CHAPTER 4 ECONOMIC ANALYSIS OF LOCAL INDUSTRIES AND BUSINESSES IN THE ARMM

4-1 Local Industries in the ARMM

4-1-1 Analysis of Enterprises with more than 20 employees from NSO Business Study

According to the Survey of Philippine Business and Industry by NSO, the number of enterprises with more than 20 employees in the ARMM decreased from 74 in 2006 to 67 in 2008. In particular, the number of enterprises in the industrial sector decreased from 21 to 15. By sector, the service sector has the largest number of establishments (Figures 4-1 and 4-2).

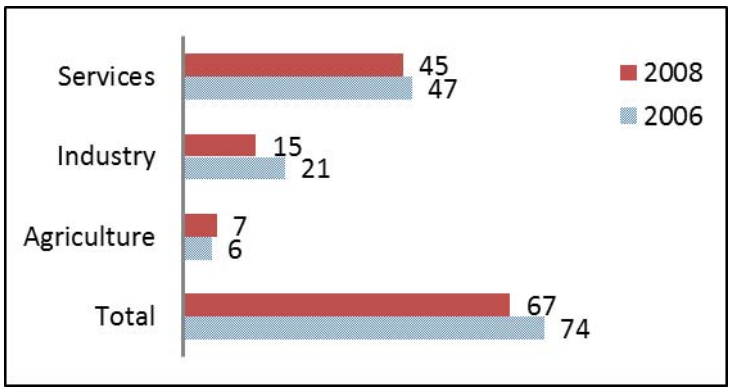


Figure 4-1: Number of Enterprises with More Than 20 Employees in the ARMM

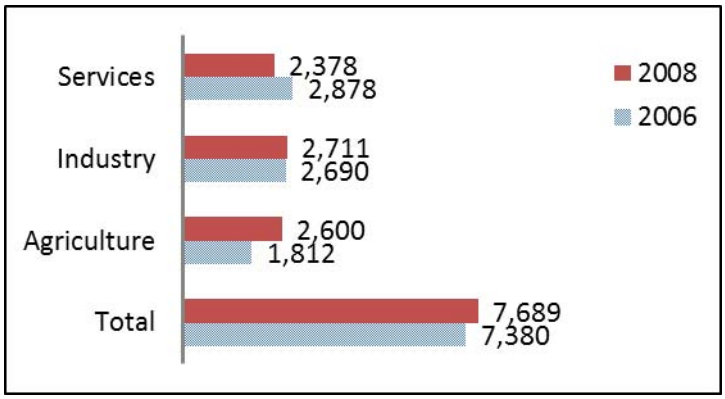


Figure 4-2: Total Employment of Enterprises with More Than 20 Employees in the ARMM

Those enterprises employ 7,689 people in total. Although the number of enterprises is the smallest, the agriculture sector employs the largest number of people of all sectors, and the average number of employment per establishment was 371 (Figure 4-3). When looking at the labor productivity measured by the value added per worker, the value of the ARMM decreased to Php 167,000, which is the lowest in the Philippines, where the value increased from Php 701,000 to 752,000. The industrial sector attained the highest value at Php 267,000 in the ARMM, although it marked a significant decrease from 2006. The value for the agricultural sector is less than half that of the industrial sector. (Figure 4-4)

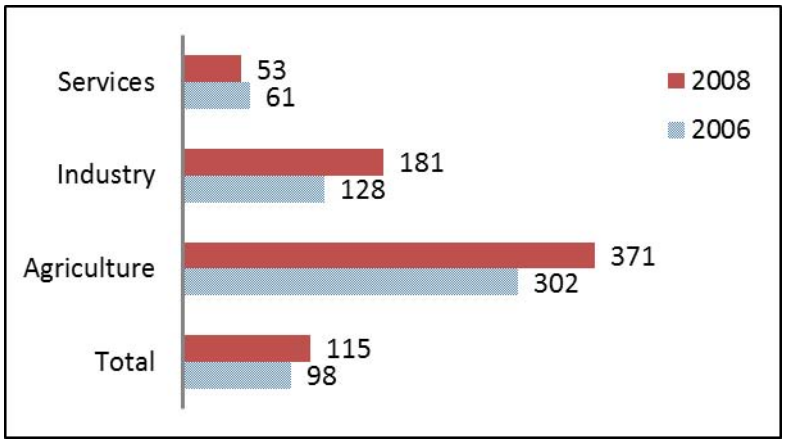


Figure 4-3: Number of Average Employment in the ARMM (Unit: Php 1,000)

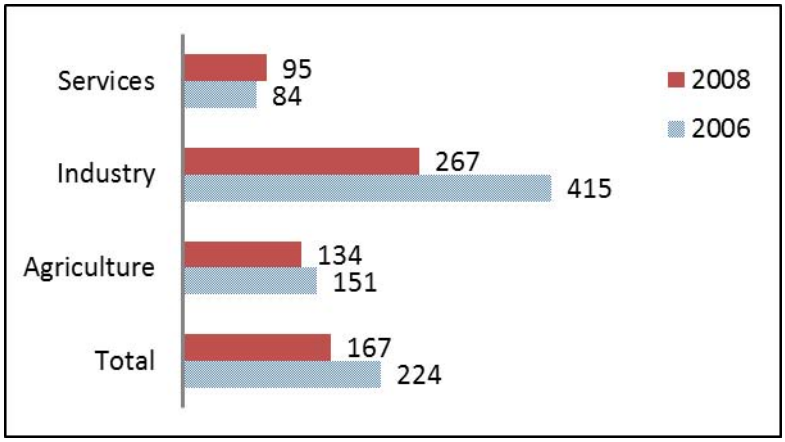


Figure 4-4: Value Added per Worker in the ARMM (Unit: Php 1,000)

Based on the above, it can be said that in the ARMM the agricultural plantation enterprises have the greatest effect on employment generation. However, the industrial sector should be promoted to increase the total value added, leading to more income for the region (Figure 4-4). Overall, all the sectors have to improve their productivity.

4-1-2 Current Status of Businesses Registered at RBOI

As explained in Chapter 2-2-3, 23 enterprises are registered at RBOI with total investment of Php 9.6 billion, out of which 14 were operational as of December 2010. Since the reported project cost of the active enterprises is Php 3.3 billion, the remaining Php 6.4 billion has not been fully utilized or not actually invested. This section will analyze the current situation of active enterprises and the reasons why nine businesses are not operational. Table 4-1 shows the current status of the active enterprises.

Table 4-1: Current Status of Active Enterprises Registered at RBOI

Product/ Service	No	Location	Cost (Php mil)	Current Status as of Nov-Dec. 2010
Fruit Plantations (banana & pineapples)	5	Lanao del Sur, Maguindanao	2,040	Exporting to Middle East, Japan, Korea & China. Two large exporters outside of the ARMM send management staff and conduct quality control and marketing. One of them plans further expansion.
Palm Oil Milling	1	Maguindanao	361	Under the network of a large company in Manila. Started operations in 2009 and has not yet reached the maximum operation capacity due to material shortages.
Coconut processing	3	Sulu, Maguindanao	155	Crude oil sold to San-Miguel Corporation, a joint business partner at the start-up. Coconut oil/lip cream sold to Hong Kong & Manila. Coconut vinegar/brandy are sold to specific clients in Manila.
Corn/ cassava starch	3	Maguindanao, Lanao del Sur	434	No information on corn starch processing, but one enterprise is said to have been expanding facilities. Cassava starch is sold to Manila. Shortage of cassava is a challenge in meeting demand.
Wood processing	1	Maguindanao	61	Providing seedlings to residents to secure material trees. Recent information is not available.
Bus Operator	1	Davao - Maguindanao	234	No information available.

Source: RBOI and interviews with the enterprises

There are several common characteristics among the above enterprises.

- Location – Good security and local leaders are favorable for industry promotion:
  Investments are concentrated in several municipalities. In Maguindanao, three are in Sultan Kudarat, two in Datu Paglas, two in Datu Odin Sinsuat, one in Buluan. In Lanao, there are two in Wao and two in Bumbaran. These municipalities have relatively stable peace and order and political leaders are said to be more proactive in promoting industry. It is well-known that the former mayor of Datu Paglas was very active in encouraging development, and his family established "Datu Paglas Corporation," which owns transportation, security service, and insurance companies as well as the Rural Bank. In the case of Sulu, the owner is from the prominent political clan in the area and they were given a guarantee from the military to protect the project, which also has its own "security force[51]". The company even constructed its own private port for shipping outside of the ARMM.
- Utilize local natural resources
  Twelve enterprises, 86% of the total 14, are engaged in agriculture-related businesses, and six of them operate plantations such as banana, pineapples, and cassava, utilizing the fertile soil and local resources. Uni-Fruiti, the largest investor in the ARMM, reported that the bananas and pineapples grown in Maguindanao and Lanao del Sur were the highest quality among the bananas grown on their plantations.
- Strong management partner/secured market
  All the five plantation businesses and palm oil processing are under the network of large exporters or a processing company. These companies send a management team for management, quality control and marketing and/or trained the staff and control financial management, including budget allocation. The crude oil processor has a large client in San Miguel who was a former partner, and their manager has experience in the same business. They have less concern about markets.
- Open to outsiders or investment from outside of ARMM or non-Muslim community
  In addition to the above case of networking with large private partners outside of the ARMM, two enterprises were started by businessmen outside of the ARMM and three are owned and managed by Chinese residents.

While these enterprises are expanding operations or sustaining the business under increasing competition in the world market, several challenges were reported, which include:

51 "Assessment of the Business and Investment Climate in the ARMM and Strategies to Address the Problems" for USAID GEM Program, Peter Wallace, AYC Consultants, 2003.

- Shortages or unstable supply of material:
  This problem was reported for palm, cassava, corn and wood. The palm oil processor plans to expand its plantation outside the ARMM to Sultan Kudarat Province because of land ownership problems in the neighboring area in the ARMM. The cassava starch processor emphasized the need to train cassava farmers to improve their farming technology.
- Price competition with other processors or in the world market:
  For crude coconut oil, cassava starch, wood processing, and coconut processing.
- Insufficient infrastructure such as roads and electricity:
  The enterprises in Datu Paglas and in DOS improved or provided necessary utilities and improved the roads by themselves when their businesses were started. Several enterprises also claimed that the rough roads affect their businesses, such as damaged bananas and difficulties encountered by farmers delivering their products.
- High transportation costs:
  High costs and infrequent operation of Port Polloc forced several enterprises to transport their products by roads to Davao for further shipping to Manila or Cebu or other countries. However, it is reported that oligopoly transport business between Cotabato and outside the ARMM via Davao lead to high land transport costs, too[52].
- Need for support to find new market:
  The enterprises without a large scale business partner are struggling to find a new market, including export for their expansion.

On the other hand, the reported reasons why nine enterprises stopped operation or could not implement the registered projects are summarized in Table 4-2.

As indicated above, several enterprises could not sustain or implement operations due to management problems. It is also thought that the feasibility studies were not sufficient. According to the USAID GEM Report, "Assessment of the Business and Investment Climate in the ARMM and Strategies to Address the Problems" in 2003, which examined the non-operational enterprises registered at RBOI, including four of the above nine enterprises, major reasons for the failure of investments are stated as: i) unpreparedness of ARMM businessmen for the demands of the proposed joint ventures and ii) insufficient knowledge in the local ARMM community on how to prepare feasibility studies or sound business proposals. The problems with land titles forced the suspension of the large-scale palm oil plantation in Lanao del Sur, but the same problem was also raised by the existing palm oil processor in Maguindanao as constraints in expanding their operations.

[52] Based on the interviews with several enterprises and stakeholders. The issue of an oligopoly in transport between Cotabato and outside of ARMM will be verified.

Table 4-2: Reasons for Non-Operation of Enterprises Registered at RBOI

Product/Service	No	Location	Cost (Php mil)	Reasons for suspension or non-implementation of the enterprises
Garment Making	1	Maguindanao	111	Suspended in 2009 due to lower competitiveness in the world market affected by the export quota system of the US, and caused by high transportation costs and labor disputes.
Palm Oil	1	Lanao del Sur	5,170	Pulled out of the project after planning a 1,000 ha investment due to problems with the land title.
Ship breaking, Steel re-rolling	1	Maguindanao	707	Not implemented due to environmental concerns about pollution. Environmental Compliance Certificate (ECC) could not be obtained.
Passenger Bus	1	Davao – Maguindanao	311	Stopped operations after partnership was dissolved.
Banana chips, coco products	2	Maguindanao	38	Stopped due to high operation costs such as transportation and electricity. Marketing failed.
Marine product	2	Maguindanao, Sulu	13	Not implemented due to management problems, inadequate squid catch
Wood products	1	Maguindanao	12	Could not acquire equipment

Source: RBOI, interviews with the enterprises, and USAID GEM Report

The USAID GEM report recommended several strategies for business and investment promotion, which included i) addressing peace and order problems, ii) strengthening the ARMM business sector, iii) strengthening the business policy making capacity of the ARMM government, including private sector participation in the policy making, iv) addressing infrastructure constraints, v) effective delivery of education, and vi) improving access to formal credit by increasing land titling efforts and encouraging the establishment of bank branches. It should be noted that the report made the following recommendations in 2003 to strengthen the business sector in the ARMM.

- Re-orient the incentive scheme.
- Improve LGU's delivery of services to businessmen.
- Identify and assist people and groups with potential for business growth.
- Link ARMM enterprises with large business companies.
- Encourage the development of other viable industries.

It is not clear how this report was shared with the ARMM government. However, some of the above recommendations, such as assistance to targeted potential groups, are reflected in the current GEM program.

4-1-3 Current Status of Industry Promotion Projects Initiated by the Government

- Case of the Southern Philippines Development Authority and the ARMM Government -

The Southern Philippines Development Authority (SPDA) is a government-owned and controlled corporation tasked with fostering and accelerating the balanced growth of the Southern Philippines. The objectives of SPDA are to i) promote the development of the Southern Philippines by initiating and/or undertaking development and/or business projects and ii) make investments for the economic development of the region. Several mandates/presidential directives have been given to SPDA, including the five projects in the ARMM which SPDA initiated and managed from the early 1980s[53]. Although detailed information is not available, the projects include several large-scale investments such as an agro-industrial project in Lanao del Sur covering 26,000 ha. It was decided to transfer these projects to the ARMM government (SPDA Office) by the Executive Order in 1993. The ARMM government set up its SPDA office and has managed the projects since then. Table 4-3 summarizes the outline and current status of the projects[54].

There are several lessons learned from the failures of the projects.

- Lack of information sharing and understandings by beneficiary residents, which led to the burnings of constructed facilities.
- Short transfer period from SPDA to the ARMM government and lack of preparation for the ARMM government, which resulted in stoppage of most projects due to lack of fund, management capacity, peace and order, corruption, lack of market, etc.

There are also other government led projects that failed in the ARMM, such as a seaweed processing plant established by the provincial government of Sulu, which is not operational and housing for homeless people. Although the reasons for non-operational status of the project are unknown, the feasibility study is considered insufficient.

[53] Since SPDA lost many old documents during a fire several years ago, detailed information could not be obtained.

[54] It should be noted that SPDA still maintains the land title for the projects and currently plans to utilize the remaining 22,000 ha of land for Kapatiran Agro-Industrial Cooperative Settlements, in Wao and Buluan to establish the Mindanao Special Economic Zone for agricultural production and processing with a budget of around US$ 11 million. SPDA explained that an investor from Saudi Arabia had already shown interest in the plan.

Table 4-3: Projects by SPDA and Transferred to the ARMM Government[55]

Location	Outline	Current Situation
< Kapatiran Agro-Industrial Cooperative Settlements>		
Lanao del Sur (Wao & Bumbaran)	The project covered 26,000 ha and developed housing on 2,000 ha and land for cropping such as corn (5 ha per lot), and planted fruit trees in 2,000 ha. One of the biggest SPDA projects.	Not properly implemented. Out of 20 target modules, only 3 were implemented and all constructed facilities under module 1 & 2 covering about 2,000 ha, houses, water system, rural health unit, farming facilities, was burned by the beneficiaries due to misunderstandings. However, SPDA prepared a plan to transform the area into a Special Economic Zone.
< Maguindanao Integrated Development Project >		
Maguindanao	Covers 400 ha of land. Provided housing for government officials and water system and roads.	Due to lack of funds, SPDA was unable to sustain the project. The water system became dilapidated and transferred to Cotabato Water District.
< Lake Buluan Development Project >		
Maguindanao	Provided fish cages for Tilapia and ice plants	Currently not functional.
< Lake Lanao Fish Cage Culture Project >		
Lanao del Sur	Provided fish cages and ice plants. A support program for the poor, started with National Loan Support Fund	It was not properly managed, and thus failed.
< Integrated Marine Fisheries Development Project >		
Tawi-Tawi	For seaweed	SPDA was not able to sustain this project.

4-2 Current Status of Businesses - Results of Business Study

4-2-1 Objectives and Methodology[56]

The objective of the Business Study is to collect and analyze the information on the current situation and the challenges faced by local businesses in the ARMM. The study targeted enterprises registered with Department of Trade and Industry-ARMM (hereinafter called DTI) that focus on manufacture and wholesale sectors, given the importance of these sectors for industry promotion. The number and distribution of samples and target municipal LGUs were pre-determined based on the number of enterprises registered at DTI and other conditions, such as the level of economic activities and the security situation. The study was implemented by the local consultants during the period from September to December 2010 and the number of interviewees is as shown in Table 4-4.

55 From the interviews with SPDA in Davao and SPDA-ARMM Office in Cotabato.

56 The study was sub-contracted to the three local consulting organizations which were trained in Cotabato City and Zamboanga City to ensure full comprehension of the questionnaire. Samples were randomly selected from the list of Business Names Registered (BNR) at DTI but the consultants obtained the information on available businesses from municipal LGUs. There were several challenges reported such as i) difficulties in finding the establishments registered with DTI-ARMM, ii) difficulties in finding manufacturing enterprises, particularly in rural municipalities, and iii) refusals by several enterprises to provide the information.

Table 4-4: Distribution of Sample Enterprises in Business Study

Province	Maguin-danao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	Total
No. of Municipalities	17	14	10	12	9	62
Manufacturing	80	57	52	27	25	241
Wholesale	19	44	59	50	49	221
Export	0	2	0	0	0	2
Mining & quarrying	9	1	0	1	0	11
Transport	11	10	10	0	2	33
Agri-related services	1	3	4	2	0	10
Total	120	117	125	80	76	518

4-2-2 Study Results

(1) Business Profile

1) Profile of the Interviewees (owners or managers)

- Educational background: It should be noted that 44% had graduated from college/university and 27% from high school, which indicates that those with higher education tried to manage their own businesses due to lack of employment opportunities, or those from relatively wealthier families could own or manage the enterprises because most of them started the businesses with their own money[57].
- Gender distribution: Males account for 64% and females for 36% of the owners and managers interviewed. The manufacturing sector shows higher female participation, with a 42% share, because many businesses in the sector are bakeries and small-scale food processing.
- Previous jobs: 23% have had no job before because many succeeded their family businesses. Other responses are varied, including farmers (15%), vendors and government employees (each 13%), and private company employees (10%).

2) Profile of the Enterprises

Employment Status by Sector is shown in Figure 4-5.

- Years in operation: 42% of the enterprises are relatively new in operation from one to five years, while 16% (83 enterprises) had been operating for more than 20 years.

[57] The ratios vary among provinces, with the highest ratio of college/university graduates in Lanao del Sur (52%), while the ratio of Tawi-Tawi was the lowest at 28%.

- Number of employees: Half of the enterprises employ less than five staff, and 30% have six to 10 staff. In total, 78% belong to micro enterprises in terms of employment. However, 69 enterprises (13%) employ more than 20 staff.

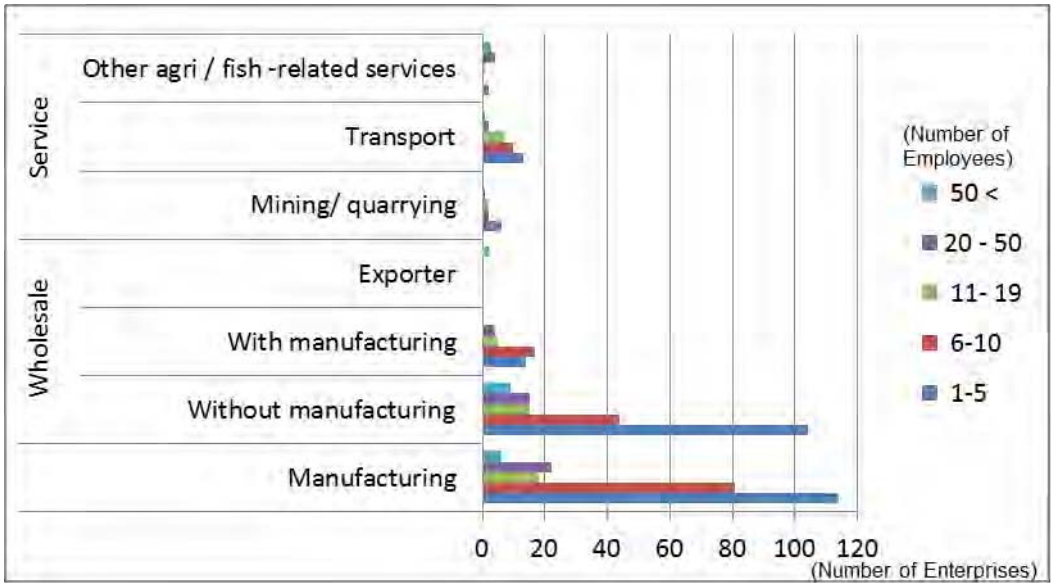


Figure 4-5: Employment Status by Sector

Employment status differs by province as shown in the Table 4-5. In Lanao del Sur, the average is larger than other provinces because there are 30 enterprises or cooperatives with more than 20 staff. In Maguindanao and Tawi-Tawi, the manufacturing sector employs more than the wholesale sector but in other provinces, the average number of employees in the wholesale sector is bigger than manufacturing. Therefore, it cannot be said that the manufacturing sector has more employment generation effects. While businesses in Maguindanao, Lanao del Sur, and manufacturing in Basilan increased employment after starting the businesses, those in Sulu, Tawi-Tawi, and wholesale in Basilan decreased.

Table 4-5: Average number of Employment of the Enterprises by Province

Province	Manufacturing		Wholesale	
	At start	At present	At start	At present
Maguindanao	6.0 (3)	9.9 (6)	5.2 (3)	8.9 (7)
Lanao del Sur	10.7 (5)	17.4 (7)	17.3 (4)	24.6 (6)
Basilan	6.5 (5)	7.2 (6)	27.7 (4)	24.7 (5)
Sulu	14.4 (13)	8.3 (6)	13.8 (9)	9.4 (5)
Tawi-Tawi	6.5 (6)	6.3 (6)	9.4 (8)	5.5 (4)

Note: Figures in parentheses ( ) show the median value.

- Registration status (Figure 4-6): The majority of these were registered as single proprietorships (82%), 12% as cooperatives, and only a few as corporation or partnership. 56% are registered with LGUs, and 40% with DTI, indicating that 16% of the businesses are registered with LGU but not with DTI although it is required that all the businesses get registered at DTI when they get the business permit from LGUs[58]. While the study focused on enterprises registered at DTI, 24% are not yet registered with any government authorities.

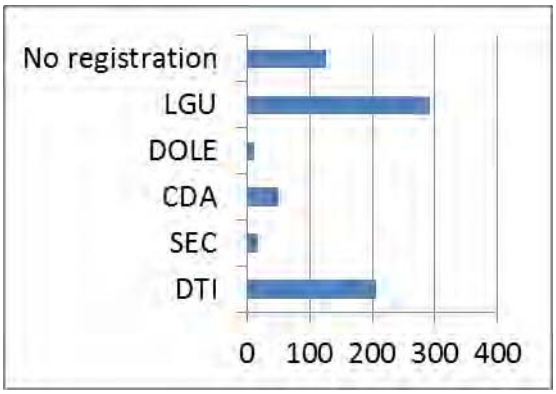


Figure 4-6: Registration Status (Unit: number of responses, multiple replies)

Major reasons for not registering include i) no need for registration (or not required by LGUs and other agencies), ii) enterprises are still new or small, and iii) no knowledge (Figure 4-7).

[58] While DTI-ARMM has been asking LGUs to encourage enterprises applying for business permits to register their business names, LGUs do not consider this to be mandatory. For example, the LGU of Parang in Maguindanao explained that they recommend the Business Names Registration (BNR) only to the enterprises which have been operating for several years. For the business permit, there are reports that LGUs require Lagay – informal monetary requirements to process and grant Business Permits. In Lanao, several municipalities do not require or do not mind about the permits.

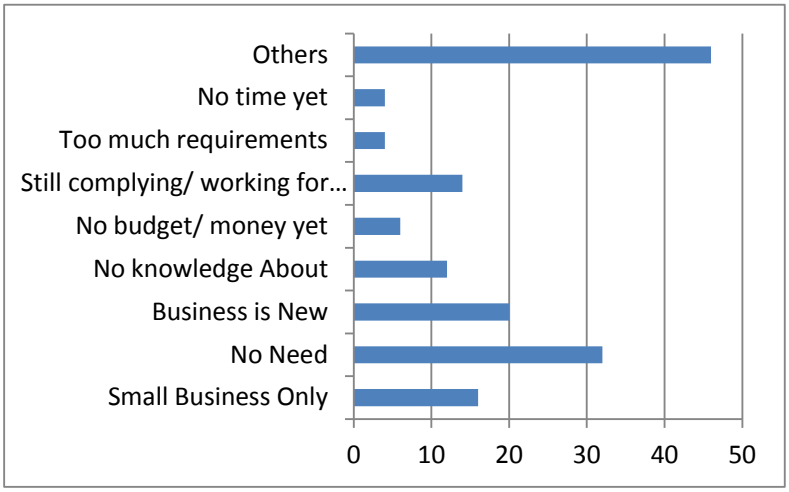


Figure 4-7: Reasons for Not Registering (Unit: number of responses, multiple replies)

- Major products: Major products in the manufacturing sector are food, including bakeries and fruit processing, while major products marketed by wholesalers are agriculture and fishery-related products, in particular coconut/copra/abaca, rice and marine products (Figures 4-8 and 4-9)

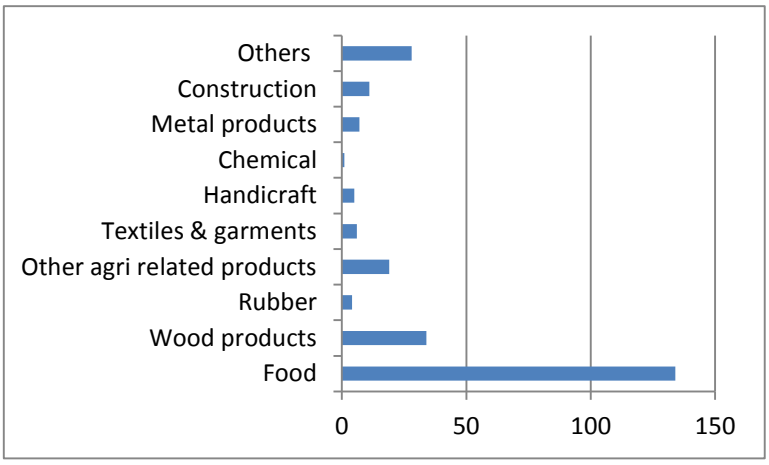


Figure 4-8: Products of Manufacturing (Unit: number of responses)

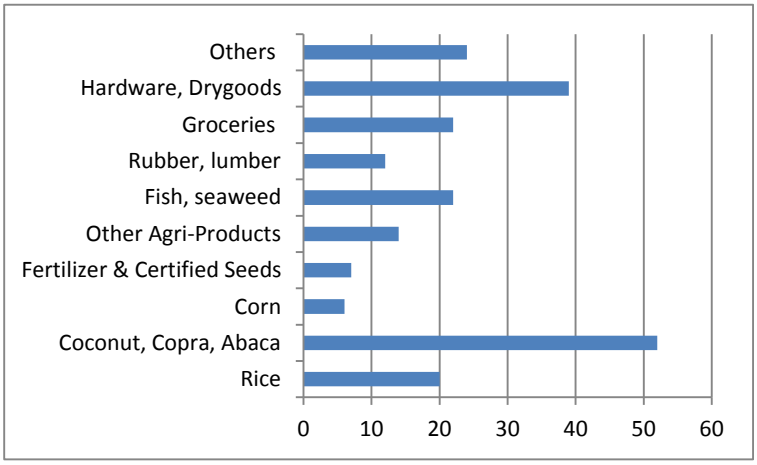


Figure 4-9: Products of Wholesale (Unit: number of responses)

- How to start businesses: Most of the enterprises started based on the resource and demand situation in the community or with the aim of taking over family businesses as shown in the Figure 4-10. About half obtained the business knowledge and skills from their family, relatives, friends, and neighbors. However, it was observed that imitating the businesses of neighbors leads to over-competition in the community and leaves less room for the business to grow since the new competition limits the available market and lowers the profitability of the business.

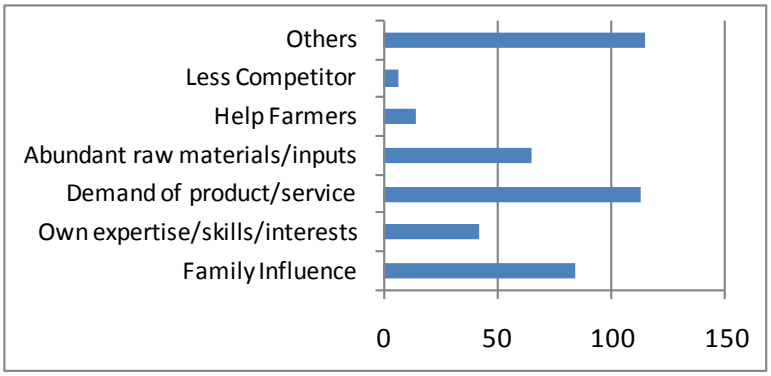


Figure 4-10: Reasons to Start Business (Unit: number of responses, multiple replies)

- Challenges at start: As for the problems experienced at the start of business, 70% answered lack of funds, followed by lack of equipment and machines, market, technical skills, material/input/products, and managerial skills (Figure 4-11). Those with insufficient funds said they managed the businesses with available resources in small-scale production or services, or borrowed from other sources such as family members, relatives or friends.

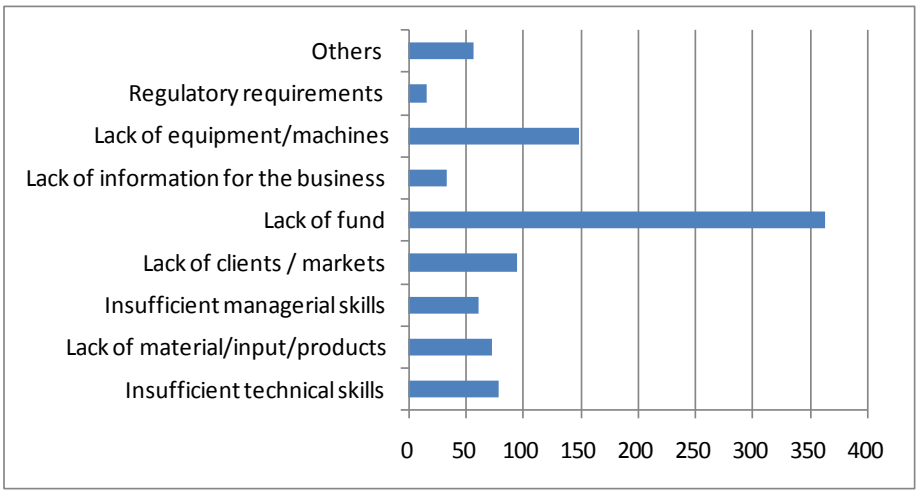


Figure 4-11: Problems at the Start of Business (Unit: number of responses, multiple replies)

- Performance after the start of enterprises: 78% reported increased working capital, 70% increased equipment/machines, and 92% increased sales. The manufacturing sector shows slightly better performance than the average.

(2) Financial Status

- Business records: Although 70% keep some kinds of business records, only 47% maintain income/expenditure records and 34% keep cash books. However, most of these records are still very basic and are not at the level at which monthly profits could be analyzed. Those who do not keep income/expenditure records and cash books, and many consider there is no need or that they can manage the day-to-day business without these records.

- Capital: The capital base of the enterprises is very small with 69% of the enterprises have less than Php 250,000 in capital. 96% of the enterprises are micro-enterprises in terms of capital of less than three million pesos (Figure 4-12).

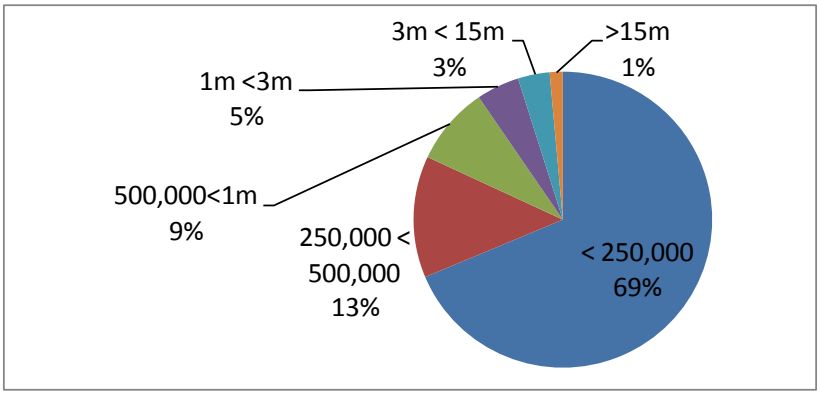


Figure 4-12: Capital of the Enterprises

- Profitability: Table 4-6 shows the average monthly profit of the enterprises in manufacturing and wholesale sector. Since most of the enterprises do not keep proper records, the profit is estimated value. However, the figures imply higher profitability in the wholesale sector than in the manufacturing sector. Since most of the manufacturing enterprises are home based and small-scale such as bakeries, confectionaries, and furniture making, their added values seemed to be very limited.

Table 4-6: Estimated Average Monthly Profit of the Enterprises (Unit: Php)

	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
Manufacturing	87,109	71,194	45,793	92,055	32,804
Wholesale	388,964	53,312	135,683	272,150	151,633

(3) Management

- Procurement and Markets: As many started business based on the supply of materials and demand in the community, their business transactions are locally based, meaning that they procure and market in the ARMM, mostly within their provinces. 87% procure their materials/products within the ARMM, while 32% sources from neighboring regions such as Region IX and XII. The responses on their market also show a similar trend, with 91% selling their products/services within the ARMM and 25% outside the ARMM, mainly to Region IX (11%) and Region XII (9%). Only 10 enterprises (2%; six in Lanao del Sur and four in Basilan) market their products outside of Mindanao (Figures 4-13 and 4-14).

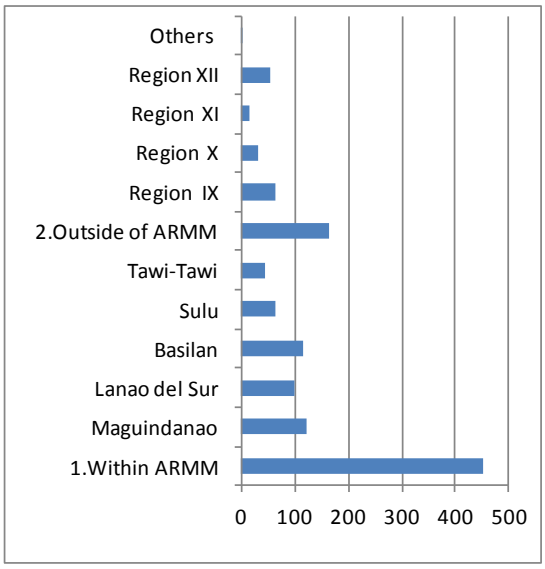


Figure 4-13: Source of Supply

(Unit; number of responses, multiple replies)

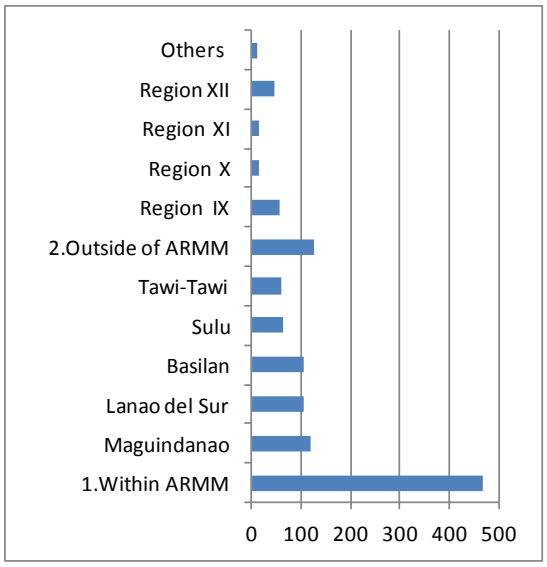


Figure 4-14: Market

(Unit; number of responses, multiple replies)

Table 4-7 shows the products being sold outside of the ARMM and Cotabato City. Most of the manufactured products are agriculture and fishery based, such as copra, corn/cassava starch, rubber, dried fish, and coffee. Wholesalers also sell copra, rice, seaweeds, coffee, abaca, and dried fish outside of the ARMM.

Table 4-7: Kinds of Products Sold Outside of the ARMM and Cotabato City

	Manufacturing		Wholesale	
	No	Products	No	Products
Maguindanao	11	Handicraft, bakery, delicacies, coffee, furniture, sugar, blocks	8	Rice, chicken, fertilizer, groceries, plants
Lanao del Sur	10	Corn/cassava starch, rubber, furniture, glass, brass	7	Copra, coconut, abaca, rice, corn
Basilan	11	Dried fish, rubber, dried seaweeds, coffee, wood, box, ice	19	Copra, rubber, fish, fruit, coconut, lumber, groceries
Sulu	7	Dried fish, coco oil, soy source, coffee	16	Copra, abaca, seaweeds, coffee, lobster
Tawi-Tawi	1	Paint	10	Seaweeds, rice, dried fish, beverage, iron works

(Unit: number of enterprises)

- Marketing strategy: It is observed that many enterprises plan the market expansion (Figure 4-15) but their strategy and skills are very limited. Sixty eight percent (68%) obtain the market information from business colleagues and 32% cited other sources such as their clients. 12% get from government agencies, while those who utilize internet, TV and radio

are very few. Half of the respondents plan to expand their market, and manufacturing are more active. While 98% in Maguindanao answered that they want to expand, there were fewer responses from islands, at 6% in Sulu, 33% in Basilan, and 39% in Tawi-Tawi.

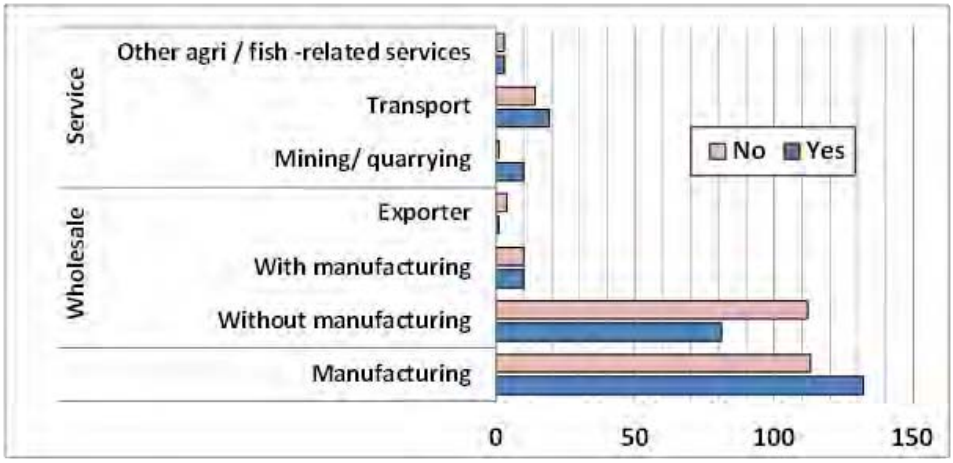


Figure 4-15: Plan to Expand Market (Unit: number of responses)

- Business strategy: More than half of the respondents cited "quality control," followed by training for employees, but at only 15%. Other strategies include ensuring honesty, timely delivery, maximizing profit and utilizing human resources. Their responses on "quality control" are thought not to be at the level at which certification standards could be achieved, as many have received neither appropriate guidance nor training. Nevertheless, their responses indicate their interest in or concerns about the quality of their products.

(4) Access and Need for Finance, Business Development Services & Training, and Networking

- Access and Need for Financial services: The majority of the enterprises were initiated by the entrepreneur's own money (83%) and/or by borrowing from family members, relatives, friends and neighbors (34%) (Figure 4-16). Their borrowing experiences in the last three years are also very limited, with only 21% responding that they had borrowed mostly from community members such as family members and relatives. On the other hand, 61% responded that they plan to borrow money, preferably from financial institutions. These indicate that there is a big gap between their demand and supply by financial institutions.

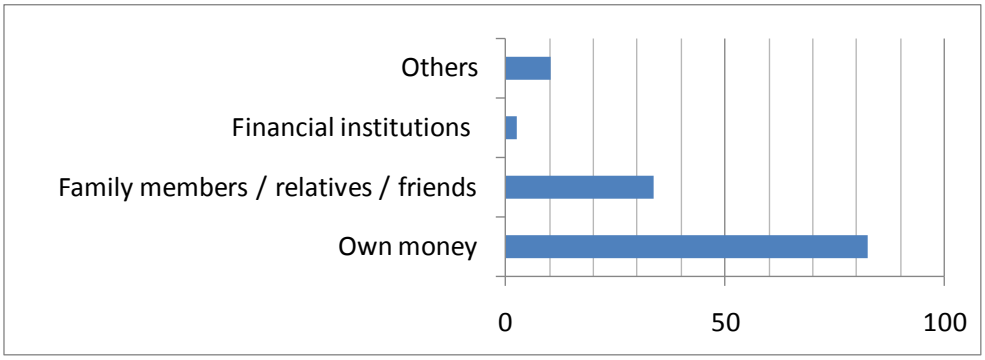


Figure 4-16: Source of Fund at the Start of Businesses (Unit: % multiple replies)

- Access and Need for Training and Business Development Services (BDS): As for the interviewees' access to training on business management and technical skills, marketing support such as trade fairs, or counseling, only 21% have taken advantage of these services. The percentage in the manufacturing sector is slightly higher than the average. There are significant differences among provinces. While 32-33% of the enterprises in Maguindanao and Lanao del Sur have experienced such services, access in the island provinces is very low, at 13% in Basilan and Tawi-Tawi and 8% in Sulu.

  As to the kinds of training and services, technical skill training ranks first, followed by marketing, business planning/management, quality control, and processing. Overall, 99 responses were for business training, while 79 responses were for technical-related training, including quality control, processing, and packaging. Only six enterprises have received business services such as business consultation and market matching. Eighty two percent (82%) of those said that these training sessions and services helped their business. LGUs were the most frequent answer in the question on training and services providers, followed by donors and the Cooperative Development Authority-ARMM (Hereinafter called CDA). It is interesting that responses for LGUs were concentrated in Maguindanao and Basilan. There were only four enterprises which responded that they used training sessions and services provided by DTI.

  However, half of the respondents need such services. There are also striking differences among provinces. While the enterprises of Lanao del Sur showed the greatest interest (69%), the percentage in Sulu is low, at 24%. As for the kind of training and service given first priority, technical skill training ranked first with 70 responses, of which 63% were in the manufacturing sector, followed by training on business planning and management (48), entrepreneurship (45), financial management (32) and marketing (19) (Figure 4-17).

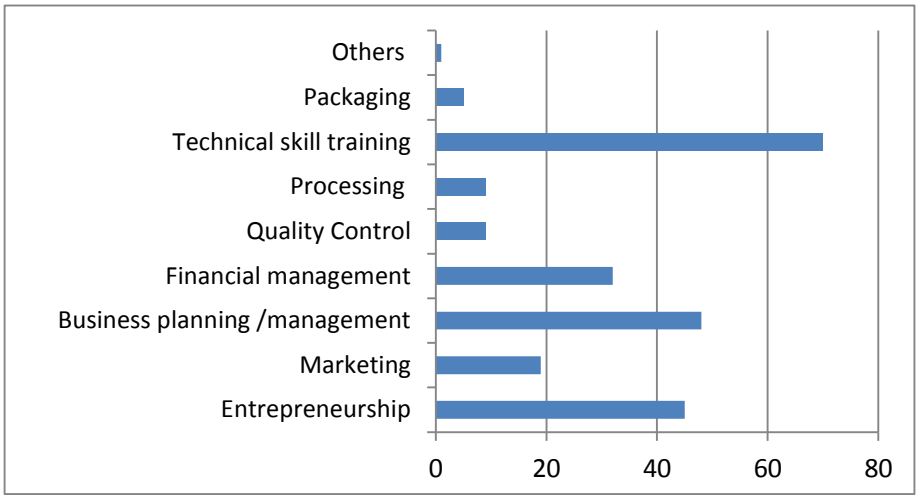


Figure 4-17: Kinds of Training Needs (Unit: number of responses, multiple replies)

- Networking: Only 10% of the enterprises belong to the network. The kinds of services provided by these networks are varied, including financial assistance, training and seminars, technical assistances, and other. However 65% of those belonging to networks utilized these services and 76% of them responded that these services helped their business.

(5) Perceived strength and opportunities

The majority of the enterprises have a positive perception of the future prospects of the industry they are engaged in, with 87% replying that their industry will grow. Frequent reasons for these positive answers are abundant resources and growing market, as also shown in their perceptions on their strength and opportunities. There are no major differences among sectors, but the manufacturing sector shows a higher percentage, with 91% responding that their industries will grow[59]. By province, while all the enterprises in Maguindanao responded that industries will grow, the percentage making this response is the lowest in Lanao del Sur, at 74%.

Figure 4-18 indicates their perceived strength. The most frequent answer is the good quality of product, which 79% of respondents cited, with the highest ratio of 91% in the manufacturing sector. The following answers are the products or services meet clients' needs, competitive pricing, and quick delivery. On the opportunity for their businesses, too, as shown in Figure 4-19, the most frequent answer is the good quality of the materials/inputs (52%). Here again, the ratio of the response by manufacturing sector is 62% and higher than the average. This indicates

[59] Further analysis will be done on kinds of products they are dealing with.

their strong confidence (or interests) on the quality of materials/inputs and then their final products, as shown in their perception on the strength above. The following responses are the growing market (47%) and the abundant supply of input / material / products (43%). Many in transport sector (55%) cited the growing market.

Figure 4-18: Perceived Strength of the Enterprises
(Unit: number of responses, multiple replies)

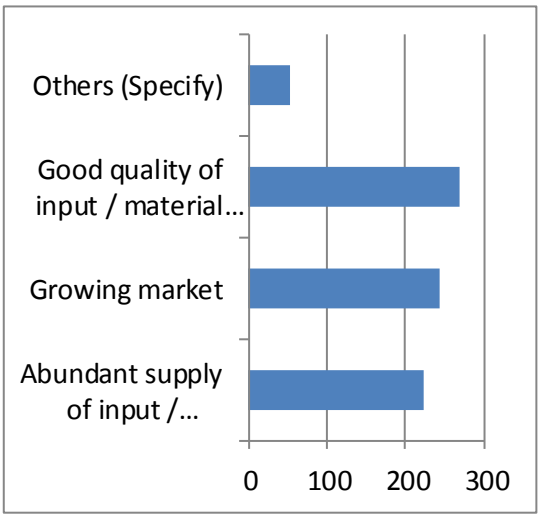


Figure 4-19: Perceived Opportunities
(Unit; number of responses, multiple replies)

(6) Problems

- Management Problems: About half (47%) of the respondents pointed to insufficient capital/funds, followed by the increase in operating costs (27%), unskilled labor (8%) and lack of management skills (6%) (Figure 4-20). Trends in these responses do not differ much among sectors and provinces, although more enterprises (54%) in the manufacturing sector cited the problem of insufficient capital/funds, while the percentage of responses for increased operating costs was high at about 40% for the wholesale and transport sector.

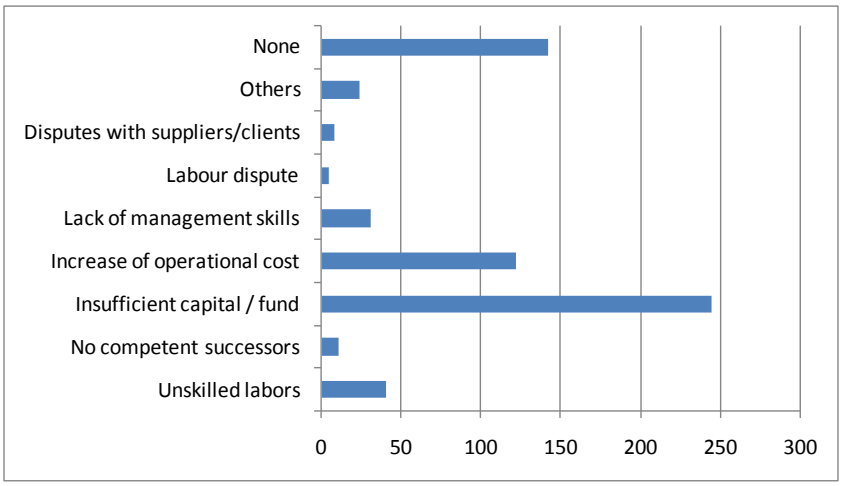


Figure 4-20: Management Problems of the Enterprises (Unit: number of responses, multiple replies)

- Technical problems: The most frequent answer is lack of facilities (24%), followed by high cost of inputs and lack of technical knowhow/supports (Figure 4-21).

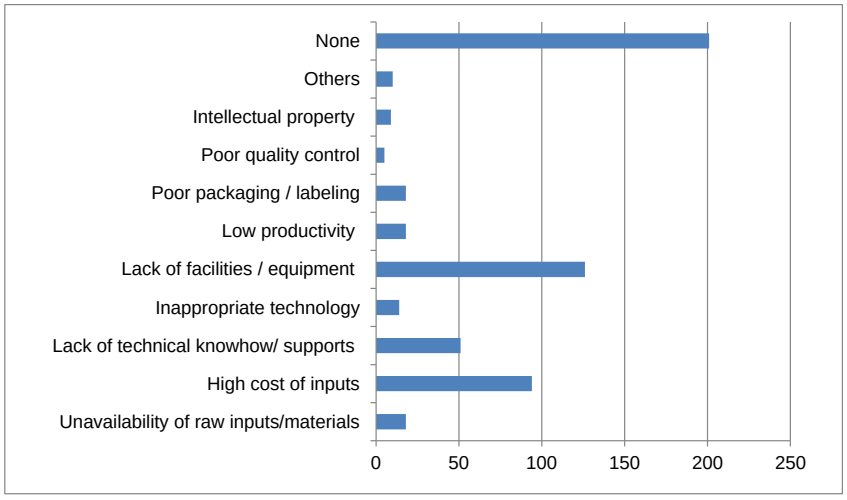


Figure 4-21: Technical Problems of the Enterprises (Unit: number of responses, multiple replies)

- Marketing problems: 46% responded no problems in marketing, which corresponds to their answers on their perceived opportunity, in which 43% cited a growing market. However, 16% raised the issue of the unstable price of products, 13% referred to competition, and 10% to the lack of transportation means (Figure 4-22). The wholesale sector is more concerned about these market problems than other sectors.

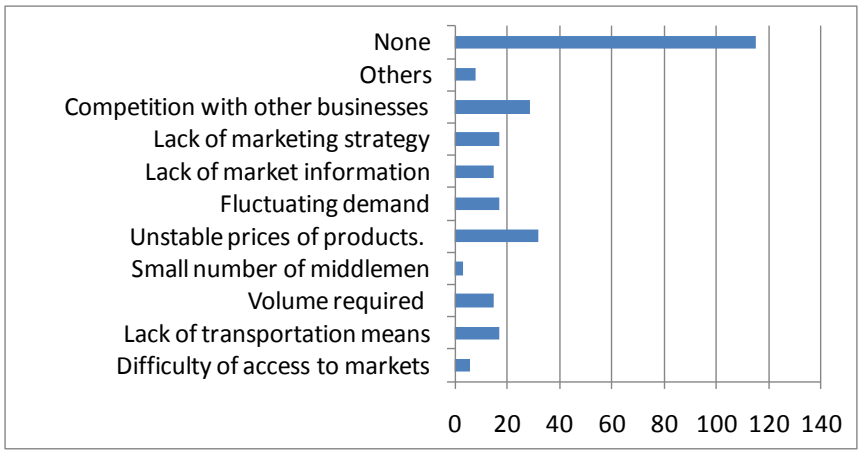


Figure 4-22: Problems in Marketing (Unit: number of responses, multiple replies)

- External factors: The most frequent answer is infrastructure (39%), followed by unstable security conditions (31%) and environmental problems (14%) such as floods. In the responses on infrastructure problems, 76% cited electricity, followed by roads (60%). It is reported that frequent power blackouts are hindering the operation of manufacturers. Significant differences exist among provinces as shown in Table 4-8. While 70% of the enterprises in Maguindanao reported no other problems, more than half of the enterprises in Basilan and Sulu reported problems with the unstable security situation. There, some interviewed shared their experiences being kidnapped. The unstable security situation discourages these enterprises from expanding and taking a prominent position in their community. Their perceptions on the problems of infrastructure are also varied. The percentage of respondents indicating concern about infrastructure, including water, was the highest in Tawi-Tawi.

Table 4-8: Problems with Other External Factors (By province)

External Problems	Maguindanao	LDS	Basilan	Sulu	Tawi-Tawi	Total
1. Unstable secutiry conditions	8%	29%	55%	50%	12%	162
2. Insufficient infrastructure	12%	51%	48%	30%	58%	202
2.1 Road	10%	20%	22%	30%	47%	122
2.2 Electricity	6%	33%	48%	5%	58%	154
2.3 Water	1%	3%	4%	1%	42%	42
2.4 Others	0%	0%	5%	1%	5%	11
3. Government regulation	1%	3%	4%	0%	0%	9
4 Lagay	0%	14%	2%	0%	3%	21
5. Political interference	0%	0%	1%	0%	0%	1
6. Others	0%	2%	4%	0%	0%	7
7. Environmental Problem	3%	32%	2%	31%	1%	71
8. None	70%	21%	6%	30%	7%	146

Note: Total number shows number of responses with multiple replies.

Table 4-9 below provides a summary of the major problems reported by more than 10% of respondents. Lack of capital/funds was raised by almost half of the businesses, followed by infrastructure and security issues. Lack of capital/funds is largely attributed to the unavailability of financial services in the ARMM. The next issues raised are increased operating costs and lack of equipment/facilities. There are fewer responses on technical and marketing issues, reflecting their confidence in their products and positive view of the growing market. However, it should be further reviewed if this is because the majority of the enterprises are currently operating for their local market, and could also be due to limited exposure to outside information.

Table 4-9: Major Problems Faced by the Enterprises Interviewed (n: 518)[60]

Problems (Total of five provinces)		Manufactur -ing	Wholesale / Export	Service*	Total	Total %
Management Problem	Insufficient capital / fund	130	99	16	245	47%
	Increase of operational cost	49	55	18	122	24%
Technical Problems	High cost of inputs	50	31	13	94	18%
	Lack of technical knowhow/ supports	18	26	7	51	10%
	Lack of facilities / equipment	73	39	14	126	24%
Marketing Problem	Lack of transportation means	17	29	8	54	10%
	Unstable prices of products.	32	45	5	82	16%
	Competition with other businesses	29	33	6	68	13%
Other external risks / problems	1. Unstable secutiry conditions	58	87	17	162	31%
	2. Insufficient infrastructure	71	77	11	202	39%
	2.1 Road	37	74	11	122	24%
	2.2 Electricity	82	70	2	154	30%
	7. Environmental Problem	28	41	2	71	14%

Note: Service sector targets transport, mining & quarrying, and agriculture/fishery related enterprises.

(Unit: Number of Responses, Multiple Replies)

Agencies expected to provide assistances: To cope with the various problems cited on management, technical issues, marketing, and other external factors, the enterprises expect support from various agencies. The highest response (47%) is for municipal LGUs, with the kind of support ranging from the issue of security, roads, training, subsidies, land settlements, and other issues. The next most frequent responses are police/legal department and donors. Financial support and provision of facilities seemed to be the major expectations from donors. Few respondents cited DTI and business associations. The results indicated that municipal

[60] Those shadowed show the problems raised by more than 30% of respondents.

LGUs are the organizations that are closer to the enterprises, so it is easier for them to ask for assistance, which is also supported by the fact that most of the training enterprises experienced were said to be provided by the LGUs[61]. However, it should be noted that not all the LGUs are active in business promotion, as noted that several LGUs do not even actively encourage business permits.

4-3 Environment for Business in the ARMM

The above analysis on investment projects and enterprises in the ARMM revealed that some of the major challenges for business and industry development are related to the business environment, including the following.

- Security situation: The unstable security situation not only affects the operations of enterprises in their locality, but also discourages the expansion of existing businesses and the entry of new investments as well as other support systems such as financial institutions. Table 4-10 shows the number of crimes in 2009 and 2010. The crimes in Basilan and Lanao del Sur (LDS) greatly increased. LGUs with a large number of crimes in 2010 are Lamitan of Basilan (104) and Marawi City of Lanao del Sur (46).

Table 4-10: Number of Crimes by Provinces in the ARMM

Province	Maguindanao	LDS	Basilan	Sulu	Tawi-Tawi
No of Crime 2009	50	62	60	29	20
No of Crime 2010	63	104	141	40	14

Source: PNP

- Infrastructure: Infrastructure problems include frequent brownouts, poor roads, water and transportation problems. Table 4-11 shows that, while the ARMM has generally lower labor and land costs than other regions, it has higher electricity and water costs, particularly in island provinces such as Tawi-Tawi.

[61] For example, the municipality of Parang has been organizing training sessions on processing and financial management for enterprises by sub-contracting local NGOs.

Table 4-11: Cost of Doing Business in the ARMM and Other Regions (as of May 2011)[62]

Minimum Daily Wage Rate	ARMM	Region XII	Region XI	Region XI	NCR
Non Agriculture (PhP)	222	255	286	255	404
Agriculture (PhP)	222	230-235	276	210-230	367
Real Estate Price	ARMM	Region XII	South Cotabato	Davao City	Cagayan de Oro
Commercial (Per sq. m)	300-2,000	10,770	760-2,400	19,300	12,200
Residential (Per sq. m)	180-1,000	4,965	90-200	3,400	4,950
Industrial (Per sq. m)	260 -2,000	8,673	320-700	380	n/a
Agricultural (Per sq. m)	3,515 - 350,000	n/a	160,000-200,000	n/a	n/a
Electricity Total Basic Rate	ARMM	Region XII	Davao City	Zanboanga	NCR
Commercial (Php/KWH)	4.29-9.32	4.11	6.5	3.74	4.69
Industrial (Php/KWH)	n/a	4.01	6.5	3.74	4.69
Water Min. charge	ARMM	Region XII	Davao City	Zanboanga	NCR
Commercial (PhP)	137 - 26,495	24 - 396	42 - 7,488	174 - 222	89 - 180
Industrial (PhP)	220 - 26,495	24 - 384	42 - 7,488	174 - 222	89 - 180

Source: DTI-ARMM provincial offices and DTI of Region XII

Other reportedly high costs are those for shipping goods from Port Polloc of Cotabato. However, the data below shows that the shipping cost from Cotabato to Manila is lower than the one from Davao to Manila, although higher than the one from General Santos and Zamboanga (Table 4-12). Thus it should be reviewed why many businesses complained about the high cost at Port Polloc, used the land transport to Davao, and shipped goods to Manila from there[63].

Table 4-12: Shipping Cost (freight cost) of Cargos to Manila (Unit: Php, as of May 2011)

Particular	Cotabato	Davao	General Santos	Zamboanga
Class A (Perissible)	66,640	72,500	35,001	43,244
Class B (Semi Process)	51,595	57,000	49,978	43,244
Class C (Raw materials)	49,133	53,300	39,730	43,244

Source: Shipping companies at the ports of each area

- Land title: The issue is critical in investment promotion and for relatively large enterprises such as plantations to secure and expand their business, as explained in Chapter 4-1-3. Unclear land titles also prevent farmers and cooperatives from obtaining loans from formal financial institutions. One of the major issues on land title is that a great deal of land that received mortgages by the Land Bank under Agrarian Reform in the ARMM is said to be now under the ownership of the bank because many farmers could not make repayments to

[62] Cost of water charge is varied depending on the pipe size ranging from 1/2 to 4 inches.
[63] The handling charges of Port Polloc are also lower than other ports. Other factors may include unseen expenses such as lagay.

the bank[64]. The Department of Interior and Employment-ARMM (Hereinafter called DILG) reported that, although it is a mandate for municipal LGUs to prepare their Comprehensive Development Plans (CDPs) and Land Use Plans for their eligibility to obtain the budget from the national government as IRA, only several LGUs were able to prepare Land Use Plans.

- Support by municipal LGUs: Required support entails various aspects, including security, infrastructure, land, business permits and other licenses such as those for land and building, as well as provision of training and other assistance. Many stakeholders pointed out the importance of the local leadership, as in the successful case of the late mayor of Datu Paglas. Table 4-13 shows the number of Business Names Registered (BNR) at DTI by provinces. The number of BNR per a population of 1,000 is the smallest in Sulu while Sulu has the second largest number of small businesses according to NSO. On the other hand, the comparable ratio of Basilan is the highest. These numbers may indicate how active LGUs are in promoting registration of the businesses.

Table 4-13: Number of Business Names Registered at DTI and Number of Small Businesses

Province	Maguindanao	LDS	Basilan	Sulu	Tawi-Tawi
No of BNR	789	1,292	580	285	530
BNR/ Population of 1000	0.62	1.13	1.42	0.34	1.18
No of Small Business (NSO Data)	1,340	3,556	791	1,417	810

Source: DTI and NSO

- Education: The fact that 44% of the enterprise owners interviewed in the business study are college graduates may indicate a link between educational status and business development. Dependence on managerial skills from large enterprises or outside of the Muslim community by the successful and/or sustaining enterprises registered at RBOI also shows that the level of management knowledge and skills is weak in the ARMM.

A system to assess the performance of provincial and municipal LGUs was introduced and the

[64] This is based on an interview with the Department of Agrarian Reform (DAR) of the ARMM and the Land Bank The same issue was raised by financial institutions in Lanao del Sur.. In Maguindanao, about 2,080 ha (0.22% of the total area) is now owned by the Land Bank. The Kidapawan Branch of the Land Bank stated that, in several municipalities in Maguindanao, the bank cannot proceed with the formal transfer of the land title to the bank due to the lack of land data provided by LGUs. The interview with the municipality of Datu Paglas revealed that, to protect their land under Agrarian Reform, the Datu Paglas Corporation made necessary repayments on loans to the bank on behalf of the farmers.

Department of Interior and Local Government-ARMM (Hereinafter called DILG) joined this national system, the Local Governance Performance Measurement System (LGPMS)[65]. The system assesses the performance of Economic Governance such as their support for agriculture, fishery, and business and industry promotion. Regarding support for business and industry promotion, the business permit process and other factors were examined. Although the scores were calculated based on the self-assessment by LGUs, the data show what areas need improvement. Table 4-14 shows the latest scores of LGU performance in the ARMM, comparing with other provinces in Mindanao and the national average.

Table 4-14: Scores of LGU Performance on Economic Governance in the ARMM

Region	ARMM					IX	XI	XII	National Average
Province	Maguin-danao	LDS	Basilan	Sulu	Tawi-Tawi	Zamboanga del Sur	Davao del Sur	South Cotabato	
Economic Governance (Total)	3.46	2.84	4.74	2.76	4.93	4.75	4.5	4.75	4.75
Agriculture	3.57	4	4.22	1.6	4.79	4.57	4.5	4.5	n.a
Fisheries	n/a	n/a	5	5	5	5	5	n.a	n.a
Business Promotion	3.34	1.67	5	1.67	5	4.57	4	5	n.a

Source: LGPMS Website

Note: The highest possible score is 5. The table was prepared based on the data as of 2010.

Large differences of the performances are observed among five provinces in the ARMM. The average scores of overall economic governance of Tawi-Tawi and Basilan are very high at 4.93 and 4.74, respectively and better than the national average of 4.48. However, the scores in the provinces of Sulu (2.76), Lanao del Sur (2.84), and Maguindanao (3.46) are much lower than the national average. In particular, the scores for business promotion at Lanao del Sur and Sulu are very low at 1.67 as well as the score for agriculture sector of Sulu at 1.6, which are much lower than other provinces.

The following were basic recommendations made by the LGPMS Reports to Sulu, Lanao del Sur, and Maguindanao Provinces[66].

<u>Business and Industry Promotion</u>

(for Sulu, Lanao del Sur, and some parts of Maguindanao provinces)

- Improve the quality of permitting or licensing

[65] The system was introduced with the assistance of CIDA. The data is assessed and scores and recommendations are given to each LGU, and the main scores and recommendations are made public in the official website of LGPMS.

[66] It is considered that the recommendations are made based on the responses from LGUs on various issues but not specific to each LGU.

- Ensure the ease of doing business. Strategize to effect the issuance of building, occupancy, and business permits in a more expedient manner
- Establish an administrative support body to take the lead in marketing the investment potentials of the local government
- Provide, or cause the provision of, direct support services to business, particularly MSMEs. Support services may come in the form of tax incentives, product labeling, product packaging, training, job fairs and trade fairs

Agriculture Support (for Sulu, Lanao del Sur and Maguindanao Provinces)

- Improve infrastructure support
- Improve credit facilitation services to farmers
- Extend adequate production support
- Provide assistance to research and development
- Improve market development services
- Reach more farming-household beneficiaries

4-4 Overall Analysis of Enterprises in the ARMM

The analysis of investments and enterprises in the ARMM in Chapter 4-1 to 4-3 reveal the following characteristics of the enterprises.

(1) Agriculture-and fishery-based: Most of the investment businesses registered at RBOI as well as the enterprises surveyed are agriculture- and fishery-based, utilizing natural resources which are considered as comparative advantages in the ARMM. The products of the enterprises marketed outside of the ARMM are also basically agriculture- and fishery-related, such as copra, seaweeds, rubber, corn, cassava, and coffee.

(2) Limited successful businesses in the manufacturing sector: While successful investments in the ARMM are concentrated on plantation products such as banana and pineapple, many of those engaged in processing face challenges of shortage or unstable supply of raw materials such as palm oil and cassava. A few successful manufacturing enterprises are engaged in processing corn starch, cassava starch and coconut oil. Most of the surveyed enterprises in the manufacturing sector are engaged in food processing such as bakery and confectionery. They are very small, targeting local and community markets and producing goods with limited added value. The average profit of the businesses in the manufacturing sector is lower than that of the wholesale businesses.

(3) Potential processing businesses: While many businesses target local markets, 40 manufacturing businesses market their products to the neighbouring regions and some sell their products even to Manila and Cebu. Their products include coffee, corn and cassava starch, rubber, dried fish, dried seaweeds, coconut oil, handicrafts, delicacies, furniture, and others.

Based on the above, it is recommended to promote the industry based on the comparative advantage of the ARMM, which are agriculture and fishery products utilizing its natural resources. There are also several agriculture- and fishery-based processed products marketed outside of the ARMM as explained in 3) above. Although some businesses already pointed out challenges such as securing stable supply of goods, it is recommended to review the potentials of these products for local industry promotion in the ARMM.

4-5 Current Status of Microfinance

4-5-1 Objectives and Methodology

The objective of the study on microfinance (MF) is to grasp the demand and supply situation and devise a strategy to expand microfinance services in the ARMM. The study was conducted through literature review, individual interviews, and focus group discussions (FGDs). The study was subcontracted to the Mindanao Microfinance Council (MMC), an MF network organization in Mindanao.

(1) Supply study

Information on the institutions operating or with plans or potential to operate in the ARMM, government programs, and informal lenders such as pawnshops was collected from existing data and through interviews with selected institutions, programs, and lenders. The information will include outreach, product design, distribution channels, portfolio performances, financial status, challenges, and their strategies to expand services to MSEs, farmers, and fishermen.

(2) Demand study

FGDs were conducted with groups of farmers, fishermen, and micro-enterprises on their borrowing experiences, cash flow, and demands for financial services. The demand study includes the analysis of the data on financial services collected in the Business Study.

(3) Microfinance training sessions

Microfinance institutions and relevant authorities were invited. The major features of microfinance and methodology as well as recent trends and new product approaches were

explained. The preliminary results of FGDs and the Business Study were shared and challenges and possible countermeasures were discussed on ways to expand the services in the ARMM.

Target municipal LGUs for FGDs and supply study were decided based on i) presence of farmers and fishermen groups who can represent primary industries in each province, and ii) availability of financial institutions and semi-formal and informal lenders for the supply study, and iii) the security situation. The following 21 LGUs were visited (Table 4-15).

Table 4-15: Municipal LGUs Visited

Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
Parang	Wao	Isabela City	Patikul	Simunul
Sultan Mastura	Marawi City	Lantawan	Jolo	Bongao
Datu Odin Sinsuat	Bubong	Lamitan	Indanan	Sitangkai
Datu Paglas	Saguiaran		Maimbung	
Buluan			Parang	
			Hadji Panglima Tahil	

4-5-2 Study Results – Demand for Microfinance

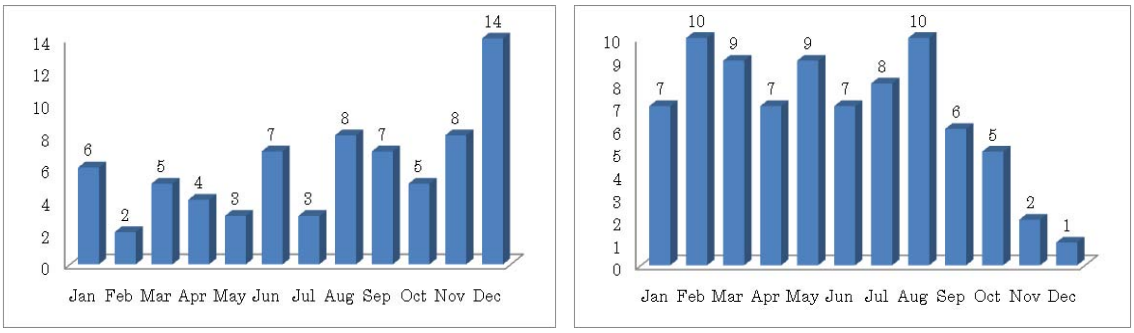
4-5-2-1 Results of Focus Group Discussions with Farmers, Fishermen, and Micro Entrepreneurs

A total of 30 groups composed of eight groups of fishermen, 15 groups of farmers, and seven groups of micro-entrepreneurs (MEs) and 326 individuals in total were interviewed. The main activities of each group are as follows:

- Farmers: Rice, corn, copra, bananas, sugarcane, rubber, cassava, vegetable, abaca;
- Fishermen: Deep-sea fishing, aquaculture, seaweed farming; and
- MEs: Vendors, traders, shop owners, and restaurants.

(1) Seasonality of Income

Figure 4-23 shows the number of groups that corresponds to the month for better cash flow (high time) and less cash flow (low time). The cash inflows are not the same in all areas and even within the same groups, but the results indicated that all of the groups experienced better cash inflows during the months of November and December. Farmers have high incomes during harvest periods, and their harvest periods depend on the type of crops and the climate conditions. MEs enjoy better cash flow in November and December.



< High Time> < Low Time>

Figure 4-23: Seasonality of Income of Fishermen, Farmers, and Micro Entrepreneurs

(Unit: number of responses of groups)

As in any agricultural community, income is affected by the quality and scale of production, which are significantly affected by farming practices, weather conditions, and the availability of water for irrigation, among other factors. Common constraints or problems raised by farmer groups are changes in weather patterns, such as recent experiences with changes in the amount of rainfall or the frequency of poor weather conditions for farming affecting their ability to recover their farming investments[67].

(2) Coping Behavior

Figure 4-24 summarizes the actions that farmers, fishermen and MEs take when cash inflow is low. Common to all groups is to borrow money, followed by engagement in trading and/or other livelihood activities, and finding employment. Very few use saved money. Borrowing money is common to all of the MEs and was viewed as a necessity to keep their enterprises going, as well as for consumption spending such as food and the education of their children. Farmers also borrow money for working capital in other livelihood activities and for food and education of children.

[67] This is based on the observations of the farmers interviewed. There was no attempt to verify or quantify the effects of climate change.

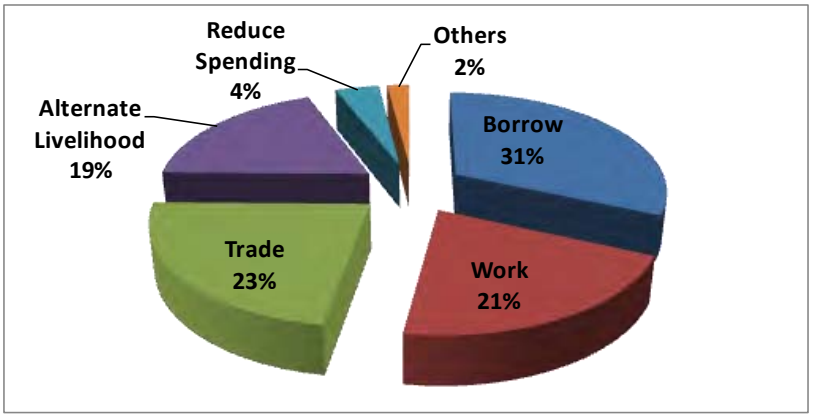


Figure 4-24: Coping Behavior when Cash Inflow is Low

Finding work between harvest periods or during lean months is common among both farmers and fishermen. A common practice is to work on other farms as farm laborers, driving "trysikad," or taking up carpentry and construction work. Spouses often help by engaging in trading and maintaining a small variety store. Other activities mentioned were backyard gardening and livestock raising.

Very few reported any form of savings. They were not able to set aside money since they immediately used the cash they received for consumption and repayment of loans taken in the previous cropping period or re-invested for the next cropping season. Except for those who are already participating in microfinance programs, most of the participants do not save money in any formal financial institution. However, MEs in Parang of Maguindanao are engaged in informal saving groups, a kind of rotating savings and credit association (ROSCA) where members contribute money regularly to be loaned to the members in turn.

(3) Sources of Working Capital

Ratio of sources of working capital is shown in Figure 4-25. All groups mentioned that they get their working capital from their own money or from relatives or friends. No interest is charged on money borrowed from relatives and friends and the loan is paid back when the borrower has earned income. The next common sources of funding are the traders and/or suppliers of farm inputs or inventory. Traders are considered the natural source of working capital of farmer groups since the traders are accessible to the farmers and offer terms and conditions that match the farmers' financial needs and ability to repay the loan. The common practice is for loans to be made in the form of farm inputs (seeds, fertilizers, pesticides) and cash for payment for farm labor and other expenses. A guaranteed buying price is given to the farmer for his farm outputs that is lower than the prevailing farm gate price.

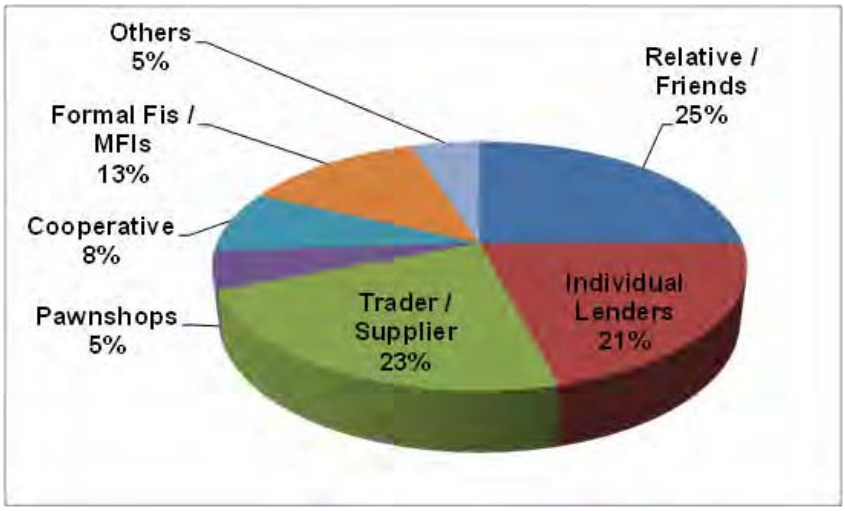


Figure 4-25: Sources of Working Capital

For MEs, the individual lenders and wholesale suppliers or input providers are common sources of working capital. Individual lenders such as the "5-6 operators" are common sources of additional working capital who commonly lend cash and charge interest rates that range from 10-20% per month[68]. Payments are made daily, weekly, or monthly depending on loan agreements between the borrower and the lender.

Fishermen have fewer alternative sources and remain self-reliant, as in the case of the Simunul fishermen's group. The Lamitan and Parang fishermen's groups do not borrow money because of the prohibitions on interest in Islamic law. However, they do borrow money from individual lenders when absolutely needed, such as in times of emergency or for the education of children.

Only 13% have accessed loans from formal financial institutions such as cooperatives, NGOs, or rural banks. The groups from Isabela, Buluan, and Sitangkai mentioned that they accessed loans from pawnshops. On the other hand, other groups do not access loans from pawnshops since they do not have any acceptable collateral to offer.

(4) Credit Features

Among the features they prioritize in choosing the sources of credit, accessibility, interest rates, and repayment period were chosen most frequently (Figure 4-26).

[68] Those informal lenders are commonly called as "5-6" because they lend 5 and request the repayment of 6 at the end of the month.

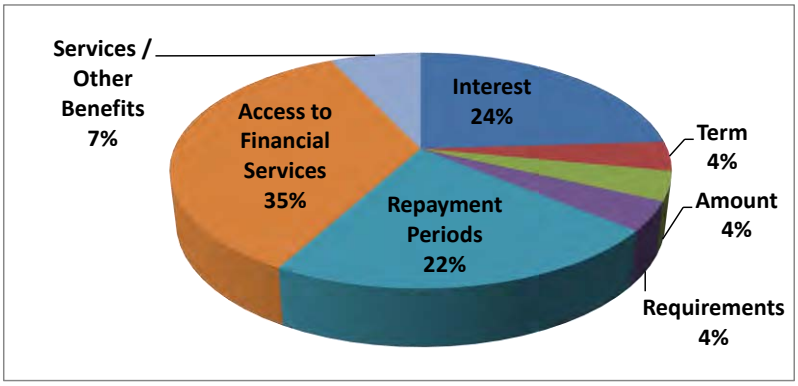


Figure 4-26: Preferences on Credit Facilities

For areas that chose accessibility or availability as top priority, these areas have very minimal exposure or have no other formal financial provider servicing their needs. Although there are areas with MFIs, not all the members of the FGD group are able to access MFIs because the MFIs allow mostly women to participate in their program. The majority of members from the farmer groups emphasized the need for access to financial services. Although they have access to credit from the local traders, they need other alternative sources that can offer better services that meet their needs because traders do not always provide all that is requested by the farmers. On the other hand, 24% identified interest rate as an important consideration in choosing a source of credit. They prefer credit with a low interest rate. The repayment period preferred by 22% means that the loans can be paid when they are capable of paying the obligation.

4-5-2-2 Results of the Business Study on Financial Services

The targets of the business study (518 samples) are manufacturers, wholesalers, mining and quarrying, transporters, and agriculture-related services and differ from the targets of FGD. Although the majority of sampled enterprises in the business study are micro-enterprises, the targets include small-scale enterprises with more than 20 employees. Therefore, the results are not the same as FGD, although there are several common features.

(1) Borrowing Experiences

The majority of the enterprises interviewed started their business with their own money and/or by borrowing from family members, relatives, friends and neighbors. The main purposes of the funds were to purchase material goods (75%) and equipment and facilities (54%), followed by to rent a business space (10%). Their borrowing experiences in the last three years are also very limited, with only 21% responding that they received loans, mostly from community members such as relatives (Figure 4-27). The major purposes of the loans were for working capital (86%)

and only 24% borrowed to purchase business assets.

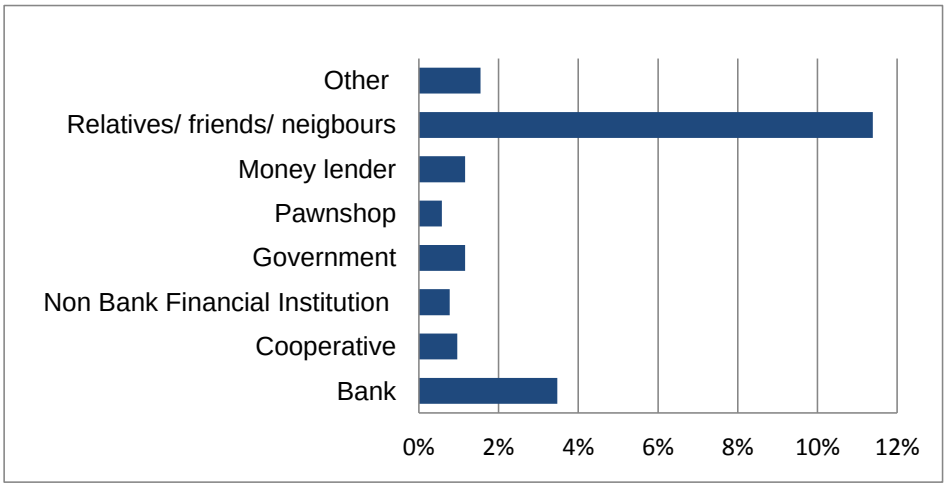


Figure 4-27: Source of Loans in Last Three Years

(2) Demand for Loans

On the other hand, 61% responded that they planned to borrow money. Here again, the major purpose is for working capital (87%), followed by funds to purchase business assets (40%). As for the loan amount, 51% required more than Php 100,000 but less than Php 500,000, and the next most frequent answer is more than Php 500,000 (33%). For the loan term, about 80% required a term of more than 24 months. The results imply that in most cases, their demands exceed the maximum amount of Php 150,000 and terms many MFIs can offer. Although their experience borrowing from formal institutions is limited, they preferred to get loans from NGOs (111) and banks (107), the answer of 35% of those requiring loans (Figure 4-28). They prefer these resources mainly because of low interest rates, easy access, or less stringent requirements and conditions, which latter would pertain to NGOs and other sources (Figure 4-29).

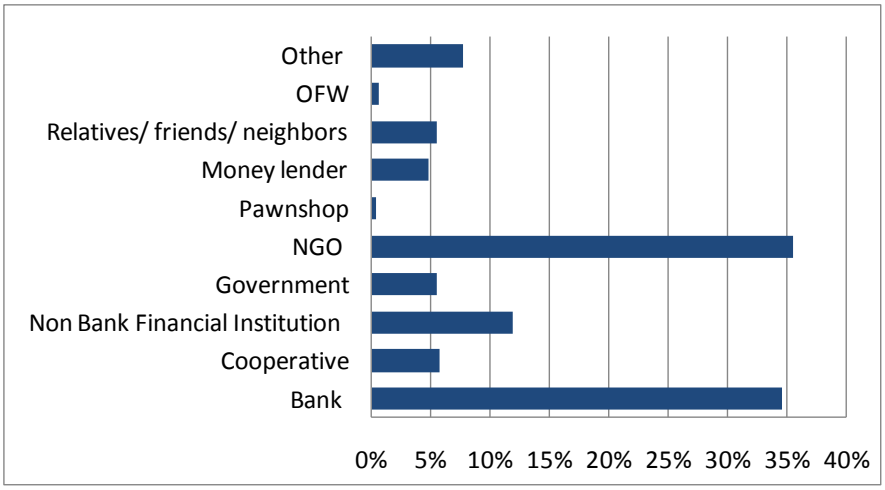


Figure 4-28: Preferred Source of Loans (multiple replies)

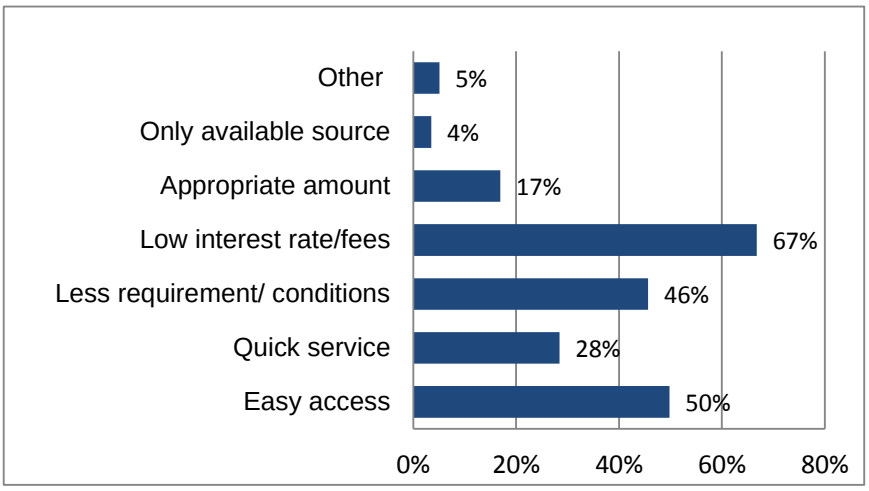


Figure 4-29: Reasons for the Preferred Sources (multiple replies)

(3) Perceived Difficulties in Getting Loans from Financial Institutions

Although a substantial number of respondents prefer to get loans from financial institutions, 70% said that it was difficult for them to get services from these institutions. The major reasons are the long process (59%), document requirements (52%), and collateral requirements (41%) (Figure 4-30).

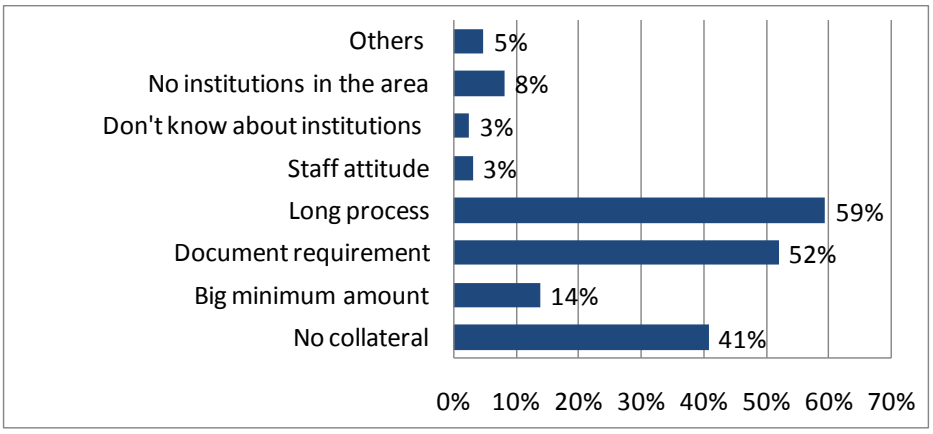


Figure 4-30: Reasons for Difficulties to Get Loans from Formal Institutions (multiple replies)

All the above data on their requirement and perceptions should be reviewed, taking into consideration that many of them do not have experience with formal institutions or may not even know about the kinds of institutions and their financial services since there are very few bank branches and NGOs providing services in the ARMM. However, this indicates the needs for financial institutions, including MFIs, to develop services that are more flexible to meet their demands and conditions, as well as simple document requirements and processes.

(4) Savings

The majority keeps cash at their places of business or at home, while 32% have savings at banks (this percentage is higher than those with loan experiences from the banks) (Figure 4-31).

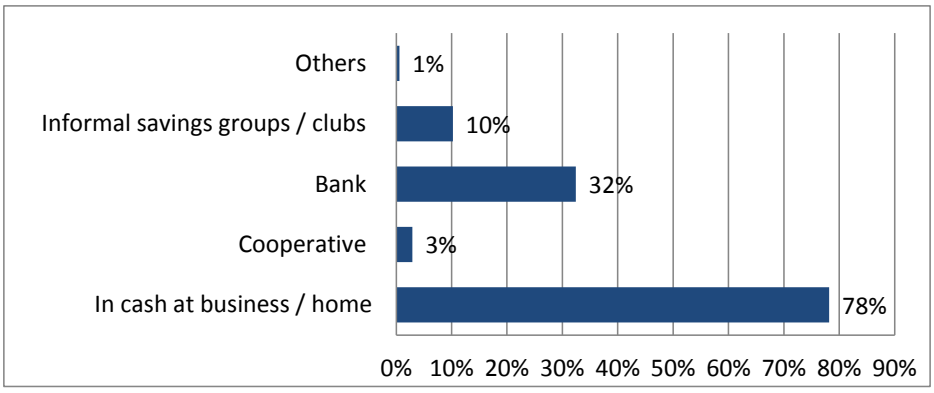


Figure 4-31: Places of Savings (multiple replies)

The reasons that these methods/institutions are selected are easy access (74%), which is the priority of those who save at their places of business and home, followed by the safety or reliability of the method/institution (48%). 53 entrepreneurs (10%) joined informal savings and clubs (Figure 4-32).

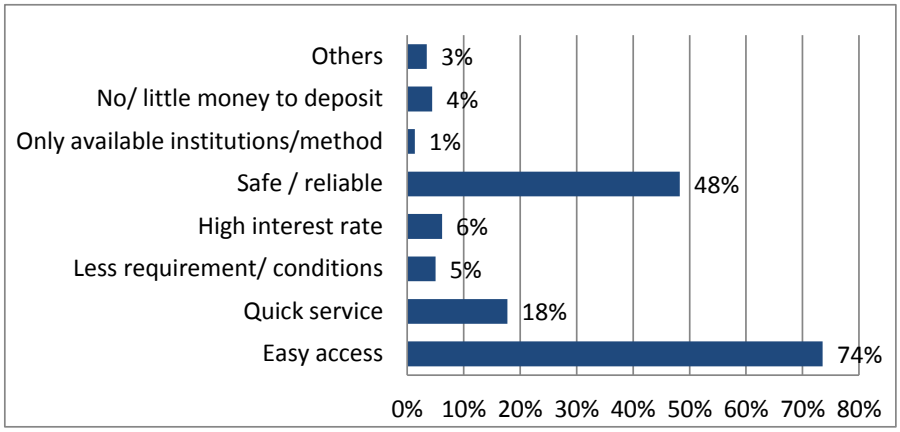


Figure 4-32: Reasons for Savings Methods/Institutions (multiple replies)

31% of the entrepreneurs responded that it was difficult to save money at formal institutions, although the percentage is much smaller than those who responded that it was difficult to get loans from financial institutions (70%). For those who cited the difficulties, the major reasons are, again, the long process (63%) and document requirements (62%), followed by the distance of the institutions (49%) or the lack of institutions in the area (21%) (Figure 4-33). Only 16% cited high minimum amount requirements. These indicated that if institutions are available in their area and provide products that make it easy to save, the institution can mobilize savings from these enterprises.

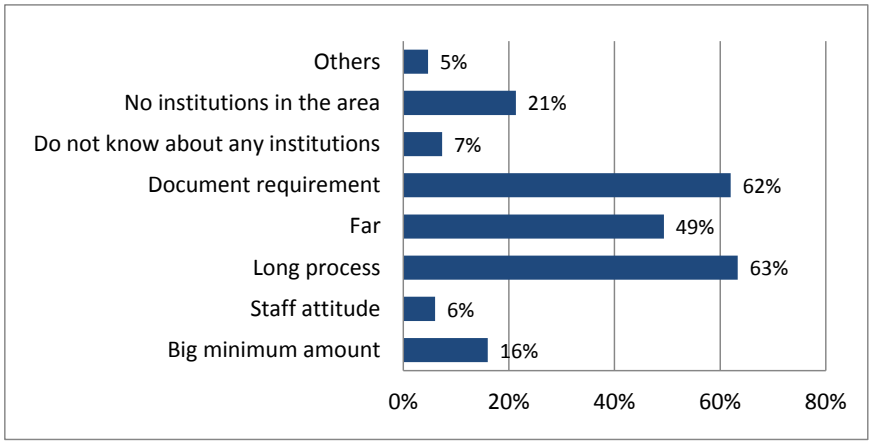


Figure 4-33: Reasons for Difficulties to Save at Formal Institutions (multiple replies)

4-5-3 Study Results - Supply of Microfinance

(1) Outreach

The supply of microfinance products and services in the Philippines is partly driven and influenced by wholesale fund providers such as PCFC and NLDC. While the outreach of microfinance in other regions in the Philippines has increased significantly over the past decade, there has been minimal growth in terms of outreach and funds used for microfinance in the ARMM. Based on the National Anti-Poverty Commission (NAPC) data, only 1% of the total 6.56 million microfinance outreach reported by the various government agencies in the Philippines belongs to the ARMM. Out of the Php 188.43 billion released for microfinance, only 4% was released to the ARMM. This shows a mismatch over priorities and the use of funds meant to assist low income households considering the ARMM is the poorest region in the Philippines.

At present, 13 MFIs including two rural banks are operating in the ARMM but their coverage is limited to specific areas in 27 LGUs (23%), with larger coverage in islands (Table 4-16). The number of clients is estimated around 22,000 (40.5% of the total population), but a majority are female retailers. Ninety-seven (97) cooperatives also provide loans to their members. They are very much concentrated in Tawi-Tawi (33) and Sulu (30). Although the data of most of these cooperatives is unavailable, there are some large financial cooperatives in Sulu and Basilan, as explained later. In total, there are 76 LGUs (64%) without services by MFIs and financial cooperatives in the ARMM. The ratio is high in Lanao del Sur (80%) and Maguindanao (69%). On the other hand, 126 pawnshops operate in five provinces, which are also concentrated in islands.

Table 4-16: Outreach Status of MFIs, Cooperatives, and Pawnshops in the ARMM

	Maguindanao	LDS	Basilan	Sulu	Tawi-Tawi	ARMM
No of MFIs Operating	5	5	3	2	2	13
No of Fin coops	15	17	2	30	33	97
No of pawnshops	14	7	39	35	31	126
LGUs with MFI service	5	6	6	6	4	27
LGUs with Fin Coops.	8	6	1	6	6	27
LGUs with pawnshops	5	4	1	4	3	17
% of LGUs with MFI service	14%	15%	50%	32%	36%	23%
LGUs without service of MFIs & Fin Coops	25	32	6	10	3	76
% of LGUs without services of MFIs & Coops	69%	80%	50%	53%	27%	64%

Table 4-17: Major MFIs Operating in the ARMM and the Provinces Covered

MFI	Clients	ROA	PAR<1day	Maguindanao	LDS	Basilan	Sulu	Tawi-Tawi
CARD	11,317	3.75%	1.69%	○			○	○
KCCDFI	4,478	4.72%	4.26%			○	○	○
Extension Farmers MPC	2,403	N/A	N/A		○			
DENRACEAE MPC	1,468	N/A	N/A				○	
MSU Sulu MPC	1,459	13.96%	N/A				○	
SCARBIDC MPC	1,300	N/A	N/A			○		
LARBECO MPC	650	N/A	N/A			○		
Nagdilaab Foundation	623	N/A	N/A			○	○	○
Coop Bank of Cotabato	561	7.27%	10.33%	○				
Hagdan sa Pag-uswag	538	1.81%	4.34%		○			

Major MFIs operating in the ARMM and their coverage provinces are shown in Table 4-17. CARD has the largest number of clients in eight LGUs in three provinces and plans to expand to three LGUs in Maguindanao and one in Lanao del Sur (Marawi City) in 2011. The second largest MFI operating in the ARMM is KCCDFI with 4,478 clients. In Sulu and Basilan, there are four large financial cooperatives in Patikul, Joho, and Lamitan. In islands, the total number of active borrowers of those cooperatives is close to the total number of clients served by MFIs. Although the detailed performance data of MFIs and cooperatives is not available, most of them report high repayment rates from 95% to 100% in the ARMM. However, the success of these institutions has been limited to a minimal number of clients who are mostly micro-enterprising women for the case of MFIs. Supply of credit has been limited to specific areas within certain municipalities thus excluding the great majority of the populace composed mostly of farmers and fishermen. MFIs are therefore still far from penetrating and saturating all the towns and barangays of the ARMM.

There is a branch of an Islamic financial institution, Al-Amanah Islamic Investment Bank of the Philippines (AAIIBP), in Cotabato City. After being absorbed by the Development Bank of the Philippines in 2008, AAIIBP re-organized its operation and is now increasing the savings services. It designed new loan programs based on the profit-sharing principle and will launch these Islamic loan products in 2011.

The Land Bank of the Philippines (LBP) and the Development Bank of the Philippines, both of which are government financial institutions, have their branches in the ARMM and provide loans to cooperatives and businesses in the region. However, due to their past bad records, in particular with cooperatives, their current services in providing new loans are very limited. For example, the Kidapawan Branch of the LBP has 195 active loans with cooperatives in Maguindanao with a loan balance of Php 80 million but the past due rate is as high as 75%. It is

reported that they failed to make repayments because they had to suspend their business during the conflict period and many coops were established just to get loans from the bank.

(2) Products and Services

The MFIs and financial cooperatives provide loans and savings products to their clients and members. Table 4-18 shows the loan products by major MFIs. Currently, the main clients of MFIs in the ARMM are women engaged in retailing and other services. While CARD and KCCDFI take an individual lending scheme using the ASA approach where they organize a group for repayment collection and regular savings, CBC and Nagdilaab use a modified Grameen approach which requires group guarantees[69]. Although CARD and the Cooperative Bank of Cotabato (CCB) have micro agriculture loan products, only CCB provides agriculture loans on a limited scale. KCCDFI plans to introduce loans to fishermen and farmers in the island provinces. The three cooperatives in the islands provide loans with a larger amount and longer term to their members and non-members, including some for agriculture and fishery. They often asked for collateral such as jewelry and the loan amount is based on the amount of capital contribution. It is observed that cooperatives and cooperative banks provide loans to their members at relatively low lending rates of 1.5 to 2 % per month. On the other hand, the interviews with some traders and pawnshop operators in Basilan and Tawi-Tawi reveal that the nominal interest rate being charged ranges from 6 % to 10 % per month.

[69] Grameen approach invented by the Grameen Bank in Bangladesh provides individual loans using group guarantee system in spite of collateral to secure repayments. Five members form a solidarity group and guarantee each other's repayments. Five to six groups make up a center where money transactions such as loan disbursement, repayment, and savings are done at weekly meetings. On the other hand, ASA approach which was also initiated by the large MFI, ASA, in Bangladesh, provide individual loans to members of a group consisting of 15-20 members. ASA approach does not require group guarantee system but money transactions are made at the regular group meetings. In ASA approach, hope to get next loans and stringent repayment collection facilitate repayments by members.

Table 4-18: Loan Products offered by major MFIs and Cooperatives in the ARMM

MFI/ Cooperative	Product	Target	Amount (Php)	Term (months)	Interest	Methodology
CARD	Sikap 1 % 2	MEs	2,000 - 30,000	1-6	2.56% / month	Individual
	Small Business	MEs	15,000 - 100,000	3-12	28% / year	Individual
	Agri-MF	Farmers	3,000 - 70,000	3-6	15% / 6months	Individual
KCCDFI	MC loans	MEs	4,000 - 30,000	6	36-40% / year	Group / Individual
CB Cotabato	KBMP	MEs	3,000 - 150,000	6	23% / year	Group
	Micro Agri	Farmers	5,000 - 150,000	6	23%/ year	Group
Nagdilaab	MF	Women, farmers, fishermen	5,000 - 50,000	6	2.5%/ month	Group / Individual
	MF	Coops	2 million	12	2.5%/ month	
Denraceae	MF, Agri-Marine loans	Members, non-members	based on CBU	18-24	1.5-2.5%/month	Individual
MSU-Sulu	MF	Members, non-members	5,000 - 200,000	12-30	2-3%/month	Individual
LARBECO	Business/Production loans	Members, non-members	5,000 - 100,000	3-12	3-4 %/month	Individual
SPCU	Loans for cooperatives	Member coops	50,000 - 1 mil.	12-18	1% / month	

All these MFIs and cooperatives provide savings services. CARD and KCCDFI requires regular small savings at their regular meetings in addition to the voluntary savings product. Cooperatives also require members to contribute capital build-up in addition to the savings.

MFIs and coops face several challenges in providing loans to farmers and fishermen such as follows: i) mismatch of the demand and products such as loan term and repayment frequency, ii) MFIs prefer female clients to males and iii) perceived risks by MFIs and coops for agriculture and fishery, such as natural calamities. Therefore, it is necessary to help those MFIs and cooperatives develop or refine the loan products for the agriculture and fishery sectors in the ARMM.

(3) Characteristics of Major Financial Institutions in the ARMM

1) NGOs

- Center for Agriculture Rural Development (CARD)[70]

CARD, the largest and oldest microfinance institution in the Philippines, started a MF program

[70] From Mix Market December 2010. http://www.mixmarket.org/mfi/card-ngo/data and the presentation by CARD at the MF Seminar in Cotabato City in December 2010.

in 1989. As of the end of 2009, CARD Bank and CARD NGO had 862 offices nationwide and served 725,901 active borrowers, with a total portfolio of US$ 77 million. They are currently operating in eight LGUs in Maguindanao, Sulu, and Tawi-Tawi. Their operation in Maguindanao includes Ampatuan and they plan to expand their operations to four LGUs in 2011. They provide a line of products and services, including Business Development Services (BDS), such as business management training, and a loan insurance program which insures loan repayments by its clients. Their Micro Agri Loan has not been implemented but is considered marketable in the ARMM.

< Micro Agri Loan by CARD>

This loan is for existing crops, not a start-up one. Payment frequency can be a lump sum, monthly, or semi-monthly term. The loan term is three to six months for Php 3,000 to 70,000. CARD does not require collateral, but borrowers must have another source of income. To secure payments even in the case of crop failures, CARD encourages farmers to make additional savings. One of the challenges for farmers and fishermen in using the product is that CARD limits men to 5 to 10% of its clients

CARD has a special unit in charge of developing new products which include the program linked with product marketing. The unit is now piloting a new agriculture product which serves relatively large scale individual farmers including those engaged in cassava farming. It is not clear if the unit can include agriculture cooperatives as target clients for the new product and implement the product in the ARMM.

- KFI Center for Community Development Foundation, Inc. (KCCDFI)

KCCDFI started its operation in 2002 in Zamboanga City and expanded it to other areas, including Jolo in Sulu, Bongao in Tawi-Tawi and Basilan. The major clients of KCCDFI are female vendors and traders. KCCDFI has no loan products for agriculture and fishery. A special feature of KCCFDI is its micro insurance program called Mutual Aid Benefit, which covers the death of KCCFDI members and their family and accidental hospitalization. In collaboration with its mother NGO, KCCFDI also provides BDS to its members. KCCFDI plans to develop new products for agriculture and seaweed farmers. The major challenge for KCCDFI in operating and expanding its services is the peace and order situation. After several staff members were kidnapped or held up at gunpoint, KCCDFI decided to close three branches in Basilan. However, even under such situation, KCCDFI reported that the repayment rate in the ARMM is better than in other areas, which is attributed to the belief in Islam that debt should not be accumulated. It also reported the challenges of limited human resource capacity.

- South Cotabato Foundation Inc. (SCFI)

SCFI was established in Koronadal City as a social development organization in 1983 and evolved to a MFI in 1999. It has six branches and serves 6,635 active members and 5,597 active borrowers as of July 2010. It covers three provinces and General Santos City in Region XII, as well as Buluan in Maguindanao of the ARMM. SCFI piloted the agriculture loan in South Cotabato Province and plans to expand it to other areas after its success. SCFI recently obtained grass-root grant assistance from the Embassy of Japan in the Philippines for its program in Region XII.

<Sustainable Agricultural Production Finance by SCFI>

This product aims at supporting the entire cultivated land area for multiple crops. It was designed based on the research by a Japanese student at Kobe University. It does not require any collateral and loan sanctions are made based on the characteristics of borrowers. However, borrowers are limited to those who meet a number of conditions including the following: have land titles; have been an actual cultivator for at least three years; have an annual gross income of more than Php 35,000; and are willing to adopt organic agriculture. The program is accompanied with a forced savings mechanism, in which savings are discounted from a volume purchase of inputs, meaning that 50% of the total discount goes automatically to farmers as personal savings while 50% goes to SCFI as a service charge for items and input disbursement. The savings cannot be withdrawn until the loans are fully repaid. SCFI's loan term is flexible based on the type of crops, with a flexible repayment scheme allowing lump sum payment. The effective interest rate is 4% per month. Although SCFI is interested in expanding this product in the ARMM, it faces the challenge of fund shortage.

2) Rural Banks

There are only two rural banks in the ARMM: one in Malabang in Lanao del Sur and the other in Datu Paglas in Maguindanao. The Rural Bank of Datu Paglas was established by the Datu Paglas Corporation, which is owned by the mayor's family, with the assistance of the national program of Microenterprise Access to Banking Services (MABS) by the Rural Banks Association with the support of USAID. The bank's main clients are contract farmers who work for the banana plantations owned by the corporation, but the bank also serves other residents, including those outside of the municipality. Although the bank adopts the individual lending method promoted by MABS, it will review the possibility of introducing the ASA model to serve more farmers and microenterprises[71].

[71] They became interested in ASA model after attending the MF Seminar conducted by this study in Cotabato in December 2010.

Another rural bank operating in the ARMM is Cotabato Rural Bank located in Cotabato City. Its main products are microfinance loans for micro-enterprises and small and medium enterprise loans. It provides services to micro-enterprises, particularly vendors and traders in three LGUs in Maguindanao, but its client base is very limited. All the loans are individual loans and are assessed based on the cash flow and characteristics of the borrowers. The bank recently started working with Catholic Relief Services, an international NGO, for the beneficiaries of the latter's agriculture project in Maguindanao. The bank plans to introduce a new product for agriculture and is interested in expanding its services in the ARMM.

In Tawi-Tawi, Muslim Upliftment Foundation, Inc. (MUFTI) plans to establish a new rural bank. The bank will be based in Bongao and cover nine LGUs. Its prospective target clients are MEs, fishermen, and farmers. Currently, MUFTI is preparing necessary documents for registration, establishing necessary capital, and seeking technical assistance.

3) Cooperative Banks/ Cooperatives

Many multi-purpose cooperatives in the ARMM provide financial services to their members. The following institutions are the major ones operating in the ARMM. It should be noted that there are two large cooperatives as well as an active cooperative union serving as many as 65 cooperatives in Sulu, which can be attributed to the efforts of the Sulu Provincial Government that has been promoting cooperatives in the province[72]. The two cooperatives in Sulu and the two cooperatives in Basilan mentioned here have been supported by technical and financial assistances by Mindanao Alliance of Self-Help Societies Southern Philippines Education Cooperative Center (MASS-PECC), a regional cooperative network in Mindanao.

- Cooperative Bank of Cotabato

Established in 1979, the bank is based in Kidapawan City in Region XII. Its service area includes some municipalities in Maguindanao. The bank is one of the few institutions that have adopted the group guarantee system of the Grameen model. The bank provides loans to MEs and fishermen including those who operate fish ponds in Parang. The bank's challenges in expanding operation in the ARMM are limited funds and lack of human resources.

- Federation of United Mindanawan Bangsamoro Women Multi-Purpose Cooperatives

Most of the federation's member cooperatives are located in the ARMM. The federation is probably the only institution in the ARMM which is currently providing financial services in accordance with the Islamic finance principle, using the profit-sharing method. The federation developed the system with assistance from Malaysia. Although detailed information on such

[72] Sulu Province was awarded for its cooperative promotion activities by the national government in 2010.

matters as outreach, product design, and portfolio quality is not available, the federation indicated that its members' dependence on grants affected their repayment.

- Sulu Provincial Cooperative Union

Established in 2008, the union has 65 affiliated cooperatives in Sulu. It provides financial services to the cooperatives including loans to agri-fishery cooperatives. The repayment rate is 95%. The union reports that a reason for this success is a continuing education and financial literacy program for its member cooperatives. The union is also engaged in coffee processing and trading that face a problem of limited access to wholesalers and financial institutions. The challenges in expanding loans to the agriculture and fishery sectors are as follows: i) it is necessary to promote advance technology for the sectors for higher profitability, and ii) MF scheme should be flexible to meet the needs of crop production.

- MSU Sulu Multi-Purpose Cooperative (MPC)

The MPC was established in 1994 in the Sulu campus of Mindanao State University (MSU) in Patikul, Sulu. Initially, the MPC served employees of the university, then expanded its membership and increased its share capital to Php 24 million while obtaining funds for its lending operation from the Land Bank and MASS-PECC. The MPC even established ATMs in Sulu. It now provides loans to non-members and the agriculture and fishery sectors. Here are the challenges for provision of loans to the agriculture and fishery sectors as well as non-members: i) collection of loan payment; ii) difficulties in organizing farmers and fishermen; iii) dole-out mentality; and iv) lack of financial management. The MPC needs to encourage members to save and invest more as well as to seek for itself more funds for lending.

- Deneraceae Multi-Purpose Cooperative

The MPC was established in 1999 in Jolo, Sulu, originating in a circle of 12 friends from DENR in order to free DENR employees from the usurers who lend money at high interest rates. The MPC expanded to an organization with 1,468 members, a capital of Php 5.7 million, and a loan balance of Php 26.9 million. It provides saving and various loan services to members and non-members, including agri-marine loan as well as insurance services affiliated with an insurance company and money transfer on Western Union. The MPC established the first ATM in Sulu. The challenges for the MPC in expanding services to the agriculture and fishery sectors and developing services in general are as follows: i) socio economic condition of Sulu, ii) lack of funds, iii) financial marketability, iv) possibility of political interventions, and v) delinquencies by farmers and fishermen. The MPC won awards such as an Outstanding Cooperative by the Land Bank of the Philippines Region IX.

- Lamitan Agrarian Reform Beneficiaries Cooperative (LARBECO)

LARBECO was established in 1994 as an MPC in Lamitan in Basilan and started financial services in 2002. It has also engaged in production of copra, cacao, and rubber. LARBECO has 855 members, a capital of Php 3.4 million, and a loan balance of Php 5.3 million. It provides savings and loan services to members and non-members. It is interested in providing loans for agriculture and fishery but a risk of natural calamities is a challenge.

- SCARBIDC MPC

Santa Clara Agrarian Reform Beneficiaries Integrated Development Cooperative (SCARBIDC) was established in 1988 in Lamitan, Basilan Province. It is engaged in production of rubber, copra, coffee, coco coir, and oil mills. SCARBIDC claims to have cultivated coffee in an area of 300 ha and rubber in 1,000 ha. SCARBIDC has a membership of 1,300 agrarian reform beneficiaries with a capital of Php 18 million, and provides consumption loans to the members. SCARBIDC plans to expand services to non-members. Although it is interested in providing loans to the agriculture and fishery sectors, it is concerned about natural calamities and repayment collection. SCARBIDC's major challenges are lack of funds and the high interest rates of the banks.

4) Government Banks

- The Land Bank of the Philippines (LBP)[73]

The Land Bank was established with a social mandate of promoting rural development. Its priorities are farmers, fishermen, SMEs, livelihood loans and agribusiness, agri-infrastructure and other agri- and environment-related projects. The bank has an extensive national network including five branches in the ARMM. Its products include loans to cooperatives, MFIs, and LGUs. Although the LBP currently takes a strict stance on lending to the cooperatives in the ARMM because of their bad repayment records, it is trying to support the promising agriculture and fishery sectors through the Food Supply Chain Program, Agricultural Credit Support Project, and Agri-fishery Microfinance (AMF) Program. For example, the bank plans to provide loans for a project to establish a palm oil nursery by the Maguindanao provincial government. The assistance from the University of South Cotabato promoted the funding from the bank.

< Food Supply Chain Program by LBP >[74]

The program was spearheaded by the Department of Agriculture, Department of Finance and

[73] Based on the website of the LBP, interviews with Kidapawan and Zamboanga Lending Centers and Head Office of LBP.

[74] This new program is supported by JICA under the Agricultural Credit Support Project (ACSP).

the Land Bank to promote food security and to increase agricultural productivity and the income of farmers. This serves as a platform from which to provide financial and technical support along the value added chain of a commodity or industry. The bank has allocated Php 50 billion to the program, particularly to support crop, livestock and fishery production, working capital and acquisition of processing equipment and other fixed assets. One of the methodologies is to provide loans to farmers for their agriculture inputs through the processor based on the condition that farmers sell their agriculture product to the processor. Repayment to the bank is done through the processor. The system has been introduced by a palm oil processor, Agumil Corp. in the ARMM, and the bank is to expand the approach to other crops such as for seaweed farmers in Tawi-Tawi.

Figure 4-34 shows the flow of the program supporting oil palm producer cooperatives in Maguindanao and neighboring provinces.

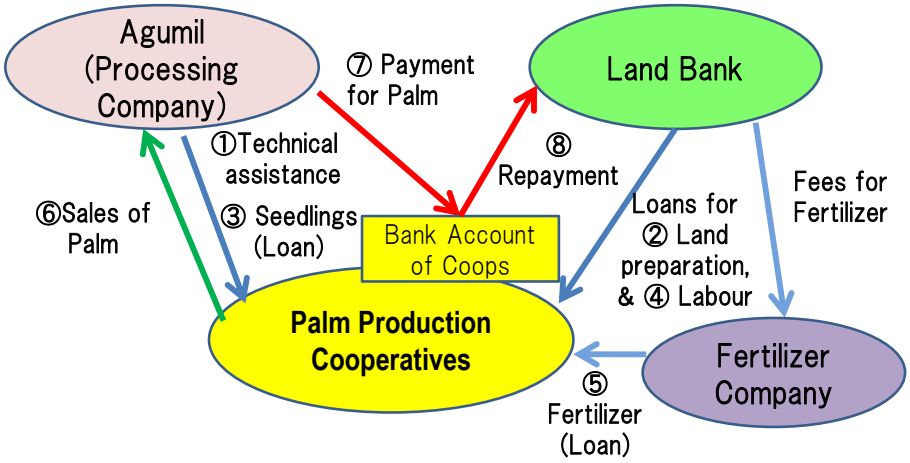


Figure 4-34: Food Supply Chain Program for Palm Oil in Maguindanao

Agumil, the palm oil processing company, provides technical training and advice to the cooperatives, while the bank provides loans for seedlings, fertilizer and cash for necessary labor on the condition that the cooperatives sell their product to Agumil. Repayment is collected through the sales to Agumil. The major characteristics of the Food Supply Chain Program are phased provision of loans based on the production status, a long repayment period of 6-30 years and a grace period of four years, and close monitoring by Agumil and the bank. Agumil guarantees the loans. By providing relatively large initial investment funds, the program helps

small-scale farmers start producing palm from which they expect larger and more frequent income than other products. However, the farmers have risks of reducing sales due to delayed delivery of products and processing, because the payment is based on the amount of processed oil. As for the bank and Agumil, the biggest risk is the side selling of products by farmers to other companies. To minimize such risk, the bank, Agumil, and another processing company in Mindanao are to conclude an agreement that the two processing companies will not purchase palm from producers who conclude a contract with the other company.

Figure 4-35 shows the planned program to support 12 associations of 3,207 seaweed farmers in Panglima Sugala LGU in Tawi-Tawi, through links with a seaweed processing company in Zamboanga. The LGU organized the federation of associations as a conduit of the loans and repayment collection as well as to provide a guarantee to the bank and to monitor the production and repayment by associations. The council consisting of the MSU-Tawi-Tawi will provide technical assistance to the associations. The plan is still being reviewed because the bank requests the federation to officially register as a cooperative. Although other LGUs such as Sitangai in the province are to replicate the plan, the LGUs need strong governance and financial capacities.

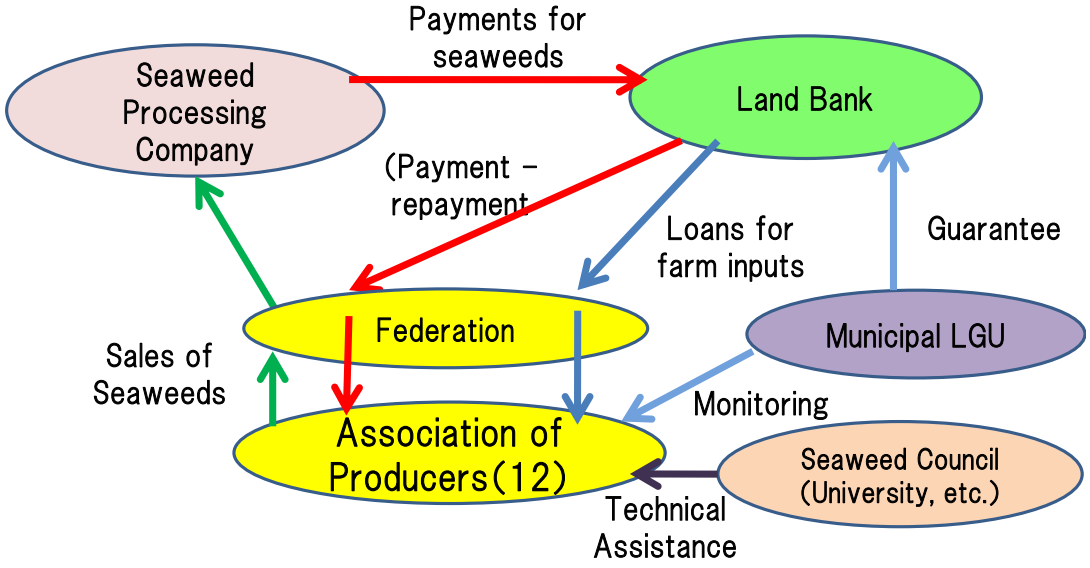


Figure 4-35: Food Supply Chain Program for Seaweed in Tawi-Tawi (Plan)

The issues that need to be cleared include the following: i) who can guarantee the loans, ii) how best to mitigate risks to farmers such as ones caused by price changes, and iii) how best to

mitigate risks to processors such as side selling of products by farmers. However, there are potentials to expand the Food Supply Chain Program to other products such as coconut, coffee, and cassava. Cargill, a major firm that processes coconut oil in General Santos, is interested in using the program.

<Agricultural Credit Support Project of LBP>

The project targets agriculture and fisheries, food- and agro-processing, farm equipment, and agriculture-related services and distribution. Eligible borrowers include small farmers and fishermen and SMEs. The LBP provides up to 80% of the total project cost for production, working capital and fixed assets for the period of 6 months to 15 years. The borrowers must have a combination of collaterals such as deed of assignment of produce, surety agreement, and fixed assets.

<Agri-Fishery Microfinance (AMF) Program of LBP>

The program is in collaboration with Agriculture Credit Policy Corporation (ACPC) to support agriculture and fishery activities. Eligible borrowers are the cooperatives and MFIs accredited by the LBP and non-accredited cooperatives. The loans for the non-accredited cooperatives are to be fully guaranteed by ACPC and must satisfy several criteria[75].

< Development Advocacy Program of LBP of LBP >

The program aims to avail loans to groups that failed to be accredited by the LBP. They include not only cooperatives but also associations and farmer and fishery organizations that utilize market contracts such as purchase orders and receivables, post-dated checks and guarantee.

<Loans through Special Conduits of LBP>

The LBP provides loans to authorized conduits such as traders who lend funds to farmers. In Maguindanao, there is only one authorized trader who provides loans to rice farmers.

75 Here are some of the criteria: in operation for at least one year; accounting and internal control; paid-up capital or net worth of at least Php 150,000.00; and not having any past due account with any lending institution

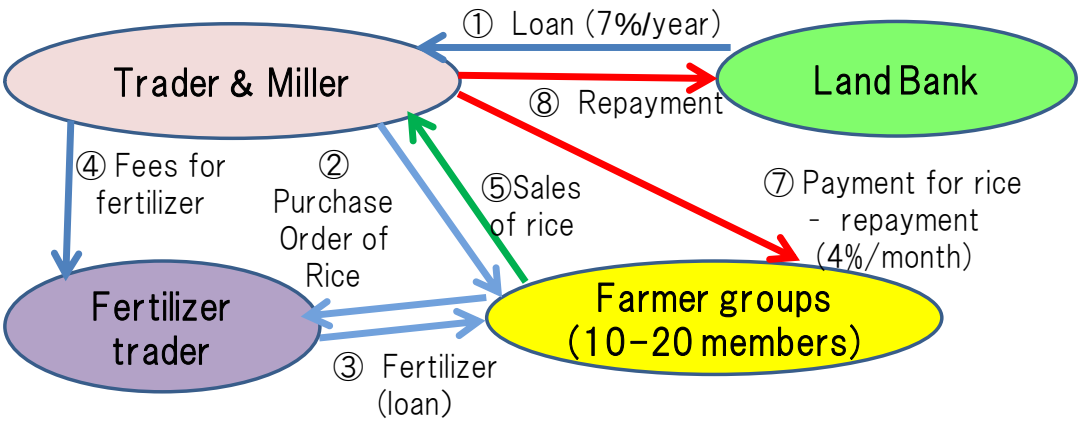


Figure 4-36: Lending system through conduit by the Land Bank

Two major benefits of the program have been observed: outreach expansion of financial services and increase of farmers' profit. The trader increased the number of farmers for his lending activities from 20 to about 200. The farmers reduced their borrowing expenses: they had previously paid high interests as much as 100% for four months to other traders, but increased their net profit under the new program. However, it should be analyzed whether the retail lending rate by the trader, 4% per month, is appropriate considering relatively low annual rate of 7% for wholesale fund from the LBP. Although a trader must meet several requirements to serve as a conduit, there are potentials to expand the system to other crops if there are established traders.

- Development Bank of the Philippines (DBP)

The DBP supports the key government development programs such as infrastructure as well as meets the needs for various investments and industries. The DBP also provides SME loans to borrowers including cooperatives and launched the Sustainable Mariculture Investment Program.

< Sustainable Mariculture Investment Program of DBP>

The program is to support mariculture projects by providing loans for working capital and facilities such as fish cages and post-harvest services and facilities such as boats, trucks, ice plants, processing plants, as well as business services such as hatchery, nursery, and feeding. Borrowers can be LGUs, cooperatives, associations, and MSMEs, for a period of up to 10 years with a maximum grace period of 3 years. One of the modalities is that the DBP lends funds to LGUs for establishing facilities which will be leased to fishermen.

5) Private Financial Institutions Specialized in Commodities

Some financial institutions specialize in financial services for specific commodities. One of them is UCPB-CIIF (United Coconut Planters Bank- Coconut Industry Investment Fund) Finance and Development Corporation (COCOFINANCE).

- UCPB-CIIF Finance and Development Corporation (COCOFINANCE)

COCOFINANCE is a subsidiary of UCPH-CHP, a large network of coconut processing companies in the Philippines and provides financial services to farmers producing coconut. The corporation has a loan program for cooperatives with minimum membership of 100, with the maximum amount of Php 50,000 per member and Php 15 million for a cooperative. Its Davao office caters to Maguindanao Province but is not active in lending because cooperatives in the province have failed to pay back loans a few times. However, the office is interested in resuming its business in the ARMM if there are promising cooperatives producing coconut.

(4) Programs to Expand Community Based Financial Services in the ARMM

1) Credit Union Empowerment and Strengthening (CUES)

The CUES project was implemented from 1997 to 2005 by the World Council of Credit Unions, Inc. (WOCCU), the trade organization of international credit unions, in partnership with Freedom from Hunger (FFH) and the United States Agency for International Development (USAID). In the first phase of the CUES project till 2002, 22 cooperatives in Mindanao including two in the ARMM were supported. The project consists of two major components: model credit union building - capacity building of cooperatives; and savings and credit with education, a financial education service designed for low income, economically active residents capable of engaging in micro-enterprise. During the implementation, the program trained a group for regular provision of savings and loans to the group members who guarantee each other. Then the group members become individual members of the cooperative. After the success of the first phase, such as increased membership and decreased delinquencies, the program entered the second phase.

2) MARADECA Community Banking

The program was started in 2004 by Maranao People Development Centre Inc. (MARADECA), an NGO in Lanao del Sur, with the support of VSO volunteers, to assist livelihood and

agricultural activities in the province. After some trials, the program is implemented in nine barangays from different municipalities of the province, servicing nine groups of 210 low-income residents who have land areas less than 0.25 ha. The program starts with group organizing, and then carries out regular weekly savings for four months. Only after successive regular savings, the program provides loans under a group guarantee to the members for their livelihood activities in kind, i.e., in goods and products. The loans are used for retailing, small processing, fishing, and livestock. Data on repayment performance is not available but 25 to 98% of the members utilized the second loans, and 25 to 40% utilized the third loans. It is necessary to refine the program in such aspects as sustainability of assistance by the program staff for loan provision.

(5) Challenges and Opportunities for Financial Services to Expand in the ARMM

The following challenges have been reported: lack of funds and capacity of MFIs and cooperatives; unstable security situation; low level of economic and marketing activities; dole-out mentality of people; and insufficient infrastructure such as roads and communications. They will be elaborated in Chapter 6.

On the other hand, here are the opportunities and potentials:

- Good repayment performances by major MFIs and financial cooperatives and their plans to expand operations and introduce new loan products for agriculture and fishery. A new rural bank is to be established in Tawi-Tawi. The successful agriculture loan program piloted by SCFI can be introduced in the ARMM. Extensive knowledge of the area and its people is one of the requirements in modifying the program features to suit the people's culture and beliefs. It is also essential to assign personnel with the same culture and beliefs so clients can easily relate to them.
- Existence of successful financial cooperatives which were supported by cooperative networks and the past project of WOCCU. It would be prudent to help such cooperatives expand their operation and replicate their experiences in other municipalities and provinces.
- The Land Bank and the DBP launched various products to support the agriculture and fishery sectors such as the Food Supply Chain Program. Other government wholesale and guarantee institutions such as ACPC, PCFC, NLDC, and Quedancor are interested in supporting financing programs in the ARMM.

Reported good portfolio performances by the major MFIs and cooperatives indicate that if appropriate programs, guidance and training are provided, ordinary businesses and farmers can

repay their loans even with the commercially-based lending rates. Such undertaking may help overcome the negative image of the past bad records of many cooperatives and government credit schemes in the ARMM. Expansion of financial services will help MSEs and farmers and fishermen to decrease their borrowing expenses for traders and money lenders who charge exorbitant interests and expand or improve their businesses.

4-6 Infrastructure and Physical Distribution

The scope of the infrastructure and physical distribution in the succeeding discussions focuses on the areas visited by the study team, particularly in three metropolitan areas, six major cities, five municipalities all within the study area, and two adjacent towns outside of the study areas. These major cities are important linkage to the ARMM, because of the established essential infrastructure, such as roads, bridges, airports, and seaports. This infrastructure is necessary for the distribution and marketing of commodities for local industries to be developed in the ARMM.

The most essential infrastructure in capturing the identified existing and potential market area for commodities is the establishment and construction of good roads and bridges, complete facilities inside the airports and seaports, and efficient roll-on/roll-off transport systems. Equally important is the construction of good gravel farm-to-market roads (FMR).

4-6-1 Road Network and Transportation

The road network in the Philippines has five administrative road classifications, namely: national roads, provincial roads, city roads, municipal roads, and barangay roads. The national roads are organized according to functions and strategic locations. The length and classification of the road network in 2009 is indicated in Table 4-19.

Table 4-19: Total Road Lengths and Classifications (km)

Classifications	Length	% Share	Paved Road	% Paved
National Road	29,370	14.3%	22,469	75%
Arterial	15,730	7.7%	13,525	86%
Secondary	14,167	6.9%	8,943	63%
Provincial Roads	31,284	15.2%	9,345	30%
City Roads	7,052	3.4%	8,369	57%
Municipal Roads	15,803	7.7%	5,394	34%
Barangay Roads	121,989	59.4%	8,020	7%
Total	205,498	100%	53,597	26%

Source: DPWH

(1) National Road

The roads are paved with concrete or asphalt or bituminous material. Road conditions range from good to fairly good, and are passable even in the worst weather conditions like heavy rain. The pavement ratio of national roads in Mindanao is 64%, much lower than the national ratio of 72%. In the ARMM, while the total length of national road is 891 km and the shortest among all the regions in Philippines, the pavement ratio is 77%, slightly higher than the national ratio. With regard to road conditions, 71% of the national roads in the ARMM are categorized as good or fair. See Tables 4-20 and 4-21 for details.

Table 4-20: National Road Pavement Ratio

National Road Pavement Ratio

Island	REGION		Paved Road (km)	Unpaved Road (km)	Total Length (km)	Pavement Ratio, %
	Philippines		21,006	8,364	29,370	72%
Luzon	National Capital	NCR	1,032	0	1,032	100%
	Cordillera Autonomous	CAR	659	1,187	1,846	36%
	Ilocos Region	1	1,449	161	1,610	90%
	Cagayan Valley	2	1,227	538	1,765	70%
	Central Luzon	3	1,771	261	2,032	87%
	CALABARZON	4A	2,063	341	2,404	86%
	MIMAROPA	4B	1,008	1,177	2,185	46%
	Bicol Region	5	1,587	610	2,197	72%
	Sub-Total		10,796	4,275	15,071	72%
Visayas	Western Visayas	6	2,176	704	2,880	76%
	Central Visayas	7	1,745	291	2,036	86%
	Eastearn Visayas	8	1,929	443	2,372	81%
	Sub-Total		5,850	1,438	7,288	80%
Mindanao	Zamboanga Peninsula	9	836	382	1,218	69%
	Northern Mindanao	10	1,170	512	1,682	70%
	Davao Region	11	910	537	1,447	63%
	SOCCSKSARGEN	12	814	490	1,304	62%
	Caraga	13	629	729	1,358	46%
	ARMM	ARMM	684	207	891	77%
	Sub-Total		5,043	2,857	7,900	64%

Source: DPWH, JICA -ARMM Road Network Development Plan,Y2008

Table 4-21: ARMM Road Conditions (Unit: km)

Location / Province		National Road			Provincial Road		
		Good/ Fair	Bad/ Very Bad	Un-known	Good/ Fair	Bad/ Very Bad	Un-known
Main Land Province	Lanao del Sur	188.7	64.0	7.1	6.8	9.4	4.0
	Maguindanao	142.0	61.4	0.0	33.8	5.6	0.0
	Sub-Total	330.7	125.4	7.1	40.6	15.0	4.0
	%	71.4%	27.1%	1.5%	68.1%	25.2%	6.7%
Inland Province	Sulu	69.2	16.0	28.0	0.0	0.0	0.0
	Tawi-Tawi	17.2	5.0	4.6	0.0	0.0	0.0
	Basilan	68.9	5.9	5.4	0.0	0.0	0.0
	Sub-Total	155.3	26.9	38.0	0.0	0.0	0.0
	%	70.5%	12.2%	17.2%	0%	0%	0%
Total		486.0	152.3	45.1	40.6	15.0	4.0
%		71.1%	22.3%	6.6%	68.1%	25.2%	6.7%
Grand Total		683.4			59.6		

Source: DPWH, JICA-ARMM Road Network Development Plan, Y2008

Note: "Unknown" means no survey was conducted due to unsecured area.

(2) Provincial Road

Provincial roads are road networks connecting municipalities inside the boundary limits of the province and are administratively under the jurisdiction of the Provincial Local Government Unit, specifically the road maintenance and repair department.

Selected sites were visited in the ARMM and the neighboring Region XII, to observe the actual situation of provincial roads that link municipalities of two adjacent regional communities. Generally, these roads are all unpaved, some of them are constructed with a gravel surface, and others do not have a gravel covering. It was also observed that most common problems of these roads are the inadequate implementation of a proper gravel road design during their construction and improper road gravel road maintenance, especially after rainy days or the wet season which aggravates the physical condition of the roads.

(3) Rural Roads (Municipal and Barangay Roads) and Rural Transportation

Rural roads combining the municipal roads and barangay roads have a total of about 137,793 kilometers or about 67% of the overall nationwide road in total. Rural roads have the least amount of paved surfaces, 34% for municipal roads, and 7% for barangay roads.

In the field survey and from interaction with farmers, there are many complaints on the inadequacy of the roads and the bad conditions of roads in the rural areas, particularly in Sitio and Barangay Communities. Small-scale agricultural farmers cannot do any more than mumble and complain, as they do not have enough clout to influence political leaders and government officials to build better farm roads. According to the farmers, traders subtract 10% to 20% per unit weight (in kilograms) due to spoilage caused by the bad roads during the transport of vegetables from the farm to the market areas in municipalities or cities. In addition, fish vendors cannot deliver fresh fish to remote areas due to the bad roads.

4-6-2 Sea and Air Transport

(1) Seaports, Network, and Transportation

1) Seaports

The seaport is the most important infrastructure linking land transport and maritime transport for the movement of commodity cargo or passengers in an archipelagic country, like the Philippines with 7,100 islands. In 2008, data from the NSCB stated that more than 18 million

metric tons were transported in domestic trade alone, and about 99.84% of that was transported by sea vessels.

The management of all ports in the country used to be under the Philippine Port Authority (PPA). However, in the 1990s, a new policy came out that revolutionized the management of some ports by bringing them under the administration of the local region or under independent management not within the umbrella of the Department of Transportation and Communications (DOTC) and PPA. These ports are managed by Cebu Ports Authority (CPA)-Cebu City, Subic Bay Metropolitan Authority (SBMA)-Olongapo City, Philippine Veterans Development Investment Corporation Industrial Authority (PIA)-Cagayan de Oro City, Cagayan Economic Zone Authority (CEZA)-Port Irene, Cagayan Province, Bases Conversion and Development Authority (BCDA); and the Regional Port Management Authority (RPMA) in the ARMM declared as free port. Also included is the Philippine Fisheries Development Authority (PFDA).

The distribution in the number of ports in the Philippines is as follows; 700 ports in Luzon, 639 ports in Visayas, and 691 ports in Mindanao. The locations of major ports in Mindanao are indicated in Figure 4-37. The JICA Report (MPSDNPS) lists the following current nationwide port administration problems: port development by many organizations; inadequate port facilities; insufficient budget for development and maintenance; lack of an integrated port development plan; and - poor port services.

In the ARMM, there are three major ports, one in Maguindanao and two in island provinces. The following are the major problems that the ports in the ARMM face:

1) Exceeded life span of some concrete structures;
2) Inadequate and dilapidated concrete pavements of port entry roadways;
3) Inadequate cargo handling equipment (e.g., some use construction cranes for loading);
4) Lack of provision for the RORO Transport System;
5) Lack of provision for hazard and safety equipment (fire hydrants, fire extinguishers, medical aid kits and skull guards for utility workers);
6) Lack of covered warehouse storage facilities;
7) Lack of maintenance of the infrastructure facilities;
8) Right of way problems for future expansion;
9) Relocation problems for squatters in adjacent areas for future expansion;

10) Lack of covered walkways for walk-in passengers;

11) Lack of parking spaces for public utility passenger vehicles and the like; and

12) Lack of the provision of cargo and passenger security measures (e.g., scanning equipment).

Location and Classification of Government Operated Seaports in Mindanao

Base Ports & Terminal Ports Northern Mindanao			
No	Type	Region	Port name
1	TP	10	Sindangan
2	BP	10	**Dapitan**
3	TP	10	Jimenez
4	TP	10	Silanga
5	BP	10	**Ozamis**
6	TP	10	Tubod
7	TP	10	Kolambugan
8	BP	10	**Iligan City**
9	TP	10	Balingoan
10	TP	10	Benoni
11	TP	10	Guisiliban
12	BP	10	**Cagayan de Oro**
13	TP	10	Opal
14	TP	13	Dinagat
15	TP	13	Dapa
16	TP	13	Socorro
17	BP	13	**Surigao City**
18	TP	13	Lipata
19	TP	13	Cantilan
20	TP	13	Tandag
21	TP	13	Aras-asan
22	TP	13	Mangagoy/Bislig
23	TP	13	Butuan
24	TP	13	Masao
25	BP	13	**Nasipit**

Base Ports & Terminal Ports Southern Mindanao			
No	Type	Region	Port name
1	BP	11	**Davao City**
2	TP	11	Babak
3	TP	11	Lupon
4	TP	11	Banay-banay
5	TP	11	Maco
6	TP	11	San Isidro
7	TP	11	Mati
8	BP	12	**Gen Santos City**
9	TP	12	Glan
10	TP	12	Mabila
11	TP	12	Kalirmingig
12	TP	9	Pagadian
13	TP	9	Malangas
14	TP	9	Ipil
15	BP	9	**Zamboanga City**
16	TP	9	Isabela City/Basilan
17	TP	9	Margosatubig

Base Ports & Terminal Ports ARMM			
1	BP	ARMM	Polloc-Parang
2	TP	ARMM	Lamitan
3	TP	ARMM	Jolo

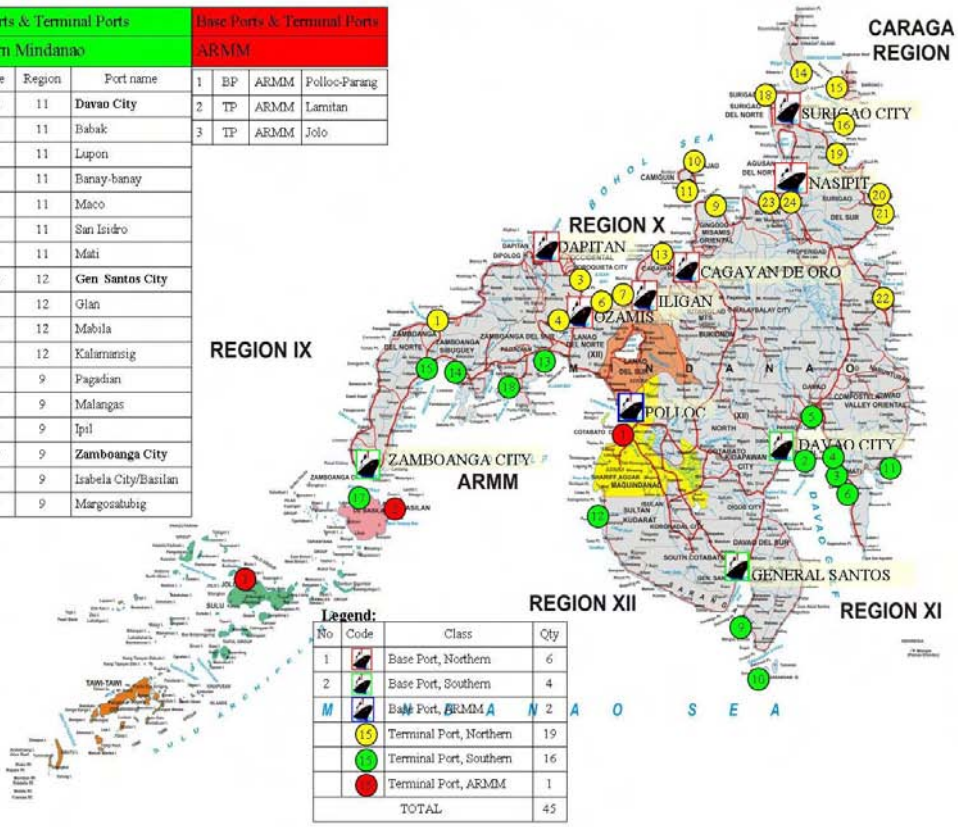


Figure 4-37: Location of Major Ports in Mindanao

Source: DPWH-ARMM, JICA

The Port Polloc in Maguindanao is the largest port in the ARMM. Based on the data, the amount of cargo handled by the Port Polloc went lower than 300,000 metric tons in 2005, as shown in Figure 4-38 (JICA-ARMM Road Network Development Plan). The ARMM government has already declared the Port Polloc as Free Port and has envisioned reviving the dynamic cargo handling activities in the area due to the great potential for agricultural development in the region and looks forward to inviting more sea vessels to dock. However, the present port has inadequate capabilities, due to the lack of facilities and cargo handling equipment. Nevertheless, the port management states that a development plan blueprint has

already been drawn up for any financial assistance that may come from any lending institution in the future.

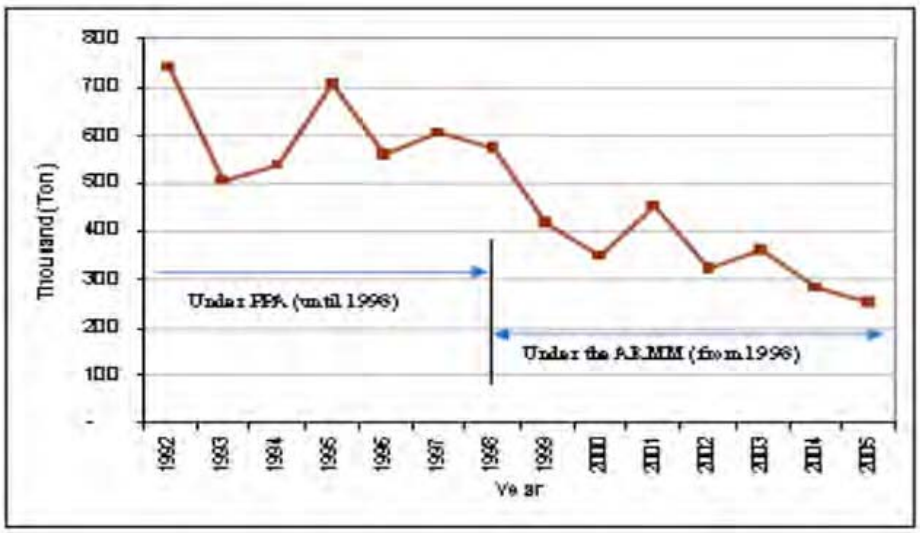


Figure 4-38: Amount of Cargo Handling in the Port Polloc
Source: DPWH-ARMM and JICA

In Cotabato City, there is Cotabato City Port, where no large domestic sea vessels were docking at the port due to port water depth problems caused by heavy accumulation of silts along the river estuary of Mindanao River. Currently there is a proposal to relocate Cotabato City Port to a new site away from the river estuary to the coastal line area with an acceptable navigable water depth or draft, in a place called Timaco Hill.

2) Seaport Network

The movement of commodities for export from and import to the country can go to any port in the world, either via direct shipment or via transshipment in major transshipment ports. In the seaport network for the major transshipment of container handling 12-foot equipment units (TEU), the following 12 ports have been identified so far: Singapore; Busan, Korea; Dubai; Kaohsiung, Taiwan; Tanjung Pelepas; Gioia Tauro, Italy; Rotterdam, the Netherlands; Algeciras, Spain; Manzanillo, Italy; Colombo, Sri Lanka; Salalah, Oman; and Marsaxlokk, Malta.

3) Sea Transport and Route

In the data from MARINA (2003), domestic sea transport or shipping services are classified into either cargo or a passenger-cargo combination. There are also 4,183 registered sea vessel units in the agency. The most common type of sea vessel in the country is the wooden hull boat

(banca) with 2,503 units. It has been used for short distance travel for many decades. The most common type of sea transport services used is the conventional cargo-passenger combination with a variety of service routes, from short to long distance, with 116 units, which can move from one island to another, either to base ports, terminal ports, or Roll-On/Roll-Off (RORO)[76] ports.

On the other hand, cargo service types are dominant on mid-and long-distance routes. Container cargo mostly docks at base ports due to the available equipment handling capability, while liquid bulk/tanker cargo mostly docks at private ports with exclusive liquid handling equipment. General cargo is usually on mid- and long-distance routes and mostly docks at base ports.

ARMM sea transport for cargo and passengers is linked to the network of major long-distance domestic container transport and long-distance passenger ferries nationwide, as shown in the routes of shipping vessels. On route to Maguindanao, the sea transport vessel will pass by at Polloc Port at Parang Municipality. It has been observed that the current cargo handling method is still the conventional system using the Load-On/Load-Off Method in passenger-cargo vessels. On the other hand, in RORO, they use wooden pallets and forklifts to load and unload the cargo. In the island provinces of Basilan, Sulu, and Tawi-Tawi, the port hub is Zamboanga City on a daily basis for passenger-cargo and cargo transport by RORO.

(2) Airports

The Republic Act 9497 created the Civil Aviation Authority of the Philippines (CAAP) on March 4, 2008, as an independent regulatory body which is quasi-judicial and quasi-legislative and possesses corporate attributes. This agency has full authority over air transport, including all pertinent facilities and infrastructure. This agency is attached to the Department of Transportation and Communications.

The airports for the air transport system in the entire country are classified into the following: i) International, ii) Principal Class-1, iii) Principal Class-2, and iv) Community. In Mindanao, there is one regular international airport in Davao City and two alternate international airports in Zamboanga City and General Santos City. In the ARMM, there is Awang Airport in Maguindanao province, which is Principal Class-1 airport, meaning only domestic flights are allowed.

[76] Roll-on/roll-off (RORO or ro-ro) ships are vessels designed to carry wheeled cargo such as automobiles, trucks, semi-trailer trucks, trailers or railroad cars that are driven on and off the ship on their own wheels. This is in contrast to lo-lo (lift-on/lift-off or load-on/load-off) vessels which use a crane to load and unload cargo.

4-6-3 Physical Distribution Facilities

Physical distribution facilities for commodities and products start at the farm level during the harvest period. This is when the handling, packaging, transporting, and storage for collection prior to distribution and manufacturing. These are essential to maintain the quality of the commodity/product until it reaches the market outlet for consumer distribution and consumption. The physical distribution facility varies by several degrees, depending on the commodity and the scale of the enterprise (backyard, micro, small, medium, or large), as observed in the field survey in selected areas in the ARMM, Region IX, Region X, Region XI, and Region XII by the study team. In the paragraph below, the physical distribution facilities for commodities like vegetables, fruits, fish and livestock and poultry are described.

(1) Vegetables

Facilities for physical distribution vary depending on the market type, whether it is a public wet market or an institutionalized market. A wet market refers to public markets or privately owned public markets. All types of consumers come and buy in this area due to the lower costs compared to supermarkets. An institutional market refers to hotels, restaurants, supermarkets, and the like where quality is prioritized over price. Generally, around 75-85 % is sold to wet markets and vegetable traders where business is conducted in cash payments, whereas with institutional markets there is a delay in payment from 15 days to 90 days, not to mention the stricter quality requirements.

1) Post-harvest Handling

Generally, farmers used rattan baskets for handling and hauling their harvest with a capacity of 40-50 kilograms from the farm to the packaging site. There, the vegetables are transferred to nylon sacks, carton boxes, and wooden crates. Few farms are keen on practicing proper handling technologies during harvest season except for those dealing with the institutional market. Farmers usually handle the vegetables in the conventional way. However, traders sometimes help to pack the harvest, depending on the demands of the buyers. Careful handling and packaging is done when the vegetables are to be transported to Visayas or Luzon in order to control spoilage.

2) Local Transportation Facilities (from Farm to Barangay Consolidation Area)

Most of the tropical vegetable farmers live in terrain ranging from almost flat to rolling slopes of less than 10%. Such area is easily accessible by four wheel vehicles and motorbikes. On the other hand, temperate vegetable farmers live at elevation ranging from 1,000-2,000 meters

above sea level and most roads are not accessible. Instead, there are trails or pathways wherein using animals as carriers or animal driven sleds or wheeled carts are the only way to get around. The common practice when hauling vegetables is to utilize open-type cargo trucks with a variable gross weight capacity from 1,000 kilograms to 8,500 kilograms. In Northern Mindanao Veggies, a thermo-truck is used in transporting vegetables for the institutional market.

3) Warehousing and Storage

The survey showed that most farmers have no established storage or warehouses. A shed or canopy is enough for the farmers to have somewhere that is shaded and a convenient place for packaging the farm products. Other farmers pack their harvest into crates or sacks right in the open field as they need to deliver their farm products to trading centers or consolidation areas fast to avoid spoilage and get cash in return from awaiting buyers. This is the opposite of other temperate vegetables like the asparagus that need quality control based on export standards and proper protective packaging. "Barangay Bagsakan" refers to the ongoing government-private project partnership under the Department of Agriculture Infrastructure Support Project in collaboration with the LGUs of barangays, municipalities, and cities that have established a kind of post-harvest facility made of concrete pavement with roofing and office space. Included in the package is support equipment and tools such as cold storage, weighing scales, plastic box/crates and a cash register. The operation and maintenance are to be handled by a group of farmers as incorporation, cooperative, or association duly registered with the Security Exchange Commission (SEC), Cooperative Development Authority-ARMM (CDA) or the Department of Labor and Employment-ARMM (DOLE) to have a legal status. The purpose of the trade center is for the farmers to have a common area to market their farm products that are both accessible to growers and traders/wholesalers where trading arrangement activities can be made or for it to serve as an auction area. In public markets, vegetables are stored in neither warehouses nor cold storage. Vendors and retailers sprinkle water every hour or immerse the products in water to keep them fresh.

4) Transportation, Seaports, and Intermodal Facilities[77]

In places such as Luzon or Visayas, where vegetable production has been catastrophically affected by a typhoon, vegetables are now packed inside 10-foot size containers. Davao region vegetable producers carry out this practice, but the costs of shipment are compensated by the high buying price. However, for Northern Mindanao, specifically in Cagayan de Oro, daily shipments are made to Visayas (Cebu, Iloilo, and Dumaguete) where the distance is shorter and

[77] Intermodal freight transport involves the transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes.

shipment costs are lower in volumes. Traders and wholesalers also take advantage on the availability of RORO.

5) Protective Packaging

It is not seen in wet markets. In institutional markets, each item is plastic sealed with Styrofoam pads and placed inside plastic boxes to minimize damage and spoilage.

(2) Fruits

Fruits distribution facilities vary depending on the kind of fruit and the market destination. Major seasonal tropical fruits that are dominant in Mindanao, like mango, durian, mangosteen, lanzones, marang, rambutan, and pomelo are sold locally although they can also be exported. However, export is limited, because other South East Asian countries are growing the same fruits. Mango has found ways onto the export market, but handling needs special attention. Pomelo is dominant in Mindanao Island but is grown more in Davao Region and Region XII.

Banana fruit is available all-year-round. Hybrid bananas are mostly for export though native bananas can also find their way onto the export market. Distribution facilities are essential, as the export quality required is stringent compared to other tropical fruits. The top producer of bananas is the Davao Region, but other regions are following suit due to the huge export demand. Hence, banana companies are expanding in nearby regions. Hereunder are the discussions related to the distribution facilities of fruits during the field survey.

1) Post-harvest Handling Facilities

Generally, fruits like durian, mangosteen, lanzones, marang, and rambutan are harvested ripe and collected inside large rattan baskets. Durians are harvested on a matured period or 5-10 days before. They are then packed inside a wooden stick crate or box in the open field or a small shed with no particular building facilities, because before sunset these boxes are due for transport to the consolidation area or to a market outlet to take advantage of the period between when they are fresh and ripe to their spoilage time. For mangoes, the method of handling during the fruit development period is important depending on the target market of the grower/farmer. The common practice of the owner/farmer is to wrap each fruit up to maintain better quality than normal. Mangoes are harvested as matured green and packed in big rattan baskets. In the same way as other fruits, these are placed and packed into carton boxes but are classified according to their size and quality. As to bananas, their post-harvest handling facilities are essential and extra efforts are made when handling to maintain the freshness quality. Large banana plantations are

equipped with post-harvest facilities with farm trailers, washing ponds, and adequate packaging buildings.

2) Local Transportation Facilities (from Farm to Consolidation Area/Local Distribution Market)

In remote areas, fruits are transported using animal driven sleds or wheeled carts, animal as a carrier, or using a single motorbike. In an area with accessible and passable roads, a four-wheel vehicle is convenient and cheaper due to its large transport capacity. Generally, transportation is available anywhere in all barangays and municipalities. Usually, this is made available by a trader or wholesaler. In the local market distribution, the same types of transportation are used with a variable gross weight capacity from 1,000 kilograms to 8,500 kilograms.

3) Warehousing and Storage

Most of the tropical fruits need no warehousing and cold storage. Immediate transport from the trader/wholesaler to the market is essential due to their short fresh life. Export-bound fruits, like bananas, are stored in a cold storage area with a controlled temperature. Large agri-businesses have their own stationary cold storage facilities while small groups, like cooperatives, use mobile refrigerated containers.

4) Transportation, Seaports, and Intermodal Facilities

Air transport is not used by traders/wholesalers due to high freight handling costs. The most common transport facilities utilized are land transport, water transport facilities, or intermodal facilities. Land transport and intermodal transport facilities are used for short distances only due to their low transportation costs. For example, mangosteen and lanzones from the island provinces of Basilan, Sulu, and Tawi-Tawi are shipped using the RORO to Zamboanga City. Export-bound fruits use the sea ports facilities, particularly the mobile refrigerated container facilities, or seaport cold storage, like in Cagayan de Oro Seaport. Most large companies own trailers and refrigerated containers, while small entrepreneurs lease refrigerated containers along with trucks and trailers from other private companies.

5) Protective Packaging

Produce for local distribution is packed into wooden crates, carton boxes, or even inside nylon sacks. Export-bound fruits, like bananas, are packed inside vacuum plastic for protection and placed inside a carton box for better handling. Such procedures are carried out in the packing plant.

(3) Fish and Marine Resources

Fish industry facilities in the country are not comprehensively available or complete, although there are 462 fishing ports constructed in the country and out of these 421 are actively operational. There are privately-owned small fish ports as well. Some fishermen or fish farmers do not have access to these fishing ports due to lack of infrastructure or roadways. There are barangays and municipalities along the coastline that have no community fishing ports or even community coastal roads for immediate access for the distribution of aquatic and marine commodities, i.e., the wet market and the institutional market. Export-quality fish and marine commodities such as tuna, grouper, shrimp, and prawn, are considered to belong to the institutional market because of its stringent handling and quality requirements.

1) Post-harvest Handling Facilities

Local small-scale fishermen use wooden hull boats ("bancas") that use hook and lines to catch fish. At the end of the day, the fish are packed and brought to a nearby market. In large-scale fish farming, most of the fishermen are equipped with boats and ships loaded with large plastic boxes in which blocks and crushed ice are kept ready for cooling any fish caught. The fish that are caught are immediately transported to the nearest fishing port using high speed motor boats. Fish are classified according to their size, type, and the quality before weighing and are loaded into plastic containers. Handling of fish is done manually. Thus, if the transfer of fish is not done carefully, a high percent of spoilage will occur. Low quality fish end up either as salted dried fish, fish bait, or fish meals.

2) Local Transportation Facilities

For local distribution, the transport facilities that are used are trucks built to accommodate and carry containers with thick walls as insulation to keep and maintain cold temperatures from the ice along with the fish. If at all possible, fish are delivered to the distribution outlet within 24 hours or less to maintain their quality. In areas where fishing ports have a fish processing plant nearby, fish like tuna are immediately loaded onto a refrigerated truck and then sent for processing.

3) Warehousing and Storage

Only major fishing ports are capable of having warehouse and storage or cold storage. There are eight major fishing ports in the country operated by the PFDA. Three of these facilities are located in Zamboanga, Davao, and General Santos City; all the rest are on Mindanao Island. These fishing ports are built with refrigeration buildings and utilities. The refrigeration building is equipped with an ice plant, ice storage, contact/air blast freezer, and a cold storage facility

(-5 °C or -35 °C). Utilities include fresh water supply, sea water supply, drainage and sewerage, power and fuel supply, and a water treatment plant. Other small fishing ports do not have the equipment and capabilities like the major fishing ports. According to some traders, these community fishing ports handle only a small quantity of fish and thus their requirements are less. In addition, the activities of a fishing port take place a few hours a day as traders are catching up for immediate distribution.

4) Transportation, Seaports, and Intermodal Facilities

In local distribution, particularly for inter-island transport, like the route from the inter-island provinces of Tawi-Tawi, Sulu, and Basilan to Zamboanga City and from the Northern Mindanao Corridor to Visayas Island, intermodal transport is essential for efficiency of the transport system. However, most of the fishermen and traders in the island provinces of the ARMM or Mindanao are not particularly dependent on this kind of transport. Instead, fishing boats are used to transport products to the major fishing ports or other any accessible fishing ports. On the other hand, tuna and other high-value fish bound for export are either transported by air freight or sea freight. Live fish for local distribution to Metro Manila is transported in the same way, either through air freight or sea freight.

5) Protective Packaging

Ice packed fish is adequate for local wet markets and institutional market distribution, but they must be frozen and packed for the domestic institutional market. Export-quality fish is frozen using either the contact or air freezing process to keep the quality excellent and is packed in accordance with the standards of the recipient country.

(4) Livestock and Poultry

All meat shall be butchered in a slaughter house as mandated by law. It is mandated to all LGUs that all municipalities and cities should have a common slaughter house. All butchered meat is inspected and certified by the National Meat Inspection Service (NMIS) under the Department of Agriculture. The NMIS provides inspection teams to every public slaughter house. In a private slaughter house for meat processing, the NMIS performs regular inspection and provide accreditation on these facilities.

Below are some of the distribution facilities that were observed, based on the ocular survey by the study team.

1) Post-harvest Handling Facilities

Almost all meat sold in the market by backyard livestock farmers have no post-harvest handling facilities. An intermediary or meat vendor comes over upon an invitation from the farmer/owner. The buyer brings a weighing scale and gets the total live weight. Then, he pays the owner according to the prevailing standard live weight price in town. This livestock is sent to a slaughter house for butchering.

2) Local Transportation Facilities

Collection and transport of livestock varies according to scale. Small vendors or traders use motorbikes to transport their livestock to remote areas with impassable roads. Others use motorcycles, or four-wheel vehicles. In communities along the river, boats are used to transport the livestock. Large livestock growers/wholesalers use trucks to transport animals. In long distance travel, refrigerated vans are used to maintain quality and hygiene.

3) Warehousing and Storage

Wet markets do not have warehouses and large cold storage building facilities. Instead, each vendor/retailer in the public market owns its own individual small-size freezer (1-2 cubic meters), which is enough for a day or two. However, in large supermarkets, hotels, and restaurants, larger storage facilities are available to accommodate the larger demand. In the poultry sector, large processing plants of big companies or corporations have cold storage as they process produce in large volumes daily. For eggs, small to large providers have storage facilities available prior to delivery.

4) Transportation, Seaports, and Intermodal Facilities

Livestock is transported on trucks for inter-regional or inter-provincial distribution. In the same way, short inter-island routes use the RORO facilities. Transportation of livestock cargo aboard ships is also practiced. However, stringent quarantine clearance is needed prior to shipment.

5) Protective Packaging

Individual vendors in public wet markets are not practicing protective packaging. Large companies or corporations distributors are packing meat in sealed plastics with the equivalent weight and price tag. These are delivered to supermarkets.

4-6-4 Physical Distribution and Market Outlet in Major Cities and Municipalities

Generally, physical distribution of commodities in the country fits the marketing channel distribution model (FAO). Based on the field survey, producers like farmers, fishermen, manufacturers and the like, regardless of the scale of their business, choose either to adopt the method of direct sales or indirect sales utilizing the intermediaries (Figure 4-39).

Direct distribution or direct sales exists in a limited scale of products or commodities and mostly in cases where distances between the source and the market outlet is short and the commodity has a limited life span or the items are perishable, such as fish, vegetables, meats, and some fruits. Most direct distribution is done by small-scale farmers, fishermen, and manufacturers utilizing the most of the hours in the day or days in the week after the farming or production activity.

Indirect distribution or indirect sales are mostly adopted by medium- and large-scale farmers, fishermen, and manufacturers for the following reasons: i) they cannot afford to lose time over perishable commodities, ii) they do not have enough manpower and logistics for distribution, iii) it is costly on their part to establish distribution outlets, and d) market outlets have territorial boundary lines drawn by brokers and sales agents, which may negatively affect revenue.

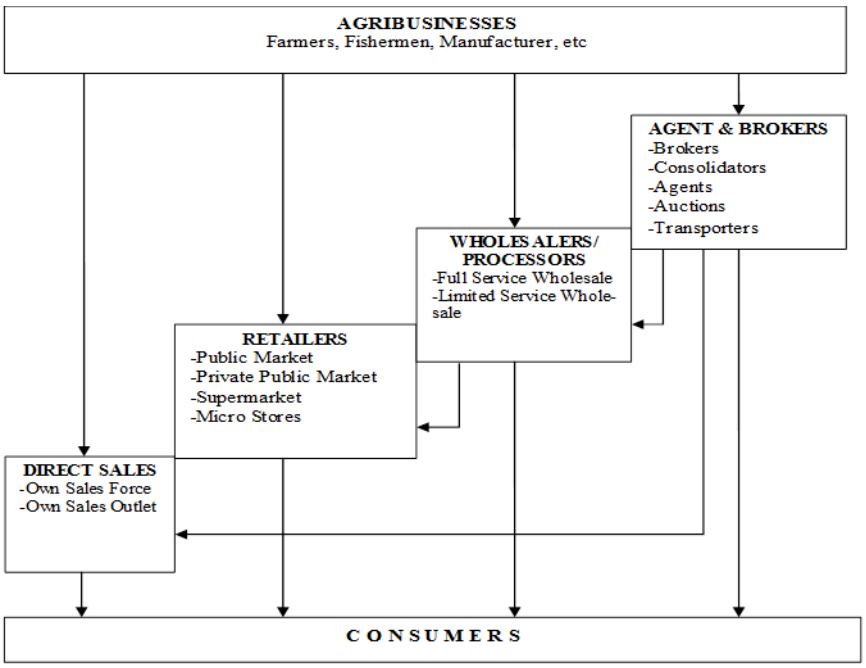


Figure 4-39: Physical Distribution of Commodities

This section explains the physical distribution and market outlet in major cities and municipalities where the major commodities of ARMM are related.

(1) Metro Cebu, Region VII

Cebu is an island province at the center of the large islands in the Visayas. It is about 587 km south of Metro Manila, bordered by sea to the east is Negros Oriental, to the southeast is Bohol Island, to the northwest is Leyte Island and Samar Island, to the north is Masbate Island, to the south is Siquijor Island and farther south is Mindanao. Cebu Province is the location of Metro Cebu, one of the metropolitan areas in the country, as declared by the National Economic Development Authority (NEDA). It is the second most populated metropolitan area after Metro Manila.

Metro Cebu is the main hub in the Central Philippines for domestic sea transport and air transport in the country. It is also the gateway for international sea transport and air transport in the Central Philippines. The reason is that it is among one of the oldest cities in the Philippines, where it became a commercial trading center since its declaration as a chartered city in 1937. Metro Cebu is known for its seaweed processing. There are 18 identified small-medium seaweed processing enterprises, organized into an association called the Seaweed Industry Association of the Philippines (SIAP). Out of these, 13 are registered to the Bureau of Investment (BOI). The distribution of the location of these 13 processors are: eight are located in Metro Cebu; two are in Zamboanga City; and three are located in Metro Manila. If all plant volume capacity is combined, Metro Cebu has the largest capacity of seaweed processing in the country.

(2) Dumaguete City, Region VII

Dumaguete City is located in Negros Island. It is an important market distribution area because it is strategically located as the nearest port for the West Side RORO Transport System (RRTS) linking Dapitan City in Mindanao, Negros Island, Panay Island, and Batangas City in Luzon. From Dumaguete City, it would take a total of four hours by fast craft and land transport to get to Cebu City. Most of the municipality's residents live in the tail end part of the island of Cebu and it is convenient for them to buy their household needs in Dumaguete City, because it would only take them an hour to travel by fast craft compared to the three hours it would take by bus. The transport system that connects the ARMM, particularly from the island provinces of the ARMM and Negros Island, is through the RRTS.

(3) Iligan City, Region IX

Iligan City is in the Northern Mindanao Corridor with a population of about 308,046. The city has an estimated land area of 813 square kilometers and has a population density of 373 people per square kilometer.

Many large businesses are attracted to Iligan City primarily because of its stable power supply and sustainable water supply, both of which are essential for industrial production plants. Major industrial facilities are as follows[78]:

- National Power Corporation (NAPOCOR) – The power generation center of Mindanao. It is known as Maria Cristina Water Falls and is the outlet of Lanao Lake of the Lanao del Sur Province.
- Global Steel Philippines Incorporation (GSPI) – formerly National Steel Corporation (NSC), the processing steel plant is capable of producing billet, round and square steel, hot and cold rolled flat steel rolled coils, hot and cold rolled steel plates.
- Mabuhay Vinyl Corporation (MVC) – the processing plant has the following products: liquid chlorine, polyvinyl chloride, caustic soda, hydrochloric acid for usage in various industrial products like soap, textiles, insecticides, lubricants, explosives, polyester, shoes, etc.
- Granexport Manufacturing Corporation (GMC) – this processing plant produces crude coconut oil and pellet. It belongs to CIIF Oils Mills Group of Companies.
- Pilmico Food Corporation (PFC) – produces wheat, flour, and wheat germ.
- Maria Cristina Chemical Industry – produces two basic metallurgical products such as calcium and ferroalloys for ferrosilicon, ferromanganese, silicomanganess, and silico chrome. It includes acetylene for battery industry.
- San Miguel Corporation- Iligan Coconut Oil (SMC-ICO) - this processing plant produces coconut solvent and pellet.
- Mindanao Portland Cement Corporation – a cement factory

In 2009, the volume and value of export commodities that went through Iligan City Seaport was about a total of 255,216,468 million kilograms, with a value of Php 5.079 billion for shipment to foreign countries like the USA, Japan, the Netherlands, and most countries in Asia. The major products exported are from coconut by-products in bulk such as oil, solvent, pellets, with the total estimated amount of Php 4.172 billion, or 82% of the total export amount (PPA-Iligan

[78] Source: http://en.wikipilipinas.org/index.PHP?title=Iligan_City

City). Coconuts are sourced out from the nearby Northern Mindanao regions, Visayas Islands, and Palawan.

Iligan City is the nearest city from Marawi City, Lanao del Sur, ARMM, where Matling Mills is availing the seaport facilities for both domestic and export trading. The Iligan seaport handles cargo and passengers from the hinterlands of the provinces of Lanao del Norte, Lanao del Sur, and parts of the provinces of Misamis Oriental, Misamis Occidental, Zamboanga del Norte and Zamboanga del Sur, and Iligan City.

(4) Zamboanga City, Region IX

Zamboanga City is located in the western tip of the Island of Mindanao and at the southern tip of the Zamboanga Peninsula. The city is famous for its major agricultural industry like fish and marine products, seaweed, rubber, abaca, and coconuts. Among the major industries that make a major impact on domestic and export distribution are canned sardines, seaweed processing, and fish and marine products.

1) Sardine Industry

Zamboanga City is the Sardine Capital of the Philippines because eight of the 11 sardine processing and canning factories in the country are situated in the city. The sardines are exported to countries in regions such as North America, Europe, the Middle East, and East Asia. The sardine canning factories have been established along the west side coastal area with its own wharf or ship docking areas. The most popular sardine brands are Mega Fishing Corporation (Mega Sardines), Universal Canning Corporation (Family's Brand Sardines), and Columbus Seafood Inc. (555 Sardines, SM Bonus Sardines, Blue Bay Sardines).

2) Seaweed Industry

The city is the center of trading seaweed due to its proximity to the Island Provinces of Basilan, Sulu, and Tawi-Tawi that produce and ship out about 2,339,935 kilograms or 46% of the total volume in the southern Philippines. The city has its own seaweed farm along its coastal lines as another source of livelihood for the community. In the Zamboanga Peninsula, an estimated 1,059,915 kilograms or 23.88% of the total volume shipped out from the southern Philippines comes from this region (February 2010, SIAP).

SIAP, the industry organization of seaweeds, lists the following number of members and major players in Zamboanga City: two seaweed processors and exporter; four seaweed exporters-wholesaler; three seaweed traders; one seaweed farmer-trader.

3) Fruit and Vegetable Industry

Most of the vegetables are locally produced in the city. However, sometimes other regions' traders compete with the local producers in the local market due to overproduction from known vegetable producing regions such as the Northern Mindanao and Davao regions. To protect local farmers/traders from these unfair trading actions by other regional traders or farmers, the City LGU created a policy that all vegetables and fruits should pass through the trading center or "Bagsakan." The farmer/trader shall pay a local tax or auxiliary fee for every volume. The Philippine National Police (PNP) is tasked to monitor and apprehend violators of this city ordinance.

On the other hand, tomatoes see a huge demand from the 11 fish canning processing plants. According to the Zamboanga Veggies Association, fish canning processing has an estimated requirement of 7,000 metric tons per month of tomatoes, of which the Zamboanga Tomato Growers can only provide 30 metric tons per day or 900 metric tons per month. To compensate for this difference, the canning plants are importing tomatoes from China at very low prices compared to the Philippine tomato price. Besides the huge price difference, the required tomato variety for canning is different from what the local farmers are growing.

4) Fish and Marine Resources

Zamboanga City is one of the strategic places for the establishment of a fishing port attributed to its wide area of sea farms for fish and marine products.

The financiers organize experienced fishermen and link them to potential buyers like traders, processors, transporters, shippers, and exporters. In other cases, the financiers are the owners of the whole distribution process like large sardine and tuna canning processors.

(5) Metro Cagayan de Oro, Region X

Metro Cagayan de Oro is located along the central coast of Northern Mindanao Island. The southern portion is bordered by the Provinces of Bukidnon and Lanao del Norte, the eastern side by Agusan Province, and in the north by Macajalar Bay which faces Bohol Sea.

Metro Cagayan de Oro is noted for its accessibility to the Visayas region, owing to its large seaport and modern base port in Northern Mindanao, where all cargo and passengers from the neighboring provinces of Agusan del Norte, Misamis Oriental, Bukidnon, Lanao del Norte and Lanao del Sur converge in this city. At present, its seaport has been rehabilitated and installed with modern equipment that can handle more container vans per hour than any other major city

in Mindanao. The seaport has cold storage facilities that are capable of handling sensitive agricultural commodities for domestic distribution and export like fruits, vegetables, and meat. Most of the agricultural cargo comes from the adjacent province of Bukidnon.

(6) Metro Davao, Region XI

Metro Davao is an agglomeration of Davao City and four surrounding cities: Digos City in Davao del Sur and Tagum City, Panabo City and Island Garden City of Samal in Davao del Norte. The metropolitan area also encompasses two municipalities: Carmen in Davao del Norte and Santa Cruz in Davao del Sur (RB Mallorca-NEDA). The area was formed based on a paper presented in Japan that cited the importance of building globally competitive metro areas in the Philippines.

Metro Davao is in the south eastern part of Mindanao Island bound by Agusan Province and Compostela Province on the north, Sarangani Province on the south, Davao Gulf and Davao Oriental on the east, and North Cotabato on the east. Metro Davao faces the coastal line of the Davao Gulf and is protected from typhoons by Mt. Apo, which is the highest mountain in the country.

The Davao region is known for its excellent climate all year round conducive to agricultural development that grows seasonal and non-seasonal tropical fruits like durian, rambutan, lanzones, mangosteen, marang, mango, pineapple, banana, and pomelo. Each individual city and municipality has its own strength as far as agricultural development is concerned.

Davao City is the center of commerce in the metropolis which has been attributed to the location of seaports, international airports, Central Public Market, Tuna Transhipment Fishing Port, Coconut Oil Processing Plant, Seaweeds Semi-Processing Plant, HDPE (High Density Polyethylene) Manufacturing Plant and other processing plants in the city. The city is also famous for its Cavendish and native bananas for export, pomelo fruits, and durians.

Digos City is the capital of the province of Davao del Sur. It is known for its vegetables, clay pots and tile factory, seaweeds, mango production, sugar cane, rice production, marine aqua-culture, Cavendish bananas, and coconuts. Although the sugar cane milling plant is part of Davao del Sur, not Digos City, Davao Sugar Central Corporation (DASUDECO) is located in the Municipality of Hagonoy. Digos City grows sugar cane in its barangays and delivers it to this mill. The radius of influence is about 50-60 kilometers from the milling plant.

Panabo City is part of Davao del Norte. It is known for its Cavendish banana production, rice production, bangus seedlings and fry production. It is presently promoting the fish cages farm and marine aqua-culture for bangus/milkfish, and groupers.

Island Garden City of Samal is under the administrative territory of Davao del Norte and is famous for its clean beach resort. The island is closer and more accessible to Davao City by RORO/ferry. The residents' livelihood in the island is more in fishing and is dependent on coconut and mango production. Just a few years ago, a JICA grant was awarded to the technical assistance to the Government of the Philippines, through the initiative of the DTI, for small-scale sustainable seaweed farming as a livelihood program with an initial 28 people as beneficiaries.

Santa Cruz Municipality, a first-class municipality, is known for its coconut production, bananas, sugar cane, fish cage farming, and aqua-culture, and seaweed farming. It has manufacturing and industrial plants such as the San Miguel Beer Brewery, the biggest in the Philippines, Sibulan Hydro-Power Plant, Coconut Coir Processing, and Franklin Baker Desiccated Coconut Plant.

Tagum City, the capital of Davao del Norte, is known for its rice production, Cavendish and native bananas, and bangus/milk fish production. It is the convergence trading zone for Agusan and Compostela Province from the north, and Davao Oriental from the east.

The distribution and market outlet of agricultural commodities in Metro Davao are discussed below.

1) Vegetables

The identified production area for vegetables in Davao Region is in Calinan district of Davao City, Maragusan Municipality of Compostela Valley, and Barangay Kapatagan of Digos City. Other identified areas are Barangay Kisante of Makilala Municipality in Cotabato, Region XII. Most of these sites are for wet markets due to their large market share and they do not include private vegetable farms exclusively for institutional markets like supermarkets, hotels, and large restaurants.

2) Banana

All banana plantations in Metro Davao are for exports and are transported to Davao City Seaport or Panabo City Seaport. Other banana plantations, like in Buluan, Wao, and Cotabato,

are for transporting containers to Davao Seaport. On the other hand, the study team was able to witness the reloading of bananas for export from the cold storage facility of Cagayan de Oro Seaport bound for Davao City, because of the non-availability of ships on that day. This means that some of the banana plantations in Northern Mindanao are shipping for export through Davao City Seaport.

3) Fruits

Davao City is the hub of all fruits in Mindanao. Most of the traders sell to wholesalers in Davao City, and they in return sell to a second trader for local destinations around Mindanao. For example, mangosteen and lanzones from Sulu and Basilan are shipped by container to a Davao City wholesaler from a trader in Zamboanga City, and then transported to all major cities in Northern and Southern Mindanao.

4) Seaweed

Seaweed farm production in the region is along the coastal area of Davao Gulf. The market for seaweed from this area is variable depending on the dictates of the buyers' price. The production of seaweed in this region has two markets, i.e., the wet market and the processing market. Wet market seaweed is for table salads. For processing, it is sent to processing plants either in Davao City, Zamboanga City or Cebu City.

5) Coconut

There are five coconut processing plants in Metro Davao. Four of these are engaged in coconut oil and one is engaged in desiccated coconut. Davao Oriental has the biggest planted area of coconut and the biggest volume source for copra in the Davao Region. However, according to staff of one of the oil processing plants, coconut players are increasing and sources are limited, so they have opted to cross the boundary into regions of other coconut processors in General Santos City and Cagayan de Oro City. Davao coconut oil processing plants can even get deliveries from Cotabato and Maguindanao provinces.

(7) Wao Municipality, ARMM

Wao Municipality is under the authority of the Province of Lanao del Sur in the ARMM. It is a fifth class municipality with a land area of 354 square kilometers, and it has a population of about 35,517 (NSO 2007), thus having an estimated density of 100 people per square kilometer.

The area is situated in a moderate climate attributed to its elevated location and is seldom visited by typhoons, which makes the area conducive to agricultural development. It is ranked in the

top ten rice areas for production, with an average area of 2,433 hectares. It is also a top producer of corn with estimated area of 31,253 hectares (JICA-DAF Comprehensive Basic Study of the ARMM, Agriculture Sector, 2003). Presently, some farmers are slowly diverting cultivation from corn to sugar cane and bananas due to these products high selling prices. The municipality is about 50-60 kilometers away from the sugar milling station in Crystal Sugar Mill in Maramag Municipality, and Bukidnon Sugar Company (BUSCO) in Quezon Municipality, both in the Province of Bukidnon.

On the other hand, many corn farmers sell corn to traders/wholesalers in Wao Municipality or in the adjacent Municipalities of Kalilangan and Pangantucan. Then, these traders/wholesalers deliver the corn to the corn flour mill in Valencia City.

The shipments of agricultural processed products are often done through the seaport of Cagayan de Oro City (CDO) for domestic and export destinations. However, if no ships arrive in CDO, cargo transports are diverted to Davao City or Gen Santos City seaports.

Presently, Wao Municipality is accessible over a good concrete road from Valencia City and Maramag Municipality passing by Pangantucan and Kalilangan Municipalities of Bukidnon. Though Wao is part of Lanao del Sur Province, there is no passable road connecting Wao and the capital City of Marawi.

(8) Buluan Municipality, ARMM

Buluan Municipality is under the authority of the Province of Maguindanao. It has an area of 343.3 square kilometers with an estimated population of 32,310, having a population density of 94 people per square kilometer. It is known for Lake Buluan, from which its name was taken. The lake has an area of 6,300 hectares, shared by the three municipalities of Quirino and Lutayan in the Province of Sultan Kudarat, and Buluan Municipality. The lake stays fresh due to the constant recharge flow from the Allah River, and it has a wide watershed or catchment area covering part of the Province of Sultan Kudarat and Koronadal City of South Cotabato Province.

Lake Buluan is famous for its fresh water fish like native tilapia, mudfish, catfish, and other native species. At present, in the neighboring Municipality of Lutayan, hybrid tilapia is being grown by a few cage fish farmers. It had been shipped to Metro Manila. However, these exports stalled due to the unstable demand and the competing supply in nearby towns in Metro Manila. Now, the focus is on the high demand of tilapia in local markets in the ARMM, Regions IX, X,

XI, and XII. Buluan is not keen on cage fish farming due to flooding in the area during the rainy season and the lack of financial capability for the required facilities.

Buluan Municipality has become active in Cavendish Banana production for export to the Middle East (Jeddah, Saudi Arabia and Iran), China, Singapore, Korea, and Japan by La Frutera Inc. Bananas are transported over land and shipped to overseas destinations passing through Davao City Seaport.

This town is also the place of the palm oil mill named Agumil Philippines Incorporated (API) with a design capacity of 30 tons per hour that started its operation in 2009 and can expand to 75 tons per hour. The plant requires about 15,000 hectares or more to maximize the capacity. At present, 7,500 hectares have been planted and of this 60% or 4,500 hectares are productive. API is encouraging small farmers to avail the benefits of having a palm tree farm. The management of API is extending its support to farmers/growers through institutionalization and guidance to have easy access to financial assistance from lending institutions.

At present, shipments of palm oil for processing either for export or domestic requirements are transported through Davao Seaport or General Santos Seaport due to the availability of foreign ships at berth in these two ports.

(9) Cotabato City, Region XII

Cotabato City is the regional center and the seat of the government of the ARMM[79]. However, the city is actually part of the Region XII or SOCCSKSARGEN region and does not belong to the ARMM. Cotabato is approximately 698.9 nautical miles (1,294 km) from Manila, and is bounded by the Sultan Kudarat Municipality, the ARMM, to the north - with Rio Grande de Mindanao separating the two - Kabuntalan Municipality, the ARMM to the east, and Datu Odin Sinsuat Municipality, the ARMM to the south. The city faces Illana Bay, part of the Moro Gulf, to the west. Geographically, the city is bounded by the largest river in Mindanao, known as Mindanao River or the “Rio Grande de Mindanao”. This river bifurcates a few kilometers upstream and has formed an island along the estuary of the Illana Bay of the Moro Gulf. Based on the history of the region, barter trading started along the river banks between the “people of the river banks” called Maguindanaoans and Chinese traders.

[79] Here is the origin of the name Cotabato: from the local dialect name for "*Kuta*," which means "Fort," and "*Bato*," which means "Stone," hence the name "Fort of Stone," which later on became Cotabato.

Today, Cotabato City is the trade center in Maguindanao Region, particularly for people from barangays along the river banks of the Mindanao River. The existing seaport was once visited by domestic and international sea vessels, but it is now used for local short-distance cargo-passenger sea transport due to the shallow draft caused by siltation along the river as the result of forest denudation. However, a proposed seaport is to be built away from the estuary of Mindanao River or along the Illana Bay at Timoca Hill where roadway construction is already ongoing. An air transport facility is located near the town of Datu Odin Sinsuat at Barangay Awang, but a business office is located in the city. Also, the seaport in Parang, Maguindanao, which was declared an open port, operated by the ARMM, supplements the cargo handling of the city, but on a longer span sea vessel docking schedule.

Some of the raw agricultural products come by land transport from the adjacent Provinces of Maguindanao, North Cotabato, Bukidnon, and part of Lanao del Sur, like vegetables, fruits, livestock, poultry, sugar, and others. Agri-industrial products come from major cities like Davao City and General Santos City by land transport, because of the available processing and milling plants in these regions. In addition, major cities have base seaport facilities where international and domestic sea vessels have a regular docking schedule. Among the dry goods that enter Cotabato City are cooking oil, spices, canned goods, soft drinks, beverages and alcohol drinks, garments, fuel and oil, and cement and other construction materials.

The only dilemma for most of the people from the Island Provinces, particularly for community leaders, is lack of direct transportation to the seat of the ARMM Government in this city. There is no available direct flight to Cotabato City from Tawi-Tawi, Sulu, and Basilan or available fast sea vessels. Good roads are available from Zamboanga City to Cotabato City, but it takes many hours of travel by land transport.

(10) General Santos City, Region XII

The site of a world-class Fish Port Complex has an area of 32 hectares with a 760-meter wharf quay type landing, a 725-meter wharf concrete stair landing, a 7,000 square meter refrigeration building, a 6,000 square meter fish market facility, and leased areas for processors, vendors, transporters, and other fish related activities. General Santos City (GSC) is known as the Tuna Capital of the Philippines. It accounts for the largest daily total of fish landings in the country and is the leading producer of sashimi-grade tuna for export to Japan, Europe, the USA, Korea, and other parts of the world.

General Santos City is bound by the three municipalities of Alabel, Maasim, and Malungon of the Sarangani Province and two municipalities of South Cotabato, namely Polomolok and T'boli. The city's economy is primarily based on agro-industrial. As a component of the SOCCSKSARGEN growth area, it has contributed much to the neighboring area's emergence as the country's agro-industrial center of major commodities due to its rich soil, good rainfall and typhoon-free climate. The area is the largest producer of corn, coconuts, copra, pineapples, asparagus and rice.

1) Fishing Port Complex

As of 2009, there are a total of 10,212 fishing vessel arrivals in the port with a monthly average of 851. These fishing vessels unloaded a total of 422,820 gross tons (GRT) of fish including tuna. The market distribution of fish is as follows.

- 60%: Mindanao
- 35%: Canning and Processing
- 1%: Visayas
- 1%: Export
- 3%: Luzon

Surprisingly, fish farmers from other provinces send the fish they catch to the GSC Fishing Port as a sales outlet or for auction. As surveyed, tuna caught as far as Palawan in Region IVb and Surigao Province is transported to the GSC. According to farmers, the price is reasonable for first class tuna. Other than this, milkfish from Digos City also send its harvest fish from fish cages to the GSC Fishing Port, because there is a guarantee of buyers at a reasonable selling cost.

2) Coconut Oil

Cargill Oil Mill Philippines is located in Barangay Tambler, and is a processing plant for coconut oil, coconut cake/meal for animal feeds, and coconut crude for such purposes as food additives, personal care, lubricants and grease, and medicine. The coconut raw materials are outsourced from Tawi-Tawi, Sulu, Basilan, Zamboanga Peninsula, Sarangani Province, Sultan Kudarat, South Cotabato, Davao del Sur, and Davao Oriental. They are also outsourced from Indonesia and Papua New Guinea.

3) Dried Fish and Fish Meal

The city is also known for its dried fish production. Most of the unacceptable-for-fresh-trading quality fish are sent for dried fish processing. Most of the market for dried fish is within Mindanao Island. Other dried varieties are processed further for fish meals.

4) Milkfish and Tilapia

The Alcantara Group in Aquaculture occupies 362 hectares of fishponds and 40 hectares of a finfish hatchery. This company also grows prawns, pompano, groupers, snappers, eels, and sea bass. At present, the hatchery can supply 1.0 billion of milkfish fry annually or about 40% of the total national requirement. In 2008, the breakdown of total production was as follows:

- 5,862 MT various fish species
- 4,879 MT milkfish
- 461 MT tilapia
- 281 MT pompano
- 187 MT shrimp and prawns

Most of the markets are on the institutional market and for Filipino communities abroad.

(11) Koronadal City, South Cotabato, Region XII

Koronadal City is the capital of South Cotabato Province and a component city of Region XII. The income of the city is derived from major agriculture products such as irrigated rice and corn. Other income derives from businesses established in the city. It is strategically located as a trading center and for the convergence of the three major cities of Kidapawan City and Tacurong City to northeast, Cotabato City to northwest, General Santos City to the south.

The city has a very dynamic economy. This is manifested by its four supermarkets, more than 15 banks, one public market, and about 30 small to medium size restaurants; universities and colleges.

(12) Carmen Municipality, Cotabato, Region XII

Carmen Municipality was classified as third class before the Malitubog-Maridagao Irrigation Project (MMIP) Stage 1 which was proposed to irrigate 10,840 hectares of land. After the project completion in 2003, most of the inhabitants have benefited from the irrigation and have started to plant rice.

It is also known for its clean and organized public market in North Cotabato. The major agricultural products of this town are corn, corn, rice, rubber, and sugar cane. It is bounded by Kabacan Municipality to the south, by Bukidnon Province to the north. It is bound by Pikit and Aleosan Municipalities, Cotabato, Pagalungan, Datu Montawal to the southwest, and Pulangui River to the east.

(13) Lutayan Municipality, Sultan Kudarat, Region XII

Lutayan Municipality has a population of 51,640 on a land area of 27 square kilometers with a density of 1,912 people per square kilometer. It has a vast lake area of 4.9 square kilometers, and 2.0 square kilometers or 40% have been developed into fish cages and aquaculture for tilapia. It is bounded by Maguindanao Province to the north, the Municipality of Columbio, Sultan Kudarat to the east, and South Cotabato Province to the south and west.

Tilapia was once transported to Metro Manila. However, after a few years, it was stopped due to the unstable demand and tight price competition from the nearby towns of Metro Manila, particularly from Laguna Lake.

Since then, tilapia fish has been distributed to all municipalities and cities in Region XII. The provincial local government unit established a tilapia nursery to sustain the demand of fish fry throughout the year. Residents in the municipality living around the lake fish outside the cages and get stray tilapia as a source of their livelihood. The municipality's major agricultural incomes are derived from irrigated rice, corn, inland fish (tilapia), sugar cane, and palm oil. Most of its agricultural products are disposed or sold to adjacent City of Koronadal as the only in and out of its town.

(14) Ozamis City, Misamis Occidental, Region X

Ozamiz City is bounded by Zamboanga del Sur and Zamboanga del Norte provinces on the west, by Tangub City and Panguil Bay on the south, by Oroquita City on the north, and Panguil bay on the east. It is a 45-minute drive from Oroquieta City, a 30-minute drive from Tangub City, a 20-minute drive from Tudela, a less-than-2-hour drive from Pagadian City, a 3-hour drive from Dipolog City, Dapitan city and a 4-hour drive to Cagayan de Oro City. Lanao del Norte is only a 20-minute ferry ride across Panguil Bay. Ozamis city is 52 km away from Maria Cristina Falls, the main source of hydroelectric power in Mindanao. Agriculture is a major economic activity in the city. 74% of its land area is devoted to agricultural use. Roughly 19,000 hectares are cropland, of which 81% are planted with coconut (14,500 hectares), corn (1,900 hectares), and palay (970 hectares).

The city has a dynamic economy. It has more than 15 banks and is recorded as the most peaceful place in Northern Mindanao, having no untoward incidents although Mindanao is noted for its skirmishes and kidnapping.

The place is a convergence of the agriculture trade from the provinces of Lanao Sur, Lanao del Norte, Zamboanga del Sur, and Zamboanga del Norte. This city can offer sea transport to Visayas as an alternate port of Dapitan and Cagayan de Oro. Though there is land transport connecting Lanao del Norte and Zamboanga del Sur passing through Aurora Municipality, commuters and traders can take a short cut by traveling via ferry or RORO between Iligan City and Ozamis City going to Oroquita City, Dapitan City, then on to Dipolog City.

CHAPTER 5 RESULTS OF POTENTIAL PRODUCTS SURVEY

5-1 Survey Methodology and Constraints

5-1-1 Survey Methodology

The Study conducted a potential products survey to obtain fundamental information and data regarding the production, production technology, processing, supply chain and marketability of each of the potential products in order to analyze the current situation of the agriculture, fisheries, and livestock in the ARMM region. The data and information were gathered and then utilized to prioritize products for action plan for local industry promotion.

The survey was conducted at selected Barangays and Municipalities for security reasons, in Maguindanao, Lanao del Sur, Basilan, Sulu and Tawi-Tawi provinces by subcontracted Filipino experts. The survey targeted mainly individual producers of the sub-sectors, cooperatives, processors, retailers and the like. Meanwhile, Japanese experts visited and interviewed key informants of enterprises, cooperatives and individual producers both inside and outside of the ARMM under the limitation of movement within the ARMM imposed due to security reasons.

In this chapter, after description of current situation of products, each product is evaluated based on the current situation viewing on production, production technology, processing, supply chain, and marketability. The situation of each viewpoint is then scored to quantify evaluation results, and the evaluation result of each product is visualized in radar chart form. The following scoring for the evaluation of each viewpoint is used. Moreover, at the end of the evaluation (results), prioritization was given to products finally selected for drawing action plan for local industry promotion.

(1) Production

On the aspect of production of target products, the current volume and scale of their production are evaluated for rating the scores. The following table indicates the reasons for rating the scores of current production status.

Table 5-1: Evaluation Standards of Production

Score	Evaluation Standards of Production
1	The production is very little in the ARMM
2	The production is a little, and only a few production cases exist in the ARMM.
3	The production cases are widely identified in the ARMM, but local product supply is not sufficient.
4	The production is enough to fulfill the local demand in the ARMM.
5	The production is enough to be supplied for outside markets.

(2) Production Technology

On the aspect of production technology of target products, the current level of production method, productivity and quality management are evaluated for rating the scores. The following table indicates the reasons for rating the scores of current status of production technology.

Table 5-2: Evaluation Standards of Production Technology

Score	Evaluation Standards of Production Technology
1	There is no production skill and it is too difficult to introduce production skill.
2	The level of production skill is still low; then the productivity is also low.
3	The standard production skill has been widely diffused; however, the quality of products is not cared well in the production.
4	The standard production skill has been widely diffused, and the quality of products is controlled/maintained in the production to some extent.
5	The high-level production skill has been diffused, and the quality of products is high.

(3) Processing

On the aspect of processing of target products, the current production status of processed products and the quality control of processing method are evaluated for rating the scores. The following table indicates the reasons for rating the scores of current processing status.

Table 5-3: Evaluation Standards of Processing

Score	Evaluation Standards of Processing
1	There is no case of product processing in the ARMM.
2	Some processing cases are found; but little processed products are diffused/consumed in the ARMM.
3	Processed products are widely made in the ARMM; however, the quality of processed products is not high, and only a little amount of processed products are consumed locally.
4	Processed products are widely made in the ARMM, and the quality of processed products is controlled/maintained. Processed products are mainly consumed locally.
5	Processed products have competitive edge in a domestic market. Processed products are mainly distributed to other areas outside of the ARMM.

(4) Supply Chain

On the aspect of supply chain of target products, the establishments of distribution network and infrastructure are evaluated for rating the scores. The following table indicates the standards for evaluating the scores of current status of supply chain.

Table 5-4: Evaluation Standards of Supply Chain

Rate	Evaluation Standard for Supply Chain
1	Little product is carried from production places.
2	The product is carried to/sold at local markets by local wholesalers/retailers.
3	The product is mainly carried to/sold at neighboring areas by local distributers/retailers.
4	The product is mainly carried to/sold at other markets or factories in Mindanao by local distributers.
5	The product is mainly carried to local markets and factories outside Mindanao.

(5) Marketability

On the aspect of marketability of target products, the current demand of the target products at local, domestic, and international markets are evaluated for rating the scores. The following table indicates tentative standards for evaluating the scores of current marketability status.

Table 5-5: Evaluation Standards of Marketability

Score	Evaluation Standards of Marketability
1	There is little demand of a product in local markets.
2	There is a high demand at local markets (only in the ARMM).
3	There is a high demand at local markets in Mindanao.
4	There is a high demand in domestic market.
5	There is a high demand in international market.

5-1-2 Constraints of Field Surveys for Product Potential Study

On the initial plan of the product potential study, a value-chain analysis was suggested as one of possible analyses or methods to evaluate collected data and information of field surveys. However, the field surveys faced serious difficulties in relevant data collection for value-chain analysis, especially detailed operational costs. According to the following restriction factors of the field surveys in the ARMM, it is considered that the value-chain analysis could not be properly made in the product potential study.

- Because the ARMM is still under a "conflict condition" at present, qualified and experienced Filipino consultants don't intend to enter any areas of the region. Moreover, many local people's mother tongue is not Tagalog and sometimes it is difficult to communicate with them in Tagalog. Consequently only ARMM originated personnel, who speak local languages, can work with the interview to gather data. Therefore, the study team had to entrust the subcontract field surveys to local NGOs or relevant organizations based in the region, even though those organizations don't have appropriate experiences and skills of relevant field surveys in agriculture, fisheries and livestock sectors.

- In the ARMM, few small-scale stakeholders (producers, processors and distributors) take their business record. Therefore, the local subcontractors could not collect sufficient field information to estimate their actual business operation in the survey. In order to compensate a shortage of field data and information in the subcontract survey, the study team implemented the additional interviews or meetings with local stakeholders at the

permitted entry places like Cotabato City, Zamboanga City and Iligan, and conducted the supplementary field surveys by local office staff at priority places and areas in the ARMM. However, it is still difficult to realize the detailed cost composition of business operation at respective value-chain stages in accordance with the collected information.

- In the ARMM, a fixed distribution route from production areas to market areas has not been well-established yet for most target products. It is because of very small production quantities for wholesaler collection and the unstable product supplies from production places. Under the unclear and unstable distribution circumstances and the difficulties in collecting cost oriented data, it is difficult to reflect properly the actual distribution situations by value-chain analysis in the ARMM.

In order to analyze the composition of economic values of target products properly as essential outputs of value-chain analysis, the detailed cost and profit data of business operation are necessary to be collected in actual value-chains from producers to retailers using the field survey. According to the concept of the value-chain analysis, the sub-contract field surveys were basically composed to collect proper economic value information of respective target products at respective value-chain stages, such as production, processing, distribution and market, by questionnaires and interviews. However, as mentioned above, the field surveys faced in difficulties especially to collect detailed cost and profit information.

5-2 Agriculture

In agriculture sector, 11 candidate products such as, abaca, bamboo, banana, cacao, cassava, coconut, coffee, mango, mangosteen, oil palm, and rubber were surveyed and analyzed in this chapter.

To select the 11 candidate products, three steps were undertaken. Firstly, listing up of candidates from previous studies, i.e., i) basic Survey on the Economic Development Report, and the ARMM Human Capacity Development Project, JICA, June 2008, ii) the Study of Local Industry in the ARMM during the JICA's Preliminary Study in November 2009, and iii) provincial profile of each province. Secondly, identifying products by stakeholders of various organizations that participated in the workshop held at 2nd and 3rd August 2010 during the Study. The listed candidate products from the said previous studies/documents and identified products in the workshop are then summarized in Table 5-6 and 5-7, respectively.

As seen from the tables, candidates are many; therefore, the criteria are set to select candidates from the products in the Tables to be surveyed and analyzed. The criteria are as follows:

- A product which is produced in the ARMM and can specify province.
- A product whose processed product can be produced by small scale producers and its value can be maintained in longer period.
- - A product which may target the overseas market and its processed products may be recognized and accepted in the overseas markets from a long term viewpoint as well.

Table 5-6: Candidates Crops in Agriculture Sector through Literature Review

Province	Source 1	Source 2			Source 3
		LGU	DTI and DAF	SMED	
Maguindanao	Coconut, Rice, Corn, Durian, Banana, Mango	Rice, Oil palm, Corn	Corn, Cassava, Banana, Rice, Coconut	Food processing, Fruit vending, Assorted retailing	Banana, Sugarcane, Coconut, Palm oil, Rubber, Jatropha, Coffee, Mango
Lanao del Sur	Cassava, Coconut, Palm oil, Corn	Abaca, Vegetable, Rice expansion	Feed making from corn, Bamboo, Rattan craft, Maranao delicacy, palapa	Rice, Corn, Cassava, Coconut	n.a.
Basilan	Rubber, Coconut, Cassava, Banana	Rubber semi-processing, Coco oil mill, Mini-flour production plant	Semi-processing plant, Coco oil mill, Solar dryer facilities, Non-irrigated farm land	Semi-processing plant, Coco oil processing plant, Mini-banana production plant	Coconut, Rice, Corn
Sulu	Durian, Mangosteen, Lanzones, Coconut, Abaca	Coffee, Cassava, Mangosteen, Durian	Coffee, Cassava, Mangosteen, Durian	No data	Coconut, Cassava, Abaca, Coffee, Rice, Corn Durian, Mangosteen, Lanzones, Citrus, Marang
Tawi-Tawi	Cassava	Cassava, Coconut, Fruits	Cassava, Coconut, Fruits	No data	Coconut, Cassava, Rice, Banana, Mango, Coffee

Source 1: Top five industries identified during local SMED plan harmonization activities and listed in the Basic Survey on Economic Development Report, ARMM Human Capacity Development Project, JICA, June 2008.

Source 2: Three most potential industries identified through interviewing conducted for the Study of Local Industry in the ARMM during the JICA's Preliminary Study in November 2009.

Source 3: Major crops indicated in the Provincial profile[80].

[80] Listed crops of Maguindanao province are crops which will be crafting of SME development plan industry and they are listed in the documents (output) of "Workshop on the Harmonization of the National and Local SME Development Plans", conducted 8 and 9 September 2006.

Table 5-7: Identified Products by Stakeholders during the Workshop

Province	Crops
Maguindanao	Rice, Corn, Coconut, Banana, Mango, Vegetables, Coffee, Oil Palm, Sugar cane, Rubber, Turmeric, Marang, Ginger, and Peanuts.
Lanao del Sur	Coconut, Cassava, Rice, Ginger, White Scallion, Corn, Vegetable, Abaca, Marang, Banana, and Pineapple.
Basilan	Rubber, Coconut, Coffee, Cacao, Abaca, Cassava, Lanzones, and Oranges.
Sulu	Coconut, Abaca, Coffee, Mangosteen, Durian, Lanzones, and Cassava.
Tawi-Tawi	Cassava, Banana, Mango, Fruits and Vegetables, Coconut, Coffee, and Turmeric.

Source: Workshop held on 2nd and 3rd August 2010 in the Study

Thirdly, the listed crops can be classified into cereal, cash crop, tuber crop, vegetable, and fruits. As for cereals, especially palay and corn as staple food may not be products for the context of local industry promotion but for food security improvement in rice-deficient Philippines. On top of that, their processed products such as rice and corn flour are merely supplemental material to process other products. Thus, cereals are not targeted in the Study. Vegetable is perishable and its processed product is limited; therefore, to maintain value of vegetable is not easy. As a consequence, some cash crops, tuber crops, and fruits are selected as candidate crops to be surveyed and analyzed.

5-2-1 **Abaca**

5-2-1-1 Background

Abaca or *Musa Textiles* is a species of banana native to the Philippines. The country is still supplying 85% of the world's demand for abaca, which is known overseas as Manila hemp. The bio fiber is a more environmentally friendly than synthetics and is considered the strongest among natural fibers. Thus, it is the one that has made the Philippines known all over the world. It is one of the most important and profitable agriculture exports of the country. Abaca is suited in a tropical climate and high to moderate precipitation areas like in the ARMM particularly Lanao del Sur and some part of the island province.

5-2-1-2 Current Situation

(1) Production

Abaca fibers are exported; meanwhile, they are also processed into the traditional costumes of the Philippines, jeans and national banknotes. More sophisticated creative products such as furniture, bags, and handicrafts are also available in metro Manila. However, the ARMM has no manufacturers using abaca fibers. Meanwhile, the high quality of Philippine abaca fiber is welcomed by traders. Good abaca fiber should be whitish, fine, strong and glossy, though the color of the fiber ranges from ivory white to light and dark. The fibers are classified into four official standard grades: S2, I G and JK.

There are 48 major abaca producing provinces and the ARMM is among the top ten producers, contributing 7.3% to the total production in the country as shown in Table 5-8. Lanao del Sur and Sulu are the two top producers in the ARMM.

Table 5-8: Production of Abaca (tons)

	2005	2006	2007	2008	2009
Philippines	74,014	69,802	66,437	68,386	65,825
ARMM	4,480	4,602	4,638	4,779	4,781
Maguindanao	102	62	61	56	54
Lanao del Sur	2,048	1,732	1,737	1,747	1,770
Basilan	0	2	61	64	65
Sulu	2,329	2,803	2,777	2,910	2,891
Tawi-Tawi	1	1	2	2	2

Source: BAS (2010)

Recent statistics from the Department of Agriculture and Fishery-ARMM (Hereinafter called DAF) provides a glimpse into abaca cultivation in Lanao del Sur. It is estimated that an aggregate area of 6,600 ha is devoted to abaca production. Abaca production is most active in 20 municipalities of the province: Butig, Lumbatan, Lumbayanague, Bayang, Sultan Dumalongdong, Lumbac a Unayan, Tubaran, Pagayawan, Binidayan, Pualas, Madamba, Madalum, Calanogas, Malabang, Balabagan, Kapatagan, Kapai, Balindong, Marogong, and Tubaran[81].

The Fiber Industry Development Authority (FIDA) indicates that the yield of abaca varies depending on the variety. FIDA also notes that there is a yield of 1.59 ton/ha for Tangongon and 1.72 ton/ha for Bongolanon which can be obtained in Mindanao[82]. According to the Municipal Agricultural Office of Kapatagan municipality of Lanao del Sur[83], the yield of abaca fiber is approximately 3.6 ton/ha in total when it is harvested twice a year; thus, 1.8 ton/ha. Kapatagan municipality used to produce the largest volume of abaca in the province 25 years ago; however, the production and cultivation area of abaca has decreased, mainly due to the spread of the mosaic disease transmitted from commercial banana plantation.

Moreover, interviewees in Lanao del Sur disclosed the low productivity which they attributed to a variety of factors including the following: i) lack of access to low interest loans for capitalization has forced farmers to borrow from private lenders and/or traders with high monthly interest rates of 20%, ii) lack of technological intervention and skills for the proper farm management of abaca, iii) lack of government support on incentives, price regulations, and budget allocation for research, iv) lack of post-harvest equipment and facilities, such as mechanized strippers and storage, v) lack of marketing support, vi) poor access roads from communities to market centers and transportation, and vii) lack of price information. These problems have discouraged farmers from continuing abaca production[84].

In Sulu, abaca is grown in about 3,300 ha or 3.52% of Sulu's agricultural land. The leading municipalities of abaca cultivation are Indanan, Patikul, and Talipao. Some abaca is also grown in patches in Maimbung, Parang and Panglima Estino, as shown in Table 5-9. The average yield of abaca in Sulu is 560kg/ha, which is significantly lower than the national average of 850 kg/ha. It is mostly shipped to Zamboanga City, Cebu and Metro Manila.

[81] Potential Products Study Report, Lanao del Sur, Maranao People Development Center, Inc., 2010.
[82] Technoguide on ABACA, Musa Textiles Nee, Fiber Industry Development Authority (FIDA).
[83] Interview with Mayor's office, Kapatagan Municipality, Lanao del Sur province.
[84] Potential Products Study Report, Lanao del Sur, Maranao People Development Center, Inc., 2010.

Table 5-9: Cultivated Area of Abaca in Sulu (ha)

Municipality	Cultivated area (ha) of abaca
Indanan	1,867.5
Maimbung	95.0
Panglima Estino	6.5
Parang	13.0
Patikul	1,158.0
Talipao	193.0
Total	3,333.0

Source: Sulu Provincial Development and Physical Framework

(2) Production Technology

The cultivation method of abaca is less complicated than annual crops. However, a two-year grace period is needed until the first harvest. Abaca is perennial. It can be harvested continuously for about 50 years since the root stock emerges beside the original plant.

One of the cooperatives in Lanao del Sur has 45 members and started abaca cultivation in 2008. It expects its first harvest in 2011 with a continuous harvest every four months. The cultivation method applied is illustrated in the Box 5-1.

Box 5-1: Abaca Cultivation by a Multi-Purpose Cooperative in Lanao del Sur

The 45 members, made up of farmers, public servants and business people, started abaca cultivation in 2008. Here are the reasons: i) there are no pigs or monkeys that eat abaca plants there, ii) abaca can be harvested for 50 consecutive years, and iii) the climate and rainfall there is suited to abaca cultivation. The current total cultivated area is 9 ha. The following is the farm work sequence with inputs.

i) Land preparation: the mountain is cleared, similar to slash and burn farming
ii) Seedlings: sucker (planting material) at Php 15/seedling
iii) Planting: there is a planting density of 3m x 3m with a 30cm-deep hole
iv) Fertilizer application: no fertilizer is applied
v) Pest and disease control: no chemicals are sprayed
vi) Weed control: manual weeding takes place every two months
vii) Harvesting: manual harvest expected January 2011
viii) Drying: solar drying
ix) Extraction: mechanical stripper made in the Philippines at a cost of Php 150,000, bought at Cagayan de Oro, as recommended by the FIDA during the training

The members expect a yield of 1.25 ton/ha and will transport the fibers to Iligan city, 70km away from Barangay Tambo. Transportation cost is around Php 5,000 to haul 4 tons one way. The selling price would be Php 32/kg. There is a buyer in Iligan, 2 buyers in Cagayan de Oro, and some in Davao city. The products will then be exported to the USA, the Middle East, and the EU.

Source: Interview with Fajron Jadeed, Multi-Purpose Cooperative

(3) Processing

In Lanao del Sur, fiber handicraft industry even at cottage level is hardly observed; however, there are some examples to show potential of fiber craft industry outside of the ARMM. One example of the processor is named Puyô Handicrafts in Cagayan de Oro.

Weaving has been traditionally practiced by *Higaonon* tribe before the entry of settlers in Mindanao. Weaving abaca fiber is a popular livelihood in the hinterland of Bukidnon. Meanwhile, Puyô Handicraft converts the weaving into bags, convention kits, home decors, Christmas decors and many more.

It employs handicraft makers and sewers coming from "urban poor" area in Cagayan de Oro City. Puyô Handicraft has established buyers. It joined regional and national trade fair and once shipped fiber craft products to the USA. Today, it tries to improve the quality of its products with new design to attract buyers abroad. Thus, the impact of Puyô's business was great to both the people in the hinterlands and urban poor women because of generated employment and income.

(4) Supply Chain

As shown in Table 5-10, although farm gate prices differ somewhat between Lanao del Sur and Sulu provinces, prices have risen slightly since 2005. In Lanao del Sur, the market margin for wholesalers ranges from 15% to 36%.

Table 5-10: Producers, Scale and Prices of Abaca in Lanao del Sur and in Sulu

	2005	2006	2007	2008	2009
Number of producers in Lanao del Sur	1,400	1,411	1,396	1,480	1,332
Farming areas in Lanao del Sur (ha)	2,409	2,411	2,450	3,160	6,600[85]
Wholesale price in Lanao del Sur (Php/kg)	37.16	35.67	34.82	45.05	36.34
Farm gate price in Lanao del Sur (Php/kg)	23.63	25.75	27.74	31.53	30.96
Farm gate price in Sulu (Php/kg)	14.46	25.71	30.66	46.85	36.81

Source: BAS (2009) for Lanao del Sur and Provincial Planning & Development Office and Municipal Planning & Development Coordinator for Sulu.

At the time of the Study, the wholesale price of abaca fiber was Php 40/kg in Lanao del Sur. In Lanao del Sur, it was noted that abaca fibers are transported from individual farms to local traders. The local traders sell them to big buyers in North Cotabato, Davao, Pagadian, and Cagayan de Oro. Some wholesalers assign brokers to coordinate with the producers in marketing of their products. There are no firm engaged in fiber finished product and by-products in the province. Fibers are all conveyed to places outside of the province. Table 5-11 shows the value chain of fibers produced in Lanao del Sur for export.

[85] Farming areas increased drastically; it is likely to be due to increment of wholesale price from Php 34.82/kg in 2007 to 45.05/kg. Farmer have seen incentive to cultivate more abaca in 2009.

Table 5-11: Value Chain of Abaca Fibers Produced in Lanao del Sur for Export

	FIDA & Inputs Suppliers	Farmers & Cooperatives	Barangay or Town Traders	Grading & Baling Establishments (Lanao del Norte)
Product	• Technology • Inputs • Planting material	• Fibers • All-in basis	• Fibers • All-in basis or classified	• Fibers classified
Activities	• Technology dessimination • Input supply	• Cultivation • Stripping, drying and storing	• Collection • Buying, selling and partially grading • Partially bailing	• Grading, bailing and export (e.g.: NEW TECH PULP)
Price	• Selling price of sucker: Php 15.00 per seedling	• Farm gate price: Php 35.00–40.00 per kg	• Selling price: Php 60.00 per kg	• n.a
Scale	• n.a	• Productivity: 1.25ton/ha	• Handling Volume: 30-50 tons/mth/trader • Weight of bail: 62.5 kg/bales	• International markets: German, France, Japan
Main Issues	• Lack of capacity for dissemination of technology (FIDA)	• Limited supply of good varieties of planting materials • Lack of technical support • Poor access roads	• Inconsistent quality of fiber • Poor access roads • Far distance to access road	• n.a

The farmers interviewed in Lanao del Sur[86] complained of difficulties in moving the fibers from farm to market or trading centers. This is due to the poor maintenance of road networks within the municipalities and the whole province. Meanwhile, traders mentioned about the low and inconsistent quality of the abaca fibers produced in Lanao del Sur. The provincial focal person for abaca conveyed that the problem of low quality fiber can be addressed by supporting the producers in their production needs, and by providing the producers the necessary machines and equipment. Due to poor quality of planting material and lack of capacity to instruct abaca fibers, productivity is rather low.

Sulu's case is different. Farmers sell the raw materials, which are not stripped and dried, to the middlemen. The middlemen then decorticate fibers from the raw material and sell the fibers to local traders outside the ARMM, specifically in Zamboanga City as shown in Figure 5-1. Some farmers directly process abaca into dried fibers and sell them to local traders.

[86] Potential Products Study Report, Lanao del Sur, Maranao People Development Center, Inc., 2010.

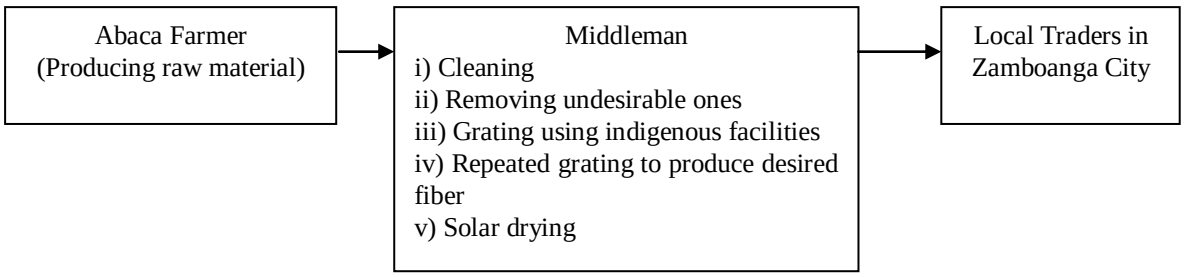


Figure 5-1: Supply Chain of Abaca Produced in Sulu

(5) Marketability

Three main uses of abaca fiber are: i) pulp for paper, banknotes, and tea bags, ii) cordage, and iii) fiber crafts like bags, carpets, clothing and furniture. According to the FIDA, the share of each of these in 2007 in the domestic market was 78.3%, 18.1% and 3.6%, respectively. Thus pulp manufacturers remained the biggest local market for abaca (FIDA 2008) (Table 5-12).

Table 5-12: Major Local Uses of Abaca Fibers

Sector	2006		2007	
	Volume (tons)	Share (%)	Volume (tons)	Share (%)
Pulp	33,304	80.9	30,312	78.3
Cordage	6,299	15.3	6,998	18.1
Fibercraft	1,589	3.9	1,410	3.6
Total	41,192	100.0	38,720	100.0

Source: FIDA (2008)

As shown in Figure 5-2, the major importers of abaca fibers in world trade are China, India, Indonesia, UK, USA and Japan. Japan is a big and stable buyer. Demand in Indonesia is growing, although the trade volume is still small. Demand from the UK has declined since 2001 though it dominates the share of the import market.

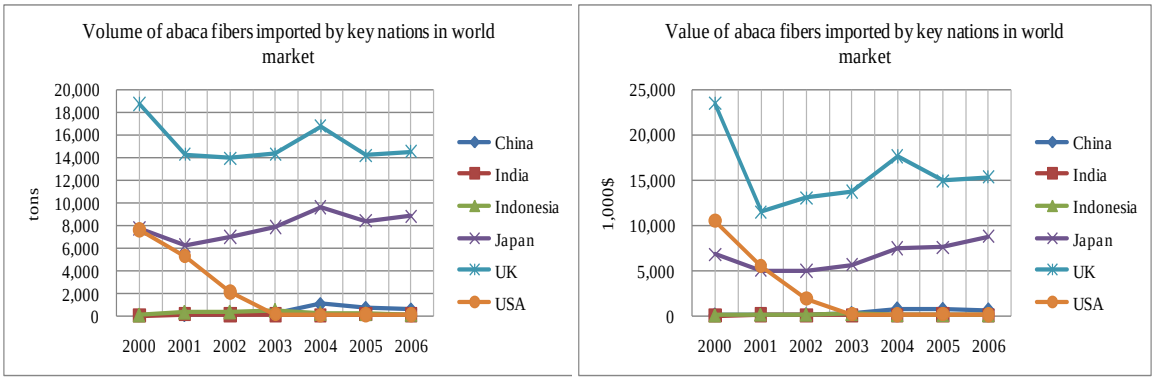


Figure 5-2: Volume and Value of Abaca Fibers Imported by Key Nations in World Trade
Source: FAOSTAT (2010)

Although export of abaca fibers from the Philippines declined, as shown in Figure 5-3 and production is not stable nationwide and in the ARMM as shown in Figure 5-4, there is stable demand because the markets in India, China and Eastern Europe have been opened for tea bags and meat casing. Cordage material is highly preferred over synthetic materials which are not environment friendly. Thus, there is a rapid growing demand for fibers for many purposes, and abaca has potential for export as well as domestic market. Meanwhile, an emerging competitor is Ecuador.

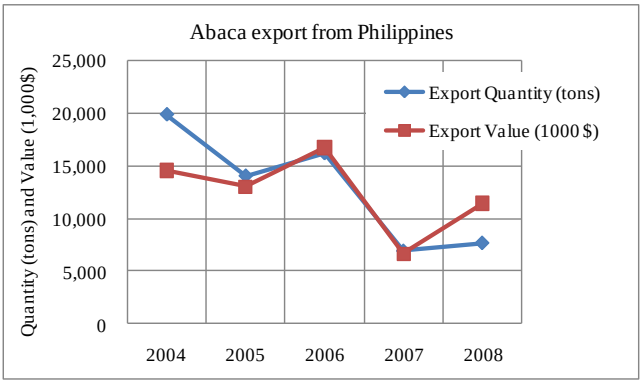


Figure 5-3: Abaca Export from the Philippines
Source: FAOSTAT (2010)

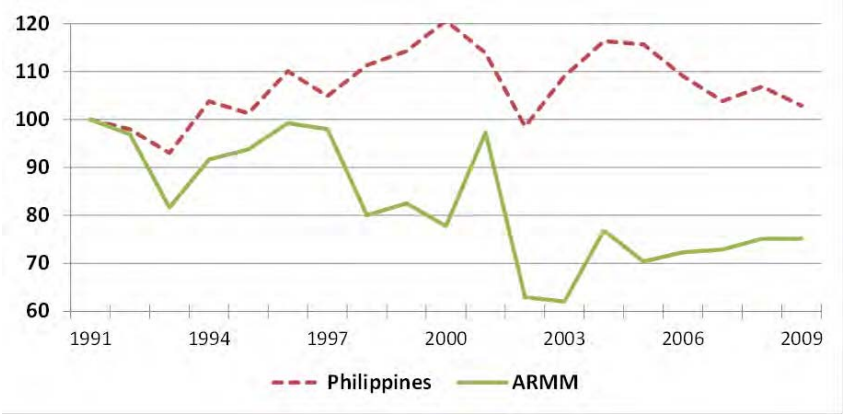


Figure 5-4: Total Amount of Abaca Production (1991=100)
Source: FAO, BAS

5-2-1-3 Main Issues and Constraints

Major production province for abaca in the ARMM is Lanao del Sur followed by Sulu so that issues of the product discussed here are based mainly on the situation of Lanao del Sur province.

(1) Low productivity

Farmers adopted low technology in growing abaca in the ARMM. Varieties used were low yielding and mixed. Some planting materials are sourced out from disease infected areas. Crop nutrient management relied on inherent fertility of the soil, without recycling farm waste into organic fertilizers or intercropping to enhance fertility. Growers often use improper tools in harvesting that may cause extreme damage to emerging suckers, thus affecting the growth of abaca and causing decline of production. Technology gap is primarily due to the lack of technical know-how of farmers on the proper farming practices and post-harvest handling.

(2) Low fiber quality

The abaca trunks are harvested and stocked or stored at the extraction area and extraction takes three-four days which usually changes the color of fibers resulting to low quality. Although fiber extraction machine exists, it is usually built and fixed near the growers' residence and far from their farm sites for security reasons against theft. This situation hinders immediate processing of abaca ribbons that causes discoloration and lowering of quality of fiber; thereby, lower buying price potential. In this case, a mobile type spindle stripping machine will be helpful.

Another factor for lowering quality is absence of drying facilities. During frequent rains, the growers keep their product in bulk in a small sheds wherever is available, resulting to

discoloration and deterioration of quality. With these situations, the quality is already hampered. The farmers are opting to loosen the pressure during extraction to produce more volume rather than quality fibers to obtain maximum sales.

(3) Absence of value added products processing

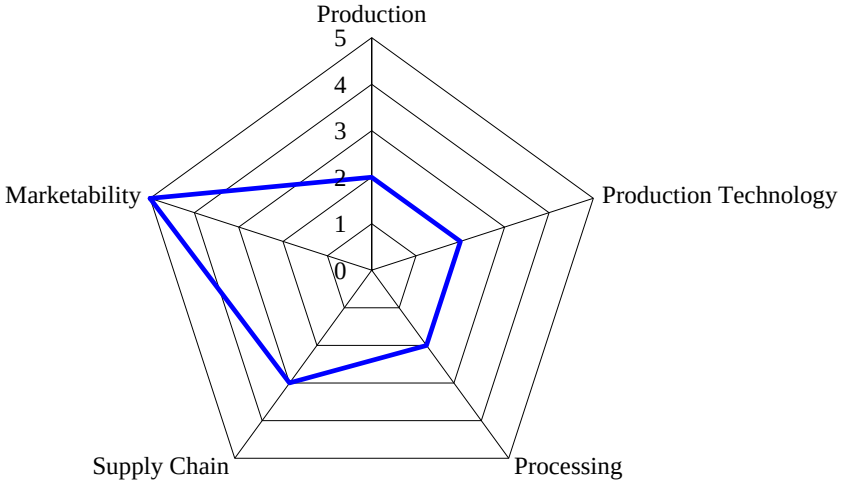
In spite of high demand of value added handcraft products developed nowadays in Mindanao, very few cottage based handicraft industry present in the ARMM. The distinct potential and creativeness of the unemployed and out-of-school youth women in the communities remained untapped. For instance, the color and designs of various abaca hand-woven cloth products of Mandaya and T'boli tribes among others, have unique distinction over other products in many parts of the country. This potential can create wide opportunities for people in abaca production areas of the ARMM for both domestic and abroad market.

(4) Lack of access to technical support

Farmers in the ARMM have limited access to constant technical assistance from FIDA in the area of production, post-harvest operation, handicraft processing, and marketing. FIDA Region-X is less capacitated to handle Lanao del Sur as their radiation areas with only seven personnel in the Region having multi-functions. LGUs through its local Agriculture Office are supposedly backing up technical assistance with FIDA, State Universities and Colleges through its extension arm; however, their extension activities are dull.

5-2-1-4 Evaluation

The abaca in the ARMM is evaluated based on existing situation as shown below.



Category	Score	Reasons for Evaluation
Production	2	ARMM contributes 7.3% to total production in the Philippines. Lanao del Sur and Sulu provinces are the two top producers in the ARMM.
Production Technology	2	Cultivation method of abaca seems not to be complicated like annual crops; however, quality is not consistent to required quality from traders due to lack of proper post harvest operation and tools and facilities. Moreover, yield of abaca fiber is about 1.8 ton/ha in Lanao del Sur and 560 kg/ha in Sulu province, which is low productivity. Quality planting material is required; but, farmers are less technically supported.
Processing	2	Abaca is processed into traditional costumes, jeans, national banknotes. Sophisticated creative products of handicrafts are also available in the country. However, handicraft industry is very limited in the ARMM. Handicraft industry in adjacent provinces outside of the ARMM to Lanao del Sur will be good references for cottage type processing. Technical support is also required for processing.
Supply Chain	3	Fibers in Lanao del Sur and Sulu provinces are conveyed to outside of the provinces. Access road and long distance between producers and traders are issues. In Lanao del Sur, licensed traders are less in number.
Marketability	5	The Philippines is supplying 85% of the world's demand. Major importers are China, India, Indonesia, UK, USA and Japan. Big and stable buyer is Japan. Market in India, China and Eastern Europe is opened for tea bags and meat casing. Cordage material is highly preferred over synthetic materials which are not environment friendly.

5-2-2 **Bamboo**

5-2-2-1 Background

Bamboo is the “Grass of Hope”. In the Philippines, bamboo has many diverse, functional and traditional uses. It underlies so much of Philippine culture. It is part of many ceremonies, traditions and beliefs. It is also used in many ways for food and food preparation. Bamboo containers are used to steam rice, the staple food of the Filipinos. Bamboo shoots are either cooked as food or pickled and are considered as a delicacy in many places. However, this aspect of bamboo utilization has not yet been developed as an industry. In agriculture, bamboo is used as props for banana and vegetables, baskets for packaging fruit, fish and vegetables, agricultural implements and construction of animal drawn carts for transporting farm products[87].

5-2-2-2 Current Situation

(1) Production

In the past, the bamboo production area would only have referred to bamboo that grew naturally in the forest and in "natural stands" on private lands. However, today, bamboo plantations have become dependable sources of raw materials for some segments of the bamboo industry. In Davao Provinces in Mindanao, thousands of hectares of lands have been planted with bamboo[88].

Though only limited numerical data on bamboo production in the ARMM exists, the estimated bamboo growing areas in each municipality of Lanao del Sur are available in Table 5-13.

[87] Philippine National Report on Bamboo and Rattan, Merlyn N. Rivera, Ecosystems Research and Development Bureau, Department of Environment and Natural Resources (DENR),College, Laguna, Philippines.
[88] Philippine National Report on Bamboo and Rattan, Merlyn N. Rivera, Ecosystems Research and Development Bureau, Department of Environment and Natural Resources (DENR),College, Laguna, Philippines.

Table 5-13: Estimated Bamboo Areas in Lanao del Sur

	Municipalities and Estimated Bamboo Area	Total Area (ha)
District 1	Busdi-Puso Buntong (5), Bubong (7), Bumbaran (10) Ditsaan Ramain (12), Kapai (16), Lumba Bayabao (9), Maguing (12) Marantao (10), Marawi city (17), Masiu (14), Mulondo (6) Piagapo (21), Poona Bayabao (7), Saguiaran (20), Tagoloan II (26) Tamparan (4), Taraka (8), Wao (6)	210
District 2	Bacolod Grande (9), Balabagan (7), Bailindong (30), Bayang (38) Butig (26), Calanogas (14), Ganassi (16), Kapatagan (10) Lumbaca Unayan (9), Lumbatan (25), Lumbayanague (30) Madalum (15), Madamba (13), Malabang (7), Marogong (10) Pagayawan (11), Picong (9), Pualas (12), S. Dumalondong (20) Tubaran (9), Tugaya (9)	338
Total		548

Source: DAF, Lanao del Sur Province (2010)

Note: The numerical value in parenthesis after name of municipality is area of bamboo in hectare.

According to the DAF of Lanao del Sur province, bamboo in Lanao del Sur is naturally grown. Therefore, the supply of raw materials is not a problem for the processing industry of bamboo. Moreover, the province has a unique culture, and theMaranao[89] are very skillful with handcrafts with a Muslim art design. The skill and design can be seen among homemade bamboo tools for local households; however, none of the bamboo product manufacturing plants are operated in the province[90]. Some furniture manufacturers in Iligan city receive their bamboo supplies from Lanao del Norte.

(2) Production Technology

Though bamboo, which is particularly cultivated for farming purpose, is hardly seen in the ARMM, cultivation technology is rather simple. The establishment of a bamboo plantation requires a minimal capital investment. Bamboo grows much more rapidly than trees. It also matures and develops stronger comparable to that of most wood species within three to five years.

As for harvesting, multiple harvests can be carried out every second year for about 120 years. Moreover, bamboo is easily intercropped with vegetables. It takes 3-5 years for a variety called

[89] People in Lanao del Sur is locally called Maranao.
[90] Interview with DAF, Lanao del Sur Province under Provincial Agricultural Office (National).

Apos, whose planting material is sold at Php 60-100, to be harvested and used as building material according to the Mindanao Baptist Rural Life Center (MBTLC) in Davao del Sur.

(3) Processing

Processing of bamboo is very limited as handicraft industry. Some small traditional instruments of Lanao del Sur are produced as souvenirs and displayed in Muslim shops in Davao city.

(4) Supply Chain

Some bamboo might have been supplied from Lanao del Sur to furniture manufacturers in Iligan city or other destinations. At ALDI BINCO, a Muslim community souvenir mall located in Davao City, one can find Maranao bamboo instruments which were uses as communication tool for people in old days. Thus, the instruments are conveyed from Lanao del Sur to Davao city by Muslim traders.

(5) Marketability

The quantitative demand for bamboo has not yet been figured out; however, Department of Trade and Industry-ARMM (Hereinafter called DTI) stressed that there are the following three dimensions to consider for promoting the bamboo industry: i) poverty mitigation, ii) climate change mitigation, and iii) disaster mitigation.

Bamboo can be used in agricultural production not only for food; it can also be processed into tools or materials for any aspect of the agricultural production. In addition, traditional or cultural products can be manufactured from bamboo. Thus, the wide variety of uses of bamboo ensures that the industry will contribute to income generation and the improvement in the livelihood of rural people.

As for climate change mitigation, it is said that a bamboo plantation of 1 ha sequestrates 12 tons of carbon dioxide every year. Disaster mitigation, or in other words, watershed management, will be partly helped by planting bamboo. This is because of four reasons: i) bamboo is effective in protecting riverbanks and hill slopes against soil erosion, ii) a bamboo plant typically binds 6 m^3 of soil, iii) planting bamboo increases the water holding capacity of mountains, and iv) bamboo forest produces about 50% or 0.70 ton/ha/year less sediments compared to a naturally mixed deciduous forest.

Thus, bamboo's market value and the impact of the industry can be appreciated for both the economy for local people and the external economy along with its multitude of functions in the

environment.

5-2-2-3 Main Issues and Constraints

(1) Uncertainty of potentiality of bamboo as handicraft industry

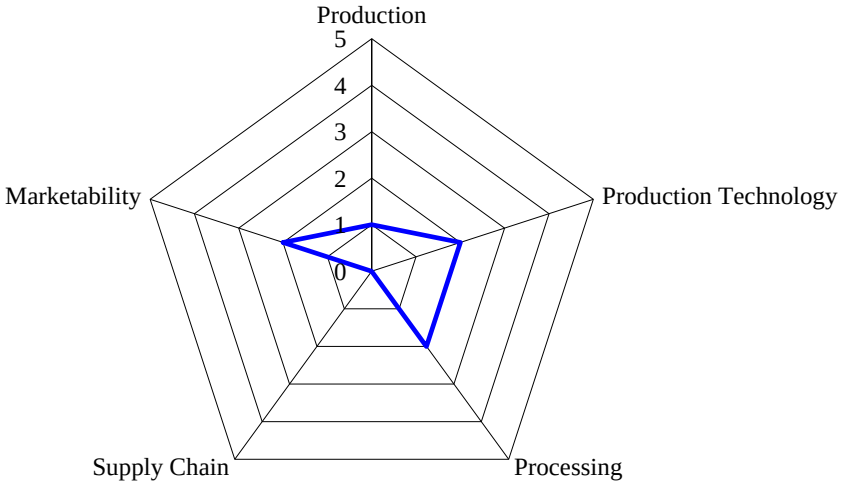
Although bamboo is seen in life of people or it is used for agricultural activities in the ARMM, advocacy on the bamboo industry is insignificant for promoting utilization of bamboo. Since the Maranao people in Lanao del Sur possess unique culture and Muslim design for cottage type processing work, bamboo should be tried if there is an opportunity for it to be handicraft products.

(2) No research and development

Bamboo is not a target crop by DA in the ARMM; as a consequence, statistical data of bamboo is limited. Research and development activities in the ARMM should be activated since the concept of bamboo industry development framework is exposed by DTI Manila.

5-2-2-4 Evaluation

The bamboo industry in the ARMM is evaluated as shown below based on the current situation as described above.



Category	Score	Reasons for Evaluation
Production	1	Limited numerical data in bamboo production in the ARMM exists.
Production Technology	2	Bamboo is naturally grown in Lanao del Sur where production data was available. In general, bamboo may easily be intercropped with vegetables.
Processing	2	Bamboo can be processed into tools or material to be used in any aspect of agricultural activities. However, only instruments made of bamboo and others are produced as souvenirs from Lanao del Sur in the ARMM. Research and development activities are required to see potentiality of bamboo for handicraft industry
Supply Chain	0	The industry is not well established; therefore, evaluation is difficult.
Marketability	2	Quantitative demand in bamboo is not figured out; however, there are three dimensions to consider when promoting bamboo industry. They are poverty mitigation, climate change mitigation, and disaster mitigation.

5-2-3 **Banana**

5-2-3-1 Background

Bananas (*Musa L.*) are the fourth largest fruit crop produced in the world. Banana is the leading fruit grown in the Philippines. It is the top hard currency earner among agricultural commodities. The industry is promising for both the domestic and international markets. The major world banana producers are India, Brazil, Ecuador, and China. In terms of the level and value of production, the Philippines is ranked fifth.

Banana production in the Philippines is already an established industry, attracting many foreign investors. Even in the ARMM, many investments have been made operational and they are already recognized as some of the most famous banana producers in the world. In Japan, the *Cavendish* variety, among others, with such brand names as "Chiquita", "Dole", "Del Monte" and "Gracio" is well known. Banana imports from the Philippines accounts for more than 90% of the total Japanese banana market.

5-2-3-2 Current Situation

(1) Production

Production in the Philippines has been increasing at 10.7% annually from 6,298,225 tons in 2005 to 9,013,186 tons in 2009, as shown in Table 5-14. Mindanao is the largest contributor to the banana industry of the country and Region XI has the largest share of production in Mindanao. The ARMM is ranked fourth. In the region, Maguindanao is the top producer with a 57.8% share or 220,670 tons, in 2009, followed by Lanao del Sur.

Table 5-14: Production of Bananas (ton)

	2005	2006	2007	2008	2009
Philippines	6,298,225	6,794,564	7,484,073	8,687,624	9,013,186
ARMM	374,970	371,994	372,676	373,486	381,745
Maguindanao	213,614	215,972	213,650	213,603	220,670
Lanao del Sur	113,953	108,412	108,219	107,689	107,766
Basilan	20,497	20,632	23,030	23,747	24,336
Sulu	17,630	17,640	18,419	19,167	19,665
Tawi-Tawi	9,275	9,338	9,358	9,280	9,308

Source: BAS (2010)

The crops can grow favorably given the agro-climatic conditions of Mindanao, including the ARMM. One problem in production is the presence of fungal diseases that infect banana fruits

and affect their taste. Caution needs to be taken when transporting the product. They should not be shaken excessively or subjected to too much shock; otherwise, the fruit will easily turn rotten. If possible, they should be sold immediately to avoid the problem of rotting. It will not last long when transported to places far away. The export industry of bananas has to be careful with handling and transportation.

(2) Production Technology

A hectare of a banana farm can produce 15-37 tons annually at a farm-gate value of Php 1,314,451 in five-year operation, against an investment of Php 482,671. This could potentially give an annual net operating income of Php 780,153 with a return on investment (ROI) of 161.63% a year. This clearly indicates the potential of the industry in generating substantial direct benefits to the farmers, investors and farm workers (Abrazado, A.F. 2006).

There are major varieties of banana grown in the Philippines. They are Bungulan, Lakatan, Latundan, Saba, Cavendish, and Quarenta Dias. For optimum growth of bananas, they need to have a monthly rainfall of 200-220mm distributed evenly and the temperature should be maintained between 15 and 35 degrees Celsius. Bananas are sensitive to strong wind so the typhoon-free zone of Mindanao is very suitable area to grow them[91]. They can be grown well with loam soil and good drainage and aeration in soil.

Bananas can be propagated by corms and suckers. Today, the development of the shoot-tip culture technology has made this possible. A wide range of planting densities are applied; 3-4, to 5-7 m in a square, triangle, or the quincunx system. Bananas are also intercropped with coconuts or cacao. Fertilization is indispensable for proper growth. Organic farming is practiced for export purposes in plantation firms; however, generating profit from it is difficult; therefore, less-chemical application farming is sometimes practiced[92].

One problem in production is the presence of fungal diseases that infect banana fruits and affect their taste. Bagging is a critical task to protect the banana bunches from pest damage and injuries and this hastens maturity, especially for exporting fresh products. The size of the wrapping bags varies with the size of the bunch.

Some banana brands sold in Japan indicate they have been produced “organically”. In fact, producers show a keen interest in producing ecologically viable products by applying organic

[91] Typhoon-belt areas are not suitable for banana production because wind velocity of 40-56km/h destroys banana crown.
[92] Interview with ALIP River Development Export-Corporation.

fertilizers and reducing the application of pesticides. Although some producers have already been certified by the "Rainforest Alliance" and given many other certificates for organic agriculture, the surveillance for the producers does not seem to have reached waste management. However, this is a very important area for the industry to sustain its operations.

(3) Processing

There is an example of banana plantation and packing house for export, located in Datu Paglas, Maguindanao, as shown in Figure 5-5.

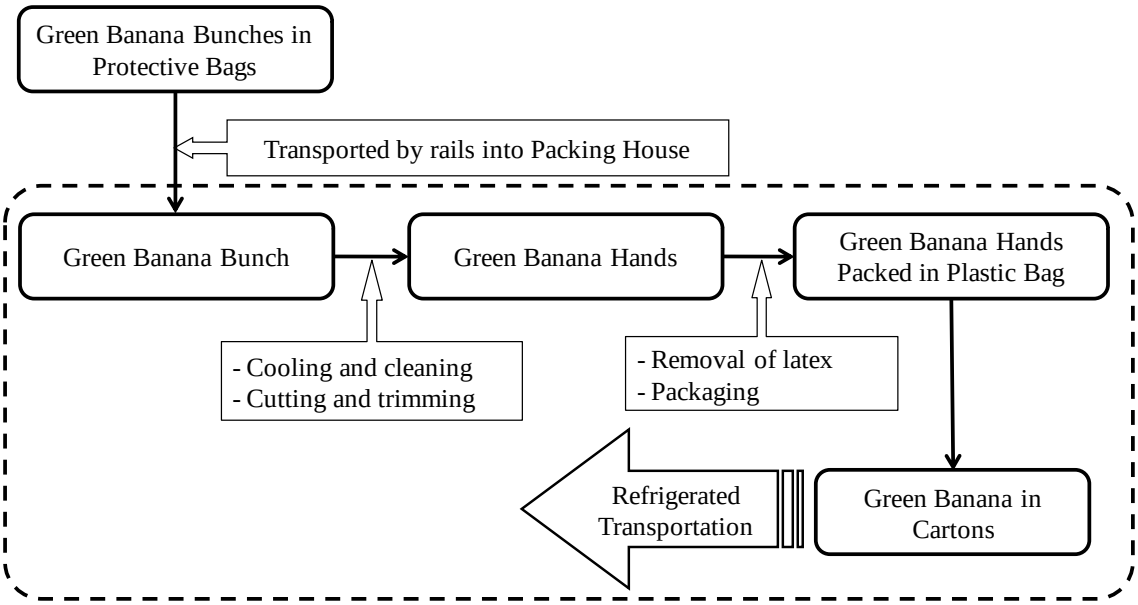


Figure 5-5: Banana Plantation and Packing House Located in Datu Paglas of Maguindanao

Fresh bananas require close attention and care from the time of flowering until they reach their final destination, the consumers. Since fresh bananas are targeted to markets outside the Philippines, regulations and codex must be observed by growers. For Japanese market, the growers are visited by a surveillance team to make sure they are only using the chemicals allowed by the Japanese authorities.

Furthermore, bananas are climacteric fruits. Thus ethylene known as a maturing hormone is produced when the fruit reaches a ripening stage and this is crucial for determining the shelf life of this type of fruit. Farmers and traders are keen to control the maturity of fruits after harvesting. This is achieved by lowering the temperature they are stored in to 13 °C, but not lower, and keeping control in order to reduce ethylene production. Although a lower temperature is desirable to delay the ripening process, if the temperature drops below 13 °C, it

will lead to chilling injuries, which cause the browning of the skin and thus, the banana loses its market values.

Besides, bananas are processed into chips, catsup, vinegar, puree, wine, jam jelly, flour and cakes. Most processors are at the household level in the ARMM. Usually, they are brought to nearby provinces or cities. Bananas, for instance, are either sliced into chips or packed. These are good for snacks. An indigenous variety known as *Saba* in the country is used mainly for processing traditional specialties, e.g. banana chips and sweetened banana, as shown in Figure 5-6.

This type of processing is mainly conducted by small-scale entrepreneurs who usually learn processing technologies from their relatives, not from formal training programs. Such entrepreneurs, therefore, need technical training on food safety and business skills through a formal channel, in order to raise their safety consciousness.

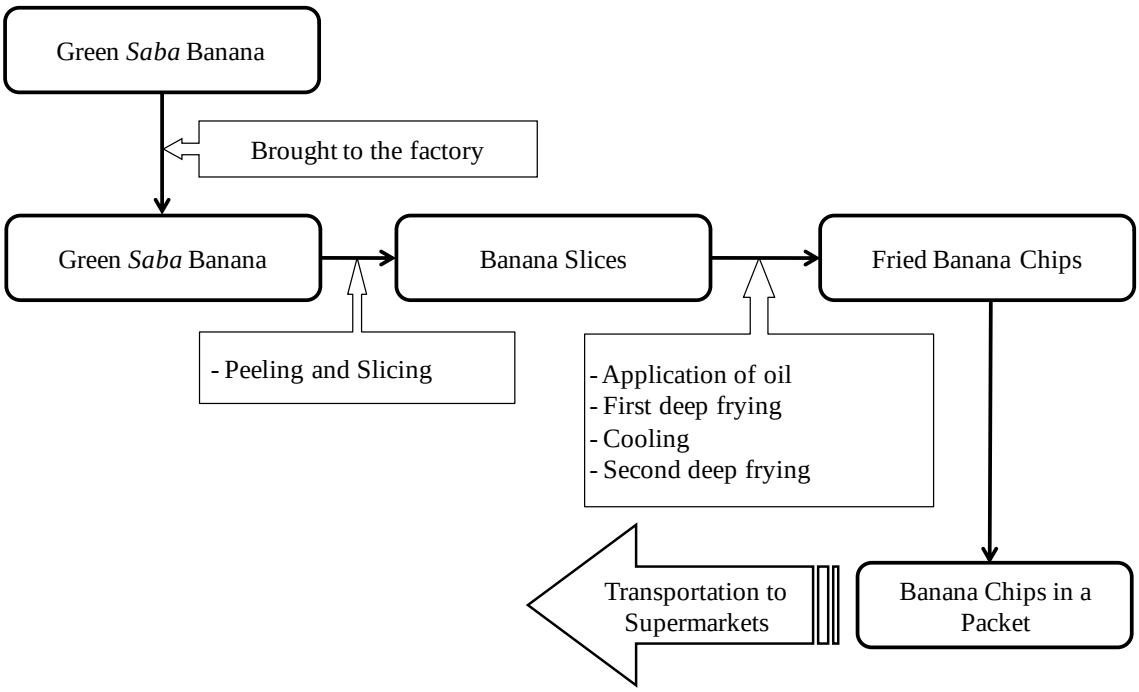


Figure 5-6: Flow Diagram of Processing of Banana Chips in Small-Scale Production

(4) Supply Chain

Figure 5-7 shows the typical local supply chain of bananas (Lakatan) produced in Maguindanao province from production to the end consumers and specified market. The middlemen collect the bananas directly from the banana farmers. These products are bought to them and then

transported directly to the processor in North Cotabato using the processor's vehicle. Table bananas, like Lakatan, are transported to the cities and sold to retailers. The variety of Cardava is sold by wholesalers in the market place which are then bought by entrepreneurs who fry the bananas.

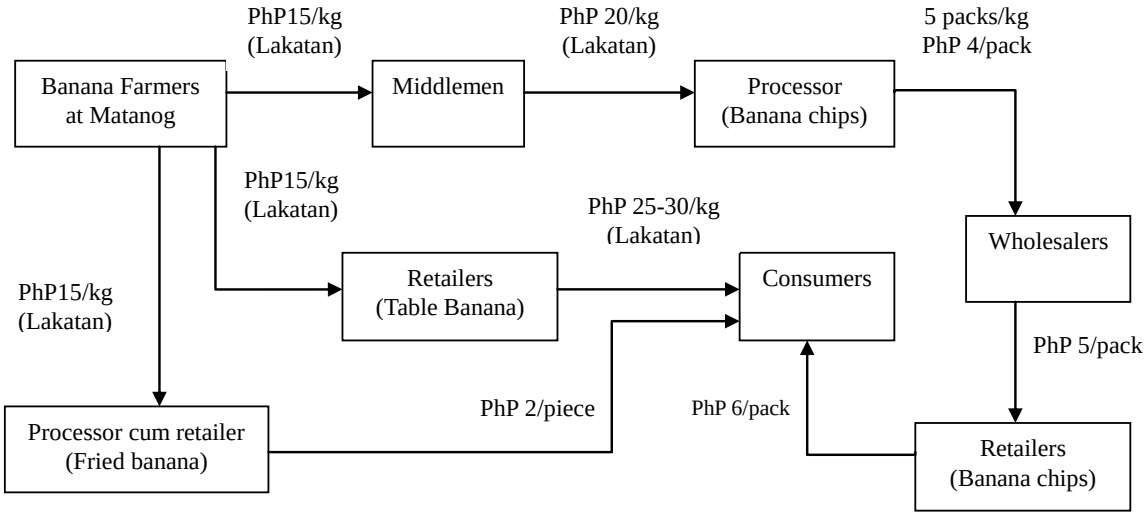


Figure 5-7: Supply Chain of Banana (Lakatan) from Matanog in Maguindanao

The delivered bananas are processed into banana chips or other finished products. Some small entrepreneurs buy bananas from the wholesalers in the market places and process them into fried bananas. Other processed products are catsup, vinegar, flour or cakes. These finished products are distributed to retailers and shopping malls all over the country. Meanwhile, some processed products are being sold along sidewalks or at cooking stands. Table bananas can be found hanging in small retail stores along the road or in the markets and sometimes in a stroll around the villages.

The following are four banana plantation firms in the ARMM, with the scale of cultivation ranging from 500 ha to some 1,000 ha, for export purposes: i) La Frutera Inc. in Buluan, Maguindanao; ii) Sugar Highland Organic Banana, Inc. in Wao, Lanao del Sur; iii) Mt. Kalatungan Agri Ventures Inc. in Bumbaran, Lanao del Sur; and iv) Alip River Development in Datu Paglas, Maguindanao.

One of the four companies' products, the fresh bananas of Cavendish (*Musa acuminate*, AAA) is exported mostly to Japan as shown in Figure 5-8, under sophisticated and strict quality control starting from cultivation, grading and packaging, and transportation to the destinations, which are being managed by Japanese trading firms.

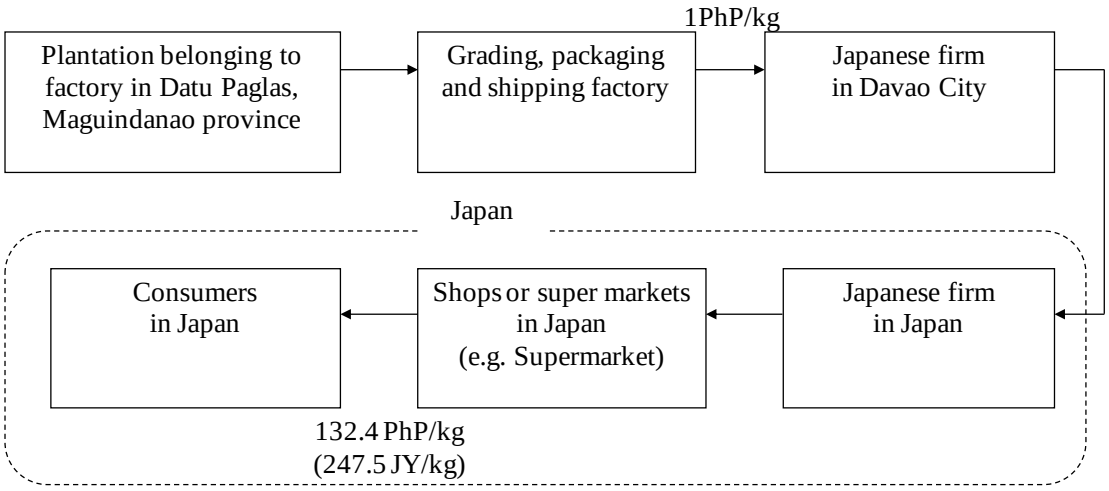


Figure 5-8: Supply Chain of Banana (Cavendish) from Maguindanao Province to Japan[93]

(5) Marketability

Cavendish bananas are exported overseas as mentioned earlier. The industry, especially for the export market, is already stable and well-established. A firm disclosed that it exports fresh Cavendish banana to the Middle East, Japan, China, Korea, Singapore and Hong Kong.

The Middle East is the biggest market, accounting for 50% of trade, followed by 40% to Japan. In particular, during the Ramadan period, the demand from the Middle East is high. When marketing to the Middle East, it is a plus factor for a company to be known that it is located in the ARMM area and is owned by a Muslim. One of the firms is interested in obtaining a Halal Certificate but is concerned that costs would increase[94]. The export market is well researched and marketing strategies are also well planned, especially by the Japanese firms instructing quality control to the Filipino plantation ventures.

The production and the market for export purposes are stable and even growing in the ARMM. According to the plantation farms, there are some reasons that the business on banana industry is growing. They are: i) management of the firms is healthy due to local leaders; ii) the area has been politically stable; iii) there is a strong commitment by the LGU; iv) good relationship among Muslims and Christians is maintained; iv) the people and community are supportive of the firm; and v) the climate, without typhoons, is suitable for banana production[95].

[93] Retail price at supermarket in Japan as example of Figure 5-8 is observed at Tsukuba city of Ibaraki prefecture, Japan.
[94] Interview with La Frutera.
[95] Interview with Mt. Kalatungan Agri Ventures Inc.

5-2-3-3 Main Issues and Constraints

(1) Unexpected use of pesticides

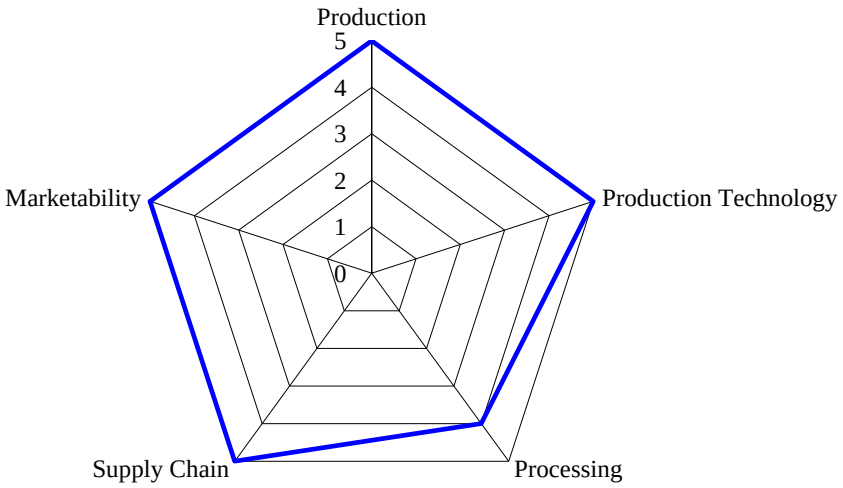
Ordinary farmers especially near big plantations of Cavendish banana are affected by pest diseases because pests from the big banana plantations migrate to their crops; thus, producers force them to utilize pesticides unexpectedly and it is additional cost for them.

(2) Theft of products

Banana plantations of Cardava and Saba banana experience fruits being stolen when they are almost harvesting stage because they are utilized especially for processing purposes.

5-2-3-4 Evaluation

Based on the above current situation described, current situation of banana in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	5	Mindanao is the largest contributor to the banana industry of the country and Region XI has the largest share of production in Mindanao. ARMM region ranks at 4th. In the region, Maguindanao province is the top producer with 57.8% share in 2009.
Production Technology	5	Cultivation technology is well established and disseminated. Some banana brands of Cavendish banana sold in Japan indicate they have been produced "organically". Producers show a keen interest in producing ecologically viable products. Some have already been certified by the "Rainforest Alliance" and given other certificates for organic agriculture.
Processing	4	Beside fresh banana sold to both domestic and international markets, they are processed into chips, catsup, vinegar, puree, wine, jam jelly, flour and cakes. Most processors are at the household levels in the ARMM.
Supply Chain	5	Distribution system is established and especially export channel is controlled by sophisticated technology to maintain quality of fresh banana.
Marketability	5	Cavendish banana is exported from ARMM to Japan, the Middle East and others. The industry especially for export market is already stable and well established. The Middle East is the biggest market, accounting for 50%, followed by 40% to Japan. In particular, during the Ramadan period, the demand from Middle East is high.

5-2-4 **Cacao**

5-2-4-1 Background

Cacao was first discovered in Mexico, then was introduced to the Philippines. The Filipinos in the late 1600's were the first in Asia to cultivate, prepare and enjoy this very exotic food that the whole world has learned to cherish. Cacao is actually a fruit and it is learned to be one of the healthiest fruits. Recent research studies have shown a link between cacao and cardiovascular health, with reduced risk of blood clots, strokes, and heart attacks. Cornell University food scientists discovered that cocoa powder has twice the antioxidants of red wine and three times the antioxidants of green tea (Quoted from Dr. Romulo, Director, the Philippine Industrial Crop Research Institute, USM).

Today, the Department Agriculture (DA) prioritized cacao as part of the commodities of High Value Commercial Crop Program because of its market potential and the thrust of the program. This is the official recognition that cacao has got for the Philippines as a crop of economic importance and with great expansion potential. The ARMM is not, of course, an exception to boost cacao industry although today's cacao production in the ARMM is very limited to certain provinces. Lamitan of Basilan province has been producing cacao. Nevertheless, there are potential areas of Type IV of Climate and Agro-Ecological Zones in the Philippines[96], which is suitable for cacao cultivation.

5-2-4-2 Current Situation

(1) Production

The Philippines used to produce some 35,000 tons of cacao beans. The decline in cacao production was triggered by the following factors: i) large scale plantations collapsed due to CARP reform, ii) large buyers withdrew from the industry, iii) farmers cut down cacao trees due to the lack of buyers, iv) cacao pod borer (CPB) hindered productivity of cacao, v) there was a steep rise in input cost, especially for fertilizers, vi) cacao trees were replaced with banana plants, and vii) the price of cacao dropped in the 1990s[97].

[96] Based on seasonal rainfall distribution, the four general types of climate in the Philippines are: Type 1-Two pronounced seasons, wet and dry, with maximum rain period from June to September and a dry season which lasts from 3 to 6 months, Type II-No dry season, with a very pronounced maximum rain period that occurs in December and January, Type III-Not very pronounced maximum rain period, with a short dry season lasting from 1 to 3 months, and Type IV-Rainfall more or less distributed throughout the year.

[97] Interview with ACDI/VOCA (NGO).

Mindanao is the cacao capital of the Philippines. The cacao area in Mindanao accounts for about 80% of the total planted area in the country. Davao is the biggest producing region, with half of the country's 10,000 ha of cacao trees located in the region. Meanwhile, Northern Mindanao and Zamboanga together account for approximately 10% of the total national production as they are historical places of cacao production. Therefore, the trees are older than in other parts of the nation. The ARMM only produces about 110 tons, which accounts for just 2.4% of total production in the country, as shown in Table 5-15.

Table 5-15: Production of Cacao (ton)

	2005	2006	2007	2008	2009
Philippines	5,679	5,415	5,237	5,149	5,134
ARMM	130	125	121	118	110
Maguindanao	5	4	3	3	3
Lanao del Sur	71	67	65	64	61
Basilan	4	4	4	4	4
Sulu	47	47	45	43	39
Tawi-Tawi	3	3	4	3	3

Source: BAS (2010)

(2) Production Technology

Very few cases found to produce cacao in the ARMM. A cooperative, namely Lamitan Agrarian Reform Beneficiaries Cooperative (LABECO) in Lamitan of Basilan province, is actively producing cacao beans. Its production flow and post-harvest operation is summarized in Figure 5-9. The cooperative produces 1,200 kg of dried fermented beans of cacao annually and gross sales from dried fermented beans was Php 120,000 at Php 100/kg of farm gate price in 2010.

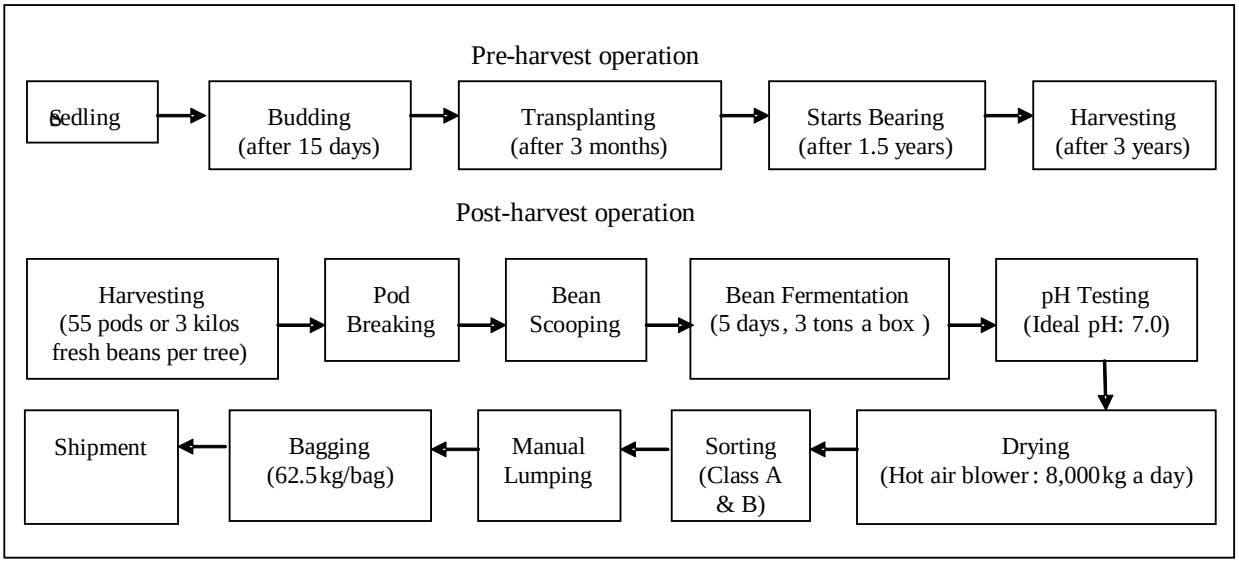


Figure 5-9: Pre- and Post-harvest Operation of Cacao Production by a Cooperative in Basilan

According to LARBECO Cacao Maintenance Supervisor, maintaining the cacao production area is laborious. This includes monthly weeding, topping and pruning, and spraying of pest control every other month. The cacao production in LARBECO started as early as 1990. Over the last 10 years, its volume of production has gradually decreased because of its laborious cultivation, high cost of maintenance and the rise of the rubber industry in the province.

The cacao pods are also being stricken by borers and being eaten by rats. In the early years of its production, the cooperative used complete fertilizers for their cacao trees. However, because of huge production area of 406 ha and high cost of fertilizers, the cooperative stopped spraying the trees.

Even in this situation, the management of the cooperative did not cut down the cacao trees, but instead, intercropped the 406 ha cacao production area with coconut trees (390 ha) and rubber trees (10 ha). It was only in 2008 that some of the trees that were planted 20 years back were rehabilitated with the assistance of the United States Department of Agriculture-funded SUCCESS Alliance Philippines Phase II program implemented by the Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA) and its partner, the Cocoa Foundation of the Philippines (CocoaPhil).

Looking at the Philippines as a whole, it is conservatively estimated that intercropping with cacao would produce 55,000 tons of cacao annually in 2020 in the Philippines[98]. The potential for intercropping is high. To achieve an annual production of 50,000 tons of cacao beans, 25 million seedlings of cacao must be planted because 2 kg of dried beans can be harvested from a tree annually. Thus, to re-vitalize cacao production in the nation, propagation of seedlings and their distribution program is inevitable[99]. However, the cost of a seedling of four months is Php 11 which is not cheaper for farmers to access. Top grafting technology will reduce the cost of seedling production.

Standard cacao cultivation method of intercropping cacao with other crops was disclosed by the University of Southern Mindanao[100]. This cultivation practice is illustrated in Box 5-2. During the pre-harvest operation, pest and disease control is important. The occurrence of pests and diseases can be minimized from 50% to 10% by i) covering young beans with bags, ii) pruning, and iii) chemical application[101].

[98] Interview with ACDI/VOCA (NGO).
[99] Interview with ACDI/VOCA (NGO).
[100] Interview with Philippines Industrial Crops Research Institute (PICRI), University of Southern Mindanao (USM).
[101] Interview with ACDI/VOCA (NGO).

Box 5-2: Cacao Beans Production Method

Standard cacao cultivation method under intercropping with coconut is as follows. Intercropping is recommended because cacao growth requires 25% shade.

i) Soil: Clay loam soil is preferable. Sandy loam is not appropriate.

ii) Climate: Annual rainfall ranging between 2,000 mm and 3,000 mm.

iii) Seedlings: Prepared seedlings at Php 20/seedling.

iv) Planting: 700 seedlings are planted under intercropping in 1ha. 1,101 seedlings under mono-cropping with 3m x 3m planting density.

v) Fertilization: 2 kg of NPK 14-14-14 as a basal dose for a tree in first year and 3-4 kg as a top dressing in the second year onwards are applied.

vi) Pest control: The beans are covered with plastic bags of 18cm x 30cm in size to protect them from CPB.

vii) Harvesting: The first harvest requires 2 years. It is harvested manually by knife. The first harvest will be 800 kg/ha, the maximum yield will be 2,500kg/ha from the fourth year onwards.

viii) Fermentation: The pod is cut and cacao seeds are extracted. Seeds are placed in 5 units of fermentation boxes containing 500 kg and the 1st-day fermentation process is performed and the first batch is transferred to second box for the 2nd-day fermentation process. Likewise, fermentation is performed until the 5th day. The temperature of forty-five degrees Celsius is maintained by covering the boxes with banana leaves or jute bags throughout the 5-day fermentation. The flavor of chocolate will not be developed from the cacao beans if the fermentation process is not applied; however, the fermentation process requires certain facilities.

ix) Drying: Drying is carried out by either solar drying, with the beans spread out on a concrete ground or by a mechanical dryer like a coconut copra dryer.

Expected high farm gate price of dried fermented beans is Php 100/kg in Davao city. Therefore, fermentation and drying are very critical processes to produce high quality beans.

Source: Philippines Industrial Crops Research Institute (PICRI), University of Southern Mindanao (USM).

ACDI/VOCA, that supports cacao producers in Mindanao, simulated a model of the profit and loss of cacao production under intercropping for a smallholder farmer. The simulation results are summarized in Table 5-16. According to the results, the net income from dried-fermented cacao beans in the 5th year from 1 ha of cacao intercropped with coconut is about Php 67,000.

Table 5-16: Simulated Model of the Profit and Loss of a Smallholder Farmer Planting 600 Trees of Cacao per ha with Coconut under Intercropping (Php/ha)

Item	1st year	2nd year	3rd year	4th year	5th year
Fixed cost for planting and establishment	14,100	900	-	-	-
Variable material cost for operation & maintenance	9,450	14,550	20,550	22,050	21,150
Variable labor cost for O&M	5,760	2,460	5,280	6,060	5,400
Subtotal	29,310	17,910	25,830	28,110	26,550
Harvesting and Post-harvest works and facilities	0	2,281	21,273	13,554	14,504
Total cost	29,310	20,191	47,103	41,664	41,054
Gross income at Php 100/kg of cacao	-	25,920	71,280	97,200	108,000
Net income	-29,310	5,729	24,177	55,536	66,946

Source: ACDI/VOCA (2010)

In the post-harvest operation, the fermentation and drying process is critical to determine quality of cacao beans because the farm gate price depends on how well the beans are treated after the harvest affecting aroma of chocolate, as shown in Table 5-17. The price is broken down by wet, dried and fermented, and dried and unfermented.

Table 5-17: Cacao Farm Gate Price (Php/kg)

Cacao Beans	Davao City	Davao del Sur	Davao del Norte	Davao Oriental
Wet	28-31	16-25	n.a.	13-15
Dried, fermented	100-110	75-110	n.a.	85-90
Dried, unfermented	90-100	55-70	50-100	90-95

Source: Cacao Watch, Vol. 1, No. 1, July-August 2010, ACDI/VOCA

However, there is no price difference on grades for dried and fermented beans in trading, although the cacao bean grade specifications were drafted by the Philippine National Standard for Cacao (PNS Cacao). The grade of the cacao bean, as shown in Table 5-18, is not always reflected in the price, due to the high demand of the dried and fermented beans in the domestic market.

Table 5-18: Cacao Bean Grade Specifications (Draft Format Version)

Grade	Beans count per 100g	Max allowable % moldy	Max allowable % slaty	Max allowable % insect damaged, germinated, or infested beans
1A	<=100	3	3	2.5
1B	101-120	3	3	2.5
2A	<=100	4	8	5
2B	101-120	4	8	5
Sub-standard	>120	>4	>8	>5
Bean waste should not exceed 1% for all samples.				

Source: Philippine National Standard for Cacao

(3) Processing

There are about 13 establishments engaged in cacao processing and confectionery/chocolate manufacturing. About seven firms have grinding facilities and the rest are engaged in manufacturing chocolate or cacao products like chocolate bars, cacao breakfast drinks and flavors. They are located in Metro Manila, Bulacan and Laguna.

However, there are no such establishments in the ARMM. It is possible to find some small-scale family business in Mindanao that processes cacao beans into *Tablea* with which one can make a cacao-like chocolate drink. This is the most traditional and commonly produced domestic chocolate product.

Kablon Farm Foods Corp, a family owned food processing enterprise in South Cotabato, which a neighbor province to the ARMM, produces approximately 17 tons cacao per year. Since it produces at a half of its potential productivity, it tries to improve its production through technical training offered by MARS affiliate on planting and processing. Processing technologies are very crucial and this firm is still under improvement for producing traditional confectionery, "*Tablea*"[102]. Post-harvest processing such as fermentation and drying affect the quality of final products[103].

(4) Supply Chain

Although only limited information could be obtained in the ARMM, one case of supply chain of a multipurpose cooperative in Lamitan of Basilan, which practices intercropping cacao with coconut and rubber on 400 ha plantation, was obtained as shown in Figure 5-10. This cooperative sells dried fermented cacao beans to a buyer in Manila at around Php 110-120/kg. According to the representative of the cooperative, the price of cacao beans usually remains high because of the regular deficit of supply to demand. Meanwhile, there are some buyers of cacao in Davao and Cagayan de Oro.

[102] Marco Arlorio, M., et al., 2008, "Roasting impact on the contents of clovamide and the antioxidant activity of cocoa beans", Food Chemistry, 106, 967-975.
[103] E.I. Adeyeye, et. al., 2010, "Effect of farm and industrial processing on the amino acid profile of cocoa beans", Food Chemistry, 118, 357-363.

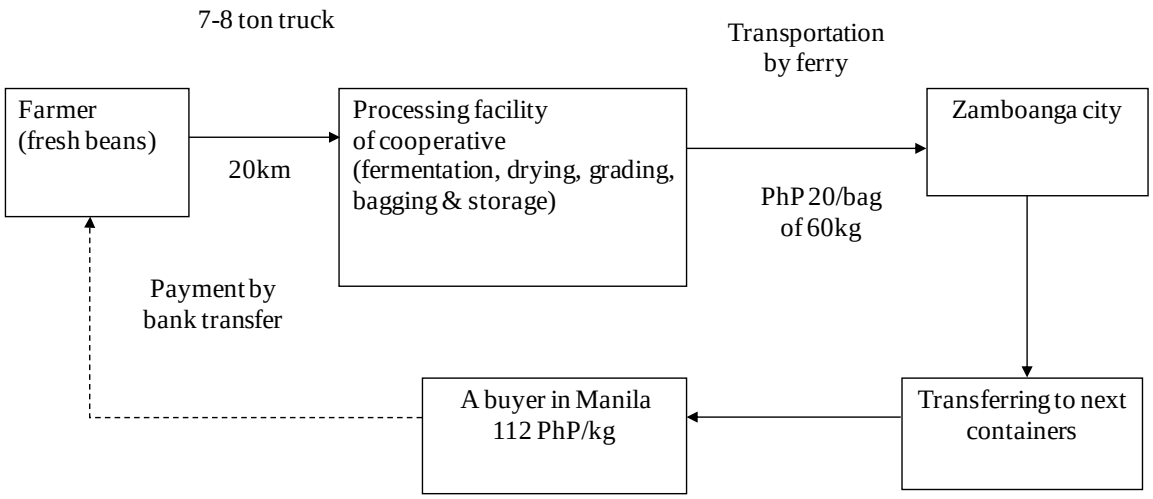


Figure 5-10: Supply Chain of Cacao Produced by a Cooperative in Lamitan of Basilan Province

Post-harvest operation is very critical so that the cooperative utilizes a sorting machine powered by an 18PS[104] diesel engine to discard low quality beans. The proportion of grade-A beans is 60%. The cooperative is facing transportation problem. The ferry bound for Zamboanga city from Basilan is not sometimes well arranged to transport the products as scheduled. Hence, re-arrangement of shipment is required.

Moreover, it is difficult for farmers to use the 55 km long access roads in the cacao plantation during rainy season; thus, the cooperative has to hire heavy civil machinery, such as graders and bulldozers from the municipality[105] to maintain the road.

Situation of value chain of cacao produced by members of Subasta Multipurpose Cooperative (MPC) located in Calinan district of Davao city is provided in Table 5-19 although it is not an example of the ARMM: however, the example will give some aspects on cacao value chain.

[104] Horsepower.
[105] Interview with Lamitan Agrarian Reform Beneficiaries Multi-Purpose Cooperative, Basilan province.

Table 5-19: Value Chain of Cacao Produced by Members of Subasta MPC, Davao

Actor	ACDI VOCA & MARS	Farmers (Members of Subasta MPC)	Subasta MPC	Buying Station or Processors
Product	• Technology • Inputs • Planting material	• Wet cacao beans • Fermented dried beans	• Fermented dried beans	• Fermented dried beans
Place	• Calinan District, Davao City	• Calinan District, Davao City	• Calinan District, Davao City	• Confectioners (Manila, Davao, Cebu)
Activities	• Nursery Technology • Quality fermentation • Production advocacy	• Cultivation • Harvesting • Fermentation • Storage • Marketing	• Buying wet beans • Quality fermentation • Storage • Marketing	• Storage & quality control • Local marketing • Export to Malaysia and USA
Price	• Seedling pick up price: Php 25.00	• Farm gate price: Php 60.00–70.00 /kg for wet beans	• Selling price: Php 120.00 per kg for fermented dried beans	• Shpping price from domestic to, Malaysia & USA: Php 120.00–130.00 per kg
Cost	• n.a	• Prodcution cost: Php 35,000/ha open field (1,100 trees for open field)	• Jute sack price for 65 kg of dried beans: Php 110.00	• n.a
Scale	• n.a	• Production: about 100 ton a year	• n.a	• n.a
Issues	• n.a	• Low production due to wait and see attitude of farmers • Fertilization and pest management	• Quality fermentation	• n.a

The MPC buys wet cacao beans from members and non-member farmers at 60-70 Php/kg and performs post-harvest operation such as fermentation, drying, sorting, and storing. The dried fermented beans can be sold at 120 Php/kg to next buyer. Post-harvest processing is very critical to selling price because if the process is not well done, the aroma of chocolate is not created affecting to the selling price.

Some problems at producers level is of low productivity due to farmers' attitude towards farming activities expressed "wait-and-see attitude" and improper pest management which is disturbance by pod borer. It can be controlled by covering a pod when it is small with transparent vinyl bag as recommended by MARS Cocoa Development Center.

(5) Marketability

The cacao industry has a great opportunity to grow by filling the gap between the domestic production of about 6,000 tons and the annual demand of 30,000 tons. As for the South East Asian region, a total of 650,000 tons of cacao is processed annually; but only 400,000 tons of cacao is supplied by the region itself. The rest is supplied from West Africa, i.e., Cote d'Ivoire and Ghana. As a matter of fact, approximately 69% of the world's projected 3,597,000 tons of cacao beans production for 2009/2010 comes from West Africa. Next is Indonesia which is the third largest provider of cacao to the world market[106].

The supply and demand in the world market of cacao beans has been characterized by period of sharp rises and falls in production and demand, as shown in Figure 5-11. During the last 20 years, the International Cocoa Organization (ICCO) average daily price ranged between US$ 774/ton and US$ 3,637/ton. The price peaked in 2009/10, resulting partly from a high deficit. As world market prices in real terms were 86% higher in 2009/10 than 2000/01, the real farm gate price increased in all producing countries.

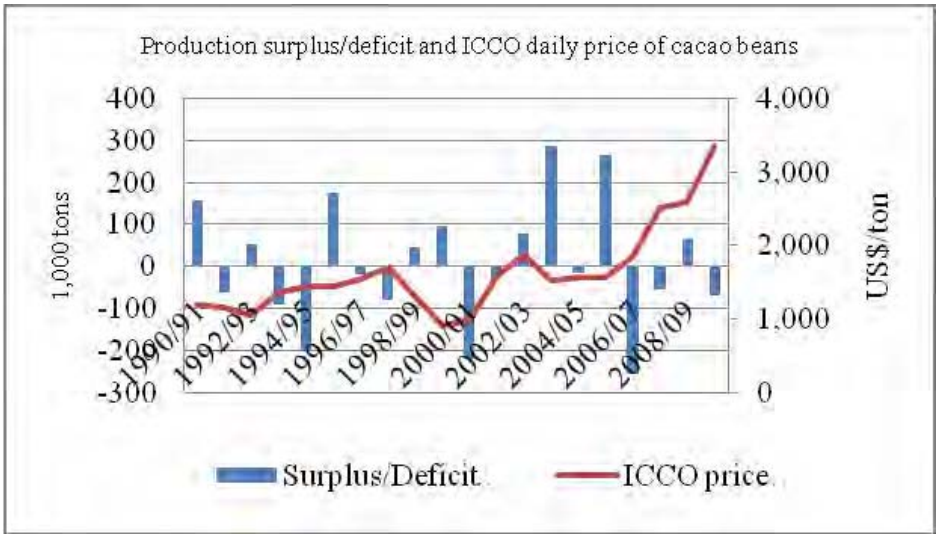


Figure 5-11: Production Surplus and Deficit and the ICCO Daily Price of Cacao Beans
Source: ICCO (2010)

Although large fluctuation in international market trend can be observed, the demand remained at high, especially in the recent years as shown in Figure 5-12[107]. The Philippines is not yet a

[106] CoCoPal Value Chain Analysis, A Systematic Overview of the Coconut, Rice and Cacao Value Chains in Mindanao to Design USDA CoCoPal Program Recommendations, ACDI/VOCA, 2010.
[107] Increase of production from 2002 to 2003 in the ARMM is due to increase of production especially in Lanao del Sur province and the province's production decrease also affected the decrease of cacao production in ARMM since

main supplier of cacao in the world; therefore, producers in the ARMM may be encouraged to produce more and improve productivity.

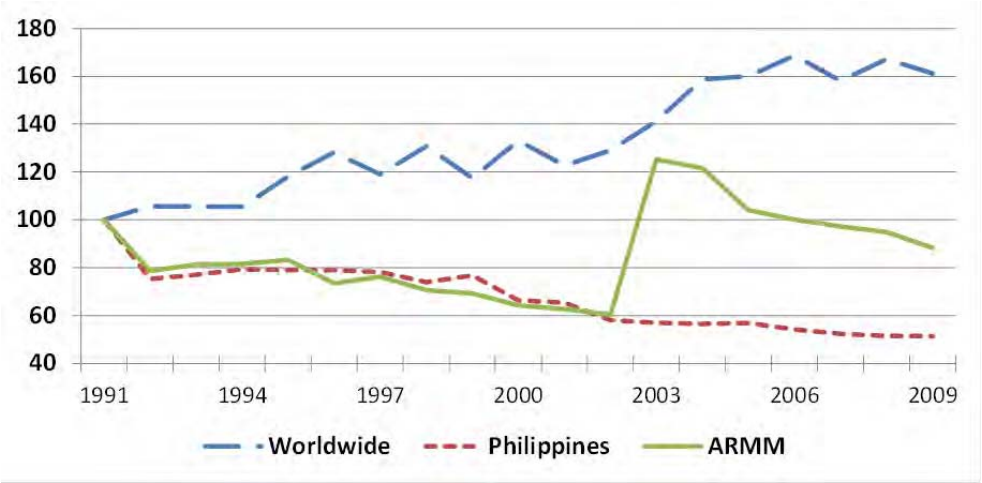


Figure 5-12: Total Amount of Cacao Production (1991=100)
Source: FAO, BAS

Cacao processing activities generally followed an upward trend, growing on average by 2.4% per annum during the period from 2000/01 to 2009/10. Europe is the largest cacao processing continent but the most dynamic region is Asia, recording an average annual growth rate of 7%. Consumption of chocolate confectionery products increased by 11% between 2000 and 2008 in selected European countries, USA, Brazil, Japan and Australia, corresponding to an annual growth rate of 1.3%[108].

In the Asia region, there is not enough production of fermented beans to meet the regional grinding capacity and only 26% of the beans produced annually in the region are fermented. As a result of this, the regional processors import almost 220,000 tons from West Africa. This deficit in regionally fermented beans represents an opportunity for the Philippines if it can produce enough high quality fermented beans at a competitive price. Because of the higher shipping costs due to rising fuel prices from West Africa, the Philippines has an increased competitive advantage in gaining access to the Asian market compared to West African countries and South American cacao producers[109].

2004.
[108] The World Cocoa Economy: Past and Present, The International Cocoa Organization (ICCO), 2010.
[109] CoCoPal Value Chain Analysis, A Systematic Overview of the Coconut, rice and Cacao Value Chains in Mindanao to Design USDA CoCoPal Program Recommendations, ACDI/VOCA, 2010.

However, the farm gate price of cacao in the Philippines was only 66% of the world price, as of December 2009. The price in the country does not firmly correlate with the world price, meaning that the world price trends do not have much impact on the domestic price. This is likely due to the fact that cacao from the Philippines has not yet been integrated into the international market; export is minimal and there is not much competition between domestically produced and imported cacao in the domestic market.

5-2-4-3 Main Issues and Constraints

(1) Limited production in the ARMM

Technical instruction to farmers on cacao is lacking in the ARMM; therefore, farmers hesitate to produce cacao. In the past, farmers had experienced the occurrence of cacao pod rots and cacao pod borers. Farmers are also hard to be convinced in engaging to farming, waiting for long period of cultivation before they can harvest. They have not embraced yet the opportunities in this industry partly because they are not aware of the present technologies and the demands of the market. In addition, accessibility of farmers to nurseries and budwood gardens for quality planting material or grafting materials is limited in the ARMM compared to other areas in Mindanao.

(2) Inferior quality of cacao beans

Aroma of chocolate is created from post-harvest operation, i.e., fermentation and drying; however, some farmers neglect or skip fermentation process, leading to low selling price. Even though fermentation requires proper attention and management, such as aeration by periodical turning for six days, some did not perform it well. Drying is done on road sides or backyard drying place so that there are chances for the material to mix with other impurities and they are sometimes rained on. Moreover, due to lack of scientific monitoring of the moisture contents during drying, optimum moisture contents between 7 and 8% wet basis, is hardly obtained; thus, drying temperature and aeration should be well-managed during drying process. Sorting after drying is not often done as well. Thus, lack of post-harvest facilities or conventional post-harvest operation affects the quality of the cacao beans before shipping, leading to low selling price.

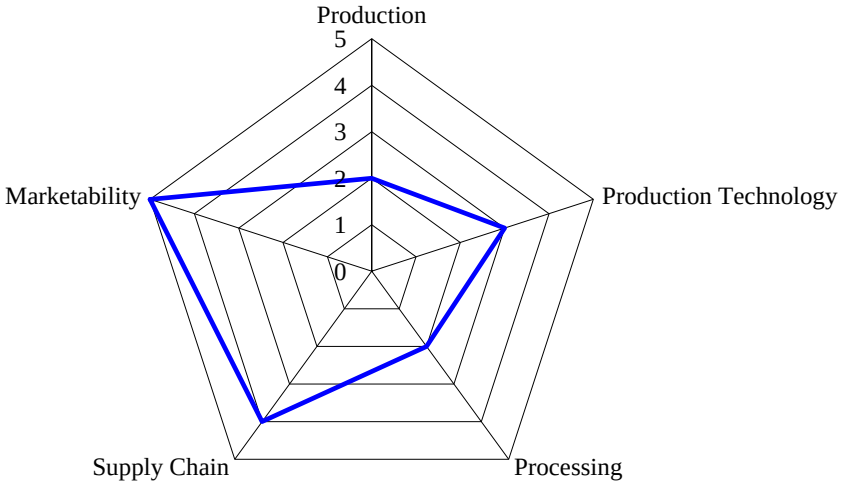
(3) Difficulty of sea transportation and road access

This is a case of Lamitan of Basilan province involving cacao shipment. For sea transportation, ferry bound for Zamboanga city from Basilan is used to ship dried fermented beans; however, the means of transportation is not sometimes well arranged as scheduled due to less capacity of the sea transportation. As for road access, it is difficult for farmers to access to the cacao

plantation during rainy season. Heavy civil machinery like graders and bulldozers belonging to LGUs are not sufficient in numbers to maintain the road; thus, maintenance of the access road is always delayed.

5-2-4-4 Evaluation

Based on the above description about current situation and evaluation of cacao industry in the ARMM is shown below.



Category	Score	Reasons for Evaluation
Production	2	The area of cacao in Mindanao shares about 80% of total planted area in the country. Davao is the biggest producing region with half of the country's 10,000 ha of cacao trees located in the region. The ARMM only produces 120 tons accounting for 2.4% of total production in the country.
Production Technology	3	Cultivation methods are well established in general. However, accessibility of farmers to nurseries and budwood gardens for quality planting material or grafting materials is limited in the ARMM compared to other areas in Mindanao.
Processing	2	There are about 13 firms engaged in cacao processing and confectionary/chocolate manufacturing, located in Metro Manila, Bulacan and Laguna. There is not processing firms in the ARMM. Some small-scale family business for processing of cacao *Tablea*, traditional cacao product, can be found within Mindanao.
Supply Chain	4	The cooperative in Lanao del Sur sells dried fermented cacao beans to a buyer in Manila. It sometimes faces difficulty on sea transportation of cacao beans to Zamboanga during shipping phase. The beans are also conveyed to Davao and Cagayan de Oro.
Marketability	5	Cacao industry has a great opportunity to be grown by filling gap between domestic production of about 6,000 tons and demand of 30,000 tons annually. This deficit represents a great opportunity for not only the ARMM but also whole the Philippines to increase production of cacao.

5-2-5 **Cassava**

5-2-5-1 Background

The Cassava industry in the Philippines is relatively small compared to that of Thailand, Indonesia and Vietnam. The industry is composed of three sub-sectors: i) food, ii) starch, and iii) dried chips for feed. Most of the cassava in the nation is consumed as food. Starch processing seems to be important and is a growing sector as commercial production and trading are related to this. The third sector, dried cassava chips for feed, is small and more localized compared to the other sectors.

Cassava is recognized one of the important commodities as alternating staple food to rice in the island provinces of the ARMM. It is also a food supplement and raw material for processed products. DA considered root crop as high value crops in 2011.

5-2-5-2 Current Situation

(1) Production

The average volume of production is about 2 million tons in the Philippines. Of this volume, it is estimated that 75% is utilized for food, 20% for starch processing and 5% for feed. Although cassava is grown extensively in the country, it is mostly grown in small patches for subsistence.

Mindanao accounts for about 60% of the total cultivation area and approximately 70% of production in the Philippines. At a regional revel, the ARMM is the most important region and it accounted for about 50% of the total production of the Philippines in 2009, as shown in Table 5-20. The ARMM has an area of 294,000 ha of cassava plantation. The ARMM also recorded the highest annual consumption of 10.4kg per capita in 2008/2009, compared to the national average consumption of 3.12 kg per capita (BAS 2010).

The area with the highest per capita consumption of cassava in the Philippines is the Sulu Archipelago where cassava is the staple food. In many rural communities, the root crops are eaten or sold as boiled roots and processed products such as fried chips, cakes and sweet porridge. Shoots of cassava are also a favorite among Filipino Muslims.

Table 5-20: Production of Cassava (ton)

	2005	2006	2007	2008	2009
Philippines	1,677,564	1,756,856	1,871,138	1,941,575	2,043,719
ARMM	950,765	965,487	977,874	1,003,542	1,012,330
Maguindanao	4,646	4,596	4,460	4,403	4,194
Lanao del Sur	483,597	483,562	482,360	490,825	494,004
Basilan	214,020	217,520	223,368	232,143	237,263
Sulu	151,230	161,419	169,808	178,324	178,285
Tawi-Tawi	97,272	98,390	97,878	97,847	98,585

Source: BAS (2010)

In Lanao del Sur, the top producer of cassava in the ARMM, production is concentrated in the farming communities of Marogong, Malabang, Balabagan, Kapatagan, Bubong, Lumbatan, Ramain, Marantao, Balindong, Lumbatan, Mulondo, Wao, Bumbaran, Marawi, Picong, Pualas, and part of Calanogas. Lanao del Sur hosts two cassava flour/starch processing plants; the Matling Flour Milling Corporation based in Malabang and the Itil Plantation Corporation in Balabagan. The two corporations account for almost 90% of the cassava production in the province[110].

Some farmers in Kapatagan produce cassava chips. The chips are sold to cassava traders in Kapatagan and Maguindanao province. Other farmers in Wao and Bumbaran produce cassava granules for brewery purposes. These granules are absorbed by the San Miguel Corporation, one of the major breweries in the country. Cassava is also a common ingredient used in several variations of Maranao delicacies such as cassava cake, tapay, pakbol and suman[111]. These are the indications that cassava production and processing play a considerable importance in the local economy of Lanao del Sur[112].

The Bureau of Agricultural Statistics reveals that cassava production has been increasing within the province since 2005. Although the statistics reveal a slight fluctuation between 2005 and 2007, the volume of cassava production went up again in 2008 and 2009. The average annual production yielded a staggering 486,869.8 tons. The production value has been increasing since 2005 as shown in Table 5-21. These existing cassava plantations showcase the potential of the rest of the areas for extensive cultivation in the future.

[110] Potential Products Study Report, Lanao del Sur, Maranao People Development Center, Inc., 2010.

[111] Tapay, pakbol and suman are Maranao delicacies wrapped in banana leaves and boiled till cooked.

[112] Potential Products Study Report, Lanao del Sur, Maranao People Development Center, Inc., 2010.

Table 5-21: Fresh Cassava Production in Lanao del Sur

	2005	2006	2007	2008	2009	Average
Production (ton)	483,597.4	483,562.6	482,360	490,825	494,004	486,869.8
Production value (million Php)	6,374.73	9,135.67	8,850.44	10,581.61	11,833.14	9,355.11
Number of producers	2,200	2,198	2,150	2,260	2,290	2,219.6
Farming areas (ha)	29,196	29,200	29,200	29,220	29,220	29, 207.2

Source: BAS (2010)

On the other hand, cassava is a traditional crop in Sulu province and it is a staple food for the majority of its people, with a menu of processed food products like "pyuto", "siyang-lag", "biyan-ban", cassava cake, etc. The area of cassava cultivation is about 2,300 ha, as shown in Table 5-22. This indicates that cassava is widely grown among the various crops in alluvial, sloping and foothill areas. Some farmers intercrop cassava with coconut or with upland rice and corn. The average yield of cassava is 10 tons/ha.

Table 5-22: Cultivated Areas of Cassava in Sulu Province (ha)

Municipality	Cultivated Areas of Cassava (ha)
Indanan	114.0
Jolo	1.0
K. Caluang	300.0
Lugus	90.0
Luuk	200.0
Maimbung	32.0
Panamao	190.0
Pandami	23.0
Panglima Estino	460.0
Panglima Tahil	2.5
Pangutaran	108.0
Parang	128.0
Pata	7.0
Patikul	215.0
Siasi	32.0
Palipao	210.0
Papul	5.0
Banguingi (Tongkil)	140.0
Total	2,257.5

Source: Sulu Provincial Development and Physical Framework

(2) Production Technology

In the absence of policies that favor the development of cereals, cassava has shown that it is competitive with domestic maize in terms of returns and reliability of harvest. One problem with cassava is its long cropping duration. Cash-strapped growers have difficulties in sustaining

their families between the planting and harvesting of cassava. Maize and other crops have the advantage of being short duration crops; hence, the cash flow from these crops is better. One cropping system that addresses this and is now widely practiced is intercropping of cassava with maize.

In brief, the system involves planting maize first and then planting cassava 20 to 30 days later between the rows of maize or between every other maize row. Maize is harvested four months later, while the cassava is harvested 10-12 months after planting. This practice offers not only a better cash flow and returns over growing cassava as a monocrop to the farmer, but it also significantly cuts down the risk of failure in cropping the maize in the second cropping season[113].

The cultivation pattern depends on the purpose of the cassava production. The Blue Seals Multipurpose Cooperative with 151 members, in Mable municipality, Lanao del Sur, produces cassava in 30 ha, while intercropping with coconuts. Other intercropping is done with coconuts and corn. The cassava is shipped to starch processing plant as a raw material. The production of cassava fresh tuber is 18-24 ton/ha for industrial purposes. The farm work sequence and inputs are described in Box 5-3.

[113] Philippine Root Crops Research and Training Center (PRCRTC).

Box 5-3: Farm Work Sequence of Cassava for Starch Processing

Cassava cultivation is over a 9-10 month period. Cassava cultivation can be started in any month. The following is the farm work sequence:

i) Land preparation: By use of a tractor hired from Matling Co. at Php 1,100/hour for three times with a total cost of Php 3,100/ha.

ii) Planting material: The stalks are about 20 cm long, at Php 150/1,000 stalks.

iii) Planting density: 70 cm row x 30 cm hill, 5,000 planting material stalks per ha

iv) Pest and disease control: No agricultural chemical is applied.

v) Fertilizer application: No organic fertilizer is applied. Three bags of 14-14-14 are applied to 1 ha 15 days after planting. A bag of fertilizer is Php 600. Nine bags of 14-14-14 are applied for 1 ha again 3 - 4 months after planting.

vi) Harvesting: Manual harvesting.

vii) Post-harvest: Washing and cleaning work are not required due to the sandy loam soil.

viii) Transportation: To Matling Co. at Malabang 10km away from the production site. One trip by a track carrying 5 ton of Cassava to Malabang costs Php 250.

Source: Interview with Blue Seals MPC, Malabang, Lanao del Sur

The cooperative cannot cope up with supply due to the following reasons: i) problems with insufficient capital for expansion of business operations, ii) lack of equipment such as heavy duty tractors, which delays land preparation, iii) lack of drying facilities for both solar and mechanical dryers and warehouses for storing the product before shipping the dried cassava chips to Sun Miguel, and iv) lack of hauling tracks and chipping machines which are utilized before drying[114].

Meanwhile, the Golden Linao Multipurpose Cooperative, with 289 members and located in Marawi city in Lanao del Sur, produces edible cassava, i.e., yellow cassava, white cassava and smooth cassava for 28 ha. In this case, cassava is produced for food and the yield is 10-15 tons/ha. The fresh edible cassava can be sold at Php 5/kg at a drop-off point in Marawi city. Box 5-4 illustrates the farm work sequence required to grow cassava by the Golden Linao MPC.

[114] Interview with Blue Seals MPC, Malabang, Lanao del Sur province.

Box 5-4: Farm Work Sequence of Cassava for Food

Edible cassava grows for 5 months, so double cropping can be performed in September to February and February to July.

i) Land preparation: Plowing is performed by the animal draft power of a carabao.

ii) Planting: Planting is done manually.

iii) Fertilizer application: Almost the same as the Blue Seals MPC. The organic fertilizer is used by the only interviewee and he uses materials like grass, waste of banana, corn comb adding enzyme made of sugar, fish and the like.

iv) Harvesting: Harvesting is done manually.

vii) Transportation: A carabao and cart are used to transport fresh cassava to Marawi 3-5 km away from production sites.

Source: Interview with Golden Linao Multipurpose Cooperative, Lanao del Sur province

Here are the general problems in the cultivation of cassava that farmers face: i) lack of access to low interest capital and ii) lack of technical support. Since the majority of financial sources available in rural communities are high-interest earning facility like loan shark and pawnshops, access to new technologies is difficult for most cassava farmers. Only rural communities with well-developed organizations have access to new farming technology to improve farm productions, e.g. technical know-how on effective farming.

(3) Processing

Cassava is recognized as one of the important commodities as staple or food supplement and raw material for homemade-type delicacy like cassava chips, cassava cakes, cassava pie, and pudding in the country. In Mindanao alone, it is said that about 30 different preparations of grated cassava exist. However, home-made cassava confectionaries produced in the ARMM do not reach wide market yet. They are traditionally prepared using fresh grated cassava which is highly perishable; hence, reaching urban market is very limited. As a result, cassava processed products is confined only to the rural areas.

There is a huge processing firm located in Lanao del Sur and it is Matling Industrial and Commercial Corp. It has a 75 to 80% share of domestic starch production although imports from Thailand and Indonesia still dominate the Philippine starch market.

Starch can be extracted mechanically from cassava and other starchy commodities such as

potatoes and cereals. Its purity can be improved through a series of sieving processes. Starch consists of amylose and amylopectin, which are polymers of simple sugar known as glucose, and can provide the majority of daily energy requirements for human beings. It is also a good raw material for alcoholic fermentation. Thus cassava has a very high potential and better processing technologies can be introduced to the ARMM to increase the value of cassava-derived starch.

(4) Supply Chain

Cassava collection can be done in two ways. The first way is that farmers can sell their harvest to the traders or the nearby market. The second way is for traders to collect harvested cassava at designated areas closer to the cassava producers. Most traders have hauling services. In most cases, farmers are indebted to the traders as the latter provides capital and material input to them at the beginning of the planting season. In return, the farmers agree that the traders have the sole authority over their products during harvest time. From the traders, cassava is either sent to local retailers in the market for consumption locally, or to processing plants to be made into flour and animal feeds.

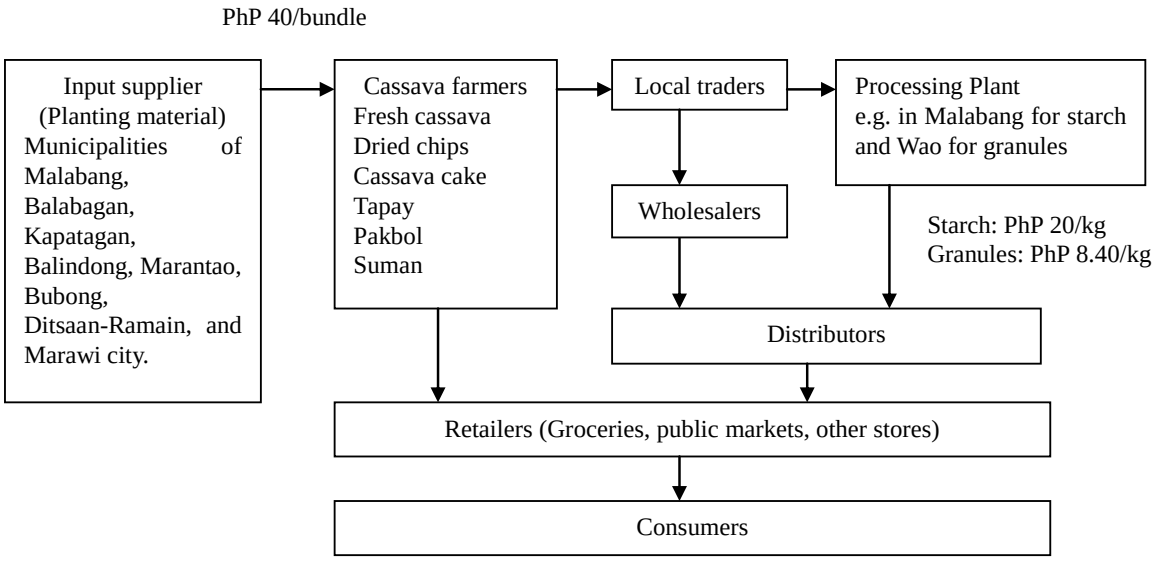


Figure 5-13: Supply Chain of Cassava Produced in Lanao del Sur

In Figure 5-13, distributors are located depending on the form of their product. Root crop distributors are found in Malabang, Kapatagan, Balabagan, and Marawi city, and starch and granules distributors are situated in Manila, Davao city, Cagayan de Oro, and Iligan City. Moreover, situation of value chain of cassava produced in Lanao del Sur and island provinces is shown in Table 5-23. The farmers are confronted with several problems including the

following: i) lack of post-harvest facilities, ii) lack of funds for operational expenses; and iii) lack of access to technology and training/s on intercropping.

In Lanao del Sur, most of the cassava for starch is conveyed to Matling Industrial and Commercial Corporation just after harvesting. Two major problems that face cassava farmers relating to the supply chain were disclosed. The first one is the lack of initiatives from the local government to improve the road networks and rural infrastructures to help the farmers in accessing the market. For instance, the farm to market road network is underdeveloped and there are no public markets. Second, the revenue on the product is low as prices are controlled by the traders. This is due to the lack of information on commodity prices. Cassava farmers have limited in their information of commodity prices as they are dictated by the local traders.

Table 5-23: Situation of Value Chain of Cassava in Lanao del Sur and Island Provinces

Actor	DAF-ARMM Inputs supplier	Farmers & Cooperatives	Town Traders	Buying Station or Processors
Product	• Technology • Inputs • Planting material	• Raw cassava root crops • Grated cassava	• Raw cassava trading • Grated cassava • Cassava starch	• Confectioners and food • Cassava starch
Place	• ARMMIARC to Lanao del Sur and Island Provinces	• Matling Industrial and Commercial Corporation (MICC) and adjacent areas • Island municipalties	• MICC of Malabang in Lanao del Sur • Balabagan, Lanao dle Sur • Island municipalities	• Domestic and overseas
Activities	• Nursery Technology • Production technology	• Cultivation • Harvesting • Processing grates for food delicacies • Marketing	• Trading raw cassava • Marketing raw cassava • Marketing processed food delicacies • Processing to starch	• Processing and quality control for bakeries • Local marketing • Domestic market for starch
Price	• Php 40.00 per bundle or sack as planting material	• Php 7.38-13.00 per kg	• Php 8.40 per kg (grated cassava) • Php 20.00 per kg (cassava starch)	• n.a
Cost	• n.a	• n.a	• Transportation cost: Php 2.00 per kg	• Transportation cost: Php 2.00 per kg
Scale	• n.a	• Planting density: 6,000 hills/ha	• n.a	• n.a
Issues	• Extension capacity is low especially intercropping.	• Financially incapable to purchase processing facilities	• Fluctuating cassava price	• n.a

(5) Marketability

The average per capita consumption of cassava is 0.06 kg per week or 3.12 kg per year in the Philippines. Weekly per capita consumption ranged from a low of 0.05 kg in February 2009 to 0.07 kg in May 2009. As shown in Table 5-24, the ARMM registered an annual per capita consumption of 10.4 kg which was three times higher than the national average. Thus, the demand for cassava consumption in the ARMM is always higher compared to other regions in the nation.

However, rice is the staple food for all Filipinos, so that future deficit will be addressed through inter-regional trade. Thus, growth in the consumption of cassava as food will be dull; therefore, attention should be given towards transforming cassava into more elaborate and convenient forms, and to extend the shelf life of fresh roots in order for cassava to remain a major food source in a growing economy characterized by rapid urbanization.

Table 5-24: Estimated per capita Consumption of Cassava in Selected Regions (kg/person)

Some Regions	Weekly					
	Aug. 2008	Nov. 2008	Feb. 2009	May 2009	Average	Annual
Philippines	0.058	0.062	0.054	0.065	0.060	3.120
Central Luzon	0.034	0.030	0.010	0.015	0.022	1.144
Central Visayas	0.040	0.026	0.037	0.046	0.037	1.924
Zamboanga peninsula	0.075	0.127	0.138	0.147	0.122	6.344
Davao region	0.051	0.036	0.029	0.043	0.040	2.080
ARMM	0.159	0.200	0.221	0.219	0.200	10.400

Source: BAS (2010)

Starch use will continue to increase. Innovation on the properties and use of starch should increase future demand. The potential use of starch for the production of high fructose sugar and other sweeteners is not too far-fetched, considering the unstable outlook of the sugar industry in the Philippines. This, however, is by no means a guarantee for the survival of the domestic cassava starch sector[115]. Moreover, a negative gap between export and import still exists as shown in Figure 5-14. Therefore, the domestic production still needs to fill this gap in order to save foreign currency to buy imported starch.

Moreover, production of cassava chips for livestock feed is promoted by the government[116]. Farmers' decision to grow maize or cassava for animal feed is influenced by the relative prices of maize grain and cassava chips. Thus, discussion on the status and market potential of cassava for feed will invariably include a presentation on the status of maize in the Philippines.

[115] Philippine Root Crops Research and Training Center (PRCRTC)
[116] Focus group discussion during workshop of the Study

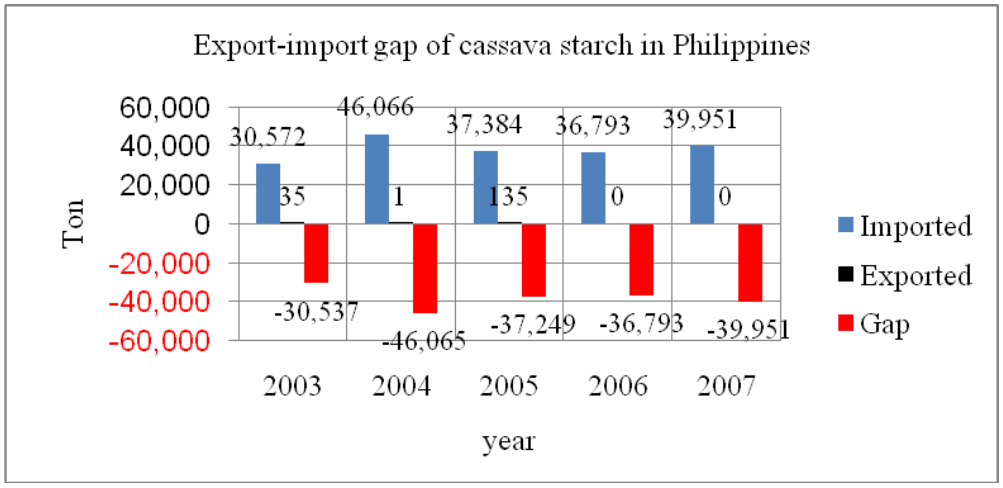


Figure 5-14: Export-Import Gap of Cassava Starch in the Philippines

In recent years, demand for cassava is growing both nationwide and globally (Figure 5-15). It may be good for cassava producers in the ARMM to add value to their product with processing technology or improvement of productivity so that they can access to this expanding market.

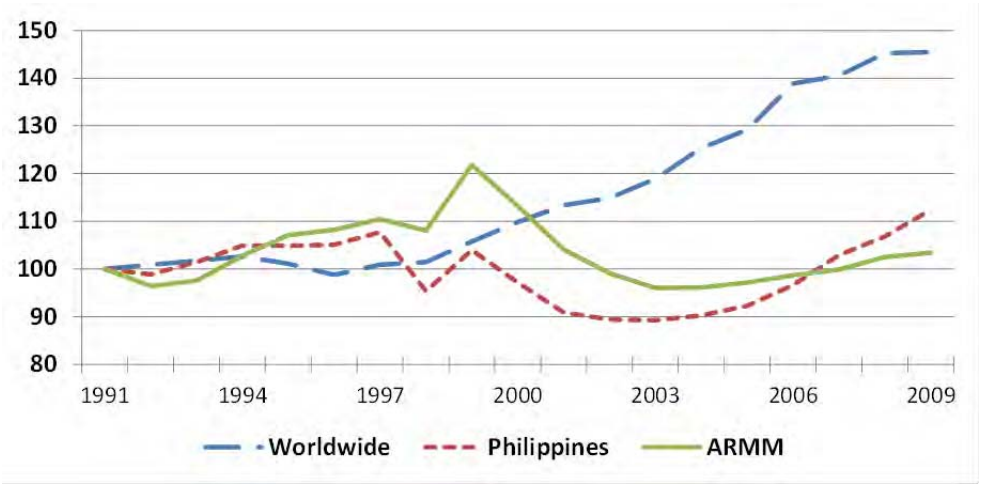


Figure 5-15: Total Amount of Cassava Production (1991=100)
Source: FAO, BAS

5-2-5-3 Main Issues and Constraints

(1) Low yield

Low yield is resulted from extensive conventional cultivation management practiced in the ARMM. This is primarily due to less fertilization. Farmers face difficulty to access to sufficient fertilizer due to high interest rate on loan when they need to purchase agricultural inputs. In addition, when farmers plant corn, they use synthetic fertilizers; but when they turn to "crop rotation" using cassava, they do not fertilize cassava, leading to low production. Farmers also

use traditional old varieties of cassava with less vitality, although cassava variety should be changed with another variety every five years. Thus, the lack of technical instruction and financial constraints lead farmers to use less fertilizer and use traditional old varieties.

(2) Lack of post-harvest technology

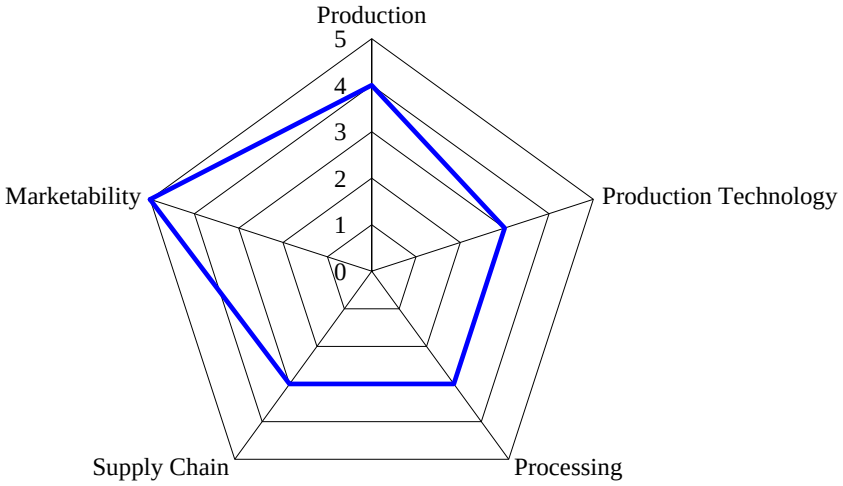
One major disadvantage of cassava is that the harvested root is perishable. It should be properly dried and stored; otherwise, the cassava roots start quality deterioration. However, post-harvest technology to maintain quality of fresh cassava root is not well disseminated. Lack of post harvest machinery and tools are lacking. Cassava graters, cassava pressers, chippers, dryers and even storage of processed cassava are not well equipped to cassava producers especially in the island provinces of the ARMM. It is partly due to difficulty for producers to access to financial support. Efficient and proper post harvest technology with appropriate equipment is necessary to the producers to avoid quality deterioration.

(3) Inactive value added processed industry

Home-made cassava delicacies produced in the ARMM do not reach wide market yet and remain in rural areas. Quality of the products is not well sanitized and processing technology is still outdated. They are traditionally prepared using fresh grated cassava which is highly perishable; hence, reaching urban market is very limited. Looking at urban markets outside of the ARMM, value added products of cassava, such as fried chips, cakes, pudding and pies, and cassava cakes are growing and getting popularity industry. Rather than alternative stale food to rice, cassava needs to find a way to transform to value-added product to remain as major crop.

5-2-5-4 Evaluation

Based on the described current situation above, current situation of cassava industry in the ARMM is evaluated below.



Category	Score	Reasons for Evaluation
Production	4	The industry is represented by three sub-sectors; food, dried chips for feed, and starch. Most of the cassava is consumed as food in the nation. Starch processing seems to be important and growing sector. The ARMM is the important region and it accounts for about 50% of the total production of the Philippines. Production for local consumption is relatively sufficient.
Production Technology	3	Cultivation method is established; however, due to less fertilization and use of less productive traditional variety, productivity is low. Farmers face difficulty to access to agricultural inputs and technical support. Inter-cropping system of maize and cassava is practiced to address low revenue from cassava. Productivity increase is, therefore, important to increase revenue for small scale cassava producers.
Processing	3	Lanao del Sur province hosts two cassava processing plants; they absorb almost 90% of the cassava production for starch in the province. Nevertheless, processed food products are not developed well but localized within rural.
Supply Chain	3	Distribution route is already established in the case of Lanao del Sur; however, infrastructure is vulnerable; e.g. less spread road networks, limited public markets in number, and limited market information on the commodity.
Marketability	5	The ARMM registered an annual per capita consumption of 10.40 kg which is 3 times higher than the national average. Demand for cassava in the ARMM for consumption is always high compared to other regions. Negative gap between export and import of starch still exists; therefore, domestic production still needs to fill this gap.

5-2-6 **Coconut**

5-2-6-1 Background

The coconut industry is one of the dominant ones in the Philippines. The coconut tree is called the "Tree of Life". It is possible to make an endless list of processed products and by-products derived from all the parts of coconut tree. In addition to oil extracted from dried copra, they are used in desiccated coconut, copra meal, young coconut, activated carbon, charcoal, coir and coir dust, etc. Thus, the lists of products that use coconut are innumerable.

Out of the 12 million ha of agricultural land in the nation, 3.25 million ha is cultivated with the coconut tree. This is a surprising figure as it is approximately 1 million ha larger than the cultivated area of rice and about two million ha larger than corn. Sixty-eight (68) out of 79 provinces produce coconuts[117]. The five provinces in the ARMM are not the exception.

5-2-6-2 Current Situation

(1) Production

The Philippines produces about 16 million tons of coconuts according to the BAS (2010). In Mindanao, Region XI is the top producer and the ARMM contributes about 14% to the total production in Mindanao. Production of coconut has somewhat increased in the ARMM and the area of cultivated land has an annual average growth rate of 0.7% from 2000 to 2005. Maguindanao recorded the highest production of 502,428 tons, among the 5 provinces in the ARMM, followed by Basilan in 2009, as shown in Table 5-25.

Table 5-25: Production of Coconut (ton)

	2005	2006	2007	2008	2009
Philippines	14,824,585	14,957,910	14,852,927	15,319,527	15,667,565
Philippines (Copra) *)	2,652,000	2,554,000	2,213,000	2,387,000	2,772,000
ARMM	1,170,409	1,180,709	1,242,708	1,250,054	1,250,971
Maguindanao	432,088	440,361	498,522	502,305	502,428
Lanao del Sur	169,897	170,338	169,860	170,725	171,482
Basilan	209,986	210,567	217,769	215,458	215,464
Sulu	202,512	203,538	206,360	212,762	209,470
Tawi-Tawi	155,926	155,905	150,196	148,805	152,127

Source: BAS (2010) and *) PCA (2010) for copra

[117] Trade and Investments Promotions Program for Mindanao's Priority Commodities Strategic Framework Plan 2006-2015, Department of Agriculture, Southern Philippines Cluster Office and The Philippine Coconut Industry, Performance, Issues and Recommendations, Economic Policy Perform and Advocacy (EPRA).

Although coconut is a dominant crop, it creates the lowest value per unit farm area when compared with other crops. The yield is about 4.4 ton/ha or 4,000 nuts/ha, or in other words, 750 kg of copra/ha. Thus, the recovery of copra is from 15 to 17% (DTI and EPRA).

In fact, the Study[118] results show that the calculated average yield of coconut copra produced in 2009 by the 14 interviewees in Maguindanao province was 669.6 kg/ha at a calculated average sale of Php 13,869/ha at farm gate price ranging from 19.00 to Php 31.00/kg. Causes for the stagnation in the coconut industry include the following: i) large areas are planted with low genetic potential, ii) vast areas are not fertilized, iii) one-third of the coconut trees are senile; and iv) coconut trees are planted on marginal lands. There are a couple of reasons for this low yield; i) less optimized intercropping is practiced and ii) production entirely depends on rain-fed[119].

Meanwhile, the ARMM is a typhoon-free zone, with fertile soil and a climate suitable for coconut plantations; thus, according to the PCA[120], some areas in Maguindanao could be developed more to increase production; therefore, support to coconut producers by the government is needed, although the PCA's manpower capacity is not sufficient.

(2) Production Technology

Higher production and productivity levels via the application of better varieties, a more balanced nutrition or fertilization regime and market development could improve the viability of the coconut industry. However, it is imperative that sustainable coconut-based integrated farming is encouraged to ensure an economically profitable and attractive industry for majority of smallholders.

In the Philippines, a research paper says that in the full-bearing stage, a yield of 4.0-4.7 ton of copra/ha/year from selected hybrids (Dwarf x Tall Types) was achieved at the farm research station. In contrast, farmer-managed farms averaged just 2.8 tons of copra/ha/year (Magat and Carpio 1995). The higher yield obtained under the experimental stations was likely due to the higher management levels. When translated into an estimated net income, at 2.8 tons of copra/ha, with 3-4 regular fertilizer applications per year, it results in a net income of around

[118] Potential Products Study in Maguindanao, CeMILARDe Foundation, Inc., 2010.
[119] CoCoPal Value Chain Analysis, A Systematic Overview of the Coconut, rice and Cacao Value Chains in Mindanao to Design USDA CoCoPal Program Recommendations, ACDI/VOCA, 2010.
[120] Interview with PCA-ARMM.

Php 18,000/ha/year at Php 9.00/kg of copra, compared to Php 5,300/ha/year with unfertilized oil palms[121].

Inputs for the coconut cultivation of 14 coconut producers, interviewed during the Study[122] in Maguindanao are shown in Box 5-5. The area of coconut they harvest ranges from 1 to 50 ha in 2009. The calculated average gross income was Php 13,869/ha at a farm gate price ranging from Php 19.00 - 31.00/kg.

Box 5-5: An Example of Inputs for Coconut Cultivation in Maguindanao Province

Inputs for coconuts cultivation in Maguindanao are as follows:

i) A variety of seedlings: native ones at Php 25/seedling

ii) Planting density: approximately 100 trees/ha

iii) Fertilizer application: Compound 14-14-14, Urea 46-0-0 or 21-0-0, Ammonium Phosphate 16-20-0 (Five producers out of 14 applied chemical fertilizer.)

iv) Chemical application: none

v) Part time labor hiring: Ranging from 2 to 10 working-days for harvesting and transportation

vi) Machinery used: 4-wheel riding type tractor of 50PS (Four producers out of 14 uses tractors)

(3) Processing

Coconut oil

Coconut oil is extracted from dry coconut meat, copra, which usually contains 64% oil, and the major fatty acid is known as lauric acid, one of the saturated fatty acids. Coconut oil is extracted by large-scale firms such as the Cargill Oil extraction plant and Legaspi Oil Co., though they are not located in the ARMM, while small- to medium-scale operators prefer to produce virgin coconut oil.

Virgin coconut oil is defined as coconut oil that has been extracted without heat treatment. One of these operations can be observed at Matling Industrial and Commercial Corp., Lanao del Sur.

[121] Enhancing incomes and competitiveness, Intercropping and toddy/sugar production in coconut-based farming systems: Possible integration with germplasm conservation and varietal improvement, Severino S. Magat, Senior Scientist and Department Manager, PCA, Manila, Philippines.
[122] Potential Products Study in Maguindanao, CeMILARDe Foundation, Inc., 2010.

This manufacturer extracts oil by an oil expeller and dries the wet oil by air in an air duct. Since coconut oil is rich in saturated fatty acids, the oil can withstand the air drying operation, which is not commonly applicable to other types of vegetable oils.

Coconut sap and sugar

One of the unique products from coconut tree is coconut toddy, as explained by Magat (1996).[123] The sap is tapped from unopened spathes of coconut. This sap contains 14-16% sucrose, as well as amino acids and vitamins, and it makes the sap highly nutritious.

PCA provides a training course for sugar production and the product can be sold at as high as Php 220/kg. The sugar is reported to be very popular, because of its health benefit with lower glycemic index. A small-scale community-based factory is usually built within a community and not walled, probably due to easy access and heat emission. However, such structure is not recommendable for food processing, including sugar, since it may allow contamination by dusts and insects during processing. Proper operation of food processing such as basic hygiene, needs to be introduced to this kind of small-scale processors.

In middle-scale processors, such as Lao Integrated Farms, Inc. and Aroman Natural Food Women's Cooperative in Carmen, though they do not exist within the ARMM but showing good examples, much stricter management is practiced, in order to meet the markets expectations. However, quality fluctuation of final products was observed from the color of packed coco-sugar and it seems to be darkening with time. This kind of undesirable quality changes, such as discoloration needs to be improved.

Processing at Aroman Natural Food Women's Cooperative in Carmen, Cotabato province shows a good example. This cooperative exists within the premises of PCA and utilizes 700 coconut trees within the center, while the cooperative pays a fee of Php 25/kg of sugar to PCA center. The capacity of the factory is for approximately 100 kg per day for 24 hour operation and the cooperative operates in 3 shifts a day for 7 days a week. The members showed their satisfaction on the business in the interview, mainly due to stable income. There are about 40 members involved in the operation and each receives approximately Php 4,600 every two months, while copra production provides them income almost every three months. Thus, this

[123] Severino S. Magat, 1996, "Intercropping and toddy/sugar production in coconut-based farming systems: Possible integration with germplasm conservation and varietal improvement," In "Proceedings of a workshop, Promoting Multi-purpose Uses and Competitiveness of the Coconut" edited by Pons A. Batugal, V. Ramanatha Rao and C. Bong.

kind of processing operation is highly beneficial for coconut farmers and it can also be a good example for what cooperatives in the ARMM can introduce.

In addition to coco-sugar, coconut sap is an ideal ingredient for making jams and preserves of tropical fruits, since it is nutritious, tasty and high in free amino acids such as glutamic acid, and sugar. Some of these products are made at Kablon Farm Foods Corp., located outside of ARMM. Such products attract health conscious customers not only in the Philippines but Singapore and other Southeast Asian countries as well.

Vinegar and Sprits

Coconut sap undergoes spontaneous fermentation of alcohol and acids[124] because it contains beneficial microorganisms, such as yeasts, acetic and lactic acid bacteria. It contains amino acids and vitamins, and also fermented products such as alcoholic beverages and vinegar. This kind of fermentation technology is practiced in most of the palm-oil producing countries in the world, and it plays an important role in traditional society and culture.

Coconut sap contains a high amount of sucrose, which is used by yeasts and bacteria to produce alcohol under anaerobic conditions and vinegar under aerobic conditions. Thus fermentation can be easily controlled in the climatic conditions of the Philippines. In addition to vinegar, distilled alcoholic beverages, such as Tuba, coconut wine, and Lambanog are commonly produced.

There are different types of historically important coconut products. Some of these products are sold through the Internet to international markets. Thus these products may have high potential for small- to medium-scale farmers and processors. However, large-scale oil producers have difficulties in collecting enough copra to meet their production capacity. This may require some guidelines and policies for all stakeholders if everyone should benefit from this potential industry.

(4) Supply Chain

At the time when the Study was conducted, dried copra was being sold at prices ranging from Php 28.00-31.00/kg on average and Php 36.00/kg during the peak period at farms in the Maguindanao province, although the annual average farm gate price was between Php 11.00 and 17.00/kg, as shown in Table 5-26.

[124] Marzia Stringini, et al, 2009, "Yeast diversity during tapping and fermentation of palm wine from Cameroon," Food Microbiology, 26, 415-420.

Table 5-26: Farm Gate Price of Nut and Copra (Php/kg)

		2005	2006	2007	2008	2009
Philippines	Matured coconut	3.58	3.37	4.03	5.27	4.15
	Copra	13.78	12.75	17.74	22.97	13.73
ARMM	Matured coconut	5.63	5.28	4.06	5.97	4.67
	Copra	13.22	12.55	15.71	23.15	14.26
Maguindanao	Matured coconut	3.87	3.72	3.92	6.87	5.02
	Copra	14.71	12.8	18.34	24.77	13.58
Lanao del Sur	Matured coconut	12.33	13.58	5.17	5.76	5.92
	Copra	-	-	13.83	14.4	15.08
Basilan	Matured coconut	4.55	4.68	4.73	5.42	4.34
	Copra	13.97	12.11	17.64	22.79	14.51
Sulu	Matured coconut	2.14	2.34	2.7	4.38	3.24
	Copra	10.92	11.41	14.07	25.07	16.65
Tawi-Tawi	Matured coconut	-	-	-	-	-
	Copra	13.3	13.87	14.75	21.16	11.46

Source: BAS (2010)

The supply chain in coconut production is basically i) collection, ii) trading, iii) processing, and iv) selling, as shown in Table 5-27, which illustrates one case in Maguindanao[125].

Matured coconuts are harvested and gathered by a group of farm workers who are hired to process coconut meat into dried copra. They then divide this up with two-thirds going to the land owner and one-third going to the workers. Young coconuts called Buko are also harvested. They are soft, delicious, and easy to scrape meat. The public consumes this young meat and coco juice as delicious snack items.

[125] Potential Products Study in Maguindanao, CeMILARDe Foundation, Inc., 2010.

Figure 5-27: Example of Value Chain of Coconut Produced in Maguindanao Province

Actor	PCA	Farmers & Cooperatives	Barangay or Town	Buying Station or Processor
Product	• Technology • Seedling	• De-husked nuts • Copra • Buko (young nut)	• De husked whole nut • Copra • Buko	• De husked whole nut • Copra • Buko • Grated matured nut
Place	• PCA-XIV-ARMM • PCA Maguindanao	• Macabiso • Sultan Kudarat • Matanog • Parang • D.O.S.	• Cotabato City	• Oil Processors in Davao • Franklin Baker de-husked nut buyer • Eateries in Cotabato city
Activities	• Technology dessimination • Input supply • Hybrid seedlings from nurseries	• Cultivation • Harvesting • De-husking • Copra making	• Cotabato City trading • Food chain enterprising	• Copra Grading • Oil Processing • Eateries • Exporting
Price	• Seedling pick up price: Php 27.00 at PCA Carmen • Seedling pick up price: Php 35.00 at Private farm	• Farm gate price of de-husked nut: Php 5.00 per kg • Farm gate price of copra: Php 28.00–31.00 per kg of copra	• Selling price of copra: Php 40.00 per kg in Cotabato City	• Price of de-husked nut: Php 9.00 per kg • Price of Copra: Php 50.00 per kg at Davao plant
Cost	• n.a	• Prodcution cost: Php 12,000/ha	• Transportation: Php 1.00 per kg	• n.a
Scale	• n.a	• Productivity: 3-4 tons of de-husked nut	• n.a	• n.a
Issues	• Less capacity of PCA-XIV-ARMM and PCA Maguindanao for extension activities	• Low productivity • Low quality of copra • Less value added processing	• Quality white copra is not observed by producers and traders	• n.a

The dried copra is sold in large volumes to Cotabato City by big buyers via local copra buyers. These are then transported to refineries outside Maguindanao like Metro Manila, Cagayan de Oro, Cebu, Iligan and Davao for the production of refined cooking oil. The big buyers of copra are corporations such as Legaspi Oil Mill, Iligan Coconut Company, Unilever Inc., Baguio Oil Company and Mayon Cooking Oil Company. Meanwhile, there is merely an oil mill in the ARMM, namely BJ Oil Mill, located in Sulu province.

The shells are gathered and processed into charcoal. Aside from being used as fuel, coconut husks are processed into coir dust and coco fiber. The fibers are made into geo-textiles while the

coir dust is used as soil additives for compost. Geo-textiles are used as cover sheets for protection against soil erosion and are placed at the side of mountains and river banks. The only reported producer of coco coir dust and geo-textiles in Maguindanao is the SAMASA consortium of the coconut farmer cooperative, Mindanao State University, Philippine Coconut Authority, De La Salle University and the Philippine Society of Agricultural Engineers based in Datu Odin Sinsuat Municipality (SAMASA brochure, 2004).

In one case dried copra produced in Basilan is conveyed to General Santos city to be processed into oil at Cargill Copra Crushing Plant[126] as shown in Figure 5-16. The crude oil conveyed to Cagayan de Oro, Cebu, Iligan, and other cities for the production of refined cooking oil.

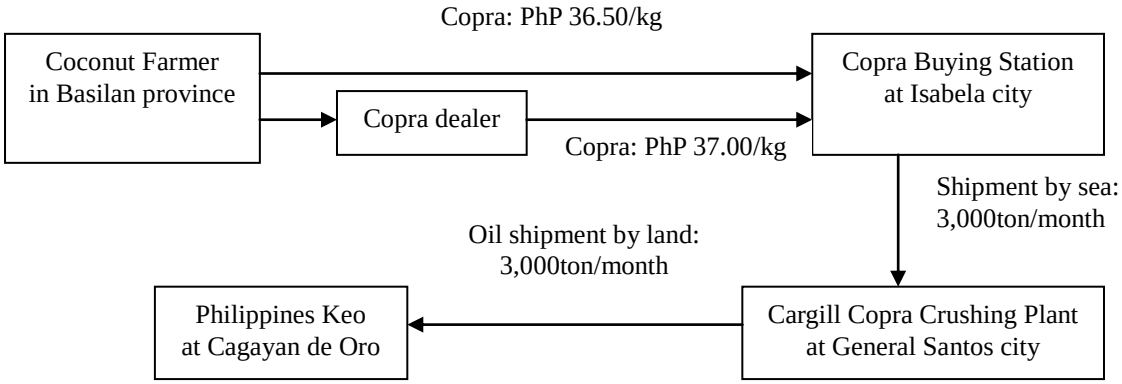


Figure 5-16: Example of Coconut Copra Supply Chain from Basilan Province

The presence of the copra buying station at Isabela city in Basilan helps the copra industry in terms of price regulation and monopoly by some copra dealers. Dried copra is conveyed by either the farmers or dealers. The price is Php 36.50/kg from farmers and Php 37.00 from dealers when buying a minimum volume of 20 tons. To receive white copra, from which high quality oil can be extracted, the buying station provides the incentive of an additional Php 0.30/kg for the white copra. The traditional drying method, called the Tapahan method, produces smoked black copra; therefore, convection methods, namely the Pugon method, is recommended by the Cargill Copra Crushing Plant and farmers have adopted it to produce white copra. However, copra production is decreasing and more farmers are shifting to rubber production[127].

In the supply chain of coconut in the three island provinces of Basilan, Sulu and Tawi-Tawi, copra producers and local traders maintain close and tight relations. Farmers sell dried copra to

[126] Interview with Cargill Copra Crushing Plant, General Santos.
[127] Interview with Cargill PhilS., Inc., Copra Buying Station, Isabela.

the local traders and the price is at the mercy of the traders. Thus, the producers are price takers because they are indebted to the traders since they provide basic needs for the period of three months from harvesting till selling. Seventy-five (75) percent of traders sell the products in the locality and 25% sell them outside of the ARMM, depending on where they can be sold most profitably[128].

One opportunity for coconut-based intercropping farmers in Sulu is the existence of the BJ Coco Oil Mill which has been made operational. It buys copra and crushes it to extract crude coconut oil and produce the by-product of copra cake.

(5) Marketability

Approximately 300 million people worldwide depend on the coconut tree for their livelihood. Although the global market for coconut-based products and by-products has experienced a cyclical past, the future presents growth opportunities for competitive nations and industry stakeholders within the industry. Volatility in prices has mainly been due to the increasing competition from other edible oils in the world market, like palm and soybeans; as well as fluctuations in fossil fuel prices which drives the demand for alternative renewable fuel sources[129].

As shown in Figure 5-17, Europe is the largest international buyer of coconuts oil and coconuts and demand is continuing to grow. This is likely due to the refined taste of consumers for healthy edible oil, high-value confectionery, and high quality personal care products.

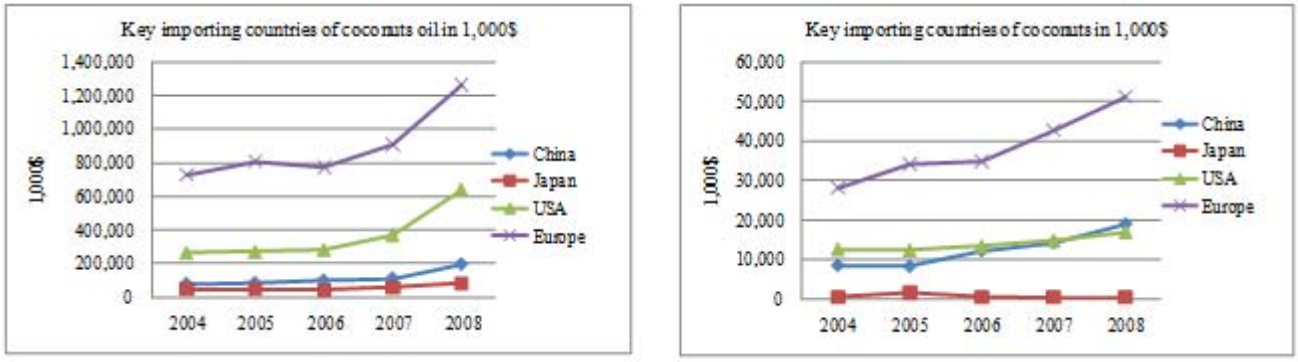


Figure 5-17: Key Coconuts Oil Importers

Source: FAOSTAT (2010)

[128] Final Report on Potential Products Survey, Basilan, Sulu and Tawi-Tawi provinces, Mindanao Autonomous College Foundation, Inc., 2010.

[129] CoCoPal Value Chain Analysis, A Systematic Overview of the Coconut, rice and Cacao Value Chains in Mindanao to Design USDA CoCoPal Program Recommendations, ACDI/VOCA, 2010.

With the emergence of new studies pointing to the health benefits of coconut and coconut-based oils, the USA is a likely market for growth in high-end market segments, especially non-traditional products such as Virgin Coconut oil, Nata de Coco, Shell Charcoal, etc. Coconut already has a stable and growing market both inside and outside of the ARMM (Figure 5-18). Its potential marketability is significant for the variety of processed products as mentioned in the above. In the U.S. market, for example, coconut sugar is drawing attention as alternative of sweetener[130].

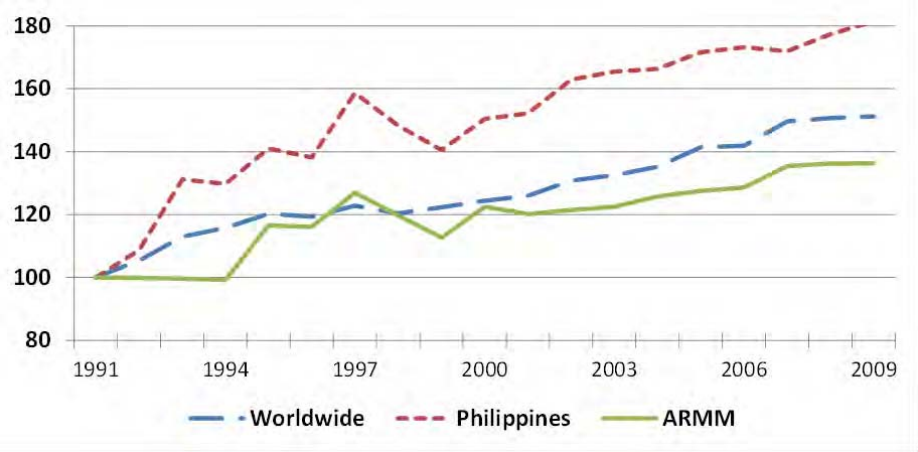


Figure 5-18: Total Amount of Coconut Production (1991=100)
Source: FAO, BAS

As for by-products, for example, coconuts coir and dust extracted from coconuts husk, are experiencing an increase in demand from China[131]. Nevertheless, the systematic collection of the material in big volume and the transportation costs to bring them into a processing plant are issues for introducing these products into the industry. This is because the coconut coir and dust processing business is only profitable when on a large scale.

5-2-6-3 Main Issues and Constraints

(1) Low productivity of copra

Copra production is one of the major coconut industries performed by coconuts farmers. Productivity of copra is low, i.e., 670 kg/ha in Maguindanao[132], because optimum fertilization with salt is not practiced widely with limited source of dwarf hybrid varieties. It is partly due to

[130] http://www.sugarcoconut.com/blogs.html
http://blog.agriculture.ph/coconut-sugar-cheap-and-healthy-sugar.html
[131] Interview with Pontmain Resources, Inc., St. Cruz and Bureau of Micro Small & Medium Enterprise Development, DTI, Manila.
[132] Potential Products Study in Maguindanao, CeMILARDe Foundation, Inc., 2010.

reluctance for investment in coconut farming by farmers and less advocacy of the industry.

(2) Low quality of copra

Quality of copra for oil extraction largely depends on drying methods. Traditionally, copra is dried under sun alongside of tarmac roads and, in order to increase the rate of drying, drying over burning husks and woods has been introduced. This direct drying leads to darker copra, due to sooth produced from the flame. Kukum dryer has been introduced and technical assistance also being provided by oil processors. However, adaptability such high quality drying structure is still low, due to financial constraints.

(3) Slow rate of coconut-based intercropping

Coconut tree is suitable to practice intercropping with other crops; however, the technology is not widely practiced. As a result, crop diversification promoted by DA is also dull. Bio-resources as input for farming exist many in the ARMM; nevertheless, they are not fully utilized in coconut production.

(4) Very little value-adding coconut processing and utilization of by-products

Although coconut is called “Tree of Life” because it can be used for various purposes, coconut possessing to add values are very limited in the ARMM, such as coconut jam, coconut sugar and syrup, vinegar, and liquor from coconut meat and coconut sap, and charcoal, twine, and geo-textile from by-products i.e., coconut shell, husk, coir and dust.

(5) Lack of quality control in coconut sugar manufacturing

Production of coconut sugar is becoming very popular business for small to medium scale farmers. Coconut sugar is produced from fresh coconut sap collected from unopened spadix. Immediately after the collection, the sap needs to be processed. Due to a lack of quality management of sap collected, the resulting sugar varies in color and develops even darker color after certain periods of shelf-life.

(6) Lack of production technology for vinegar and sprits

Coconut sap contains naturally occurring enzymes and yeasts which proceeds natural fermentation of sap into vinegar and alcoholic beverages. These products are traditionally accepted and widely produced by small to medium scale producers. However, the producers lack in basic knowledge on food processing and hygiene, which lead to improper fermentation causing contamination or making products unsafe for human consumption.

(7) Less capacity for advocacy of PCA Region XIV-ARMM

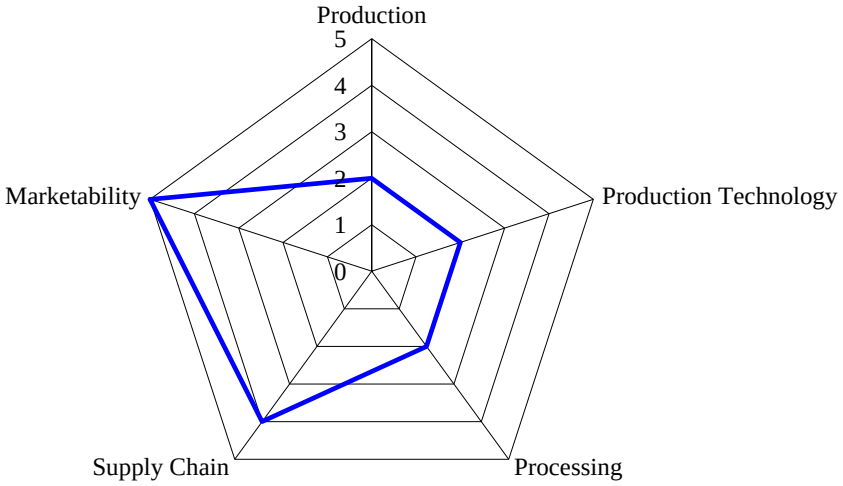
There are only 12 personnel who undertake extension services of PCA Region XIV-ARMM and it conducts little training on coconut processing. It has a total of only 32 personnel who serve the coconut industry in the ARMM with over 300,000 ha with more than 100,000 coconut farmers and farm workers. On top of that, dissemination of market information is limited due to inactive extension and inability for farmers to access to communication media.

(8) Lack of access to affordable and easily accessible agricultural credit

Farmers are not willing to risk in accessing loans with collaterals especially land mortgages because these lands are their last resorts for survival. Besides, there are voluminous requirements of getting loans from banks and credit institutions and farmers do not appreciate such procedures.

5-2-6-4 Evaluation

Based on the described current situation above, current situation of coconut is evaluated as follows:



Category	Score	Reasons for Evaluation
Production	2	3.25 million ha is cultivated with coconut in the Philippines which is about 1 million ha larger than palay farm. The ARMM contributes 14% to total production in Mindanao. Although coconut is a dominating crop, it creates the lowest value per ha among crops.
Production Technology	2	There is a need to improve productivity. Higher production and productivity levels via application of better varieties and balanced nutrition or fertilization could improve it. Sustainable coconut-based integrated farming for diversification should be accelerated to increase income sources for majority of smallholders. Post harvest operation especially conventional drying copra changes color of copra to blackish which is evaluated low in quality.
Processing	2	There is one crude oil processing plant in the ARMM; the BJ Coco Oil Mill in Sulu province. Apart from oil extracted from copra, there are innumerable processed products or by-products from coconut in general; however, value-added processed products represented by coconut sugar are not promoted yet in the ARMM. Use of by-products is also inactivated.
Supply Chain	4	Distribution channel of copra is established from the ARMM to its destinations including export of oil. Nevertheless, as for by-products, e.g. coir and dust, systematic collection of the material in big volume and transportation costs to bring them into a processing plant are issues for activating the industry.
Marketability	5	Europe is the largest and growing international buyer of coconut oil and coconut products due to its refined taste as healthy edible oil, high-value confectioneries, and high quality personal care products. Coir and dust from coconut husks as by-products are the one which demand is increasing in China

5-2-7 **Coffee**

5-2-7-1 Background

Known as the second most consumed beverage in the world, coffee occupies an important place in the world economy. It is not a food; instead it is a nonessential grocery item; therefore, there are incorrigible lovers and niche buyers in the world markets regardless of prices, especially in developed areas like EU and Japan. Besides, this soluble or instant coffee is a household staple even among the lower economic classes in the Philippines. Coffee is one of the priority commodities to be promoted by the Department of Agriculture (DA). According to DA, the country has been encountering growing shortage of coffee.

5-2-7-2 Current Situation

(1) Production

The country is one of the few nations that produce four varieties of coffee. They are Arabica, Excelsa, Liberica and Robusta. The number of matured trees is summarized in Table 5-28 and Robusta remains the major variety with almost 75% share of the total trees in 2009.

Table 5-28: Number of Matured Coffee Tree in the Philippines

Variety	2008	2009
Arabica	13,957,631	13,442,739
Excelsa	6,239,477	5,960,179
Liberica	980,529	954,398
Robusta	64,351,373	64,321,585
Others	229,166	227,289
Total	85,758,176	85,442,739

Source: BAS (2010)

The total production of coffee in the Philippines was 96,433 tons in 2009 and roughly 75% of the country's coffee output comes from Mindanao. In the ARMM, the major sources of coffee are Sulu, Maguindanao and Basilan provinces and their share of the total in the ARMM is 46%, 31%, and 19%, respectively, as shown in Table 5-29.

In terms of yield, the Philippines registered an average of 1.23 kg/tree. The highest yield per tree was recorded at 3.38 kg in Central Luzon followed by Western Mindanao with 3.21 kg and then the ARMM with 1.67 kg (DTI).

Table 5-29: Production of Coffee (ton)

	2005	2006	2007	2008	2009
Philippines	105,847	104,093	97,877	97,428	96,433
Mindanao	79,173	77,667	73,274	72,674	71,822
ARMM	10,958	11,000	10,844	10,922	10,737
Maguindanao	3,648	3,649	3,360	3,363	3,370
Lanao del Sur	292	299	294	279	297
Basilan	2,057	2,090	2,105	2,050	2,032
Sulu	4,829	4,839	4,942	5,092	4,911
Tawi-Tawi	132	124	143	137	128

Source: BAS (2010)

According to BAS, total coffee production declined slightly from 97,428 tons in 2008 to 96,433 tons in 2009 and this downtrend in production of 1.02% was a result of the prevailing and continuously unstable peace and order situation in Sulu and excessive rains during the flowering stage, which hampered harvesting efforts in coffee farms. Production is also projected to decline by 2-3% in 2010 as a result of the hot and dry weather conditions experienced due to the El Nino phenomenon[133].

Sulu province is the fourth largest producer with about 5% share in the nation in 2008. In terms of production of each variety, Sulu is the top producer for Excelsa with a 20% share, the fourth for Arabica with a 5% share, the second for Liberica with a 22% share, and the ninth biggest producer for Robusta with a 4% share. Looking at production at the municipal level in Sulu province, where data was available, as shown in Table 5-30, the remarkable producers are Patikul, Parang, Talipao, Panglima Estino, Luuk, and Indanan with total coffee production area of 2,261 ha.

The average yield in Sulu is 2.28 tons/ha. Low productivity of the coffee beans in Sulu is due to, i) poor maintenance practices of farmers, ii) poor harvest technology, iii) poor harvest handling methods and iv) inadequate post-harvest facilities, according to the Provincial Agricultural Office of Sulu province.

[133] Gain Report, Philippines, Coffee Annual, Global Agricultural Information Network, USDA.

Table 5-30: Coffee Production in the Municipalities of Sulu

Municipalities	Area planted (ha)	Production (ton)	Productivity (ton/ha)
Indanan	82.00	196.80	2.40
Jolo	-	-	-
K. Caluang	55.00	123.75	2.25
Lugus	39.00	87.50	2.24
Luuk	85.00	196.80	2.30
Maimbung	10.75	24.00	2.20
Panamao	35.00	78.75	2.25
Pandami	2.00	4.50	2.25
Panglima Estino	160.00	360.00	2.25
Panglima Tahil	-	-	-
Pangutaran	5.00	11.25	2.25
Parang	260.00	585.00	2.25
Pata	2.00	4.50	2.25
Patikul	1,570.00	3,542.00	2.26
Siasi	50.00	157.50	3.15
Talipao	104.00	234.00	2.25
Tapul	4.00	9.00	2.25
Banguingui	-	-	-
Total	2,463.75	5,615.35	2.28

Source: DA, Sulu (2009)

(2) Production Technology

The coffee cultivation method practiced by a farmer in Tacurong city of Sultan Kudarat province; however, which is not in the ARMM, is illustrated in Box 5-6, to substitute for the limited technical information at the producers' level for coffee cultivation in the ARMM. One can consider that this case is a more or less better example compared to some methods performed in the provinces of the ARMM.

The problem in the above case is the low quality of harvested cherry, because hired labors do not care about the quality due to the payment system which is usually based on quantity they harvested. They never harvest selectively but pick up any cherries on the branches of the coffee trees. As a result, the recovery of high quality cherry is low.

This farmer would like to produce and sell organic coffee to the niche market instead of Nestle Philippines so that an extra Php 20-50/kg will be gained compared with the regular coffee farm gate price given by the firm. To do so, the farmer distributes earthworm to neighboring farmers to let them practice organic coffee farming. The response from products grown with the use of organic fertilizer is not dramatically different in the short term. In the long term, synthetic fertilizer application will be reduced and soil fertility will be recovered, leading to cost reductions and an increase in total income if organic farming is introduced. Introducing organic

farming is one of the approaches for coffee producers to segregate the market and break into the niche market.

Box 5-6: Example of Coffee Cultivation Practiced by a Producer

An oculist got married with a farmers' daughter and they started coffee production. He cultivates 50 ha of coffee with 9 other members of a cooperative. The variety of the coffee is Robusta and all the coffee cherry is shipped to the buying station of Nestle Philippines located in Davao. The coffee farm gate price fluctuates weekly; however, it ranged from Php 80 to 90/kg at the time of these interviews. The following is the farm work sequence and inputs.

i) Seedlings: Provided by Nestle Philippines free of charge (Market price is Php 8-10/seedling).

ii) Planting density: 900-1,000 seedlings/ha intercropped with rubber, corn, upland paddy and papaya.

iii) Fertilization: Applied with compound NPK 14-14-14 and urea 46-0-0. Supplemental organic vermicompost is also applied.

iv) Pest control: Use of chemicals is minimal; but, vermin tea[134] diluents with a 1-16 fold is applied by the use of a knapsack sprayer as biological repellent.

v) Harvesting: Labor is hired at Php 2 per 2kg of harvest during the season from September to February.

Source: Interviews with a coffee farmer, Tacurong city, Sultan Kudarat province.

High quality green coffee beans are well accepted by the markets. Quality green coffee beans are produced through selective harvesting and post-harvest processing facilities. However, most of the coffee growing smallholders practice non-selective harvesting without care in the ARMM. It leads to post-harvest loss in quality and quantity. On top of that, senile trees are lowering productivity. The coffee growing smallholders need to acquire adequate knowledge and technology in production. The technical improvement on cultivation method and post-harvest is essential in the ARMM.

(3) Processing

The processing up to roasted coffee beans or coffee powder is performed by processors. The farmers' main task is to produce green coffee beans. The quality of green coffee is much affected by harvesting method and post-harvest operation. Most of farmers in the ARMM produce coffee green beans and sell them to buyers or processors. One of the big processors in

[134] Vermi tea is made by cast of earthworm.

Mindanao is Nestle Philippines.

There is a case of cooperative producing final products in Sulu province. It is the People's Alliance for Progress Multi-Purpose Cooperative (MPC). It was officially registered with 254 members. The chairperson of the MPC, participated in coffee training conducted by Nestle Philippines in 2008. Thus, the MPC could apply coffee technology obtained and has thrived and succeeded in the coffee business.

The cooperative leader has been exhaustively exploring various linkages both within and outside Sulu to promote their coffee. The cooperative has a total coffee farm land area of 254 ha, mostly intercropped with coconuts and cassava. In 2010, the cooperative produced 1.2 tons of mixed Robusta, Arabica, Excelsa and Liberica coffee powder under the Royal Coffee brand and 300 kg of Alamid Coffee. The production of specialty coffee by the cooperative is very limited. The Alamid coffee is extracted from the dung of civet cats that eat only the ripe coffee cherries. In Manila, the selling price of the Alamid Coffee is Php 3,000 per kg and that of the Royal Coffee is Php 1,000 per kg. More than the quantity, it is the quality of their coffee products that makes them valued by buyers particularly from outside the region.

Meanwhile, Sulu province has a coffee processing center. It is an LGU project managed by the Sulu Provincial Cooperative Union (SPCU). The center plays a significant role for the coffee producers in the province particularly the small-scale one. The center purchase the ripe coffee berries delivered by the farmers at reasonable price.

(4) Supply Chain

The value chain was observed in Maguindanao. It is a case of coffee produced in Upi as shown in Table 5-31. Although most of the coffee cherry/beans is shipped to Nestle Philippines and other firms, the supply chain in the local market has the following flow; i) collection, ii) trading, or iii) processing, and iv) selling..

Table 5-31: Example of Value Chain of Coffee Produced in Upi of Maguindanao Province

Actor	DAF-ARMM Nestle	Farmers	Barangay or Town Traders	Processor
Product	• Technology • Training • Planting material	• Green Coffee Beans	• Green Coffee Beans	• Quality and graded dried coffee beans • Processed beans • Powdered coffee
Place	• DAF-ARMM • Nestle Nurseries	• Upi	• Traders in Cotabato City • Buying station in General Santos & Davao Cities	• Nestle processing Plant in Cagayan De Oro City
Activities	• Technology dessimination • Input supply	• Cultivation • Harvesting • De-pulping • Drying	• Upi Trading • Cotabato City trading • House-based processing	• Grading • Processing • Shipping
Price	• Seedling pick up price at Nestle: Php 8 • Seedling pick up price at Upi: Php 10	• Farm gate price of coffee green beans: Php 70/kg	• Selling price: Php 75/kg to Cotabato City trader • Selling price: Php 80/kg to Cotabato city powder processor	• Buying price of coffee green beans at Nestle: Php 110/kg
Cost	• Low capacity of the ARMM government for technology dissemination	• Prodcution cost: Php 40,000 /ha • Transportation cost: Paid Php 5 per sack to Upi traders	• Transportation cost: Php 20/sack of coffee beans from Upi to Cotabato	• n.a
Scale	• n.a	• Productivity: 3.0 tons/ha	• n.a	• Market: Domestic and international markets
Issues	• n.a	• No nurseries yet of coffee for cuttings in Upi • Stealing of coffee fruits before harvesting • Non-selective harvest • Stray animals destroying the coffee plantations.	• Quality of beans not consistent to standards required by Nestle	• n.a

Coffee farmers harvest coffee cherry and then dry them under the sun. The skin is removed from the dried cherry by a machine. They are then packed, ready for the market. Coffee beans are sold to middlemen who sell them in large volume to traders in Cotabato City. The big

traders sell them to retailers who roast and grind the beans for coffee shops and consumers. The beans are roasted and ground into powder. It is packaged in paper bags or plastic which are also then sold to consumers.

The price of coffee increases when the demand is high in market. However, coffee farmers earn less in remote areas where middlemen dictate the price of coffee. The farmers have no choice to sell because few middlemen visit the remote areas and cover the transportation costs. There is no competition among buyers; consequently, the farmers are price takers as a result. When they opt to sell directly to the market, they end up paying high transport costs.

(5) Marketability

Global demand for coffee is estimated at 137,000 million bags (50 kg each), with the USA as the biggest market, followed by Brazil, Germany, Japan, and Italy, according to DA. Coffee has a potentially big domestic market as well. Coffee is considered a household beverage in the Philippines. Today, soluble or instant coffee dominates about 90% of all coffee consumption domestically. Domestic coffee consumption seems to be increasing slightly, due to a predicted increase in all food and beverage consumption as the domestic economy recovers. Meanwhile, Nestle Phil Inc. accounts for 85% of the coffee market in the country.

The trade data from the National Statistics Office shows that the import of coffee beans increased from 15,700 tons in 2008 to 30,700 tons in 2009. The beans are imported from the neighboring countries. Major partners are Vietnam and Indonesia. There might be informal trade between the islands of the ARMM and Indonesia or Malaysia. Soluble coffee is also imported and the volume increased from 13,960 tons in 2008 to 19,293 tons in 2009[135]. Therefore, there is certainly room for domestic coffee producer to fill the increasing domestic demand.

The global market is growing as mentioned, especially boosted by the change of lifestyle in emerging countries with high economic growth (Figure 5-19). For marketing of coffee, branding strategy is one of the most important issues as well as price or quality, because consumers will select coffee by its brand more often than the case of other commodities. To promote coffee of the ARMM, developing its brand value is important matter as well.

[135] Gain Report, Philippines, Coffee Annual, Global Agricultural Information Network, USDA Foreign Agricultural Service

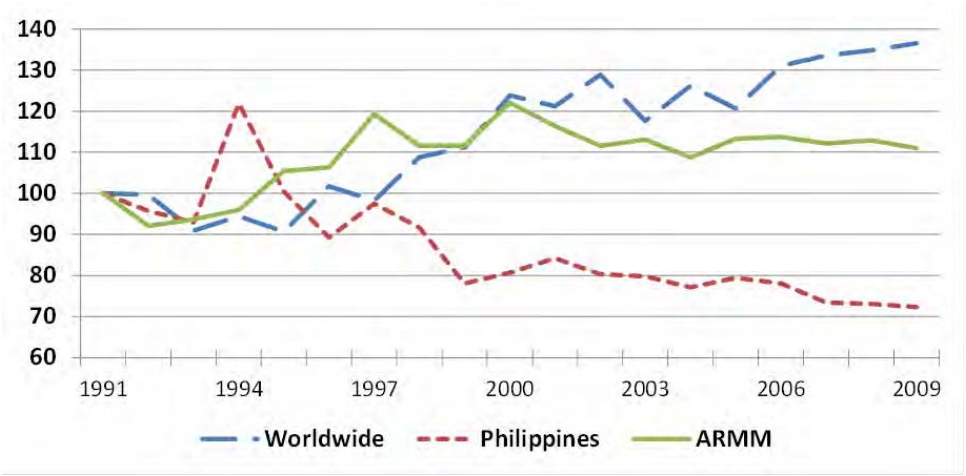


Figure 5-19: Total Amount of Coffee Production (1991=100)
Source: FAO, BAS

People in Sulu, which have many coffee shops, drink coffee five times a day[136]. This Sulu's case is not merely particularity in Sulu. Muslin areas are well known as a place for coffee drinkers especially in remote areas. Moreover, there is a trend for the young Filipinos to like coffee drinks. Coffee shops are increasing in number in the country and some franchised coffee shops are gaining popularity among the younger generation, especially in urban centers.

The niche market can be targeted by those who produce high value coffee such as organic coffee[137] and Alamid coffee. Alamid coffee or civet coffee is seen as having high value. This can be observed in the Panamao and Talipao municipalities of Sulu. A multipurpose cooperative with 200 members in Sulu produces Alamid coffee and its farm gate price is Php 3,000/kg. It is shipped to Sabah of Malaysia and Manila. It is said that roasted Alamid coffee bean is sold at Php 10,000/kg. However, some farmers never touch such waste material from wild cats, due to their religious beliefs.

To promote high value coffee, it is important to search the market channels with a branding strategy which differentiates the quality or value of the coffee. This might be an attractive story behind the coffee beans. With organic coffee, the first step is to obtain certification by an authorized or internationally recognized organization[138]. To do so, farmers must make sure their

[136] Interview with DA, Sulu province.
[137] This organic coffee is not officially certified as organic coffee by an authorized organization for accreditation though the cooperative considers it as organic coffee because the coffee is produced under primitive way simply without using any inputs.
[138] The Government of Philippines promotes organic agriculture under Republic Act No. 10068; An Act Providing for the Development and Promotion of Organic Agriculture in The Philippines and for Other purposes. Refer to foot note No. 61 for more detail.

farming methods meet the requirements of the accrediting organization.

5-2-7-3 Main Issues and Constraints

(1) Low productivity of green coffee beans

Productivity of Robusta coffee in the ARMM is low; productivity per tree in the ARMM is 1.67 kg compared to the highest yield of 3.38 kg in Central Luzon followed by Western Mindanao with 3.21 kg[139]. Traditional method of extensive farming is dominating in the ARMM; therefore, appropriate cultivation method with intercropping should be disseminated to avoid risk of mono cropping. In Sulu, coffee farming is still traditional and not intensive one. The conventional method does not apply any cares like fertilizer application and weed control. Moreover, senile coffee trees lower productivity. In addition, producers are provided with less information on coffee cultivation technology.

(2) Poor quality of green coffee beans

Selective harvesting is not well adopted; thus, ripe and unripe coffee cherries are all harvested at once. Flotation to separate ripe berries from harvested mass by use of water is not widely practiced. Thus, insect-damaged or unripe berries are thus transferred to the next process. Sun-drying of the berries is performed on road side or at back yard on ground. Therefore, there are many chances for the material to mix with impurities. As a result, the quality of green coffee beans is low and not appreciated by processors, leading to low farm gate prices offered by consolidators or traders.

(3) Unawareness and misunderstanding of organic coffee by producers

Organic coffee production is not merely using organic fertilizer as inputs to coffee farming. It is still a coffee production method respecting the rules of the nature. It maximizes the use of on-farm resources and avoids the use of off-farm inputs especially chemical fertilizers and pesticides. As for organic certification, accreditation process of organic coffee by domestic or international bodies[140] is not well-informed or understood by farmers although some coffee

[139] DTI

[140] According to Republic Act No. 10068 of the Government of the Philippines, An Act Providing for the Development and Promotion of Organic Agriculture in The Philippines and for Other purposes, terms of "Organic" refers to the particular farming and processing systems, described in the standards and not in the classical chemical sense. The term "Organic" is synonymous in other languages to "biological" or "ecological". It is also a labeling term that denotes products considered organic based on the Philippine National Standards for Organic Agriculture. The Act then defines "Organic Agriculture". Organic agriculture includes all agricultural systems that promote the ecologically sound, socially acceptable, economically viable and technically feasible production of food and fibers. Organic agriculture dramatically reduces external inputs by refraining from the use of chemical fertilizers, pesticides and pharmaceuticals. It also covers areas such as, but not limited to, soil fertility management, varietal breeding and selection under chemical and pesticide-free conditions, the use of biotechnology and other cultural practices that are consistent with the principles and policies of the act, and enhance productivity without destroying the soil and harming farmers, consumers and the environment as defined by the International Federation of Organic Agriculture

producing cooperatives produce organic coffee without being exposed to certification and procedure for organic coffee.

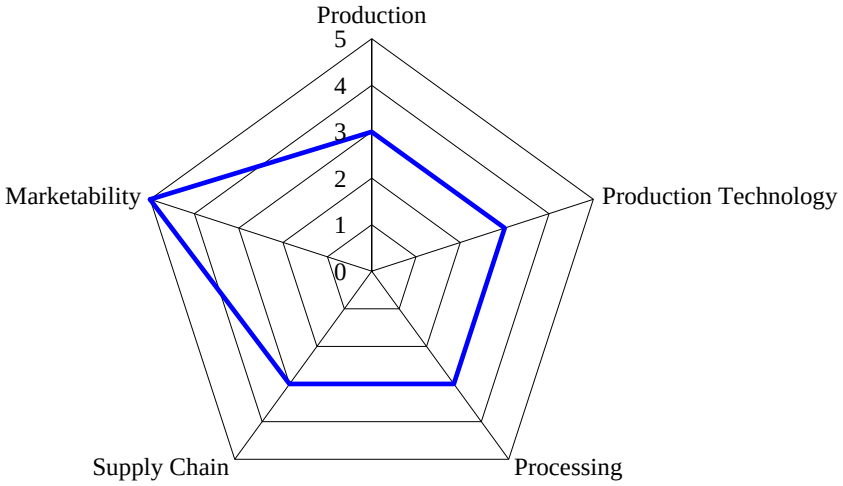
(4) Lack of market linkage and consolidation

Even if quality green coffee beans are supplied, it is not reflected to farm gate price given by middlemen supplying them to coffee firms. The price is dictated by them, taking advantage of the traders' position in power balance between them and individual producers who are not apt to consolidate or group to increase bargaining power or to decrease unit cost for post-harvest processing and transportation of bulk of beans. Moreover, branding of green coffee beans to break in market especially niche market has not yet been activated in the ARMM because producers are not aware of such strategy to create marketability of the products. Organic coffee or area specific produced coffee should be focused in branding of coffee.

Movement (IFOAM). National Organic Agricultural Board (NOAB) is the organization which carry out the policy and program provided in the Act. NOAB is attached to the Department of Agriculture (DA).

5-2-7-4 Evaluation

Based on the description of current situation of coffee in the above, current situation of coffee in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	3	The Philippines is one of the few nations producing four coffee varieties, Arabica, Excelsa, Liberica and Robusta. Mindanao dominates 75% of total coffee production of the Philippines. The ARMM contributes about 11% to total production of the country.
Production Technology	3	Productivity of Robusta coffee in the ARMM is low; productivity per tree in the ARMM is 1.67 kg compared to the highest yield of 3.38 kg in Central Luzon followed by Western Mindanao with 3.21 kg. Some producers are not aware of organic coffee though they sell roasted or grinded coffee beans as organic coffee.
Processing	3	Nestle is the one which activates coffee industry as a buyer of green coffee beans from farmers and process them into commercial products. However, very few cases are seen that farmers' groups process them into final products like roasted coffee beans.
Supply Chain	3	Distribution channel is established and most of the farmers sell green coffee beans to traders who convey the beans to processing firms; however, the farmers in rural have no choice to sell the beans to few middlemen visiting the areas and have to cover the transportation costs.
Marketability	5	There are big international and domestic markets. Soluble or instant coffee dominates about 90% of all coffee consumption in the country. Coffee shops increases and franchised coffee shops get popular. However, imports of coffee beans increased from Vietnam and Indonesia. Soluble coffee is also imported and it increased its volume. Therefore, there is a room for domestic producer to fill the increasing domestic demand.

5-2-8 **Mango**

5-2-8-1 Background

A mango variety widely grown in the Philippines is known as "*Carabao*" and develops very distinctive yellow color when it reaches maturity stage. It also produces attractive flavor, texture and taste. Thus mango is very popular both in the domestic and export markets. In addition to such attractive attributes, mango has high nutritive values such as vitamins C, B1, B2 and provitamin A.

Mango is the national fruit of the Philippines and is ranked as the third most important fruit crop following bananas and pineapples. The markets for mango are well established domestically and internationally for both fresh fruit and processed products. Approximately 95% of the total mangoes produced are consumed in the domestic market and the rest is for export. Today, the Philippines mango industry sustains approximately 2.5 million farmers nationwide.

5-2-8-2 Current Situation

(1) Production

The total annual production of mangoes ranged between 890,000 tons and 1 million tons in the last five years, as shown in Table 5-32.

Out of the total production in the nation, Mindanao accounts for about 20%. The ARMM contributes some 7% of the total production in Mindanao and is ranked fifth among other regions. As for the cultivation areas of mango, the production area in Mindanao increased at a rate of 9% annually from 2000 to 2005. During the period, although production occupied a small portion in Mindanao, the ARMM recorded the highest growth rate of the cultivation area at 39%. In addition, Sulu and Maguindanao are the two top producers of mango in the ARMM.

Table 5-32: Production of Mango (ton)

	2005	2006	2007	2008	2009
Philippines	984,342	919,030	1,023,907	884,011	771,441
ARMM	14,462	14,414	14,846	12,094	14,752
Maguindanao	5,291	5,303	5,522	3,172	4,308
Lanao del Sur	150	133	119	118	117
Basilan	224	215	226	219	218
Sulu	8,273	8,230	8,459	8,096	9,616
Tawi-Tawi	524	533	521	488	492

Source: BAS (2010)

The mango variety of Sulu is *Indian mango* or *katchamitha*, one of the less-exported varieties; on the other hand, *carabao* or *manila super mango* is produced in Maguindanao. Though production of mango is at its largest in Maguindanao, among other provinces in the ARMM, productivity is the lowest, at less than 1.0 ton/ha. Productivity in Sulu is the highest; it is higher than the national average, as shown in Table 5-33.

Nevertheless, the *katchamitha* variety of Sulu has less value than the *carabao*, because the former's average farm gate price has been Php 6/kg from 2005 to 2009; on the other hand, the latter's average price in the same period was Php 28.5/kg.

Table 5-33: Productivity of Mango (ton/ha)

	2005	2006	2007	2008
Philippines	6.00	5.35	5.56	4.73
ARMM	1.26	1.26	1.29	1.04
Basilan	2.40	2.31	2.43	2.35
Lanao del Sur	3.76	3.17	2.84	2.81
Maguindanao	0.54	0.55	0.57	0.33
Sulu	6.84	6.72	6.51	6.00
Tawi-Tawi	1.53	1.50	1.45	1.32

Source: BAS (2009)

(2) Production Technology

Mango is categorized as highly perishable climacteric fruits and is considered to be possible to control post-harvest ripening. However, mangoes are also known to be susceptible to cold temperature and physical injuries as well. Furthermore, the highest attention may need to be paid to disinfection when it comes to export markets, since mangoes can easily create quarantine problems, such as fruits flies. Thus, fresh export of mango still requires more research works on post-harvest ripening control and, disease and insect infections[141].

Results of research and development on pre- and post-harvest technology of mango production in the Philippines are well published and disseminated by institutions or programs like the Agricultural Training Institute and High Value Commercial Crops (HVCC) Program of the DAF; meanwhile, the mango business varies according to the functions of the farmers and workers in the field..

[141] Jacobi, K.K., MacRae, E.A., Hetherington, S.E, 2001, "Review – Post-harvest heat disinfestation treatments of mango fruit", Sientia Horticulturae, 89, 171-193.

To increase the harvest, the farmer makes a contract with a mango fruit sprayer group, locally called an "enhancer" in the case of Maguindanao province[142]. The group takes charge of the cost of the chemicals and spraying to promote flowering. It also carries out the caring and management of the trees during the period of development of the fruits until the harvest. The arrangement between the mango trees' owners and the enhancers is one of crop sharing. The standard agreement is that one-third goes to the owner and two-thirds are taken by the contractor. At harvest, the owner has the option to sell his portion to the contractor.

(3) Processing

About a quarter of the total mango production is processed and the mango processing sector produces various product forms of mango such as mango puree, mango juice, dried mangoes, mango concentrates, frozen mangoes, mango glaze, edible parts, mango in brine and mango preserves. Processors are generally small and medium scale processors.

Many small-to-medium scale business operators are engaged in dry mango production, widely in the nation but very popular in Cebu. Cebu dry mango is widely known and established brand, and DTI Region VII assists such mango processors by introducing export markets and quality requirements, among others. Thus, close collaboration between government and business sectors is inevitable in the current success of Cebu dry mango.

Some small-scale manufactures in Cebu indicated that they are making efforts in order to produce softer product, without depending on much less amount of chemical preservatives. Dry mango products are usually made from matured but relatively sour mangoes, which are dried after mixing with powder sugar. Sugar powder prevents mold growth by lowering water activity and provides adequate sugar/acid ratio. Final texture, either soft or hard, is determined by the final moisture content of drying operation usually at 60℃ or below. The discoloration or browning, can be developed by the use of sweet mangoes, high sugar content of raw mangoes or prolonged drying operations, among other production conditions.

Some processors are also involved in manufacturing fruit-flavored sweets such as soft candies, and this indicates the possibility of preserving essential components of mangoes immediately after harvesting, and storing such attractive properties until its use as ingredients for further processing. More potential seems to exist in the ARMM but this surveillance in the region, did not come close to much efforts or encouragements made to help business sectors as was in Cebu. Fresh mangoes can be harvested during its green and highly acidic stage, and processed into

[142] Potential Products Study in Maguindanao, CeMILARDe Foundation, Inc., 2010.

sweetened dry mango, mango slices or cubes in syrup, or changing into mango puree or nectar for further production of juice, different types of beverages, and flavoring agents. In such forms, mangoes can be utilized constantly even during low production season from July to January. More attention may need to be paid to this particular commodity.

The mango juice category is dominated by two large food manufacturing companies in the country: San Miguel Corporation and RFM Inc. Mango juice concentrates for export from 1995-2004 has increased by around 160% per year while other processed products also posted bullish growth rates: dried mango (25%), and mango puree (49%)[143]. Dried mango of many brands can be even accessible through internet. Many of the mango puree processors are located in the National Capital Region and surrounding Luzon provinces such as Bulacan, Pampanga, Laguna and Cavite. Majority of the processors for dehydrated candies and puree mangoes are located in Cebu[144]. Therefore, it seems to be that processing industry in the ARMM has more possibility to break in markets; however, competition is relatively high with those areas.

(4) Supply Chain

The supply chain of Mango (*carabao*) produced in Maguindanao province is illustrated in Figure 5-20. The enhancers are one of the key players in the chain, buying fruits from farmers or being provided a contracted volume of mango from farmers and they transport the fresh mangoes and wholesale them to processors or sell them to retailers.

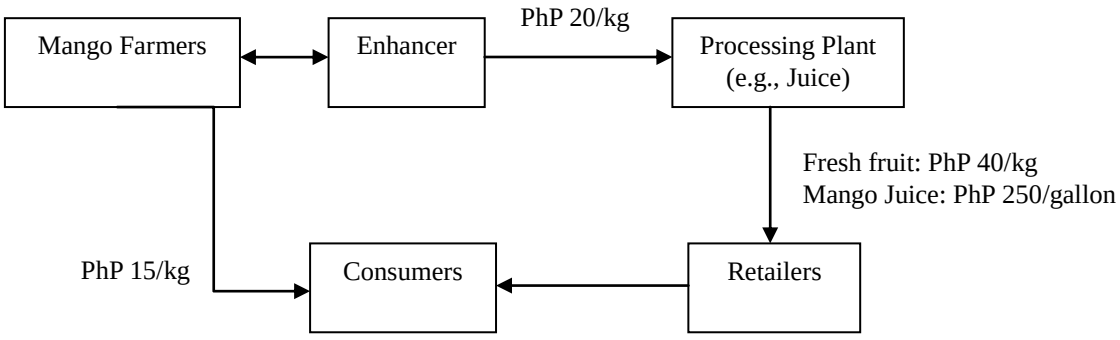


Figure 5-20: Supply Chain of Mangoes (*carabao*) Produced in Maguindanao

Although only limited information on the supply chain of mangoes produced in Sulu exists, there is an example of the supply chain in another island, Tawi-Tawi, as shown in Figure 5-21. Farmers plant mangoes as the delicacy (dried mango) of places in the vicinity, such as Cebu and

[143] RBOI.
[144] RBOI.

Manila. Upon harvesting, farmers sell their fresh mango products directly to the local community; the others are then sold to the markets. Since the means of transportation are expensive and the mango farm is far from the market, farmers are essentially forced to sell their products to the local traders. Then the traders ship the products to Bongao and sell them in markets for the end buyer's consumption.

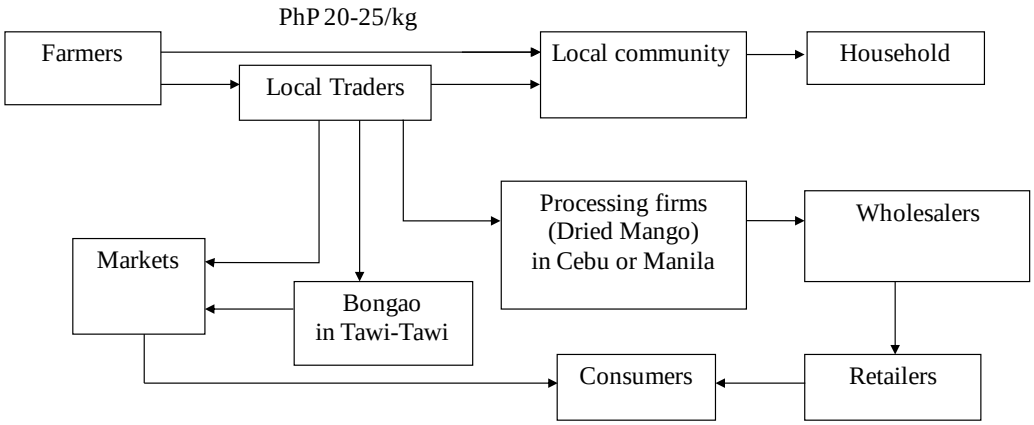


Figure 5-21: Supply Chain of Mango Produced in Tawi-Tawi Province

As shown in Figure 5-26, local traders are engaged in the "buy and sell" business. They transport fresh mangoes to manufacturing firms in Cebu and Manila to process them into dried mangoes. The processing firms distribute the processed product to the wholesalers. The consumers are the localities and most of the vacationers purchase the product as "pasalubong[145]" when they go back to their hometowns.

(5) Marketability

International and local demand for mango products has been increasing. Specifically, export of mango juice concentrate increased by about 160% per year from 1995 to 2004. Other processed products increased the contribution to exports. These are dried mangoes and mango puree. Meanwhile, multinational firms like Dole and Lapanday Foods Corp. have invested in mango production.

More than 90% of the nation's mango supply goes to domestic markets, in which 75% is consumed as fresh fruit and the remaining 25% is processed into various forms. On average, the national per capita consumption of ripe mango is estimated at 0.06 kg per week, which is

[145] "Pasalubong" means souvenir.

equivalent to 0.1-0.2 pieces of ripe mango[146] (*carabao*), or 3.17 kg per year, which in turn is equivalent to 8-12 pieces in 2008/2009.

By region, the estimated per capita consumption of mango in Central Luzon is 4.94 kg per capita a year, or about 12-19 pieces, while in Western Visayas, it was only 1.77 kg per capita a year, or 4-7 pieces. Meanwhile, the average annual mango consumption of the ARMM is less than the national average, as summarized in Table 5-34.

Table 5-34: Estimated per Capita Consumption of Ripe Mango by Some Regions (kg/person)

Some Regions	Weekly					Annual
	Aug. 2008	Nov. 2008	Feb. 2009	May 2009	Average	
Philippines	0.020	0.018	0.066	0.138	0.061	3.172
Central Luzon	0.007	0.005	0.131	0.236	0.095	4.940
Western Visayas	0.011	0.012	0.025	0.086	0.034	1.768
Central Visayas	0.021	0.020	0.049	0.122	0.053	2.756
Northern Mindanao	0.039	0.052	0.048	0.097	0.059	3.068
Davao region	0.046	0.049	0.055	0.087	0.059	3.068
ARMM	0.035	0.042	0.050	0.040	0.042	2.184

Source: BAS (2010)

The Philippines mango is exported to 48 countries. The major markets are Hong Kong and Japan where the combined market share of mango from the Philippines is nearly 65% as shown in Figure 5-22.

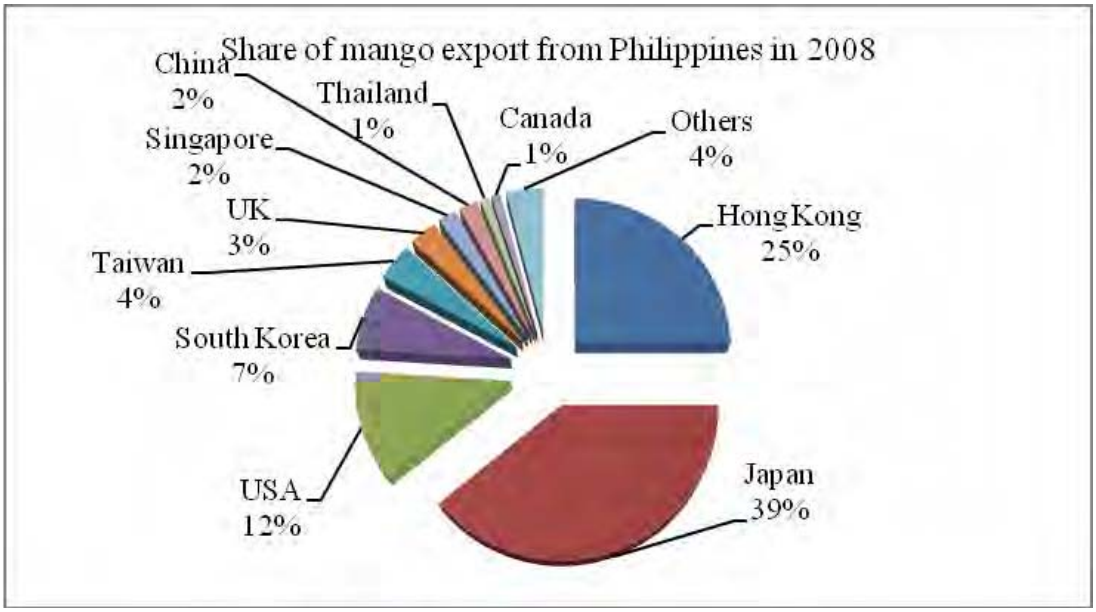


Figure 5-22: Share of Mango Exports from the Philippines in 2008

[146] Weight of a piece of ripe mango (carabao) ranges from 270 to 440 g.

China allowed eight firms to export mangoes to the country and Australia accepted mangoes from Davao del Sur. Thus the international market is growing. There are no serious problems when shipping mangoes to Hong Kong, China and Japan. However, the freight costs to growing markets like the Middle East are expensive. The challenge is to overcome the transportation cost issues, as the products are exported by air.

5-2-8-3 Main Issues and Constraints

(1) Intercropping mango under coconut trees

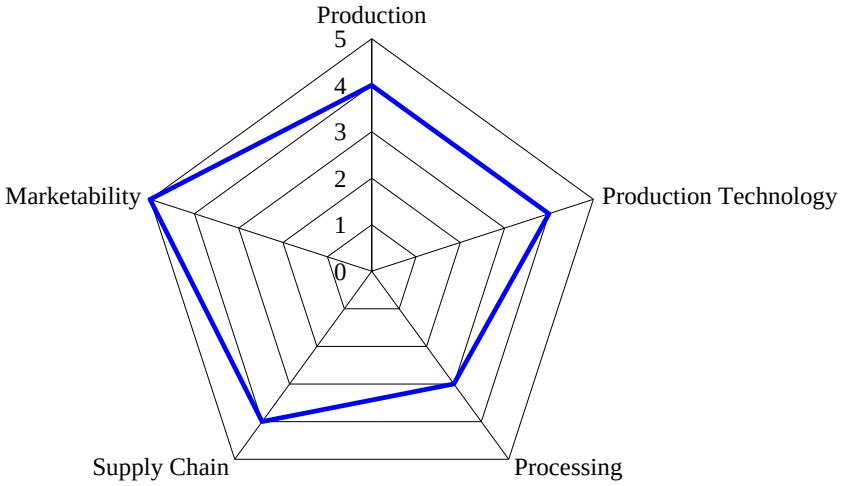
DAF does not recommend mangoes to be planted under coconut trees or shady areas because mangoes are sun loving trees. Only the outer branches exposed to sunlight will bear fruits if they are shaded. Therefore, intercropping for crop diversification is not likely to be promoted with mango trees.

(2) Inducers utilization and harvesting of immature fruit

Mango needs to be sprayed with inducers for sufficient fruiting. Some farmers sometimes cannot afford to purchase them so that production is affected and production volume is lower than the previous season. In addition to that, although mango gets fruiting; however, some farmers harvest it when it is not matured yet. Famers are likely to harvest it before it is matured to try to be competitive in market price. Thus, flowering and selecting fruits for harvesting sometimes affect on production of quality fruits.

5-2-8-4 Evaluation

Based on the described current situation above, current situation of mango industry in the ARMM is evaluated as shown below.



Category	Score	Reasons for Evaluation
Production	4	Mindanao accounts for about 20% of total production in the Philippines. The ARMM contribute to some 7% of total production in Mindanao. Sulu and Maguindanao provinces are the two top producers of mango in the ARMM.
Production Technology	4	Results of research and development on pre- and post-harvest technology of mango production in the Philippines are well published and disseminated. However, mango is not preferred for intercropping with other crops and chemical as inducer needs for proper fruiting.
Processing	3	Processed products like dried mango and mango puree are well recognized in domestic and international markets; thus, the ARMM plays as suppliers of raw material to Cebu and Manila.
Supply Chain	4	Supply chain is established. Farmers plant mangoes as the delicacy like dried mango of places in the vicinity, such as Cebu and Manila. Since the means of transportation are expensive and the farmland of mangoes is far from the market, farmers are essentially forced to sell their products to local traders.
Marketability	5	The market has been established in domestic and international for both fresh fruit and processed products. More than 90% of the nation's mango supply goes to domestic markets, in which 75% is consumed as fresh fruit and the remaining 25% is processed into various forms.

5-2-9 **Mangosteen**

5-2-9-1 Background

Mangosteen (*Garcinia mangostana Linn.*), dubbed the "Queen of Tropical Fruits," is in high demand in the domestic and international markets. Today, not only its fresh fruits but also its processed products and medicinal and cosmetic products, are well-known both in the domestic and international markets. The taste of the fresh fruit is well liked by western people. Hence, mangosteen is a very promising fruit due to its great latent demand. It should be noted that the Mindanao 2020 recommends strategizing to increase mangosteen production as raw material for dietary and alternative medicine.

Sulu is one of the major sources of mangosteen in the ARMM. It has optimum circumstances to grow mangosteen. In Sulu, the farmers only use primitive way to grow it, stick to traditional natural cultivation and do not practice appropriate cultivation. Processing of mangosteen into jam has been practiced for household consumption. The mangosteen has also been used for healing purpose. Mangosteen tea is popular for intestinal regulation, antidiarrheic and also for mothers after delivery. Although its medicinal value is known, local farmers or cooperative do not know what kind processed product they have to produce and what kind of processing technology they have to acquire to produce value added processed products in Sulu.

5-2-9-2 Current Situation

(1) Production

Very few farmers grow mangosteen in the Philippines. As shown in Table 5-35, the harvested area of mangosteen is the lowest among the major fruits grown in the Philippines, though this has been slightly increasing since 2005. There is a misconception among potential growers that mangosteen is difficult to grow due to its slow growth, with a long juvenile period of eight to ten years and the bienniality of production. Some also consider that the fruiting and yield of the mangosteen tree is unpredictable.

Sulu province is the top mangosteen producer in the ARMM, as shown in Table 5-36, The total number of trees bearing mangosteen in the ARMM is approximately 135,980 (BAS 2010) accounting for 65% of the total number of mangosteen fruit bearing trees in the Philippines. In the ARMM, Sulu dominates this market with approximately 134,000 trees, or 98% of the total production (BAS 2010).

Table 5-35: Harvested Area of Major Fruits in the Philippines (ha)

	2005	2006	2007	2008	2009	Average
Banana	417,755	428,804	436,762	438,593	446,371	433,657
Calamansi	20,209	20,253	20,545	20,956	20,912	20,575
Durian	13,769	15,673	17,167	18,371	18,669	16,730
Lanzones	18,266	19,668	20,015	20,331	20,430	19,742
Mango	164,101	171,711	184,174	186,770	188,139	178,979
Mangosteen	1,713	1,813	1,991	2,214	2,263	1,999
Papaya	9,459	9,280	9,125	9,175	8,904	9,189
Pineapple	49,215	49,813	53,978	58,251	58,823	54,016
Rambutan	5,299	5,444	5,631	5,669	5,672	5,543
Watermelon	6,545	6,910	7,234	6,246	6,237	6,635

Source: BAS (2010)

Table 5-36: Production of Mangosteen (ton)

	2005	2006	2007	2008	2009
Philippines	5,152	4,494	4,683	866	1,567
ARMM	3,851	3,783	3,341	21	558
Maguindanao	7	1	23	n.a.	n.a.
Lanao del Sur	21	19	16	16	15
Basilan	13	n.a.	13	n.a.	1
Sulu	3,806	3,764	3,286	5	542
Tawi-Tawi	4	n.a.	2	n.a.	n.a.

Source: BAS (2010)

Some municipalities are famous for mangosteen in Sulu. They are Indanan, Patikul and Talipao, as shown in Table 5-37. Sulu is a suitable place to grow the fruit because of the preferable climate and soil, which contains organic matter in the clay loam. The rainfall and temperature are also appropriate: 2,000mm of annual precipitation and a temperature of 28-30 degree Celsius on average. The altitude of growing areas is between 50 and 700m above the sea level.

According to the DA in Sulu Province[147], mangosteen is harvested once every two years and one can harvest 350 bundles of fruit or about 7,000 pieces of fruit, which is equivalent to about 700-875kg, from a tree[148]. Harvesting starts in June and continues until October.

Mangosteen production remains inactive in Sulu. However, a multipurpose cooperative with 200 members plans to establish a mangosteen processing facility to extract mangosteen juice

[147] Interview with DA, Sulu province.
[148] One bundle contains about 20 fruits and its weight is 2.0-2.5kg.

with the help of an investor from Manila who would like to sell processed products out of mangosteen.

Table 5-37: Municipalities Producing Mangosteen in Sulu Province

Municipalities	Area planted (ha)	Production (ton)	Productivity (ton/ha)
Indanan	98.0	245.00	2.50
K. Caluang	7.5	18.75	2.50
Luuk	29.5	110.00	3.73
Maimbung	1.5	3.75	2.50
Panamao	19.0	71.25	3.75
Panglima Estino	5.5	13.75	2.50
Parang	14.0	35.00	2.50
Pata	5.0	12.50	2.50
Patikul	317.0	870.00	2.74
Siasi	2.0	7.50	3.75
Talipao	38.0	142.50	3.75
Total	537	1,530	2.85

Source: DA, Sulu (2009)

Meanwhile, there is a farmer known as the "King of Mangosteen" produces mangosteen in Kidapawan, Cotabato province, which is not within the ARMM, although this province does not belong to the ARMM. It is a good model of mangosteen production compared to Sulu. In the case of the producer in Kidapawan, mangosteen can be harvested twice a year, partly depending on temperature. The number of pieces of fruit in 1 kg is 8-9 in Kidapawan; but on the other hand, that of 1 kg in Sulu is 18-22. Thus the fruits of Kidapawan are quite large. Many buyers approach from Davao, Iligan, Cebu, and Cagayan de Oro, and handling volume between 3 and 5 tons at once. The fruit harvested by the King of Mangosteen is also sold in Manila and Davao's shopping mall "SM"[149]. The difference between the cultivation technologies of Sulu and Kidapawan will be discussed in detail next.

(2) Production Technology

A comparison of mangosteen cultivation in Sulu province and Kidapawan of Cotabato province is shown in Table 5-38. The cultivation method of mangosteen in Sulu is primitive. On the other hand, the methods practiced in Kidapawan of Cotabato province are well-developed and intensive. One can point out that mangosteen farming in Sulu province is not artificially developed but that the fruits are naturally grown. Thus, there are many things to modify and

[149] Interview with Dr. Alfred's Essentials Inc.

improve in the farming technology for mangosteen production in Sulu province in order for the industry to be productive and lucrative.

Table 5-38: Comparison of Cultivation in Sulu and Kidapawan of North Cotabato

	Sulu	Kidapawan of North Cotabato
Land preparation	It is not practiced.	Weeding and clearing
Seed/ seedlings	Seeds: Obtained from fruits.	2-year old seedlings costing Php 100-120/seedling
Planting density	10 m x 10 m, 1 seed/hill, 100 hills/ha	10 m x 10 m, 1 seedling/hill, 100 hills/ha
Fertilizer	No application	Besal dose: Handful of urea (60-0-0) for a tree Top dressing (2nd year): Application of urea (20-0-0, 60-0-0) depending on the growth of trees
Pest control	No chemical application	Very minimal chemical application
Other management work	No other management works	Weeding: Grazing by cattle and goats. Pruning: The first pruning is practiced in the 3rd year when the lateral branch starts extending. From the 6th year onwards, the internal branch is also pruned.
Juvenile period	10 years	6 years
Harvesting	Harvested once every two years Manual harvesting	Harvested twice a year Harvested with tools
Size of fruits	Small, 18-22 pieces of fruits per kg	Large, 8-9 pieces of fruits per kg
Cultivation pattern	Intercropped with coconut tress Intercropping helps in growing mangosteen	Intercropped with industry crops like banana, rubber and longkong

Source: Interview with DA, Sulu province and Dr. Alfred's Essentials Inc.

Here are the critical bottlenecks in mangosteen cultivation when introducing to growers: i) the long juvenile period until the first harvesting, and ii) the very limited peak season. Normally, as seen in Sulu province, it takes ten years until there is a substantial harvest and the harvesting peak is only once every few years. However, proper farm management with inorganic and organic fertilization shortens the juvenile period. Moreover, if adequate irrigation and nutrition are provided, the tree will bear fruits four to five years after planning with large planting materials of 140 cm or taller, which is grown for a period of 30 months or more. In addition, off-season inducing of flowering and fruiting can be made feasible by keeping the tress healthy with timely and adequate fertilization, irrigation and pruning. Intercropping with durian,

rambutan, lanzones and jackfruit helps in growth during the immature stage of young mangosteen to provide shade and it generates income as well[150].

(3) Processing

Recently, mangosteen it also gets an attention from food and medical industries due to the therapeutic effect of its ingredient. Mangosteen is considered one of these beneficial fruits. Its non-edible rind is used as a traditional medicine for treating abdominal pain, diarrhea, dysentery, infected wounds, suppuration and chronic ulcers in Asian countries. Experimental studies[151] [152] indicate that the pericarp of mangosteen is rich in xanthones and other bioactive substances, and has many medicinal benefits.

In order to preserve such beneficial properties of mangosteen, some aggressive farmers in the ARMM and other regions in Mindanao are trying to produce value-added products such as jam, preserve, juice, dry rind and extract essence. Although it has high potential, the white edible aril part contains less beneficial components and needs to be mixed with non-edible pericarp parts, giving some astringency and dark color resembling the fruit's outer color.

Some manufacturers produce products by mixing both parts and often fail to remove the foam from inside the products, which may lead to contamination, loss of nutrients, and shortening of their shelf life. It is; therefore, important to exhaust air and foam during the processing operation. Although processing in the ARMM is very limited, there is a farmer in Kidapawan of Cotabato province, which is not the ARMM, who processes mangosteen into mangosteen jam, soap, tea, and capsule as herbal dietary supplement. They are shipped to both domestic and overseas markets such as the USA, the UK and Israel. Capsules are exported to the USA and the UK, tea is exported to Israel, and jam and soap are both shipped to domestic. Thus, producers of mangosteen in the ARMM also have potential to do processing business by referring to such model case.

(4) Supply Chain

The supply chain of mangosteen produced in Sulu is dominated by many middlemen until their final destinations of Zamboanga city, Pagadian, Cotabato, Davao and outside of Mindanao.

[150] Presentation of Dr. Marisa E. Garcia, University of Southern Mindanao, during Fruits Forum, 2010.
[151] José Pedraza-Chaverri, et al., 2008, "Review; Medicinal Properties of Mangosteen," Food and Chemical Toxicology, 46, 3227-3239.
[152] Werayut Pothitirat, et al., 2009, "Comparison of bioactive compounds content, free radical scavenging and anti-acne inducing bacteria activities of extracts from the mangosteen fruit rind at two stages of maturity," Fitoterapia, 80, 442-447.

As shown in Figure 5-23 and Table 5-39, farmers make a bundle of mangosteen, about 2-2.5 kg or 20 pieces of fruit after harvesting and sell the fruits at Php 5-7/bundle, which is equivalent to Php 2-3/kg. However, at the final destination of Davao, the transaction is carried out by weight. The selling price at the time ranged from Php 40 to 60/kg during on-season. Therefore, much of the marketing margin is absorbed by the middlemen before it reaches the final consumer. Thus, the transaction near the farm gate is based on the bundles of fruit, but trade is done based on weight in cities in the case of mangosteen. It was observed by the Study team that the retail price of mangosteen from Sulu province sold at the Cotabato city mega market was Php 50/kg; meanwhile, that from Kidapawan was Php 40/kg.

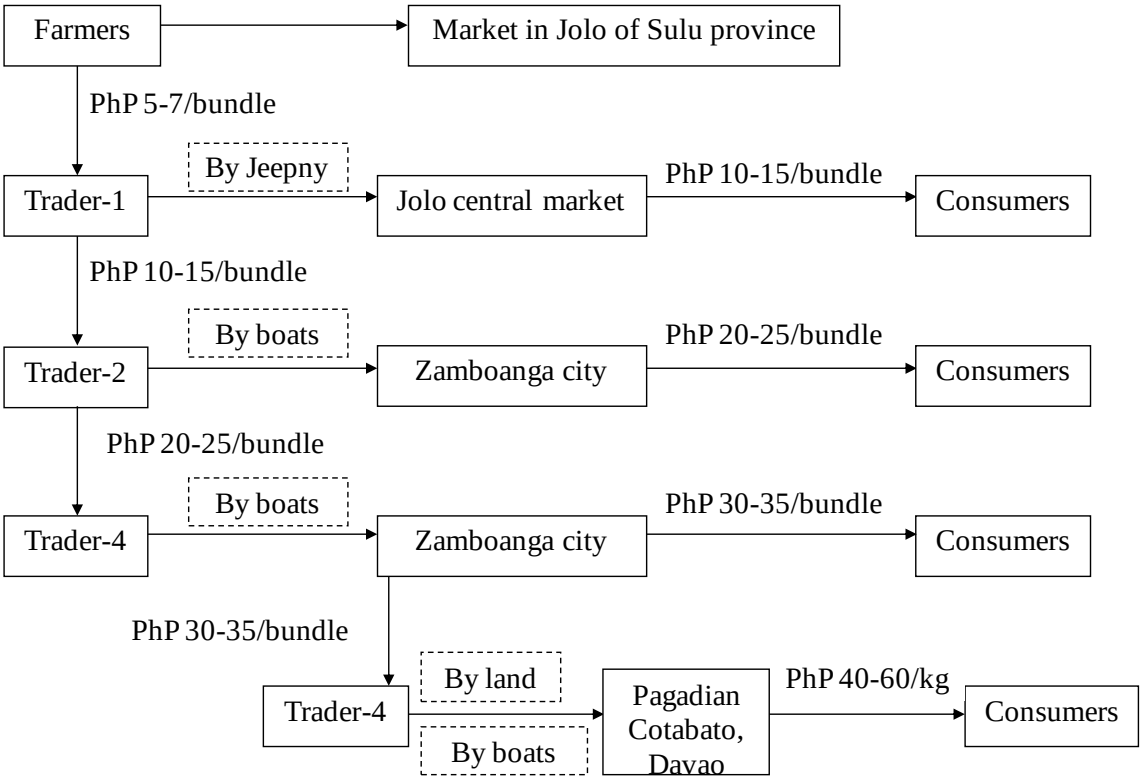


Figure 5-23: Supply Chain of Mangosteen Produced in Sulu Province

Table 5-39: Situation of Value Chain of Mangosteen Produced in Sulu and Kidapawan

Actors	Input Suppliers and DAF-ARMM	Farmers & Cooperatives	Barangay or Town Traders	Buying Station or Processors
Product	• Technology • Inputs • Planting material	• Fresh fruits • Mangosteen pulps	• Fresh fruits • Mangosteen pulps	• Fresh fruits • Mangosteen pulps
Place	• Sulu province • Basilan Province	• Jolo (Sulu) • Zamboanga City • Kidapawan	• Jolo (Sulu) • Zamboanga City • Kidapawan	• Jolo (Sulu) • Zamboanga City • Domestic and export markets
Activities	• Nursery Technology • Production technology	• Cultivation • Harvesting • Processing • Marketing	• Trading fruits • Marketing fruits • Marketing dried pulps	• Storage and quality control • Marketing and Processing • Exporting processed herbal mangosteen
Price	• Price of seedling of6 months olds: Php 35.00	• Farm gate price: Php 5.00-7.00 per bundle of 20 pieces of fruits	• Selling price: Php 15.00 per bundle of 20 pieces of fruits	• Selling price of fresh fruits: Php 20.00 per kg • Selling price: Php 40-60 per kg (Davao) • Selling price (off-season): Php 500 per kg (Davao) • Selling price of capsulated mangosteen: Php 475.00 per a box of 90 capsule
Cost	• n.a	• Prodcution cost: Php 50,000 per ha	• n.a	• n.a
Issues	• No nursery demonstration areas for quality seedlings	• Perishable in 20 days after harvesting • Limited processing activities in the ARMM	• n.a	• n.a

(5) Marketability

The market potential of mangosteen is high. The potential in the export market is even higher for mangosteen producing nations. It is reported in Malaysia that mangosteen is widely demanded, but the supply is not enough. Responding to this demand, Malaysia rapidly expanded the area of mangosteen production from 2,895 ha in 1992 to approximately 10,000 ha

in 2000. The bulk of export from Thailand for fresh mangosteen goes to Taiwan and Hong Kong, while frozen mangosteen is exported to Japan.

Mangosteen is recognized in domestic and international markets not only for the taste of its fresh pulp, but its versatile uses, such as in food, medicine and cosmetics. Its nutritional value is also attractive, as shown in Table 5-40.

Table 5-40: Nutritional Composition of Mangosteen per 100g Edible Portion

Constituents	Quantity
Edible portion	26.0%
Food energy	71.0 calories
Protein	0.7g
Fat	0.8g
Carbohydrates	17.3g
Fiber	1.3g
Ash	0.2g
Calcium	18.00mg
Phosphorous	11.00mg
Iron	0.3mg
Thiamin	0.06mg
Riboflavin	0.01mg
Niacin	0.40mg
Ascorbic acid	2.00mg

Source: Agriculture and Fisheries Information Service, DA, 2003

For medicine and cosmetics, all parts of the mangosteen, including the hard outer rind are utilized. In fact, some research studies revealed that the rind has anti-oxidant, anti-bacterial, anti-fungal and anti-tumor properties. Mangosteen also appears to have anti-histamine and anti-inflammatory properties. The active therapeutic compound found in the fruit has been named "Xanthones." Today, mangosteen capsules, under trademarks like *Dr. Alfred's* and *MX3,* are seen in shopping malls in major cities in Mindanao. India and the USA have substantially opened their markets to import products of xanthones.

Mangosteen juice is sold at a high price in the domestic market. The mangosteen jam industry has potential to be well established for domestic and international consumers, and it can start from a small-scale as well. For example, some firms export mangosteen tea to Israel; mangosteen capsules go to the USA and the UK; jam is also exported to the USA and Korea; and mangosteen soap is sold at various places within and outside of the Philippines. Thus, the use of mangosteen in various forms is breaking into many markets.

5-2-9-3 Main Issues and Constraints

Major production province for mangosteen in the ARMM is Sulu so that issues of the product discussed here are based on the situation of Sulu province.

(1) Misconception on difficulties in cultivation

Concerning production technology, there is a misconception among potential growers that it is difficult to grow mangosteen due to its slow growth, long juvenile period and bienniality of production. Some also think that the fruiting and yield of mangosteen tree is unpredictable. Planters of Sulu; thus, stick to traditional natural cultivation and do not practice appropriate cultivation. It is hardly to say that mangosteen cultivation is farming in Sulu. Dissemination of package of technology in cultivation is necessary.

(2) Very limited activities of processing

All parts of the mangosteen can be utilized as raw materials for processed products; however, processing activity is very limited for only interior regular consumers in Sulu province. It is due likely to the lack of dissemination of package of technology on processing as well.

(3) Lack of awareness on medicinal value as supplemental food

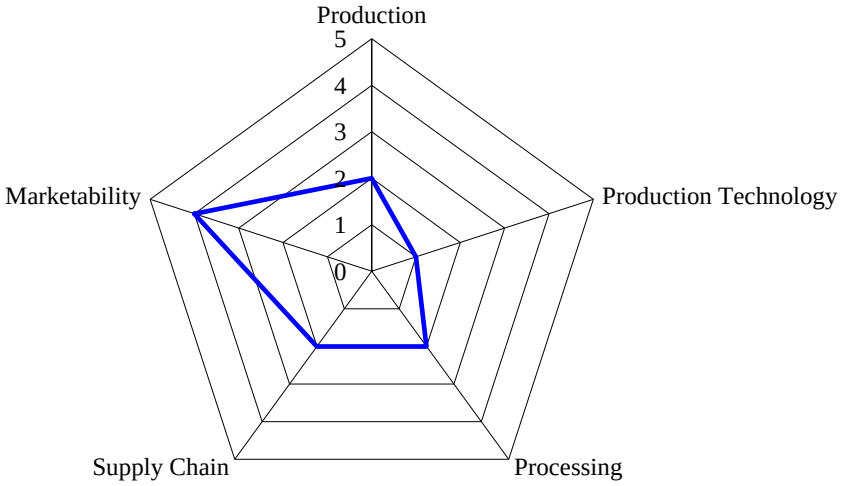
Medical value and health benefit out of mangosteen is well acknowledged in domestic and international market; however, farmers or cooperatives in Sulu do not know what kind of processed products they have to produce and what kind of processing technology they have to acquire.

(4) Conventional handling unit for business practices

Most profit seems to be absorbed by middlemen before mangosteen reaches the consumers. The transaction near the farm gate is practiced by use of unit of “bundles of fruit”, but trade is done on “weight basis” in urban cities. Thus, conventional transaction method differs depending on physical location or distance to urban market

5-2-9-4 Evaluation

Based on the current situation described above, the current situation of mangosteen industry in ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	2	The harvested area of mangosteen is the lowest among the major fruits in the Philippines. The ARMM shares 36% of the total production in the Philippines. Mangosteen production in ARMM is only centered in Sulu Province.
Production Technology	1	Production technology is primitive and on-farm management is not fully preformed in Sulu. Farmers' attitude is so-called waiting and see attitude. On the other hand, Kidapawan's cultivation is more scientific and standardized. Therefore, there is a need to improve cultivation method in Sulu so that off season's production would be possible.
Processing	2	Processed mangosteen jam is well known. Xanthones and bioactive substances are rich in rind which can be raw material of supplemental capsule. All the part of fruits can be utilized; however, processing industry is very limited in the ARMM.
Supply Chain	2	Distribution from Sulu to retailers exists; however, handling is complex. Farmers make a bundle of fruits of 2-2.5 kg or 20 pieces and sell in form of bundle. However, at Davao city, the transaction is performed by weight basis. Thus, much of the marketing margin is absorbed by the middlemen before reaching the final consumer.
Marketability	4	Market for mangosteen in Sulu is Zamboanga city, Cebu, Cagayan de Oro, Manila, etc. Other processed products from Kidapawan go to the USA, Israel, and Korea. Processed products of mangosteen are growing.

5-2-10 **Oil Palm**

5-2-10-1 Background

The oil palm tree is a perennial crop with an economic life of 20-30 years, and yields continuously throughout the year. The oil, extracted and refined from the crop, is used mainly for cooking food; moreover, it can be a diesel fuel substitute. Thus, palm oil is renewable being coming from trees, unlike petroleum – based petrochemical.

5-2-10-2 Current Situation

(1) Production

The domestic consumption of palm oil products in the Philippines was 76,000 tons in 1998 and it has since then been growing at an annual rate of 5% due to the ideal climate found in the region (Food & Agribusiness Yearbook, 2000). The oil palm is usually produced under out-growers scheme or contract farming. The products from oil palm are palm oil, palm kernel oil, and hydrogenated vegetable oil.

According to BAS, total planted area for oil palm in the Philippines in 2009 was 41,444 ha and in the same year, 800 ha cultivated area was estimated in the ARMM, accounting for 1.9 % of the cultivated land area of the country. The only producing province in the ARMM was Maguindanao[153]. There are four oil mills in Mindanao; two in Lagusan, one in Buluan and another one in Tacurong, according to RBOI (2010).

(2) Production Technology

The facts of the technical information on oil palm cultivation, practiced in the plantation of Agumil Philippines Inc., a joint venture of between Filipino and Malaysian investors, are shown in Table 5-41.

[153] On the other hand, according to RBOI-ARMM (2010), cultivated land area was 4,000 ha in Maguindanao and Lanao del Sur provinces.

Table 5-41: facts on Oil Palm Cultivations

Species	Tenera
Origin	Africa
Tree height	6-9 m
Color of ripe fruits	Reddish orange
Nursery period	9-12 months
Age of harvesting	26-30 months after field planting
Harvesting interval	8-15 days
Number of bunches per tree a year	1-12 bunches
Bunch weight	16-24 kg
Oil from mesocarp	20-50%
Oil production per ha a year	3.5-5.0 ton
Planting density	128 trees/ha, 9.5 m x 9.5 m triangular method
Economic life	20-30 years

Source: Agumil Philippines Inc. (2010)

As a perennial crop, an oil palm tree grows fast and matures early. It bears fruit after 28 months. However, it is difficult for poor farmers to join the group of planters because of the high production costs, although oil palm products have a high value (Potential Products Study for Local Industry (PPSLI), Maguindanao, 2010).

An oil palm tree remains productive for 22 to 30 years when the newly developed dwarf hybrids are used for planting. Oil palm is much easier to grow than the coconut trees in terms of the cultivation of trees and processing for oil. It is less affected by climate change than annual vegetable crops. It also helps in mitigating environmental change as it can sequestrate carbon dioxide in the atmosphere and induce higher rainfall[154]. However, a careful feasibility study is needed for expansion of plantation due to the occurrence of pest diseases, like Red Palm Weevil.

Moreover, as for seeds, certified seeds are not available in the Philippines so that they have to be imported from Malaysia and Papua New Guinea. As a result, seedling cost of the oil palm is Php 250. Thus, totally Php 31,750 is required to plant 127 trees per ha. Therefore, small-scale cultivation of palm oil is rather difficult to run but it suits to a large-scale mono crop plantation[155].

[154] Triple P Farmers and Nursery (TPFN), Kabacan.
[155] Interviewed at DAF-ARMM.

(3) Processing

Oil palm is a high productive crop and its main product oil and many by-products are versatile in their uses. The palm oil yield is normally 6.2 tons of vegetable oil/ha year in terms of Crude Palm Oil (CPO) and Palm Kernel Crude Oil (PKCO). Other vegetable oil crops have a lower recovery. Soy beans have an oil yield of only 0.4 ton/ha; rapeseed 1.5 ton/ha, sunflower 1.2 ton/ha a year, as shown in Table 5-42.

Table 5-42: Productivity of Vegetable or Tree Oil Crops in the World

Crops	Average yield of oil (ton/ha)
Oil palm	6.2
Soy bean	0.4
Rapeseed	1.5
Sunflower	1.2
Coconut	1.5

Source: Triple P Farmers and Nursery (TPFN), Kabacan

Therefore, one needs to grow 4 ha of rapeseed, 5 ha of sunflower and 4 ha of coconut tree to produce the same volume of oil produced in just 1 ha of oil palm trees.

(4) Supply Chain

The supply chain of oil palm produced in Maguindanao is shown in Figure 5-24. This is reflected in the following activities: i) collection, ii) trading, or iii) processing, and iv) selling. Oil palm fruits in bunches are collected every quarter by the workers of the land owners. After buying the raw fruits they are transported by the oil mill processors. The buying of oil palm is exclusively between the farm owner and the processor. In processing, fruits are separated from the stake and processed into raw oil palm. The processors then extract crude oil and it is shipped to Manila and India for further refining.

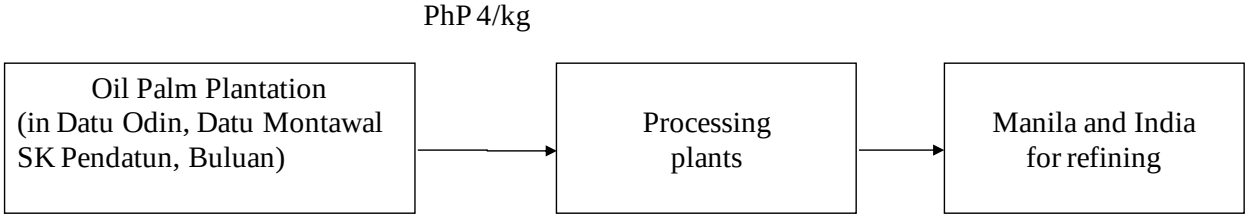


Figure 5-24: Supply Chain of Oil Palm Produced in Maguindanao Province

(5) Marketability

An intensive study made by the Association of Indonesian Producers of Vegetable Oil shows that the worldwide demand for vegetable oil, 130 million tons in 2010, is envisaged to increase

up to 263 million tons in 2020 due to industrial growth, especially in China and India, as listed in Table 5-43. Crude palm oil will make up half of the international market of this oil. As a consequence, the three major exporters, Indonesia, Malaysia and Thailand, as listed in Table 5-44, will still be dominating the international market.

Table 5-43: Major Importers of Palm Oil in the Global Market

Country	Volume (million ton)	Share (%)
India	8,200	22
China	7,150	20
Europe	5,300	14
Pakistan	2,300	7
USA	952	3
Bangladesh	900	3
Others	12,175	31
Total	37,377	100

Source: Agumil Philippines Inc. (2010)

Table 5-44: Leading Crude Palm Oil Producing Nations

Country	Cultivated Area (1,000 ha)	Production (1,000 ton)	Share of Production (%)
Indonesia	7,500	24,500	49
Malaysia	4,500	18,600	37
Thailand	625	1,500	4
Nigeria	460	850	2
Colombia	390	810	2
Others	1,126	3,077	6
Total	14,601	49,377	100

Source: Triple P Farmers and Nursery (TPFN), Kabacan

The domestic market for palm oil was approximately 113,000 tons in 2000. Demand is likely to increase due to three factors: i) increase in population; ii) underlying growth in demand for cooking oil; and iii) trend of shifting from coconut to palm oil for the common usage of cooking oil, since coconut is set to have a high value for industrial uses.

Having the same kind of tropical climate and rainfall patterns like the three major nations mentioned before, the provinces in Mindanao of the Philippines possess the strength of having a suitable environment for oil palm production and the opportunity for the international and domestic demand to expand their current levels of production. The ARMM is not an exception. However, investment in oil palm plantation expansion should be made lucrative to small-scale farmers with environmentally sustainable way, not for the large-scale better-off farmers and entrepreneurs.

5-2-10-3 Main Issues and Constraints

(1) Difficulty to access to seeds or seedlings

Certified seeds of oil palm are imported from Malaysia, Papua New Guinea, and Thailand; therefore, price of seedling of oil palm is Php 250 which is too expensive for farmers to access it. Seedlings are booked before a grower can get them. For Agumil contract growers, proposals are assisted and Agumil becomes the technical consultant and the guarantor before the funding bank approves the cooperative contract grower's loan.

(2) Quality deterioration after harvest

During peak seasons, the producers' products become in their risk possession because after harvests, the fresh fruits bunches have only 24 hours of good shelf life and quality then deteriorates which means reduced prices.

(3) Land tenure dispute

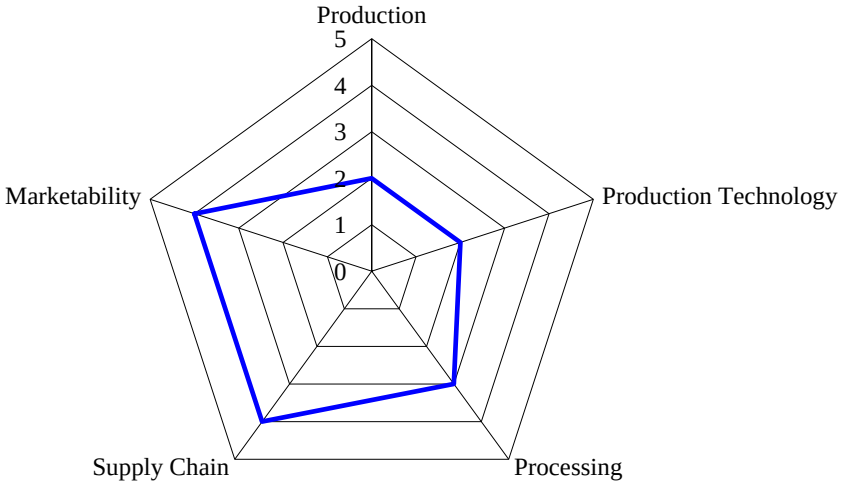
The land dispute occurs on ownership at certain area in the ARMM. The natives of the area are also claiming on the lands where Malaysian investor has the oil palm plantations. Until now, the plantation was no longer maintained. Since large-scale plantation is needed to economically sustain the industry, land ownership and its use are always issues.

(4) High investment for plantation and processing plant

Large scale plantation type of oil palm cultivation is lucrative together with oil processing plant which should be constructed near the plantation because harvested fresh fruit bunches should be transported to the plant within 24 hours. It seems that this kind of investment in plantation and oil mill plant does not fit to investment capacity of small-scale producers and their consolidated producers' groups.

5-2-10-4 Evaluation

Based on the current situation described above, the current situation of oil palm industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	2	According to BAS, total planted area for oil palm in the Philippines was 41,444 ha in 2009 and, in the same year, 800 ha cultivated area was estimated in the ARMM, accounting for 1.9% of the cultivated land area of the country.
Production Technology	2	As a perennial crop, an oil palm tree grows fast and matures early. It bears fruit for 28 months. However, it is difficult for small-scale farmers to join the group of planters. As for seeds, certified seeds are not available in the Philippines so that they have to be imported from overseas. As a result, seedling cost is Php 250. Plantation of oil palm suits to a large scale mono crop plantation.
Processing	3	There are only few oil processors from oil palm in Mindanao. Farmers' cooperatives seldom extract oil by themselves at small-scale.
Supply Chain	4	Oil palm supply chain is established. Oil palm fruits in bunches are collected by the workers of the land owners and they are transported to the oil mill processors directly. The buying of oil palm is exclusively between the farm owner and the processor. The processors extract crude oil and ship them to Manila and India.
Marketability	4	Worldwide demand for vegetable oil, 130 million ton in 2010, is envisaged to increase up to 263 million ton in 2020 due to industrial growth especially in China and India. Demand is likely to increase in domestic due to some factors; increase in population, growth of demand for cooking oil, and tendency of shifting from coconut to palm oil.

5-2-11 **Rubber**

5-2-11-1 Background

Rubber means both natural rubber (NR) and synthetic rubber (SR). More than 50,000 uses have been discovered and developed for natural rubber. There are so many industrial uses that could not be substituted for another product. Besides, tire manufacturing and construction use about 70% of rubber as their source of raw materials; today's rubber is also used for gloves, medical wares, sports wares, shoes, balls, and the like. Moreover, rubber wood can also be used as a resource for promotion of the industry. It is used as material for furniture, tiles, plywood, and the like. Thus; rubber is one of the most stable and reliable hard currency earners in the Asian tropical nations.

5-2-11-2 Current Situation

(1) Production

The world's natural rubber annual production is approximately 10 million tons, as shown in Table 5-45. Major providers of rubber to the international trade are Thailand, Malaysia and Indonesia; on the other hand, the Philippines' share is too small to compare with those three.

Table 5-45: World Natural Rubber Production and Consumption (1,000 tons)

	2003	2004	2005	2006	2007
Production	8,033	8,748	8,882	9,680	9,685
Consumption	8,033	8,715	9,082	9,216	9,715

Source: Philippines Industrial Crops Research Institute, USM

In the Philippines, however, as shown in Table 5-46, production of rubber latex has increased by about 10% annually from 315,636 tons in 2005 to 411.044 tons in 2008. Mindanao is the top grower in the country accounting for almost 99% of the total cultivation area of rubber. The aforesaid gain in production resulted from the sustained high price of natural rubber and the support of Local Government Units (LGU) that encouraged tapping and planting in the major producing provinces of North Cotabato and Zamboanga Sibugay.

Table 5-46: Production of Natural Rubber Latex in the Philippines and ARMM (ton)

	2005	2006	2007	2008	2009
Philippines	315,636	351,556	404,072	411,044	390,962
ARMM	27,068	27,979	29,884	31,494	32,435
Maguindanao	64	52	50	36	92
Lanao del Sur	4,384	4,071	3,921	594	425
Basilan	22,619	23,856	25,914	30,864	31,918
Sulu	.	.	.	.	.
Tawi-Tawi	.	.	.	.	.

Source: BAS (2010)

The ARMM contributes 8.3% of the total natural rubber production in the Philippines. The ARMM's production has been increasing by 4% annually from 2005 to 2009. In the region, Basilan province is the biggest producer of rubber, accounting for almost 98% of the total natural rubber production in the ARMM, followed by Lanao del Sur where production drastically dropped from 2007 to 2008 due to the reduction of matured trees from 100,000 in 2006 to 60,000 in 2007. This can most probably be attributed to cutting and re-planting.

Besides Basilan province, South Upi and Upi of Maguindanao province are also rubber producing areas. Most of the rubber growers in the ARMM are smallholders. Their average cultivating area of rubber is 1-2.5 ha and this is intercropped with tropical fruits, such as lanzones, durian, rambutan, bananas and coconuts. It has just been observed that farmers have started rubber tree plantation in Tawi-Tawi.

(2) Production Technology

The main economic product of natural rubber is latex, a milky sap found in the bark of rubber trees. To do business with latex, one can invest in a rubber plantation with Php 30,000/ha and he or she can earn a monthly gross income of Php 25,000 from the first harvest 13 years after planting, as shown in the next Table 5-47. Moreover, farmers get an average gross income of Php 50,000-60,000/ha-year from intercropping while the rubber is still immature.

Table 5-47: Simulated Yield and Gross Income of Rubber per ha

Age of tree	Yield of latex (kg/ha-month)	Income (Php/month)	Income (Php/year)
5-6 years old	100	8,500	85,000
7-8 years old	140	11,900	119,000
9-11 years old	180	15,300	153,000
11-12 years old	240	20,400	204,000
13-14 years old	300	25,500	255,000

Source: Philippines Industrial Crops Research Institute (PICRI), USM

Box 5-7 illustrates a typical rubber cultivation and tapping. Tapping, the most critical process, involves regular opening a thin shaving of bark carefully to cut the latex vessels, which contain the liquid latex, without destroying the cambium of the tree. It is normally performed by a skilled person, namely a "Tapper". The tapper performs tapping every two days on the same tree, staring at 5:00 am and completing about 1 ha a day.

Box 5-7: Rubber Cultivation and Taping

The typical rubber cultivation method is as follows:

i) Land preparation: It is not practiced; but clearing weeds is required.

ii) Seedlings: Five hundred seedlings are required for 1 ha. A seedling costs Php 25.

iii) Planting: The planting density is dependent on the other crops used for intercropping; 6 m x 3 m for annual crops, 7 m x 3 m for grain crops, and 12 m x 2 m or 24 m x 2 m double row for fruits or tree crops.

iv) Fertilizer application: 120g of NPK 14-14-14 for a seedling as a basal dose is applied. A top dressing with 100g follows 1 month after the first. NPK is applied every 3 months and 6 months in the 2nd and 3rd year, respectively.

v) Chemical application: Fungicide is applied.

vi) Pruning: Branches extending from the trunk part for harvesting latex are pruned 1-3 years after planting.

vii) Tapping: 5-7 years after planting, tapping can start. Tapping means to scratch the trunk, about 75-150 cm from the bottom, where pruning was carried out in advance, to let the white milky sap exude. This then drops into a collecting cup in which a 10% acid solution is contained for solidifying the harvested sap. This solid is then called latex.

The life and productivity of a rubber tree depends much on the skillfulness of the tapper. If the technology is performed appropriately[156], the tree can be productive for 30 years. If not, it will not last 10 years. The tree owner and tapper practice crop sharing; the tapper receives 30% of the total sales from the latex. In other cases, the tapper is paid about Php 78 a day of 175 tapping days, or one tapping cycle.

Rubber can be intercropped with vegetable only during the first to fourth year after planting. Seedling price of rubber is Php 45 and 500 seedlings per ha is required so that seedling cost is Php 22,500 per ha. From 7th year, latex production is stable and then gross income will be

[156] USM provides training of tapping and the cost is Php 500 for a two-week course.

Php119,000[157] from the operation year[158]. In addition, at least 5ha of cultivation scale is needed to produce substantial benefit[159].

The common form of rubber in Mindanao for shipping is the "cup lumps", where the rubber latex is mixed with an acid to coagulate or form a mass. Harvesting rubber latex is very sensitive. It must be harvested in a short time and requires good passable road for transporting container, thus this need high initial production capital.

(3) Processing

Processing activities of rubber into final product natural rubber (semi sheet rubber form) from latex, which normally farmers harvest and ship to processors, are seldom seen in the ARMM. However, the following process of Figure 5-25 is the general processing steps from field latex to sheet rubber.

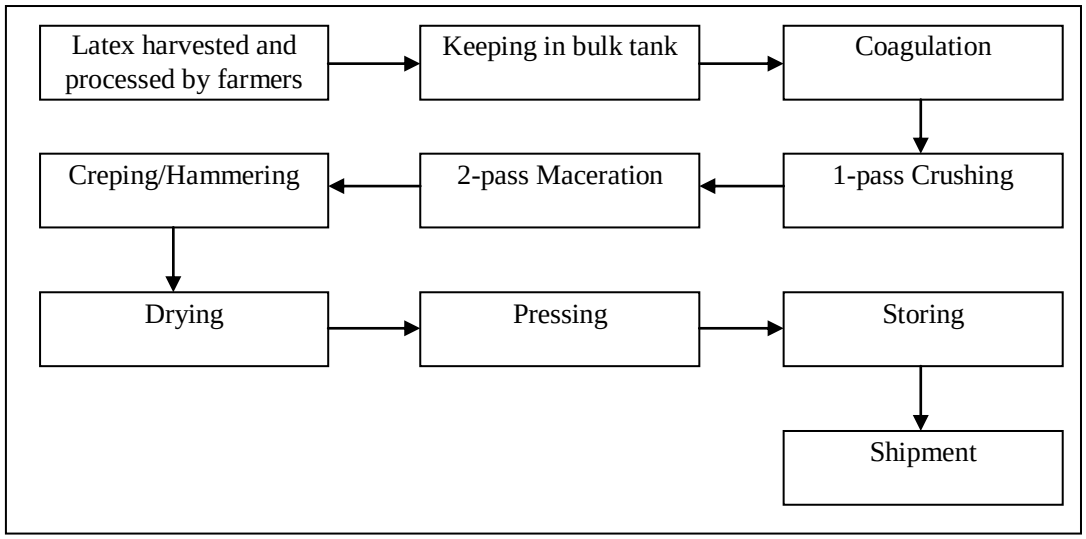


Figure 5-25: Typical Processing Flow from Latex Harvested in Field into Semi Sheet Rubber

As seen in the above processing flow, it is composed of some complicated activities with machineries, equipment and facilities which need much investment; thus, small-scale processing seems to be rather difficult to start the processing business due to investment scale. It is needed Php 180,000 to invest in small-scale processing factory for rubber at community level[160].

[157] Interviewed DAF-ARMM.
[158] Interviewed DAF-ARMM.
[159] Interviewed University of Southern Mindanao.
[160] Interview at DAF-ARMM.

(4) Supply Chain

There is limited information on the supply chain found in the ARMM; however, one case of Maguindanao can be presented. This case is for the rubber production areas, Upi and South Upi, to represent the typical rubber supply found in the ARMM.

There are no processing plants operating in Maguindanao where the farmers directly sell their products. The supply flow is not as complex as for other commodities. For example, the latex collected by local farm households in Upi is sold to Cotabato province where rubber processing plants are located or Davao City in a large volume. A selling price of Php 35-40/kg awaits the planters; however, this still does not attract more producers to invest in rubber.

As shown in Figure 5-26, rubber growers harvest rubber sap in latex form and it is stored to increase the volume to be sold to the cooperatives. The cooperatives gather the cup lump rubber from the farmers and sell it to the said processors in Cotabato province or Davao City. Thus, rubber latex in cup lump form harvested in Upi, Maguindanao province, is transported to the processing plant of raw rubber processor located at Makilala, Cotabato province of Region XII. Rubber cup lump form are grounded and mixed with acid as softener and cooked by steam method, and then packed as raw natural rubber. This natural rubber is shipped to outside of Mindanao. 90% is exported to other countries in East Asia while 10% is shipped to local industrial processors located in Cebu and Metro Manila to make industrial goods for transportation parts, e.g., tire, bushing, o-rings, sanitary use, construction and households needs, and others uses.

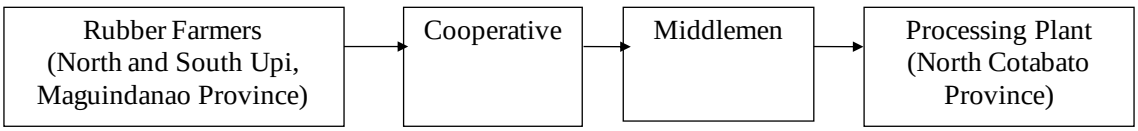


Figure 5-26: Supply Chain of Rubber from North and South Upi, Maguindanao

(5) Marketability

There is now a greater demand for natural rubber, as the world consumption of rubber has been increasing. The world production of natural rubber is projected to increase by 3-5% per year up to 2015. World Bank data shows that there is a global demand for 6,685,000 tons of natural rubber. The major markets are China, the USA, Europe and Japan, according to the DA.

Moreover, industrialization in Russia and India is further boosting demand. Meanwhile, rubber production will increase due to the expansion of plantations in Indonesia and Vietnam, which

enter neighboring countries to plant natural rubber under land concession policies of the recipient nations.

Although the share of rubber production in the Philippines is small in terms of world market demand, there is still room to develop rubber plantation in Mindanao, the major production area in the nation. It is said that the total available area for rubber expansion in Mindanao is around 52,000 ha, but the actual potential suitable land is over 300,000 ha, which can be found in Central Mindanao, Zamboanga Peninsula and the ARMM.

5-2-11-3 Main Issues and Constraints

(1) High investment in harvesting and post-harvest into cup lumps

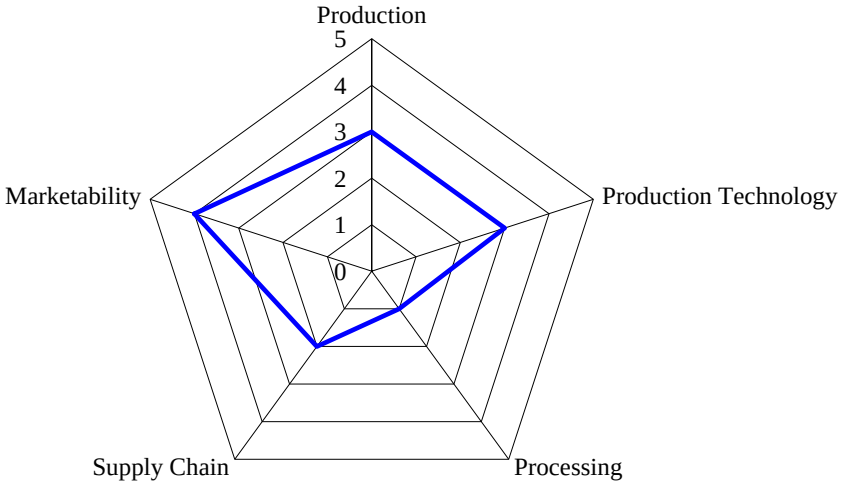
Rubber is normally harvested as rubber latex and converted into cup lumps after harvest by the tappers. Rubber latex is mixed with acid to transform it into cup lumps form as mass. Harvesting rubber latex is very sensitive. It has time limit for harvesting and needs good passable road for transport container of latex to a certain collection places. The fresh latex will solidify if it is not converted immediately after harvesting by producers; thus, this harvesting and post-harvest operation need high initial production capital.

(2) High investment in processing facilities and equipment

High investment is required to process from latex to semi sheet rubber at processing plant as well. Some sophisticated machinery and facilities are required; therefore, small-scale cottage processing factory to be operated by consolidated farmers groups is hard to start. Large plantation is encouraged from a viewpoint of economic scale.

5-2-11-4 Evaluation

Based on current situation described above, the current situation of rubber industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	3	ARMM contributes 8.3% to total natural rubber production in the Philippines. In the region, Basilan province is the biggest producer of rubber, accounting for almost 98% of the total natural rubber production in the ARMM.
Production Technology	3	Life and productivity of rubber tree depends much on skillfulness of the tapper. If the technology is appropriate, tree can be productive for 30 years. If not, it finishes within 10 years. At least 5 ha of cultivation scale is needed to produce benefit though intercropping is possible during the first 4 years.
Processing	1	There is not processing plants in Maguindanao province but there are some in Cotabato province in Region XII where the farmers sell their products but through traders. Large investment is needed in small-scale processing factory for natural rubber sheet at community level.
Supply Chain	2	The supply flow is not so complex; nevertheless, selling price offered by traders does not still attract them to invest more in rubber. Transporting latex form is sensitive so that passable road is required.
Marketability	4	Major markets are China, the USA, Europe and Japan. Moreover, Industrialization in Russia and India can boost demand further. Although share of the Philippines is small in world demand, there are still rooms to develop rubber plantation in Mindanao.

5-3 Fisheries

The fisheries sector is an important economic sector of the ARMM. It provides substantial employment and income for some segments of the population, contributes to export earnings and supplies a major part of the dietary protein requirement of the population as a whole. In particular, aquaculture is now seen as one of the most promising industries for increasing fisheries production in the region. As future fisheries potential products, the Study has selected grouper, seaweed, mud crab, abalone, milkfish, and tilapia, and has collected the relevant data and information about those fisheries products.

There are some existed study reports and development plans for local industries in the ARMM. However, most of them simply concluded that fisheries and aquaculture would take important roles for local economic development in the ARMM without any indication of particular potential products, except seaweeds. Only a few studies and development plans showed exact names of potential products in fisheries sector. Therefore, different from agriculture and livestock sectors, only limited materials are available to identify exact fisheries products (Table 5-48). In order to make up for detail information of potential products in fisheries sector, the results of potential fisheries products at each province, discussed at the first workshop of the Study, was also utilized.

Table 5-48: Candidate Products in Fisheries Sector by Various Studies and Workshops

Province in the ARMM	Local Consultant Survey Report in the Preliminary Study (Oct. 2009)	Provincial Development and Physical Framework Plan (2008)	Workshop Result in this Study (Aug. 2010)
Maguindanao	- Fish culture - Mud crab culture - By-product fish processing	**Aquaculture:** Seaweed	**Marine Fishing:** Marine fishes **Inland Fishing:** Tilapia, Catfish, Mudfish **Aquaculture:** Seaweed, Mud crab, Shrimp, Milkfish
Lanao del Sur	- Tilapia - Common carp - Smoked processed fish (yellow-fin tuna)	**Inland Fishing:** Freshwater fishes **Aquaculture:** Tilapia	**Marine Fishing:** Marine fishes **Inland Fishing:** Freshwater fishes **Aquaculture:** Tilapia, Common carp, Milkfish
Basilan	- Marine fishing - Seaweed - Aqua-marine culture	**Marine Fishing:** Marine fishes **Aquaculture:** Seaweed, Shrimp	**Marine Fishing:** Marine fishes **Aquaculture:** Seaweed, Shrimp, Milkfish, Marine fishes (grouper, etc.)
Sulu	- Seaweed - Abalone - Grouper - Squid / octopus - Tuna	**Marine Fishing:** Marine fishes **Aquaculture:** Seaweed	**Marine Fishing:** Marine fishes **Aquaculture:** Seaweed, Abalone, Marine fish (grouper)
Tawi-Tawi	- Seaweed - Live marine products - Fresh & chilled marine fishes - Dried fishes	**Marine Fishing:** Marine fishes, Abalone, Sea cucumber, and etc. **Aquaculture:** Seaweed, Grouper, Abalone, Milkfish, Shrimp	**Marine Fishing:** Marine fishes, Lobster, Swimming crab, etc. **Aquaculture:** Seaweed, Grouper, Abalone

According to the lists of candidate products from a literature review of existed documents, and the additional interviews to relevant persons engaged in fisheries sector in the ARMM, the target products for the product potential study were identified as shown in Table 5-49.

Especially, the Study has selected grouper (marine fish), seaweed, milkfish, tilapia, abalone and mud crab as high potential products in fisheries sector, and has collected the relevant data and information about those fisheries products. Those fisheries products are commonly produced at large areas of the ARMM. Moreover, the aquaculture techniques of those products have been developed and widely diffused in the Philippines, and their regional productions are possibly increased by local promotion efforts of their culture activities.

Other fisheries products, such as lobster, sea cucumber, squid and mud fish, are excluded from target products of the potential product study, because their production is very limited and their culture techniques have not been developed yet due to technical difficulties. In case of shrimp, even though shrimp culture skills are diffused domestically, locally produced shrimps in the ARMM are only by-products of brackish-water pond culture of milkfish or mud crab. Therefore, shrimp is also excluded from target products.

Table 5-49: Target Products for Product Potential Study in the ARMM Provinces

Provinces	Fishing	Aquaculture
Maguindanao	Marine fish, Freshwater fish	Seaweed, Tilapia, Milkfish, Mud crab
Lanao de Sur	Marine fish, Freshwater fish	Tilapia, Milkfish
Basilan	Marine fish	Seaweed, Abalone, Marine fish (Grouper, etc.)
Sulu	Marine fish	Seaweed, Abalone, Marine fish (Grouper, etc.)
Tawi-Tawi	Marine fish	Seaweed, Abalone, Marine fish (Grouper etc.)

5-3-1 **Abalone**

5-3-1-1 Background

Abalone is a high-value marine product in the domestic and international markets. In the ARMM region, there are plenty of suitable zones for abalone fishing and culture in the island provinces, especially, Sulu and Tawi-Tawi. Two marine multi-specie hatcheries are run in Tawi-Tawi, and both of them are located in Bongao, the central town of the province. The larger hatchery is jointly operated by the Mega Fishing Corporation and Bureau of Fisheries and Aquatic Resources-ARMM (Hereinafter called BFAR). Mindanao State University of Tawi-Tawi operates another experimental hatchery. Both hatcheries have the capacity and skill to produce juvenile donkey's ear abalone (*Haliotis asinina*), using artificial methods, and then regularly supply them to local fishers and the fishing communities.

5-3-1-2 Current Situation

(1) Production

The production of cultured abalone is still very low in the ARMM, and has not been recorded yet. Abalone culture has been recently introduced in the island provinces, especially Tawi-Tawi, since a full-scale operation of abalone seed production at Lato-Lato Marine Multi-species Hatchery. Some local communities start to grow abalone seeds in their small-size pens. However, their culture operation is still under a trial level.

(2) Production Technology

The abalone juveniles produced in local hatcheries are commonly stocked in fish pens or floating baskets in coastal waters. Natural seaweeds, such as *Gracilaria* and *Acanthophora*, are regularly harvested, and given to the abalone in pens and baskets. These kinds of seaweeds are preferred to grow the abalones. Abalones can grow up to a marketable size (50g/piece) in nine to twelve months (Figure 5-27). In another method, certain abalone juveniles are also released to proper sea beds, where seaweeds naturally flourish.

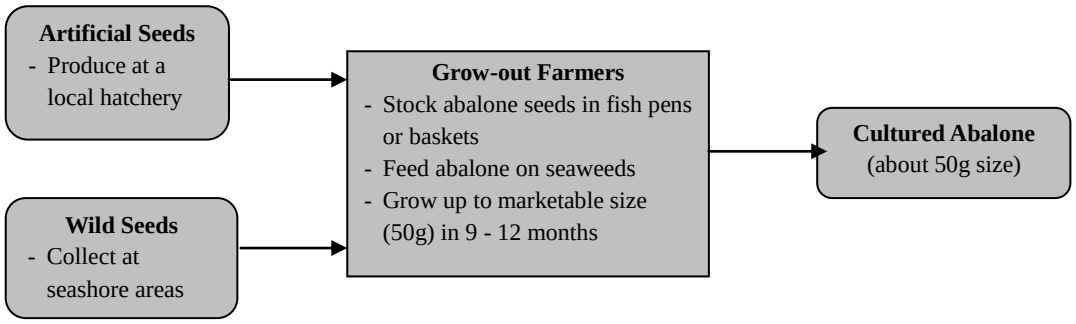


Figure 5-27: Production Process of Abalone Pen Culture, Tawi-Tawi

(3) Processing

Locally cultured abalone in the ARMM is dealt as live or fresh products. There are few cases of abalone processing in the ARMM. However, abalone could be dried as a preserved product. The dried abalone could be exported to the international market.

(4) Supply Chain

Due to small production of cultured abalone in the ARMM, its formal distribution route is unsettled at present. Live or fresh abalones produced in Tawi-Tawi are generally distributed to Zamboanga City, where most of them are consumed. Only a little portion of them may be transported to Manila or other major cities. The farm-gate price of live abalone attains Php 300-500/kg in Tawi-Tawi. Therefore, the future industrial potential of abalone culture is quite high among local marine products in the ARMM.

Table 5-50: Current Situation and Issues of Supply Chain of Abalone Industry in the ARMM

	Local Hatchery	Grow-out Farmer	Wholesalers	Distributor/Trader
Product	Abalone Seed (2-3 inches)	Live/Fresh Abalone (50 g in size)	Live/Fresh Abalone	Live/Fresh Abalone
Activities	- Produce abalone seeds in artificial method	- Grow-out abalone in fish pens or cages - Feed seaweed on abalones	- Purchase live/ fresh abalones from local farmers - Transport them to Zamboanga City	- Purchase live/fresh abalones from local wholesalers - Sell them at other major cities
Price	Seed price is Php 10 / pieces	Farm gate price is Php 300-500/kg (live abalone)	Wholesale price is Php 500-800/kg (live abalone)	Sale price is Php 800-1000/kg (live abalone)
Business Scale	18,000 pieces of abalone seeds are produced in 2009	3,000 pieces of live abalones are sold in a farmer group	Only 3-5 local traders dealing abalones in Tawi-Tawi	Unknown
Maine Issues	- Limited capacity of seed production facilities	- Lack of knowledge of abalone culture management	- Small quantity of live abalones	- Small quantity of live abalones

(5) Marketability

Because abalone is an important ingredient of Chinese cuisines, there is its high demand at domestic and international markets. In addition, the market values of live and fresh abalones are also high. Live or fresh abalones have a high market potential with high market values, if their qualities are well maintained by a proper handling.

The world market supply trend of cultured abalone is indicated below (Figure 5-28). The world market supply of cultured abalone continuously grows in recent years. The growth rate of the world market supply of cultured abalone is also very large.

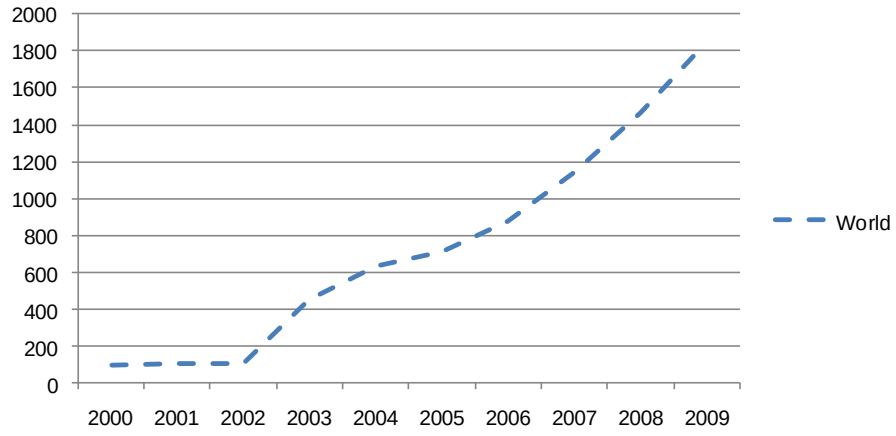


Figure 5-28: Market Supply of Cultured Abalone in the World (Year 2000 = 100)
Source: FAO Aquaculture Statistics

5-3-1-3 Main Issues and Constraints

Main issues of abalone industry promotion in the ARMM are shown as follows.

(1) Insufficient supply of abalone seeds

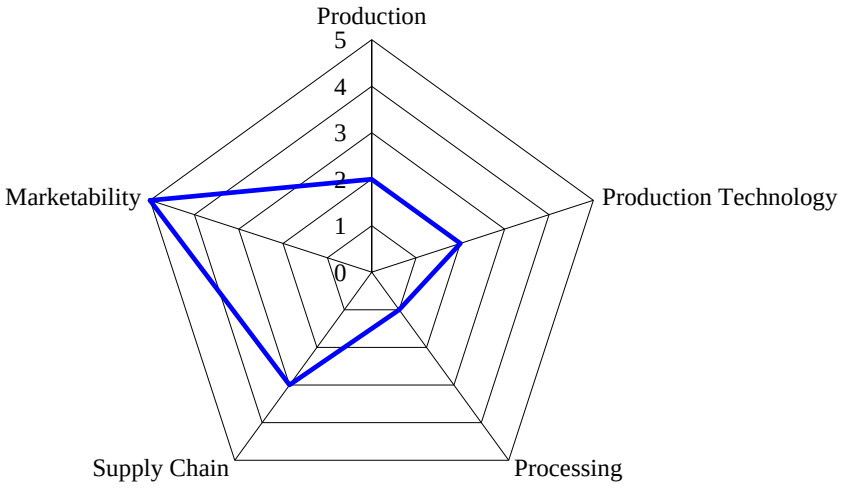
In the ARMM, abalone seeds are regularly produced at two local marine hatcheries in Tawi-Tawi Province, Lato-Lato Multi-species Marine Hatchery Marine Hatchery of Mindanao State University (MSU) of Tawi-Tawi. Those marine hatcheries have started to distribute abalone seeds to local fishing communities. There are high demands of abalone seeds in the region. However, because there are capacity limits of abalone seed production at the hatcheries, the production volume is not sufficient to meet the demands of local communities. To increase the hatchery capacities for abalone seed production, the hatchery facilities should be extended and renovated.

(2) Little awareness of abalone grow-out culture

Because abalone culture is newly introduced in the ARMM, the number of farmers engaging in abalone grow-out culture is still small. To promote abalone culture in local fishing communities, demonstration and model programs of abalone grow-out culture are necessary. Because MSU of Tawi-Tawi and Sulu tackle to disseminate basic farming models to local fishing communities, those extension programs should be strengthened to promote abalone culture at region-wide.

5-3-1-4 Evaluation

According to the result of the potential product study, the current situation of abalone industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	2	Abalone production in the ARMM is still limited, because abalone culture was introduced in Tawi-Tawi a few years ago.
Production Technology	2	Lato-Lato Multi-purpose Marine Hatchery and Marine Hatchery of MSU Tawi-Tawi can produce abalone seeds artificially, and supply abalone seeds to local fishing communities. However, abalone culture skill is still new for local fishers.
Processing	1	Abalone is commonly traded in fresh style, because fresh abalone is durable in dry condition. Dried abalone can be processed for export; but it is not common in the ARMM.
Supply Chain	3	Fresh abalones cultured/captured in the ARMM are mainly distributed / consumed at Zamboanga City. Some of fresh abalone may be distributed at Manila or other cities.
Marketability	5	Abalone is one of high-value fisheries products in the Philippines and neighbor countries, such as Hong Kong or Macau. Therefore, the market demand of abalone products is very high.

5-3-2 **Grouper**

5-3-2-1 Background

Grouper ("Lapu-Lapu" in the local language) is one of the high-value fishes in domestic and international markets. Live grouper is an important ingredient in Chinese cuisines. Thus it is commonly exported to neighboring countries, such as Hong Kong, Macao, Taiwan, Singapore, and China. The island provinces (Basilan, Sulu, and Tawi-Tawi) in the ARMM have a great number of coral reefs and vast shallow water areas, which are good grounds for fishing groupers. For these reasons, the island provinces of the ARMM region have a higher potential for grouper fishing.

5-3-2-2 Current Situation

(1) Production

Live grouper culture in the ARMM is less active than the Zamboanga Peninsula (Region IX) and Caraga (Region XIII) (Table 5-51). However, grouper culture production is gradually increasing in Tawi-Tawi (Table 5-52). In particular, Sibutu Island has become the center of grouper culture in the ARMM. At present, about 300 farmers are engaged in the grouper cage culture at Sibutu).

In the ARMM, about 1,500 ton of groupers are captured annually in coastal areas on average, and this rises to a 10 % share of the total grouper production in the Philippines (Table 5-53). More than 90 % of groupers are caught with artisanal fishing activities (municipal fisheries), which is operated by small gear items and boats in coastal areas. The catch quantity of groupers is dominated by the Tawi-Tawi and Sulu provinces in the ARMM, and reaches more than 70 % of the regional production (Table 5-54).

Table 5-51: Aquaculture Production of Groupers in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric tons)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines	273.0	303.8	417.2	2601.9	907.8	900.7	
Mindanao	79.6	74.9	146.9	159.8	241.5	140.5	15.6%
ARMM	0.9	0.3	0.0	7.8	11.1	4.0	0.4%
Davao Region	3.2	2.9	4.1	4.3	0.7	3.0	0.3%
SOCCSKSARGEN	6.8	2.0	1.4	1.2	1.7	2.6	0.3%
Zamboanga Peninsula	28.9	25.1	29.7	27.6	125.4	47.3	5.3%
Northern Mindanao	0.0	0.0	0.0	0.0	0.9	0.2	0.0%
Caraga	39.8	44.6	111.7	119.0	101.7	83.3	9.3%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-52: Aquaculture Production of Groupers in the ARMM, 2005-2009[161]

Province in ARMM	Annual Production (metric tons)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM	0.9	0.3	0.0	7.8	11.1	4.0	
Maguindanao	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Lanao del Sur	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
Basilan	0.9	0.3	0.0	0.0	0.0	0.2	5.9%
Sulu	0.0	0.0	0.0	0.0	0.9	0.2	4.4%
Tawi-Tawi	0.0	0.0	0.0	7.8	10.2	3.6	89.7%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-53: Marine Fisheries Production of Groupers in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines	13,219	14,545	16,053	17,277	15,605	15,340	
Mindanao	5,179	5,001	5,158	5,042	4,935	5,063	33.0%
ARMM	1,552	1,526	1,667	1,683	1,390	1,564	10.2%
Davao Region	426	572	455	498	339	458	3.0%
SOCCSKSARGEN	164	147	87	102	182	136	0.9%
Zamboanga Peninsula	1,479	1,197	1,415	1,439	1,888	1,483	9.7%
Northern Mindanao	236	382	458	562	593	446	2.9%
Caraga	1,323	1,177	1,076	758	542	975	6.4%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-54: Marine Fisheries Production of Groupers in the ARMM, 2005-2009

Province in ARMM	Annual Production (metric tons)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM	1,552	1,526	1,667	1,683	1,390	1,564	
Maguindanao	7	31	23	35	72	34	2.1%
Lanao del Sur	256	262	270	264	269	264	16.9%
Basilan	54	68	51	70	78	64	4.1%
Sulu	402	449	518	493	459	464	29.7%
Tawi-Tawi	833	716	805	821	512	737	47.2%

Source: Fisheries Statistics of the Philippines, BAS

[161] Some programs of grouper culture were carried out in Basilan. However, those programs were moved to other island provinces like Tawi-Tawi, because of availability of grouper seeds.

The trends of grouper fishing and culture production in the ARMM are shown in Figure 5-29.

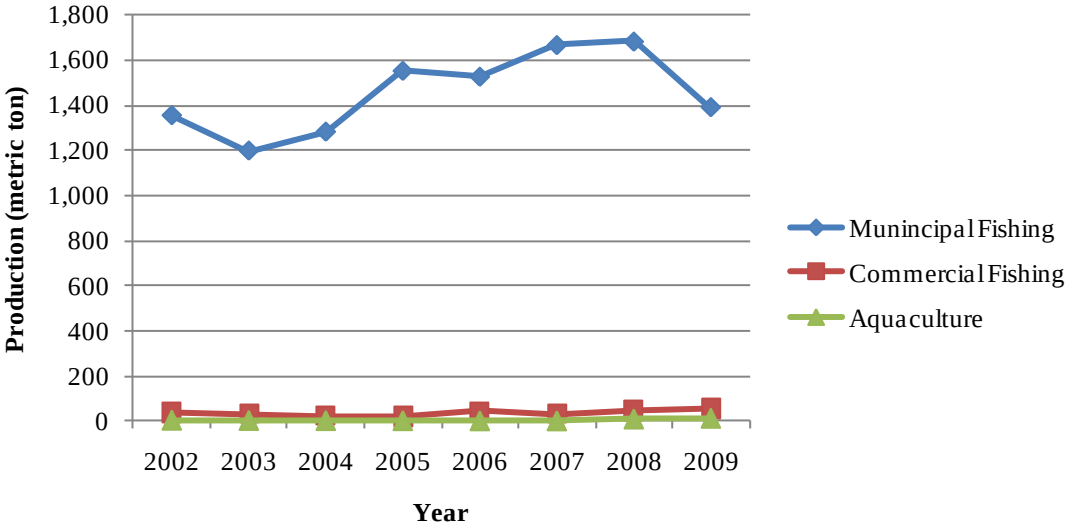
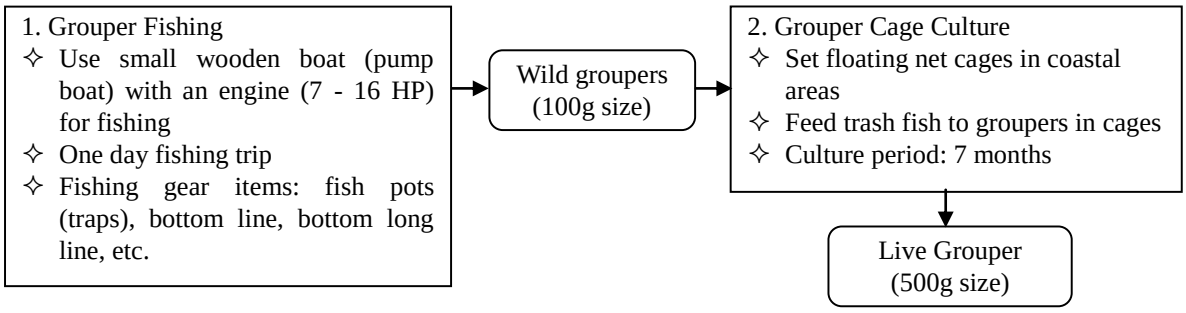


Figure 5-29: Trend of Grouper Fishing and Culture Production in the ARMM, 2002-2009

Source: Fisheries Statistics of the Philippines, BAS

(2) Production Technology

As for the operating grouper culture, it is necessary to build floating net cages and set them in coastal areas. As it is difficult to artificially produce grouper seeds at local hatcheries, local farmers have to collect wild groupers fingerlings, and keep or raise them in cages up to their shipment. Usually, trash fish are fed to groupers in the cages. Growing small-size groupers (4 - 5 inches) in cages usually takes 7 months to the harvest (Figure 5-30).



*HP: Horse Power

Figure 5-30: Common Process of Grouper Cage Culture in Tawi-Tawi

Source: The Result of Field Survey in the Study

Local marine hatchery in Tawi-Tawi makes an effort to develop the artificial production of grouper seeds. However, it has not been successful there yet, because it requires sensitive handling and high-skilled management. Local farmers totally rely on the supply of wild live fish. Thus this is a limitation of grouper production in the ARMM.

Most local fishers use bottom lines or fish pots for fishing groupers in coastal areas. They use pump boats (small wooden canoes) with small engines or even without engines. The basic methods of grouper fishing are simple and require a low capital outlay. However, most local fishers do not use ice to preserve captured fish, because the supply of ice is very limited at local fishing places. Therefore, it is hard to maintain the freshness of their captured fish.

(3) Processing

Groupers stocked or cultured in fish cages are distributed as live fish at high values to domestic and international markets. They are rarely used for processing purposes, because the market value of live and fresh groupers is much higher than that of processed ones.

However, most of groupers captured by local fishers are commonly processed as dried fish at remote fishing villages, because they do not have little means to preserve fresh fish. Locally dried groupers and marine fishes are usually produced in sun shines on bamboo or wooden-made tables. However, the market value of dried fish is much lower than those of fresh or live fishes. Moreover, the weather condition always affects the quality of dried fish products. Figure 5-31 shows a typical production process of dried fish.

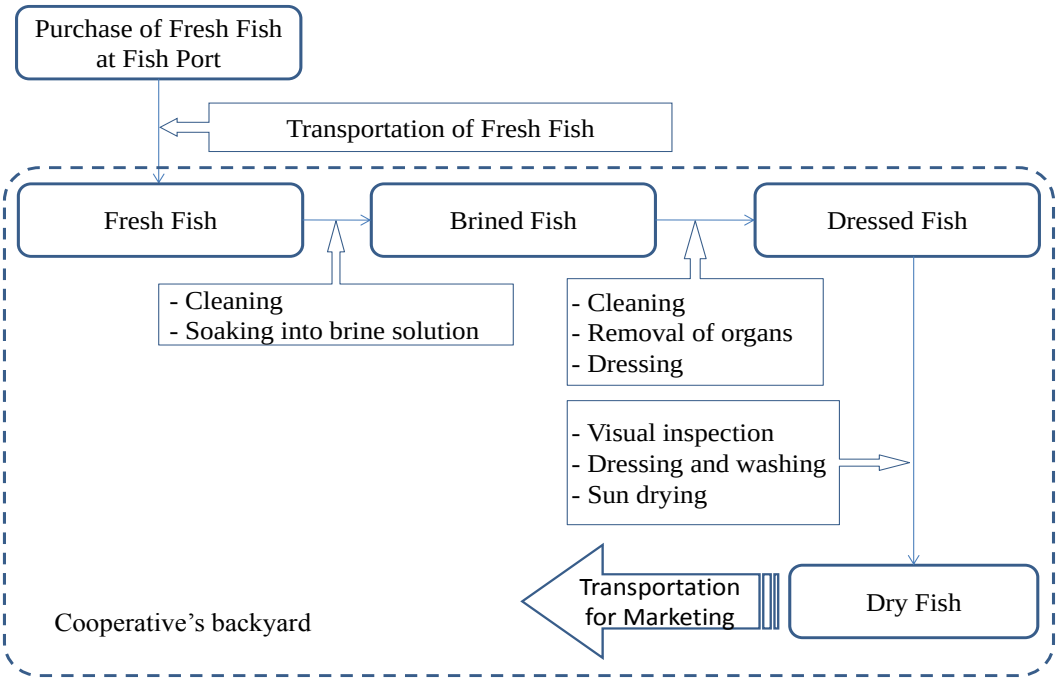


Figure 5-31: Typical Production Process of Dried Fish

(4) Supply Chain

Most grouper products produced in the ARMM are mainly distributed to major cities in Mindanao and Visaya. In the island provinces, local fishers, processors, and collectors usually sell their grouper products to wholesalers based in central towns of the respective provinces, such as Bongao (Tawi-Tawi), Jolo (Sulu), Maluso or Lamitan (Basilan) (Figure 5-32). Local wholesalers transport the grouper products to Zamboanga City by ferry or in their own boats. From Zamboanga City, fresh and dried fish are distributed to other major cities in Mindanao and Visaya.

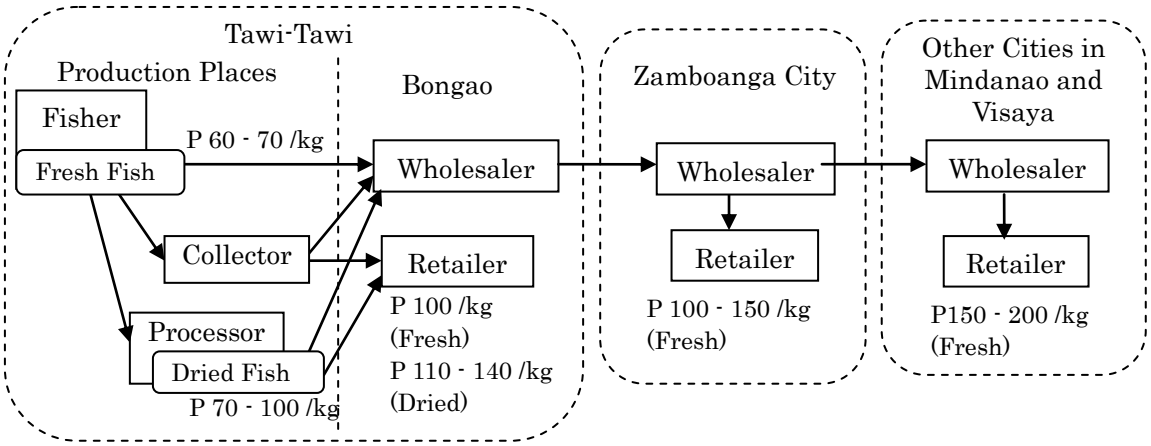


Figure 5-32: Supply Chain of Fresh and Dried Groupers Produced in Tawi-Tawi

Source: The Result of Field Survey in the Study

Live groupers have different distribution routes from fresh and dried fish: the former are collected by local wholesalers based in the central towns, and are then sold to foreign traders of live fish through Zamboanga City (Figure 5-33).

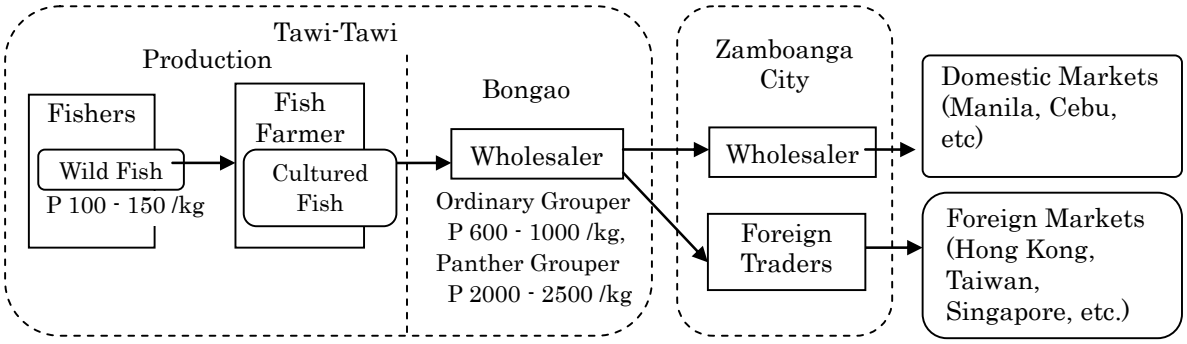


Figure 5-33: Supply Chain of the Live Groupers Produced in Tawi-Tawi.

Source: The Results of the Field Survey in the Study

Table 5-55: Current Situation and Issues of Supply Chain of Live Groupers in the ARMM

	Seed Collector	Grow-out	Wholesaler	Distributor/Trader
Product	Grouper Seed	Live Grouper	Live Grouper	Live Grouper
Activities	- Collect grouper seeds at coastal areas - Sell grouper seeds to local farmers	- Grow-out groupers at fish cages - Sell them to local wholesalers	- Purchase live fish from local farmers - Sell them to local distributors/ traders	- Carry live groupers to other major cities and neighbor countries
Price	Seed price is Php 150/seeds	Farm gate price is Php 1000-1500/kg (live ordinary groupers)	Wholesale price is Php 2,000-3,000/kg	Market price is more than Php 3,000/kg
Business Scale	Local fishers collect grouper seeds as a part-time job	200-300 kg of live groupers can be harvested per a farmer.	Live groupers are sold to local distributors of live fish products	Some traders carry live groupers directly to neighbor countries, mainly Hong Kong
Main Issues	- Limited resources of grouper seeds at coastal areas	- Low productivity of cage culture, - Dependence of wild seed collection	- Small quantity of locally cultured groupers	- Small quantity of locally cultured groupers

(5) Marketability

Live grouper is not only consumed in the domestic markets of the Philippines, such as Manila and Cebu City, but is also exported to neighbouring countries or regions, especially Hong Kong, Macau, and Taiwan. On average, about 6,000 tons of live groupers are exported from the Philippines (Table 5-56 and Figure 5-34). 90% of the volume of exported live groupers from the Philippines goes to Hong Kong (Table 5-57).

Table 5-56: Volume and Value of Export in Live Grouper from the Philippines

Export of Grouper	Annual Export Volume or Value					Annual Average
	2005	2006	2007	2008	2009	
Volume (metric ton)	7,088	6,727	5,358	4,898	7,801	6,374
Value (PHP 1,000)	766,607	735,624	763,821	559,531	893,358	743,788

Source: Fisheries Statistics of the Philippines, BAS

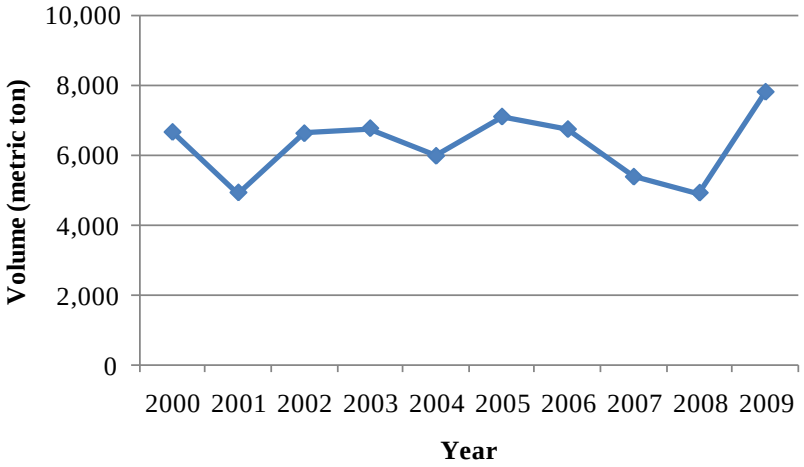


Figure 5-34: Export of Live Grouper from the Philippines

Source: Fisheries Statistics of the Philippines, BAS.

Table 5-57: Major Destination Countries of Live Groupers in the Philippines, 2008

Destination	Volume (metric ton)	Percentage
Hong Kong	4,442,515	90.7%
Macau	266,730	5.4%
Taiwan	142,447	2.9%
Singapore	29,098	0.6%
China	7,711	0.2%

Source: Fisheries Statistics of the Philippines, BAS

The market supply trends of cultured groupers in the world, the Philippines and the ARMM are indicated below (Figure 5-35). Market supply of cultured groupers has been increasing in the Philippine and the international market. If the ARMM is able to improve the supply chain and production system to meet this growing market and to deliver products to market properly, there would be a large potential.

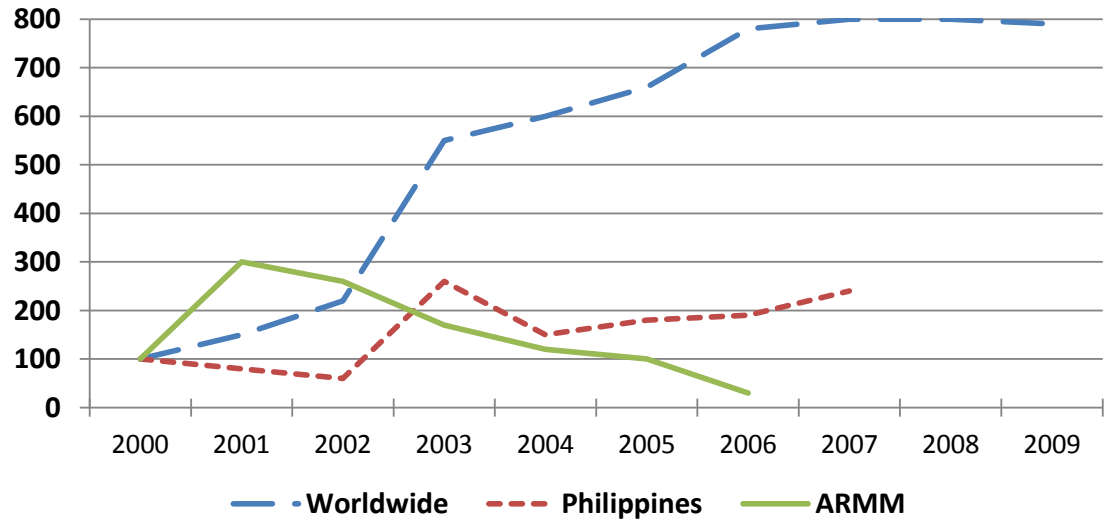


Figure 5-35: Market Supply of Cultured Groupers in the World, Philippines and the ARMM (Year 2000 = 100)

Source: FAO Aquaculture Statistics, BAS Fisheries Statistics

5-3-2-3 Main Issues and Constraints

Main issues of grouper industry promotion in the ARMM are shown as follows.

(1) Dependence of seed supply on wild fish capture

Artificial grouper seed production is still underdeveloped at local marine hatcheries operated in Tawi-Tawi. Therefore, local fishers collect wild grouper seeds at coastal areas for their cage culture operations. Because wild grouper seeds can be caught by simple fish traps, large efforts of wild grouper collection decrease the natural grouper resources at coastal areas. In order to promote grouper culture in the ARMM in the future, local fishing communities have to control and manage their collection of grouper seeds immediately.

It is important to develop artificial production technologies of grouper seeds at local level. However, artificial grouper seed production is only succeeded in a few species in Southeast Asia. Moreover, it takes a long time to breed grouper brood stock and collect high-quality fertilized eggs regularly. To develop local marine fish culture industry, it is indispensable to strengthen technical capacity of local marine hatcheries.

(2) Low quality of fresh grouper products

The market value of live groupers is commonly is higher than that of fresh fish. However, because most of cultured or captured groupers are not properly handled and preserved after

harvest or fishing, it is difficult to maintain their freshness for a long time in post-harvest stages. Actually, in island provinces, the majority of groupers are processed into dried fish. Only a small portion of groupers is shipped to markets as fresh or live fish. To maintain a high quality of fresh fish, it is necessary to improve handling skills of fresh fish in post-harvest stages, and to prepare small-scale infrastructures, such as clean landing places, ice stockers, and etc.

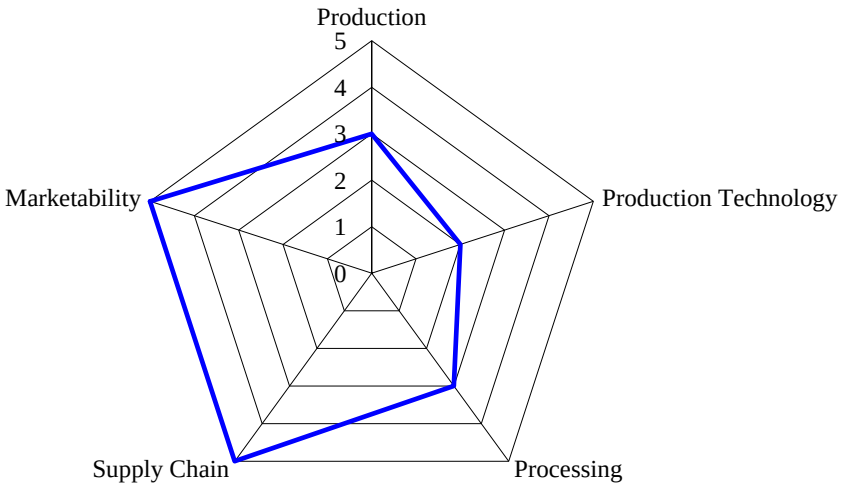
(3) Insufficient skills of grouper culture

Local fishers of the ARMM do not have a long experience in cage culture of live grouper, even though a lot of fish cages have been introduced at coastal areas of island provinces, especially Tawi-Tawi. In fact, most local fishers have not had enough opportunities to learn proper culture and handling technologies of marine finfish culture, especially groupers.

Trash fish is the most popular feed for groupers in cages. However, it is difficult to collect a large amount of trash fish constantly, because fish catches of artisanal fishing are small in island provinces. Since the number of fish cages is increasing gradually at coastal areas, many local fishers engaging in grouper culture face a shortage of local trash fish supply. In order to promote grouper culture in the ARMM, it is indispensable to develop a local-made fish feed as alternative of trash fish. The alternative fish feed should be made from locally produced materials, such as local-made fish meal, rice bran, algae powder, and etc.

5-3-2-4 Evaluation

According to the result of the potential product study, the current situation of grouper industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	3	Groupers are commonly captured by artisanal fishing at coastal areas of the ARMM. Recently, fish cages for stocking and farming groupers are gradually increased at coastal areas, especially at Tawi-Tawi.
Production Technology	2	Grouper seed supply currently depends on a collection of wild small fish. There is a local marine finfish hatchery in Tawi-Tawi to develop artificial seed production.
Processing	3	The majority of groupers are processed into salted dried fish, because of lack of preservation facilities at production sites.
Supply Chain	5	Fresh and live groupers are dealt with high value for Chinese cuisines. Especially, live groupers are traded to Hong Kong and Macau.
Marketability	5	The market trend of fresh and live groupers is highly upward domestically and internationally.

5-3-3 **Milkfish**

5-3-3-1 Background

Milkfish ("Bangus" in the local language) is commonly consumed in the Philippines. There are various kinds of local milkfish cuisines, and milkfish demand is very large in the domestic market. Sometimes, it is called the "national commercial fish." For these reasons, milkfish is commonly farmed everywhere in the Philippines. However, the milkfish production in the ARMM is very limited, although there are extensive areas of coastal marsh and mangrove forest in Maguindanao, Lanao del Sur, and Basilan.

5-3-3-2 Current Situation

(1) Production

Recently, the annual production of the milkfish culture in the ARMM was less than 3,000 metric tons on average (Table 5-58). The ARMM is the smallest region of milkfish culture production in Mindanao. Moreover, the milkfish culture production of the ARMM accounts for only a 1% share of national production. In fact, in the ARMM Region, milkfish culture is operated only in Maguindanao and Basilan Provinces. Maguindanao is the dominant province for milkfish production in the ARMM (Table 5-59).

In Maguindanao, there are many brackish-water fish ponds in coastal marsh or mangrove areas of the coastal municipalities, such as Parang, Sultan Kudarat, and Sultan Mastura. These brackish-water fish ponds are generally used for milkfish culture by the extensive method. Surprisingly, milkfish are also cultured at freshwater fish pens and cages in Lake Buluan, the largest freshwater lake in Maguindanao. In Basilan, milkfish is usually cultured in fish ponds in coastal areas.

Table 5-58: Aquaculture Production of Milkfish in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines (total)	289,153	315,070	349,704	350,830	347,586	330,468	
Mindanao (total)	48,317	49,101	56,668	62,064	68,087	56,847	17.2%
ARMM	2,103	2,686	2,770	3,256	3,595	2,882	0.9%
Davao Region	8,555	9,180	13,868	17,985	22,143	14,346	4.3%
SOCCSKSARGEN	13,247	14,006	14,723	15,096	14,879	14,390	4.4%
Zamboanga Peninsula	11,141	10,073	10,695	9,832	11,446	10,638	3.2%
Northern Mindanao	8,017	8,038	9,191	10,564	11,740	9,510	2.9%
Caraga	3,248	3,112	3,415	3,323	2,275	3,074	0.9%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-59: Aquaculture Production of Milkfish in the ARMM, 2005-2009

Province in ARMM	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM (total)	2,103	2,686	2,770	3,256	3,595	2,882	
Maguindanao	1,663	2,222	2,274	2,821	3,128	2,422	84.0%
Lanao del Sur	7	3	1	0	0	2	0.1%
Basilan	433	461	495	435	467	458	15.9%
Sulu	0	0	0	0	0	0	0.0%
Tawi-Tawi	0	0	0	0	0	0	0.0%

Source: Fisheries Statistics of the Philippines, BAS

Milkfish are also naturally captured in coastal marsh or mangrove areas. The ARMM is the most popular region for milkfish fishing activities of the inland waters in Mindanao. The milkfish production of inland fishing in the ARMM accounts for a 30% share of the national production (Table 5-60). In the ARMM, the milkfish production of inland fishing is conducted only in the coastal marsh areas of Maguindanao (Table 5-61). However, compared to the total aquaculture production, the amount of milkfish landed is relatively small.

Table 5-60: Inland Fisheries Production of Milkfish in Mindanao, 2006-2009

Region in Mindanao	Year				Annual Average	Share
	2006	2007	2008	2009		
Philippines (total)	3,636	2,261	3,714	9,347	4,740	
Mindanao (total)	1,724	1,723	2,138	1,694	1,820	38.4%
ARMM	1,094	1,655	1,656	2,060	1,616	34.1%
Davao Region	0	0	0	0	0	0.0%
SOCCSKSARGEN	0	0	0	0	0	0.0%
Zamboanga Peninsula	0	0	0	0	0	0.0%
Northern Mindanao	95	67	67	62	73	1.5%
Caraga	1	1	0	16	5	0.1%

(unit: metric ton)

Source: Fisheries Statistics of the Philippines, BAS

Table 5-61: Inland Fisheries Production of Milkfish in the ARMM, 2006-2009

Province in ARMM	Year				Annual Average	Share
	2006	2007	2008	2009		
ARMM (total)	1,094	1,655	1,656	2,060	1,616	
Maguindanao	1,094	1,655	1,656	2,060	1,616	100.0%
Lanao del Sur	0	0	0	0	0	0.0%
Basilan	0	0	0	0	0	0.0%
Sulu	0	0	0	0	0	0.0%
Tawi-Tawi	0	0	0	0	0	0.0%

(unit: metric ton)

Source: Fisheries Statistics of the Philippines, BAS

(2) Production Technology

Milkfish can be cultured in both brackish-water and freshwater conditions, because it has strong tolerance to salinity changes in the water. In Maguindanao, milkfish is mainly produced in brackish-water ponds in the coastal marsh areas. Cultured fish are grown out by being fed on only natural organisms, such as planktons and algae, which naturally grown in pond waters. These traditional ways of milkfish pond culture are very simple and extensive.

There is no milkfish hatchery in the ARMM. The supply of milkfish seeds for brackish-water pond culture totally depends on the amount of wild juveniles captured at the seashore. Because the collection of wild milkfish seeds fluctuates seasonally, the seed supply is not stable all year round. Milkfish seeds can only be collected in large quantities in the dry season. The harvest of wild seeds peaks from March to July. A low supply of milkfish seeds is often caused by the rainy season.

The common process of brackish-water pond culture is shown in Figure 5-36. There are three main actors in pond culture: seed collectors, nursery farmers, and grow-out farmers. Each actor has their own role and activity in the production of milkfish in coastal areas.

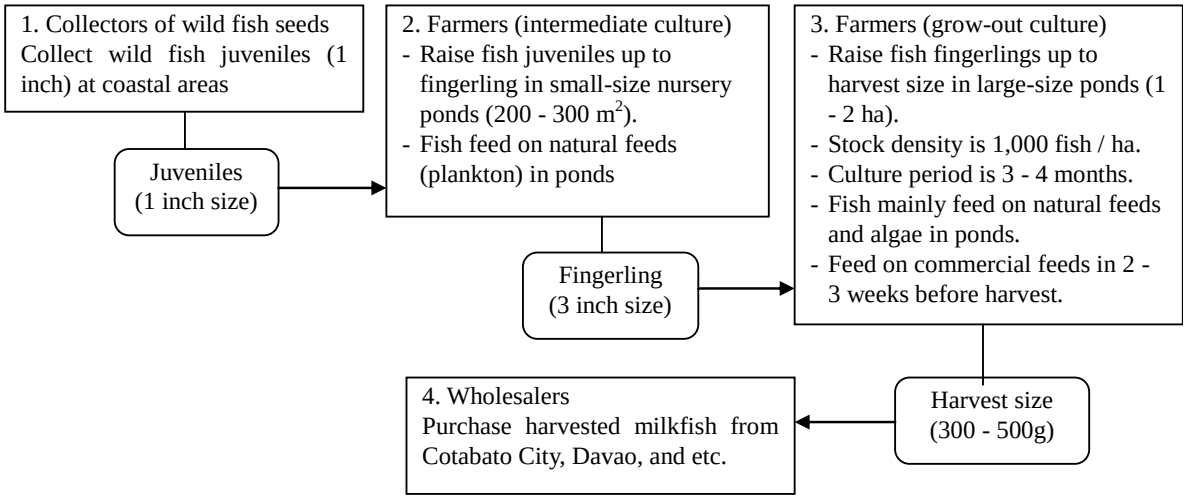


Figure 5-36: Production Process and the Process of Milkfish Pond Culture in Maguindanao.
Source: Results of the Field Survey in the Study

As mentioned above, milkfish is also farmed at Lake Buluan, a freshwater lake in Maguindanao. At present, only one private company is engaged in milkfish culture with large-size fish pens, which enclose certain water areas in the lake.

(3) Processing

Locally produced milkfish in the ARMM is distributed and consumed as fresh fish at local markets. There are few cases of milkfish processing in the ARMM.

In other regions of Mindanao, milkfish is commonly processed as dried bone-less fish or smoked fish. Because there are a lot of small bones in milkfish body, boneless processing adds a certain value to milkfish products in domestic markets. If milkfish can be much more produced in the ARMM, locally produced milkfish may be utilized for processing purposes in future.

(4) Supply Chain

Milkfish produced in brackish-water ponds in Maguindanao are mainly consumed in local markets of the production areas and in Cotabato City (Figure 5-37). Commonly, milkfish is distributed and consumed as fresh fish in the ARMM. Wholesalers based in Davao sometimes come to Maguindanao to purchase fresh milkfish from local pond farmers. However, the amount of milkfish distributed outside the ARMM is probably very small. Value-added processing of locally produced milkfish is very rare in the ARMM.

The coastal areas of Maguindanao are one of the important production areas for the supply of wild milkfish juveniles. A large amount of wild milkfish juveniles can be captured at the seashore lines. They can then be shipped to General Santos and Davao to compensate for a shortage of local milkfish seeds for fish pond or cage operators.

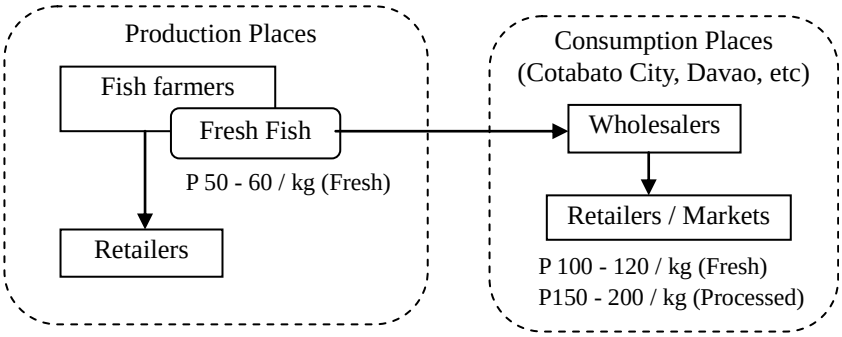


Figure 5-37: Supply Chain of Cultured Milkfish Produced in Maguindanao.
Source: Result of Field Study in This Study

In case of Basilan, locally cultured milkfish is mostly distributed to Zamboanga City by local wholesalers.

Table 5-62: Current Situation and Issues of Supply Chain of Seaweed Industry in the ARMM

	Seed Collector	Grow-out	Wholesaler/Retailer	Distributor/Trader
Product	Milkfish Seeds	Fresh Milkfish	Fresh Milkfish	Fresh Milkfish
Activities	- Collect milkfish seeds at coastal areas - Sell milkfish seeds to local farmers	- Grow-out milkfish at brackish-water ponds - Sell them to local wholesalers	- Purchase fresh fish from local farmers - Sell them to local consumers and distributors	- Carry fresh milkfish to other major cities - Sell them at local markets
Price	Seed price is Php 150 per 1,000 seeds (Php 1.5 / seed)	Farm gate price is Php 50-60/kg (500g size)	Wholesale / Market price of fresh fish is Php 80-100/kg	Market price is Php 100-120 /kg
Business Scale	Local fishers collect milkfish seeds as a part-time job	700-800 kg of fresh milkfish can be harvested at 2-3 ha ponds.	Most milkfish are sold to local consumers and retailers.	According to a shortage of market supply, local traders come to Cotabato City to purchase milkfish.
Main Issues	- Limited resources of milkfish seeds at coastal areas	- Low productivity of pond culture, - Dependence of wild seed collection	- Small quantity of locally cultured milkfish	- Small quantity of locally cultured milkfish

(5) Marketability

Annual consumption per capita of milkfish, 2008-2009 is shown in Table 5-63. In the ARMM, most of locally-produced milkfish are consumed in local markets or neighbouring towns. As milkfish is one of the most popular fishes in the Philippines, the national annual consumption of milkfish is 4.21 kg/person on average.

In the ARMM, the annual consumption per capita of milkfish is 1.35 kg/person, which is less than a half of the national level. Due to abundant catches of marine fish, milkfish is less consumed in island provinces, Tawi-Tawi, Sulu, and Basilan. Contrarily, in Maguindanao and Lanao del Sur, milkfish is popularly sold and consumed at local markets even though those milkfish consumption levels are lower than the national average. According to those estimated figures, the current supply of locally produced milkfish is smaller than a potential demand derived from the national average.

In other regions of Mindanao, their estimated figures of consumption per capita are also lower than that of the national average. It may indicate a further potential of milkfish supply at markets of neighbouring regions.

Table 5-63: Annual Consumption per Capita of Milkfish, 2008-2009

Region in Mindanao	Annual Consumption per capita (kg/person)	Difference from National Consumption
Philippines	4.21	
ARMM	1.35	-2.86
Davao Region	3.80	-0.42
SOCCSKSARGEN	2.76	-1.46
Zamboanga Peninsula	1.09	-3.12
Northern Mindanao	2.13	-2.08
Caraga	2.18	-2.03

Province in ARMM	Annual Consumption per capita (kg/person)	Difference from National Consumption
ARMM	1.35	
Maguindanao	3.07	-1.14
Lanao del Sur	0.78	-3.43
Basilan	0.42	-3.80
Sulu	0.05	-4.16
Tawi-Tawi	0.16	-4.06

Source: Survey of Food Demand for Agricultural Commodities in the Philippines, BAS

The market supply trends of cultured milkfish in the world, the Philippines and the ARMM are indicated below (Figure 5-38). The growth of milkfish supply and production in the ARMM is sometimes instable and fluctuating. However, similarly to the upward trend of national milkfish supply, the milkfish supply from the ARMM has been increasing in recent years.

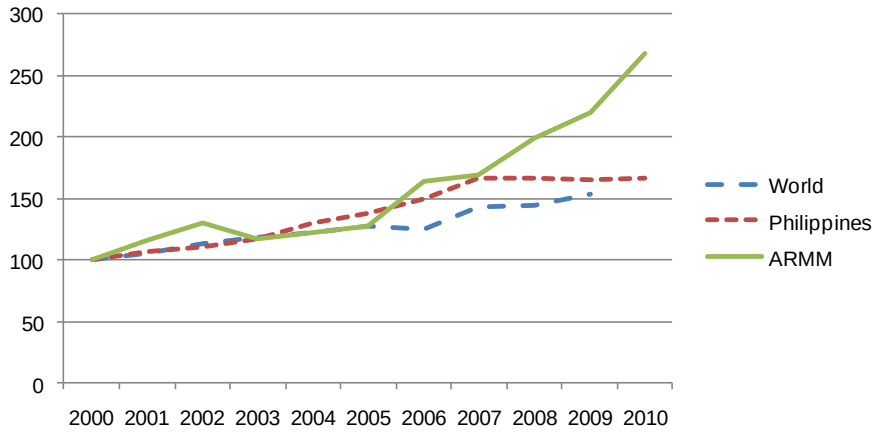


Figure 5-38: Market Supply of Cultured Milkfish in the World, Philippines and ARMM
(Year 2000 = 100)
Source: FAO Aquaculture Statistics, BAS Fisheries Statistics

5-3-3-3 Main Issues and Constraints

Main issues and constraints of milkfish industry promotion in the ARMM are shown as follows.

(1) Low productivity of local pond culture

Most milkfish pond farmers adopt traditional culture method. Cultured fish grow-out with feeding on only natural organisms in ponds, because they are given little additional feeds. To improve a productivity and quality of milkfish cultured in ponds, improved culture method should be applied. In improved culture, fish farmers give other feeds to fish, such as compound feeds in addition to natural organisms in ponds. Even though the productivity of fish pond is expected to be improved by applying semi-intensive culture, a feeding cost of fish culture is increased in comparison with a traditional culture. Hence, in order to minimize the cost at actual fields, the utilization of local materials should be considered as fish feeds. Rice bran fermented with animal manures is one of effective local-made feeds for milkfish culture, since a JICA technical cooperation project for milkfish culture extension (COFBreP: Comprehensive Outreach and Fish Breeding Project, 2008-2010) proved the feeding efficiency of fermented rice bran for milkfish pond culture.

(2) Shortage of seed supply for possible demand

Currently, most fish farmers do not face any serious shortages of local fish seed supply, because milkfish seeds naturally come and grow out in brackish-water ponds along mangrove forests and coastal areas. However, securing wild milkfish seeds must be considered to promote milkfish culture largely in the ARMM, because there is no local milkfish hatchery to produce

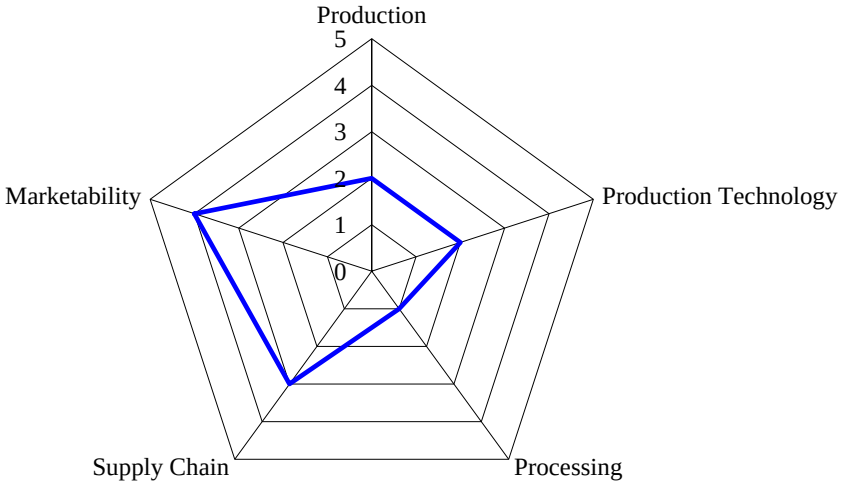
milkfish fries and fingerlings artificially in the ARMM. The establishment of a local milkfish hatchery is a necessary measure to avoid a future problem: a shortage of local seed supply. However, since an investment of the hatchery facility construction is very high, it is not much realistic in the ARMM at present. Finfish Hatchery Inc. (Alabel, Sarangani Province) of the Alacantara Group is a largest supplier of milkfish seeds to local fish farms all over the Philippines. When a shortage of local milkfish seed supply happens in near future, local farmers can obtain and purchase milkfish fries at the hatchery.

(3) Little popularity of milkfish processing activities

Most milkfish produced in the ARMM are distributed as fresh fish at local markets. There are few processed products of local produced milkfish in the ARMM, even though several kinds of processed products of milkfish are developed and distributed in other regions. That situation may be reflected by low production of local milkfish culture. To promote local milkfish demand and consumption, it is indispensable to develop processed products of locally cultured fish. By referring to the cases of milkfish processing in other regions, such as Region XI (Davao), milkfish processing activities should be introduced into local fish farmers' groups or cooperatives. Especially, local women groups in fishing communities should participate in fish processing activities.

5-3-3-4 Evaluation

According to the result of the potential product study, the current situation of milkfish industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	2	Even though milkfish is the most popular fish in the Philippines, the production in the ARMM accounts for only 1% of the nation. Maguindanao is a major production province in the ARMM.
Production Technology	2	Local fish farmers apply extensive method for milkfish pond culture. Cultured fish feed in natural organisms grown in brackish-water ponds. Therefore, it bears little cost but the production is low. There is no milkfish hatchery in the ARMM. Local milkfish seed supply depends on catches of wild milkfish fries.
Processing	1	Boneless dried milkfish is widely consumed as value-added products all over the Philippines. However, the milkfish processing activities are not common in the ARMM.
Supply Chain	3	Fresh milkfish cultured in the ARMM is mainly distributed / consumed at local markets of the ARMM and neighbor cities, Cotabato City or Zamboanga City.
Marketability	4	Local milkfish consumption in the ARMM is good, even though local milkfish culture production is low. Due to its high popularity, local milkfish demands are expected as to be much increased.

5-3-4 **Mud Crab**

5-3-4-1 Background

Mud Crab ("Alimango" in the local language) is one of the most highly-valued marine products, and it is farmed and consumed all around the Philippines. There are various species of mud crabs; in particular, the black giant crab, *Scylla serrata*, is widely farmed in ponds with brackish-water. The king crab *(Scylla tranquebarica*, a dark greenish-color) is also commonly cultured in brackish-water ponds, and sold at a higher value in local markets than common mud crabs.

5-3-4-2 Current Situation

(1) Production

The ARMM accounts for only 0.1 % of the national production of mud crabs. In Mindanao, Northern Mindanao (Region X) is the largest production region in mangrove crab culture, because there is vast mangrove forest in the coastal areas of the region (Table 5-64). In the ARMM, mud crabs are cultured in brackish-water fish ponds in the coastal areas of Maguindanao. In other provinces of the ARMM, mud crab culture has not yet become commonplace (Table 5-65).

Table 5-64: Aquaculture Production of Mud Crab in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines	6,851	7,797	9,309	11,625	13,730	9,862	
Mindanao	1,965	2,521	3,718	4,341	6,213	3,751	38.0%
ARMM	13	12	12	14	18	14	0.1%
Davao Region	16	12	6	4	4	8	0.1%
SOCCSKSARGEN	0	0	0	0	0	0	0.0%
Zamboanga Peninsula	149	120	116	122	237	149	1.5%
Northern Mindanao	1,646	2,255	3,398	4,021	5,779	3,420	34.7%
Caraga	141	121	186	180	175	161	1.6%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-65: Aquaculture Production of Mud Crab in ARMM, 2005-2009

Province in ARMM	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM	13	12	12	14	18	14	
Maguindanao	13	12	12	14	15	13	95.4%
Lanao del Sur	0	0	0	0	0	0	0.0%
Basilan	0	0	0	0	0	0	0.0%
Sulu	0	0	0	0	3	1	4.6%
Tawi-Tawi	0	0	0	0	0	0	0.0%

Source: Fisheries Statistics of the Philippines, BAS

(2) Production Technology

In Maguindanao, mud crab culture takes place in brackish-water ponds in the traditional, extensive way. Crabs are usually cultured in large-size ponds (1-2 ha) at a low stocking rate, and mainly feed on natural organisms in the ponds. Some farmers add trash fish into the ponds to raise the stocked crabs faster and bigger. The supply of mud crab seeds completely depends on the collection of wild crabs at local mangrove areas (Figure 5-39).

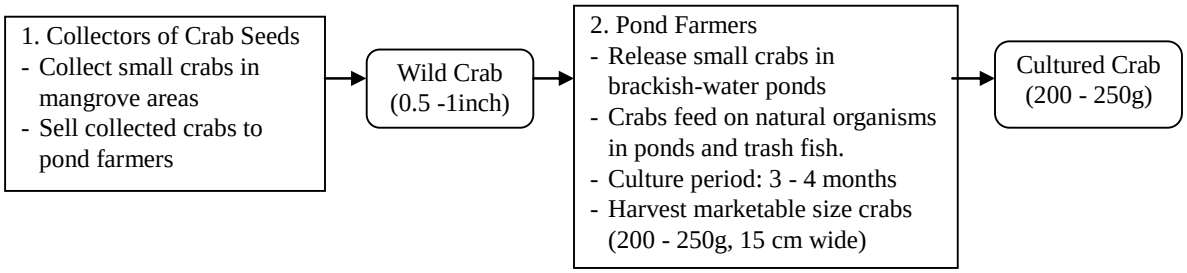


Figure 5-39: Common Production Process of the Mud Crab in Maguindanao.

Source: The Results of the Field Survey in the Study.

(3) Processing

Locally produced mud crab is commonly distributed as live or fresh products. There are very few cases of mud crab processing in the ARMM.

(4) Supply Chain

The distribution route of the mud crab is very simple. In Maguindanao, some farmers organize cooperative associations to sell their products jointly to wholesalers and local people at reasonable prices. Most of the mud crabs cultured at Maguindanao are consumed in Cotabato City. A certain amount of the cultured mud crabs are also distributed to other major cities in

Mindanao, such as Davao, General Santos, and Koronadal. Because mud crabs can stay alive in dry conditions for several weeks, they are easy to handle and transport over a long distance by simply tying them up (Figure 5-40, Table 5-66).

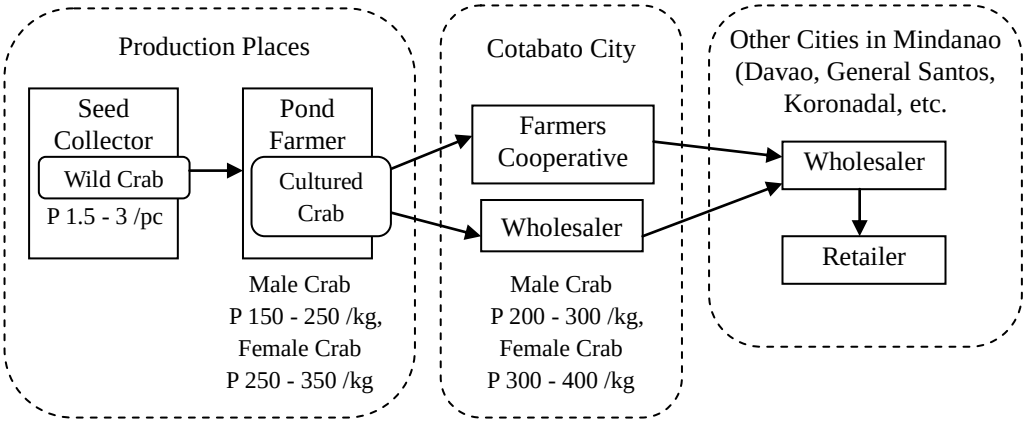


Figure 5-40: Supply Chain of Cultured Mud Crab Produced in Maguindanao

Source: The Result of the Field Survey in the Study

Table 5-66: Current Situation and Issues of Supply Chain of Mud Crab in the ARMM

	Seed Collector	Crab Farmers	Wholesaler	Distributor/Trader
Product	Mud Crab Seeds	Live Mud Crab	Live Mud Crab	Live Mud Crab
Activities	- Collect mud crab seeds at mangrove areas - Sell mud crab seeds to local farmers	- Grow-out mud crab at brackish-water ponds - Sell them to local wholesalers	- Purchase live mud crabs from local farmers - Sell them to local consumers and distributors	- Carry live crabs to other major cities - Sell them at local markets or restaurants
Price	Seed price is Php 1.5-3 /piece	Farm gate price is Php 150-250 /kg (male) and 250-350 /kg (female)	Wholesale price is Php 200-300 /kg (male) and 300-400 /kg (female)	Sale price is Php 500-600 /kg
Business Scale	Local fishers collect crab seeds as a part-time job	30-50 kg could be harvested monthly at 2-3 ha ponds.	Farmers' cooperatives work for collection and sale of locally cultured mud crab	Local traders carry live mud crab to Manila or other major cities with other fresh fisheries products.
Main Issues	- Limited resources of mud crabs at coastal areas	- Low productivity of pond culture, - Dependence of wild seed collection	- Small quantity of locally cultured mud crab	- Small quantity of locally cultured mud crab

(5) Marketability

Mud crab is one of the high value marine products in the Philippines, because it is an important ingredient in local seafood. Thus the demand of mud crab is also quite high in the domestic and international markets.

The export quantity of live crabs has dropped in recent years. The mud crab makes up a large portion of the live crabs exported. On the other hand, the export quantity of processed crab products, such as crab meats and pastes, is increasing. However, it is the blue swimming crab (*Portunus pelagicus*), which is captured in sea areas, that is mainly used for these processing purposes. Little mud crab is also used for processing. Therefore, there is a trend of the portion of mud crab gradually becoming smaller in the national export of crab products (Table 5-67, Figure 5-41).

Table 5-67: Export Volume and Value of Crab Products in the Philippines, 2005-2009

Product Type	Volume / Value	Year					Annual Average
		2005	2006	2007	2008	2009	
Live	Volume (metric ton)	1,909	2,501	1,727	1,625	2,978	2,148
	Value (million PHP)	372	489	339	435	867	500
Frozen / Fresh / Chilled	Volume (metric ton)	140	67	83	64	33	77
	Value (million PHP)	23	20	15	8	4	14
Processed	Volume (metric ton)	2,380	2,022	2,180	3,703	1,346	2,326
	Value (million PHP)	1,551	1,220	1,463	1,096	982	1,262
Total Export	Volume (metric ton)	4,429	4,590	3,990	5,392	4,357	4,552
	Value (million PHP)	1,946	1,729	1,817	1,539	1,853	1,777

Source: Fisheries Statistics of the Philippines, the BAS

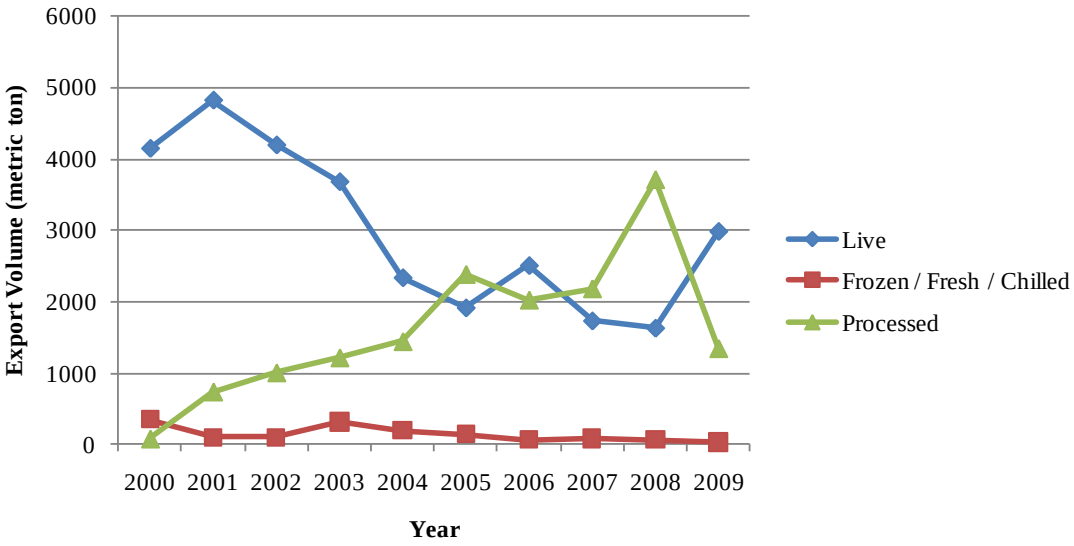


Figure 5-41: Export Trend of Crab Products in the Philippines

Source: Fisheries Statistics of the Philippines, BAS

The market supply trends of cultured mud crab in the world, the Philippines and the ARMM are indicated below (Figure 5-42). The market supply of mud crab in the world and the Philippines continuously has been increasing in recent years. However, the upward trend of mud crab supply in the ARMM is much lower than that of national supply. It means that the mud crab supply from the ARMM has not caught up with the current upward market trend in the Philippines.

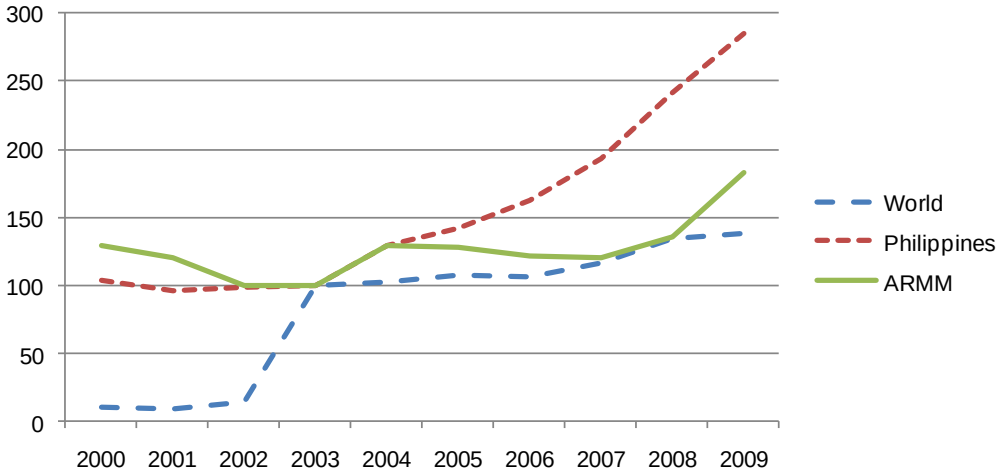


Figure 5-42: Market Supply of Cultured Mud Crab in the World, the Philippines and the ARMM (Year 2003 = 100)

Source: FAO Aquaculture Statistics, BAS Fisheries Statistics

5-3-4-3 Main Issues and Constraints

Main issues and constraints of mud crab culture promotion in the ARMM are shown as follows.

(1) Unstable of local seed supply of mud crab

Because there is no marine hatchery handling mud crab in the ARMM, the current seed supply of mud crab completely depends on wild seed collection at coastal and mangrove areas. Therefore, local seed supply is often reflected by the seasonal and environmental conditions. However, most crab farmers have not seriously considered seed supply of mud crab, because mud crab seeds naturally enter ponds with water flows, and grow out with feeding natural organisms in ponds.

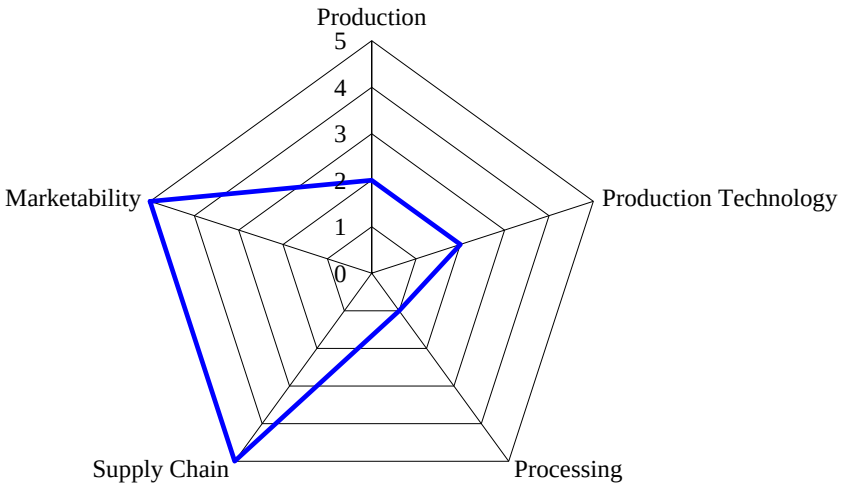
The future promotion of mud crab culture will raise a demand of crab seeds at producer side. It may exhaust natural resources of mud crabs rapidly by excessive collection of wild crab seeds at local coastal areas. To avoid that situation, mud crab collection should be well managed in crab farmers' organizations, such as cooperatives or associations.

(2) Low quality of mud crabs produced in ponds

Because most farmers take traditional methods to culture mud crab in ponds, they do not provide crabs in ponds regularly with additional feeds, such as trash fish or compound feed. Therefore, mud crabs in ponds do not grow out equally, and their harvest sizes are varied. Some crabs can be grown at large size, but, others are not grown up to market sizes. The quality of harvested mud crabs is not also stable. Usually, small-size crabs have only a little meat inside; therefore, their values are very low. To stabilize the quality of harvested mud crabs, it is necessary to improve feeding management in ponds.

5-3-4-4 Evaluation

According to the result of the potential product study, the current situation of mud crab industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	2	Mud crab is produced only at coastal areas of Maguindanao and Basilan. Mud crab is cultured with milkfish at brackish-water ponds in traditional extensive methods. Therefore, local mud crab production is very limited.
Production Technology	2	Traditional extensive culture is very simple. Mud crabs naturally grow out with feeding in natural organisms produced in ponds. However, the productivity of pond culture is low, and harvested crabs in ponds vary in size and quality.
Processing	1	Mud crab can live in dry condition for a long time. Mostly, mud crab is dealt in live or fresh.
Supply Chain	5	Fresh mud crab cultured in the ARMM is mainly distributed / consumed at neighbor cities, Cotabato City or Zamboanga City. Some of fresh mud crab are distributed to Manila or other cities.
Marketability	5	Mud crab is one of high value fisheries products in the Philippine. It can be exported to neighbor countries, such as Hong Kong or Macau. The market demands of live, fresh, and chilled mud crabs are so high.

5-3-5 **Seaweed**

5-3-5-1 Background

Seaweed is an important material of "Carrageenan", which is widely used in the food and other industries as thickening and stabilizing agents. The ARMM has the largest areas of shallow water in Mindanao, especially in the island provinces. Hence the ARMM has a high potential for seaweed production. There are two types (genera) of seaweed as carrageen materials, *Eucheuma* and *Kappaphycus*. *Kappaphycus cottonii* is most commonly cultured in the ARMM.

5-3-5-2 Current Situation

(1) Production

The ARMM is the largest production region for seaweed culture in the Philippines, accounting for a nearly 40% share of the national seaweed production (Table 5-68). In the ARMM, Tawi-Tawi and Sulu Provinces have large shares of the seaweed production, and account for 60% and 30% shares, respectively. Maguindanao Province also accounts for a 10% share of seaweed production in the ARMM (Table 5-69), since seaweed culture has been introduced at Parang Bay and Bongo Island. These examples of seaweed production indicate that the ARMM has suitable natural conditions for seaweed culture, especially in the island provinces.

Table 5-68: Production of Seaweed Culture in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines	1,338,597	1,468,906	1,505,069	1,666,556	1,739,994	1,543,824	
Mindanao	738,663	827,440	877,587	939,449	974,289	871,486	56.4%
ARMM	510,137	560,684	617,624	657,159	683,084	605,738	39.2%
Davao Region	1,809	2,201	2,161	2,625	4,344	2,628	0.2%
SOCCSKSARGEN	236	36	82	188	265	161	0.0%
Zamboanga Peninsula	176,631	211,228	201,618	222,161	225,057	207,339	13.4%
Northern Mindanao	34,673	33,803	35,524	35,818	38,879	35,739	2.3%
Caraga	15,177	19,488	20,578	21,498	22,660	19,880	1.3%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-69: Production of Seaweed Culture in the ARMM, 2005-2009

Province in ARMM	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM	510,137	560,684	617,624	657,159	683,084	605,738	
Maguindanao	14,450	55,800	64,007	74,116	80,222	57,719	9.5%
Lanao del Sur	0	0	0	0	0	0	0.0%
Basilan	3,797	3,658	4,467	5,945	5,963	4,766	0.8%
Sulu	184,776	178,150	187,236	199,205	210,250	191,923	31.7%
Tawi-Tawi	307,114	323,076	361,912	377,892	386,648	351,328	58.0%

Source: Fisheries Statistics of the Philippines, BAS

(2) Production Technology

The basic skill and processes of seaweed culture are simpler than those of shellfish or finfish culture. Moreover, the necessary equipment for seaweed culture is also simple. Usually, bamboo sticks, ropes, pet bottles, and concrete anchors are needed to construct floating rafts. Therefore, it is not hard to procure these materials, and set-up farming rafts without special skills. Farmers or operators keep certain blocks of coastal water exclusive for seaweed culture. A basic model of a floating raft used in the seaweed culture in Mindanao is shown in Figure 5-43. The model of a floating raft is usually set up in deeper water areas.

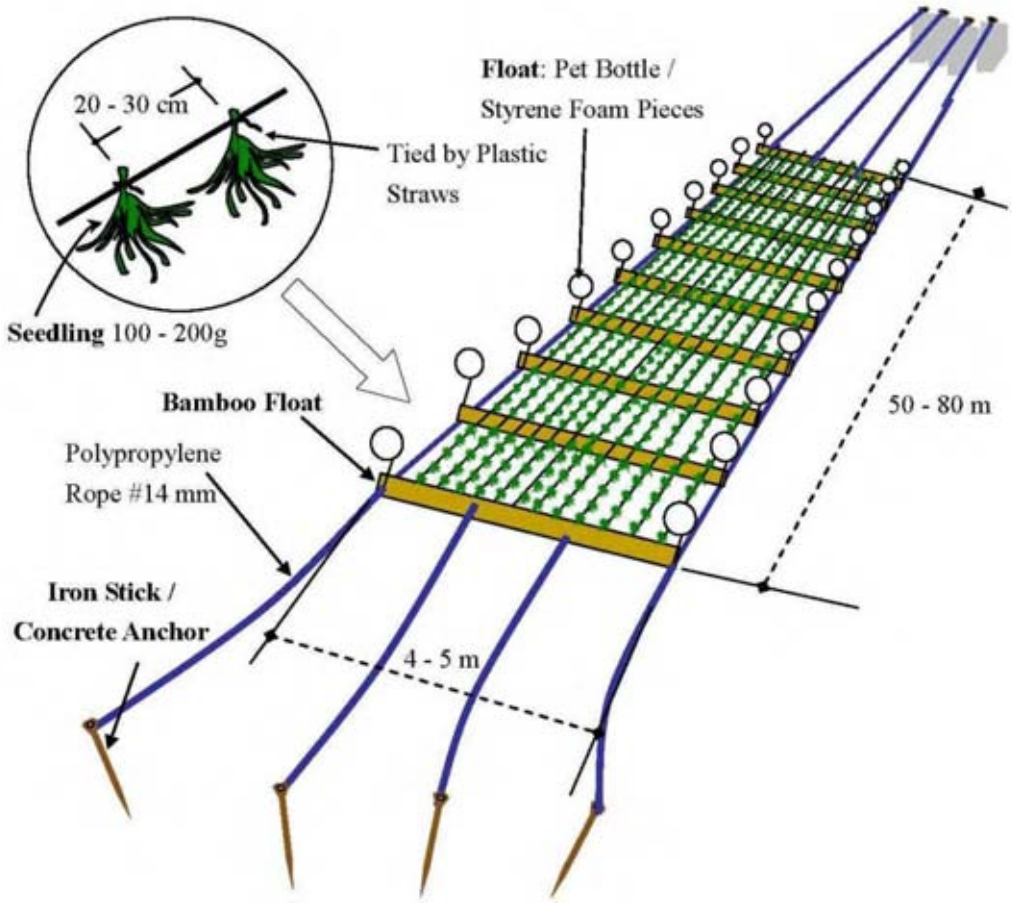


Figure 5-43: Common Model of Floating Rafts for Seaweed Culture in the ARMM.
Source: Result of Field Survey in the Study, USAID Report

As for the seaweed culture process, it is not necessary to apply any fertilizers. Seaweed naturally grows out by absorbing the natural nutrients in the sea water. Farmers clean cultured seaweeds regularly because debris and epiphytes or non-parasitic small hairy algae attached to the seaweeds covering the photosynthetic area of the plant that inhibits sunlight which is necessary in the food-making capabilities of the plant. Seaweeds infested with epiphytes have stunted growth. The basic production structure of seaweed culture is summarized in Figure 5-44.

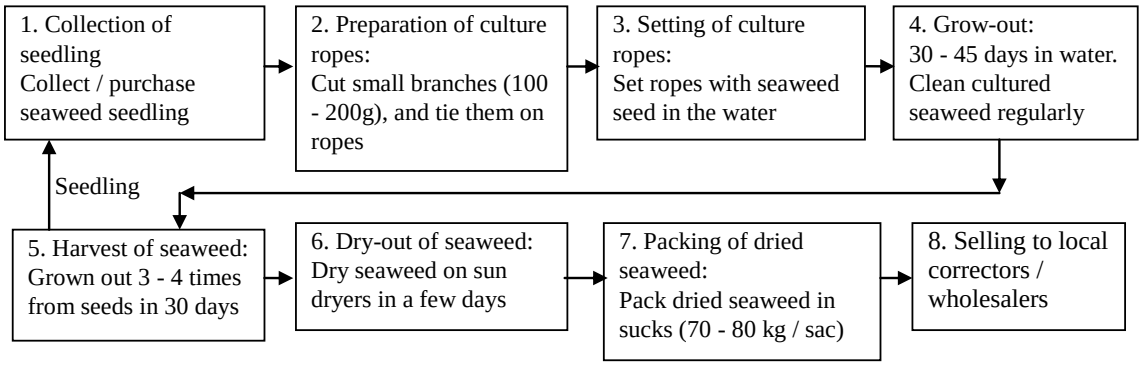


Figure 5-44: Production Process of Seaweed Culture in the ARMM

Source: Result of Field Survey in the Study

(3) Processing

Harvested seaweeds are usually dried on solar dryers at coastal waters or beaches. On the processing of dried seaweeds, any contamination with sand, dust, or other materials should be avoided to maintain the product quality. The best way to process dried seaweeds is to dry them in the sun on bamboo-made solar dryers standing in the sea. However, in the ARMM, a large amount of seaweeds are still dried directly on sand beaches and roads beside farmers' houses.

Dried seaweed is used as a material of carrageenan powder. Carrageenan powder is commonly used as thickening stabilizers for processed foods, such as ice cream. However, there is no carrageenan processing factory in the ARMM, because of unstable supplies and higher costs of electricity and tap-water. Locally produced dried seaweeds in the ARMM are processed at carrageenan factories located in Zamboanga City, Cebu City, and Manila.

(4) Supply Chain

At first, local collectors and wholesalers collect dried seaweeds which have been collected from seaweed farmers. According to the orders from processing factories of seaweed chips or carrageenan production, local wholesalers supply dried seaweeds to those factories. Some seaweed processing factories are operated in Zamboanga City; however, the major processing companies and factories are located in Cebu or Manila. Recently, some major seaweed companies established their own collecting points in places of production in order to purchase dried seaweeds directly from producers at more reasonable prices, without the intervention of local wholesalers (Figure 5-45, Table 5-70).

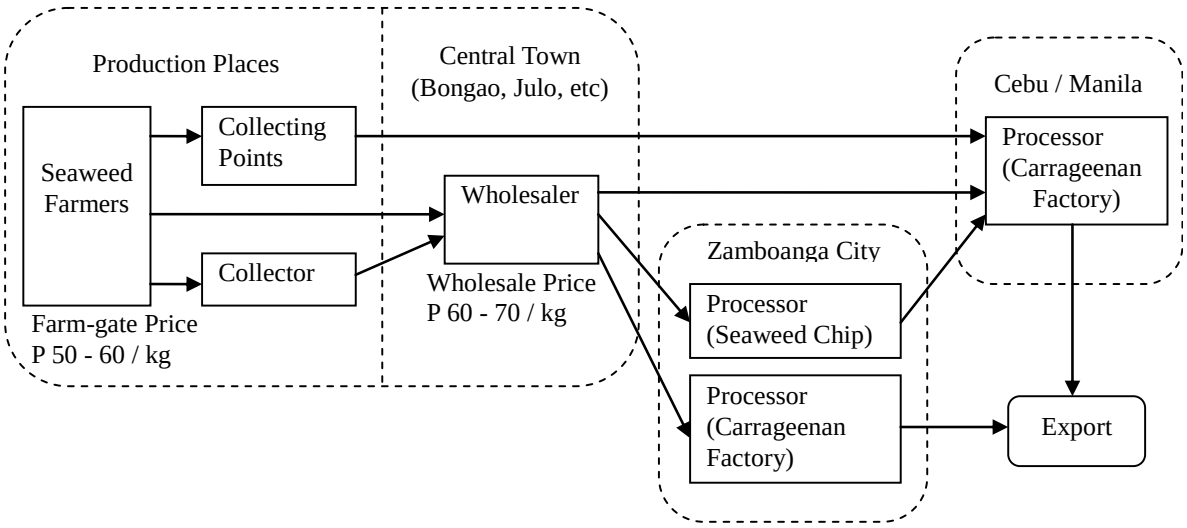


Figure 5-45: Common Supply Chains of Seaweeds in Island Provinces of ARMM.

Source: Results of Field Survey in the Study.

Table 5-70: Current Situation and Issues of Supply Chain of Seaweed Industry in the ARMM

	Seaweed Farmer	Local Consolidator	Wholesaler	Carrageenan Processor
Product	Dried Seaweed	Dried Seaweed	Dried Seaweed	Carrageenan Powders
Activities	- Grow-out seaweed at coastal areas - Dry seaweeds on the sun light	- Collect dried seaweed from local farmers - Sell them to local wholesalers	- Purchase dried seaweeds at production places - Transport them to processing factories	- Collect dried seaweeds - Produce carrageenan powders
Price	Farm gate price of dried seaweed is Php 30 - 40 / kg	Wholesale price is Php 50 - 60 /kg of dried seaweeds	Wholesale price is Php 70 - 80 /kg of dried seaweed	Average trading price of carrageenan powders is Php. 300 - 400 /kg
Business Scale	100 - 120 kg of dried seaweed is produced by a farmer in a month	10 - 20 tons of dried seaweed is sold in a month	Unknown	5,000 - 7,000 metric tons of carrageenan powder is produced in a factory annually.
Main Issues	- Limited capitals of expansion of seaweed farming	- Lack of proper storages for preservation of dried seaweeds	- Lack of the quality control of dried seaweeds	- Higher cost of electricity and water - Influence of international market demand and price

(5) Marketability

Most of the cultured seaweeds are processed in particular forms, such as raw dried products and dried chips. Thus, those primary processed products of seaweeds are exported as industrial materials mainly to developed countries, such as the USA, Canada, Germany, and Japan. The primary processed products used to be one of the major exported commodities of seaweeds in the Philippines. However, with a recent increase in domestic carrageenan production and the competition in supplying raw materials with other countries, the export quantity of primary seaweed products has been gradually dropping in the last five years. On the contrary, the export quantity of carrageenan products exceeds that of primary processed products at present (Table 5-71 and Figure 5-46).

Table 5-71: Export Volume and Value of Seaweed and Carrageenan Products in the Philippines

Product type	Volume / Value	Year					Annual Average
		2005	2006	2007	2008	2009	
Seaweed Products (Dried, Chip, etc.)	Volume (metric ton)	22,025	19,332	11,949	13,423	10,723	15,490
	Value (million peso)	1,485	1,289	995	1,121	604	1,099
Carrageenan Products	Volume (metric ton)	9,553	10,732	14,149	12,825	13,361	12,124
	Value (million peso)	2,234	2,356	3,224	4,275	4,097	3,237

Source: Fisheries Statistics of the Philippines, BAS

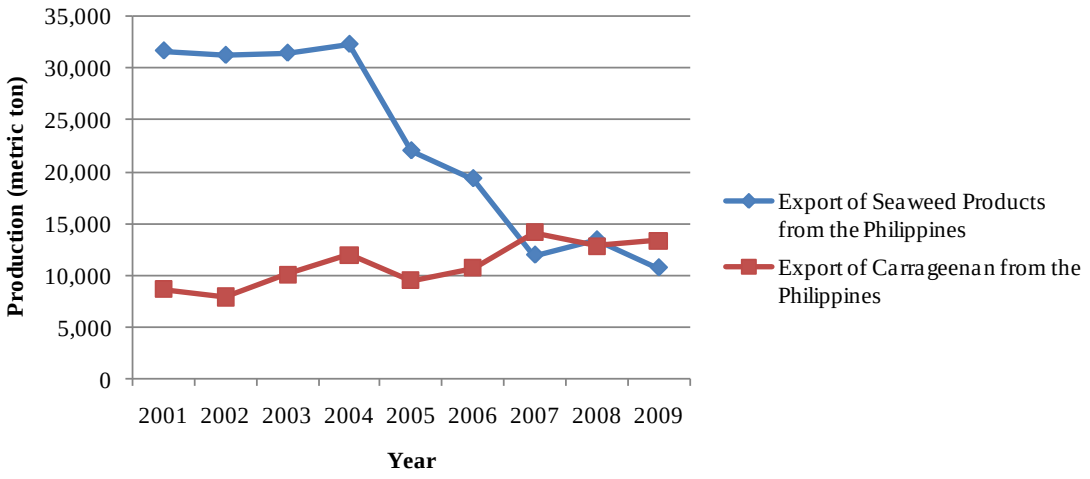


Figure 5-46: Export Trends of Seaweed and Carrageenan Products in the Philippines.
Source: Fisheries Statistics of the Philippines, BAS

The market supply trends of seaweed in the world, Philippines and ARMM are indicated below

(Figure 5-47). According to an upward trend of world seaweed market supply, the seaweed supply from the ARMM has been increasing in recent years. However, the growth rate of seaweed supply in Philippines has not caught up with the world growth of seaweed market. The growth of seaweed supply has been largely fluctuating in the ARMM.

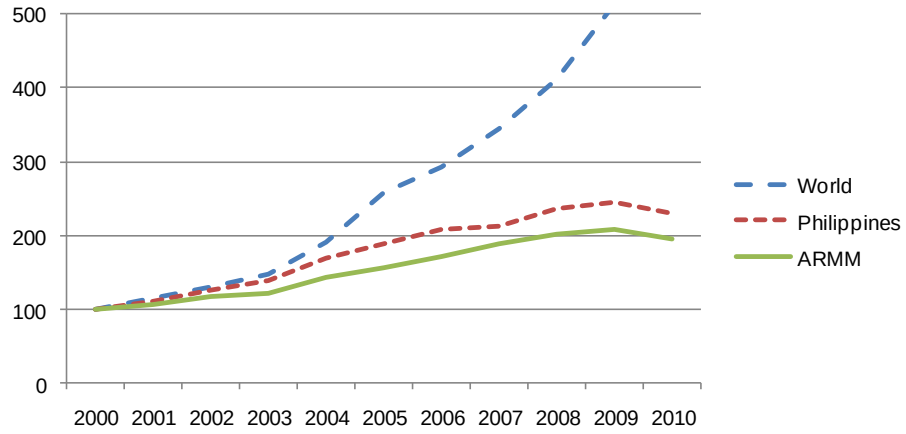


Figure 5-47: Market Supply of Seaweed (*Eucheuma* and *Kappaphycus*) in the World, Philippines and ARMM (Year 2000 = 100)

Source: FAO Aquaculture Statistics, BAS Fisheries Statistics

5-3-5-3 Main Issues and Constraints

According to the current situation of seaweed industry mentioned above, the main issues of seaweed promotion in the ARMM are shown as follows.

(1) Unstable quality of dried seaweeds

To avoid any contamination with other substances, such as sand, pebble, and rubbish, harvested seaweed has to be dried out on clean floors and places. However, many farmers still place harvested seaweed on any open spaces beside beaches, such as sand / grass grounds or roads, for their drying. Sometimes, other substances, such as salt or sand, are intentionally mixed with dried seaweed to add its weight, before their sales to local traders. In other cases, dried seaweeds are spoiled while being stored for long time in their houses. Those handling manners should be improved to deal in good quality seaweed products at higher value.

(2) Few active organizations of local seaweed farmers

Because seaweed culture needs wider coastal areas, seaweed farmers should regulate their culture spaces properly to avoid conflicts with ordinary fishing activities. Although a market demand of seaweed products gradually increases, local farm-gate prices of dried seaweeds are

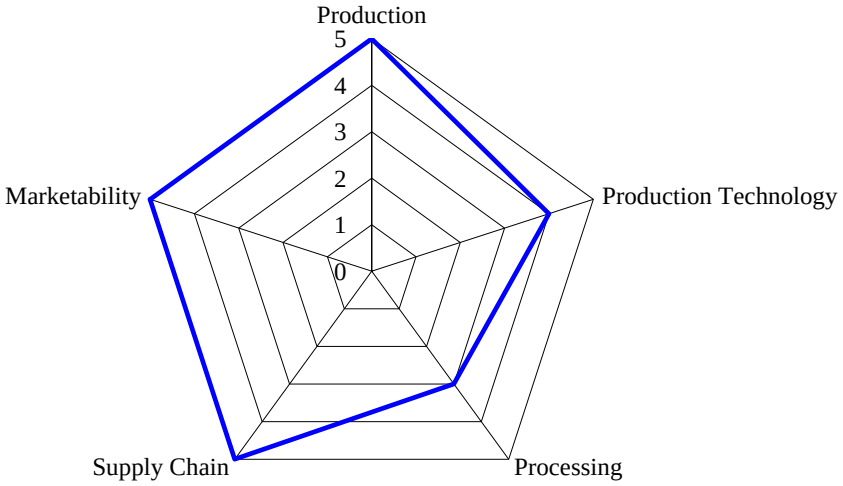
stagnant at lower level. Usually, local farmers sell their dried seaweed in individual negotiations with local traders. However, the traders usually lead the price negotiation, getting a strong bargaining power of dried seaweed. In order to resist their bargaining power, seaweed farmers should form local business organizations, such as cooperatives or associations, to negotiate for better selling prices to traders.

(3) Depletion of cultured seaweed quality

When same strains of seaweeds are used for grow-out continuously in a long time, the seaweed production is gradually dropped by a depletion of seaweed quality. To maintain stable seaweed production and its better quality, seaweed farmers have to obtain and plant a pure strain of seaweed regularly. The pure strains of seaweeds are duplicated by tissue culture at a biological laboratory, and distributed as seedling sources to production sites. However, the distribution structure of the pure strain seedlings is still underdeveloped in the ARMM, because a biological laboratory for tissue culture is newly established at BFAR.

5-3-5-4 Evaluation

According to the result of the potential product study, the current situation of seaweed industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	5	The ARMM is the largest region of seaweed production in the Philippines. Seaweed culture is very popular at island provinces, Tawi-Tawi and Sulu. Recently, the coastal areas of Parang in Maguindanao are also one of seaweed production sites in the ARMM.
Production Technology	4	Seaweeds can be cultured by simple methods which local fishers easily apply at coastal areas. Floating rafts of seaweed culture can be made of simple materials with low costs.
Processing	3	Fresh seaweeds are dried under sunlight after harvest. However, a quality control of dried seaweed processing is not stable. Dried seaweed is a main material of carrageenan powders. The processing factories are located in Zamboanga City, Cebu City, and Manila, not in the ARMM.
Supply Chain	5	Most seaweed products, such as seaweed chips or carrageenan powders, are exported to USA, EU, and Japan for various purposes. Especially, the demand of carrageenan is very high at international market.
Marketability	5	The upward trend of seaweed supply is very high in the world. The international demand of seaweed products as a carrageenan material will be much higher.

5-3-6 **Tilapia**

5-3-6-1 Background

Tilapia is one of the most popular freshwater fish in the Philippines. The EXCEL tilapia (excellent strain) is commonly produced and distributed in nationwide. The EXCEL is an improved strain of Nile tilapia (*Oreochromis niloticus*) in growth performance by combining improved family selection and rotational mating. Tilapia can inhabit both freshwater and brackish-water conditions, and tolerate low oxygen conditions in water. In addition, tilapia can be raised by natural feeds, such as plankton and water weeds. Therefore, tilapia is a durable and economical fish for aquacultural operation.

5-3-6-2 Current Situation

(1) Production

The aquaculture production of tilapia in the ARMM accounts for only 1.3% of the national production (Table 5-72). On the other hand, in Mindanao, the ARMM is the second largest production region of tilapia culture next to SOCCSKSARGEN (Region XII). In the ARMM, the tilapia culture production of Maguindanao is much larger than that of other provinces (Table 5-73). This is especially the case, in Lake Buluan, where about 100 local farmers operate large-scale fish pens for tilapia culture. At present, Lake Buluan is the largest production place of tilapia culture in the ARMM. In Lanao del Sur, tilapia is also cultured in fish ponds or pens around Lake Lanao, which is the largest freshwater lake in the Philippines. However, compared with Maguindanao, the production scale of the tilapia culture at Lanao del Sur is still very small.

Table 5-72: Aquaculture Production of Tilapia in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines	163,003	202,041	241,171	257,109	260,911	224,847	
Mindanao	12,813	16,003	17,105	16,723	17,959	16,121	7.2%
ARMM	431	2,770	3,193	3,810	3,980	2,837	1.3%
Davao Region	757	855	974	913	922	884	0.4%
SOCCSKSARGEN	9,105	9,389	9,601	8,236	8,900	9,046	4.0%
Zamboanga Peninsula	1,566	1,876	1,880	1,931	2,281	1,907	0.8%
Northern Mindanao	743	890	1,154	1,454	1,541	1,156	0.5%
Caraga	212	222	303	379	336	291	0.1%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-73: Aquaculture Production of Tilapia in ARMM, 2005 - 2009

Province in ARMM	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM	431	2,770	3,193	3,810	3,980	2,837	
Maguindanao	369	2,718	3,142	3,751	3,919	2,780	98.0%
Lanao del Sur	60	50	50	58	60	56	2.0%
Basilan	2	2	1	1	1	1	0.0%
Sulu	0	0	0	0	0	0	0.0%
Tawi-Tawi	0	0	0	0	0	0	0.0%

Source: Fisheries Statistics of the Philippines, BAS

Under the national distribution program of tilapia, the Bureau of Fisheries and Aquatic Resources (Hereinafter called BFAR) produces and supplies tilapia seeds for local fish farmers from two hatcheries of freshwater fish in Maguindanao (Datu Odin Sinsuat) and Lanao del Sur (Marantao).

In terms of inland fishing of tilapia, the ARMM is the second largest production region in Mindanao next to SOCCSKSARGEN (Region XII) as well as in tilapia culture (Table 5-74). In the ARMM, Liguasan Marsh in Maguindanao and Lake Lanao in Lanao del Sur are the largest production grounds for tilapia fishing (Table 5-75). In the ARMM, the production of tilapia fishing has been relied on a stable yield on inland fishing (Figure 5-48). However, fishing activities in the inland marsh areas are greatly affected by the fluctuating water levels and the volume of major rivers. This is because marsh lands are flooded by river water in the rainy season, and then dry out in the dry season.

Table 5-74: Inland Fishing Production of Tilapia in Mindanao, 2005-2009

Region in Mindanao	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
Philippines	32,507	39,687	37,649	42,704	43,463	39,202	
Mindanao	15,439	16,104	16,779	18,598	19,440	17,272	44.1%
ARMM	5,985	5,672	5,393	5,943	5,701	5,739	14.6%
Davao Region	99	75	82	70	70	80	0.2%
SOCCSKSARGEN	7,223	8,142	8,872	10,085	10,745	9,013	23.0%
Zamboanga Peninsula	217	226	239	236	276	239	0.6%
Northern Mindanao	1,006	986	1,087	1,217	1,610	1,181	3.0%
Caraga	909	1,002	1,106	1,047	1,038	1,020	2.6%

Source: Fisheries Statistics of the Philippines, BAS

Table 5-75: Inland Fishing Production of Tilapia in the ARMM, 2005-2009

Province in ARMM	Annual Production (metric ton)					Annual Average	Share
	2005	2006	2007	2008	2009		
ARMM	5,985	5,672	5,393	5,943	5,701	5,739	
Maguindanao	2,711	2,144	1,985	2,381	2,108	2,266	39.5%
Lanao del Sur	3,273	3,527	3,406	3,560	3,591	3,471	60.5%
Basilan	1	1	1	2	2	1	0.0%
Sulu	0	0	0	0	0	0	0.0%
Tawi-Tawi	0	0	0	0	0	0	0.0%

Source: Fisheries Statistics of the Philippines, BAS.

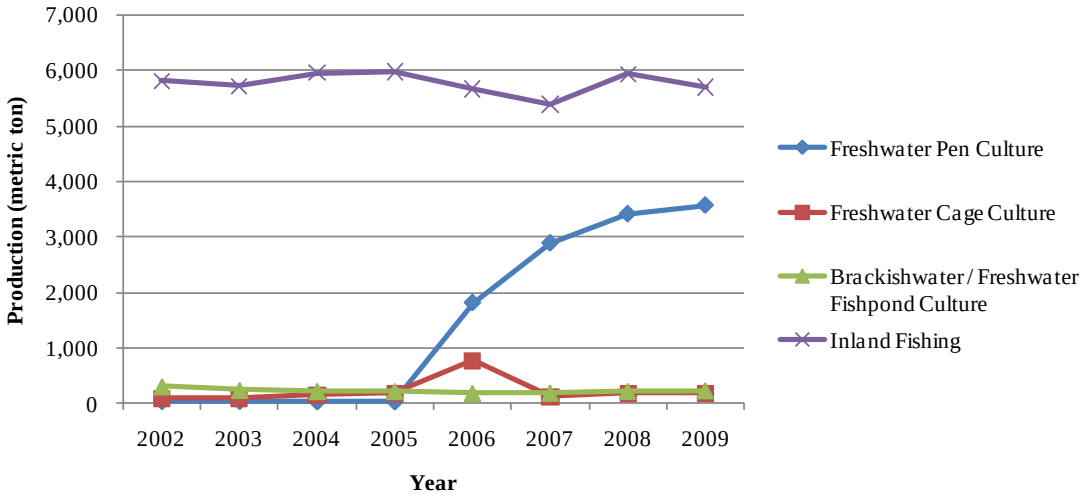


Figure 5-48: Production Trends of Aquaculture and Inland Fisheries of Tilapia in the ARMM.
Source: Fisheries Statistics of the Philippines, BAS

(2) Production Technology

The basic process of tilapia culture is very simple. In the ARMM, extensive farming way is common in tilapia culture. As the most popular case of tilapia culture in the ARMM, the production structure of the fish pen culture at Lake Buluan is shown in Figure 5-49.

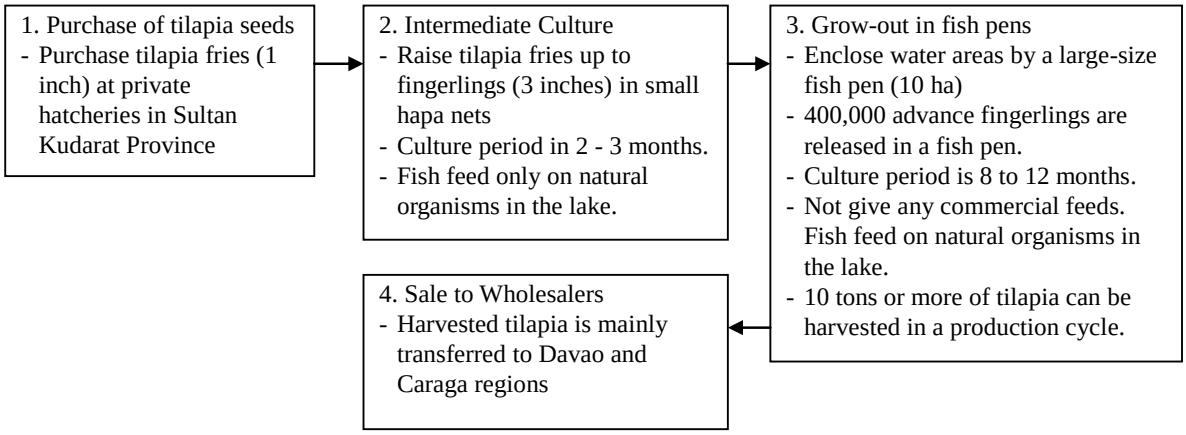


Figure 5-49: Production Process of Tilapia Pen Culture, Lake Buluan, Maguindanao
Source: The Results of the Field Survey in the Study

In Lanao del Sur, pond culture is a common style for farming tilapia. Local farmers purchase rice bran at local rice mills at low prices, and feed it to tilapia in ponds. In addition, they also use livestock animal manures for growing natural feeds in ponds (Figure 5-50). However, they have to carry the manure from the outside of the province, such as Iligan or Cagayan de Oro, because livestock raising activities are very weak in Lanao del Sur.

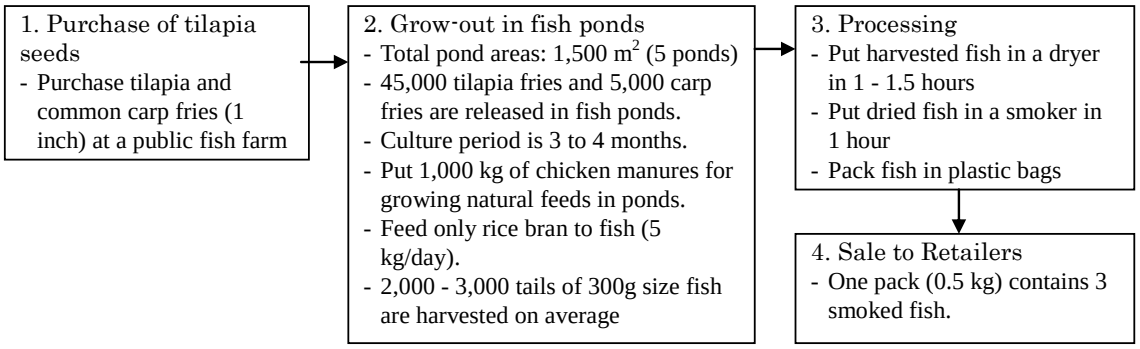


Figure 5-50: Production Process of Tilapia Pond Culture and Processing, Marawi City, Lanao del Sur (e.g., Lanao Trust ARBs Marketing Cooperative)
Source: The Result of Field Survey in the Study

In inland fishing in the ARMM, local inland fishers usually take small wooden canoes for fishing activities in marsh areas and lakes. They mainly use only simple gear items for tilapia fishing, such as gill-nets or fish pots (trap). Most inland fishers operate their small boats with small-size engines or without any engines. Therefore, they usually fish near the shore line of their village.

(3) Processing

Most of locally produced tilapia is distributed as fresh fish at local markets in the ARMM. A small portion of tilapia is used for processing dried and smoked fish. Locally processed tilapia is distributed only at local markets. However, the cases of tilapia processing are very rare in the ARMM.

(4) Supply Chain

As indicated in Figure 5-51, most tilapia products are consumed in local markets and neighbouring towns. The fish pen culture at Lake Buluan is the only case of tilapia on sale outside the ARMM. Current situation and issues of supply chain of tilapia in the ARMM are shown in Table 5-76.

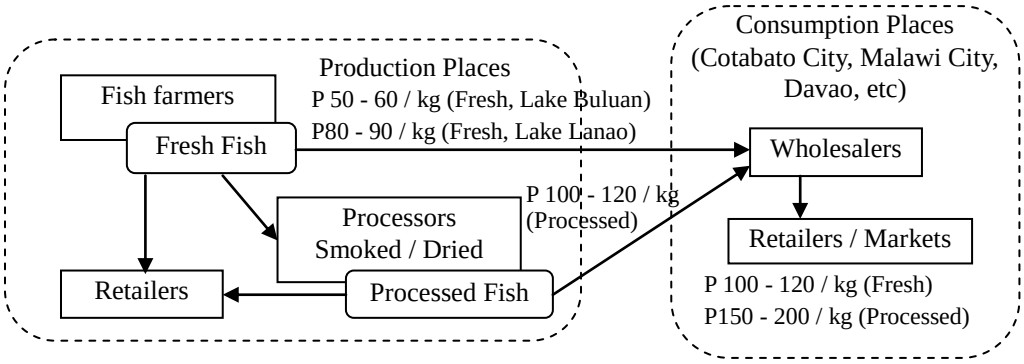


Figure 5-51: Supply Chain of Cultured and Wild Tilapia in the ARMM.
Source: The Result of Field Survey in the Study

Table 5-76: Current Situation and Issues of Supply Chain of Tilapia in the ARMM

	Local Hatchery	Grow-out Farmer	Processing	Wholesaler/Retailer
Product	Tilapia Seed	Fresh Tilapia	Dried/Smoked Tilapia	Fresh/Dried/ Smoked Tilapia
Activities	- Produce tilapia seeds in artificial method	- Grow-out tilapia at freshwater ponds, - Feed local natural feeds or commercial compound feeds	- Dry and smoke fresh tilapia	- Purchase fresh / processed fish from local producers / processers - Sell them at local markets
Price	Seed price is Php 0.15-0.45/pieces	Farm gate price is Php 50-60/kg	Wholesale price is Php 100-120/kg (smoked abalone)	Retail prices of fresh or smoked tilapia is 100-120 /kg or 150-200 /kg
Business Scale	1.3-1.5 million tilapia seeds can be produced monthly at a public Hatchery	20-30 ton of cultured tilapia (300-400 g size) is produced at a local commercial farm.	75-100 kg of smoked tilapia are produced per day in a local processing factory	Most business scales of local wholesalers / retailers are very small.
Issues	- Limited capacity of seed production facilities	- Lack of knowledge of culture management - Low productivity of pond culture	- Low management for the quality of processed tilapia	- Low quality of locally cultured tilapia

(5) Marketability

The average annual consumption per capita of tilapia in the ARMM is 2.60 kg/person, which is about half of the national average consumption of 4.68 kg/person (Table 5-77). It is because little tilapia is distributed and consumed in the island provinces, Basilan, Sulu, and Tawi-Tawi. The annual tilapia consumption of Maguindanao, 5.77 kg/person, is actually higher than the national average. This means that tilapia is widely distributed and highly consumed in Maguindanao. However, in Lanao del Sur, the annual tilapia consumption is still lower in comparison with Maguindanao, even though tilapia is one of the important fish fused in traditional Maranao cuisines. A higher demand for tilapia in internal markets will be explored in Lanao del Sur in the future.

In other regions of Mindanao, their tilapia consumption per capita is lower than that of the national average, except SOCCSKSARGEN (Region XII). It means that a higher potential demand for locally produced tilapia of the ARMM will be explored in other neighbouring regions.

Table 5-77: Annual Consumption per Capita of Tilapia in Mindanao and ARMM, 2008-2009

Region in Mindanao	Annual Consumption per capita (kg/person)	Difference from National Consumption
Philippines	4.68	
ARMM	2.60	-1.61
Davao Region	1.61	-2.60
SOCCSKSARGEN	6.81	2.60
Zamboanga Peninsula	0.47	-3.74
Northern Mindanao	1.61	-2.60
Caraga	0.83	-3.38

Province in the ARMM	Annual Consumption per capita (kg/person)	Difference from National Consumption
ARMM	2.60	
Maguindanao	5.77	1.56
Lanao del Sur	1.98	-2.24
Basilan	0.16	-4.06
Sulu	0.00	-4.21
Tawi-Tawi	0.00	-4.21

Source: Survey of Food Demand for Agricultural Commodities in the Philippines, BAS

Because of a rapid development of tilapia pen culture at Lake Buluan in recent years, total tilapia production in the ARMM has gone up suddenly since 2006. The upward trend of tilapia production in the ARMM is much larger than that of the national production. A most portion of tilapia produced at Lake Buluan is distributed to and consumed at major cities of neighboring regions, such as Davao and Cagayan de Oro. Therefore, the recent large ascent of tilapia production doesn't much contribute to facilitating and exploring an internal market demand in the ARMM.

The market supply trends of cultured tilapia in the world, Philippines and ARMM are indicated below (Figure 5-52). The world and national market of cultured tilapia supply has been increasing in recent years. The cultured tilapia supply in the ARMM has also been increasing in correspondence with the upward trend of tilapia supply.

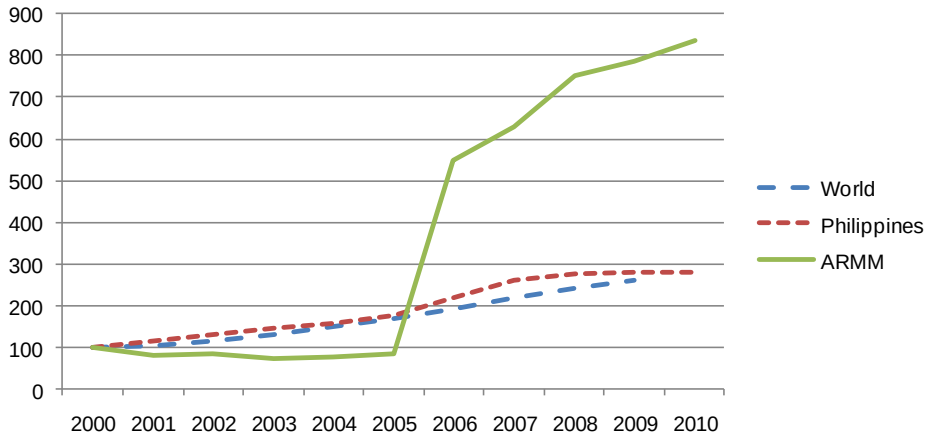


Figure 5-52: Market Supply of Cultured Tilapia in the World, Philippines and the ARMM (Year 2000 = 100)

Source: FAO Aquaculture Statistics, BAS Fisheries Statistics

5-3-6-3 Main Issues and Constraints

Main issues of tilapia culture promotion in the ARMM are shown as follows.

(1) Shortage of local supply of tilapia seeds

There are two freshwater fish farms operated by BFAR. They are located at Datu Odin Sinsuat of Maguindanao and Marantao of Lanao del Sur. Most fish farmers obtain tilapia seeds at those fish farms; however, their facilities are not fully utilized and operated to produce tilapia seeds. Marantao fish farm has been operating since 1960's and the farms' facilities are out of date and needed to be reformed.

There are limited capacities of seed production at the above two fish farms, even though their operations were strengthened. To solve a regular shortage of tilapia seed supply, it is necessary to raise their awareness and train local tilapia seed producers. Basically, BFAR fish farms should produce tilapia broodstock of pure strains and provide them to local seed producers.

(2) Low productivity of tilapia pond culture

Most local farmers grow out tilapia with traditional culture methods (extensive). Even though the operational costs of traditional pond culture are low, the productivity of fish ponds is also low. In addition, a fish production cycle becomes longer too. To improve the fish pond productivities and shorten the fish production cycle, semi-intensive culture methods should be introduced. For introduction of semi-intensive fish culture, feeding cost should be minimized by utilizing local-made feeds. Similarly as milkfish culture, fermented rice bran can be effectively

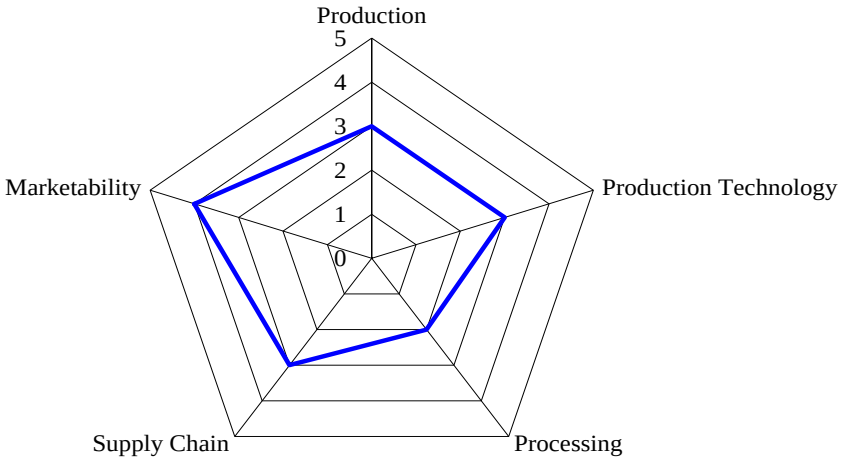
used for tilapia culture.

(3) **Low quality of tilapia processed products**

Some fish farmers' organizations or women groups have already made processed tilapia products, such as smoked or dried boneless fish. However, the quality of those processed products is not stable, because the product quality is not properly managed in their processing. Therefore, those local-made processed tilapia products are dealt only at low value. To improve the product quality, it is important to introduce standard rules of quality management in the processing steps, such as regular quality monitoring.

5-3-6-4 Evaluation

According to the result of the potential product study, the current situation of tilapia industry in the ARMM is evaluated as follows.



Category	Score	Reasons for Evaluation
Production	3	Tilapia is mainly produced at Maguindanao and Lanao del Sur in the ARMM. The largest production site of tilapia culture is Lake Buluan, Maguindanao. There are many fish pens for tilapia culture in the lake. The production of tilapia fishing in rivers and lakes is also high.
Production Technology	3	Tilapia is culture in fish ponds or pens in extensive method. Cultured tilapia fish grow out with feeding in natural organisms grown in ponds / pens. The culture methods are very simple, and their operational costs are very low. However, the productivities of fish pond/pen culture are not much high.
Processing	2	Some farmers' organizations make smoked and dried fish from their cultured or captured tilapia. Those local-made tilapia products are mainly distributed at local markets. However, the quantity of locally processed tilapia is still low.
Supply Chain	3	Fresh tilapia cultured in the ARMM is mainly distributed / consumed at local markets of the ARMM. Some of locally cultured tilapia is sold at neighbor cities, such as Tacurong or Davao.
Marketability	4	Tilapia is a common local fish at Maguindanao and Lanao del Sur. The potential of tilapia demand is high, because it is important as a local animal protein source. However, comparing to national level, local tilapia consumption in ARMM is still low; because local tilapia production is not sufficient.

5-4 Livestock

In livestock sector, five candidate products, carabao, cattle, chicken, duck and goat were surveyed and analyzed.

To select candidate products, there were two steps followed. Firstly; listing up candidates from previous studies, i.e., i) Basic Survey on Economic Development Report, ARMM Human Capacity Development Project, JICA, June 2008, ii) The Study of Local Industry in the ARMM during the JICA's Preliminary Study in November 2009, and iii) Province profile of each Province. Secondly; identifying products by stakeholders from various organizations participated in the Workshop held on the 2nd and 3rd August 2010 during the Study. The candidate products listed from the previous studies/documents and identified in the Workshop are summarized in Table 5-78 and Table 5-79.

The criterion for selecting the candidates is;

1) A product will be produced in small-scale size and its value can be maintained in longer period.

Table 5-78: Candidates Species in Livestock Sector through Literature Review

Province	Source 1	Source 2			Source 3
		LGU	DTI and DAF	SMED	
Maguindanao	Cattle Goat	No data	No data	No data	Goat, Cattle, Chicken
Lanao del Sur	Cattle Goat	Cattle	No data	No data	No data
Basilan	Cattle Goat	No data	No data	No data	Cattle, Chicken, Carabao
Sulu	Cattle Goat	No data	No data	No data	Cattle, Chicken, Carabao, Goat, Horse, Duck, Pig
Tawi-Tawi	Cattle Goat	No data	No data	No data	Cattle, Chicken, Carabao, Goat

Source 1: Top ten industries identified during the local SMED plan harmonization activities and listed in the Basic Survey on Economic Development Report, ARMM Human Capacity Development Project, JICA, June 2008.
Source 2: Three most potential industries identified through interview conducted by the Study of Local Industry in the ARMM during the JICA's Preliminary Study in November 2009.
Source 3: Major livestock indicated in the provincial profile

Table 5-79: Identified Products by Stakeholders during the Workshop

Province	Livestock
Maguindanao	Goat, Chicken, Cattle, Carabao, Duck (Meat and Egg)
Lanao del Sur	Goat, Chicken, Cattle, Carabao, Duck (Meat and Egg)
Basilan	Goat, Chicken, Cattle
Sulu	Goat, Chicken, Cattle, Duck (Meat and Egg)
Tawi-Tawi	Goat, Chicken, Cattle

Source: Workshop held on 2nd and 3rd August 2010 in the Study

The detail of each candidate products is shown as follows.

5-4-1 **Carabao**

5-4-1-1 Background

Carabao[162] is an indigenous livestock resource and classified as swamp-type buffalo. It is an integral component of the smallholder mixed farming system. It remains an important source of power, particularly in the rain-fed and upland areas. However, in irrigated rice-producing areas, hand tractors are now replacing carabaos in significant scale.

The carabao production in the ARMM is confined to the backyards. However, it assists farmers in various types of farm work and crop production as a constant company of farmers in the area. Most households use the animal as their regular mode of transportation for farm supply purchases, product marketing and other farm activities[163].

5-4-1-2 Current Situation

(1) Production

The total carabao inventory in the Philippines, as of January 1, 2009, was estimated as 3.32 million heads, decreasing about 0.02% from the previous year. Out of the inventory, backyard farms accounted for more than 99% of the total carabao population. While the backyard production slightly decreased from the previous year, the inventory in commercial farms was up by 14.33%. The table below shows the inventory of carabao in the Philippines and the provinces of the ARMM from 2005 to 2009. (Table 5-80)

[162] Carabao is a domesticated subspecies of the water buffalo found in the various part of Southeast Asia. Carabaos are associated with farmers, being the farm animal of choice for pulling both a plow and the cart used to haul produce to the market.
[163] Potential Products Study for Maguindanao in 2010

Table 5-80: Production of Carabao (Number of head)

	2005	2006	2007	2008	2009	Annual Average	Share as of 2009
Philippines	3,326,833	3,360,675	3,383,621	3,338,570	3,320,966	3,346,133	-
ARMM	177,409	194,933	208,136	221,022	223,711	205,042	6.13%
Provinces in the ARMM							Share (ARMM)
Maguindanao	115,147	131,757	142,168	153,931	154,815	139,564	68.07%
Lanao del Sur	50,915	50,729	52,068	51,661	51,680	51,411	25.07%
Basilan	10,795	11,888	13,334	14,794	16,449	13,452	6.56%
Sulu	416	451	470	535	644	503	0.25%
Tawi-Tawi	136	108	96	101	123	112	0.06%

Source: BAS (2010)

Carabaos are sold either for their meat or as a working animal. Every carabao is registered to the municipal hall and receives certificate of an animal live birth. Without the certificate, they cannot be transported. It is prohibited to butcher a carabao aging five years old or below by law[164].

The number of carabao in the ARMM accounted for about 6% of the total number in the country in 2009. Maguindanao accounted for the highest production in the ARMM at about 68% of the total production in the region, followed by Lanao del Sur at 25% and Basilan at 6.6% in 2009. The island provinces had a combined share of only about 7%, although the number of carabao in Basilan grew by 65.6% from 2005 to 2009. Nearly 100% of the carabao inventory in the region comes from backyard farms.

As explained in Chapter 2, Carabao is the most common livestock in Maguindanao and Basilan in terms of BAS animal unit. Maguindanao produced 154,815 heads in 2009. In the ARMM, carabaos are raised mostly for farm work but in Lanao del Sur, some are raised for meat production, too. In 2009, the annual carabao inventory is 51,680 heads. In Tawi-Tawi and Sulu, the annual carabao inventory is 123 heads and 644 heads in 2009.

(2) Production Technology

Carabao has longer gestation period than any other domestic farm ruminants. The average gestation of carabao is 310-315 days. Moreover the reproduction needs a skill due to difficulty

[164] BAS (2010)

of heat detection. Therefore, it might be very difficult for local farmers to produce one calf annually.

Local farmers are also primarily concerned with activities related to forage production. However, they do not take enough care for carabao management such as providing quality feed and reproduction. It was also observed insufficient housing arrangement in the farm and limited disease control practices, which are explained in detail in 5-4-1-3 (1). These technology problems lead to the low productivity of carabao in the ARMM.

(3) Processing

In the Philippines, dairy product processing from carabao such as cheese making has already been established as an industry. However, it is not so popular yet in the ARMM region. Aside from the ARMM, there are several companies and universities which produce and sell dairy products as discussed below.

Carabao milk and milk processed products

Carabao is also a good source of milk for household consumption and for indigenous products. Fresh carabao milk is being sold along the highways of Central and Northern Luzon. A company based in Metro Manila is now using carabao milk for ice cream as commercial product.

According to the Philippine Carabao Center (PCC), carabao's milk is considered as the most nutritious food because of its rich protein, fat, lactose, vitamins, minerals, and water. Carabao's milk is richer and creamier than a cow's or goat's milk due to its high percentage of fat. Carabao's milk in the mammary gland is clean and free of microbes. However, once the milk has been secreted from the mammary gland, it is susceptible to bacteria coming from surroundings. Since the milk is highly nutritious, it becomes an efficient medium for the bacteria to spread. This is the reason why fresh milk is spoiled easily. PCC identified several ways to maintain the freshness of carabao's milk as follows. Immediately after milking, fresh milk must be stored inside an ice box or refrigerator. Milk must be pasteurized or cooked to kill the microbes to make the milk safe to drink. This is usually done by heating the milk for 15 seconds at 72°C. The milk should be chilled and maintained at temperature of 4-8°C. If not all consumed, milk must be stored in an ice box or refrigerator to control the spread of microbes that are not killed during the pasteurization process. To avoid wastage, milk must be processed such as pasteurized milk, pastilles de leche (native sweets), choco milk, kesong puti (cheese), milko-jel, condensed milk, cheese

spread, ice cream, mozzarella, and coagulated milk. There are just some of the many products from carabao's milk[165]. Pastilles de leche is one of the favorite native delicacies or sweets. With a tinge of the Spaniards' influence, as the name implies, it is made simply of milk and sugar. Since the ingredients are simple, the finest possible quality of milk and sugar is very important. Bulacan is well-known for pastilles production but lately some of the best pastilles made from pure carabao milk come from Nueva Ecija. Aside from pastilles, there is also the kesong puti which is the Philippine version of the salty cottage cheese made from carabao's milk. Another ingenious product of cheese making in the country is carabao mozzarella. The appearance is somewhat similar to the typical mozzarellas of the Italians, but it has slight grey pastiness when sliced.

(4) Supply Chain

1) The supply chain for carabao production in Lanao del Sur is as follows (Figure 5-53).

Calf: Price @ ₱ 6,000.00 per calf (within age of 6-8months) Calf Sources: Municipalities of Matungga, and Balo-i in Lanao del Norte, and from distributors in Marawi City Areas of Carabao Farming: across the rural communities of Lanao del Sur (from various municipalities) Propagation Period: carabao are ready for trading after 6 years	Local Trading: farmers sold their carabao to local traders for meat production Local Farmers: farmers purchase carabao for farming purposes Selling Price: Price @ ₱ 150.00 per kilogram	Carabao Meat: Price @ ₱ 180.00 per kilogram Slaughter House: Marawi City	Local Distribution: carabao meat locally distributed Price @ ₱ 230.00 per kilogram • Marawi City • Balo-i	Distribution: • Public Markets

Figure 5-53: Supply Chain of Carabao in Lanao del Sur

In Lanao del Sur, carabaos are sold in the livestock market or "bagsakan" where traders, peculators, and brokers are waiting. There are several trading stations for livestock in the

[165] Pastilles de leche is one of the favorite native delicacies or sweets. With a tinge of the Spaniards' influence, as the name implies, it is made simply of milk and sugar. Since the ingredients are simple, the finest possible quality of milk and sugar is very important. Bulacan is well-known for pastilles production but lately some of the best pastilles made from pure carabao milk come from Nueva Ecija. Aside from pastilles, there is also the kesong puti which is the Philippine version of the salty cottage cheese made from carabao's milk. Milko-jel is made by making milk into soft gel with gulaman bars and colored adding yellow coloring. It is topped with caramel and diced fruit topping such as pineapple tidbits, banana and avocado.

province, namely: Marawi City, Wao, Malabang, and Balabagan. Livestock are transported by the traders to other cities and provinces such as Cotabato, Iligan, Cagayan de Oro, Valencia (Bukidnon), Pagadian, Maguindanao, Lanao del Norte, Misamis Oriental, and Zamboanga del Sur.

During the study, the traders and wholesalers reported the problems of road networks within the province, armed groups, bandits, and *Rido*[166].

2) The supply chain for carabao production in the province of Maguindanao is as follows (Figure 5-54).

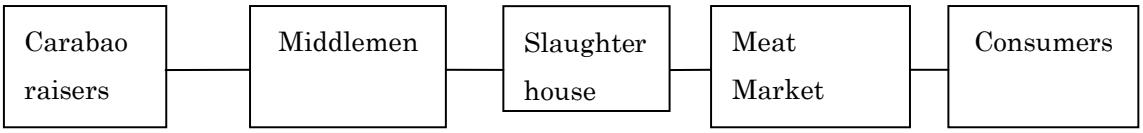


Figure 5-54: Supply Chain of Carabao in Maguindanao

Table 5-81 shows an example of value chain of carabao in the ARMM[167]. The production cost could not be obtained.

[166] Potential product survey for Lanao del Sur in 2010
[167] By study team

Table 5-81: An Example of Value Chain of Carabao Produced in the ARMM for Local Market

Actor	DA/Phil. Crabao Center & inputs suppliers	Farmers & Cooperatives	Barangay or Town Traders/Middlemen	Meat Processing Slaughter	Retailing
roduct	Technology / inputs / feeds	Heads All-in basis	Heads All-in basis or classified (Selling)	Transportation	Processing	Heads Classified
Place	Barangay Level	Barangay Level	Barangay to Town/city DOS(Mag), Masiu(LDS)	Barangay to Town/city		Cities
ctivities	• Technology dessimination • Input supply • Vaccination and AI	• Breeding • Raising	• Collection • Buying, selling	Transportation	• Halal Slaughtering w/ Certification w/ transportaion cost	• Meat Retailing at Public Market • Live selling
Price	6-8 months young calf Php6,000.00 Vaccination:	Farm gate price: 5-6 years old Php 12,000 – 18,000	Selling price: Php 20,000		Php 230/kg	Php 260.00/kg Php 26,000.00/head
Cost		• Production cost: Php xx/kg or xx/ha		• Transportation cost Php 150/head		
Scale		• Productivity: Backyard Farming @ 1-3 heads per farmer	• Handling Volume:			• Local Market
ssues	• Lack of capacity for dissemination of technology (DA) • Lack of AI technicians and other manpower • Lack of facilities for PCC like area for pastureland	• Lack of technical support • Lack of technical production knowhow • Lack of appropriate facilities (e.g: livestock market, veterinary clinics, slaughter house) • No proper forage • No proper housing	• Unstable prices • Lack of marketing support • Absence of proper market information dissemination • Lack of quality monitoring system (quarantine, and etc.) • Lack of marketing facilities	• High transportation cost • Poor condition and maintenance of road networks • Proliferation of armed groups and bandits • Lack of logistical facilities (service bays for truck carriers, and etc.)	• Lack of facilies for slaughtering	

(5) Marketability

As shown in Figure 5-55, the annual average farm gate price per kilogram of live carabao in 2009 in the Philippines was Php 63.73. This was 10.25 % higher than the figure of the previous year, which was Php 57.80/kg.

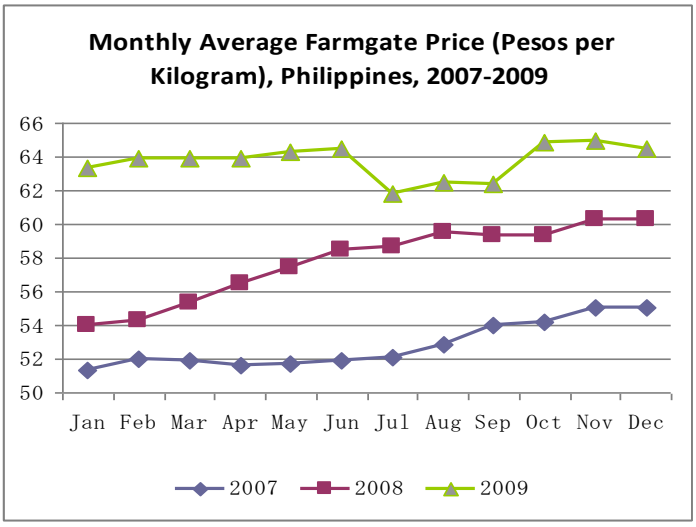


Figure 5-55: Farm Gate Price of Live Carabao in the Philippines

In 2009, the total number of carabaos slaughtered for meat was estimated at 456,368 heads in the Philippines. This was a decline of 2.05% from the previous year's record of 465,934 heads[168].

5-4-1-3 Main Issues and Constraints

(1) Low productivity

It is observed that the productivity of carabao in the ARMM is very low due to the following issues.

1) <u>Lack of introduction of improved grass varieties for feeding purpose</u>

It is important to efficiently feed quality grasses to the carabaos. However, the introduction of improved grass varieties is very limited in the ARMM. Several species of grass such as *Pennisetum purpureum, Setaria sphacelata, King Grass, Brachiaria umidicola, Brachiaria decumbens and Panicum maximum* are the recommended varieties in the ARMM. In addition to the quality grasses, Legumes also should be fed to carabaos to provide more protein for growth and production. Legumes such as *Macroptilium atropupureum, Pueraria phaseoloides, Centrosema pubescens, Stylosanthes guianensia and Arachis hepogesa* are recommended to be fed to carabaos.

[168] BAS (2010)

2) Insufficient proper utilization of farm by-products as feed resources

Currently, utilizations of farm by-products such as rice straws and corn cobs as feed are not yet common in the ARMM. Rice straw can be fed to cattle up to 40% of the total feed ration. If the farmer applies storage feed making method such as Urea Treated Rice Straws, it can be used as supplements.

3) Insufficient feeding management technologies in the farm

Most farmers are unaware and unconcerned about the nutrient contents of their feed which is vital to the animals' growth and reproduction. The feeds should be formulated based on cattle's sex, age, weight gain desired and the moisture contents of available roughage and feeds.

4) Limited cattle housing arrangement in the farm

Having a barn is indispensable for raising carabaos. However, the housing arrangement is not sufficient in the ARMM. A fenced loafing area must be provided with feeding racks and water supply to allow animals to loaf freely. Flooring of the area must be cemented for keep drying. Cogon and Nipa as roofing materials are preferred in hot and humid areas. Ventilation is of utmost importance. Majority of pneumonia cases can be traced to excessively warm and humid interior and sudden change in temperature.

5) Lack of disease control technologies

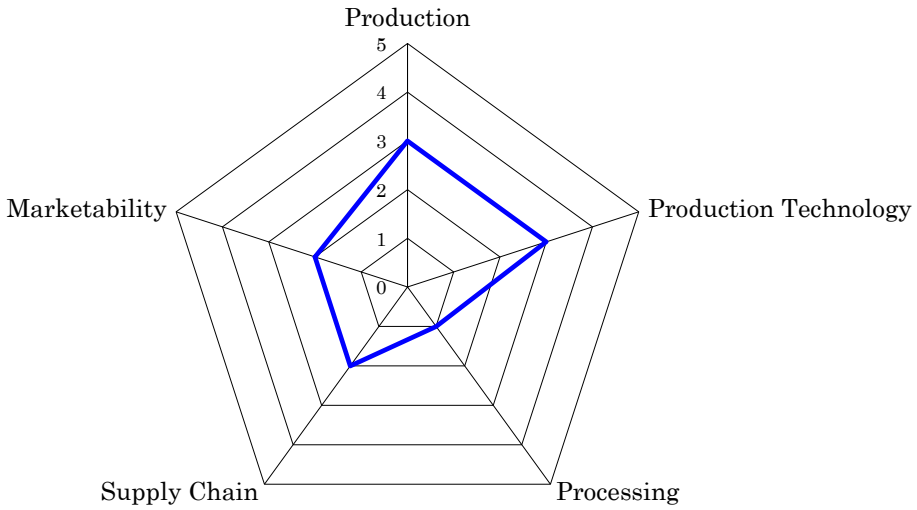
Disease prevention and outbreak control systems are very important in raising carabaos. However, most of the farms in the ARMM do not care much about disease prevention and control systems. Necessary measures such as provision of sufficient feed, monitoring, clean water, and de-worming processes are not regularly practiced in the region.

(2) Difficulties to introduce artificial insemination technology

Breeding of carabao is usually done by natural mating in the ARMM. The artificial insemination is much more difficult than those of other ruminant animals such as cattle. The reason is that the period of heat of carabao usually occurs at night and local farmers therefore have lost the appropriate timing of insemination. Consequently, carabao production does not increase as expected. Introduction of artificial insemination technology is desirable for improving present status. Moreover, it will improve quality of carabao by using superior semen though it is not easy to find the technicians who have artificial insemination techniques of livestock in the communities.

5-4-1-4 Evaluation

Based on above, the situation of carabao industry in the ARMM is evaluated as below.



Category	Score	Reasons for Evaluation
Production	3	The carabao production in the ARMM accounted for 6% of the total inventory in Philippines, as of 2009. Carabao is the most common livestock in Maguindanao and Basilan.
Production Technology	3	Carabao has strong resistibility to severe environment compared to cattle, therefore, it is not so much attention is provided.
Processing	1	Milk from carabao can be utilized as raw material for processed products; however, processing activity in the ARMM is very limited due to lack of supply of milk.
Supply Chain	2	Basically, carabao is sold at local markets by traders or wholesalers in the ARMM.
Marketability	2	In the ARMM, farmers raise carabaos for farming and do not sell their carabaos to be butchered. It is prohibited by law to butcher a carabao that is aged five years old or below.[169]

169 BAS (2010)

5-4-2 **Cattle**

5-4-2-1 Background

Cattle raising is predominantly a backyard endeavour in the Philippines. They are either stall-fed or tethered along roadsides and backyards with whatever available feed obtained. Cattle raisers can use cheap, plentiful farm by-products such as corn stover, rice straw, copra meal, rice bran and sugarcane top, which ordinarily go to waste. Most importantly, it helps provide the high-protein foods for the Filipino diet.

5-4-2-2 Current Situation

(1) Production

The total cattle inventory in the Philippines was estimated at 2.586 million heads on January 1, 2009. Compared to last year's level, inventory of cattle from backyard farms grew by 0.44 percent, while inventory from commercial raisers declined by 0.67 percent. Around 94 percent of the total cattle inventories were raised in backyard farms and only six percent were raised commercially. Backyard farms are increasing because of the following advantages: i) it requires minimum space for housing, ii) it gives the farmer year-round work and provides him with extra income. Backyard cattle fattening on a large scale can be profitably undertaken. It consists of buying healthy stock, feeding and fattening them for 120 to 180 days, and selling them at any time of the year. Fattening operation requires simple facilities and level of management.

The ARMM cattle inventory for 2009 was 109,644 heads. The cattle population can mostly be found in backyard production. This means that each farmer has an average of 2-7 heads of cattle.[170]

[170] Potential product survey for Lanao del Sur in 2010

Table 5-82: Production of Cattle (Number of head)

	2005	2006	2007	2008	2009	Annual Average	Share as of 2009
Philippines	2,547,956	2,519,740	2,565,849	2,566,492	2,586,386	2,557,285	-
ARMM	97,458	97,972	102,284	104,596	109,644	102,391	4.00%
Provinces in the ARMM							Share (ARMM)
Maguindanao	40,253	40,898	41,763	41,937	37,989	40,568	39.62%
Lanao del Sur	36,070	37,246	42,194	44,962	44,954	41,085	40.13%
Basilan	3,303	3,676	3,685	5,554	13,675	5,979	5.84%
Sulu	14,982	13,580	12,150	9,745	10,367	12,165	11.88%
Tawi-Tawi	2,850	2,572	2,492	2,398	2,659	2,594	2.53%

Source: BAS (2010)

Cattle production in the ARMM amounted to only 4% of the national inventory in 2009. The mainland provinces in the region reported the largest shares in the regional inventory of cattle, with 40% in Lanao del Sur and 39.7% in Maguindanao in 2009. Only 1% of the cattle in the region were raised for commercial purpose.

In the ARMM, production is confined to small backyard raisings. However, in Lanao del Sur, cattle production has been showing bullish and upward figures since 2005. Records from the BAS show that the province has an annual average cattle production of 41,085 heads between 2005 and 2009. In the fourth quarter of 2009, the total population of cattle in the province was 44,954 heads. In Basilan, the annual cattle inventory is 13,675 heads in 2009 which were increased from 3,303 in 2005. In Tawi-Tawi, the annual cattle inventory is 2,659 heads in 2009

(2) Production Technology

The government imports Brahman cattle and perhaps some other adaptable tropical breeds. The preferred breed of raisers is Brahman since it is highly adaptable to the local environment. There are reports that the backyard sector exhibits a preference for the white variety with long ears and these are the dominant characteristics of a Brahman. There is more demand for Brahman in the auction market and it commands a higher value, so Brahman has been a mainstay in the country.[171]

[171] Backyard cattle raising written by Zac Saria

In the ARMM area, cattle are rarely raised in ranches. Production is confined to small backyard farms. The herds are only allowed to graze freely in vacant lands where grass is abundant. They rarely plant different nutritious forages which they could use to feed their animals with the nutrients they require. Information on forage and pasture grasses and trees is scarce.

Some well-off farmers practiced the "paiwe" system, namely they own a number of livestock and these are distributed to other farmers to be raised. There are several agreements on this practice. Usually the first offspring will go to the raisers-farmer and the second offspring will be awarded to the owner. Other owners buy the offspring from the raisers in cash, but leave the livestock to the raisers. The other livestock is inherited by the children when the original owner dies.

In terms of disease prevention, immunization and de-worming practices, local livestock raisers seek the assistance of the Department of Agriculture-Animal Science and Veterinary personnel in the area. The breeding of the livestock is achieved by natural means.

In addition to the disease prevention, there are other issues of insufficient production technologies which lead to low productivity of cattle, as in the case of carabao. The technologies include: feeding management and housing arrangement, which are explained in detail in 5-4-1-3 (2).

The typical cattle raising is illustrated in the Box 5-8.

Box 5-8: Cattle Raising

The number of personnel including the owner in charge of cattle raising is four. All of them can sufficiently take care of rice production, vegetable production and cattle raising as well. The species of cattle are native and grazing on the wild grassland. However, the owner introduced several kinds of improved grasses such as Napier grass, Bahia grass, Para grass and Star grass too.

He selects the grasses according to their natural characteristics, for example, Para-grass is planted on watery places because it has strong water tolerance. Legumes like Centrocema, Puero, Calopo, Ipil-ipil and glyricidia are utilized. "I would like to propagate more glyricidia, because it is useful for feeding and living fence "he said.

Concentrated feeds are never given to make feeding costs lower. However, the salt which is very important for any livestock are given at all times. Suffering from parasites (external and internal) always occur, therefore de-worming is regularly practiced. Whenever the cattle suffer from any sickness, the owner calls a private veterinarian who is also a relative, to treat the sick cattle. Only natural breeding is only practiced; artificial insemination was never tried.

The time of selling cattle is not so seriously considered. Whenever occurred the necessity of expenses, the cattle is sold if only necessary. The average price of gross income is Php 22, 000 per head for a two-year old cattle.

When the owner calls the cattle, they immediately run and come together beside and surround him since he always takes care and treats the cattle like a family." This kind of attitude is very important because if we are close to the cattle always, it is easy to determine their health conditions" he cheerfully said. If a farmer has a capital for a pair of cattle for production, he can use the male cow as a working animal while the female may have calf offspring the following year. If the calf is a male, the farmer may sell the offspring to buy a female calf also so that the following years, more female may bear offsprings. Mr. Darping stressed that they need money for cattle production.

Source: Interview with Mr. Darping, Dalmangcob, Sultan Kudarat municipality

(3) Processing

In the Philippines, meat processing such as sausage has already been established as an industry. However, it is not so common yet in the ARMM region.

(4) Supply Chain

The total beef supply in 2009 in the Philippines was estimated at 231,050 metric tons. This was a drop of 1.35% from the previous year's level of 237,200 metric tons.[172]

1) Farm Gate Price

In the Philippines, the annual average farm gate price of live cattle in 2009 was Php 76.23/kg. This was 6.66% more than the previous year's annual average price of Php 71.47/kg. (Figure 5-56)

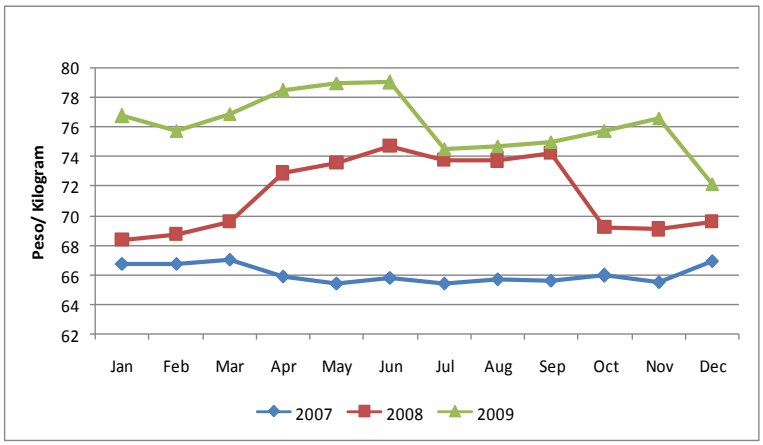


Figure 5-56: Monthly Average Farm Gate Price, Philippines

2) Wholesale Price

In 2009, the annual average wholesale price of beef/kg (dressed weight) in Metro Manila was Php 165.44. This was 10.49% higher than the previous year's average price of Php 149.73/kg.

3) Retail Price

The annual average retail price of beef rump in 2009 was Php 244.18/kg in the Philippines. This was 6.69% higher than the previous year's average price of Php 228.26/kg.

[172] BAS(2010)

There is limited information on the supply chain in the ARMM; In Maguindanao, middle men usually collect the stock and bring them to slaughter houses. The stock is butchered and distributed to the meat vendors in public markets. Although the meat products are sold in Cotabato City and Maguindanao, overall supply of cattle meat or beef is limited in the market. The meat is classified and then distributed to meat vendors[173]. As explained in the section on Carabao, there are also several trading stations for cattle and other livestock in Lanao der Sur.

There are challenges for cattle raisers to tackle when marketing their animal, such as insufficient knowledge concerning the appropriate time of cattle selling and lack of market linkage and consolidation which are elaborated later in 5-4-2-3.

Table 5-83 shows an example of Value Chain of Cattle Produced in the ARMM.

Table 5-83: An example of Value Chain of Cattle Produced in the ARMM for Local Market[174]

Actor	DA/Veterinarian & input supplies	Farmers & Cooperatives	Barangay or Town Traders/Middlemen	Meat Processing Slaughter	Retailing
roduct	Technology / inputs / livestock/poultry	Heads All-in basis	Heads All-in basis or classified	Transportation	Processing	Heads Classified
Place	Barangay Level	Barangay Level	Barangay to Town/city	Barangay to Town/city	LGU Recognized slaughterhouse	Cities
ctivities	• Technology dessimination • Input supply/dispersal • Vaccination	• Breeding including artificial insemination • Raising • Fattening	• Collection • Buying, selling	Transportation	• Halal Slaughtering • Slaughter Certification with transportaion	• Meat Retailing at City Market • Live selling
Price	4-6 months young cattle Php 4,000.00 Vaccination:	Farm gate price: 2-3 years old Php 12,000 – 18,000	Selling price: Php 20,000		Php 70/head	Php 260.00/kg Php 26,000.00/head
Cost		• Prodcution cost: Php5,000-Php8,000/head		• Transpo cost Php200/head w/ BAI certification free of disease		BAI is Bureau of Animal Industry
Scale		• Productivity: Backyard Farming @ 2-3 heads per farmer.	• Handling Volume:			• Local Market • Slaughter house
ssues	• Lack of funding for outreach technology down to farmers (DA) to include AI • Low veterinary monitoring and medical assistance to farmers	• Lack of technical support • Lack of technical knowhow the proper raising of livestock • No proper forage • No proper housing		• High transportation cost due to distance and poor road network	• Lack of facilities for slaughtering	• Some hot meats sold at public markets passed through vendors with certificates • Many LGU markets with no veterinary certificates

[173] Dressed carcass weight is about 90kg
[174] By study team

(5) Marketability

The volume of beef imports in the Philippines in 2009 was 41,000 metric tons, valued at US$ 51.76 million Freight on Board (FOB). Compared with the previous year's results, the volume and value of imports decreased by 16.65% and 24.45%, respectively[175]. As explained, in the ARMM, the stock is butchered and distributed to the meat vendors in public markets but supply of cattle meat or beef is limited in the local market.

5-4-2-3 Main Issues and Constraints

(1) Low productivity of cattle

The productivity of cattle is also low in the ARMM due to the following issues, most of which are similar to the issues on carabao.

1) Insufficient introduction of improved grass varieties for feeding purpose

It is important to introduce quality grass throughout the years and to feed it to the animals efficiently but such is not commonly practiced in the ARMM. Grasses and legumes which are efficient feeds for cattle are recommended in the ARMM.

2) Insufficient usage of multi-purpose legume trees

Utilization of legume trees is very important. However, only few farmers are utilizing those technologies on in the ARMM. Use of their leaves provide as feeds cattle with good sources of protein. Beside feed resources, legume trees are very convenient and useful as "living fence" to protect cattle.

3) Insufficient utilization of by-product from the farm as feed resources

For cattle raising, too, there are not so many cases utilizing by-product from farm such as rice straw and corn cobs as feed resources in the ARMM. As in the case of carabao, rice straw such as Urea Treated Rice Straw can be used as additional feed sources.

4) Improper arrangement of cattle housing in the farm

Housing arrangement for cattle is not proper in the ARMM. A fenced loafing area barn, cemented flooring must be provided. Cogon and nipa as roofing materials are preferred in hot and humid areas for ventilation to prevent pneumonia.

5) Insufficient feeding management technologies in the farm

[175] Potential Products Study for Lanao del Sur in 2010

The feeds should be formulated based on cattle's sex, age, weight gain desired and the moisture contents of available roughage and feeds. However, most of cattle farmers do not care much about nutrient contents with cattle feeds.

6) Lack of disease control technologies

The most necessary animal cares for disease prevention are providing sufficient feed, clean water, and de-worm any purchased or borrowed cattle for parasites and check for disease before putting them with flock. Regular monitoring of the flock during feeding or while grazing to notice abnormal behaviors is also required. However, most of farms in the ARMM do not care much about disease prevention control.

(2) Insufficient knowledge concerning the appropriate time of cattle selling

Most of cattle raisers hardly care about the time to sell cattle. Cattle will gain body weight daily depending on the feed given and the breed. However, at one stage, the body weight will not increase anymore because the cattle have reached its mature size. Postponing the sale of cattle too long will result in a loss, because there is no more increase in body weight to cover the extra maintenance cost.

(3) Lack of market linkage and consolidation

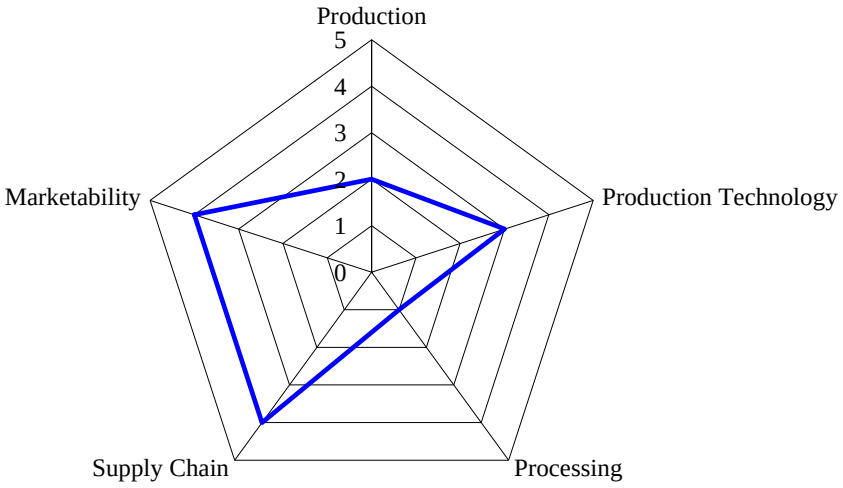
Lack of price information often makes small cattle raisers run into unfavorable condition due to disinformation by cunning brokers. It is also not easy for brokers to purchase two or more cattle from small cattle raisers. It is necessary that the small cattle raisers form a producer group and a cluster by the producers in a barangay or with other barangays in the neighborhood in order to perform transaction with brokers as a group.

(4) Difficulties for access to technical support channels

Cattle raisers in the ARMM have limited access to constant technical assistance from DA in the aspect of production and veterinary treatment etc. Most of raisers have difficulties in contacting government livestock technicians when they badly needed their assistance. If they need to ask any veterinary treatment for their cattle, raisers contact private veterinarians instead.

5-4-2-4 Evaluation

Based on the above, the situation of cattle raising in the ARMM is evaluated as below.



Category	Score	Reasons for Evaluation
Production	2	Cattle raising in the ARMM is still limited and predominantly a backyard endeavours. This means that each farmer has an average of 2-7 heads of cattle.
Production Technology	3	The herds are only allowed to graze freely in vacant lands where grass is abundant. Farmers rarely plant different nutritious forages which they could use to feed their animals with the nutrients they required. General feeding management also is not efficiently done.
Processing	1	Cattle meat can be utilized as raw materials for processed products; however, processing activity in the ARMM is very limited due to lack of supply of cattle.
Supply Chain	4	It is usually the middlemen who collect the stock and bring them to the slaughter house. The stock is butchered and distributed to the meat vendors in public markets including Cotabato City which is outside of the ARMM.
Marketability	4	Beef meat is very common among the Filipinos. By introducing superior cattle species and improvement of raising management, the meat quality will be improved more to expand its market, although the current supply in the ARMM is also limited.

5-4-3 **Chicken**

Concerning chicken production, there are two types of raising; one is broiler production and the other is raising native chicken. In this study, the raising of native chicken is mainly analyzed because of its potential for value addition and marketing.

5-4-3-1 Background

Culturally, native chicken is integral to all special occasions such as birthdays, baptisms, weddings, and fiestas. Most of the small farmers are raising native chickens.

Native chicken is the common fowl found in the backyards of most rural households. It is a mixture of different breeds and is believed to have descended from the domesticated red jungle fowl. Under backyard management, the chickens are allowed to look for their own food. Meat and eggs of native chickens are preferred by many Filipinos over the same products from broiler because of their taste, leanness, pigmentation and suitability to Filipino special dishes.

Egg production in the ARMM region is considered backyard production scale. Eggs are convenient staple food in the province. Eggs from native chicken are sold to augment family income. Therefore, majority of the farming and fishing communities raises chicken in their backyards for additional income.

5-4-3-2 Current Situation

(1) Production

In the Philippines, the inventory of native chickens, as of January 1, 2009, was 76.54 million birds. This was an increase of 2.05% over 76.54 million birds in 2009[176].

The top chicken producers are the regions that are intermittently struck by strong typhoons. Therefore, the large-scale broiler companies thriving in these regions incurred so much damage especially during the year 2009 when the number and destruction of the typhoons were unprecedented[177].

The ARMM contributed only 1.5% of the national inventory of chickens in 2009 but has

[176] BAS(2010)
[177] Six (6) typhoons including the most destructive typhoon "Ondoy", were recorded in the fourth quarter of that year to have had destructed the major broiler producing regions such as Central Luzon and CALABARZON

increased its chicken production in the most of the ARMM area. Maguindanao had the largest inventory of chickens in the region with 35% share of the regional total in 2009, followed by Lanao del Sur at 28%, Sulu at 21%, and Basilan at 10%. Chicken rearing is not considered a profitable business due to the high price of feeds such as corn and because of intense international competition.

Although the chicken inventory in Lanao der Sur in 2009 was decreased to 509,856 from the previous year as shown in the Table 5-84, the figure almost doubled in 2010 to 929,448[178].

It is fortunate for the ARMM to have a relatively good climate and geographical condition compared to the other regions in the country, which is very conducive for native chicken production. Costs to be incurred in this undertaking would be much affordable basically because it is not necessary to construct modern and expensive facilities to safeguard it from harsh weather conditions. Therefore, it is a very promising industry in the ARMM.

Table 5-84: Production of Chicken (Number of head)

	2005	2006	2007	2008	2009	Annual Average	Share as of 2009
Philippines	136,000,904	134,332,861	135,624,327	154,272,036	158,663,075	143,778,641	-
ARMM	1,907,873	1,976,389	2,041,935	2,367,876	2,493,979	2,157,610	1.50%
Provinces in the ARMM							Share (ARMM)
Maguindanao	755,407	742,862	672,298	773,410	909,832	770,762	35.72%
Lanao del Sur	545,688	595,616	612,264	759,747	509,856	604,634	28.02%
Basilan	148,354	145,691	217,854	223,160	323,510	211,714	9.81%
Sulu	370,849	400,415	433,927	486,578	585,703	455,494	21.11%
Tawi-Tawi	87,575	91,805	105,592	124,981	165,078	115,006	5.33%

Source: BAS (2010)

Many people are encouraged to raise native chicken in Lanao del Sur especially in the rural areas because raising did not entail costs to them free-ranged. Wide tracks of land in rural areas are available for free-range native chicken raising and families that are engaged to this kind of activity do not need to buy commercial feeds[179].

[178] Due to no data about the number of native chicken, the figure shown is the total number of broiler and native chicken
[179] Source; Livestock coordinator of Lanao del Sur

In 2009, the annual chicken inventory in Maguindanao is 909,832 heads. There is a high demand of the chicken meat in the province especially during Islamic feast such as month of Ramadan, pilgrimage season, and the Christian Christmas season. Still this time, many farmers are raising native chicken as can be seen daily in Maranao restaurants especially in Marawi City and Iligan City.

Native chicken inventory in Lanao del Sur has a total of 509,856 head in 2009. Majority of the farming and fishing communities also raise native chickens in their backyards to augment the family income.

In Basilan, the annual chicken inventory is 323,510 heads in 2009. A very small number of layers were recorded in Basilan, while there is no record of broiler production in the region. In Tawi-Tawi and Sulu, nearly 100% of the chickens are of native breed.

(2) Production Technology

Native chickens are well known for their adaptability to local agro-climatic conditions, toughness, ability to utilize farm-by-products and resistance to diseases. Moreover, they require minimal care, management and inputs. Native chicken are kept in shades and cages in the late afternoon till night time. Early in the morning native chickens are brought out the field for feeding. They can range/graze on the grasses abundantly found in the area. By nature, they freely scavenge the soil in search for crawling insects and worms.

However, the raising management of small-scale native chicken farm seems difficult to access suitable information for implementing efficient management. Hence the productivity is not high in the region. For example, fattening management is roughly conducted; farmers do not take much time to put attention about their native chicken. Other technical issues include housing, disease control and sanitation management as explained later. Proper way of suitable native chicken raising for each farm condition provides a substantial improvement in the productivity of native chicken and stabilization of the farm management in the ARMM.

With regard to eggs, increasing number of eggs from one hen is not easy since a hen lays an egg everyday and keeps only three eggs at the nest, an owner can take excessive eggs. It means that the owner with ten hens can have ten eggs a day, and seventy eggs a week. Those eggs are kept in a hatchery incubator. To let hen lay an egg everyday, the owner must take it out of hen. Then hen will keep standing not to brood eggs for the next two to three weeks. The owner is able to have up to fifteen eggs from a hen.

The typical native chicken raising is illustrated in the Box 5-9.

Box:5-9: Native Chicken Raising

The Palomo family first entered into agribusiness in 2003 in search of better income generating activities for daily sustenance and for basic education for their children. A family member who had duck raising shared the hatching technology to the Palomo family.

With some guidance and trial and error experiences, they were able to hatch 300 pullets in their first year of operations using an incubator type hatchery. Even with their small success in their first year of operations, still, their meager income was not able to sustain the necessities of the flock up to saleable sizes leading to their discouragement in continuing the business.

In 2008, the Palomo family directed their focus on their coconut plantations intercropped with any cash crops for extra income and consumption. Their little savings eventually encouraged them to raise native chicken again but through a natural semi-free range method of chicken raising within the perimeters of their coconut plantation.

Their earnings from 2008-2010 got them a pair of cattle and one of their older child got two Goats for the family. Currently the family now has 200 heads of native chicken which sells for Php 120-130 per kilogram. The family can sell an average of eight heads of male chickens per month.

The product and sales in 2010 was Php 1, 000 from Native chicken, Php 900 from Copra, and Php 800 from Rice/Corn per month. There was no sale yet from other crops since it is only intended for family consumption, so more or less gross income of Php 2, 700 per month is the average rural income of the Palomo family.

Source: Interview with Ms. Elita S. Palomo, Sitio Libertad, Dukay, Esperanza, Sultan Kudarat municipality.

(3) Processing

Native chicken is a convenient staple food in the ARMM for cooking such as fried, grilled, or stewed. However, they are not considered as processed food.

(4) Supply Chain

The price of native chicken was not available from the data but native chicken meat and eggs are priced higher than those coming from commercial poultry. As shown in Figure 5-57, in 2009, the average farm gate price of broiler in the farms was Php 78.73 per kilogram, or 8.0 percent higher than last year's average price. The lowest farm gate price at Php 74.84 per kilogram was reported during the month of January while the highest price was registered in December at Php 85.78 per kilogram[180].

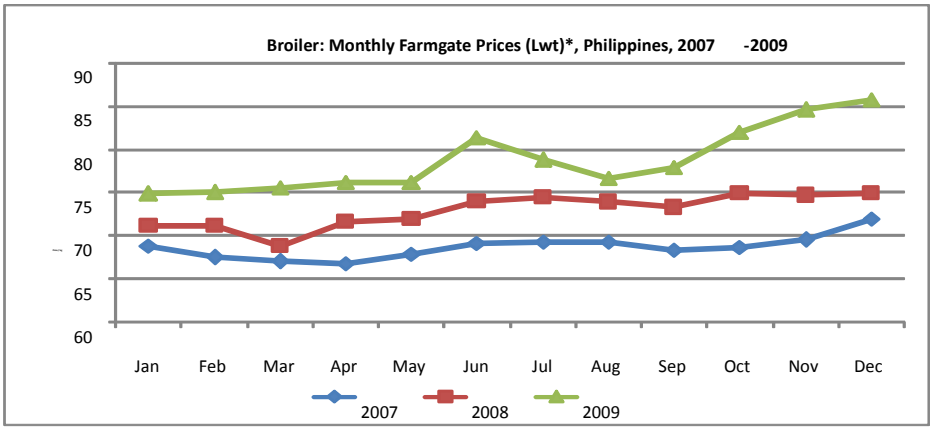


Figure 5-57: Monthly Farm gate price of Broiler, Philippines (Php)

Native chicken in the ARMM is usually brought to town market by farmers. It is sold alive to traders. They will be slaughtered and sold to meat retailers. The retailers sell the chicken meat to the customers. There are challenges such as insufficient knowledge about when to sell chickens and weak market linkage and consolidation system between small raisers and brokers, which are elaborated later.

Table 5-85 shows an example of value chain of native chicken in the ARMM.

[180] As the price of native chicken was not available, the price shown here is that of broiler.

Table 5-85: An Example of Value Chain of Native Chicken Produced in the ARMM for Local Market[181]

Actor	DA/Veterinarian & input supplies	Farmers & Cooperatives	Barangay or Town Traders/Middlemen	Meat Processing Slaughter	Retailing
roduct	Technology / inputs / planting material	Heads All-in basis	Heads All-in basis or classified	Transportation	Processing	Heads Classified
Place	Barangay Level	Barangay Level	Barangay to Town/city	Barangay to Town/city	LGU Recognized slaughterhouse	Cities
ctivities	• Technology dessimination • Input supply/dispersal • Vaccination	• Backyard raising • Free range raising	• Collecting/gathering • Buying • Marketing	Transportation	• Halal Slaughtering • Slaughter Certification with transportaion	• Meat Retailing at City Market • Live selling
Price	Pullet dispersal Vaccination:	Farm gate price: 4-6 months Php 100-Php110 per kg	Selling price: Php150 per kg		Php 10/head	Php 180.00/kg to Php200./kg
Cost		• Prodcution cost: Php10,000 to Php15,000				
Scale		• Productivity:Free rangeFarming @ 10 hens and 2 roosters.	• Handling Volume:			• Local Market
ssues	• Lack of funding for outreach technology down to farmers (DA) • Low veterinary monitoring and medical assistance to farmers	• Lack of technical support • Lack of technical knowhow on the mass production and raising			• Lack of facilities for slaughtering • Low maintenance on current halal slaughter houses	• Many LGU markets with no veterinary certificates

(5) Marketability

In 2009, the total volume of chicken meat imports was registered at about 61,444 metric tons and valued at US$ 35.14 million FOB. As compared with the levels in 2008, the volume and value of imports significantly increased by 40.42% and 53.82%, respectively (Table 5-86). The increase of import was attributed to the stagnant production during the period, because typhoons and flood affected the broiler industry during the fourth quarter of 2009 as explained before.

Although the detailed data of native chicken is not available, the flavor of native chicken is improved in recent years and the restaurants serving the native chicken are increasing at the urban areas reflecting the changing preferences of consumers to native chicken from mass-production chicken. Native chicken meat is considered to be a rich source of highly nutritious substances indispensable to the human diet. The native chicken has found a permanent space in the plates of Filipinos.

[181] By study team

Table 5-86: Volume and Value of Chicken Meat Imports of the Philippines, 2007-2009

Item	2007	2008	2009
Volume (kg)	38,335,531	43,758,488	61,444,488
Value (FOB)	20,743,153	22,848,495	35,145,501

5-4-3-3 Main Issues and Constraints

Main issues of Native Chicken raising in the ARMM are as follows.

(1) Low productivity of chicken

Productivity of chicken in the ARMM is low due to the following issues.

1) Shortage of proper utilization of legume trees as multi-purpose resources

Utilization of legume trees is very important but very limited farmers are introducing those technologies in the ARMM. Some trees in the ARMM are also legumes and feeding their leaves provide native chicken with good sources of protein. Legume trees are very convenient as "living fence" and the tree can be planted near the house or native chicken shed. More than one type of legume tree should be planted alongside or between rows for extra forage and fencing purpose. *Gliricidia*, *leucaena*, *calliandra* and *sesbania* are recommendable.

2) Insufficient housing technologies in the farm

Most of farmers do not consider much about the housing. Native chicken sleeps just beside the farmer's house. However, native chicken also needs a house for proper growth. It is not necessary to build expensive ones. There are many locally available cheap materials like bamboo, coconut trunks, cogon, nipa and rattan.

3) Shortage of proper disease control, sanitation and feeding management technologies in the farm

Giving vitamins and antibiotics when they are necessary is encouraged. De-worming should be done every three months. To control mites and lice, area sanitation must be done. This is supported by bathing of hens after weaning the chicks. It is usually done one month after hatching. This practice ensures the native chickens to be free from infestation of pests and diseases. Supplemental feeding including vitamins and minerals, administered when appropriate, ensures the native chickens' health and vigor for quality meat.

(2) Insufficient knowledge concerning native chicken selling

Most native chicken raisers do not care much about the time to sell native chicken. As in the case of goats and cattle, at one stage the body weight of native chicken will not increase anymore when it reaches a matured size. Postponing the sales will result in a loss to cover the extra maintenance cost.

(3) Lack of market linkage and consolidation

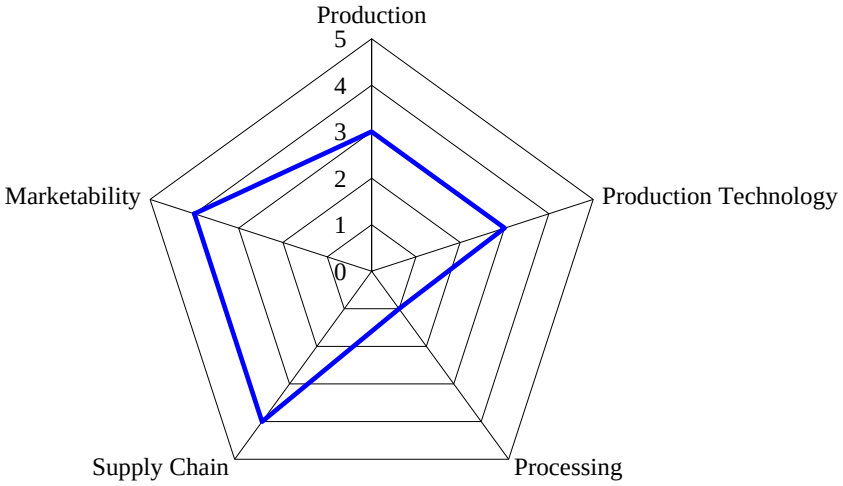
Dealing of native chicken is not efficiently done between small raisers and brokers. Lack of knowledge on price by small native chicken farmers leads to the situation that brokers does not present the accurate price according to the market. Hence, it is also difficult for brokers to purchase many native chickens from a farmer. It is necessary for the farmers to form a producer group or a cluster in a barangay or with other barangays in the neighborhood to perform transaction as a group

(4) Lack of access to technical support

Native chicken raisers in the ARMM have limited access to constant technical assistance. Difficulties in contacting government livestock technicians when they need assistance are apparent constraints.

5-4-3-4 Evaluation

Based on current situation previously described, the chicken industry in the ARMM is evaluated as below.



Category	Score	Reasons for Evaluation
Production	3	Native chicken production in the ARMM is widely observed but mostly considered as backyard production. This means that each farmer has an average of 4-5 heads of native chicken.
Production Technology	3	Farming techniques are relatively simple. Native chickens are well known for their adaptability to local agro-climatic conditions, hardiness and resistance to diseases. Moreover, they require minimal care, management and inputs. Fattening management is roughly conducted; farmers do not take much time to pay attention about their native chicken
Processing	1	Native chicken is a convenient staple food in the ARMM but it is not considered as processed food.
Supply Chain	4	Buyers of native chickens most often buy directly from the farmer and sell to the markets including outside of ARMM, such as Cotabato City. Buyers are middlemen or direct consumers.
Marketability	4	Meat and eggs of native chickens are preferred by many Filipinos over the same products from commercial poultry because of their taste, leanness, pigmentation and suitability to Filipino special dishes.

5-4-4 **Duck**

5-4-4-1 Background

Duck raising is a traditional livestock industry in the Philippines. Duck raising is especially recommended in bay or coastal towns like those bordering the shores of Laguna de Bay, where there are abundant supplies of fresh water snails which are good feed for ducks. Ducks are generally raised for eggs, but they are also sold for meat. Boiled duck sperm eggs are famous as traditional delicacy called "Balut"

Backyard farming dominates duck production in the Philippines today. Small flocks are commonly raised by rural households as they can subsist under a wide range of climactic conditions on various feeds and are resistant to common avian diseases

5-4-4-2 Current Situation

(1) Production

The total number of duck is estimated 10.57 million birds on January 1, 2009, which is 0.7% lower than in 2008 in the Philippines. The duck population in backyard farms was estimated at 7.83 million birds, posting a minimal growth of 0.83%. The inventory in commercial farms stood at 2.54 million birds, or 9.64% lower than the previous year. This decline mainly attributed to the decrease in the number of duck farm raisers. Around 75.46% of the total population was raised in backyard farms, and the rest in commercial farms[182].

The duck production in the Philippines was considered as a lucrative enterprise. Duck egg production rose from 33,400 tons in 1991 to 53,630 tons in 2002 with the average growth rate of 4.03%. Duck meat production rose from dressed weight 6,513 tons in 1991 to 11,057 tons in 2002 with the average growth rate of 4.51%.

Duck production in the ARMM was 3.6% of the national total in 2009. Nearly all ducks in the region are raised by individual families. It should be noted that the volume level of duck production in the ARMM decreased significantly during the period of 2005 and 2009 by 33.3% in Lanao del Sur and 16.6% in Maguindanao.

[182] BAS (2010)

In 2009, the annual duck inventory in Maguindanao is 277,072 heads, which accounted for nearly 80% of the total duck production in the ARMM. However, a very small number of them are being raised on a commercial scale in the province. The duck raising industry in the island provinces except Sulu are in a small scale, raised by private small households. Basilan and Tawi-Tawi hold the least duck inventory in the ARMM in 2009 with 7,730 and 7,393 heads respectively.

Table 5-87: Production of Duck (Number of bird)

	2005	2006	2007	2008	2009	Annual Average	Share as of 2009
Philippines	10,438,739	11,146,745	10,161,581	10,508,205	10,577,395	10,566,533	-
ARMM	405,561	366,917	389,209	367,929	355,899	377,103	3.57%
Provinces in the ARMM							Share (ARMM)
Maguindanao	328,189	295,100	308,494	296,096	277,072	300,990	79.82%
Lanao del Sur	44,424	33,102	41,493	29,641	29,641	35,660	9.46%
Basilan	6,737	6,890	7,395	7,377	7,730	7,226	1.92%
Sulu	18,944	25,254	25,177	27,828	34,063	26,253	6.96%
Tawi-Tawi	7,267	6,571	6,650	6,987	7,393	6,974	1.85%

Source: BAS (2010)

(2) Production Technology

In areas where duck raising is allowed and space is available, a small flock of ducks can be kept in the yard of a household at a low cost. Except for a brooder, which is needed for the first week or so, the main facilities and equipment needed to get started are simple structures, such as a partially-enclosed shed, inexpensive fencing, a feed hopper or trough made of wood and a simply constructed watering device.

Ducks are kept on open ponds or rice fields in a nearby dry sheltered area. Ducks kept on ponds may obtain a part of their food from plant and animal life in and around the pond such as snails. In the ARMM areas, it is common to manage duck raising in fish farming ponds in which fish such as tilapia is cultured.

(3) Processing

In the Philippines, meat processing of duck has not yet been established as an industry.

However, in Maguindanao, there is ample supply of salted eggs in the market but is greatly depending on the seasonality of duck eggs supply. The equipment and facilities used in their processing are plastic pales, basins, and bottles. The production is done manually and uses simple technology. The quality of the product is not good in comparison with other area's product.

Here is the process of making salted eggs:

1) Clean and weigh 5 kg of duck eggs.
2) Make a salt solution in a pail.
3) Soak the eggs in the salt solution.
4) Cook after 14 days, and then cool.
5) Pack them by kilo[183].

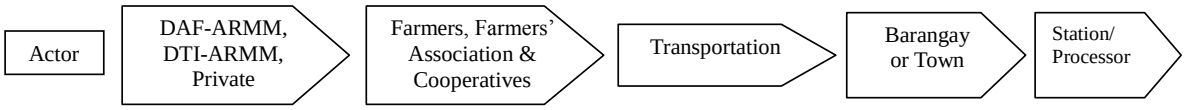
(4) Supply chain

In the Philippines, the annual average farm gate price of duck rose from Php 64.08 per kilogram in 2009 to Php 64.85 per kilogram in 2010. It was only 1.21 percent higher than the 2009 price. The highest price at Php 68.58 per kilogram was registered in April, while the lowest price of Php 60.71 per kilogram was recorded in August[184].

Table 5-88 shows an example of value chain of duck in the ARMM.

[183] Potential product study for Maguindanao in 2010
[184] BAS(2010)

Table 5-88: An Example of Value Chain of Ducks Raised in Datu Odin Sinsuat (DOS)



roduct	Technology / inputs / dispersal/livelihood	Ducklings/ducks/eggs		Brangay, town,city		Fresh Eggs, Balut, Salted Eggs, Duck meats
Place	Regional , Provincial, Municipal Levels	Municipal and Barangay Levels	Barangay to Town/City	Town/City		Cities/Municipalities/ Barangays
Place	DAF-ARMM Private (ORC Cot City), Midsayap	DOS, ORC Cot. City, Midsayap		Cotabato City Bgy NDVillage, Cot City, DOS		Cotabato City DOS, Parang Upi, Midsayap
.ctivities	• Technology • Duckling dispersal	• Hatchery of ducklings • Rearing • Egg production • Egg processing • Marketing	Transportation	• Hatchery of ducklings • Rearing • Egg production • Egg processing • Marketing of eggs and live ducks	Transportation	• Marketing/Vending of coocked baluts and salted eggs
Price	• Livelihood assistance at Php35/female duckling	• Php35/hedd on classified female ducklings or • Php18/head for unclassified ducklings (combined male and female) • About to lay duck layer is at Php100-Php120/head	Free delivery from the hatchery plant to the owner or buyer	• Culled ducks (24 months laying) are priced at Php40 to Php50/head	• Php0.50/pc of classified fresh eggs	• Cooked balut is sold at Php15/pc during lean season and Php13/pc for peak season • Salted egg is Php10/pc
Cost	• Prodcution cost: • Php120/layer. A family of 4 needs 300 layers and 45 drakes for a cost of Php41,400. One week feed cost at Php500/sack/day = Php3,500. Caretaker wage is Php1,500/month. TOTAL = Php46,400.				• Free transportation cost from the owner to the buyer	
Scale		• 300 layers and 45 drakes For a family of 4 members	Ratio practice in Cntral Mindanao is 1:7, that is 7 layers for one drake and the age of flock is 5 to 6 months (about to lay flock).			

(5) Marketability

In 2009, the supply of duck meat in the Philippines was estimated at 13,826 metric tons, which reveals a decrease of 6.7% against the previous year's supply. The total supply of duck eggs went down from 42.454 metric tons in 2008 to 39,617 metric tons in 2009. The annual per capital consumption of duck eggs was 0.40 kg, or 9.09% lower than in 2009[185]. (Table 5-89)

[185] BAS (2010)

Table 5-89: Duck Supply and Utilizations Accounts (Unit: metric ton)

Item	2007	2008	2009	% Change 09/08
Duck Meat Total Supply	15,062	14,817	13,826	6.69
Production	15,044	14,732	13,746	6.70
Import	18	85	80	5.88
Utilization	15,062	14,817	13,826	6.69
Export	-	-	-	-
Processing	-		-	-
Duck Eggs Total Supply	46,990	42,454	39,617	6.68
Production	46,990	42,454	39,617	6.68
Import	-	-	-	-
Utilization	46,990	42,454	39,617	6.68
Export	-	-	1	-

Source: BAS-Agricultural accounts and Statistical Indicators Division

Note: The conversion rate of duck eggs is 15 pieces/ kg.

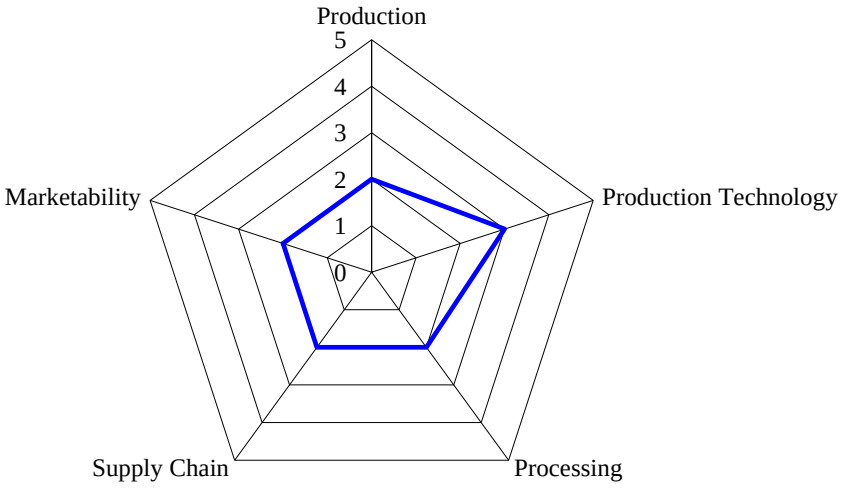
Duck production is one of the most profitable livestock industries in the Philippines mainly because of its egg which can be marketed through different channels. Duck eggs, both in fresh and preserved forms, are sold and consumed daily throughout the country. Duck meat is also gaining ground in the market today. However, in the ARMM, ducks are sold for meat when snail feed gets scarce.

5-4-4-3 Main Issues and Constraints

Duck production in the Philippines is declining. The decline was attributed to the decrease in the number of duck farm raisers due to lack of pasture areas such as rice field and the coastal area. Traditionally, these ducks are commonly raised in rice fields and other watery areas, but the massive conversion of lands hindered the growth of this industry

5-4-4-4 Evaluation

Based on the above, the situation of duck in the ARMM is evaluated as below.



Category	Score	Reasons for Evaluation
Production	2	The duck population in the ARMM is small and decreased significantly from 2005, due to the diversion of paddy which are home to ducks to other crops.
Production Technology	3	Standard production skill is practiced but there are areas to be improved. The areas where abundant supplies of fresh water snails which are good duck feed are recommended.
Processing	2	Duck meat and egg can be utilized as raw materials for processed products; however, processing activity in the ARMM is very limited due to lack of supply duck itself.
Supply Chain	2	Ducks are generally sold to local markets as eggs or meat.
Marketability	2	The supply of duck meat in the Philippines was decreasing by year. The total supply of duck eggs also decreasing.

5-4-5 **Goat**

5-4-5-1 Background

Goat is a popular livestock nationwide as well as in the ARMM. It fits the conditions of small-hold farms. Culturally, goat meat dishes are integral to all special occasions, such as birthdays, baptisms, weddings, and fiestas. Hence, they command a higher price in comparison with other meats on the market. They are not only a good source of protein for Filipinos, but they also provide much-needed additional income for farmers. In fact, goats provide a livelihood to about 15 million Filipinos across the country today. Goat multiplies fast and it does not need much care because they eat tree leaves, weeds, grasses, and agricultural by-products. Therefore its production requires low initial investment with smaller risks compared to other livestock species and it is an attractive livestock among poor families.

5-4-5-2 Current Situation

(1) Production

The total goat inventory in the Philippines was estimated at 4.20 million heads as of January 1, 2009. Among the total goat population of 4.22 million, 99.02% were raised in backyard farms. Those raised in commercial farms accounted for only 0.98%. Currently there is an increase in demand for goats. Of these goats, around 37% were female breeders or does, 9% were male breeders or bucks, 33% were kids, and 21% were classified as castrated males and other goats for fattening[186].

Goat production in the ARMM comprised 6.0% of the national inventory in 2009. Goat raising seems to be increasing both in the country and in the ARMM region. In the ARMM, Maguindanao is the leading goat producing province with 49% of the regional production in 2009, followed by Lanao del Sur with 25%, Sulu with 12%, and Basilan with 9%. The number of goats in the region has increased by 32.2% from 2005 to 2009. Significant increases were seen especially in Sulu, Basilan, and Lanao del Sur. This is because goat production is now viewed highly promising because of: i) a low initial investment requirements; ii) a short time frame for getting a sizable return; iii) low maintenance costs; and iv) a high demand in both the local and national markets.

[186] BAS (2010)

In Maguindanao, the production of goats is confined to the backyards. The production in 2009 was 117,538 heads in the province. The unavailability of high grade forage and grasses, upgraded breeds and lack of information on scientific goat production and technology are impediments of the venture expanding in the province. Despite the high demand of the goat meat in the province during Islamic feasts, such as the month of Ramadan and the pilgrimage season, the province still has a limited supply of the product.

In 2009, the goat inventory in the region reveals that the province of Lanao del Sur had a total of 62,061 live goats. This was an increase of almost 2,000 heads from the previous year's annual inventory of 60,303 live goats. Table 5-90 shows the upward trend of the annual goat inventory to increase since 2005. Goat production in Lanao del Sur is still backyard-type in nature[187].

In the provinces of Basilan and Tawi-Tawi, the annual goat inventory in 2009 is 26,090 and 12,985 heads respectively. In the province of Sulu, the number of goats has increased significantly from 15,372 heads in 2005 to 42,949 heads in 2009.

Table 5-90: Production of Goats (Number of Heads)

	2005	2006	2007	2008	2009	Annual Average	Share as of 2009
Philippines	3,535,195	3,735,816	4,048,550	4,174,251	4,222,234	3,943,209	-
ARMM	197,837	223,669	245,904	252,948	261,623	236,396	6.00%
Provinces in the ARMM							Share (ARMM)
Maguindanao	104,700	117,203	118,918	122,284	117,538	116,129	49.12%
Lanao del Sur	50,573	57,084	63,338	60,303	62,061	58,672	24.82%
Basilan	16,170	19,482	24,392	23,678	26,090	21,962	9.29%
Sulu	15,372	19,689	29,042	36,045	42,949	28,619	12.11%
Tawi-Tawi	11,022	10,211	10,214	10,638	12,985	11,014	4.66%

Source: BAS (2010)

(2) Production Technology

Goats require low maintenance because they eat tree leaves, weeds, grasses, and agricultural by-products. Moreover, women and children can raise goats, making it a sound option to

[187] Potential product survey for Lanao del Sur 2010

augment the country's programs on livelihood. The typical goat raising is illustrated in the Box 5-10.

Box 5-10: Goat Raising by Multi-Purpose Cooperative (AIMARBEMPCO)

The goat raising activity of AIMARBEMPCO Cooperative was patterned from the concept of Domphet-Dhuafa or "DD concept" which have been learned from the training on "Bridging Leadership in the ARMM" conducted by the Asian Institute of Management in Notre Dame University, Cotabato City. DD is a Malaysia-based organization engaged in goat raising adopting a scheme of providing goats to the farmers and buys back the goats when it reaches marketable size. In 2005, the cooperative requested the assistance of the Department of Agriculture (DA) to provide them with goats to start the goat-raising activity. They aim to breed and disperse the goats to each member.

Currently, there are 7 members/caretakers who have already been distributed with goats. Once the mother goat is able to reproduce, the kids are sold back to the cooperative leaving the mother goat to the caretaker who then breeds for his own production. Criteria for selecting beneficiary are as follows: i) interest and commitment in the program; ii) available barn/housing for the goats, and; iii) enough supply of forage within the production area.

Starting with only 11 heads in 2005 and with an initial capital of Php 108,000, they were able to build barns, established forage and supplemental feedings, acquire medicines/vaccinations, and bought 20 additional high-bred goats. Currently they have 130 heads of goats. The cooperative raises both *Anglo-Nubian* and *Boer* breeds in a 19-hectare land in total. They also perform goat fattening to increase sales and production. The current selling price of the goat ranges from Php 3,500 to 5,000 depending on its size and breed. They sell 35 heads or average gross sales of Php 148,750 per annum. The buyers are from Basilan and Zamboanga City. Goats are highly maintained with proper vaccinations, medications and supplements/vitamins to maintain best quality, and also with the initiative of DA Basilan, they were able to test an artificial insemination once, and the doe was able to produce 2 kids.

Source: Interview with Multi-Purpose Cooperative (AIMARBEMPCO)

There are several technical challenges, which are observed for goat raising. These challenges include insufficient feeding management such as improved forage varieties for feed and utilization of agricultural by-products, shortage of goat housing technologies, insufficient

animal health care and disease prevention, and shortage of knowledge and understanding on the characteristics of native goat and the hybrid type.

How Islam described halal livestock in the ARMM

Here, the required process for livestock to be certified as halal is explained as a sample animal because the processes include important technical issues to tap into the emerging halal market. However, the proper processes are not fully taken at the moment due to insufficient information and trainings, facilities, and so on. In Islamic communities, all the animals have to be lawful to be eaten, alive, healthy, and not pregnant, to be slaughtered only for the reason of food in the name of the Creator, ALLAH (s.w.t) and not for any other reasons (it has to be well-fed, not thirsty handled and moved gently and individually) and naturally fed (no haram feed ingredients such as meat, blood and bone meal, withdrawal period needed if such have happened, e.g., three days for birds, seven days for sheep and goat and forty days for cattle or carabao). It needs fully separated slaughterhouse (no single-roof or compound) and to be from non halal animals.

Considering the withdrawal period if animals fed with haram ingredients as in artificial management (commercial feeds) or scavenging chicken near garbage or dead carcasses (human, animals, birds, etc.), but feed with natural plant-based within said period in a cage or in pens.

1) Halal Goat

   Goat is one of the most popular animals to be sold as halal. Halal goat must comply with halal certification to be pure halal because the certifying board will act as an outside endorser of the goat farm and assure the halalness of the farm or product, the Halal Certification Board is the one accountable if there is fraud in the issuance of halal certificate. (Allah Knows Best). Anybody can claim halal but without outside endorser, the "halalness" is doubtful and not sure so according to Islamic Law anything doubtful will fall into haram or unlawful in Islam.

   Halal goat shall be raised according to Islamic traditions and must be certified halal. Feeds should not have hormone or antibiotic residues on meat and should be heavily fenced to prevent entry of non-halal animals. Commercial feeds in raising goats should not be used because of the presence of blood meat and bone meal.

   In case of halal processed meat in groceries/fast foods which are placed in one container freezer or compartments, these become non-halal for Muslims. Goat meat processed in the same grinding machine with non-halal meats make the goat meat non-halal

When farmer decided to raise halal goat, keen attention should be paid. The farm must be certified halal after complying with all necessary guidelines set by the halal certifier as part of Halal Regulation. Otherwise "halalness" is doubtful.

Feeding the halal goat farm must follow the guidelines set by the Halal Board (e.g. Grasses/legumes are not contaminated with dirty matters (faces of any animals) and chemical. If such happened, wash with water three times and become halal). Feed concentrate must be free of non-halal animal protein such as meat, bone and blood meals, if such things happen, practice of veterinary quarantine that is the withdrawal of said contaminated feeds for seven days before slaughter (feed only non-animal protein for seven days).

Vaccination is allowed to prevent the disease to occur. However, seven days before slaughter, vaccination is not allowed because vaccine is always oil-based as vehicle usually animal fats. Treatment by antibiotic is allowed provided you strictly follow the meat withdrawal period as indicated in the label of the antibiotic bottle. (No-need for Lab tests Residues on Meat unless the raiser is in doubt.)

2) Slaughtering of halal goat

- The concept of halal goat farming is from farm raising to plate. No "haram" or chemical contamination should be involved in between, otherwise the "halalness" is in doubt or nil if said goat farm does not comply halal guidelines.

- Transportation must be separated from non-halal animals (no mingling with pigs or other non-halal animals), if the truck use intermittently with non-halal animals, said truck must be debugged (Islamic ritual) washed thoroughly with water before loading the halal goat.

- Slaughterhouse where the halal goat is brought, must follow the guidelines set by the halal board. So far in the Philippines, we can find halal slaughterhouses only in Datu Odin Sinsuat (Maguindanao), Lamitan (Basilan), Bongao (Tawi-Tawi), Wao (Lanao del Sur), and Sultan Naga Dimaporo (Lanao del Norte, Region X). All of those slaughterhouses are non-functional except in Datu Odin Sinsuat and Lamitan. Many slaughterhouses are non-functional at present because slaughterhouses were constructed mainly at Christian areas but not Muslim residential area; therefore,

there are not so many opportunities to operate a halal slaughterhouse. In addition, the number of halal goat to be processed at halal slaughterhouse is not sufficient.

Slaughterhouse is only for halal animals, it must be totally separated from non-halal animals. To avoid cross contamination in a single roof or even single compound with pigs and other non-halal animals.

Actual slaughtering of halal goat is carried humanely but can avoid stunning and slaughtering separately, to avoid animal from seeing each other because in Islam it is a double kill, hence, inhumane (Koran 6: verse 38)[188].

(3) Processing

In the Philippines and in the ARMM, meat processing of goat has not yet been established as an industry. Goats brought to the slaughter houses are butchered, and the parts are classified. Then they are distributed fresh to meat vendors in the market[189].

(4) Supply Chain

The 2009 annual average farm gate price of live goat went up from previous year's Php 75.29/kg to Php 87.83/kg. The highest average farm gate price in 2009 was registered during the month of June at Php 90.87/kg. This was 18.85% higher compared with the price in the same period in 2008. On the other hand, the lowest farm gate price was recorded during the month of January at an average of Php 85.26/kg. This price was 19.29% lower than last year's level. (Figure 5-58)[190]

[188] Source: Dr. Norodin A.Kuit, Lead Halal Auditor-MMHCBI Chief, Livestock Division-DA-ARMM
[189] Potential product survey for Maguindanao in 2010
[190] BAS(2010)

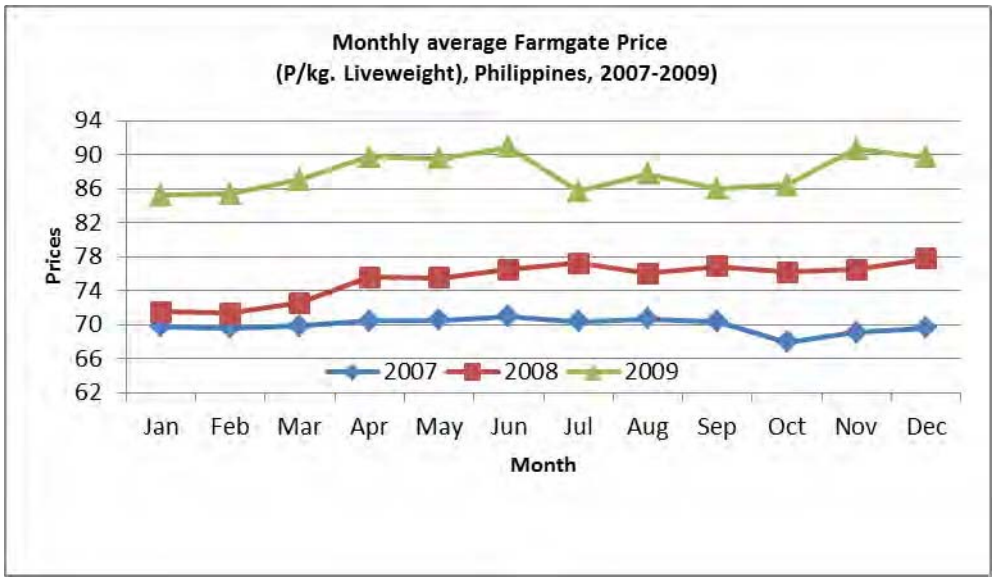


Figure 5-58: Monthly Farm Gate Price of Goat, Philippines

Table 5-91 shows an example of value chain of goat in the ARMM.

Table 5-91: An Example of Value Chain of Goat Produced in the ARMM for Local Market[191]

Actor	DA/Veterinarian & input supplies	Farmers & Cooperatives	Barangay or Town Traders/Middlemen	Meat Processing Slaughter	Retailing
roduct	Technology / inputs / livestock/poultry	Heads All-in basis	Heads All-in basis or classified	Transportation	Processing	Heads Classified
Place	Barangay Level	Barangay Level	Barangay to Town/city	Barangay to Town/city	LGU Recognized slaughterhouse	Cities
ctivities	• Technology dessimination • Input supply/dispersal • Vaccination	• Breeding including artificial insemination • Raising • Fattening	• Collection • Buying, selling	Transportation	• Halal Slaughtering • Slaughter Certification with transportaion	• Meat Retailing at City Market • Live selling
Price	3 months old Native goat Php 500.00 Vaccination:	Farm gate price: 2 years old Php 1,500 average	Selling price: Php 2,500.00		Php 35/head	• Php 180.00/kg • Php 3,500/head
Cost		• Prodcution cost: Php800-Php1000/head		• Transportation cost Php 100/head		
Scale		• Productivity: Backyard Farming @ 3-10 heads per farmer	• Handling Volume:			• Local Market
ssues	• Lack of funding for outreach technology down to farmers (DA) • Lack of licenced veterinarian	• Lack of technical support • Lack of technical knowhow the proper raising of livestock • No proper forage • No proper house for goats		• High transportation cost due to distance and poor road network	• Lack of facilities for slaughtering	• Some hot meats sold at public markets passed through vendors with certificates • Many LGU markets with no veterinary certificates

[191] By study team

In Lanao del Sur, goats and other livestock are sold in the livestock market or "bagsakan" where traders, speculators and brokers gather. There are several trading stations for goats and other livestock in the province, and the goat is transported by the traders to other cities and provinces (Figure 5-59).

Kid Goat: Price @ ₱ 500.00 per kid (within age of 3 months) Sources: Municipalities of Pualas, Malabang, Balabagan, Kapatagan, and Picong Areas of Cattle Farming: Municipalities of Pulas, Malabanga, Balabagan, Kapatagan, Bumbaran, Mulondo, Bubong, Balindong, Marantao, and Picong Propagation Period: goat are ready for trading after 2 years	Local Trading: farmers sold their goats to local traders for meat production Local Farmers: farmers sold their goats to other local farmers for meat consumption Selling Price: Price @ ₱ 1,500.00 per goat (for age 2 years old)	Meat: Price @ ₱ 65.00 per kilogram Slaughter House: Marawi City	Local Distribution: goat meat locally distributed Price @ ₱ 85.250.00 per kilogram • Lanao del Sur • Lanao del Norte • Pagadian City	Distribution: • Public Markets

Figure 5-59: Example of the Supply Chain of Goats in Lanao del Sur

The supply chain for goat in Maguindanao is shown as Figure 5-60.

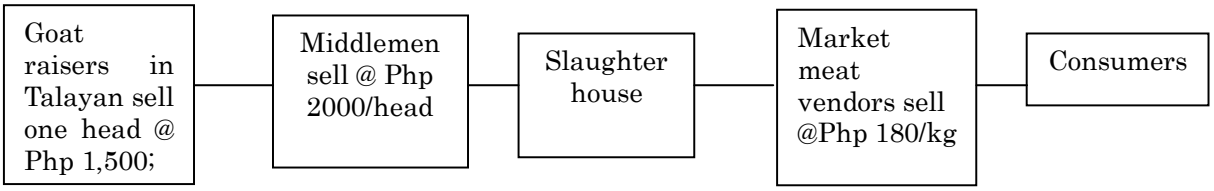


Figure 5-60: Example of the Supply Chain of Goats in Maguindanao[192]

Goats are gathered by middlemen or farmers and are brought to the market during market days. Meat vendors purchase them directly from farms, bring them to Cotabato City, butcher them in a slaughter house, and distribute them to market vendors.

In the provinces of Basilan and Tawi-Tawi, farmers usually sell their goats to the middlemen and then the middlemen go directly to traders and ship the goat to Zamboanga. Sometimes the

[192] Dressed carcass weight is about 15 kg.

middlemen sell them directly to restaurants or fast-food chains. But during the special occasions, farmers sell their goats directly to local consumers.

(5) Marketability

Trends of goat productions, as shown in Figure 5-61, are not like agriculture or fisheries. Market growth of goat products is varied among the market segment, regional, domestic or international situations. In particular, the growth in the ARMM is much stronger than the international market while the growth in Philippine is little.

At the moment, there is an increase in demand for goats. As explained before, goat meats are now popular in all special occasions and the meats command a higher price in the market. Although the total goat inventory in the country is steadily increasing at 2% per year, supply is still not meeting the current demands. It is expected that this increase in supply will continue until 2020, the year when supply is finally projected to meet demand.

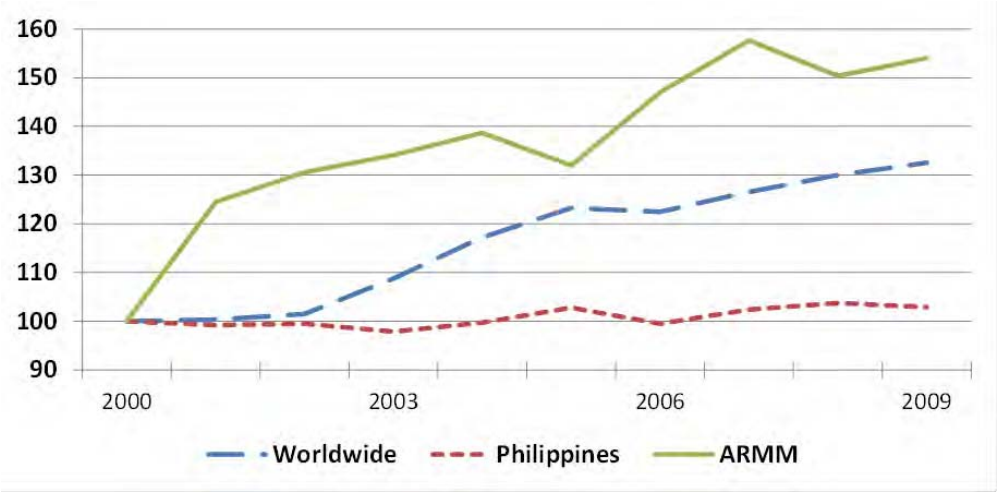


Figure 5-61: Total Amount of Goat Production (2000=100)
Source: FAO, BAS

5-4-5-3 Main issues and Constraints

(1) Low productivity of goat

Productivity of goat industry in the ARMM is low due to the following issues.

1) Insufficient improved forage varieties for feed resources

Goats can grow with low nutritive value grass compared with cattle. However, it is important to introduce quality grass throughout the years and to provide feed efficiently. *Pennisetum purpureum, Setaria sphacelata, King grass, Brachiaria umidicola, Brachiaria decumbens and Panicum maximum* etc. are recommended varieties in the ARMM. Furthermore, Legumes should be fed to goat to provide protein for growth and production. *Macroptilium atropupureum, Pueraria phaseoloides, Centrosema pubescens, Stylosanthes guianensis and Arachis hepogesa* etc., are recommended.

2) Shortage of proper utilization of legume tree as multi-purpose resources

Utilization of legume trees is very important. However, very limited farmers are introducing those technologies in the ARMM as explained before. The leaves of the legumes can provide goat with good sources of protein and the trees planted near the house or barn can protect goats as "living fence". More than one type of legumes trees such as *gliricidia, leucaena, calliandra* and *sesbania* should be planted alongside or between rows.

3) Limited utilization of by-products from the farm as feed resources

Agricultural by-products such as rice straw can be fed to goat up to 40% of the total ration. If baled or stacked and adequately protected from the weather, rice straw can be used as additional feed sources of energy anytime of the year when feed supply is short. However, the use of these by-products is not yet commonly practiced in the ARMM.

4) Improper feeding management technologies in the farm

Feed is a key factor for goat raising to be profitable and goat raiser must formulate feeds based on his animals' sex, age, weight gain desired and the moisture contents of available roughage and feeds. However, most of goat farmers do not care about nutrient contents of goat feed.

5) Shortage of proper goat housing technologies in the farm

For goats, too, most houses are not suitable for raising. The best design for a goat barn is to have it elevated off the ground with stalled floors. It is especially true for area with a lot of rain. This type of barn can help keep the animals healthy and productive.

6) Shortage of proper general feeding management technologies in the farm

Feed is a key factor for goat raising to be profitable. However, most of goat farmers do not care about nutrient contents of goat feed. Goats need feed nutrients for maintenance,

growth and production. Goat raiser must formulate feeds based on his animals' sex, age, weight gain desired and the moisture contents of available roughage and feeds

7) Insufficient animal health care in the farm

Goats require basic health care. Goats occasionally need to have their hooves trimmed. However, there is almost no one who is practicing it in the ARMM. It is not a good practice to let the hooves grow long because it can cause difficulty to animal in walking and lead to leg and foot problems. Also, the hooves may break and cause injury and infection.

8) Shortage of proper management technologies to decrease occurrence of disease

In goat raising, one of the most important things is to decrease disease problems using proper management and health care of goat. However, most of goat farms in the ARMM do not give much attention on prevention such as proper and sufficient feed and clean water, worm medication, and adequate care of pregnant does and newborn kids etc.

9) Shortage of knowledge and understanding on the characteristics of native type goat and hybrid type goat

According to livestock development strategy in the Philippines, the hybrid type of goat such as Anglo Nubian has been introduced for nearly forty years already. However, it is hard to say that the adaptation of hybrid type is successfully done among the goat raisers. The issues of hybrid goat raising in the ARMM are; i) lack of care about environmental research prior to introducing hybrid type goat to the candidate area, and ii) lack of technical transfer activities to the farmers especially on breeding methods. In addition, when making cross breed between hybrid male goat and native female goat, it should be done with kidding experience and not first kidding experience to avoid delivery troubles.

(2) Insufficient knowledge concerning goat selling

Most of goat raisers are not so keen to sell their goats timely. Goats will gain body weight daily depending on the feed given and the breed used. However, when the goat has reached its matured size, the body weight will not increase anymore. Postponing the sale of goat too long will result in a loss, because there is nothing more to increase in body weight to cover the extra maintenance cost.

(3) Lack of market linkage and consolidation

Under the present circumstances, dealing with goats is not efficiently done between small goat raisers and brokers. When the small goat raisers do not have the basic knowledge concerning goat price, sometimes brokers do not give the accurate price according to the market.

From a broker's point of view, when he needs two or more goats at once, it is difficult to secure them from small goat raisers. In that case, the brokers have to visit other small goat raisers to purchase another goat, and it is not efficient. If the small goat raisers in a barangay exchanges information about production of goat mutually, they can improve the situation by sharing the time of shipment of goat in a common schedule. Therefore, it is necessary for the small goat raisers to form a producers' group and to form a cluster with the producers in a barangay or with other barangays in the neighborhood in order to perform goat sales transactions as a group with the middlemen or brokers.

(4) Very limited activities of processing

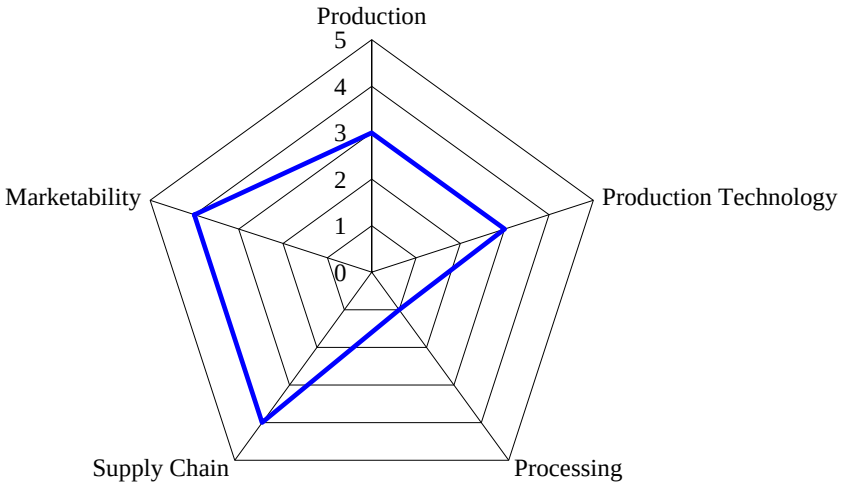
Goat meat and milk can be utilized as a raw material for processed products; however, processing activity is very limited due to lack of supply of goat itself in the ARMM.

(5) Lack of access to technical support

Goat raisers in the ARMM have limited access to constant technical assistance from DA in the aspect of production and veterinary treatment etc. Even when they are able to contact government livestock technicians, it is also seldom to get the needed advice from them. Therefore, most of goat raisers ought to contact private veterinarians

5-4-5-4 Evaluation

Based on the above, the situation of goat in the ARMM is evaluated as below.



Category	Score	Reasons for Evaluation
Production	3	The goat production is widely done in the ARMM but mostly considered as backyard production. This means that each farmer has an average of 2-3 heads of goat.
Production Technology	3	It is seldom that much time and expenses are allocated for goat raiser to cater for their goats in the ARMM. The herds are only allowed to graze freely in vacant lands where grasses are abundant. Farmers seldom plant different nutritious forages which they could use to feed their animals with the required nutrients.
Processing	1	Goat meat can be utilized as raw materials for processed products; however, processing activity in the ARMM is very limited due to insufficient supply of goat itself.
Supply Chain	4	Goat meats are well adapted as stable food in the Philippines. Live goat is conveyed to even outside of the ARMM by local vendors.
Marketability	4	Despite the high demand for the goat meat in the province during Islamic feast such as month of Ramadan, and pilgrimage season, the ARMM still seek for the goat meats from other areas, because of the limited supply of goat.

5-5 Prioritization of Products

This subchapter exercises the prioritization of analyzed products to extract products which can be promoted for local industry development in the ARMM. Nevertheless, it does not mean that products which are not prioritized here are evaluated not to have potential to develop local industry. Prioritization criteria differ among sectors, agriculture, fisheries, and livestock.

5-5-1 Agriculture

Based on the analytical description in previous subchapters, evaluation of current situation of analyzed eleven products is summarized and tabulated in Table 5-92.

Table 5-92: Summary of Evaluation of Current Situation of Analyzed Products

	Production	Production Technology	Processing	Supply Chain	Marketability	Total
Abaca	2	2	2	3	5	14
Bamboo	1	2	2	0	2	7
Banana	5	5	4	5	5	24
Cacao	2	3	2	4	5	16
Cassava	4	3	3	3	5	18
Coconut	2	2	2	4	5	15
Coffee	3	3	3	3	5	17
Mango	4	4	3	4	5	20
Mangosteen	2	1	2	2	4	11
Oil Palm	2	2	3	4	4	15
Rubber	3	3	1	2	4	13

Before setting prioritization criteria, banana, mango, and bamboo were turned down from the prioritized products. Banana and mango scored more than 20 points in total and the industries of these two commodities have already been established well by private sectors, especially for export market. Therefore, the industries possess existing high potentials to promote their own industries without particular intervention. Meanwhile, bamboo, which is evaluated lowest, has not yet reached the level of industry as agriculture and thus this commodity still needed advocacy at first. Hence, priority is not provided to it for intervention at this moment. As a consequence, abaca, cacao, cassava, coconut, coffee mangosteen, oil palm, and rubber are candidate products to be prioritized.

The following criteria are applied for prioritizing the above-mentioned eight products.

i. Products are currently produced by smallholders in the ARMM. Productivity is

increased, and quality is improved by introducing proper cultivation and post harvest technology under the proper technical guidance by public and private sectors.

ii. Small-scale food and handicraft processing industry can be performed as local industry promotion by consolidated producers' groups.

Comparing the eight candidate products regarding the above criteria, the potential of each candidate product is shown in Table 5-93.

Table 5-93: Priority of the Candidate Products

Products	Satisfaction of criteria		Envisaged condition of the product to its industry	Priority
	i	ii		
Abaca	High	High	Conversion of fiber will contribute to income generation and vitalization of the abaca related industry including export of raw material.	High
Cacao	Medium	Medium	Though cacao is somewhat a new product in the ARMM, it can vitalize the industry by producing more quality dried and fermented cacao beans for meeting international high demand.	Medium
Cassava	High	Medium	Cassava can vitalize the industry through local Muslim processed products and other urban products like cassava cakes as food, and supplying starch in internationally high demand.	High
Coconut	High	High	Coconut can revitalize the industry with high-value processed products and stabilize farming by intercropping with other crops for diversification.	High
Coffee	High	Medium	Coffee, especially Robusta, can boost the industry more through productivity increase and improving quality of green coffee beans to meet the demand of private firms in the Philippines. Branding strategy also creates opportunity to link up with international market.	High
Mangosteen	Medium	Medium	Mangosteen will vitalize the industry by introducing proper cultivation and processed products such as jam, juice and supplemental food products. Mindanao 2020 recommends strategizing to increase mangosteen production as raw material for dietary and alternative medicine as well.	Medium
Oil Palm	Low	Low	Oil palm will promote the industry with large scale investment in long term. Plantation type cultivation is necessary.	Low
Rubber	Medium	Low	Rubber will promote the industry with large scale investment in long term. Basilan promotes rubber by provincial government support, which is particular case.	Low

From the criteria described in Table 5-93, abaca, cacao, cassava, coconut, coffee, and

mangosteen are specified as prioritized products to promote local industry and then the provinces are also specified for the each product as shown in Table 5-94.

Table 5-94: Specified Provinces for the Priority Products

Priority Products	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
Abaca		x		x	
Cacao			x		
Cassava		x	x	x	x
Coconut	x	x	x	x	x
Coffee	x			x	
Mangosteen				x	

5-5-2 Fisheries

Comparison of current situation among the analyzed products is shown in Table 5-95.

Table 5-95: Evaluation Scores of Priority Fisheries Products in the ARMM

	Production	Production Technology	Processing	Supply Chain	Marketability	Total
Abalone	2	2	1	3	5	13
Grouper	3	2	3	5	5	18
Milkfish	2	2	1	3	4	12
Mud Crab	2	2	1	5	5	15
Seaweed	5	4	3	5	5	22
Tilapia	3	3	2	3	4	15

According to the results of the potential product survey in the ARMM, generally, their scores of production and production technology tend to be low. On the other hands, their scores of supply chain and marketability tend to be high. It means that the productivities of the target products remain at low levels by conventional production methods and efforts, in spite of their high distribution and market potential. In processing of the target products, its scores also tend to be low. It indicates the processing efforts and activities of those fisheries products are not common in the ARMM.

The potentials of target fisheries products are compared on the aspects of the following criteria. Especially, the product market aspects, such as market value and scale, are considered to be most important for the promotion of locally produced products. The evaluation results of target fisheries products are indicated in Table 5-96.

ii. *Market value*: the market values of respective products are relatively evaluated at following three levels: high, medium and low in comparison with the average value of common fisheries products.
iii. *Market scale*: the possible market scale of respective products are evaluate at following three levels: high (the product can reach to foreign markets), medium (domestic markets) and low (regional markets).
iv. *Production cost*: total production costs of respective products, comprising initial costs and operational costs, are evaluated at following three levels: high, medium and low in comparison with assumed production costs of target products.

Table 5-96: Priority of the Candidate Products

Fisheries Product	Market Potential		Production Cost	Envisaged condition of the product to its industry	Priority
	Market Value	Market Scale			
Abalone	High	High	Medium	Live and fresh abalones will be dealt at high value in domestic and foreign markets. Backyard cages or pens for abalone culture can be installed at coastal communities by minimum financial supports. According to reinforcement of local hatcheries, sufficient abalone seed can be supplied to local communities.	High
Grouper	High	High	High	Live and fresh groupers will be dealt at very high value in domestic and foreign markets. However, the operational cost of grouper culture is pretty high, because of installation of floating fish cages and feeding with trash fish or commercial feeds. According to improvement of seed production techniques, grouper seeds will be stably supplied to local farmers in the future.	Medium
Milkfish	Medium	Medium	Medium	Fresh and processed milkfish will be widely distributed and consumed in domestic markets. The product values may be maintained at reasonable level because of high domestic demand. Local existing brackish-water fish ponds can be fully utilized to increase fish production by introduction of improved culture techniques.	Medium
Mud Crab	High	High	Medium	Live and fresh mud crabs will be dealt at high value in domestic markets. Some amounts of high quality crabs can be exported to neighbor countries. Local existing brackish-water fish ponds can be fully utilized to increase crab production by introduction of improved culture techniques.	High
Seaweed	Low	High	Low	The market scale of seaweed products, especially carrageenan, will be much larger, because of high international demand. If local product quality is improved, the demand of local products will be much larger. Because of low production cost, seaweed culture can be expanded all over coastal areas in the region.	High
Tilapia	Medium	Medium	Low	Fresh and processed tilapia will be widely distributed and consumed in domestic markets. Existing paddy fields can be utilized/modified as fish ponds with minimum capitals. Large areas of freshwater lakes and marsh lands can be utilized for tilapia cage culture.	Medium

Due to a potential comparison in target fisheries products in the potential product study, abalone, mud crab and seaweed are regarded to have higher development potentials than other products, because of high market potentials and reasonable production costs or investments. Therefore, those products should be selected as priority products for local industry development in fisheries sector.

However, in case of groupers, live and fresh fish can be dealt at much higher values in domestic and foreign markets, even though the initial and operational costs of grouper culture are relatively higher. Therefore, the profitability of grouper culture is higher than those of other products.

Milkfish and tilapia are possibly distributed in only domestic markets. However, the market demands of both fishes in the near future will be increased gradually by high population growth. Even though their market areas are limited, the potential of future consumption is very large. For the reasons above, grouper, milkfish and tilapia should be regarded as priority products of fisheries sector development.

In term of the selection of priority fisheries products for local industry promotion in the ARMM, all target fisheries products should be considered as priority products. Those priority fisheries products are expected to contribute to local fisheries industry promotion all around the ARMM. Table 5-97 then shows the target potential provinces of respective priority fisheries products in the ARMM.

Table 5-97: Target Potential Provinces of Priority Fisheries Products in ARMM

	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
Abalone			x	x	x
Grouper	x		x	x	x
Milkfish	x	x	x		
Mud Crab	x	x	x		
Seaweed	x		x	x	x
Tilapia	x	x			

5-5-3 Livestock

Evaluation of the current situation of analyzed five products is summarized and tabulated in Table 5-98.

Table 5-98: Summary of Evaluation on Current Situation of Analyzed Products

	Production	Production Technology	Processing	Supply Chain	Marketability	Total
Carabao	3	3	1	2	2	11
Cattle	2	3	1	4	4	14
Chicken	3	3	1	4	4	15
Duck	2	3	2	2	2	11
Goat	3	3	1	4	4	15

The evaluation scores indicate the present achievement levels of priority livestock products in several categories. According to the results of product study in the ARMM, generally, the trends of their scores of production and production technology are low. On the other hand, their scores of marketability are high except carabao and duck. The productivities of priority livestock products are low whereas they have high market potential. In processing of priority livestock products, its scores also tend to be low. It indicates that the processing efforts and activities of those products are not common in the ARMM.

The following criterion is applied for prioritizing the five products.

- Products are currently produced by smallholders in the ARMM and productivity will be increased and quality will be improved by introducing proper livestock and poultry management and technology under proper technical guidance by public and private sectors.

Comparing the five candidate products regarding the above criteria, potential of each candidate is shown in Table 5-99.

Table 5-99: Priority of the Candidate Products

Products	Satisfaction of criterion	Envisaged condition of the product to its industry	Priority
Carabao	Low	Carabaos are sold either for their meat or as a working animal. Farmers are primarily concerned with activities related to crop production and little interest is given to improve carabao management such as feeding and reproduction. Moreover, improved carabao productions are not appreciated.	Low
Cattle	High	Cattle require low maintenance because they eat tree leaves, wild grasses, and agricultural by-products. Cattle have the very high value as property in the farmer life. Backyard farms are increasing because of the following advantages: i) it requires minimum space for housing. ii) It gives the farmer year-round work and provides him with extra income. Fattening operation requires simple facilities and level of management.	High
Chicken	High	Farming technologies are relatively simple and the products have a market because they can be sold in small quantities such as a few eggs or birds at a time. Native chickens are well known for their adaptability to local agro-climatic conditions, toughness, ability to utilize farm-by-products and resistance to diseases. Moreover, they require minimal care, management and inputs.	High
Duck	Low	Duck raising is especially recommended in the coast or paddy field where there are abundant supplies of fresh water snails which make good duck feed. However, the numbers of ducks are decreasing due to shortage of pastures area for duck raising.	Low
Goat	High	The conception rate of goat is higher than the cattle, and has superior breeding performance. Since it can give birth to a goat up to three times offspring about in two years, even if selling number increases and the numbers of group decreases, there will be an advantage that recovery of the number of stock group is early. Moreover, goats require low maintenance because they eat tree leaves, wild grasses, and agricultural by-products.	High

Based on the analysis for the candidate products, degree of priority is provided to each product, as shown in Table 5-99. High priority is given to cattle, chicken and goat. The priority livestock products are expected to contribute to local economic development in all the ARMM provinces. It is considered that all five provinces can be target areas for the potential products as shown in Table 5-100.

In this table, the prioritized products and places are mentioned accordingly. This means, although the areas' backgrounds such as production technologies and level are not equal among

the provinces, all of the indicated provinces are still producing the prioritized commodities.

Table 5-100: Specified Provinces for the Priority Products

Priority Products	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi
Cattle	x	x	x	x	x
Chicken	x	x	x	x	x
Goat	x	x	x	x	x

On the other hand, some specific recommendations are done by product. Cattle raising and goat raising are highly recommended for the provinces of Maguindanao and Lanao del Sur for its vast land areas with rich grasses where cattle and goats could freely forage. The geographical locations of these provinces are also very conducive for these types of undertaking because these areas are endowed with moderate climate and the dry season which affect very much to forage production is not severe, and other destructive forces of nature, either. The geographical location is also an advantage in the distribution of these commodities since it is near to cities with big consumption for meat such as Davao, Iligan, Cagayan de Oro, and etc.

As for the island provinces of Basilan, Sulu, and Tawi-Tawi, their geographical locations itself suggests that a small type or medium type of livestock such as native chicken and goat are suitable. The land area of these island provinces are basically limited, thus, making the native chicken and goat the most suitable livestock to be raised by farmers and fisher folks.

CHAPTER 6 MAIN CURRENT ISSUES AND CONSTRAINTS OF LOCAL INDUSTRY PROMOTION

6-1 Distribution Infrastructure

6-1-1 Road and Land Transport

In the existing and potential market area for commodities, the establishment and construction of good roadway and bridges, complete infra-facilities inside airports and seaports, and an efficient roll-on/roll-off transport system are crucial. Equally, the construction of good gravel road from farm to market is important.

(1) Bad road condition from farms to markets

As to rural roads, about 34% of municipal and 7% of barangay roads are paved. The ARMM is essentially an agriculture-rich region, but poor farm-to-market road conditions greatly affect dealings between farmers and traders. According to the farmers, traders subtract 10% to 20% per unit weight (in kilograms) due to spoilage caused by bad roads during the transport of commodities from farms to market areas in municipalities or cities. During the rainy season, farms can be inaccessible even to four-wheel drive (4WD) vehicles, so that the produce cannot be transported. Even if the agricultural products do make it to the markets, the spoilage rate is high because of the extremely rough roads.

(2) Inadequate RORO Transport System

RORO (Roll-on/Roll-off) system enables efficient cargo transport but it was observed that the current cargo handling method in Port Polloc, major port in Maguindanao province is still the conventional system using the Load-On/Load-Off Method. On the other hand, in RORO, they use wooden pallets and forklifts to load and unload the cargo.

6-1-2 Physical Distribution Facilities

(1) Inadequate local transportation facilities for agricultural products (consolidation point/local market)

1) Limited consolidation area

In remote areas, commodities are transported using animal-pulled sleds, wheeled carts, carrier animals, or single motorbikes. In areas served by passable roads, a 4WD vehicle is more convenient and cheaper, as it is faster and has a larger transport capacity. Some

farmers use sheds or canopies when packing their products. Others pack their harvest into crates or sacks right in the open field, as they need to deliver their produce to trading centers or consolidation points quickly to avoid spoilage and thus get more money for their products from waiting buyers. The consolidation area, which is accessible to both farmers and traders/wholesalers, serves as a trading or auction zone.

2) Shortage of cold storage in local market

In public markets, vegetables are not kept in warehouses or cold storage; most tropical fruits need neither form of storage. Immediate transport from the trader/wholesaler to the market is essential due to the products' short fresh life.

(2) Need to improve fishing port facilities

1) Inadequate fishing port facilities

There are coastal barangays and municipalities that have no community fishing ports or even roads for the immediate access to and distribution of aquatic and marine harvests; i.e., wet and institutional markets.

2) Shortage of cold storage in local market

Trucks are mainly used for the local distribution of farmers' produce. They have thick walls either for insulation against heat or for keeping the temperature low in containers carrying fish and ice. As much as possible, fish are delivered to the distribution outlet within 24 hours after being caught to ensure their freshness. Fishing ports feature refrigeration buildings and utilities. The refrigeration building is equipped with an ice plant, ice storage, contact/air blast freezer, and a cold storage facility (-5°C or -35°C). Utilities include fresh and sea water supply, drainage and sewerage, power and fuel supply, and a water treatment plant. Small fishing ports do not have the equipment and capabilities of major fishing ports. According to some traders, the requirements of community fishing ports are less anyway, as they handle only a small quantity of fish.

(3) Improvement of facilities for livestock

1) Inadequate or no provision of hygiene and sanitary facilities

Most of the building facilities are open to vistors: workers do not wear sanitary suits, there are no sanitary provisions for guests, and there is no regular schedule for disinfestations. Handling tools, rails and pulleys are rusted and tainted sometimes.

2) Inadequate drainage and sewerage systems

Drainage canals are clogged, sewer disposal reservoirs are overflowing, and there is no clean-up routine schedule.

3) Inappropriate waste disposal and waste treatment facilities

Livestock waste is piled up within the compound and exposed to vectors.

4) Shortage of cold storage

Because there is no cold storage system, livestock is butchered early in the morning and immediately delivered to the wet markets.

6-2 Finance

Several MFIs and lending cooperatives are successfully operating in a limited number of municipalities in the ARMM, and many of them are interested in expanding operation. However, there are several obstacles to expansion plan.

(1) Insufficient capacity and fund of MFIs and cooperatives

There is a need to strengthen the capacity of locally based MFIs and cooperatives, including the provision of assistance for new product development. The internal capabilities, particularly those of its middle and ground managers, the skill of the staff in handling clients and risk management, and the organizations' systems are common areas that need to be strengthened. Top management and their competence in running organizations may affect an organization's performance and its ability to meet its goals. Meanwhile, the financial management and governance of many cooperatives must be improved for increased transparency. Many MFIs and cooperatives have pointed to the lack of funds as a hindrance to expansion.

(2) Mismatch of loan product design and demand

Although some MFIs offer loan products for farmers and fishermen, the product designs still fall short of addressing the actual situation - a much longer cash flow and income cycle for the borrowers. The factors that discourage loan seekers include repayment frequency, requirements of non-agriculture income, and requirement for weekly meetings. The MFIs' built-in methodology excludes potential clients in the agriculture and fishery sectors. The methodology also has gender bias, targeting women over men, even if it is usually the men who undertake the main income-generating activity in the family.

On the other hand, substantial number of MSMEs reported the needs for bigger loans on longer terms which many MFIs cannot cater to, because the MFIs set their maximum loan amount at

Php 150,000 for the terms of less than 24 months. Although the Land Bank and the Development Bank of Philippines have such relatively large loans to MSMEs, many enterprises do not avail their services, citing their long processes and stringent document requirements as obstacles.

(3) Security problem

In Basilan and Sulu, some MFI staff members were kidnapped, forcing the MFIs to close their branches. MFIs hesitate to operate in some barangays in Maguindanao due to the shaky peace and order situation. Although MFIs hire local staff members who understand the political, social, and cultural situation of the area to avoid problems, the firms nevertheless tend to avoid risky areas.

(4) Insufficient infrastructure and difficulties to access to remote areas

Infrastructure and access to remote areas are the major considerations of MFIs in their expansion plans. Good road networks and the availability of frequent transportation allow the MFI staff to travel faster and safer from the office to field locations. The presence of these facilities indicates the easiness of trade in the area, which allows more enterprises to flourish. Areas that are difficult to access have less trade activities and such situation would not attract the financial service providers.

(5) Low level of economic activities in remote areas

A MFI looks for a specific minimum number of clients in an area before it considers operating there. If there are very few businesses or prospective clients in the area, an MFI will not be financially sustainable.

(6) Past bad records of cooperatives

The Land Bank was saddled with bad debts or the inability to collect on loans in many ARMM-based cooperatives. For this reason, the bank has adopted a stricter stance when extending loans in the region.

(7) Insufficient financial management capacity of people

The tendency to depend on grants from government and donors still prevails in many local residents and with their insufficient capacity in financial management making it difficult for MFIs and cooperatives to implement commercial financing. This requires efforts for MFIs and cooperatives to provide trainings on financial literacy such as budgeting, savings and debt management to their clients and members.

6-3 Quality Control (Sanitation)

According to the survey, there is a low ratio in the ARMM of food-related organizations bearing certificates attesting to an acceptable level of hygiene in the work environment. In the food-related industry, a hygienic work environment is a prerequisite to quality control, especially for companies that want to grow and/or expand to other areas. The main issues and constraints leading to low quality control are analyzed below.

(1) Insufficiency in knowledge

Among the food processors in the ARMM, 68 % of them sense a lack of modern technological knowledge. Because most food-related organizations are family-based, they apply traditional knowledge to food processing and hygiene, and fail to adopt modern technology.

(2) Immature administrative preparedness

The City Health Office provides a hygienic guidance to food handlers twice a year, but the current target organizations are mostly restaurant operators, caterers, etc., not the food processors whose products are sold to unspecified consumers. In addition, the Food and Drug Administration at the ARMM (FDA-ARMM) is understaffed and thus unable to fully provide hygienic guidance to food-related organizations. The cause seems to be insufficient budgetary allocations from the local governments. As a result, only five food-related organizations have obtained a license to operate (LTO) in the ARMM. Considering that Region XI has 991 food-related organizations with LTOs (as of August 25, 2009), it is clear that something must be done about the dismal awareness of food-related organizations in the ARMM pertaining LTOs.

(3) Expensive fees for the certificates

Fees for acquiring and maintaining the required certificates are rather high for the family-based organizations in the ARMM.

(4) Shortage of financial base for facilities

Many of the family-run organizations in the ARMM do not have sufficient funds for facilities that are not directly connected with food processing but are important for improving hygienic conditions. This is evident from the comments made by a sanitary permit inspector: “They are poor; it is even difficult to decide to inspect those who conduct daily life business because the inspection may hinder their livelihood.” Financing is one of the key issues in improving the hygienic conditions of family-based enterprises.

6-4 Organizational Strengthening/BDS

(1) Difficulty of access to BDS for producers' group

A study reveals that many formal and informal producers' groups undertake business activities in the ARMM, but the majority of them have hardly tapped business development services (BDS). The Department of Trade and Industry-ARMM (Hereinafter called DTI) and the Cooperative Development Authority-ARMM (CDA) offer these services ad hoc, although they do not conduct them regularly due to the lack of planning capacity and budget. The producers' groups are advised to look for private BDS providers, such as chambers of commerce, MFIs, and nongovernmental organizations (NGOs), but understandably, financial constraints keep them from doing so.

(2) Immature management capacity of producers' group

Most of the producers' groups have serious problems with their management skills and encounter major difficulties in accounting, marketing, and group management. Accounting is a big headache for cooperatives. Many of them fail to submit to the CDA the required financial statements for their reregistration as cooperatives. In marketing, many groups are struggling to gain access to the limited number of traders. The lack of information on commodity prices in the market is also a challenge. The capacities of group management, such as leadership and meeting facilitation, are also insufficient in many of these groups.

(3) Insufficient training experiences among provincial DTI officers

The DTI has a mandate to provide BDS to business groups in its areas of coverage; technical staff members are regularly assigned to its various provincial offices. However, based on the interview with the DTI personnel and the office's accomplishment report for 2010, the provincial staff hardly rendered any BDS addressing the producers groups' concerns. Only DTI Tawi-Tawi conducted several training programs.

(4) Difficulty to complete re-registration as a cooperative

When R.A. 9520[193] was implemented, many cooperatives failed the series of screenings conducted by the CDA for reregistration purposes. A mere 30 cooperatives had successfully reregistered by the end of May 2011. The main impediments to reregistration are the difficulty

[193] Republic Act 9520: An act amending the cooperative code of the Philippines to be known as the "Philippine Cooperative Code of 2008"

of amending the cooperative codes—the institutional rules and regulations on cooperative - and preparing the financial statements to be audited by the external auditor. An external auditor has to validate the financial statements, but many cooperatives cannot afford to pay the fees for auditing services or are unable to get external auditors.

6-5 Halal Industry

As explained in Chapter 2, the National Commission on Muslim Filipinos (NCMF) is tasked to lead in the promotion and development of the Philippine halal industry and accredit halal certifying entities/bodies. However, the NCMF has not yet completed the preparation process of the criteria for the accreditation of halal certifiers. This limited administrative management capacity of NCMF is one of the major basic issues for promotion of halal industry in the Philippines.

Based on the findings of this study and the reports in the Regional Halal Food Industry Development Plan, the major issues and constraints for promotion of halal industry in the ARMM are as follows;

(1) Low production volume, productivity and poor quality of potential halal products

Although there are many agriculture/fishery/livestock products that can be promoted as halal, the absolute volume of production, productivity, and quality of each potential product is generally low. A similar observation was made in the processing and quality control category. As part of these general findings of all potential products, the technology and expertise applied to processing and quality control is also at entry level.

(2) Limited and inaccurate knowledge on halal concept and certification

The majority of people in the ARMM are presumed to be familiar with halal concept because they are Muslims. However, it has been observed that they have meager, often inaccurate knowledge of halal certification due to the insufficient information dissemination and promotion of halal certification.

(3) Limited implementation activities for promotion

Although the promotion policy and institutional set-up on the development of halal industry have already been identified in the ARMM government, the positive tangible outcomes are rarely seen on the practice level which is mainly attributed to few implementation activities.

For example, since the creation of MMHCBI in 2006, some limited number of enterprises have been certified in the ARMM. In addition to limited support from DTI and ARMM Business Council, enterprises in the ARMM sometimes misunderstand that they are familiar with halal because they are Muslims, so that they have tendency to ignore the proper process of halal certification. They should be advised that by acquiring halal certificate they could introduce their products to bigger national or international markets in the Islamic world as well as to improve the hygienic conditions of their work environment.

(4) Short supply of necessary resources and support facilities for promotional activities

Necessary resources and support facilities in each sphere for halal industry promotion are of either short of supply or not easily available; including the capable human resources such as experts on technology and administrative services, financial fund and formulation of sustainable institutional arrangement. The lack or shortage of capable human resource is seen as the most serious challenges because it usually takes a very long time to educate/train/maintain these technical experts in sustainable manners.

(5) Additional needs for joint and comprehensive approach

Due to interrelationship of the major issues and constraints mentioned above, it might be very insufficient and unfair to tackle each subject separately from the view point of overall and sustainable halal industry development. It is now necessary to implement joint operations in real terms for promotion of halal industry in the ARMM.

CHAPTER 7 RECOMMENDATIONS FOR LOCAL INDUSTRY PROMOTION

7-1 Vision and Objectives

As explained in Chapter 2, the GRDP growth rates of the ARMM have been low: 1.6% in 2008 and 2.6% in 2009, compared with the Mindanao average of 3.9% and 3.7%. Per capita GRDP of the ARMM was Php 18,924, only a fourth of the national average of Php 83,274 in 2009. The poverty incidence in the region was at 38.1% in 2009, the second highest in Mindanao. The annual population growth rates of the ARMM averaged 5.7% from 2000 to 2007 and this is more than twice the average of Mindanao. High population growth, coupled with slow economic growth, will aggravate poverty in the ARMM, hence, widening the economic gap between the region and other parts of Mindanao. This situation will exacerbate the peace and order problems in the ARMM and Mindanao, as poverty is considered one of the biggest barriers to the resolution of conflicts and reduction of crimes such as kidnapping.

On the other hand, the ARMM is blessed with rich natural, agricultural, and marine resources, complemented by an abundance of young labor force and an advantageous geographical location, as it seldom experiences natural calamities (e.g., typhoons). In addition, there are large and growing potential markets and an unmet regional demand for agriculture, fishery, and livestock products. In fact, most of the investment business and enterprises in the ARMM are agriculture- and fishery-based. There are a few small-scale manufacturers which market their products (e.g., coffee, rubber, dried fish, and seaweeds) to neighboring regions and even Manila and Cebu. However, the shortage or unstable supply of raw materials is a problem. The number of successful manufacturing ventures (e.g., coconut oil, corn and cassava starch, etc.) is likewise modest. The profitability of small manufacturing enterprises is not high compared with that of wholesale businesses. Therefore, it is recommended that the ARMM industries to be promoted be those with comparative advantages, such as the ones dealing with agriculture and fishery resources.

To obtain the sustainable development for the economy of the entire ARMM and to fill the gap between ARMM and other regions, it needs to sustain the average annual growth rate of at least 4.5% or higher, as indicated in Chapter 2-2-1. To achieve this target, the region's economy has to achieve the annual growth of 7% in primary industry, judging from the growth trend of the ARMM economy in the past ten years. It can be a viable target as a result of promotion of potential products. This target will be an important benchmark for local industry promotion,

though it is not necessarily a direct impact on the regional economy from those products.

The various challenges were identified from the products survey in the view of value chain for local industry promotion in the ARMM. They are summarized as shown in Table 7-1 though detailed explanation is provided in Chapter 7-2.

Table 7-1: Identified Major Issues Found from Products Survey for Local Industry Promotion

Supporting Institution including Government and Private Entities	• Lack of inputs • Low capacity of governmental organizations on technology dissemination • Difficulty to access to finance (inadequate loan product, capacity of financial institutions, etc.)
Production and Processing	• Low productivity • Unstable and low quality of products • Poor post-harvest facilities • Immature processing technology and sanitation control • Inactive processing for high value processed products
Distribution and Infrastructure	• Inadequate local transportation facilities (Consolidation areas and cold storage) • Poor fishing ports • Poor hygienic and sanitary facilities, sewerage system, and waste disposal and treatment ficilities for livestock
Marketing	• Less opportunity to know market information • Limited sales channel • Low level of selling know-how • Distance to large consumer market

Moreover, some external constraints were raised, namely: i) unstable peace and order situation, ii) very few investments from inside and outside of the ARMM, iii) long distances to large consumer markets, and iv) the social psychology of people, who see themselves as victims and dependents and their insufficient developmental wills and entrepreneurship.

The manner by which these potential industries will be promoted is critical, not only for the ARMM government, but also for all the Mindanao regions and the entire Philippine archipelago. What is required most is the strategic and efficient utilization of available resources and opportunities. The current low productivity of the primary industry (agriculture, fisheries, and livestock) sector connotes a huge potential to improve the productivity, production, and income of poor farmers and fishermen, who make up more than 60% of the labor force in the ARMM. The farmers/fishermen's cooperatives can start or upgrade the processing of primary products. But these products should have high acceptability in the emerging markets within or outside of the region.

There were several development programs and assistances to promote the local industries in the ARMM as pointed in Chapter 2. The OTOP program in the ARMM gives important lessons for industry promotion such as needs for support of the local leadership in the municipalities, integrated support for identified potential products, and mobilization of the private sector. Since the continuation of the OTOP activities is uncertain under the current administration, the proposed strategies do not specifically include OTOP. However, the study recommends the following approaches based on the past development programs in the ARMM: i) enhanced involvement of communities and strengthen their capacities, ii) building corporate partnership and public-private partnership, iii) stronger enabling policy, and iv) the establishment of a healthy business environment by the regional and municipal governments.

Firstly, the local industry promotion should be a bottom-up approach, focusing on the capacity development of producers. The success of economic development and industry promotion in the ARMM needs the collective participation, peaceful coexistence, mutual respect, and cultural sensitivity of all people in the region; as well as their effective participation in contributing benefits to rural communities. To do this, it is necessary to strengthen the capacities of the rural poor. Secondly, the forging of partnerships with corporate partners should be encouraged. Small growers and farmers are at the mercy of the traders in many aspects—from inputs to marketing and processing, but this kind of relationship can be improved by partnering with corporations who can benefit from the partnership and prove their corporate social responsibility through their engagement for communities and development. This does not mean to exclude existing traders or wholesalers, whose roles have to be reexamined, and whose relationship with producers can be improved. The national government can assist in establishing linkages and building partnership with these corporations. Thirdly, the regional and local governments should work at creating a business environment that is conducive to the development of partnerships between the communities and the business sector; i.e., maintaining peace and order, improving basic service delivery, etc.

The Vision and Objectives for local industry promotion in the ARMM for the next ten years are set in accordance with the study analysis. The targets are small-scale local farmers and fishermen, and promotion will be carried out through technologies which the farmers and fishermen can utilize. Their technological know-how and entrepreneurial ability must be boosted with improved access to finance. Potential markets (local and others) will be carefully selected based on the security situation and promoted in collaboration with other stakeholders.

Vision:

To achieve stable and sustainable economic revitalization in the ARMM region with a main focus on agriculture, fisheries and livestock sectors, and to contribute to reducing poverty embedded in small-scale agricultural and fishing villages.

Objectives:

1) Formulation of localized small-scale enterprises with specific target in the neighborhood areas and local villages.
2) Organization of possible enterprises with careful considerations of unstable security situations and limited infrastructures in the ARMM.
3) Application/Utilization of techniques, knowledge/information, approaches and strategies most suitable to the ARMM's socio-economic and historical background.
4) Promotion of local industry that can be sustained by local farmers and fishermen as key actors, and with small financial investment.
5) Full utilization of local resources available within and outside the ARMM.
6) Promotion of entrepreneurships among small-scale farmers, fishermen, processors and marketers in the ARMM.
7) Promotion of Government-Private Industry-Academic cooperation, and furthering LGU inclusion to broaden partnerships.

Vision (Overall goal aimed at in the Master Plan)
To achieve stable and sustainable economic revitalization in the ARMM region with a main focus on agriculture, fisheries and livestock sectors , and to contribute to reducing poverty embedded in small-scale agricultural and fishing villages.

Objectives (Possible and necessary steps to be taken to achieve the Vision)
1) Formulation of localized small-scale enterprises with a specific target to neighborhood areas and local villages.
2) Organization of possible enterprises with careful considerations of unstable security situations and limited infrastructures in the ARMM.
3) Implementation of techniques, knowledge/information, approaches and strategies most suitable to ARMM's socio-economic and historical background.
4) Promotion of local industry that can be sustained by local farmers and fishermen as key actors, and with small financial investment.
5) Full utilization of local resources available within and around the ARMM.
6) Promotion of entrepreneurships among small-scale farmers, fishermen, processors and marketers in the ARMM.
7) Promotion of government-private industry-academic cooperation, and furthering LGU inclusion to broaden partnerships.

1. Production and Processing

1.1 Agriculture
1) Increasing productivity by introducing appropriate farming technology.
2) Improving quality of products.
3) Capacitating extension ability of ARMM government body.
4) Linking producers and cottage level processors with other successful models.
5) Supporting producers and processors with finance through financial institutions.

1.2 Fisheries
1) Improving the productivities of fisheries products.
2) Introducing quality management of fisheries products.
3) Improving seed supply condition.
4) Establishing extension coordination structure.
5) Introducing micro-financial schemes for local fisheries activities.

1.3 Livestock
1) Providing required technical extension activities to farmers.
2) Improving market channels for livestock by grouping of farmers.
3) Improving access to technical support concerning veterinary services.

1.4 Quality Control (Sanitation)
1) Establishing and operating a body which will continuously educate, instruct and give guidance to the food related organizations in the ARMM in terms of hygiene.
2) Making the food related organizations recognize the importance of having the hygienic work environment and assist them in acquiring sanitary permit, License to Operate (LTO) and/or halal certificate.

2. Product distribution/ Infrastructure
1) Improvement of distribution facilities and infrastructure in local farming and fishing communities, e.g. local markets, cargo pickup points, and local roads.

2) Installation of storehouses to prevent product deterioration during a distribution process.

3) Reinforcement of existing community-based infrastructure.

3. Marketing
1) Identification of market needs and improvement of producers' access to market information, e.g. by installing satellite-shops and furthering market information provision.

2) Supporting market expansion through business matching, business meetings , trade fairs and seminars.

3) Optimization of above mentioned strategies 1) and 2) in accordance with targeted market, whether it is targeting ARMM regional market , or domestic/overseas markets).

4. Finance
1) Promotion of financial services by financial institutions for production & processing groups and cooperatives.

2) Promotion of financing systems/ services for small scale farmers and fishermen utilizing existing value chain actors such as processors and traders.

3) Strengthen cooperatives and production groups for their capital build up, savings and credit activities.

5. Organizational Strengthening/BDS
1) Promotion of leadership among local farmers and fishermen, and enhancement of group cooperative activities.

2) Promotion of cooperative formation and reinforcement of existing cooperative activities.

3) Strengthening organizational activities that help achieve an increase and stabilization of production by small scale farmers and fishermen with appropriate quality control.

4) Promotion of entrepreneurships by offering basic business knowledge, e.g. business planning, accounting, financial control and monitoring, and marketing strategies.

Figure 7-1: Vision, Objectives and Strategies for Local Industry Promotion in the ARMM

7-2 Proposed Strategies for the ARMM Government and Concerned Stakeholders

To achieve the objectives proposed above, strategies are suggested for five categories, with action plans for each category, which are elaborated in Chapter 8. For production and processing, the study identified 15 priority potential products: six for agriculture, six for fisheries, and three for livestock; action plans were formulated for each product. The proposed action plans start from the small-scale pilot phase, which will be implemented in selected areas of the ARMM. The areas will be chosen based on current production and services, potential farmers' or fishermen's groups, the security situation, and so on. The results of the pilot phase will be incorporated in the implementation phase. For optimum effect, government and private resource organizations will be fully utilized and empowered during the pilot and implementation phases through collaboration.

The strategies are categorized as follows.

1. Production and Processing
    - 1.1 Agriculture
    - 1.2. Fisheries
    - 1.3 Livestock
    - 1.4 Quality Control (Sanitation)
2. Product distribution/Infrastructure
3. Marketing
4. Finance
5. Organizational Strengthening/BDS

7-2-1 Production and Processing

7-2-1-1 Agriculture

(1) Potential and Issues

The agriculture sector employs a sizable portion of the rural population and possesses a huge potential to boost the ARMM economy through local industry promotion. However, this potential has not fully manifested itself yet. Since farmers in the ARMM still do not apply proper production technologies, they can raise their productivity just by leaning and adopting proper technologies. Better post-harvest operations and crop processing are the key to the promotion of local industry in the ARMM. The farmers can create additional value, prolong shelf life, help poor farmers diversify the source of their income, and find ways to cushion the effects of seasonal or fluctuating income.

Moreover, value addition strategy i.e. processing will empower not only primary crop producers, but also entrepreneurs, farmers' groups, cooperatives, and women's groups in harnessing unused labor and potential capacities. Thus, as a result of the processing of primary products, the benefits of local industry promotion are maximized within the community.

Certain crops gain added value when productivity is increased and proper postharvest operation and processing are applied due to the high demand for raw materials and semi-processed or processed products in domestic and overseas markets. The crops can be cultivated by small-scale farmers and the processed products enjoy a robust demand in the markets. During the study, the prioritized products were abaca, cacao, cassava, coconut, coffee, and mangosteen.

Common characteristics of the crops are a high potential and demand in both domestic and overseas markets. Their processed products are also very much in demand. While some prioritized commodities are already produced in large volumes in the ARMM, the others need a boost in production. The national government's agriculture sector policy promotes some crops as high-value crops, which encourages the producers to increase their output. The crops include abaca, cacao, and coffee as industrial crops, and cassava as a root crop. Coconut and mangosteen have attractive processed products.

Nevertheless, several issues have to be addressed before the crops' potential benefits to the local industry in the ARMM can be realized, namely:

1) Low productivity, so that a steady supply of products cannot be assured for the market or the next in the chain creating additional value in food and handicraft processing.
2) Quality is not reliable, so that the farm gate price for primary products or raw materials goes down.
3) Slow pace of dissemination of appropriate intercropping technique for crop diversification to increase the producers' sources of income.
4) Quantitative and qualitative losses during post-harvest operations before shipment.
5) Very limited food and handicraft processing to create additional value by consolidating people's groups or small-scale entrepreneurs.
6) Insufficient capacity of the ARMM government/institutions to conduct extension service on farming and processing technology. Lack of access to finance to purchase necessary farm inputs or start processing.
7) Lack of access to finance to purchase necessary farm inputs or start processing.

(2) Strategies

Accordingly, the strategy of the agriculture sector has been structured to tackle the above issues. The concrete strategies are as follows:

1) Increasing productivity by introducing appropriate farming technology with quality-assured planting materials and maximizing the use of on-farm resources as inputs to reduce production cost (e.g., compost).
2) Improving the quality of products through pre-harvest and postharvest operations by introducing appropriate farming, proper harvesting methods, and the collective use of modified postharvest machinery and facilities.
3) Bolstering the extension ability of the ARMM government in farming and processing through fundamental activities such as the implementation of nursery, compost, and demonstration farms; and conducting Training of Trainers (TOT) and On-the-Job Training (OJT), tapping the human resources from both the public and private sectors in the Philippines.
4) Linking producers and cottage-level processors with other successful models within and outside the ARMM to sensitize and expose producers and consolidated groups to knowledge and practical experiences in production and processing.
5) Supporting producers and processors through financial institutions in obtaining inputs in farming, and equipment and facilities for small-scale processing businesses, together with technical supervision.

7-2-1-2 Fisheries

(1) Potential and Issues

The biggest plus factor for the fishery sector is an attractive potential market (e.g. international market), offering high prices (for fishery products such as grouper, mud crab and abalone). If fishermen can increase production and provide a stable supply of quality fisheries products, they can sell them at much higher prices, thus increasing their income.

However, there are some issues in the ARMM that must be dealt with:

1) Low productivity of fishery products

   Many local producers still employ traditional methods in catching or raising milkfish, mud crab, tilapia and other organism. Compared with other regions, the, productivity of the ARMM remains low. The local producers do not produce enough to be able to strike deals with middlemen or distributors.

2) Unstable product quality

The quality of fishery products in the ARMM is not stable, as no proper measures for quality management have been taken at the producers' or processors' level. Products that are not of standard quality fetch lower prices at domestic markets and do not qualify for export.

3) Insufficient seed supply

In the cases of milkfish, mud crab, and grouper, local producers depend on wild seeds caught in natural waters. Currently, it is difficult to produce sufficient number of such seeds artificially at local hatcheries. The shortage of seeds seriously affects local fishery production.

4) Weak linkages between Bureau of Fisheries and Aquatic Resources-ARMM (Hereinafter called BFAR), LGUs and local farmers in extension programs of fisheries product promotion

BFAR has conducted a variety of extension programs to improve the fisheries production and promotion. However, due to shortage of the manpower of BFAR, it often struggles to operate and monitors the field activities in close coordination with the concerned LGUs and fish farmers. It is necessary to strengthen the weak linkages among them.

5) Lack of financial programs to support local fish farmers' activities

In many areas of the ARMM, there are few institutions that offer financial services to local fishers or fish farmers. Therefore, most fishers and farmers have few opportunities to receive loans to start or expand their fishing and aquaculture activities.

(2) Strategies

In promoting fisheries sector, the proposed strategies focusing on productivity, quality control and seed supply are proposed and discussed below.

1) Improving the productivity

Improved skills and methods for production and processing of fisheries products should be introduced to raise production and productivity, which will contribute to product promotion, distribution and markets ability.

2) Introducing quality management

In order to sell the fisheries products at higher and stable prices, their quality must be

controlled under certain standards. Local producer groups must regularly check the quality of the products and adhere to production and processing procedures.

3) Improving seed supply condition
Only three public hatcheries are located in the ARMM, two for tilapia and one for marine species. To strengthen their capacity for seed production and meet local seed demands, the hatcheries' facilities should be rehabilitated and expanded.

4) Establishment of extension coordination structure for fisheries product promotion
To operate and monitor field activities of local fishers and fish farmers properly, Bureau of Fisheries and Aquatic Resources-ARMM (BFAR), LGUs (provincial and municipal) and financial institutions will make a close coordination structure for extension programs on marine fisheries and aquaculture promotion. These organizations shall coordinate with each other to offer proper technical and financial services to local fishers and fish farmers.

5) Introduction of micro-financial schemes for local fisheries activities
For local fishers and small-scale fish farmers, it is too difficult to access loans from commercial banks because they cannot present or put up the collateral for the loans. Proper unsecured loan schemes, such as microfinance programs, should be arranged in cooperation with microfinance institutions, cooperatives and government financial institutions such as the Land Bank, in order to support and sustain the general fisheries operation in the region.

7-2-1-3 Livestock

(1) Potential and Issues

Many farmers in the ARMM are engaged in the livestock industry. However, technologies that are more suitable to the farmers need to be adopted to further improve the sector. Because farmers are quite familiar with the livestock industry, their output improves substantially when they learn various production technologies and apply proper management techniques.

There are various areas wherein farmers, most of whom currently produce livestock in their backyards, can improve and expand their production and sales. Proper support from LGUs and continuous technical support from researchers and livestock experts are therefore needed for the improvement of livestock production and will allow poor farmers to diversify their income sources and make them self-reliant, goal-oriented, and motivated. Even if a farmer starts with little capital, proper management skills and motivation can make the business prosper.

The study identified three species of livestock to be promoted as priority potential products: goat, cattle, and chicken. There is a huge and growing unmet local demand for these products because production volume in the ARMM is very low. For example, there has been increasing appreciation for the flavor of native chicken in recent years; and the number of restaurants serving native chicken is increasing in urban areas.

The methods of raising goats, cattle, and native chickens in the ARMM do not differ much, in that they are predominantly viewed as backyard endeavor. The major issues and concerns in livestock production are enumerated and discussed below.

1) Low productivity due to the farmers' insufficient know-how and facilities
   Most of them do not pay attention to the nutrient contents of the feeds, which the livestock needs for maintenance, growth, and production. The feeds should be formulated according to an animal's sex, age, desired weight gain, and the moisture content of available roughage and feeds.

2) Insufficient knowledge when to sell the livestock
   At present, the dealing of livestock is not efficiently done between small livestock raisers and brokers. If the small farmers do not have basic knowledge of the price of livestock, the brokers sometimes take advantage by not disclosing the accurate market price.

3) Very limited livestock processing activities
   Meat and milk can be utilized as raw materials for processed products; however, processing activity is very limited due to the insufficient supply of meat and milk.

4) Limited access to technical support concerning veterinary services
   Livestock farmers in the ARMM have limited access to technical assistance from the Department of Agriculture (DA) as regards production, veterinary treatment, etc.

(2) Strategies

In the ARMM's livestock sector, the first priority is to increase production before even going into processing. Therefore, livestock farmers must to improve their farming technologies through the technical transfer activities of related organizations and offices. The following strategies are proposed to tackle the above issues.

The suggestions mentioned below will be for DA and the other related organizations which have

expertise in livestock and poultry

1) Providing required technical extension activities to farmers

Increasing the productivity of small-scale farmers by introducing appropriate livestock technologies, such as

- Improvement of general feeding technology
- Improvement of forage production and pasture management technology
- Improvement of livestock reproduction technology
- Improvement of the utilization of by-product from agriculture and industry

2) Improving market channels for livestock through the grouping of farmers

Improving the livestock marketing system by introducing producer's grouping in the area will generate more advantageous sales, as well as direct sales to the market.

3) Improving access to technical support concerning veterinary services

The veterinary services of DA should be strengthened by utilizing the livestock's extension program currently undertaken by the said agency.

7-2-1-4 Quality Control (Sanitation)

(1) Potential and Issues

With regard to quality control in the food sector, a hygienic work environment is a prerequisite. However, the food-related organizations in the ARMM have exhibited very poor hygienic conditions in the work environment. Constraints to the improvement or modernization of the hygienic environment in the workplace in food-related establishment are:

1) Insufficiency of knowledge on hygiene
2) Immature administrative capacity to provide hygienic guidance
3) Expensive fee for acquiring and maintaining the required certificates
4) Shortage of financial base for facilities

(2) Strategies

To resolve the issues 1) and 2) above is time-consuming but very crucial which require some organized program on long term basis. The following strategies are proposed.

1) Establishing and operating a body which will continuously educate, instruct and give guidance to the food-related organizations on hygiene

The operating body will work independently from the local government units, having the

collaboration or assistance from them.

2) Making the food related organizations recognize the importance of having the hygienic work environment and assist them in acquiring sanitary permit, License to Operate (LTO) and/or halal certificate.

Those permits or certificate are the evidences which prove that the holders have established and satisfactorily maintain the level of hygiene and conducive working environment requirement of DOH, FDA or MMHCBI.

7-2-2 Product Distribution/Infrastructure

(1) Potential and Issues

The following constraints regarding the facilities and physical distribution were identified:

1) Inadequate local transportation facilities, such as the lack of a consolidation area and cold storage in local markets
2) The need to improve fishing port facilities
3) Improvement of facilities for livestock, including hygienic and sanitary facilities, drainage and sewerage systems, and waste disposal and treatment facilities.

(2) Strategies

To cope with these constraints, it is necessary to identify and prioritize the needed facilities for the industry promotion of priority products. The study proposes the following strategies and worked out the detailed action plan.

1) Improvement of distribution facilities and infrastructure in local farming and fishing communities, e.g., local markets, cargo pickup points, and local roads.
2) Installation of storehouses in cargo pickup points to prevent product deterioration during the distribution process.
3) Reinforcement of existing community-based infrastructure.

7-2-3 Marketing

(1) Potential and Issues

Each prospective product of the ARMM has a market opportunity to meet a growing demand in and outside the region. Whereas most products will first target the regional market, some have potential to penetrate markets nationwide or overseas.

However, local producers are unable to take advantage of this opportunity due to the lack of

access to market information that they could use for product development and expanding their sales channels. Market information consists not only of market prices, but includes data on competitors, customer demand, and other market issues as well. Producers with insufficient market information cannot gauge the market value and acceptability of their products. Thus, they sometimes introduce products without knowing how they would be received by the market. As a consequence, producers lose the motivation to improve their products' market competence, such as quality, productivity, delivery system, and customer satisfaction. Moreover, even if they had enough market information, they could still be hobbled by limited sales channels. Since the business sector in the ARMM is not large or strong enough for producers to extend the sales channels, they need, therefore, support from the government, chamber of commerce and other organizations. In short, marketing activities in this region are hampered by inadequate access to market information and limited sales channel.

There are other challenges in the promotion of products. Many producers in the ARMM are ineffective at adding value and marketability to their products (e.g., through quality control, processing, and packaging). Improving productivity and production stability are also critical matters for producers to address if they are to find stable markets and sales channels. In other words, their product supply should be steady and reliable.

(2) Strategies

The ARMM government must help local producers improve the marketability of their products by providing them with more access to market information and opportunities to extend their sales channels. The Department of Trade and Industry-ARMM (Hereinafter called DTI) needs to build its promotion capacity to be able to play a major role in implementing marketing strategies. To translate these strategies into action, the following measures shall be taken:

1) Identifying market needs and improving local producer's access to market information, e.g. by installing satellite shops and enhancing the provision of market information
2) Supporting producers in extending the sales channels of their products through business matching, trade fairs, and seminars
3) Optimizing strategies 1) and 2) in accordance with the range of their targeted market, i.e., regional, domestic, or overseas markets.

Nevertheless, marketing promotion will not succeed if products are not improved to meet market requirements and a stable supply is not ensured. Thus, marketing promotion should be implemented in relation with the other strategies in the master plan.

7-2-4 Finance

(1) Potential and Issues

The ARMM has very few financial institutions, and only 22,000 clients are estimated as being served by microfinance institutions. In the region, access to finance is severely constrained—the worst in the Philippines—so that most of the farmers, fishermen, and microenterprises cannot avail of the services of formal financial institutions. They have to use their own capital or resort to informal financing, including loans from money lenders and traders with interest rates run as high as 20% per month.

On the other hand, there have been positive developments in the area. Several MFIs have started operations in certain municipalities of the ARMM and are doing well; remarkably, repayment rates exceed 95%. The MFIs view the ARMM as a big potential market and are interested in expanding their services therein. In the region's island provinces, there are successful financial cooperatives which are now open to nonmembers and have expanded their services by installing automated teller machines (ATMs). Government financial institutions such as the Land Bank have introduced new programs targeting the agriculture and financial sectors. The Philippine government endorses the international movement called "financial inclusion," which aims to expand financial access to all, and several government institutions are providing loan funds to MFIs operating in the ARMM. The Philippines is the most developed country in Asia in terms of mobile phone banking, such as Smart Money and G-cash.

However, there are several obstacles to the expansion of financial services in the ARMM

1) Insufficient capacity and fund of MFIs and cooperatives
2) Mismatch between the loan product design and the demand from farmers and fishermen
3) Security problem
4) Insufficient infrastructure and difficulty in reaching remote areas
5) Low level of economic activity in remote areas
6) Past bad records of cooperatives
7) Insufficient financial management capacity of prospective clients

(2) Strategies

There are issues which require long-term and comprehensive government action, such as security and infrastructure. However, the following strategies are proposed to promote financing for the ARMM under the current situation, particularly for small-scale farmers and fishermen.

1) <u>Promotion of financial services by private and government financial institutions for</u>

production and processing groups and cooperatives

The proposed activities include new product development for farmers and fishermen, capacity development for MFIs and cooperatives, forging linkages and collaboration with LGUs and national government institutions to facilitate their support for security and funding for MFIs. The marketing of new products through innovative channels such as mobile phones will enable MFIs to serve areas that are remote or have security problems. For the enterprises and cooperatives which require large amount of loans than those being provided by MFIs, services by the LBP and the DBP will be facilitated.

2) Promotion of financing systems/services for small-scale farmers and fishermen utilizing existing value chain actors such as processors and traders

By linking or utilizing processors and traders who have information about and a transaction history with farmers and fishermen, the financial institutions can expand their services for them, such as through the supply chain finance program of the LBP.

3) Strengthen cooperatives and production groups for their capital build up, savings and credit activities

In remote areas and for production groups that cannot meet the requirements of MFIs, the approach is to first strengthen the groups' savings and credit activities, then link them with MFIs or financial institutions This phasing approach is more viable.

In each approach, it is recommended that the MFIs or other stakeholders conduct financial literacy training on managing money, budgeting, savings, and financial services for poor farmers, fishermen, and MSEs alike.

7-2-5 Organizational Strengthening/BDS

(1) Potential and Issues

As mentioned above, the primary constraint in BDS is very limited access to the services of producers' and processing groups. Although the officers at DTI provincial offices already have knowledge on BDS, they face insufficient budget allocation to deliver the services. The budget deficit is the major cause that these DTI officers cannot develop their skills as professional BDS providers. Moreover, many producers' groups still face constraints of access to information of BDS providers. Weak management capacity of producers' groups and lack of skills including accounting, marketing, and group management remained unsolved. Another critical issue in the ARMM is how existing cooperatives can pass the strict re-registration processes that CDA is

currently instituting conducting for all the cooperatives.

Among these constraints, the Study contributed to the increasing accesses between BDS providers and producers' groups. The Study compiled a variety of BDS providers both public and private in the ARMM. Through dissemination of the information at provincial and municipal LGUs, producers' groups can start accessing to the information. Since the Study has already prepared the institutional list, this information can be disseminated to producers' groups through the LGUs.

The Study team suggests the following strategies for the left of those issues mentioned above.

(2) Strategies

1) Development of leadership among local farmers and fishermen, and enhancement of cooperative activities

In order to tackle the weak management capacity among producers' groups, the development of their leaderships is very important. BDS covers accounting, marketing and leadership development by practicing skills of group management. By strengthening the leadership, these groups can extend their good influences and enhance their activities to their neighbors.

2) Promotion of cooperative formation and reinforcement of existing cooperative activities

The CDA plays a leading role in forming cooperatives. Donor projects often encourage beneficiaries to organize themselves into cooperatives. Unfortunately, many cooperatives ceased operations shortly after they were established. Therefore, such promotions should target only those who truly understand the advantages and importance of cooperatives.

Another key function of the CDA is to assist in providing technical services to the cooperatives, but they shall lose their status if they failed to reregister. The CDA regional office, supported by provincial CDA offices and LGUs, can set up a system to identify cooperatives that need help in reregistration and give them the necessary technical services.

3) Strengthening of organizational activities that help boost and stabilize the production of small-scale farmers and fishermen, with appropriate quality control

The improvement of production will be accomplished through inputs, serious application of production technologies and BDS. BDS aims to improve the quality of management in terms of accounting, marketing, group management leadership promotion, etc. The action

plans in Chapter 8 described in detail the contents of these production technologies, quality control, and organizational management through BDS.

4) Promotion of entrepreneurships by offering basic business knowledge, e.g. business planning, accounting, financial control and monitoring strategy

This strategy targets those who are willing to start new businesses and, DTI provincial offices have basic capacities to provide these services. Contents of the services are more or less identical to the introductory components of BDS for existing cooperatives.

7-3 Other Recommendations to the ARMM Regional Government

In addition to the proposed strategies explained above, the followings are recommended to the ARMM regional government based on the analysis of current policies, regulations, programs and prevailing business environment in the ARMM.

(1) Introduction of performance management system

As explained in Chapter 7-1, the strategic and efficient utilization of resources, potentials, and opportunities are essential for industry promotion. However, it has been observed that the regional government's current programs for industry promotion are not directed towards the harnessing of available resources, due mainly to inadequacy in the budget, planning and properly targeting beneficiary groups; monitoring, and evaluating the programs and operations. Therefore, it is highly recommended that the Regional Planning and Development Office (hereinafter called RPDO) requests the concerned ARMM line agencies (e.g., DTI, DAF, BFAR, DOST and CDA) to include their performance targets and outputs in their annual and quarterly plans such as the number of producers and entrepreneurs trained or assisted and expected outcomes (e.g., increased production or sales, newly designed products, etc.). The institutions will monitor the progress quarterly by collecting data from their provincial offices and include the statistics in their annual performance report for submission to RPDO. The strengthened capacity of project management of the "plan-do–see" process by the concerned institutions will definitely lead to efficient and effective projects and programs implementation and produce positive results such as higher income for producers and entrepreneurs and poverty reduction.

(2) Strengthen the linkages with national and regional programs for industry promotion

The ARMM formulates its own policies and prepare budget for industry promotion but there are cases wherein DTI and other agencies cannot join the national and Mindanao industry programs and activities. Concern has been raised about the widening gap in industry promotional

activities between the ARMM and other regions. There are, of course, various opportunities for collaboration including the following: trade fairs; cluster development; BDS including product design and the business counselor system; and BIMP EAGA. The newly formulated national and regional plans such as the new MSMED Plan of the Philippines 2011-2016 and Mindanao 2020 share common objectives with the strategies proposed in the study. National and regional agencies are also interested in assisting the ARMM government to utilize its potential for economic development. Therefore, it is strongly recommended for the ARMM regional government to strengthen the linkages with regional, national and Mindanao wide institutions to utilize the available opportunities for local industry promotion. The necessary budget should be allocated for this purpose. Proposed activities for this purpose include upgrading the computers of the DTI to join the data base of BNR (Business Names Registered) of the DTI (National), which will facilitate business matching of enterprises in the ARMM with the businesses in other regions may be afforded the same opportunities.

(3) Improve business environment in collaboration with LGUs

The analysis of investments registered at RBOI and the business study results revealed that in addition to the capacity development of the enterprises, such as BDS, it is important to improve the business environment, particularly, in finance, infrastructure, transportation, security, LGU support system and the clarification of land titles. Since most of these issues should be tackled by LGUs, it is expected that the regional government will direct the municipal and provincial governments into taking action. The following specific measures are recommended:

1) Strengthen security efforts to arrest the escalation of crimes in Maguindanao, Basilan (particularly in Lamitan City), Sulu, and Lanao del Sur (particularly in Marawi City) by the respective provincial and city governments, which will be monitored by the regional government.
2) Implementation of investment promotion programs for LGUs such as Network Investment for Local Executives (NILE) initiated by RBOI-ARMM, which will encourage local leaders to improve the business environment, including security, infrastructure, finance, land titling, etc. It is important for local leaders to know the various benefits of improving the business environment in their areas of jurisdiction.
3) The Department of Interior and Local Government-ARMM (DILG) will facilitate the updating of the Local Governance Performance Measurement System (LGPMS) by LGUs, as well as the sharing of the experiences of active LGUs in industry promotion, such as Upi for their Business Development Center and Parang for their collaboration with General Santos City.

4) Facilitation of the registration of business permits by the LGUs and BNR by the DTI, as the levels of current efforts are varied from LGU to LGU. For example, Sultan Kudarat is one of the LGUs that are striving to improve the registration system.
5) The actual transportation cost from Cotabato to Manila should be reviewed and analyzed, including possible unseen costs such as *lagay* (grease money), which may discourage investments in the REZA.

(4) Take measures to strengthen the institutions and activities for further promotion of halal industry

As explained in Chapter 6-5, the internal major constraints for promotion of halal industry are low production volume, low productivity and poor quality control of the products.

1) Among them, the core problem is identified as limited production of halal-compliant agri-fishery products. Then, the major and immediate challenge is how to increase the volume of halal compliant agri-fishery products in the region. To deal with the challenges, the other parts of this study have already identified priority potential products and have presented ways and means to increase the volume of production, and how to improve productivity and effect quality control.

2) There is an urgent need of direct intervention from DTI or other concerned departments/offices of the ARMM to strengthen the institutional capacity and to reactivate the halal certification and public dissemination of activities pursued by MMHCBI for the private sector. The basic components of the intervention should include substantial support for administrative expenses and employment of permanent staff, capacity development of the newly recruited staff, and implementation of workshops and other actual activities for dissemination and halal certification procedure.

3) It is very important to provide sufficient and real inputs such as operational funds, human resources with advanced technical capability, construction of administrative management and operation facilities such as training/dissemination center on halal certification, research laboratory with technical equipments and halal slaughterhouses with attached appropriate hygiene facilities and equipment. The actual activities such as technical trainings on halal certification procedure and dissemination activities are also required.

4) It is advisable to establish a coordination, and overall commanding function/mechanism with middle and long term perspective and sustainable manner. This formula can be

applied either by reactivating and/or reorganizing present institutional arrangements such as inter-agency TWGs or by creating a new oversight institution, with specific mandates, sufficient operational funds/budgetary arrangements and enough number of assigned permanent staff. The initially important assignment of this coordination/commanding mechanism is to collect pertinent information on the overall promotion related activities in cooperation with RPDO and other concerned departments/offices. After finding and analyzing the general situation of all the different activities, this coordination/commanding institution should put priority on commitments to private sectors. By mobilizing all the available resources as mentioned above, it should lead and immediate action to support business activities of private sector. Lessons learned from these committed activities should be shared among stakeholders and reflect to next actions.

5) It is necessary to develop concrete implementation measures by the ARMM governments to support halal certification activities on processing, distribution and financing stages with middle and long term perspective. The initial approach may be to select one appropriate priority product as a sample, and then to prepare the comprehensive halal certification implementation plan on its particular production, processing, distribution and financing stages and then implement the plan. Since the quantity is generally small and the quality is poor, the industrialization/development varies by each product. It is practically difficult to examine the applicability and to develop the overall measures for the halal certification on each of these products. The study recommends to accumulate implementation cases of small scale halal certification for a while and then to develop comprehensive measures of halal certification on each of priority products at a later stage.

6) It is very evident that major cities and regions of Mindanao became very aware of the various advantages of halal industries. Those local governments and private sectors have already started their active involvement. The most symbolic phenomenon is the presence of a laboratory for halal certification and strong initiative and commitment by the government of Region XII for production of halal-compliant agri-fishery products. It is also commonly observed, through the interviews with various stakeholders, that DTI-Region XI and their private sectors are steadily pursuing expansion of the halal related business activities. The situation seems very critical for the ARMM in the light of competition and challenges with neighboring regions and major cities for halal industry promotion. Therefore, immediate implementation of existing plans and measures by the initiative of the ARMM government and related organizations such as MMHCBI and

ABC is highly recommended.

7) Since the preparation of the Halal Accreditation Guidelines by NCMF has not yet been completed, it is foresighted that the process of national accreditation of halal certification organizations may be further delayed. In such a case, the major Philippine halal certifiers may not be able to undertake halal certification activities, which are nationally integrated and religiously trustworthy, within a shortest period of time. This is not a favorable situation not only for the Muslim population but for all halal industry-related organizations in the Philippines. In order to avoid the occurrence of such phenomenon in the future, it is recommended that the ARMM government, MMHCBI and/or other concerned authorities initiate immediate constructive measures. These immediate measures will include close coordination with the NCMF to expedite the criteria formulation process and other related procedures. A possible joint effort to implement and strengthen the national halal certification system and its promotion in the Philippines should be explored.

7-4 Consistency with Other Development Strategies

The proposed strategies explained in the section of 7-2 correspond to the strategies adopted in the Regional Development Plan of the ARMM from 2011 to 2016, the Mindanao 2020 Peace and Development Framework, Philippine Development Plan (2011-2016) and MSMED Plan (2011-2016) as shown in the Table 7-2.

7-4-1 Consistency with the Regional Development Plan of the ARMM (2011-2016)

The Plan proposed a mission to promote lasting peace and security, ensure access to quality social services, and sustain economic, political and socio-cultural gains. The plan also sets regional macro-economic targets of annual growth rate of GRDP at 3.5% and reduce poverty incidence to 43% by 2016. To achieve the goal, several strategies for economic development are identified. The following main strategies are consistent with the proposed strategies in this study.

(1) Harness the rich resources with emphasis on the region’s comparative advantage (including seaweed, coconut and cassava)
(2) Strengthen economic trade and investment relation with Muslim countries
(3) Enhancement of entrepreneurial skills and institutional mechanisms of MSMEs and Cooperatives

(4) Institutionalize halal industry-led region by promoting processing industry and quality control
(5) Intensify scientific & technology application, product and service marketing
(6) Strengthen cooperative management through saving mobilization and capacity enhancement
(7) Installation and upgrading of infrastructure support facilities

The proposed strategies and action plans share the basic ideas for economic development in the ARMM, "harness the rich resources with emphasis on the comparative advantage" which will be supported by other complementing strategies such as distribution infrastructure, marketing, finance, and organization strengthening & BDS. The action plans in this study will assist the ARMM regional government to translate the above strategies into actions in the fields.

7-4-2 Consistency with the Mindanao 2020 Peace and Development Framework

Mindanao 2020 is an inter-regional development plan crafted by the Mindanao Development Authority (MinDA) in 2010. Under the vision of improved quality of life through a peaceful and sustainably developed Mindanao, five themes were stipulated. There are many areas of the proposed strategies which are common to the economic themes of Mindanao 2020. First, Mindanao 2020 also focuses on potential sectors and industries, which include seaweed, fisheries, and marine culture in the Archipelago; organic farming; and processed tropical fruit in land-based areas of Mindanao. Second, their strategies include "Enhanced and more inclusive value chains" such as SME food processing of seaweed, "Enterprise development focusing on MSMEs," "Inclusive world-class agriculture and agribusiness." Since there are also common prioritized products such as seaweeds, fisheries, and organic farming, the proposed strategies can be implemented with the collaboration of and support from MinDA and other regions in Mindanao.

7-4-3 Consistency with the Philippine Development Plan 2011-2016

The PDP aims for "inclusive growth" that creates jobs, draws the majority into the economic and social mainstream, and continuously reduces mass poverty. Therefore, it is expected that the plan will assist the ARMM -the poorest region- for its people to benefit from the growth. There are many areas in which the proposed strategies share common points with the PDP:

(1) <u>Industry and service sector:</u>
The strategies include support to MSMEs such as the provision of BDS and access to finance and market expansion.
(2) <u>Agriculture and fisheries sector:</u>

Products that carry a comparative advantage for the Philippines, including coconut, mangosteen, and abaca, are analyzed. One of the three goals is improved food security and increased income. The strategies include:

1) Raise productivity and incomes of agriculture and fishery based households and enterprises diversifying production, ii) improving rural facilities such as post-harvest facilities and trading posts, iii) developing markets, iv) strengthening of research, development and extension, and v) improving access to credit.
2) Increase investments and employment across an efficient value chain through i) expanding markets; ii) localized agricultural promotion and development; iii) value-adding into products and developing the capacities of stakeholders for value-chain management, iv) promoting the vertical and horizontal integration of inputs, production and marketing, v) strengthening of agriculture exports by concentrating resources on high-value crops (fruits, coffee, coconut, etc.) and fishery products (grouper, seabass, seaweeds, etc.), and vi) expanding investments in aquaculture and other food production areas.
3) Transform agrarian reform beneficiaries (ARBs) into viable entrepreneurs by i) strengthening the organizational capacity of ARBs, ii) scaling up microenterprises into formal and viable SMEs, iii) liberalizing the access to credit of ARBs, and so on.

The proposed strategies in this study are in line with the several basic approaches for industry and agriculture promotion in PDP such as a focus on improving the productivity and income of households and MSMEs, the promotion of value-adding and linkages among value chain actors, and so on. There are also common potential products identified including as coconut, mangosteen, abaca, coffee, grouper, and seaweed. Therefore, there is a possibility that the proposed strategies can be implemented in collaboration with the national government under the PDP.

7-4-4 Consistency with the Micro Small and Medium Enterprise Development (MSMED) Plan (2010-2016)

The MSMED Plan identifies several issues to be tackled for MSME development such as high cost of doing business, lack of access to finance and market information and low productivity and competiveness, which were also identified in the ARMM as major constraints during the study. Therefore, the four Outcome Portfolios in the plan share common aims and strategies proposed in the study as follows.

(1) Business Environment (BE): Eight results frameworks in the outcome include institutional support for the development of startup and existing MSMEs, promotion of entrepreneurship among MSMEs, soft and hard infrastructures for MSMEs, and dissemination of the information required by MSMEs.

(2) Access to Finance (A2F): All the expected results in this portfolio are the ones proposed in this study. These results are: i) to provide financial services even for start-up MSMEs and those in country side, ii) to promote financial services with the requirements and processes which are reasonable and manageable for MSMEs, iii) trainings for MSMEs in financial management, iv) trainings for financial institutions for services to MSMEs, v) facilitation of information to access financial resources by MSMEs, and vi) coordination for MSMEs to access needed funds.

(3) Access to Markets (A2M): The A2M portfolio is made up of eight results statements describing the expanded access to markets needed by MSMEs. There are several results common to the strategies proposed in the study, such as: establishing marketing support systems, dissemination of market information, and coordinated government support programs to help MSMEs to access local and global markets.

(4) Productivity and Efficiency (P and E): The P and E portfolio has seven results statements which include, appropriate skills and attitudes by MSMEs, greater productivity, compliance with international quality standards, and available and accessible information on productivity enhancement.

Since there are many common areas to be pursued by the MSMED Plan and the proposed strategies, it is highly recommended that the ARMM government will closely work with DTI to utilize possible opportunities provided by the national government for MSME Development.

Table 7-2: Consistency with other Development Plans

Development Policies	Strategies for Local Industry Promotion in the ARMM					
	Production	Processing	Distribution Infrastructure	Marketing	Finance	Strengthen Orgn. & BDS
Regional Development Plan						
Harness agriculture & aqua-marine resources	○	○				
Strengthening economic, trade & investment relation with Muslim countries				○		
Enhancement of entrepreneurial skills and institutional mechanisms of MSMEs and cooperatives					○	○
Institutionalize halal industry-led region		○				
Intensify scientific & technology application, product & services marketing.		○		○		
Strengthen cooperative management thru saving mobilization & capacity enhancement					○	○
Installation & upgrading of infrastructure support facilities			○			
Mindanao 2020						
Provide focused policy, program/project & support to potential sectors.	○	○	○	○	○	○
Enhanced & more inclusive value-chains	○	○	○	○	○	○
Massive enterprise/SMEs development		○			○	○
Inclusive world-class agriculture/agribusiness	○					
Philippine Development Plan 2011-2016						
Industry and service sector - Increased productivity & efficiency	○	○	○	○	○	○
Agriculture & fishery sector - Improved food security & increased income	○	○	○	○	○	○
MSMED Plan 2011- 2016						
Business Environment			○			○
Access to Finance					○	○
Access to Market				○		
Productivity and Efficiency		○				