

Status Of The Philippine Fish Processing Industry

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Introduction

The Philippine Archipelago is composed of more than 7,000 islands with an irregular coastline of almost 18,000 km. Its territorial water including the EEZ is 220 million hectares with a shelf area of more than 18 thousand hectares and a coral reef area of 27 thousand sq km. Inland resources include swamplands of about 338,393 hectares and freshwater fishponds of about 224,527 hectares. Other inland resources include lakes, rivers and reservoirs with a total area of 250,000 hectares. About 2,000 species of fish, molluscs, crustaceans, echinoderms, coelenterates, corals, and many other aquatic flora and fauna inhabit the Philippine waters.

In view of the current call for productivity to sustain the Philippine economy amidst the pressing economic crisis, the fishery sector holds a considerable promise. The annual growth rates achieved

by the Philippine fishery sector from 1980 to 1989 were 4.0% and 16.5% in quantity and value respectively. In 1989, the total fish production was valued at ₱45 billion accounting for almost 5% of the Gross National Product (GNP). Production is largely contributed by municipal capture fisheries (46.6%) followed by commercial fisheries (26.9%) and the rest by the aquaculture sector (26.5%), as shown in Table 1.

As of 1987 the Philippines per caput consumption of fish was estimated at 40.0 kg/annum which is quite high as compared with per caput consumption of other products as shown in Table 2. The country has among the fastest growing populations in Southeast Asia with the present population of 60.5 million and an average growth rate of 2.4% per annum.

Fish has always been an important food item in the Philippine diet. About 50% of the animal protein intake of the average Filipino is derived from fish. About 1 million Filipinos are directly or indirectly employed in the fishery industry.

Table 1. Total fish production by sector, 1989.

	Quantity ('000 mt)	%	Value (x10 ⁹ ₱)	%
Aquaculture	0.629	26.5	15.7	34.8
Municipal fisheries	1.105	46.6	18.4	40.8
Commercial fisheries	0.637	26.9	11.0	24.4
TOTAL	2.371	100.0	45.1	100.0

Table 2. Per capita consumption of fish and other products as of 1987.

Food Group/Sub Group	Total
Fish	40
a) fresh fish	25
b) dried fish	4
c) processed fish	4
d) crustaceans and mollusks	7
Dairy	15.7
Poultry meat	3.3
Eggs	3.7
Fresh meat	9.7
Organ meat	1.5
Processed meat	2.2

Source : Based on the 3rd National Nutrition Survey conducted by the Food & Nutrition Research Institute (FNRI) in 1987.

Considering its contribution to economy in terms of GNP share, external trade and foreign currency earnings, employment opportunities and nutritional benefits, the fish processing industry is here to stay.

Fish Supply Situation

Not all of the domestic production of fish and other fishery and aquatic products are consumed in the Philippines in like manner that not all fish consumed in the Philippines are produced locally. Considering external trade in fisheries, fish supply available for human consumption is computed at 1.87 mt for 1988 and 1.98 million mt for 1989.

The Philippines ranked the 12th largest fish producer in the world in 1986 and is located along a major tuna-migration path which yields half of the skipjack and one third of the yellowfin catch of the world.

Aquaculture has promising growth potential considering its fast profit turnover, stability of its

inputs, high value and export potential of its products and employment opportunities in the rural communities.

Among the aquaculture species, seaweeds dominate the produce and their contribution to total catch is shown in Table 3, together with the other major species cultivated.

A large volume of the total catch is consumed fresh and chilled while the rest are processed as cured, canned, frozen as fillets or disposed of live. Cured fish and fishery products are mostly consumed locally, although small quantities are exported.

Today, the fishery sector continues to provide the much needed food supply both for local and export markets. A five-year fish production with an increasing trend is shown in Table 4.

Product development and new technologies play a major role in converting the raw materials into various food items with varying product characteristics, consumer acceptability, nutritional and economic values.

Table 3. Major species of fish and fishery products, 1989.

Species	%
Marine Commercial and Marine Municipal Fisheries	
1. Tuna and tuna-like species	19.89
2. Roundscad	13.81
3. Sardines	8.06
4. Anchovies	8.05
5. Slipmouth	4.18
6. Indian mackerel	3.40
7. Threadfin bream	2.83
8. Big-eyed scad	2.54
9. Round herring	2.11
10. Squid	1.75
11. Others	33.38
	<u>100.00</u>
Inland Municipal Fisheries	
1. Snails	55.89
2. Tilapia	8.99
3. Carp	5.10
4. Freshwater sardine	4.79
5. Freshwater clams	4.46
6. Small shrimps	3.65
7. Freshwater goby	3.34
8. Others	13.78
	<u>100.00</u>
Aquaculture Fisheries	
1. Seaweeds	42.69
2. Milkfish	30.65
3. Tilapia	12.98
4. Shrimps/prawns	7.61
5. Mussel	2.61
6. Others	3.46
	<u>100.00</u>

Table 4. Five-year (1985-1989) fish production trend.

Year	Quantity(mt)	Value('000 ₱)
1989	2,371,109	45,093,712
1988	2,269,744	42,118,213
1987	2,213,040	37,349,479
1986	2,089,484	37,331,483
1985	2,052,111	31,297,268

Post Harvest Technologies

Fish Curing

Old methods of fish curing such as drying, smoking and salting predominate in the regions. These methods have long been practiced and were proven to be effective in immediately preserving the fish after catch. These methods enable the distribution of fish products widely especially to areas where supply is inadequate. Most of the fish curing operations are done in the fishing regions where there is a ready supply of raw materials. Operations vary from small cottage industries to medium scale. Per caput consumption of dried fish is estimated at 4.0 kg/year.

Chilling And Freezing

For a tropical country like the Philippines, preserving fish by chilling and freezing is necessary. Chilling is effective in preserving the fish prior to subsequent handling after catch and during transport to the wet markets. The locals do not normally require frozen fish for their supply. There is a marked preference for freshly caught uniced fish among Filipinos. Freezing as a method of fish preservation has a long way to go especially now that there is an increasing demand for high-quality tuna meat for *sashimi* and *sushi* in the Japanese market. In terms of value, our frozen fishery products show the greatest bulk of expor-

tation. For shrimp alone, a total of 26,768 mt were exported in 1989 which earned a total of more than ₱5 billion. Principal exports of fish and fishery products for 1989 are shown in Table 5.

Thermal Processing

Canning is still limited to a few species of fish, viz tuna, sardines, mackerel, roundscad, and milkfish. Canned tuna production is mostly for the export market while a small volume is consumed locally. Shortage of raw material is often the problem of the local canners such that importation of cannable species is oftentimes resorted to.

The use of heat-resistant bottles to pack fish for thermal processing has gained recognition and products preserved in bottles or glass jars have penetrated the local market. The use of retortable pouches for thermal processing of fish and fishery products has not yet found commercial application in the local canning industry.

Manufacture Of Minced Fish Products

The manufacture of products like fishballs, squid balls, fish *quekiam*, fishburger, fish noodles, salami, *kroepeck* and fish sticks show a growing potential in the local market. These products are now becoming popular and there is consequent increasing demand for them.

The growing demand for minced fish products in Europe and other developed countries indicate a bright future for these products.

Shellfish Processing

Aside from shrimps and prawns, other more popular crustaceans and molluscs are processed as chilled or frozen for the export market. This includes lobster tails, crabmeat, abalone, cuttlefish/squid, arkshell and octopus. A few of these species are processed and exported as dried products.

Table 5. Principal exports of fish and fishery products in terms of value, 1989.

Products	Quantity (mt)	FOB Value	
		('000 ₱)	('000\$)
Shrimp/Prawn	26,768	5,035,080	833,635
Tuna	57,057	2,809,659	129,986
Seaweeds, dried	30,994	804,546	37,245
Shellcraft articles	2,163	275,665	12,774
Cuttlefish/squid	3,221	269,308	12,477
Fish transport alive	6,347	156,944	7,284
Capiz shells	4,797	121,890	5,639
<i>Bangus</i> (Milkfish)	1,336	85,580	3,944
Natural and cultured pearls	246	66,317	3,080
Sea cucumber	1,022	31,735	1,465

Source : Fisheries Policy Research and Economics Division, BFAR, Quezon City, 1989

Fishmeal Processing

Scraps and offal from canning and freezing operations and by-catch are absorbed by the local fishmeal industry. Rejects in the dried and smoked fish products are likewise utilized for this purpose. Due to insufficient fishmeal production, supply is supplemented by importation. In 1989, import of fishmeal was 56,474 mt.

Other Fishery Products

The abundance of catch of certain fishery products in some areas has promoted the development of various food preparations using traditional methods with some modifications. However, production is influenced by regional and cultural characteristics which significantly affect the consumption and distribution of the finished products. Thus, fermented clams, oysters, mussels and salted jellyfish are popular only in the Visayan region, while fermented mudcrab, boiled tuna and fermented freshwater fishes are a specialty in some provinces of the Tagalog regions. Boiled dried fish are also produced in small quantities.

The production of deboned milkfish in its raw, fresh, marinated and smoked forms is becoming popular not only in Metro Manila area but also in other milkfish producing regions of the country. It is a labor-intensive industry which had generated employment opportunities for the population.

Advances In Fish Processing Technology

Fish Handling

One important area of concern in the fish processing industry is the application of appropriate fish handling practices in order to maintain or improve the quality of the catch and minimize wastage.

In an effort to meet this goal, the government, through the Bureau of Fisheries and Aquatic Resources and other research agencies has conducted studies and implemented programs geared towards the improvement and development of the fish processing industry.

Ballo, Camu, Abella and Guevara, (1989) studied the handling and transport of live mud crab, *Scylla serrata* Forskal. Abella, Repito and Olavides (1989) studied the handling and transport of live grouper *Epinephelus tauvina*. The acceptability and shelf-life of frozen cooked mussel meat was studied by Ballo, Ragasa, Abella and Guevara (1989). Studies on handling, transport and depuration of green bay mussel *Mytilus smaragdinus* was conducted by Guevara, Abella, Canonizado, and Ballo, (1978).

The Bureau of Fisheries and Aquatic Resources has also introduced the use of high density polyethylene (HDPE) plastic containers in the handling and transport of fish and fishery products, particularly of aquaculture products. Today, the HDPE containers and similar types of plastic containers are widely used in the fish processing plants and their use aboard a commercial fishing boat is a continuing subject for study.

Dumping the catch on floors at the landing sites still is a common practice resulting in serious losses in quality. Physical damages and bacterial contamination become inevitable and considering the great loss both in quality and value, the use of fish sorting trays was also introduced. Because of this, sorting the fish has become more convenient and the fish are being handled in a more hygienic manner. However, as the trays are prone to loss and some fish traders consider them as an additional investment cost, there is a need for a more extensive demonstration of the use of the fish sorting trays in order to make the fish traders and handlers realize their relative advantages.

Manufacture Of Value-Added Products

The excellent dietary quality of fish and its relatively high economic value have long been recognized. Presently, the demand of convenience products has stimulated awareness of the manufacturers to develop value-added products like IQF, battered/breaded stir-fried, ready-to-cook convenience foods. These products suit the consumers' need for innovations in food taste and appearance. This is one innovation in the fish processing industry which a local manufacturer has

recently ventured into after extensive research in product development. Among the value-added products that the country is now exporting are shrimp dumpling (*Ha-kiaw*), shrimp *shu-mai*, nuggets made from shrimp, cuttlefish and white-meat fish, patties, breaded shrimps and *tempura*.

Comminuted or fish jelly products such as fishballs, fishburger, fish sausage, and *chikuwa* are likewise produced.

Seaweeds Processing

The seaweed industry is currently earning some ₱900 million (US \$45 million) a year. Presently, there are two big manufacturing companies engaged in the processing of *Eucheuma* spp. into dried powder form for export. *Gracilaria* spp. and *Gelidium* spp. are also processed into agar.

Drying of seaweeds is done in most of the production areas. The dried seaweeds are then collected and are sold to the processing plants for further processing. Because of the financial opportunities, prospects for creating employment and vast income potential, the promotion and culture of seaweeds is currently being encouraged.

The country has now a new seaweed processing plant located in Zamboanga which is the only one in the country that produces a high value culture media from agar.

Infrastructure And Laboratory Support Services

The Bureau of Fisheries has also established the following aquaculture demonstration centers that provide facilities and support services to the industry. These aquaculture centers located in the different parts of the country are now under the direct supervision of the Department of Agriculture.

1. Pagbilao Brackishwater Aquaculture Demonstrations and Training Center, Pagbilao, Quezon.
2. Butong Fish Farm and Experimental Station, Taal, Butong Batangas.
3. Tanay Research Laboratory Station, Tanay, Rizal.
4. National Freshwater Fisheries Center. Munoz, Nueva Ecija.
5. Bohol Aquaculture Development and Training Center, Bohol, Cebu.
6. Lala Demonstration and Training Center, Lala, Lanao del Norte.
7. The BFAR-IDRC Fish Health Laboratory. This laboratory conducts fish disease diagnosis, prevention and control, parasitological examination, biological examination and water quality analysis to ensure that high quality fish and disease-free fishery products are produced.
8. The BFAR Post Harvest Technology Division Laboratory. This laboratory conducts studies on fish handling, processing, product development, chemical and microbiological examination of fish and fishery products for quality assurance.
9. The National Commercial Fisheries Development Center (NCFDC) formerly the Fisherman's Training Center, Naval Base, Sangley Point, Cavite City. This was established to provide a common base for development and upgrading the manpower needs of the marine fishing industry. The center provides laboratory facilities for the development and testing of improved fishing technologies and design of appropriate curriculum for effective technology transfer of fishing technology concepts, principles and techniques. Fish handling is one of the major courses offered to fishermen, fish handlers, fishery instructors, and extension officers in order to disseminate proper fish handling practices.

10. **The (BFMC) Bayawan Fishermen's Marketing Cooperative, Inc.**

Located in Negros Occidental, this cooperative has created a marketing alternative which works to the advantage of the local fishermen, and fish processors and which has enhanced the involvement of women in development. The fish processing facility is equipped with a smokehouse, blast freezer, sizing machine, block-ice machine, refrigerated containers, fish boxes and other materials which are needed by the local industry.

In addition, the Philippine Fish Development Authority has established fishing ports and fish processing complexes in most of the fishing regions of the country. These are briefly described below.

11. **The Navotas Fishing Port Complex (NFPC)** located at Navotas, Metro Manila is the first and largest fishing port in the country and in Southeast Asia. The port accounts for about 40% of total commercial fish landings in the country and supplies about 80% of the total fish needs of Metro Manila. An average of 600 mt of fish is traded nightly. The flow of catch landed at NFDC is shown in Fig. 1, and the distribution of fish landed is shown in Table 6.

Table 6. Distribution of fish landed at Navotas Fishing Port Complex (NFPC).

% of Catch	Distribution
50	Wet market, Manila
30	Fish processors
15	Provincial markets
1	Fish meal production
4	Fish smokers/dryers

Source : (King, 1988)

12. **The Iloilo Fishing Port and Processing Complex** also provides facilities for processing cuttlefish, shrimps and prawns and boneless milkfish, fish fillets and other exportable species.

13. **A similar operation** takes place at the Zamboanga Fishing Port and Processing Complex located at Sanggali, Zamboanga City. Squid balls, shrimps and prawns, cuttlefish and fish fillets are processed here. Other fishery ports are also located at Mercedes Camarines Norte, Camaligan, Naga City, General Santos City and at many other small fishery ports in strategic locations of the country.

These facilities help improve the quality of the catch and maximize its utilization by minimizing transport costs and quality losses.

Problems And Needs Of The Industry

Like any other food processing industries, the fish processing industry is not free of problems. The Philippines is still beset by the following difficulties :

Insufficient Supply Of High Quality Raw Materials

Despite being a fish producing country, the Philippines has insufficient raw materials of high quality. This can be traced to the fact that only the high-value exportable species receive the highest degree of attention from catch to distribution. Losses of approximately 25% to 30% of the total catch are incurred due to poor handling practices. The problems include lack of quality-consciousness among fishermen and non-hygienic and sanitary conditions at landing sites and markets. As a result, other more serious problems crop up such as inferior quality in some fishery products. This include mould growth and insect infestation during storage of dried and smoked products, bacterial spoilage, reddening and souring of cured fish, contamination of fishery products and low yield in canned tuna products due to poor quality raw materials. Inevitably, an insufficient supply of

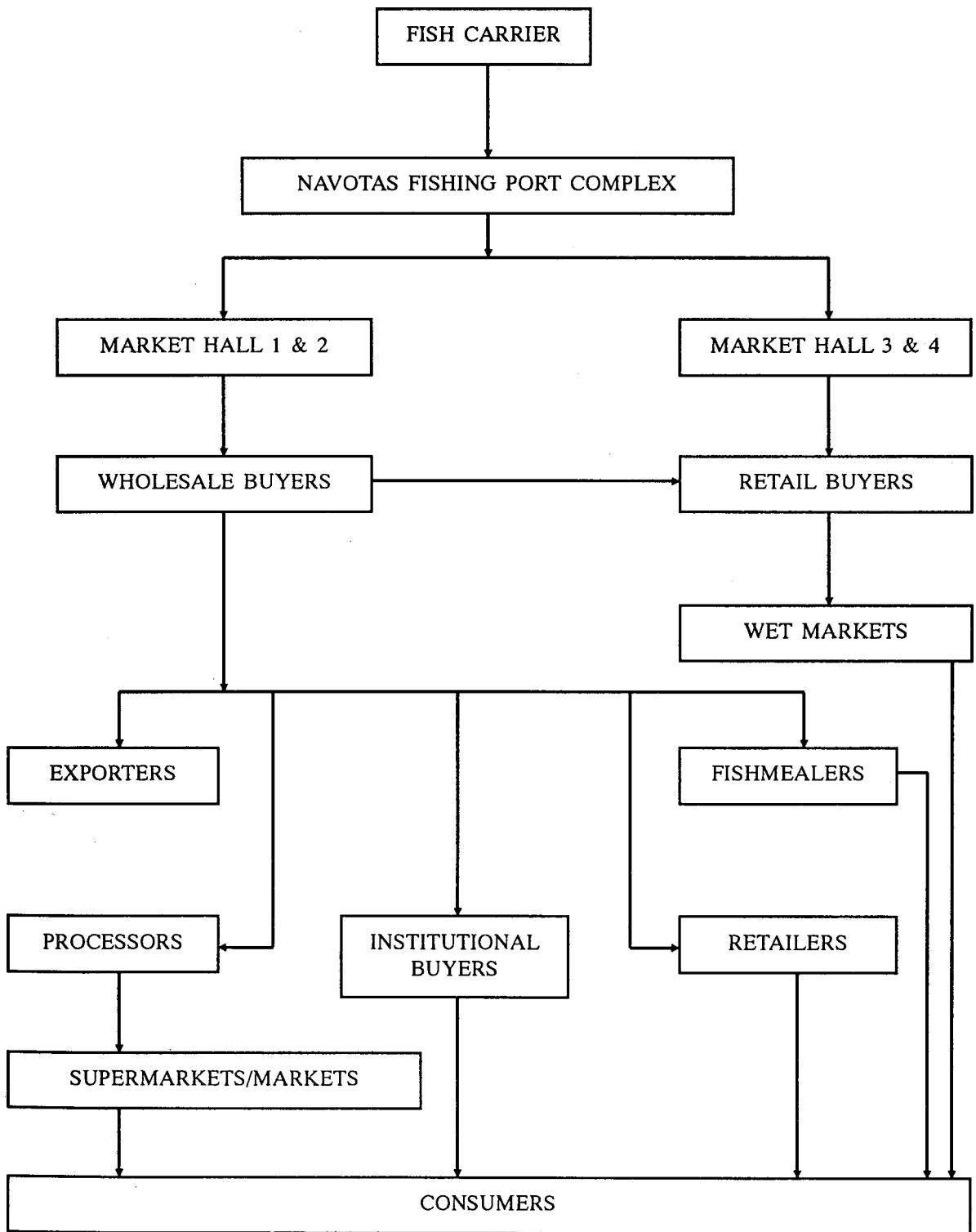


Fig. 1. Flow of catch landed at Navotas Fishing Port Complex, Metro Manila area.

high-quality raw material leads to reduced product yield, both in volume and in value. Conversely, as a general rule, high quality raw materials give high-quality finished products and they fetch better price.

Inadequate Supply Of Ice In Many Fish Producing Areas

While ice is considered to be the most effective means of preserving the catch especially in a tropical country like the Philippines, a lack of ice, due to high costs, particularly in remote fishing villages, is often the primary cause of poor quality in the catch, if not outright spoilage. In addition, the absence of ice plants and cold storage and transport facilities aggravates the situation. Consequently, in times of glut, some fishermen resort either to selling their catch at very low prices or preserving them by curing. Therefore, there is a need to build new plants in some regions and to rehabilitate existing plants and cold storage facilities.

Limited Capital Among Small And Medium Scale Operators Hinder Technology Transfer/Acceptance

Evidently, only the large-scale fish processors can afford to provide their own quality control facilities and to hire adequately trained manpower to monitor their operations for quality assurance. These are the processors that cater to the needs of the export market. They can afford to adopt new techniques, and purchase new equipment to improve and expand their product range. Unlike them, the lowly, small and medium scale processors of cured fish products are constrained by capital. As a result, opportunities for further expansion and improvement and adoption of new technologies are often not taken up.

Inadequate Infrastructure Facilities

Additional infrastructure facilities like the fishing port and processing complexes in Iloilo, Zamboanga and other fish processing areas have

enhanced the distribution and marketing of the catch. Such facilities are needed to achieve distribution of better grade catch and to promote the country's export products. However, these facilities are still inadequate to accommodate the landings nationwide. Similarly infrastructure such as farm-to-market roads, and new or rehabilitated ice plants and cold storage facilities are absolutely necessary.

The Need For Effective And Extensive Technology Transfer Activities

The severe problems in the industry resulting from poor handling practices, hygiene and sanitation, poor product quality and other causes can be improved by an effective and extensive technology transfer mechanism.

Lack Of Standardized Procedure For Traditional Products

This results in non-uniform product quality, which limits their sale to domestic market only. There is a need to develop standards and codes of practice for processing traditional products.

Inadequate Fish Marketing Information For Information And Services

Inadequate fish marketing information and services, working together with inadequate fish supplies (which was discussed earlier), often create great differences in fish prices in some parts of the country.

Summary And Recommendations

The most important roles that the fish processing industry plays in socio-economic development are to provide for adequate food and nutritional needs of the people, the creation of employment and the building of trade relationships between nations through exports.

Intensive efforts have been made to increase the volume and value of raw materials and finished products. Product research and development

studies have been carried out on the utilization of available resources in order to minimize wastage and optimize utilization of resources. Traditional fish processing techniques are still practiced widely and new techniques are slowly finding acceptance in the commercial level. Considering the growing demand for convenience food items and value-added products and innovation in food processing, new products and new markets are not far from being established.

In spite of the many problems that the industry is currently facing it has shown considerable improvement and development over the past years. In order for the industry to survive and to realize its goals it will need strong support from both the government and the private sector.

In response to the various problems and needs of the industry, the following steps are strongly recommended :

1. Implementing a massive extension service program on good fish handling practices, quality-consciousness and good manufacturing practices in the fish processing industry for quality assurance and for effective and immediate transfer of technology.
2. Priority for the establishment of infrastructure facilities and the rehabilitation of existing ones in the fish producing areas of the country. This will help regulate the supply and distribution of catch while assuring better quality raw materials at reasonable costs to the consuming public.
3. Providing fish inspection services and trained fisheries extension service specialists, in the fish producing areas to render technical and advisory assistance on matters pertaining to fish quality control, processing and utilization.
4. Expanding and strengthening existing fish processing and quality control laboratories by providing additional equipment/machineries in order to make their services more responsive to the needs of the industry.

There is a need to establish more fish inspection and quality control laboratories in the regions.

5. Encouraging and supporting basic and applied research on the efficient utilization of indigenous resources, especially those with export potential, and the development of new high-value products and appropriate technologies for increased productivity.
6. Implementing and promoting product development activities with income generating potential.
7. Developing a directory of fish processing plants and products. This could be used to determine the future development and improvement needs of the industry, to identify problem areas and solutions. The directory would also serve as a reference resource for researchers, development planners, and the industry.

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Discussion

The meeting noted the growth of the fish product industry in the Philippines. Responding to a question about the source of surimi being used for surimi-based products, Miss Camu said that the surimi are produced locally.

Responding to the observation that there was a lack of standards for traditional products in the Philippines, and asked whether there was any indication from the small-scale industry that such standards are required, Miss Camu said that there had been no such signals from the industry but she felt that local consumers would benefit from such standards.