or more technically known as acute hepatopancreatic necrosis syndrome (AHPNS) appeared to have been infecting the shrimp aquaculture sector in Asia. The susceptible species included *P. monodon* and *P. vannamei*. The earliest

²⁷FAO. http://www.fao.org/fishery/culturedspecies/Penaeus_monodon/en#tcNA0019

publication on EMS, which reported the first occurrence of this disease in Southern China and Hainan Island in 2010 and subsequently in Viet Nam and Malaysia in 2011.²⁸

The spread of EMS throughout Asia, the largest shrimp production region in the world, causing primary producers, like China, Thailand, and Vietnam to experience sharp declines in their respective productions. In 2013, China's shrimp production, in particular, dramatically decreased, suffering a 20% decline from 1.4 Million MT produced in 2012 to 1.1 Million MT. It accounted for the lowest shrimp production rate in China since 2008. Similarly, Thailand's shrimp exports already dropped by a reported 49% since 2013, decreasing from 7,082 to 3,583 metric tons during January and February of 2014.²⁹

The effect of the onslaught of EMS on the world shrimp trade can be observed in the trend in shrimp/prawn imports of the USA, one of the biggest buyer's worldwide (see Fig. 12-3). The volume of shrimp/prawn imports to the US dropped sharply by 43,346.98 MT, starting 2012, with a corresponding decline in value of imports by around US\$318 Million. However, in 2013, despite the continued drop in imports by almost 26,000 MT, value shot up by 26%.

The global rise in shrimp prices and the failure of major shrimp/prawn producers to fill the supply gap has opened up prospects for the local shrimp industry, which has – due in part to strict regulatory measures by BFAR to prevent the entry of EMS to the country by suspending the importation of live shrimp species – remained EMS-free. Particularly, for vannamei growers, mainly in Luzon, who were content with the P280/kg farm gate price in 2011, but experienced a jump to P350/kg late 2013, and further up to P380/kg as of April 2014, they are now given more incentive to increase production.³⁰

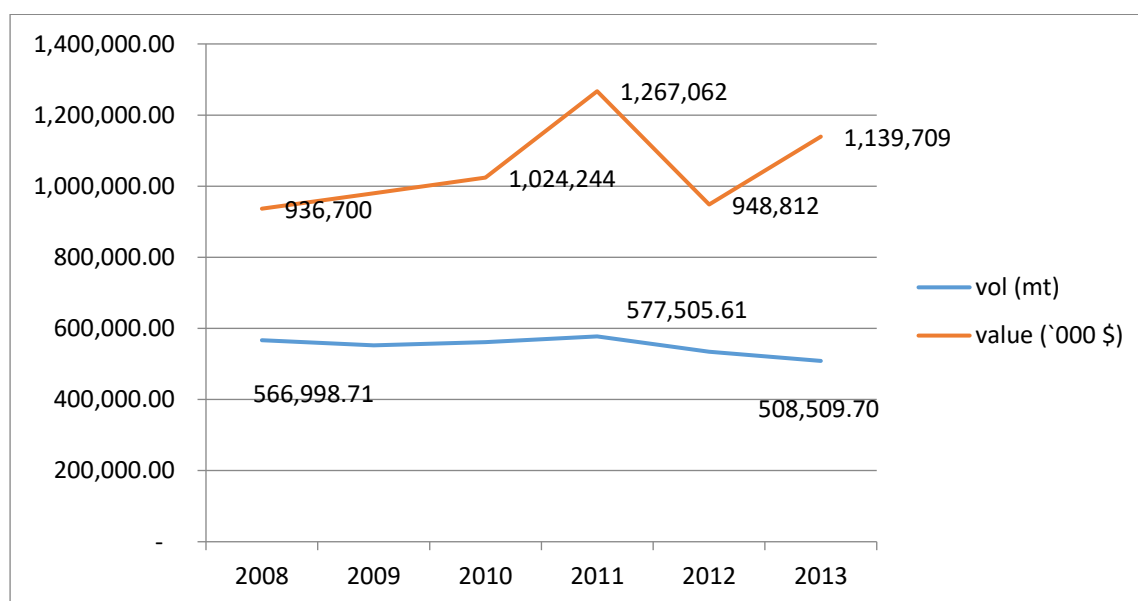


Figure 12-3 US Shrimp Imports (Volume and Value)

Source: US trade data, 2013

²⁸FAO. 2013. Report of the FAO/MARD Technical Workshop on Early Mortality Syndrome (EMS) or Acute Hepatopancreatic Necrosis Syndrome (AHPNS) of Cultured Shrimp, in Hanoi, Vietnam, June 25-27, 2013. FAO Fisheries and Aquaculture Report No. 1053. FAO, Rome. p. 1.

²⁹Florida Organic Aquaculture (FOA). April 15, 2014. 2013 Shrimp Production Decline Spurs Change in Exporter Lineup. FOA News. <http://flaquaculture.com/blog/?p=461>

³⁰BAS data

12.4 Industry Players

As earlier discussed in the section on Aquaculture, most of the big companies that were operating in the region in the 1980's to 1990's were mainly involved in the prawn industry. When the industry collapsed, most of them ceased to operate. Presently, a number of companies are still present in the region, but either in upstream industries, such as feeds distribution, or in downstream industries, mainly processing.

12.4.1 Primary Processing (Grow-out)

As with other aquaculture commodities in the region, the prawn grow-out sector in the region is mostly composed of small fishers/operators, except for a few medium to large-sized fishpond operators with production areas reaching 35-64 has. And each individual operation valued at approximately P8 Million and above (data from household survey, KII). The rest of fishpond operators, the majority of whom are operating in Surigao del Sur, are Fishpond Lease Agreement (FLA) holders are small operators with a production area of 1 to 5 hectare each.

Although there is no existing government data that would present the distribution of prawn growers according to scale of operations, it could be inferred from secondary-source information (see Table 9) and supported through FGD/KIIs conducted, that most (approximately 60%) of the small prawn growers are located in Surigao del Sur province while operators with larger production areas (including major prawn-producing cooperatives) are concentrated in Agusan del Norte (around 30%) and to a lesser degree in Surigao del Norte (approx. 10%). Agusan del Sur and Dinagat Island are not known to have any brackish water prawn operations.

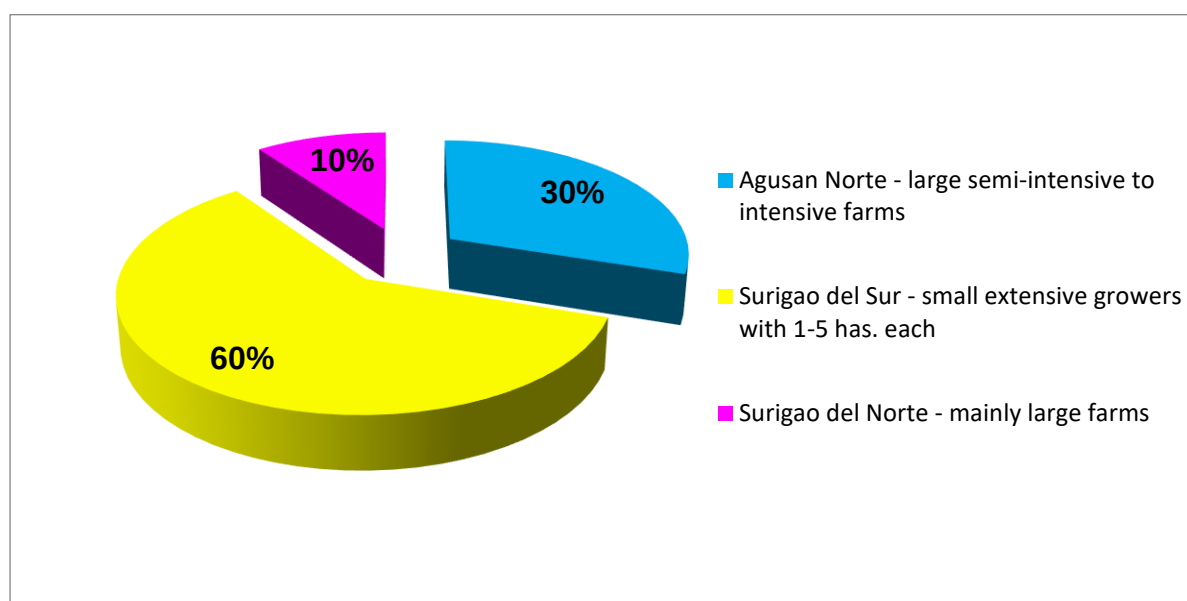


Figure 12-4 Distribution of Prawn Growers in the Region based on Scale of Operations

Source: BFAR-Caraga, FGD, KII

Over the years, however, production by smaller growers, mainly in Surigao del Sur, has been diminishing as more and more of them reduce the scale of their operations, shift to less capital-intensive commodities like milkfish, or even opt out of business due to the diminishing productivity of their ponds, exacerbated by rising operation costs.

Table 12-5 Registered Prawn Farms in Caraga (As of Sept. 30, 2013)

	COMPANY NAME	LOCATION	AREA (HA)
1.	Buenaflor Fish Farm Corp.	Brgy. Rizal & Sabang, SDN	64.0
2.	Baug Carp Beneficiary Farm	Panaytayon, Magallanes, ADN	
3.	Henry Teng Fishpond	Taod-oy, Magallanes, ADN	35.0
4.	Jimmy Bolido Farm	Tago, SDS	11.0
5.	Jida Aqua Resources	Caloc-an, Magallanes, ADN	3.5
6.	Barcenas Farm	Pandugcan, Lapaz, Bayabas, SDS	2.4
7.	Pandugan Lapaz Farm	Lapaz, Bayabas, SDS	2.0
8.	Sanchez Farm	Purok Pinya, Mercedes, Tago, SDS	1.4
9.	Annabel Farm	Malimbong, Tago, SDS	2.0
10.	Jose Amparo / Dobouzet Farm	Taod-oy, Magallanes, ADN	42.0
11.	Hygino Arim Farm	Balilahan, Tandag City, SDS	3.0
12.	Ludivina Sabanal Farm	Cabugan, Tandag City, SDS	2.2
13.	Vergenia B. Benimili Fish Pond	Macda, ADN	1.0
14.	Caasinan Agri-Aqua Farm Corp.	P-2 Kauswagan, Cabadbaran, ADN	7.0

Source: BFAR

12.4.2 Input Supplier: Hatcheries

Prawn hatcheries operating in the region exclusively produce tiger prawn since none of them are certified to breed white shrimp. All prawn hatcheries in the region are privately owned and have small-to-medium sized operations with an average value of P2 Million (KII data).

Table 12-6 Prawn Hatcheries in Caraga

NAME	LOCATION
Mede Prawn Hatchery	Tagcatong, Carmen, Agusan del Norte
Sto. Nino Prawn Hatchery	Sitio Bolihon, Tagcatong, Agusan del Norte
Mina Prawn Hatchery	Sitio Anahaw, Tagcatong, Agusan del Norte
Cahagan Prawn Hatchery	Cahayagan, Carmen, Agusan del Norte
Cabatuan Prawn Hatchery	Poblacion, Carmen, Agusan del Norte
Ashlee Prawn Hatchery	Tagcatong, Carmen, Agusan del Norte
Vic Tubo Prawn Hatchery	Poblacion, Carmen, Agusan del Norte
Asia Prawn Hatchery	Amontay, Nasipit, Agusan del Norte
RM Prawn Hatchery	Amontay, Nasipit, Agusan del Norte
RT Prawn Hatchery	Amontay, Nasipit, Agusan del Norte

Source: BFAR, Caraga

12.4.3 Input Supplier: Feed Companies

All of the commercial prawn feed distributors that supply to the region can be categorized as large-scale aqua-feed producers with nationwide operations, such as Tateh Premium Feeds Corp., Oversea Feeds Corp., B-Meg Feeds (a subsidiary of San Miguel Corp.), and Charoen Pokphand (CP) Feeds Corp. Their respective feed mills are located outside the region, but most have distribution branches and warehouses situated locally.

12.4.4 Outbound Logistics: Processors

Unlike other aquaculture subsectors, where small-scale processors exist (such as for dried fish, bottlers, fillet), shrimp processing is exclusively undertaken by private medium-large-

scale companies because of the intensive capital required to establish plant facilities and for operations, including the acquisition of the necessary government and industry certifications and permits. Locally, only HJR Intl. Corp. is the only remaining processing company operating in the region. The rest of local prawn harvests that are intended for export are processed outside the region through buyer/wholesaler channels.

This is consistent with the national trend in recent years, where, as a result of declining shrimp supply, many exporters closed down their factories. As in the region, most of the remaining shrimp processors in the country are medium to large size companies. From this it could be inferred that small companies could not sustain processed shrimp operations in the current local business environment, unless it processes various products for multiple markets or is part of an integrated system with its own hatchery, feed mill, farms, and processing facilities, and has complete control over input and output.³¹

12.5 Overview of Value Chains

The prawn industry is predominantly a full-cycle aquaculture system, where hatchery operations are fully developed and integral to the “core” business, with upstream activities including feed supply and brood stock/ spawn supply as outsourced activities. As such, the value chain diagram presented for Aquaculture in general is also applicable to the prawn subsector:

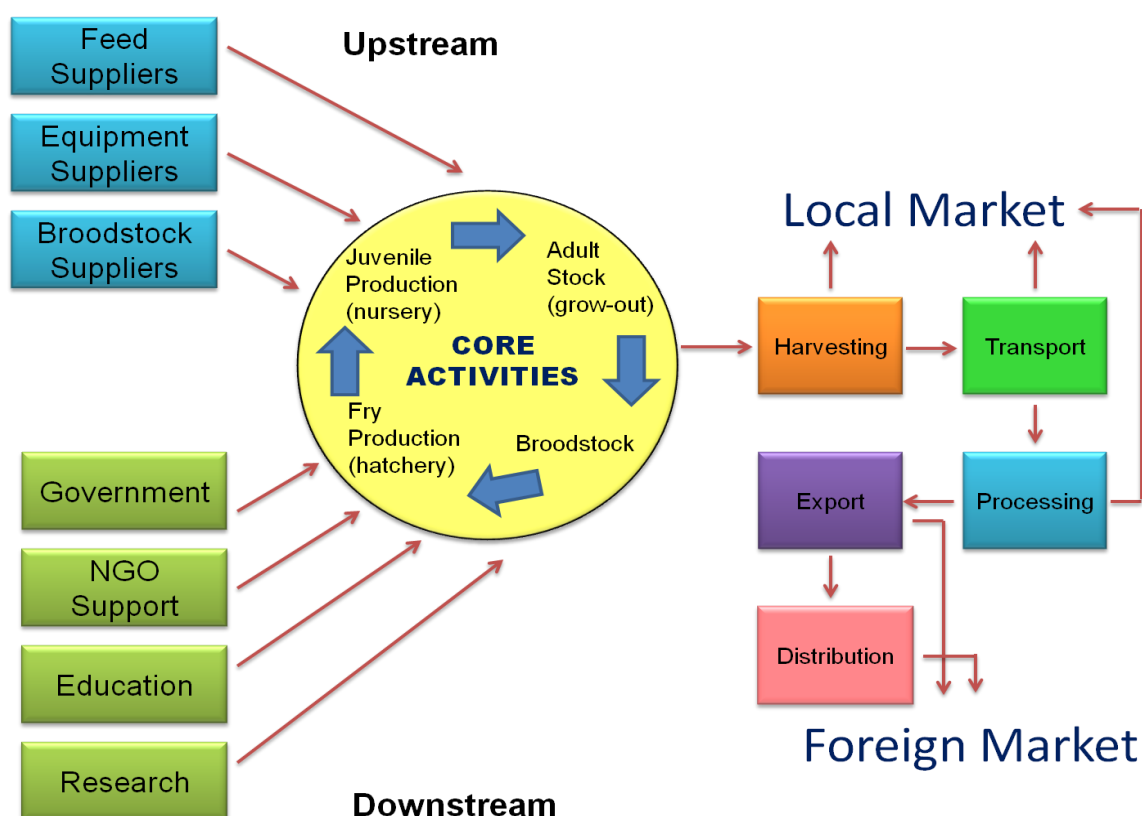


Figure 12-5 Prawn Subsector Value Chain

As in the aquaculture value chain, the segment in which there is the most smallholder participation is in the grow-out production segment. From this perspective as the “core business,” the value chain could then be illustrated as such:

³¹ Van Duijn, et al, 2012.

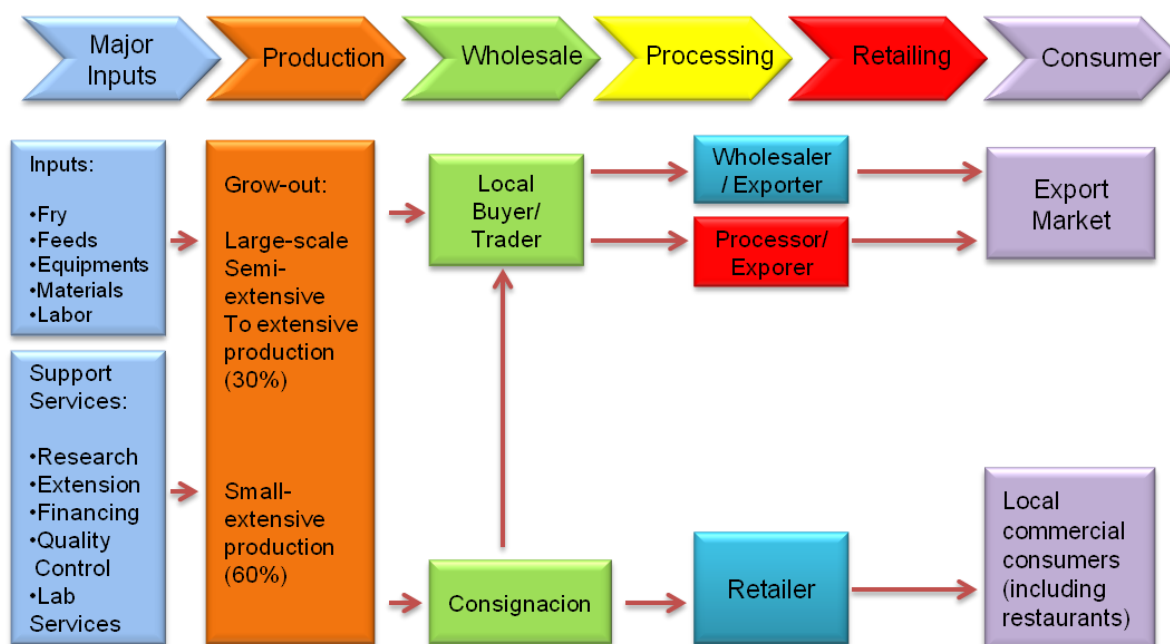


Figure 12-6 Value Chain of Prawn Culture

Table 12-7 Processed Prawn (for Export Market) from Large-scale Commercial Farmers

	Price/kg	Margin
Grow-out Production (Large Scale)	P260-P320	50-70%
Buyer Trader	P300-360	12-15%
Exporter (Wholesaler or Processor)	Vannamei = P2,500 Tiger prawn = P4,300	730- 1,094%

The value-chain for large-scale commercial farming to produce processed prawn for export is fairly straight-forward, with minimal players along the buyer channel. This is primarily because of the system developed by the big players during the industry's halcyon days, where they virtually dominated the chain, either as fully integrated operations (from hatchery, grow-out, all the way to processing, like AA Export/Import Corp.), or where a big processing plant or exporter would directly procure harvest from growers through contract-growing arrangements. Another set-up would be for big growers to transact directly with the exporters. Either way, middlemen and brokers were virtually eliminated from the chain by these big players as a way to absorb most of the margins and implement a strict traceability record, which was a requirement by most importing countries.

At present, even with reduced supply and demand, large-scale commercial farmers still mostly sell their products directly to processors. This is also the case for almost all white shrimp growers.

12.5.1 Local Buyers and Consignacions

However, shrimp harvested from the numerous smaller-scale polyculture farms are mostly traded through middlemen, who endeavor to meet minimum volume requirements by scouring the provinces for available harvest, consolidating them, and shipping off to his client, who may be a wholesaler, processor, or exporter based in either Cebu or Manila.

12.5.2 Processing and Export Companies

Medium-sized processing companies generally do not have their own farms but depend more on individual farmers, middlemen and the fish market.

It is important to note that unlike the situation in Vietnam and Indonesia, Philippine shrimp is mostly exported as block frozen or semi-Individual Quality Frozen (IQF). Processing activities are mostly limited, as shrimp products for Japan and other Asian countries are mostly unpeeled and always headless. The limited processing requirements in these markets mean that exporters have slightly larger profit margins for black tiger prawn compared to pacific white shrimp, as the demand for the latter is mostly in peeled and headless products. From the total export basket, approximately 75% is exported as block frozen, 15% as semi-IQF and only 10% as IQF.³²

Table 12-8 Processed Prawn (for Export Market) from Small-scale / Polyculture Farmers

	Price/kg	Margin
Small- scale or polyculture grow-out production	P260-P320	50-70%
Consignacion	P300-P360	12-15%
Buyer Trader	P340-P400	11-13%
Exporter (Wholesaler or Processor)	Vannamei = P2,500 Tiger prawn = P4,300	730-1,094%

Most shrimp from small-scale producers are traded through the local fish market or consignacion, where traders collect all the shrimp and sell them to exporters. The fact that small scale producers are not registered and market their product through middlemen or the fish market creates several issues relating to traceability and food safety. Notwithstanding, it is important to note that, oftentimes, these small growers are not aware that their harvest still ultimately ends up for the export market, a tact used by local buyers to cement their place in the supply chain (FGD and KII data).

Table 12-9 Fresh/chilled Prawn/Shrimp (for Domestic Market)

	Price/kg	Margin
Small- scale or polyculture grow-out production	P260	50-70%
Consignacion	P300	15%
Buyer Trader	P340	13%
Domestic Retail Market	P360	6%

Domestic supplies are almost always distributed through local fish markets and are mostly portions of the harvest that are undersized and fall below sizes required by processors.

Factoring in the circuitous route of shrimp/prawn produced by small and polyculture growers, it is estimated that 60-70% of the produce is exported and that 30-40% is distributed on the domestic markets.



Figure 12-7 Prawn Fry Value Chain

³²ibid

Going backward to the supply channel, the grow-out sector is supported by a highly developed seed stock supply system. Again using the milkfish industry as an example, it can be observed that prawn growers are served by independent private hatcheries operating in the region, although, in the case of vannamei, there are no accredited local hatcheries and growers procure their fry from accredited hatcheries in General Santos City, Cebu, or Luzon.

Suppliers of wild-caught fry have gradually diminished because of preference for better quality hatchery-bred fry.

Broodstock are periodically replenished and purchased from the wild or from international sources, especially for white shrimp breeders, which require SPF (specific pathogen-free) certification.³³

Table 12-10 List of Accredited P. vannamei Hatcheries in the Philippines

HATCHERY	LOCATION
Abalos Hatchery	Zambales
Conching Hatchery	Zambales
Orient Sun Marine Products	Zambales
Charoen Pokphand Foods Philippines Corp.	Zambales, Negros Oriental, Gen. Santos City
Star Hatchery	Zambales
Jamandre Hatcheries, Inc.	Guimbal, Iloilo
Dobe Hatchery	Cebu, Bohol
Oversea Hatchery	Cebu
Vannamei Hatchery, Inc.	Cebu
Global Gen Hatchery	Cebu
Marcela's Frontier Resources Inc.	Bohol
Aquaski Prawn Hatchery	Sta. Cruz, Davao Del Sur
Sta. Cruz Vannamei Hatchery	Sta. Cruz, Davao Del Sur

Source: BFAR

12.6 Market Preference and Technology Required

12.6.1 Processed Shrimp/Prawn – for export

Table 12-11 Market Preference (processed prawn)

PREFERENCE	FINAL CONSUMER	OTHERS
Product form	Block frozen or semi-Individual Quality Frozen (IQF) Head-on or head-off Peeled or unpeeled Size dependent on buyer requirement	Fresh, chilled

³³As of March 2013

Desired product quality and characteristics	Grade A and B Fresh, no spoilage, etc.	Fresh, no spoilage
Desired packaging	Block frozen or semi- IQF	Whole, head-on, unpeeled
Desired place of sale and manner of procurement or delivery	Wet market, grocery	Farmgate
Buying price	Vannamei = P2,500/kg Tiger prawn = P4,300/kg	P260-320/kg

Table 12-12 Technology to meet market preference (processed prawn)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	Primary (peeling etc.) Secondary - <i>tempura</i> , <i>sushi</i> , <i>shaomei</i> , <i>hargao</i>	None
Packaging technology	Good Manufacturing Practice(GMP), Hazard Analysis and Critical Control Points (HACCP)	Growers – none Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Block, IQF	Growers - crushed ice Distributors – crushed ice
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Cold-chain facilities Sanitary containers	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration	Growers – none Distributors - basic food safety & refrigeration
Others (please specify)	EU certification, etc.	

Fresh/chilled Shrimp/Prawn – for domestic market

Table 12-13 Market preference (fresh chilled prawn)

PREFERENCE	FINAL CONSUMER	DISTRIBUTOR (per specific buyer)
Product form	Fresh/chilled Whole, head-on, unpeeled	Fresh, chilled Whole, head-on, unpeeled
Desired product quality and characteristics	Fresh, no spoilage, etc.	Fresh, no spoilage
Desired packaging	N/A	N/A
Desired place of sale and manner of procurement or delivery	Wet market, grocery	Farmgate
Buying price	P36/kg	P340/kg

Table 12-14 Technology Required to Meet Market Preference (fresh chilled prawn)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	N/A	N/A
Packaging technology	N/A	Growers – none Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Blast-freezing	Growers - crushed ice Distributors – crushed ice
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Cold-chain facilities Sanitary containers	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration	Growers – none Distributors - basic food safety & refrigeration
Others (please specify)		

12.7 Cost and Margin

Prawn farming is a very lucrative enterprise because profit margins are very high for growers (50-70%), especially if semi-intensive or intensive culture systems are instituted. This is, however, because capital requirements are also comparatively substantial. The risks in prawn farming are also very high and increase as the grower intensifies his operations.

With the perennial presence of WSVV disease looming over their heads, tiger prawn growers, especially small farm holders with limited capital, resort to risk-averse extensive systems and compensate by fully utilizing the farm by getting in as many cycles in a given year (with long-term detrimental results to the productivity of their ponds).

Local brokers and middlemen, who are usually subservient to wholesalers, exporters, and processors, receive nominal margins since the latter usually dictate market prices.

For processed product, the greatest values are found in the processing/export sector due to the prevailing international market prices, although investment and operating costs are equally high. This is why this segment is dependent on the export market.

12.8 Other Benefits for Target Farming and Fishing Households

12.8.1 Employment and consequent benefits

Most growers are self-employed and receive no pecuniary benefits that are required by law. In some cases where cooperatives are big enough to hire personnel, some growers are employed to perform ancillary operations while other household members, mostly women, take on support or administrative functions. As such, however, incomes are not substantial, with household survey results showing that average annual income is approximately P70,000 per annum.

12.8.2 Access to resource base, facilities and consequent benefits

Most growers in the prawn industry have access to the resource base, but limited, depending on the scale of the production. In cases of cooperatives, access is collective (either as a member of a cooperative or as a tenant) and limited to small amounts.

12.8.3 Access to technology/projects/trainings/services and consequent benefits

Access to technology is limited because it is largely dependent on the frequency of government and NGO programs, unless the grower is a member of a cooperative.

Unfortunately, prawn growers are not as organized as milkfish growers or fishing communities. Therefore, access to training, technology, and development programs are either through their own initiative (such as joining conferences or symposia), through technical extension services of service providers, or through cooperatives, if a member.

12.8.4 Access to information and consequent benefits

Access to information is severely limited because of the lack of facilities that provide information.

Due to the lack of any local industry institution or organized structure, prawn farmers are dependent on government for access and involvement. Institutions, like BFAR or SEAFDEC-AQD, interact with growers on an individual basis.

However, a traditional industry practice has been for service providers to extend to growers assistance in acquiring information and technology updates.

12.9 Resource and Industry Governance

12.9.1 Vulnerability of their resource base

The resource base is highly vulnerable, mainly because of the susceptibility of prawn farms to disease outbreak. As such, government must strictly supervise and regulate the industry to prevent this from happening.

12.9.2 Risk-mitigating or resiliency-building measures presently in place

Measures are primarily the purview of the relevant government agency, BFAR, in ensuring that entry of EMS is prevented and outbreaks of WSSV are averted through strict biosecurity requirements for farms and regulation of movement of live crustacean organisms (brood stock and fry).

Existing linkages (aside from seller-buyer relation) between and among value-chain actors, including relevant institutions that intervene in the value-chain.

Historically, service providers (such as feeds companies and hatcheries) and processors interact with individual farm operators to share information and provide technical advice, to the extent of deploying technicians just for this purpose. This is, of course, because their respective businesses are dependent on the well-being of the grower.

Another institution that has consistently interacted with the grow-out sector is SEAFDEC-AQD, which periodically conducts extension activities to growers and other industry players.

Another institution that is relevant to the sector is PhilShrimp, an association of shrimp producers and processors that conducts trade shows and “congresses” for the industry. Although it used to have an influential role in facilitating cooperation throughout the shrimp sector, the association is not so active at the moment, due to conflicts within the association and continuous crop failure, which has reduced the perspective for Philippine shrimp. The association used to promote research for hatchery and farm technology, introduce new production technologies, and was the industry’s main lobby group for the concerns of the industry players to the national government.³⁴

12.10 Summary of Issues for Attention

12.10.1 Buyer Channel

Currently, the grow-out sector, especially the small farm holder segment, has no organization to collectively move up in the value chain, although there would be some individuals that have expanded their business to trading. Trimming down marketing layers, through cooperatives, if any could also be done, thereby bypassing the traditional market layers.

a. Improving product quality by introducing cold-chain system in the supply chain and enabling growers’ access to CSF facilities and capabilities. Providing growers with access to cold-chain facilities, CSF, and providing training on GMP, HACCP, and Basic Food Handling & Refrigeration would substantially improve their harvest and enable them to impose the higher market farm gate prices.

12.10.2 Primary Activities / Operations

a. As earlier discussed, the threat of disease outbreak from existing pathogens compels growers to adopting extensive culture systems to prevent the occurrence of stress that would trigger mortalities. Instead, farmers generally reduce stocking densities and other parameters and compensate by increasing the frequency of crop cycles. This, however, has a long-term deleterious effect as good culture management procedures in between cycles (such as pond cleaning, disinfection, and preparation) are forsaken. Alternative farm practices that promote good culture management procedures can, therefore, be promoted through demonstration farms that show improved yields from applying such basic practices while at the same time mitigating mortality from secondary symptoms of WSSV and other health issues.

b. Most smallholder farms have reduced productivity due to poor maintenance and current state of disrepair of existing production areas. Government and other institutions can help growers by providing material assistance in the improvement and repair of ponds.

c. The presence of WSSV in production areas limits tiger prawn expansion. Therefore, growers may opt to shift to vannamei culture, which has shown resiliency against existing endemic pathogens. This, of course, has to be undertaken under stringent measures to prevent similar disease problems for white shrimp from happening.

- Since government has been regularly providing similar programs for milkfish, tilapia, and, to a limited extent, tiger prawn farmers, it can also promote vannamei production among prawn farmers by conducting vannamei fry dispersals to initially jumpstart vannamei production in the province.

- Existing vannamei service providers, such as Dobe Hatchery, CP Feeds, and others may be recruited to conduct technical seminars and other forms of assistance in the region to convince existing prawn and brackish water milkfish farmers to go into vannamei farming.

³⁴ibid

d. The local industry, through BFAR, SEAFDEC, and other development programs, may take advantage of the current resurgence of activity by Philippine shrimp exporters in the vannamei market by encouraging them to resume contract-growing arrangements among local farmers.

12.10.3 Input Supply Channel

Local growers prefer tiger prawn over white shrimp because of the relative ease in availing of fry, which they can obtain either from government dispersal programs or local prawn hatcheries. These hatcheries, on the other hand, are discouraged from going into vannamei fry production primarily because of the costs involved in accreditation, as well as the cost of procuring SPF-certified brood stock. White shrimp spawn may only be used for a number of spawning before their fecundity eventually declines and consequently have to be replaced by new ones.

a. Hatcheries may be encouraged to expand to vannamei fry production by helping them in the certification process, as well as in the initial acquisition of brood stock.

b. Cooperative arrangements may also be explored between accredited off-site hatcheries and local ones, under the supervision of BFAR, wherein vannamei fry production is done locally using the brood stock of accredited hatcheries. These may be done under some profit-sharing scheme.

12.10.4 Market

Identification and establishment of IT-based solutions to enable growers' access to timely and accurate market information and prices.

As discussed earlier, a universal problem is access to market information. Based on household survey, KIIs, and FGDs, growers conventionally obtain information on market price from their buyer and verifying the accuracy of the information by asking other buyers. This is not very effective, especially if local buyers also obtain their information from off-site wholesalers. Providing growers with reliable information through provision of internet and IT-based solutions (such as giving cooperatives internet connection and computers), as well as sources of market information (list of websites with current prices) would eliminate their dependence on traders for market information. This would be of immense benefit to growers, whose harvest are mainly for export, but have little knowledge of international market rates).

13 AQUACULTURE

13.1 General Industry Overview

Aquaculture in the Caraga Region is composed of the following types:

a. Inland Aquaculture – this refers to the practice of aquaculture in land-based ponds, including fish pens. This is further categorized as either fresh or brackish water. Therefore, fish conventionally produced in inland fishponds range from marine and intertidal species that are euryhaline, including black tiger prawn (*Penaeus monodon*), pacific white shrimp (*P. vannamei*), milkfish (*Chanoschanos*), mud crab (*Scylla sp.*), lobster (*Panulirus sp.*), and tilapia (*Oreochromis sp.*), to fresh water fish, like catfish (*Clarius sp.*), freshwater shrimp (*Machrobrachium rosenbergii*), sutchi catfish (*Pangasius sp.*), and carp (*Cyprinus carpio*).

b. Mariculture – this is a sub-sector of aquaculture that is done primarily at sea, using fish cages. The most ubiquitous fish farmed in marine cages is milkfish while other species include grouper (*Epinephelus sp.*), rabbit fish (*Siganus guttatus*), mangrove snapper (*Lutjanus sp.*), pompano (*Trachinotus sp.*), and tropical abalone (*Haliotis asinina*). To a lesser degree, fish cage farming is also done in inland bodies of water (such as lakes and tributaries) to produce freshwater tilapia, pangasius, carp, and other freshwater fish. Mariculture likewise encompasses seaweed (*Kappaphycus sp.*) farming, although it is not technically a “fishery”.

This section will not go into details on the Prawn Industry as it will be discussed comprehensively in a separate section.

13.2 Production

Aquaculture is the second most valuable fishery in the region (next to Municipal Fisheries), producing an average of 25,302 MT every year and with an average annual value of P735,581.00 (see Tables 1a and 1b).

Table 13-1 Volume Fisheries Production in Caraga, 2008-2012 (metric tons)

Type of Fishery	ANNUAL PRODUCTION (in metric tons)				
	2008	2009	2010	2011	2012
Commercial Fisheries	7,214	6,676	7,221	6,064	5,199
Municipal Fisheries	76,888	70,380	69,069	66,600	64,098
Aquaculture	27,058	26,599	24,899	23,487	24,468
Seaweeds	21,498	22,660	21,454	20,401	21,296
Grand Total	132,660	126,316	122,644	116,554	115,063

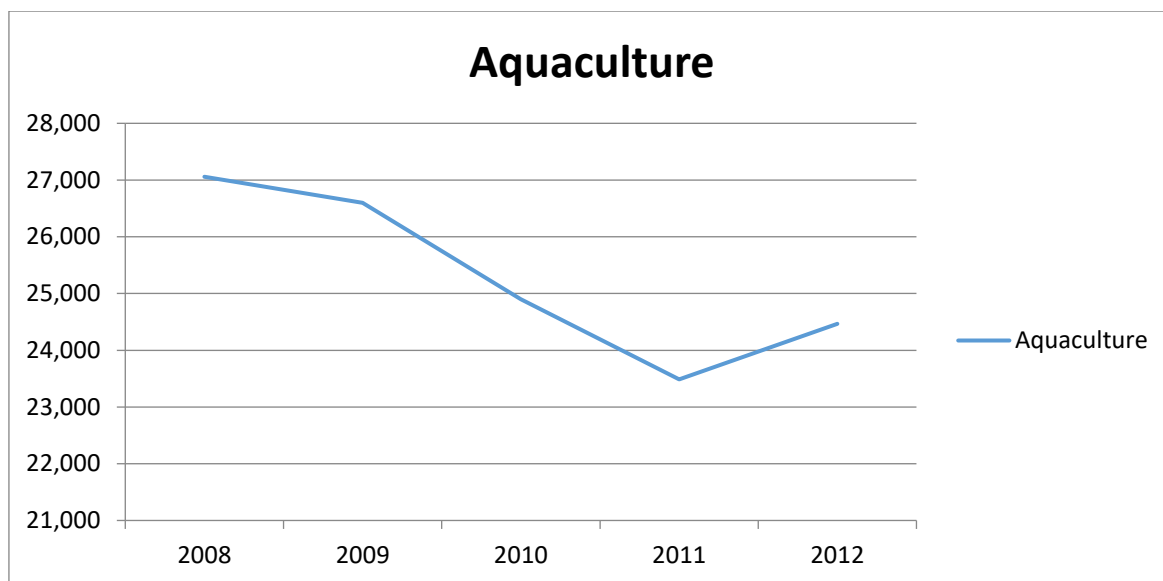


Figure 13-1 Aquaculture

Source, BFAR-Caraga

Table 13-2 Value of Fisheries Production in Caraga, 2008-2012 (in `000 Php)

Type of Fishery	ANNUAL VALUE OF PRODUCTION, `000 (Php)				
	2008	2009	2010	2011	2012
Commercial Fisheries	444,257	387,721	426,570	405,405	373,451
Municipal Fisheries	4,896,654	4,385,639	4,493,203	4,570,093	4,391,820
Aquaculture	1,041,823	759,198	647,480	601,281	628,124
Grand Total	6,382,735	5,532,559	5,567,253	5,576,780	5,393,396

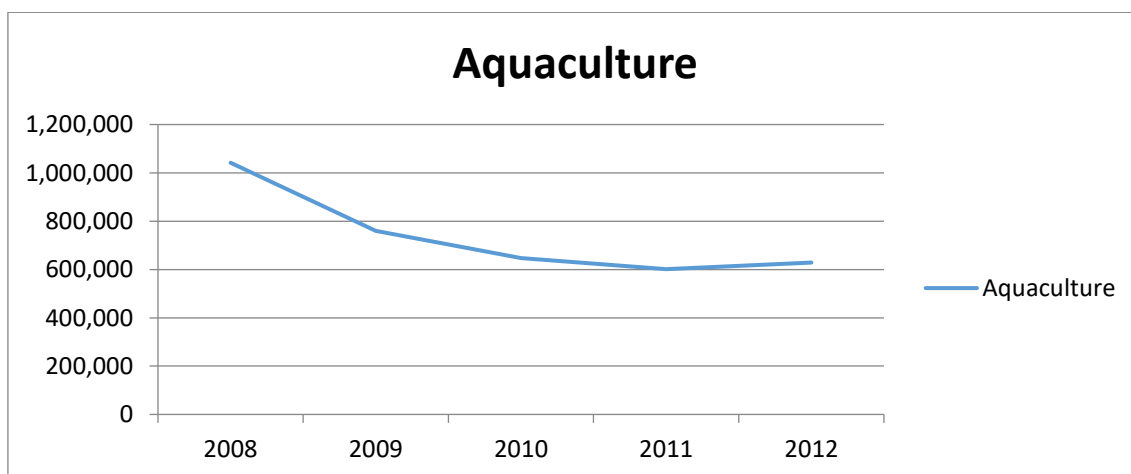


Figure 13-2 Aquaculture

Source, BFAR-Caraga

13.2.1 Culture Environment

The overwhelming share of aquaculture production in Caraga is inland brackish water farming, providing almost 70% of total production. A far second is fish farming in brackish water cages, followed closely by marine fish cage production (see Fig. 13-3).

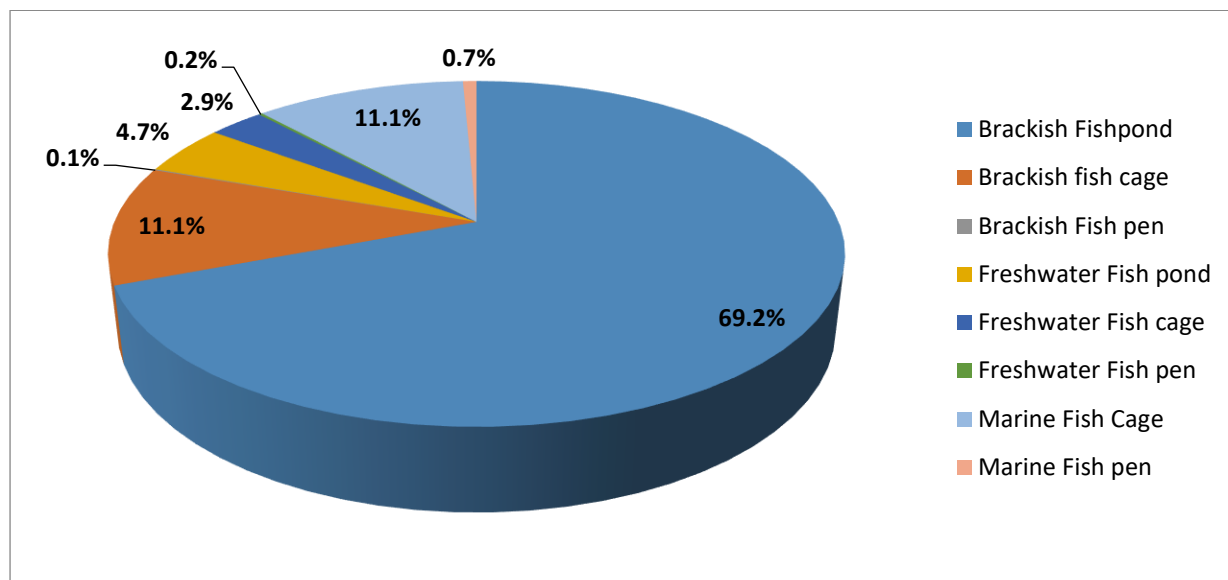


Figure 13-3 Percentage of Aquaculture Production in Caraga by Culture Environment

Source: BFAR, 2011

A distinguishing feature of the region is its extensive inland waters, such as lakes, rivers, and tributaries, which the population has utilized for aquaculture, among other uses. This accounts for the collective aquaculture production from freshwater systems, amounting to 7.8%. Most freshwater aquaculture production is found in Agusan del Sur, which has the most number of lakes and rivers.

Prominent among the rivers in Caraga is the Agusan River, the third largest river in the country with a total drainage area of 10,921 square kilometers. The Agusan River traverses the provinces of Agusan del Norte, Agusan del Sur, and Butuan City. Within the Agusan River Basin lies the Agusan Marsh, which, due to its unique physical and biological significance, was declared as a protected area under the National Integrated Protected Area System (NIPAS). Lake Mainit is the largest lake in the region that straddles the provinces of Agusan del Norte and Surigao del Norte. It is the fourth largest lake in the country and traverses eight municipalities: Alegria, Tubod, Mainit, and Sison in the province of Surigao del Norte and Tubay, Santiago, Jabonga and Kitcharao in Agusan del Norte.³⁵

River and other freshwater systems are also used for fish culture in cages. Portions of the mouth of Agusan River, Masao River in Butuan City, Kalinawan River in Tubay, and other river systems in the other provinces are presently inundated with fish cages.

³⁵Caraga Regional Physical Framework Plan (RPFP), 2004-2030.

Table 13-3 Rivers, Lakes, Crater Lakes and Marshlands in Caraga

Province/City	Major River	Lakes	Volcano Crater Lakes	No. of Marshlands
Butuan City	7			
Agusan del Norte	6	1		
Agusan del Sur	34	31		1
Surigao del Norte	19	1	1	
Surigao del Sur	19			
Caraga Region	85	33		

Source: DENR

Note: Lake Mainit covers the provinces of Surigao del Norte and Agusan del Norte

13.2.2 Commodities Produced

Although government data reports that the biggest production in the Caraga region in terms of volume is in seaweed, it should be qualified that seaweed is a high-density, low-value product and that its inclusion in fisheries statistics, though still categorized as an aquaculture industry, has the effect of distorting the real situation of the aquaculture industry, both local and national.

As this report focuses on actual fish production, it underscores this distinction and submits that the main fishery products from Caraga are those that actually are fish.

With the foregoing premise, aquaculture in the region is predominantly for the production of milkfish, which is reared either in fish cages (in marine or brackish water environments), or in brackish water ponds near the coast. Pond culture of milkfish is done either exclusively or polycultured with either tiger prawn or mud crab. Milkfish production accounts for almost 60% of total production. Mariculture provides the biggest volume of fish production in the region, mainly for milkfish. This is followed by brackish water pond production, again primarily for milkfish.

A far second to milkfish in terms of volume produced is prawn, which are reared mainly in brackish water ponds, contributing around 17.5% of production, tilapia (8.46%), followed by grouper, siganids, and other high-value marine species (6.73%).

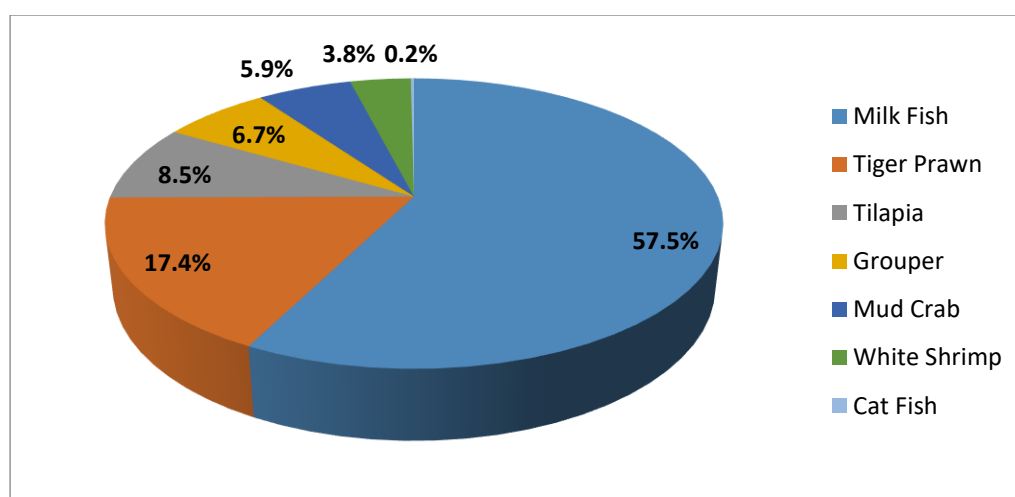


Figure 13-4 Percent Share of Aquaculture Production in Caraga Region, by Commodity

Source: BFAR, 2011

The priority of species produced is consistent with national trends in aquaculture, where the government has played a significant role in influencing the kind of fish being cultured by growers and operators. The proliferation of mariculture parks established by the Bureau of Fisheries and Aquatic Resources (BFAR), ostensibly to promote high-value commodities like grouper, have ended up mainly for milkfish culture. Moreover, the preponderance in production of these low to medium-value cultured species, such as milkfish and tilapia, which reflect high total accumulated value but comparatively low per capita income, has also been due in part to government efforts, including BFAR programs in the dispersal of fingerlings of milkfish, as well as Genetically Improved Farm Tilapia (GIFT) and Genetically Enhanced Tilapia (GET EXCEL) strain fingerlings, of which the industry has mastered the production technology without considering global seafood market preferences.

In the 1980s, when Philippine Aquaculture was at its height – with tiger prawn as the “darling” of Philippine growers –Agusandel Norte was among the areas in Mindanao that experienced much success, along with other prawn-producing provinces in Luzon and the Visayas. However, when the industry crashed in leading high-density production areas in the Philippines, aquaculture in Agusan Del Norte crashed too. This was due to the onslaught of diseases – first, with the virulent strain of luminous *Vibrio* bacteria in the 1990s and white spot in 2002, subsequently, delaying the industry’s recovery and rendered many production areas yet unsuitable for commercial tiger prawn production.

At present, tiger prawn, contributing around 17.4% of total production, remains a significant presence in only three provinces: 1) Agusan del Norte (particularly in Butuan City, and the municipalities of Magallanes and Buena Vista) and partly in Surigao del Norte (in the municipality of Placer) as well as in Surigao del Sur (Hinatuan and Bislig), although milkfish production has eventually overtaken the former in terms of volume. Many prawn ponds were converted into milkfish areas due to the unavailability of continuing prawn farming and fish cages for milkfish rapidly proliferated. The Province of Surigao del Sur still garners the highest value, even though it showed declining production trends for the period 2008-2012.

On a national level, the prawn industry has shown a radical shift towards the non-native pacific or western white shrimp (*Penaeus vannamei*) as an alternative to tiger prawn production as it has shown a resiliency against the white spot disease. In Caraga, although not yet substantial, vannamei is now being reared in some former prawn areas in Agusandel Norte, particularly, in Magallanes, Buenavista, and Butuan City, consisting 3.85% of total aquaculture production.

13.2.3 Distribution of Production

As with the Agusan area, milkfish production in the Surigao provinces has become the primary aquaculture activity, mainly through fish cage operations. However, due to the abundance of marine life found in its coastal waters, farming of high-value seafood, such as grouper and lobster, has been a hallmark in this area. Although high-value aquaculture in these provinces is not as developed as the milkfish industry and culture practices are still very traditional, production of grouper for the live reef food fish trade is relatively significant, contributing almost 7% to total aquaculture production in the region. In fact, in Mindanao, the Surigao provinces are second only to the Zamboanga Archipelago in terms of volume of production of high-value grouper and lobster. Considered low-density, high-value products, these seafood species are not as plentiful in terms of volume, but has a much higher per-capita value.

Surigao del Sur consistently remains the top supplier in the region in terms of Aquaculture, posting a share of 79.69 % or a total of 100,813.37 MT for the period 2008-2012, as compared to the other provincial players (Figure 3).

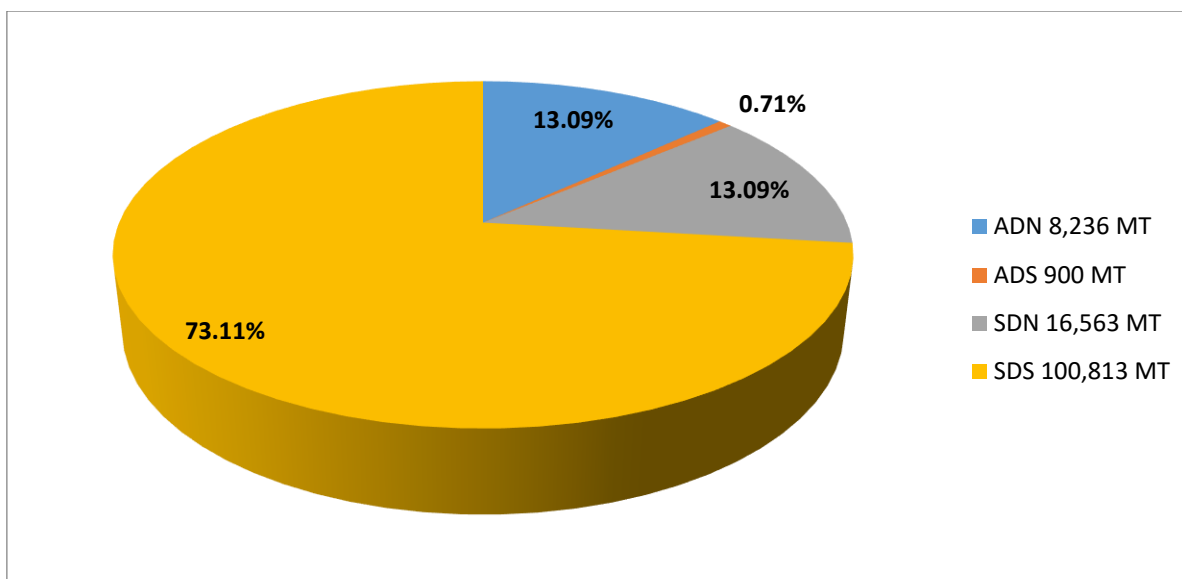


Figure 13-5 Percent Share of Aquaculture Production in Metric Tons, by Province, 2008-2012

(Source: BFAR, Caraga)

13.3 Market Demand

In the last three decades (1980–2010), global food fish production of aquaculture has expanded by almost 12 times, at a mean annual rate of 8.8%. Aquaculture enjoyed high average annual growth rates of 10.8% and 9.5% in the 1980s and 1990s, respectively, but has since slowed to an annual average of 6.3%. In the course of half a century or so, aquaculture has increased from being almost negligible to fully comparable with capture fisheries in terms of feeding people in the world.³⁶

Table 13-4 Major Philippine Fishery Exports in Terms of Volume (MT) and Value

Commodity	Quantity (MT)	FOB Value	
		('000\$)	('000 Pesos)
Tuna	76,888	294,114	12,670,439
Seaweeds	46,252	212,125	9,138,326
Shrimp/Prawn	6,715	60,497	2,606,222
Crabs/crabs fat	6,164	58,228	2,508,479
Octopus	9,577	36,902	1,589,756
Grouper	6,023	21,751	937,052
Squid and Cuttlefish	5,704	23,016	991,542
Ornamental Fish, Live	5,503	6,650	286,476

Source: BFAR, 2011

Among aquaculture commodities produced locally in the region, seaweed, shrimp/prawn, and grouper are included in the top 8 major fishery exports of the Philippines (Table 13-4).

Seaweed is ranked second in terms of export value, at P9.08 Billion (FOB). Carrageenan remains the major product being shipped abroad comprising 73% of the total seaweed export value. The USA, China and Belgium are among the major markets for Philippine seaweed

³⁶Food and Agriculture Organization. 2012. The State of World Fisheries and Aquaculture 2012. FAO Fisheries and Aquaculture Department. Rome, p. 24

products. Top importing countries of seaweed and its natural products, in any form fresh, chilled, semi-refined, refined, frozen or dried are: France, Canada, USA, China, Thailand, Hong Kong, Korea, United Kingdom, Denmark, Belgium and Germany.

However, in spite of the huge production volume of seaweed, it actually only contributes 10% to total value of aquaculture production, since seaweed is a low-value crop in fresh form.

As processed seaweed, it transforms into high-value carrageenan, only then contributing a major share to the country's export of aquatic products (see Table __).³⁷ On a local level, however, using FOB value as a basis to establish the comparative importance of seaweed as a commodity is misleading because the biggest profit margin from the carrageenan value chain is in the processing stage, which is done outside the region.

Shrimp/prawn ranks third among the top fishery exports of the country. Most of the shrimps/prawns are exported in fresh/chilled/frozen form, with a total value of P2.6 Billion. Top export markets for prawn and shrimps in any form, frozen, chilled or fresh, are Japan, USA, Korea, Guam, Canada, Taiwan, Hong Kong, China, Netherlands, Trust Territory of the Pacific Islands, and the United Kingdom.

Although paling in comparison to either seaweed or shrimp, grouper is still a major fishery export, placed at sixth in terms of export value. The major market for grouper is the live reef food fish trade in Hong Kong and Mainland China.

Milkfish, as the most commonly produced aquaculture commodity in the country, is mainly sold and consumed locally. Consumer preference for milkfish has been very strong among Filipinos as it is hailed as the country's national fish. It constituted 15 percent of the total household consumption for fish in 2000.³⁸ Fresh milkfish is typically found in the local markets, but processed milkfish is also available in various forms such as deboned, marinated, stuffed (*relleno*), and smoked milkfish. Other food preparations, such as milkfish *lumpia*, fishcroquettes, *sisig*, *longganisa*, and burger patties have recently gained popularity.³⁹

Domestically, milkfish products are sold in Metro Manila, Regions 1, 2, 3, Cordillera Administrative Region (CAR), and Cebu, with institutional buyers, such as Chowking, SM, Jollibee, and Philippine Air Lines (PAL).

Export of milkfish reached 4,626.14 metric tons, valued at US\$ 15.89 million. Major markets of Philippine milkfish are USA, Canada, UK, Korea and Australia. Out shipment of milkfish, however, pales in comparison to other fishery exports – both in terms of volume and value – owing to the fact that milkfish products do not command a high price and primarily caters to the ethnic market of Filipinos overseas.⁴⁰ For the most part, however, milkfish remains a traditional food fish in the Philippines, Indonesia and Taiwan.

13.3.1 Live Reef Food Fish (LRFF) Industry

Another market where Caraga is a significant contributor because of its production of high-value seafood is in the international LRFF trade. Live fish have traditionally been traded around Southeast Asia as a luxury food item. Most LRFF are imported into Hong Kong, China either for local consumption or for transshipment to mainland People's Republic of China

³⁷Garcia, Yolanda and Z. Sumalde. 2013. Growth of Aquaculture Productivity in the Philippines. SEARCA, DA-BAR, and PhilRice, Philippines, p. 8

³⁸Garcia, Y., M. Dey, and S.M. Navarez. 2005. Demand for Fish in the Philippines: A Disaggregated Analysis. Aquaculture Economics and Management 9 (1–2): 141–168

³⁹Garcia, 2013

⁴⁰National Industry Cluster Capacity Enhancement Project (NICCEP).
<http://www.niccep.dti.gov.ph/cluster.php?code=10>

(PRC). Target species for this trade are usually a variety of grouper (*lapu-lapu*) species (See Table 4).

Other desired non-fish species in this trade are lobster, sea cucumber (*Holothuridae* and *Stichopodidae*), and abalone.

Table 13-5 Wholesale prices of live marine fish in Hong Kong (per kg)

English Name	Scientific Name	US\$	Php
Red grouper	<i>Epinephelus akaara</i>	130.00	5,200.00
Leopard coral grouper	<i>Plectropomus leopardus</i>	74.99	2,999.52
Camouflage Grouper	<i>Epinephelus polyphekadion</i>	31.92	1,276.60
Brown Marbled Grouper	<i>Epinephelus coguttatus</i>	29.62	1,184.72
Brown-spotted grouper	<i>Epinephelus areolarus</i>	27.39	1,095.48
Yellow-finned seabream	<i>Acanthopagrus latus</i>	23.60	943.80
Green grouper	<i>Epinephelus coioides</i>	21.69	867.52
Hybrid Grouper		19.37	774.80
Russell's snapper	<i>Lutjanus russellii</i>	13.68	547.30
Rabbit Fish	<i>Siganus oramin</i>	10.47	418.60
Painted sweetlip	<i>Diagramma pictum</i>	10.36	414.28
Malabar Red snapper	<i>Lutjanus malabaricus</i>	10.34	413.40
Pompano	<i>Trachinotus blochii</i>	10.12	404.72
Mangrove snapper	<i>Lutjanus argentimaculatus</i>	9.40	376.12
Gold-lined seabream	<i>Sparus sarba</i>	9.10	364.00
Head grunt	<i>Pomadasyska akan</i>	7.83	313.30

Note: as of April 14, 2014

Source: Hong Kong Fish Marketing Organization

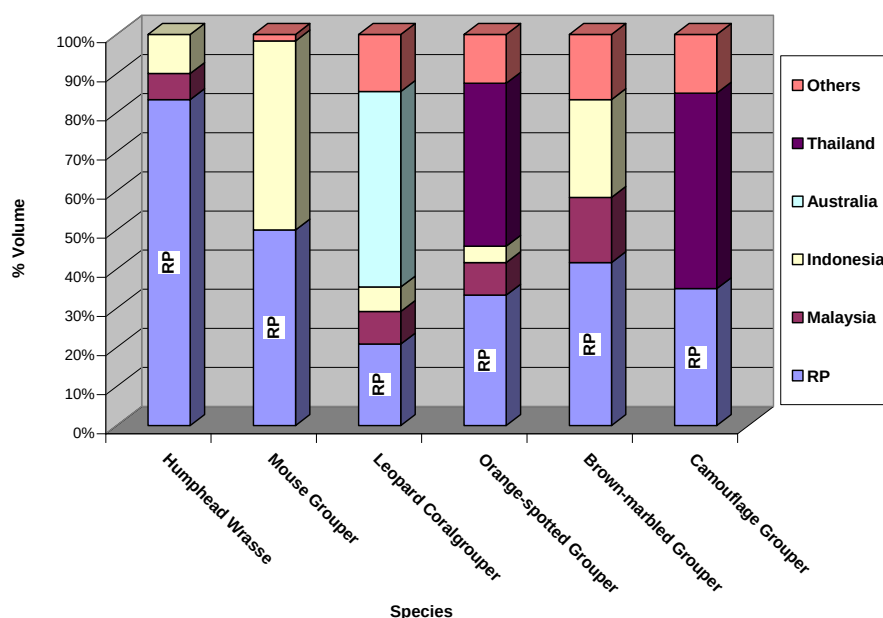


Figure 13-6 Volume of imports for six major species imported into Hong Kong, China, by country of origin

Source: Asian Seafood Market Profile: China Seafood. Food Export Association of the Midwest USA. <https://www.foodexport.org/Resources/CountryProfileDetail.cfm?ItemNumber=2587>

Mouse grouper or “señorita” or “kubing” (*Cromileptes altivelis*), for instance, is one of the pricier and sought after species sold to the China market, with value reaching up to USD75/kg. Roughly half of the twelve metric tons annual import of mouse grouper to Hong Kong comes from the Philippines. Most of these are sourced either from Bohol, Palawan, Surigao del Norte (as the consolidation point and port of exit), or the Sulu Archipelago (mainly Tawi-Tawi province). In fact, for most major species imported into Hong Kong, the Philippines is consistently a significant contributor (see Figure 4).

13.4 Industry Players

Back during the prawn industry’s heyday in the 1980’s to the 1990’s, a number of corporate aquaculture farms like the HJR Intl. Corp. were operating in the region, as well as companies engaged in contract growing of tiger prawn, such as Integrated Aquaculture Specialist, Inc. (INTAQ) Foods. HJR and AA Import/Export Corp. operated processing plants in the region. Other big companies, like San Miguel Corp. (SMC), Tateh Premium Feeds Corp., Oversea Feeds Corp., and Gold Coin supplied commercial feeds and had local distribution offices in the region.

Table 13-6 Registered Aquaculture Farms in Caraga (as of September 30, 2013)

	Company Name	Location	Area	Commodities
1.	Buenaflor Fish Farm Corp.	Brgy. Rizal & Sabang, SDN	64	milkfish, tiger prawn
2.	Baug Carp Beneficiary Farm	Panaytayon, Magallanes, ADN		milkfish, tiger prawn
3.	Henry Teng Fishpond	Taod-oy, Magallanes, ADN	35	milkfish, tiger prawn
4.	Jimmy Bolido Farm	Tago, SDS	11	tiger prawn
5.	Jida Aqua Resources	Caloc-an, Magallanes, ADN	3.5	tiger prawn
6.	Balmis Farm	Brgy. Umbay, Tago, SDS	4	milkfish
7.	Barcenas Farm	Pandugcan, Lapaz, Bayabas, SDS	2.4	milkfish, tiger prawn, crabs
8.	PanducanLapaz Farm	Lapaz, Bayabas, SDS	2	tiger prawn
9.	Sanchez Farm	PurokPinya, Mercedes, Tago, SDS	1.4	tiger prawn, tilapia, crabs
10.	Annabel Farm	Malimbong, Tago, SDS	2	milkfish, tiger prawn
11.	Jose Amparo / Dobouzet Farm	Taod-oy, Magallanes, ADN	42	milkfish, prawn
12.	Hygino Arim Farm	Balilahan, Mabua, Tandag City, SDS	3	milkfish, tiger prawn, tilapia, crabs
13.	Ludivina Sabanal Farm	Cabugan, BagongLunsod, Tandag, SDS	2.2	milkfish, tiger prawn, tilapia, crabs
14.	Vergenia B. Benimili Fish Pond	Macda, ADN	1	milkfish, tiger prawn
15.	Caasinan Agri-Aqua Farm Corp.	P-2 Kauswagan, Cabadbaran, ADN	7	tiger prawn
16.	Rogelio Baltonado Farm	Brgy. Noli, Bayugan City, ADS	0.1	Tilapia
17.	Allan Perez Farm	Campo 4, Nueva Era, Bunawan, ADS	0.1	Tilapia
18.	Josue Asilum Farm	Sinobong, Veruela, Agusan del Sur	1.5	Tilapia
19.	Cherry Banda Farm	P-4, Patin-ay, Prosperidad, ADS	-	tilapia

Source: BFAR

At present, the grow-out sector in the region is almost entirely composed of small fishers/operators, except for land-based inland aquaculture, where medium to large-sized fishpond operators with production areas reaching 35-64 has. and each individual operation valued at approximately P8 Million and above are existent, although not a significant population (household survey and KII data). This is because capital and property requirements for pond-based operations (for prawn and milkfish) are much bigger compared to fish cage operations for milkfish or tilapia. The rest of fishpond operators, the majority of whom are operating in Surigao del Sur, are Fishpond Lease Agreement (FLA) holders are small operators with a production area of 1-5 hectares each.

Table 13-7 Fishpond Lease Agreements (FLAs) in the Region (Has.)

Province	FLAs (Has.)
Agusan del Norte	863
Surigao del Norte	343
Surigao del Sur	1,211
Total, Caraga	2,417

Source: BFAR-Caraga

Household survey data also show that out of the total number of respondents engaged in fish cage aquaculture, 50% own only 1 module, around 37% have 2, while only 3.33% possess more than 4 cages (Fig. 5a). This suggests that the majority of cage growers are low-income earners, having a production value of only around P30,000 and average harvest income of only approximately P15,000 per harvest. Growers owning more than 4 fish cages are only 3.33% of the grower population.

Likewise, household survey data on the value fishpond production area per respondent, show that more than 80% had a value less than P5, 000 (Fig. 5b).

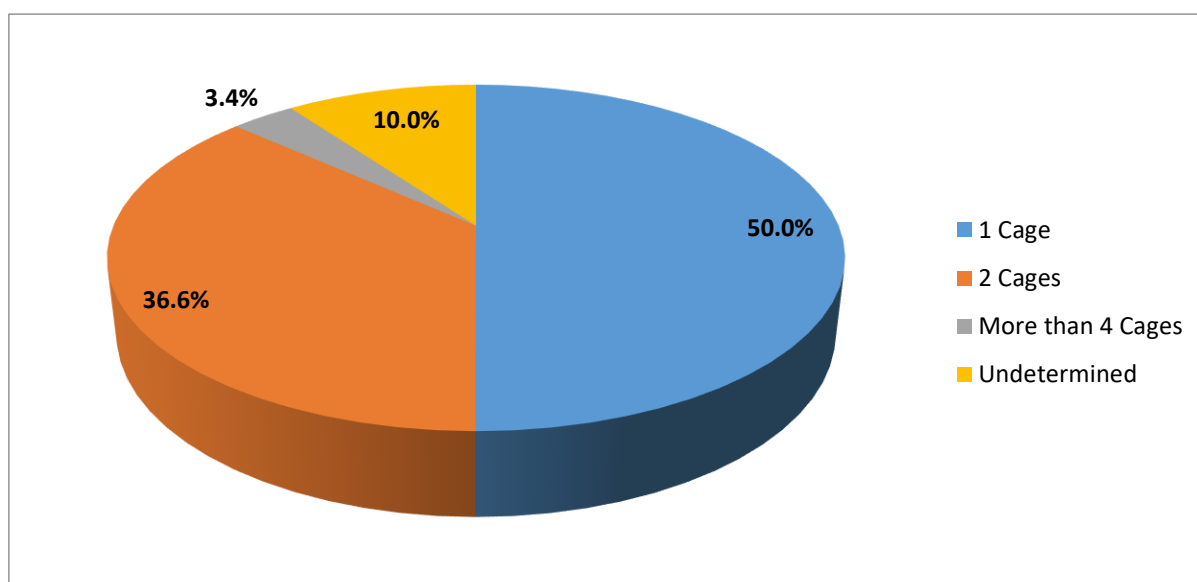


Figure 13-7 Household Survey on number of fish cages owned per respondent

Source: Household Survey

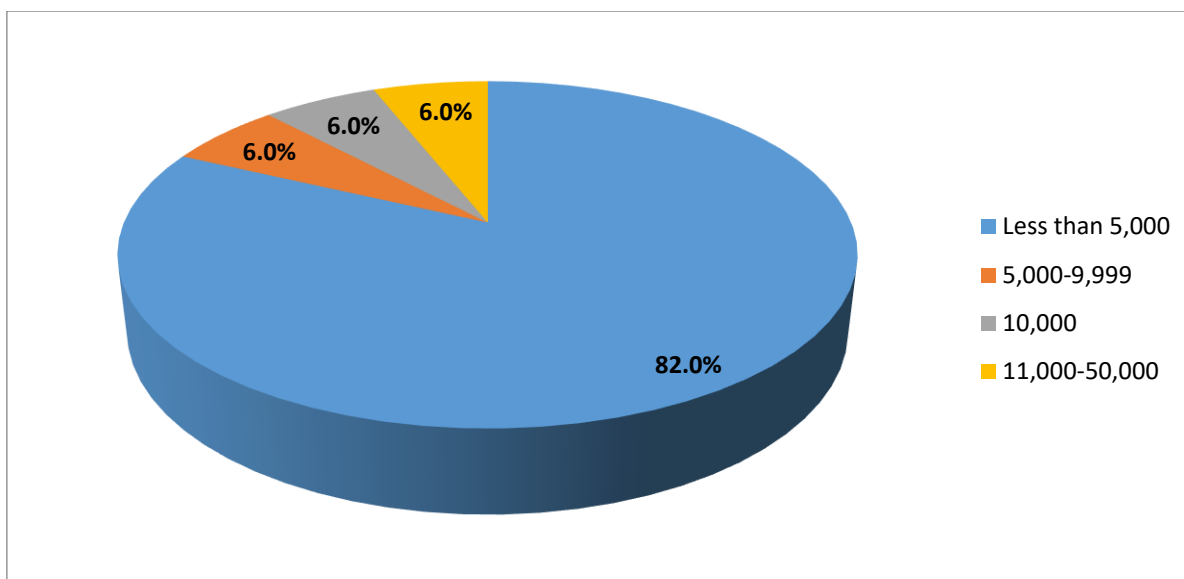


Figure 13-8 Household Survey on value of fishpond production area owned per respondent

Source: Household Survey

Because of their involvement in the prawn industry, major aquaculture companies in the region (and most elsewhere in the country) consequently had to cease operations. Only HJR has maintained its processing operations in Agusandel Norte, but at a much smaller production output. SMC (through its subsidiary, B-Meg Corp.) and Tateh are still also operating in the region, but focus more on the marketing of milkfish feed and have also diversified to livestock feeds.

A recent presence in the region is Cabadbaran Aquatech Resources Corp., which has Japanese investors and is into eel (*Anguilla* sp.) culture. Its establishment is not related to any current trends in local aquaculture development, but may potentially benefit the industry, as well as the locale.

13.5 Overview of Value Chains

Aquaculture is either partial or full cycle. The first is when wild-caught, undersized juveniles are held and reared in confinement until market size. As this practice still requires some sort of fish capture (that of catching juveniles from the wild), this is not as sustainable a practice as full-cycle aquaculture, which involves the culture of the target organism from spawning up to rearing to market size.

In a full-cycle aquaculture system, therefore, hatchery/nursery operations are included in the “core” business, with upstream activities including feed supply and brood stock/spawn supply as outsourced activities. On the other hand, Processing is considered a downstream activity. To illustrate more specifically the relationship between the core activities and the upstream and downstream activities we may use the following diagram:

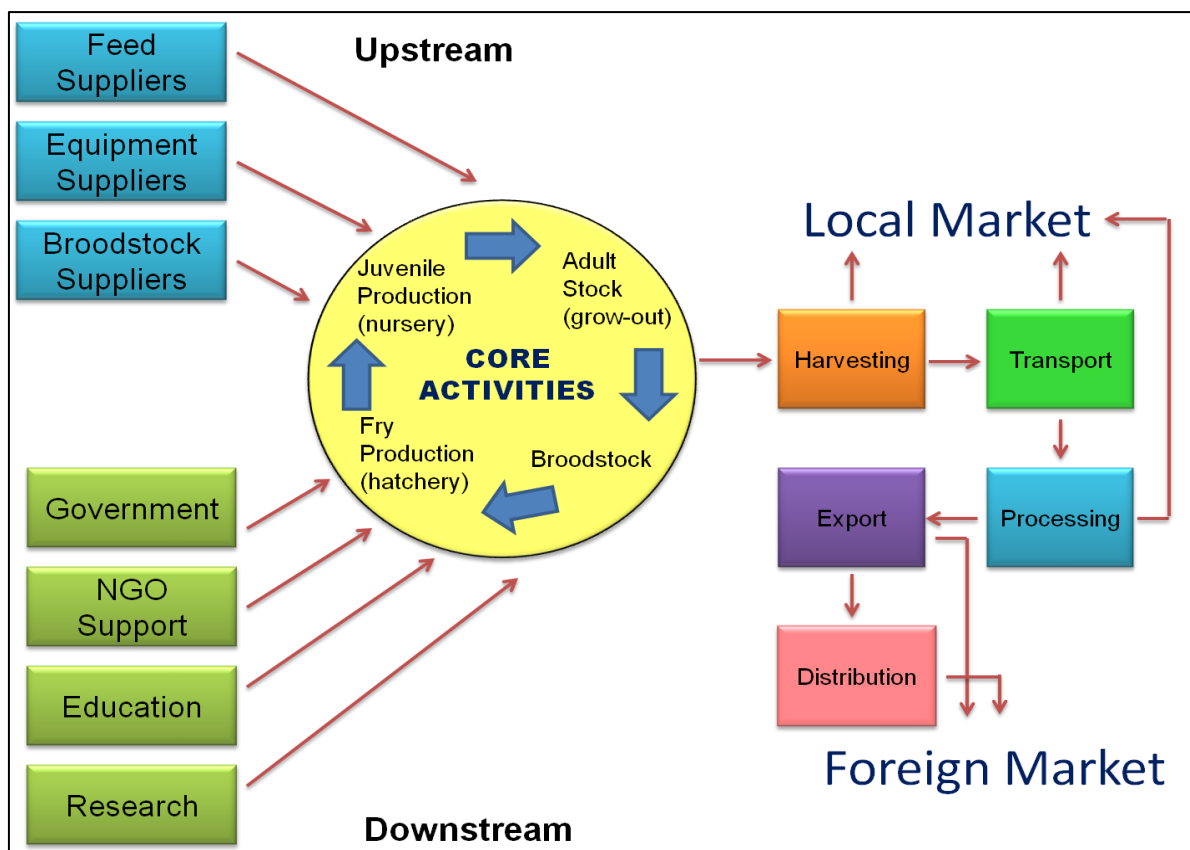


Figure 13-9 Aquaculture Subsector Value Chain

In the aquaculture value chain's full range of activities to bring products to final market destinations, however, the segment in which there is the most smallholder participation is in the grow-out production segment. From this perspective as the "core business," the value chain could then be illustrated as such:

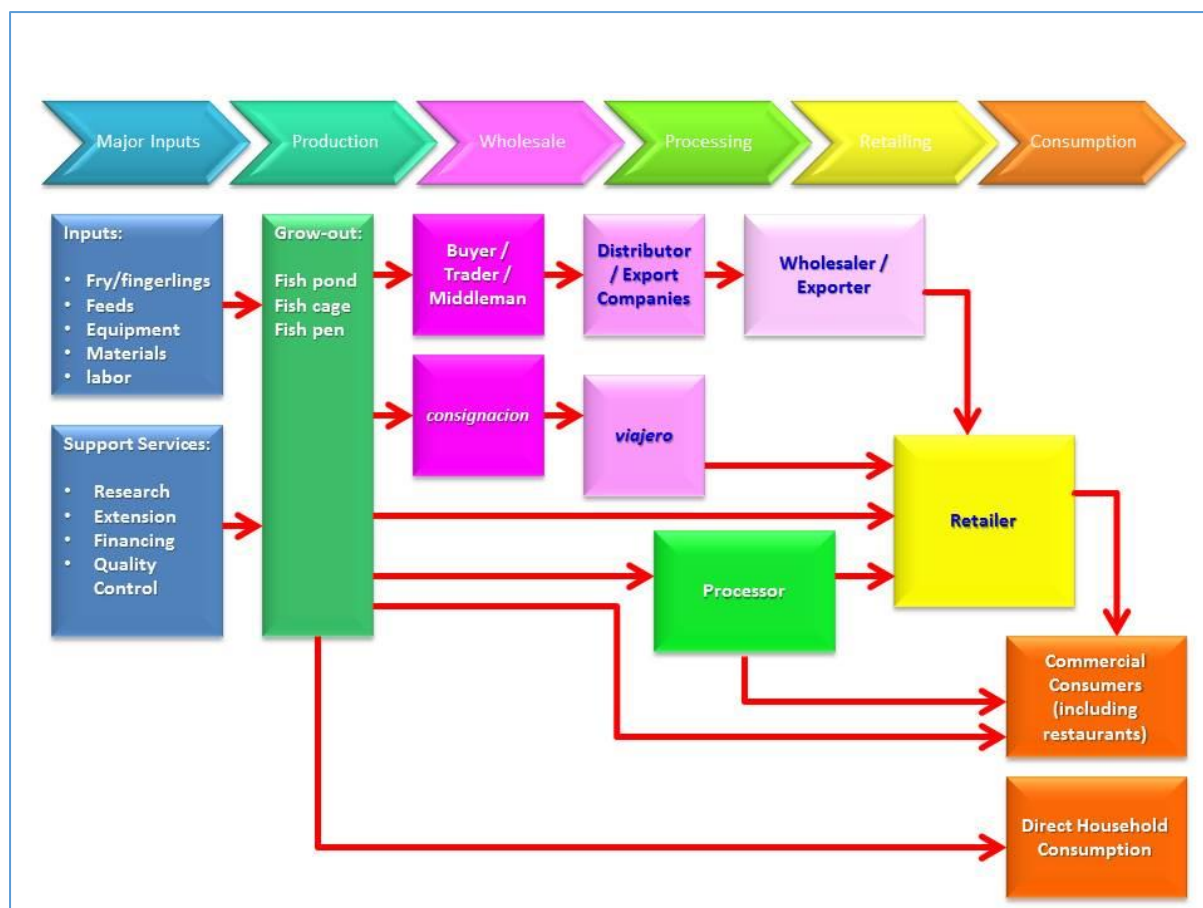


Figure 13-10 Municipal Value Chain

Table 13-8 Fresh Milkfish Value-chain

	Price per Kilo	Margin
Grow-out Production	P90.00	33%
Consignacion/Broker	P117.00	30%
Buyer/Seller	P119.69	2.3%
Viajero	P155.60	30%
Retailer	P160	2-5%

Grow-out producers do not usually sell fish directly to consumers, but supply them through cooperatives, brokers, dealers, collectors or wholesalers, and retailers. In general, the majority of fish products are sold in auction markets through dealers, brokers, wholesalers or cooperatives to smaller dealers, and then retailers. This is exemplified thoroughly in the fresh milkfish value-chain.

Producers usually sell the milkfish to a “*consignacion*” or auction broker. The *consignacion* is a fixture in the Philippine seafood industry. Here, the traditional, centuries-old way of trading fish, called the “*bulungan*” (whispering) is still being practiced, that is, each buyer or bidder “whispers” his bid to the fish trader. It is a bidding process where transparency is never practiced. Whoever “whispers” the highest bid wins the fish. A *consignacion* is either privately owned or managed by the local government. As such, its mark-up in price includes cost of facilities maintenance and labor.

In turn, the broker sells to wholesalers. Wholesalers, then, distribute to “*viajeros*” (travelers), and the *viajeros* to the retailers in the wet markets. *Viajeros* conventionally own “fish cars,”

which are utilized to transport fish from the trading post to wet markets, retailers, and other consumers as far as the Visayas. Operational costs include fuel, ice, labor, vehicle maintenance, and other transport costs.

One of the most significant costs in the input supply channel is Feeds, which generally comprise 70% of the total operational cost. Currently, feeds manufacturing and supply is dominated by big companies, like San Miguel Corp. (through its subsidiary, B-Meg), Tateh Premium Feeds, and Oversea Feeds Corp.

Table 13-9 Milkfish Juvenile Fingerling Value-Chain

	Price per Kilo	Margin
Hatchery	P0.30/pc	
Nursery	P5/pc	
Grow-out Production	P90.00/pc	33%

Going backward to the supply channel, the grow-out sector is supported by a highly developed seed stock supply system. Again using the milkfish industry as an example, it can be observed that major aquaculture commodities are mainly served by hatcheries and nurseries. Suppliers of wild-caught fry have gradually diminished because of preference for better quality hatchery-bred fry.

In the region, hatcheries (except for prawn) are usually government-run. There is not much incentive for commercial milkfish hatchery operations because government hatcheries that sell fry are subsidized or regularly conduct free fry/fingerling dispersal activities.

What has been commercialized and private sector-led is fingerling production in nurseries (using land-based brackish water ponds). In the nursery, milk fish are grown from fry (*kawag-kawag*) to fingerling (*hatirin*). In the transition stage, the fingerlings are further grown to juvenile size (*garungan*). This again was developed by the private sector rather than any research institution. Milkfish fingerling production gained additional impetus with the proliferation of fish cages, which require large size fingerlings rather than fry.⁴¹

Table 13-10 Fresh Tilapia Value-chain

	Price per Kilo	Margin
Grow-out Production	P55.50	10%
Consignacion/Broker	P66.00	18%
Buyer/Seller	P71.00	8%
Viajero	P76.00	7%
Retailer	P81.00	7%

The fresh tilapia value-chain is similar to the fresh milkfish value-chain. In the buyer channels, the tilapia harvest goes through the same conduits before reaching retail markets. Limited opportunities for value-adding and processing, as well as low dressing recovery restrict post-harvest preparation for tilapia.

As in milkfish supplier channels, seed stock supply is provided by a well-developed network of hatcheries and nurseries. In the region, government-run facilities like the Caraga Fisheries Research and Development Center for Freshwater Development (CFRDC) in Kitcharao, Agusan del Norte, Provincial Fish Hatchery in Patin-ay, Agusan del Sur, Municipal Tilapia

⁴¹Yap, W.G., A.C. Villaluz, M.G.G. Soriano and M.N. Santos. 2007. Milkfish Production and Processing Technologies in the Philippines. Milkfish Project Publication Series No. 2, Department of Agriculture - Bureau of Agricultural Research (BAR) 96 pp.

Hatchery in Esperanza, Agusan del Sur, and Provincial Fish Nursery in Tago, Surigao del Sur periodically disperse tilapia fingerlings throughout the region.

Household survey data also show that around 50% of growers obtain their seed stock from the aforementioned sources. In 2011, BFAR dispersed 7.8 Million fingerlings to more than 3,000 fish farmers in the region. Accordingly, BFAR-Caraga annually distributes this large a scale consistently.

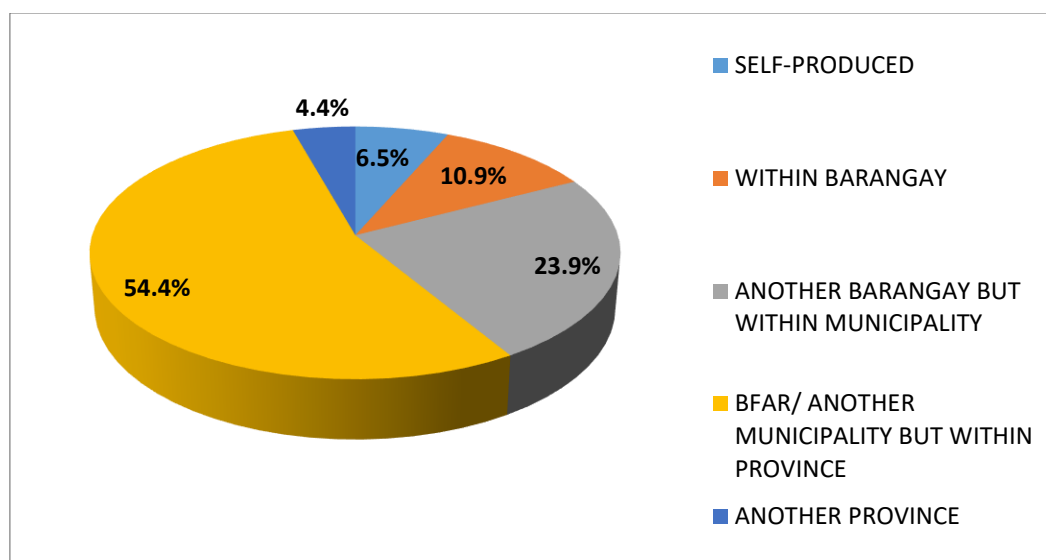


Figure 13-11 Household Survey on seed stock source

Table 13-11 Processed Milkfish Value-chain (bottled milkfish)

	Price per Kilo	Margin
Grow-out Production	P58.00	12%
Processor	P130.00	30%
Retailer	P208.00	20%

Deboned or “boneless” milkfish, which is almost exclusively prepared in the Philippines is one of the most popular processing methods for this fish and comes in various preparations, like smoked, marinated, belly cut, etc. This is to cater to its most preferred preparation, as whole or filleted fish for cooking. The trimmings produced in the process of deboning are optimized for many other products, such as fishballs, *quekiam*, and *lumpia* (spring rolls).

Deboned, smoked, and marinated are gradually becoming more mainstream in terms of consumer preference. However, market value is kept at bay by oversupply and dominance of large processing companies, like Alsons Aquaculture Corp., with its popular “Sarangani Bay” product brand, and Century Pacific Food’s processed milkfish varieties that rule grocery store shelves.

Increasingly, more of the milkfish harvest is processed into value-added forms, like bottled (salmon style, sardine style, Spanish style, smoked in oil, etc.), canned, smoked, dried, and marinated (brined, sweetened). This is due to the oversupply of milkfish that is flooding the local markets and, consequently, depressing farm gate prices.

Bottling, in particular, was developed when sardine bottlers in Dipolog experienced a dearth in fresh sardine and had to look for an alternative raw material to keep on producing. Readily available were undersized milkfish that were being sold lower than the usual market price.

Bottled milkfish, however, are produced primarily by growers (usually cooperatives) that purchase fresh milkfish directly from their grow-out section to keep production costs low and produce in relatively small volumes. Retail outlets include grocery stores and specialty stores. It was only when big food processing companies, like Alsons Aquaculture Corp. and Century Foods, included bottled milkfish in their product lines that this particular preparation started to be exported commercially, either as gourmet food or staple commodities for niche ethnic markets abroad.

Value-adding to milkfish products has been mainly a government initiative, like BFAR, which, aside from programs to supply seed stock and improve grow-out production, has also made interventions along the downstream areas of the value-chain, particularly, post-harvest processing. Unfortunately, as with its aquaculture production efforts, its stratagem has been largely technology-driven (i.e. promoting developed food processing technologies) without much thought as to the market.

Table 13-12 High-Value Seafood Value-chain for the LRFF market

	Price per Kilo	Margin
Grow-out Production	P550.00	35%
Live Fish Trader	P750.00	36%
Buyer/ Exporter	P867.52	15-16%
Tiger Lobster (Live)		
Grow-out Production	P1,500.00	50%
Live Fish Trader	P1,900.00	27%
Buyer/ Exporter	P3,400.00	80%

Unlike the fresh/chilled fish industry, the high-value seafood industry has different buyer channels. Growers usually sell their harvest to a live fish trader, who is equipped with facilities for live fish consolidation. From the trader, the live fish are sold to off-site buyers, who then sell to wholesalers abroad or local outlets (like seafood restaurants).

Supplier channels for high-value aquaculture in the region are not as developed as in other places. Currently, most growers obtain their juveniles from gleaners and other purveyors of wild catch. The distance from existing high-value hatcheries (the nearest being Finfish Hatcheries in Sarangani Province, Region XII) has prevented local growers from availing of seed stock from hatchery sources. Moreover, the usual variety produced by grouper hatcheries (green grouper) is classified as “low-end”, whereas growers in the region prefer the high-end variety (coral trout, giant, or mouse grouper). The relatively expensive cost of hatchery-bred fingerlings (P12 per inch or P48 per 4-inch fingerling), however, is not a deterrent as local growers are even willing to pay as much as P300 per piece of tiger lobster juveniles, sourcing their seed stock from as far as the Zamboanga provinces. Similarly, feeds supply is not well-developed at present, with growers preferring individually procured and prepared “feed” from “trash” fish over commercial feeds.

Unlike in aquaculture sub-industries where the fish produced is mainly for the domestic market, the high-value aquaculture industry’s preference for the export market has exponentially increased the impact of the universal lack of growers’ information on market prices and trends. Consequently, they are unable to take the overwhelming profit margin that exporters currently enjoy (80%).

13.6 Market Preference and Technology Required

13.6.1 Fresh/chilled Seafood – for most aquaculture produce

Table 13-13 Market Preference (Fresh/Chilled Seafood)

PREFERENCE	FINAL CONSUMER	OTHERS
Product form	Fresh, chilled	Fresh, chilled
Desired product quality and characteristics	Fresh, no spoilage	Fresh, no spoilage
Desired packaging	Whole round	Whole round
Desired place of sale and manner of procurement or delivery	Wet market, grocery	Consignacion
Buying price	P160/kg	P117-155.60/kg

Table 13-14 Technology to meet Market Preference (Fresh/Chilled Seafood)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	N/A	N/A
Packaging technology	Good Manufacturing Practice(GMP), Hazard Analysis and Critical Control Points(HACCP)	Growers – none Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Ice slurry	Growers - crushed ice Distributors – crushed ice
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Cold-chain facilities Sanitary containers	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration	Growers –none Distributors - basic food safety & refrigeration
Others (please specify)		

Based on household survey, the preferred product form is fresh whole fish (96.97%), and frozen, chilled, and dried as the least preferred forms (at 1% each). Based on FGD, KII, and HH survey results, it was determined that most growers have not received any sort of post-harvest handling and quality management as the focus of government technical extension has been mostly related to improving grow-out production. This Post-harvest handling has been perceived as not very essential since the usual practice has been for buyers to take over fish handling at the farm gate or for the grower to bring the harvest over to a consignacion, entailing relatively short transport periods and minimum handling.

At the consignacion, brokers and viajeros have access to ice plants and ice-crushing equipment. They are also equipped with sanitary and insulated containers, such as plastic crates, plastic pallets, and styrofoam boxes. Fish cars used by viajeros have either metal plastic bins or styrofoam boxes.

The relatively simple value-chain for fresh/chilled harvest means that individual growers have the capacity to meet consumer requirements, but not the capability since they do not possess the means of marketing and distribution. Although not yet the norm, some organized growers (with government assistance) have effectively moved up the value chain to handle distribution.

For most, however, participation is restricted to the grow-out production sector and do not reap the monetary benefits of increased value along the buyer channels.

13.6.2 Processed Seafood (Pre or partially cooked) – primarily for milkfish

Table 13-15 Market Preference (Partially Cooked)

PREFERENCE	FINAL CONSUMER	OTHERS
Product form	Deboned Marinated Filletted smoked	Fresh, chilled
Desired product quality and characteristics	Refrigerated, no spoilage	Fresh, no spoilage
Desired packaging	Vacuum-sealed	Whole round
Desired place of sale and manner of procurement or delivery	Grocery, retail outlets	Consignation
Buying price	P200/kg	P117/kg

Table 13-16 Technology to Meet Market Preference (Partially Cooked)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	Deboning, fish processing	N/A
Packaging technology	GMP, HACCP	Growers – Deboning, fish processing (some) Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Refrigeration	Crushed ice
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Refrigeration facilities Sanitary containers and equipment HACCP-certified facilities	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration Processing	Growers – Deboning, fish processing (some) Distributors – basic food safety & refrigeration
Others (please specify)	Marketing, Business Mgmt.	None

Some organized growers (usually cooperatives or mariculture park locators) have moved up the value chain and diversified into fish processing. This development is not yet the norm and depends on the success of the cooperative/association. However, due to market limitations (mainly domestic and within the municipality), revenues from this added industry are nominal, albeit having provided cooperative/association members with increased cooperative dividends and employment for members not directly engaged in grow-out production (usually women).

For this value chain, some organized growers have both the capacity and the capability, but in small volumes and limited distribution capacity. For most, however, participation is restricted

to the grow-out production sector and do not reap the monetary benefits of increased value along the buyer channels.

13.6.3 Processed Seafood (cooked) – exclusively for milkfish

Table 13-17 Market Preference (Cooked)

PREFERENCE	FINAL CONSUMER	OTHERS
Product form	bottled canned	Undersized, fresh, chilled
Desired product quality and characteristics	Refrigerated, no spoilage	Fresh, no spoilage
Desired packaging	Bottled, canned	Whole round
Desired place of sale and manner of procurement or delivery	Grocery, retail outlets	farm gate
Buying price	P208/kg	P58/kg

Table 13-18 Technology to meet Market Preference (Cooked)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	Bottling, canning Pressure cooking	N/A
Packaging technology	GMP, HACCP	Growers – bottling (some); canning (none); processing (some) Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Refrigeration	Crushed ice
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Refrigeration facilities Sanitary containers and equipment HACCP-certified facilities	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration Processing	Growers – Deboning, fish processing (some) Distributors – basic food safety & refrigeration
Others (please specify)	Marketing, Business Mgmt.	None

Similar to pre or partially cooked product, bottling has been added onto growers' cooperatives' inventory of products. As mentioned earlier, however, raw material has to be procured directly at the farm gate to minimize production costs.

As bottled milkfish is not a staple commodity, it is not very much in demand and produced mainly as a value-added by-product, notwithstanding Alsons and Century's efforts at marketing the product. Growers' cooperatives that are engaged in this value-adding are restricted to bottling because canning would require investment requirements way beyond their limited capacities. As such, product forms are not packaged very attractively and not

marketed vigorously. The same goes for other value-added products, such as fishballs, quekiam, and lumpia (spring rolls).

For this value chain, some organized growers have both the capacity and the capability, but in small volumes and limited distribution capacity. Nonetheless, current low demand for these products has not resulted in any significant revenue for growers. For most, however, participation is restricted to the grow-out production sector and do not reap the monetary benefits of increased value along the buyer channels.

13.6.4 Processed milkfish – primarily for the mainstream export market

Table 13-19 Market Preference (processed Milkfish)

PREFERENCE	FINAL CONSUMER	OTHERS
Product form	bottled canned smoked <i>surimi</i>	deboned
Desired product quality and characteristics	Refrigerated, no spoilage	Fresh, no spoilage
Desired packaging	bottled canned smoked	Whole round
Desired place of sale and manner of procurement or delivery	Grocery, retail outlets	wholesaler
Buying price	undetermined	P119.69/kg

Table 13-20 Technology to meet Market Preference (processed Milkfish)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	Bottling, canning Pressure cooking Smoking <i>surimi</i>	N/A
Packaging technology	GMP, HACCP	Growers –processing (some) Distributors – basic food safety & refrigeration
Storage/Cold-chain technology	Refrigeration	Crushed ice
Transport technology	Cold-chain	None
Specialized facilities or equipment needed	Refrigeration facilities Sanitary containers and equipment HACCP-certified facilities	Growers – none Distributors – access to CSF, ice plants, insulated containers
Specialized skills needed	GMP, HACCP Basic Food Handling & Refrigeration Processing	Growers – Deboning, fish processing (some) Distributors – basic food safety & refrigeration
Others (please specify)	Market information EU standards & certification	

The government strategy at developing post-harvest processing capabilities is generally correct and the path towards addressing oversupply and depressed market value of milkfish. However, its investment and efforts have not significantly improved product value and, consequently, revenues for growers-turned-processors because the market has not expanded beyond domestic requirement and an ethnic overseas market.

Global requirements for foodfish are clearly increasing, as well as the supply gap. Moreover, there is a volume of literature on mainstream export market consumer preferences, such as the growing need for *surimi* or fish analogues in Japan, EU preferences for smoked fish, bottled Portuguese-style, and specific packaging requirements, as well as American predilection for whitefish.

The key is having reliable market information on the mainstream consumers' preferences in each export destination and not just catering to the needs of the OFW community.

Currently, due to lack of information and capital requirements, growers do not have the capacity or capability to meet consumer requirements. Therefore, all players along the value chain are constrained by relatively low market value and limited market distribution.

13.6.5 High-Value Seafood (grouper, lobster, abalone, crabs) – primarily for the LRFF export market

Table 13-21 Market Preference (High Value seafood)

PREFERENCE	FINAL CONSUMER	OTHERS
Product form	Live	live
Desired product quality and characteristics	Live, no wounds or blemishes, (table fish size)	Live, no wounds or blemishes, (table fish size)
Desired packaging	Oxygenated plastic bags	N/A
Desired place of sale and manner of procurement or delivery	Seafood restaurants	Growers
Buying price	Grouper – P867 Lobster – P3,400	Grouper – P550 Lobster – P1,500

Table 13-22 Technology to Meet Market Preference (High Value seafood)

	Technology required to meet market preference of specific buyer	Current state of technology
Production/Processing technology	N/A	N/A
Packaging technology	Live fish	Growers – Live fish (some) Distributors – Live fish
Storage/Cold-chain technology	Live-chain technology	Live-chain technology
Transport technology	Live-chain technology	Live-chain technology
Specialized facilities or equipment needed	Live fish packing and transport	Growers – none Buyers/exporters - Live fish packing and transport

Specialized skills needed	Live fish handling Sustainable Full-cycle High-value culture technology	Live fish handling
Others (please specify)	Fish health Market information	None

Currently, growers of high-value species in the region base their culture methodology on traditional (even primitive) farming techniques, applying their crude understanding of the species' biology and life cycle to captive rearing conditions (i.e. lobster and grouper are carnivorous, ergo, are fed with "trash" fish). As such, survival rate is usually low and production volumes are consequently small. However, as these cultured species are considered "low-density, high-value," even the marginal yields still allow for a modicum of profit. It is also attractive to growers because capital requirements are not that big for traditional farming methodologies, such as using low-end culture structures, using wild catch as seed stock, and using "trash" fish feeds.

Growers at present do not have the capacity or capability to move up the value chain due to lack of resources and, therefore, are not able to take advantage of the higher margins along the buyer channels. The potential is there, however, given that no special added technology or skills are required. Market information and access to resources for business development (to improve production and expand operations to distribution) are essential, nonetheless.

13.7 Cost and Margin

In studies undertaken by the FAO, it was evident that majority of benefits generated throughout the seafood value chain are generally captured by the retail / wholesale / secondary processing sector of the industry. This trend is shown both in developing and developed countries' fisheries. Such studies have also highlighted important information about seafood value chains, including that the share of fishers becomes relatively lower as the product becomes more processed.⁴²

The value chains were shown to also have similar characteristics to value chains for agricultural products where the primary sectors receive a relatively lower share of the retail value of highly processed products and a higher share in less processed and fresh products.⁴³

Producers usually sell the milkfish to a "*consignacion*" or auction broker with a 33% margin, inclusive of the mark-up and marketing costs. The *consignacion* is a traditional institution in the Philippine seafood industry. Here, the traditional, centuries-old way of trading fish, called the "*bulungan*" (whisper) is still being practiced today. That is, each buyer or bidder "whispers" his bid onto the ear of the fish trader. It is a bidding process where transparency is never practiced. Whoever "whispers" the highest bid wins the fish. A *consignacion* is either privately owned or managed by the local government. As such, its mark-up in price includes cost of facilities maintenance and labor.

In turn, the broker sells to wholesalers at a margin of 20-30%. Wholesalers distribute to "*viajeros*" (traveler), and the *viajeros* to the retailers in the wet markets. *Viajeros* conventionally own "fish cars," which are utilized to transport fish from the trading post to wet markets, retailers, and other consumers as far as the Visayas. Operational costs include fuel,

⁴²Russell, David and S. Hanoomanjee. Sept. 2012. Manual on Value Chain Analysis and Promotion. Project ref. N° SA-4.1-B20.Pescapes Italia. ACP Fish II. European Union.

⁴³Asche, Frank, E. Gudmundsson and M. Nielsen. 2006. Revenue Distribution through the Seafood Value Chain. FAO Fisheries Circular No. 1019, FAO, Rome.

ice, labor, vehicle maintenance, and other transport costs. Both the wholesalers and “viajeros” get 30-40% margin.⁴⁴

For processed product, the greatest values are found in the processing sector, although as the value chain specific to processed milkfish reveals, it is not much of an increase and restricted by supply-and-demand considerations.

Specific to high-value aquaculture, on the other hand, the overwhelming margin belongs to the exporter, who takes advantage of the grower’s limited capital and market “ignorance” to depress value at the producer level, which, is still substantial, nevertheless.

13.8 Other Benefits for the Target Farming and Fishing Households

a. Employment and consequent benefits

Most growers are self-employed and receive no pecuniary benefits that are required by law. In some cases where cooperatives are big enough to hire personnel, some growers are employed to perform ancillary operations while other household members, mostly women, take on support or administrative functions. As such, however, incomes are not substantial, with household survey results showing that their average annual income is only approximately P70,000 per annum.

b. Farming/Fishing households as suppliers (of services and goods other than agricultural products) and consequent benefits

Aside from their usual farming, growers are occasionally called upon to take on menial jobs in cage construction, pond preparation, net fabrication, and labor during harvest. Income from these services are sporadic, varies on the number of days it takes to complete the activity (usually below minimum wage), and have no other institutionalized benefits included.

On the other hand, women are usually deployed as vendors in wet markets and earn additional income from sales.

c. Access to resource base, facilities and consequent benefits

Access to resource base and facilities is high, but collectively (either as a member of a cooperative or as a tenant) and limited to small amounts. This enables growers to have a more regular means of income without having to invest substantially for operational costs.

d. Access to technology/projects/trainings/services and consequent benefits

Access to technology is limited because it is largely dependent on the frequency of government and NGO programs.

e. Access to information and consequent benefits

Access to information is severely limited because of the lack of facilities that provide information.

⁴⁴Fisheries Policy and Economics Division. 2008. Commodity Roadmap: Milkfish. BFAR. Philippines

13.9 Resource and Industry Governance

Establishing cooperatives and other forms of organized structures among aquaculture producers has shown to be essential in increasing access to resources, government programs. In most of the aforementioned areas, access is largely facilitated by membership to an organized structure, such as a cooperative. Specific to the mariculture sector, access is made available through established mariculture parks, where operations are organized and where government focuses its extension activities. Clearly, mariculture parks have not just served in a regulatory and productive capacity, but has developed into a sort of convergence point for the implementation of crucial programs and assistance.

BFAR has been the most relevant institution in terms of key interventions in the value chain, particularly in seed stock distribution, extension on farming methodology, up to post-harvest processing and marketing. To a certain degree, other institutions, like the respective local governments, Department of Trade and Industry (DTI), Southeast Asian Fisheries Development Center – Aquaculture Department (SEAFDEC-AQD), Dept. of Environment and Natural Resources (DENR), and donor programs have come in to implement programs that either increased technical capacity or provided some form of material assistance to enhance production and ancillary enterprises (see Table 7).

As mentioned earlier, the thrust, however, has been more on improving production (either through basic methodologies to introduce recipients to a given livelihood or more sophisticated technology to improve practices). In the case of post-harvest processing, the strategy has been to introduce backyard or cottage industry-type value-added processing.

Locally, there have been no operational public-private partnerships, such as SEAFDEC-AQD's *Abot Negosyo* Program, which has not been introduced in the region.

Table 13-23 Projects Implemented in the Region and Perception on Usefulness

Name of Project	Year	Lead Implementer	Rate
SANCTUARY	2014	USAID	Somewhat useful
Sustainable Livelihood	2014	DSWD	Somewhat useful
Crab Fattening	2014	BFAR/DENR	Useful
Crab Fattening	2014	BFAR/DENR	Useful
Crab Fattening	2014	BFAR/DENR	Useful
Fisher Folk Coop	2013	LGU	Very useful
Fish Net	2013	DA	Very useful
Fish Production	2013	DA	Useful
Fish Production	2013	BFAR	Very useful
Fish Production	2013	BFAR	Very useful
fish production	2012	BFAR	Very useful
Fish Production	2012	BFAR	Very useful
fish Production	2012	BFAR	Very useful
Fish Production	2012	BFAR	Useful
Hands-on training on tilapia culture in cage	2012	BFAR	Useful
FISH PRODUCTION	2012	BFAR	Very useful
Hands on training on tilapia culture in cage	2012	BFAR	Useful
Fish Cage Production	2012	BFAR	Very useful
Fish Production	2012	BFAR	Very useful

Fish Production	2012	BFAR	Somewhat useful
Fish Production (Fingerlings, B Net, Feed, Cage)	2012	BFAR	Very useful
Fish Production	2012	BFAR	Very useful
Fish (Tilapia) Production	2012	BFAR	Very useful
Financial Assistance	2012	BFAR	Very useful
hands-on training in tilapia in cage (fish production)	2011	BFAR	Very useful
Hands on Training in Tilapia Culture in cage	2011	BFAR	Useful
Hands - On Training On Tilapia in Cage	2011	BFAR	Very useful
Fish Production	2011	BFAR	Very useful
Mangrove Planting	2009	LGU	Very useful
Fish Production	2009	BFAR	Very useful
Hands-on Training on Tilapia Culture in Cage	2001	DA-BFAR	Useful
Hands-on training on Tilapia culture in Cage	2001	DA-BFAR	Useful
Hands-on Training on Tilapia Culture in Cage	2001	DA-BFAR	Useful
Hands on training on Tilapia culture in cage	2001	DA-BFAR	Useful
Hands-on Training on Tilapia Culture in Cage	2001	DA-BFAR	Useful
Fish Cage	2000	Tacmagira	No use
Mangrove Rehab	2000	Farm - C	No use
D.K.	1998	DA.	Very useful
Womens' Haloan Organization	1995	Mr.Sagrado	Very useful
KKKK-Coop	1982	NGO	Very useful
Biyayang Dagat	1982	LGU	Very useful
Fish Production		DA	Very useful
Fisheries		BFAR	Very useful

Source: Household Survey

13.10 Summary of Issues for Attention

a. Buyer Channel

Clearly, in order for growers to partake of the high margins in the buyer channels, it has to move up in the value chain. Trimming down marketing layers, through cooperatives, should be encouraged to market production directly to retailers, thereby bypassing the traditional market layers.

a.1. For the fresh/chilled market, growers that have organized into cooperatives should invest in facilities and equipment that would enable them to market, distribute, and even retail their own product. This would also simplify the supply chain and eliminate antiquated institutions like the *consignacion*, as well as allow them to take on the role of *viajeros*.

a.2. *Improving product quality by introducing cold-chain system in the supply chain and enabling growers' access to CSF facilities and capabilities.* Equipping growers' groups with cold-chain facilities, equipment, and providing training on GMP, HACCP, and Basic Food Handling & Refrigeration would substantially improve their harvest and enable them to impose the higher market value that are currently declared by the *viajeros*. Their competitive advantage in quality would then enable them to become the preferred suppliers over the traditional *viajeros*.

b. Input Supply Channel

Aside from buyer channels, growers may also extend their operations to the input supply channel.

b.1. As fry are usually distributed freely by the government, growers' groups may take advantage of this program by operating their own nursery to produce juveniles (*garungan*). Garungan operations would require acquisition of land-based ponds for nursery and transition operations.

b.2. Another potential input supply channel role is in "finisher" or "maintenance" feeds manufacturing, which requires minimal investment (mainly a mixer and hammer mill for "cookie" production). "Cookies" are supplement or "extender" feeds that have reduced protein content (around 8-10% crude protein content from copra meal) and use waste bread and bakery products as binders. By utilizing "cookies" on species that are not so protein-intensive (like milkfish and tilapia), growers are able to reduce their total feed cost and earn additional revenue from this added product.

In relation to this, rationing the exact daily feed biomass requirements to reflect actual feed requirements is needed as a standard practice among growers.

c. Market Expansion

c.1. In order for processed milkfish to appreciate in value, it would have to penetrate the mainstream export market. Having already started developing growers' capabilities in fish processing is a positive development, but should be focused towards meeting actual product preferences in these export markets. This, however, is something that the national government and national industry associations should work on, specifically, in conducting market studies on consumer preferences abroad (both mainstream and niche, such as kosher, organic, etc., but not ethnic/OFW) to identify and adopt product forms for milkfish post-harvest processing and value-adding. In relation to this, opening up markets, both locally and abroad, for "boneless" milkfish, would be valuable. The Philippines is the only country in the world to produce boneless milkfish to date.

c.2. *Identification and establishment of IT-based solutions to enable growers' access to timely and accurate market information and prices.* As discussed earlier, a universal problem is access to market information. Based on household survey, KIIs, and FGDs, growers conventionally obtain information on market price from their buyer and verifying the accuracy of the information by asking other buyers. This is not very effective, especially if local buyers also obtain their information from off-site wholesalers. Providing growers with reliable information through provision of internet and IT-based solutions (such as giving cooperatives internet connection and computers), as well as sources of fish market information (list of websites with current prices) would eliminate their dependence on traders for market information. This would be of immense benefit to high-value growers, whose harvest are mainly for export, but have little knowledge of international market rates).

d. Primary Activities / Operations

d.1. Given that milkfish production has become highly saturated, efforts should be made to shift a portion of its production to higher-value alternative commodities, such as grouper and pompano for mariculture areas and *P. vannamei* for brackish water areas, where viable.

d.2. Similarly for freshwater aquaculture, producers of tilapia and other low-value freshwater species should identify alternative commodities for the region's sizeable freshwater production areas to improve revenues (i.e. "koi" and other ornamental fish production).

e. High-Value Aquaculture

Due to the region's unique geography, production of high-value seafood for the LRFF trade has great potential for existing and potential growers. However, as earlier explained, this aquaculture subsector is not very developed.

e.1. Efforts must be made to promote and introduce the production of high-value aquaculture through demonstration modules or farms, and through technical/material assistance.

- Interventions in the value-chain for high-value aquaculture, such as commercial feed supply, seed supply, and marketing channels should be made:
- Establish and promote distribution channels for off-site grouper hatcheries (such as Finfish Hatcheries, SEAFDEC-AQD, and others) to ensure more seed stock availability and options for growers. A long-term objective, however, should be in establishing local hatchery/nursery systems for the region.
- Promote the use of commercial feeds among high-value growers to improve production efficiency and reduce production cost.
- Organize growers into cooperatives and promote their relocation to mariculture parks to increase access to government programs and assistance, as well as access to market information (if and when introduced) and markets.
- Gradually expand the operations of growers' cooperatives along the value chain (such as in consolidation and export) by providing them with the means to consolidate live seafood and transport them to end-users.
- Develop a live-chain system for the local high-value aquaculture industry.

14 CONCLUSIONS and RECOMMENDATIONS

The household survey component of the baseline study has revealed that the poverty incidence among farming and fishing households in Caraga Region is high and that the targeted project participants were highly vulnerable. The lack of access to improved technologies, market, credit, processing facilities and information are among the hindering factors identified by the study that result to the detriment of farmers and fisher folks.

The value chain mapping component of the baseline study for the selected commodities was able pinpoint the inequitable distribution of cost and margin among the players in the value chain. The value chain analyses highlight the trend that farmer producers are among those who get the lesser share of the benefit pie while having a larger share of the cost in production and product transformation. The determinants relates back to low productivity, low quality of produce, poor product handling, absence of quality inputs, less adaption of appropriate technologies and lack of opportunity to participate in the marketing of their products.

The Philippine Cold Chain Project, which strategically aims to increase agricultural productivity and expand trade of agricultural products, will be an important contributor in alleviating the overall socio-economic status of its targeted project participants directly in selected sites. Corollary to that, the Project will serve as catalyst in realizing the redound of benefits indirectly to the greater portion of the population of Caraga Region in form of food security as result of increases in agricultural productivity and the emergence of better economic opportunities, job creation and increase in household income as result of the expansion of trade of agricultural products.

From the viewpoint of the study team, PCCP needs to efficiently link together the value chain players and enablers in a common framework of improving processes, putting in place enabling policies and ensuring fair and equitable access to benefits. In so doing, the Project should focus on identifying the gaps and resort to addressing issues in all nodes of the value chain.

The Project strategy of having a market driven approach to productivity enhancement within the confines of international standards and the strategy to provide the necessary infrastructures to improve the supply chain, post-harvest and processing in the context of cold chain will be more effectively put forward to work if it leverages resources of the private sector and government.

Related to the actual implementation of the Project, PCCP may the need to:

- Re-assess in more quantitative manner, with more emphasis on scope and efficiency, the list of barangays recommended by prospective partner agencies and local government units; this may lead to some barangays being replaced;
- Give as much consideration to private enterprises as it will to producers organizations in both site selection and project implementation;
- Expand and intensify its media and technology use plan for broader reach, even while adjusting to the educational level of producers who are the primary targets

8.7. Socio-Economic Status and Vulnerability of Target Participants

- High poverty incidence. Based on a poverty line of P96,182 per household in Caraga, the poverty incidence among target farming and fishing households in the baseline study area is 61.3% (compared to 31.9% among the general population). The high poverty incidence is corroborated by 71.7% of households having experienced hunger.
- Low employment rate. Only 17.0% of the labor force are employed, coming from 46.1% of the target households. 18.4% of those employed are in the agricultural sector.
- Lack of education, limiting chance of being employed or finding a good-paying job. Only 7.1% of the population over 21 years old have finished college and only 42.1% of those aged over 16 years have finished high school. This also has a bearing on the way the project's capability-building interventions will be designed.
- High self-employment in agriculture. 46.7% of the labor force are self-employed, coming from 87.3% of the target households. 68.8% of the self-employed are in farming and 19.7% are in fishing.
- Multiple income sources. 64.3% of the target households earn from both employment and self-employment. They generally earn higher than those relying on one source only.
- Insecure land tenure. Only 63.2% of farmers own the land they till. Only 50.3% of households own the lot on which their house stands. This may be a constraint for the project as farmers who do not own the farm they are tilling are generally less motivated to diversify and/or expand their production.
- Limited access to formal credit. Although 58.0% of the households have borrowed money, only 34.2% have access to banks, cooperatives, lending agencies, and government agencies. This is an opportunity for the project to introduce credit financing.
- Lack of farm mechanization. Only 5.8% of farmers have either a tractor or a power tiller. This is an opportunity for the project to introduce farm mechanization.
- Limited capability building. Of the targeted households, only 23.4% have at least one member who has undergone technical training. This highlights the need for capability building which the project intends to address.
- Adequate access to communication and broadcast media. 73.0% of the target households have cellular phone. 67.3% have television and 33.2% have radio. 32.2% have a DVD or VCD player. This opens possibilities for the project's media plan.
- Low participation in organizations. While 79% of the barangays in the baseline study area have farmers' organizations and 38% have fishers' organizations, only 24% of farming and fishing households are represented in these organizations. This will pose a challenge to the project as it aims to give producers' organizations a greater role in the value chain.
- Accessibility problems. 27.4% of the barangays in the baseline study area are difficult to reach during and immediately after heavy rains. 42% of farms are vulnerable to floods and 18% are vulnerable to erosion. Soil and water management need to be given attention at both farm and cluster (of farms) levels.

8.8. Opportunities and Synergies

- The Caraga Region is a net importer of pinakbet vegetables. This opens the door for the project to encourage farmers to expand production, diversify if needed, and improve product quality. The latter is especially crucial because local consumers are already used to vegetables of better quality coming from neighboring regions.
- 74% of local farmers depend on commercial seeds. There are three main suppliers (with nation-wide operations) in the region. The biggest, East West Seeds, provides agricultural extension services to farmers who buy its seeds. A partnership with East West Seeds is already being considered by the project.
- There is an industry association called the Caraga Vegetable Growers Network that the project can work with but the project may need to help strengthen the network.
- Banana chip export declined in 2010 but is now increasing. 25 of the 35 registered banana chips plants in the country are in Mindanao. 21 of these are in the Davao Region, just south of Caraga Region.
- The broiler value chain is relatively integrated. Farmers venture into broiler production only if they have a production or futures-type contract, with a specific target market. (Some backyard producers have informal agreements with buyers where the sale weight and price are specified.) The formal production contract typically specifies production and biosecurity procedures to be followed.
- Big integrators have introduced protocols that assure the final buyer of safety from farm to fork.
- In commercial contract growing, specialized company trucks with individual coops or plastic chicken crates are used to transport the birds. This can serve as example to smaller producers and lead them to initiate discussion on shared facilities.

8.9. Potential Problems and Constraints

- Mango production is concentrated in the towns of Buenavista, Nasipit, and Carmen in Agusan del Norte. If the project were to cover these towns, it may have to contend with long-established business and social ties between producers and the sprayers-contractors-traders.
- There are farmers associations in those towns but because the trees are basically leased by the sprayer-contractor the association has little role in production and marketing. Even members who manage their own trees deal individually with traders and not through the association.
- The project may also have to contend with a processing plant in Cebu and another local plant which are directly leasing trees in the three towns, bypassing the local sprayer-contractors. A government-owned plant, without similar arrangement, is now having problems with the low volume and irregularity of supply.
- Saba is alternative staple food for 25% of the households in the project area. Most banana farmers therefore do not yet appreciate its agribusiness potential and most banana stands remain poorly maintained, unfertilized, and vulnerable to pests and disease.

- Contract growing arrangements between Celebes Agricultural Corporation, the biggest banana chips producer in Caraga, and local farmers associations did not prosper presumably because Celebes found cheaper and more predictable sources in Davao. It might take the project extra effort to ask those associations, as well as others, to reconsider a similar arrangement.
- There is no commercial poultry breeding farm in Caraga Region. There is one hatchery in Agusan del Sur that buys eggs from Davao City but its chicks are for its own farms.
- Dressing plants (and their adjunct cold storage) in the region are private and exclusive.
- .For local producers to be able sell pork in other regions, they have to patronize class “AA” slaughterhouses. But currently there are only three in Caraga.
- Fish characteristically go through several buyers before reaching the consumer to the disadvantage of both fishers and consumers. The buyers form an intricate network and dismantling it is easier said than done. A cold chain accessible to fishers has to be in place as part of the effort.
- Producers engaged in the culture of prawn and other species that are geared towards the export market often have difficulty adjusting to its demands due to limited information and understanding, inadequate technology, and production issues such as disease control and quality management.

The following sections outline specific recommendations for the project regarding value chains evaluated under the baseline survey.

14.1 VEGETABLES

Technology

- Several key indicators suggest there is need for additional training in input development and even marketing strategies. This is even among the farmers who already produce their own input. Training in production, packaging and preservation technologies need to be enhanced. In addition, there is a need to assess and monitor the adaptability of the produce to changes in climate.

Profitability

- For representative vegetables, retail prices in Caraga tend to be twice or more than twice the farm-gate prices. Promotion of purchases from farmers' markets rather than large establishments may help bridge this gap. The Department of Agriculture has already organized at least one activity to encourage direct-from-farmer purchases. However, consistent follow-up activities and marketing may be needed to ensure the sustainability of benefits. One possible window to promote sales is to ride on the current trend of demand for healthy, organic vegetables.

Involvement of women

- The vegetable industry is an area where women are heavily involved, primarily in the retail and trading of vegetables. Vegetable production is still dominated by men. However, the trend for women in production is also increasing. Of special interest is a group of widows in Bislig whose backyard farming efforts have been helping them sustain their families. Increasing the involvement of women in vegetable production has great potential to ensure that families have an additional source of income as well as a consistent supply of food.

14.2 CARABAO MANGO

Technology

- There is a very low proportion of farmers cultivating mangoes using improved techniques. This indicates a need for trainings on these improved techniques, including flower induction, bamboo propping, de-suckering and ripening induction among others.

Profitability

- Pesticide and fertilizers take up a significant amount of the cost of production for mangoes. Improvement of technology may be able to help reduce these costs and increase farmer profit.

14.3 SABA BANANA

Technology

- There is a very low proportion of farmers cultivating bananas with improved techniques. This indicates a need for trainings on these improved techniques. In

addition, there is need for input on processing and preservation of bananas as well as how to make the plants more resilient to changes in climate;

- The provision of adequate infrastructure and support systems as discussed in Chapter 8 may also improve overall production.

Profitability

- Cost drivers such as fertilizers and pesticides account for half of the banana's price. Improved technology may address this gap and increase farmer profit;
- There is a lower gap between retail and farm gate prices in neighbouring regions, signals a need to analyse the factors that bring about this disparity. An experience cited by the farmers indicate that a farmers' market may also help in improving farmer profits from this product.

14.4 LIVESTOCK AND POULTRY

Technology

- Farmers could participate in the mainstream industry if given the opportunity to learn more the technology and be given an access to reasonable financial facilities.
- Private sectors in partnership with the government could also facilitate the establishment of appropriate centralized or cluster or community-based dressing plant with cold chain facilities.
- Farmers should also expose and learn on how the market system works in the industry level in order to improve the consistency and biosecurity of all level of the chain as required by the preference of the end consumer.
- Farmers could also explore to commercialize the production of Native Chicken as the demand of healthy food option is growing. Proper management protocol could be developed in order to optimize the productivity of Native Chicken meat and egg production.
- Cluster approach on agri-business system should be considered as small farmers have limitation to a larger scale. Cluster approach could augment and help organized small-scale to become large-scale.
- Bottom-line, enablers (Private Sectors and Government) should work with the small famers and should be proactively part of the whole value chain system and management.

14.5 SWINE

Issues affecting swine production and marketing in Caraga include:

- High production costs and farmers have no appropriate system of production records.
- Inputs of supplies are expensive and producers are lack of knowledge of producing in-house feeds by using local or available resources.

- Low quality of meat and live products particularly for the smallholder or backyard farms that reflects to have difficulties to access to good price; low quality output prone to exploitation from the middleman or trader's price dealing.
- Mortality rates of swine and chicken are high due to poor quality breeds and or unavailable good quality breed and lack financing capacities to acquire or purchase medicines and vaccines.
- Inequity price of live pig and chicken especially in for the Backyard Farmers given by traders in the village due to lack of market information.
- Low access to veterinary services for the producers or farmers.
- Lack of access to financing for daily operations and expansion.
- Low knowledge of handling Swine and Chicken meat with sanitation both at market and slaughterhouse or dressing plant.
- Lack of appropriate Cold Chain Facilities in order to improve or maintain the superior quality of the animal products and by products.
- Lack of Organizational development support for the existing and emerging Community-Based Livestock/Poultry Producers.

14.6 FISH CAPTURE

Buyer Channel

- Clearly, in order for primary producers to partake of the high margins in the buyer channels, they have to move up in the value chain. Trimming down marketing layers, through cooperatives, should be encouraged to market production directly to retailers, thereby bypassing the traditional market layers.
- For the fresh/chilled market, fishermen that have organized into cooperatives should invest in facilities and equipment that would enable them to market, distribute, and even retail their own product. This would also simplify the supply chain and eliminate antiquated institutions like the *consignacion* and *suki* system, as well as allow them to take on the role of *viajeros*.
- *Improving product quality by introducing cold-chain system in the supply chain and enabling growers' access to CSF facilities and capabilities.* Equipping municipal fisher folk communities with cold-chain facilities, equipment, and providing training on GMP, HACCP, and Basic Food Handling & Refrigeration would substantially improve the quality of their catch and enable them to impose the higher market value that are currently declared by intermediaries and middlemen. Moreover, CSF facilities would enable them to the option of storing surplus produce during peak seasons.

Input Supply Channel

- Aside from buyer channels, fisher folk cooperatives may also extend their operations to the input supply channel, such as boat building, fishing fabrication sale, etc.
- A cooperative may explore the possibility of importation and sale (and later, actual fabrication) of fiberglass boats, which are only more expensive by P5,000 per unit, but quicker to finish (at 1 unit per day molding time) and hardier. The cooperative may then

be able to sell boats at a much brisker pace and, if to a member, at a staggered payment basis, as a benefit to membership.

- Another potential input supply channel role is in “crushed ice” making and distribution. The cooperative may purchase ice blocks from ice plants and do the crushing locally (requiring some investment in an ice crusher and small cold storage facility or makeshift refrigerated “bodega” similar to the ones utilized by ice dealers in wet markets.
- In this manner, fishermen are encouraged to employ ice regularly as part of their on-board catch stowage and post-harvest process, thereby, promoting quality and freshness of their catch.

Primary Activities / Operations

- The diminishing productivity of capture fisheries and the relatively high vulnerability of the resource base, compounded by the general inadequacy of incomes from this livelihood, should be the bases to introduce fishermen to alternative and more lucrative economic activities, particularly, in aquaculture since their proximity to the coast, familiarity with the cultured species, and experience with factors affecting production, such as weather, water parameters, etc. make it possible for them to shift to fish cage farming, with some training and material assistance.

14.7 PRAWN AND AQUACULTURE

Buyer Channel

- Currently, the grow-out sector, especially the small farm holder segment, has no organization to collectively move up in the value chain, although there would be some individuals that have expanded their business to trading. Trimming down marketing layers, through cooperatives, if any could also be done, thereby bypassing the traditional market layers.
- Improving product quality by introducing cold-chain system in the supply chain and enabling growers’ access to CSF facilities and capabilities. Providing growers with access to cold-chain facilities, CSF, and providing training on GMP, HACCP, and Basic Food Handling & Refrigeration would substantially improve their harvest and enable them to impose the higher market farm-gate prices.

Primary Activities / Operations

- As earlier discussed, the threat of disease outbreak from existing pathogens compels growers to adopting extensive culture systems to prevent the occurrence of stress that would trigger mortalities. Instead, farmers generally reduce stocking densities and other parameters and compensate by increasing the frequency of crop cycles. This, however, has a long-term deleterious effect as good culture management procedures in between cycles (such as pond cleaning, disinfection, and preparation) are forsaken. Alternative farm practices that promote good culture management procedures can, therefore, be promoted through demonstration farms that show improved yields from applying such basic practices while at the same time mitigating mortality from secondary symptoms of WSSV and other health issues.
- Most smallholder farms have reduced productivity due to poor maintenance and current state of disrepair of existing production areas. Government and other

institutions can help growers by providing material assistance in the improvement and repair of ponds.

- The presence of WSSV in production areas limits tiger prawn expansion. Therefore, growers may opt to shift to vannamei culture, which has shown resiliency against existing endemic pathogens. This, of course, has to be undertaken under stringent measures to prevent similar disease problems for white shrimp from happening.
- Since government has been regularly providing similar programs for milkfish, tilapia, and, to a limited extent, tiger prawn farmers, it can also promote vannamei production among prawn farmers by conducting vannamei fry dispersals to initially jumpstart vannamei production in the province.
- Existing vannamei service providers, such as Dobe Hatchery, CP Feeds, and others may be recruited to conduct technical seminars and other forms of assistance in the region to convince existing prawn and brackish water milkfish farmers to go into vannamei farming.
- The local industry, through BFAR, SEAFDEC, and other development programs, may take advantage of the current resurgence of activity by Philippine shrimp exporters in the vannamei market by encouraging them to resume contract-growing arrangements among local farmers.

Input Supply Channel

- Local growers prefer tiger prawn over white shrimp because of the relative ease in availing of fry, which they can obtain either from government dispersal programs or local prawn hatcheries. These hatcheries, on the other hand, are discouraged from going into vannamei fry production primarily because of the costs involved in accreditation, as well as the cost of procuring SPF-certified brood stock. White shrimp spawners may only be used for a number of spawnings before their fecundity eventually declines and consequently have to be replaced by new ones.
- Hatcheries may be encouraged to expand to vannamei fry production by helping them in the certification process, as well as in the initial acquisition of brood stock.
- Cooperative arrangements may also be explored between accredited off-site hatcheries and local ones, under the supervision of BFAR, wherein vannamei fry production is done locally using the brood stock of accredited hatcheries. These may be done under some profit-sharing scheme.

Market

- Identification and establishment of IT-based solutions to enable growers' access to timely and accurate market information and prices.
- As discussed earlier, a universal problem common is the access to market information. Based on household survey, KIIs, and FGDs, growers conventionally obtain information on market price from their buyer and verifying the accuracy of the information by asking other buyers. This is not very effective, especially if local buyers also obtain their information from off-site wholesalers. Providing growers with reliable information through provision of internet and IT-based solutions (such as giving cooperatives internet connection and computers), as well as sources of market information (list of websites with current prices) would eliminate their dependence on traders for market information. This would be of immense benefit to growers, whose harvest are mainly for export, but have little knowledge of international market rates.

APPENDIX