

Status and Development of the Fish Processing Industry in Malaysia

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Abstract

The main emphasis of the National Agriculture Policy is to increase food production. At the same time, the importance of managing the fishery resources on a sustainable basis is fully recognized. In the fisheries sector, the new Seventh Malaysian Plan stresses even further on achieving this objective via increasing efforts in off-shore fishing, aquaculture (essentially seawater cage culture) and downstream value-added activities, while at the same time reducing aquatic environmental degradation. This paper looks at the fishery resources, market outlook and consumption trends.

This paper also outlines trends and developments in the fish processing industry in Malaysia and includes research conducted by government organizations, research institutions and institutions of higher learning in the country. Emphasis will be given to the development and improvement of traditional products for wider acceptance, surimi and surimi-based products and product development from aquaculture produce. This involves the introduction of technological know-how by understanding the basic processes in an effort to upgrade the quality of the fishery products processed in the country.

The increasing consumer's demand for safe and high quality food products requires a concerted effort on the part of the food producers and R & D authorities to incorporate good quality management in food production. The fish processing industry is no exception. Priority settings in R & D with sound quality management are discussed.

Introduction

Food is vital to the survival of mankind. With the ever increasing population of the world, the demand for more food becomes critical. The industry itself is growing at a rapid rate. In Malaysia, it

contributes significantly to the gross national product of the country, while providing the much needed employment opportunity for the population.

New technologies for better food production and processing are continually being introduced. To be competitive in the international markets, the food industry must keep abreast of any new developments in the fields. In the fishery sector, the post-harvest technology or rather the fish processing technology, provides a means and opportunity to maximize utilization and minimize losses of available resources.

With an increasingly complex scenario on managing the fisheries resources on a sustainable basis, R & D in fish processing emphasized on upgrading the production and development of new products. In this regard, MARDI has embarked on extensive research in the areas of development and improvement of traditional products, surimi and surimi-based products, and utilization of aquaculture produce (Wan Rahimah, 1995). However, commercialization of such products by the private sector has been rather slow as compared to other economic generating industries.

The demand for fresh and safe seafood has been high at all times, both locally and internationally. The present consumers are more conscious about food quality and safety. In response, regulations are made more stringent to ensure food safety and to facilitate fair trading. International trade has become more competitive. All these have put pressure on the producer to increase product quality and safety in a cost-effective manner. The government has an obligation to assist the industry in facing such challenges. Given a limited labour force and having to compete with other more attractive economic generating industries, the fish processing sector is now facing labour constraints. Again, this would call for concerted efforts by both the government and private sectors to address the situation, especially in formulating R & D priorities in areas of immediate needs.

Industry Analysis

Fish and fishery products will continue to form an important component of the Malaysian diet. At present, fish constitutes about 60-70% of the national animal protein intake with *per capita* consumption of about 37 kg per annum (Ibrahim, 1994). The rate of demand is expected to increase in the future not only because of the increasing population, but also because the population (lately quoted at close to 20 million people) is becoming increasingly conscious of fish and fishery products as health food items.

In 1994, fish production in Malaysia accounted for about 1.2 million tonnes valued at RM 2.99 billion and this has contributed about 1.61% to the national GDP. More than 90.2% of the total fish

production were from the capture fisheries, whereas aquaculture contributed close to 9.6%, and the inland fisheries registered at 0.2% (Department of Fisheries, 1994). Export figures in the same year, amounted to RM 865.9 million whereas import was at RM 808.1 million; thus giving a trade surplus of merely RM 58 million. This was far below the figures registered in previous years, as indicated in Table 1.

The fishery sector also supports direct employment to 79,802 fishermen and 18,143 aquaculturists, giving a total of 97,945 persons employed directly in the fisheries industry. This constituted about 1.29 % of the labour force in the country. Indirect employment through fishery-related activities is too numerous to consider, but on the whole contributed a significant role in the development of the fishery's industry.

Table 1. Fisheries trade of Malaysia (1987-1994).

Year	Export (RM million)	Import (RM million)	Surplus (RM million)
1987	445	353	92
1988	508	384	124
1989	577	456	121
1990	630	405	225
1991	740	480	260
1992	765	633	132
1993	801	691	110
1994	866	808	58

Source: Department of Fisheries, Malaysia

Fishery Trade and Consumption

In terms of value, Malaysia is a net exporter of fish and fishery products. However, in terms of quantity, the country is a net importer. The strong economic performance and improved health conditions has somewhat influenced the increase in population, with bigger old-age and young infant groups in addition to the increasing size of the youth group. This had also resulted in an increase in fish consumption as the main animal protein source. Taking into account the increasing fish landings annually, both from capture fishery as well as aquaculture, Table 1 shows that, while there were substantial increase in exports, there was also a big leap in the import figure from 1993 to 1994. Possible reasons include the following:

a. An overall increase in household income has influenced the eating preference of an individual family unit. Seafood restaurants are more frequently visited either as a family function or as an organized group function. The demand for good quality fish has in fact

increased together with an increase in the demand for special delicacies that are of foreign origins. In effect, more Grade I and II fish are being sought after. At the same time, the demand for Grade III fishes maintained a slower momentum of growth, especially for the lower income-group.

- b. With the rapid development in industrialization, the influx of foreign workers, to meet the urgent requirement in labour force, has also increased. To date, it has probably been estimated to be more than two million. Fish consumption trend, especially in the urban areas, was mostly affected by this increase in foreign workers, with more demand for Grade III fishes, aquaculture and freshwater species.
- c. The tourism industry has spurred the seafood consumption substantially. Organized group functions for foreign tourists are more visible in big cities. This has prompted the increase in the number of seafood restaurant chain, and at the same time developed 'foreign taste' in the menus provided. More Grade I and II, and imported items were being sought after.

- d. An increased emphasis on aquaculture has resulted in an increase in the demand for aquaculture feed supply. More fishery resources were being diverted into fishmeal production and more import of fishmeal that is unfit for human consumption was observed. Consequently, the fishery trade observed more import and less export.
- e. Market trend and consumption have also triggered fish processors to increase production and introduce product varieties in the market.

Nevertheless, it seemed that effort is still short of meeting the increasing demand. Therefore, there is a need to double up the present effort.

Traditionally, we have been exporting Grade I and some Grade II, while importing Grade III fish for the mass majority. This was done in accordance with the preferential taste and demand. However, from the above scenario, this trend has lately changed somewhat. The following tables provide some indication of the fishery trade in Malaysia.

Table 2. Fish exports to various countries, 1993 and 1994.

Country	1993		1994		Change (%)
	Quantity (Tonnes)	Percent (%)	Quantity (Tonnes)	Percent (%)	
Thailand	63,751	30.9	77,526	31.4	+ 21.6
Japan	26,341	12.8	55,317	22.4	+110.0
Singapore	71,088	34.5	54,108	21.9	- 23.9
Italy	2,177	1.1	17,812	7.2	+ 718.2
Australia	7,204	3.5	7,652	3.1	+ 6.2
U.S.A	5,944	2.9	5,285	2.2	- 11.1
Hong Kong	3,883	1.9	4,751	1.9	+ 22.4
United Kingdom	2,351	1.1	3,608	1.5	+ 53.5
Others	23,450	11.3	20,664	8.4	- 11.9
Total	206,189	100.0	246,723	100.0	+ 19.7

Source : Department of Fisheries, Malaysia

In 1994, the bulk of the fishery commodities was exported to Thailand (31.4%), Japan (22.4%) and Singapore (21.9%); as indicated in Table 2. In terms of export value, however, Japan still remained the top

importer (31%), followed by Singapore (14.4%), Australia (8.5%) and U.S.A at 7.6%; as indicated in Table 3.

Table 3. Value of fish exports to various countries, 1993 and 1994.

Country	1993		1994		Change (%)
	Value (RM million)	Percent (%)	Value (RM million)	Percent (%)	
Japan	264.9	33.1	269.3	31.1	+ 1.7
Singapore	132.3	16.5	124.8	14.4	- 5.7
Australia	59.0	7.4	73.9	8.5	+ 25.3
U.S.A	61.6	7.7	65.8	7.6	+ 6.8
Hong Kong	50.7	6.3	54.5	6.3	+ 7.5
Italy	27.7	3.4	40.5	4.7	+ 46.2
Spain	27.0	3.4	35.5	4.1	+ 31.5
Thailand	27.8	3.5	35.1	4.1	+ 26.3
Others	149.7	18.7	166.5	19.2	+ 11.2
Total	800.7	100.0	865.9	100.0	+ 8.1

Source : Department of Fisheries, Malaysia

The difference in export quantity and value to the various countries suggested that export to countries like Japan, U.S.A and other European countries mainly of fishery commodity of higher value, whereas the export to countries like Thailand

consisted mainly of cheaper fishery commodities. As evident from Table 4, Malaysia exported high value fishery commodities like fresh and frozen prawns, while importing lower value fishery commodities like fresh, chilled and frozen fish in

order to obtain foreign exchange and country to meet the domestic demand.

Tables 5 and 6 indicate that there was a significant amount of trade in fishmeal which is unfit for human consumption, between 1993 and

1994. All in, about more than 70% increase was observed. Obviously, this increase could be due to the increase in aquaculture activities throughout the period.

Table 4. Composition of export and import of fish and fish products, 1994.

Composition	Export		Import	
	Quantity (Tonnes)	Value (RM)	Quantity (Tonnes)	Value (RM)
Live fish	6,115.4	57,684,339	1,122.8	56,832,420
Fish, fresh or chilled	21,815.9	51,430,606	132,234.9	277,216,113
Frozen fish	26,590.7	36,423,170	43,962.0	137,982,070
Shrimps, prawns, lobsters fresh, frozen	14,148.3	269,685,889	24,146.2	119,605,944
Squid, cuttlefish, octopus & other mollusc, fresh, chilled or frozen	127,008.4	76,487,488	2,141.5	6,489,956
Fish prepared or preserved, n.e.s: caviar and other caviar substitutes prepared from fish eggs	24,414.1	190,121,205	12,916.0	61,473,620
Crustaceans, mollusc and other aquatic invertebrates, prepared or preserved, n.e.s	11,955.9	130,067,635	6,437.1	27,087,440
Fishmeal unfit for human consumption	4,273.8	4,514,571	25,935.2	34,990,746
Miscellaneous	10,400.4	49,511,946	26,983.8	86,456,769
Total	246,722.9	865,926,849	275,879.5	808,135,078

Source : Department of Fisheries, Malaysia

Table 5. Composition of export of fishery commodities from Malaysia, 1993 and 1994.

Composition	Export Quantity (Tonnes)		Change (%)
	1993	1994	
Live Fish	6,325.92	6,115.36	- 3.3
Fish, Fresh or Chilled	22,309.86	21,815.89	- 2.2
Frozen Fish	19,216.15	26,590.71	+ 38.4
Shrimps, Prawns, lobsters fresh, frozen	12,918.96	14,148.35	+ 9.5
Squid, cuttlefish, octopus & other mollusc, fresh, chilled or frozen	81,569.04	127,008.04	+ 55.7
Fish prepared or preserved, n.e.s: caviar and other caviar substitutes prepared from fish eggs	32,544.50	24,414.12	- 25.0
Crustaceans, Mollusc and other aquatic invertebrates, prepared or preserved, n.e.s	11,542.89	11,955.93	+ 3.6
Fishmeal unfit for human consumption	6,895.76	4,273.76	- 38.0
Miscellaneous	12,866.15	10,400.39	- 19.2
Total	206,189.23	246,722.55	+ 19.7

Source : Department of Fisheries, Malaysia

Table 5. Composition of import of fishery commodities from Malaysia, 1993 and 1994.

Composition	Import Quantity (Tonnes)		Change (%)
	1993	1994	
Live Fish	1,042.9	1,122.8	+ 7.7
Fish, Fresh or Chilled	132,514.4	132,234.9	- 0.2
Frozen Fish	43,887.6	43,962.0	+ 0.2
Shrimps, Prawns, lobsters fresh, frozen	23,365.3	24,146.2	+ 3.3
Squid, cuttlefish, octopus & other mollusc, fresh, chilled or frozen	1,334.2	2,141.5	+ 60.5
Fish prepared or preserved, n.e.s: caviar and other caviar substitutes prepared from fish eggs	10,681.2	12,916.0	+ 20.9
Crustaceans, Mollusc and other aquatic invertebrates, prepared or preserved, n.e.s	4,878.3	6,437.1	+ 32.0
Fishmeal unfit for human consumption	19,476.7	25,935.2	+ 33.2
Miscellaneous	24,463.0	26,983.8	+ 10.3
Total	261,630.6	275,879.5	+ 5.4

Source : Department of Fisheries, Malaysia

On the whole, consumption of fish has increased substantially both for direct human needs as well as for aquaculture. Increase efforts in aquaculture for an increase in fish production, to some extent, affect the availability of raw materials for value-added fish processing and also for fresh consumption. With the present trend in fish consumption and fish production, Malaysia would still be a net importer as well as exporter of other fish and fishery commodities at the turn of the century.

R & D in Product Development

In recent years research in selected areas of the fishery processing sector was conducted by research organizations, government agencies and institutions of higher learning in the country. Research is essential in upgrading the quality level of products processed by small and medium scale processors located throughout the country.

1. Improvement of Traditional Products

A lot of effort has been made with a view to upgrade the status and acceptability of fish-based traditional products in Malaysia. With the presence of traditional products such as snacks, fermented and

dried and/or salted products, efforts are directed towards the use of appropriate technology to control the processes involved.

In the processing of fish crackers various critical control points have been identified and selected technologies have been adapted for use at the processor's level (Wan Rahimah, 1996). This includes the introduction of the mechanical stuffer for uniformity of shape and the use of mechanical dryers for better control of the drying process. Recently, there is the emergence of ready-to-eat fish crackers that are processed in a slightly different manner from the norm. Many small-scale processors have closed down their activities in recent years due to shortage of traditional raw materials and a simultaneous increase in cost of production.

In the case of dried salted fish, efforts are being undertaken by various government agencies towards more organized activities at the processor's level so that some control during salting and drying is achieved. This would contribute towards overall quality improvement of the products.

An effort has also been made by MARDI to improve the production of *sesar unjur* a traditional dried product of Sarawak made from prawns by the use of a mechanical drier for better control of the drying process (Wan Johari, 1994).

2. Surimi and Surimi-Based Products

Even though surimi-based products have been introduced into the country decades ago, it was only a few years back that the processing was established in the country in spite of the availability of technology. This is attributed mainly to the rapid growth of small-scale processors of surimi-based products who previously were highly dependent on fresh raw material or surimi imported from neighbouring countries. Presently, there are three big processors of surimi in the country located in Peninsular Malaysia and two in East Malaysia. These processors are located throughout the country, mainly in the vicinity of urban dwellings.

Surimi and surimi-based production makes up 6.4 percent of total processed products for 1994 (Department of Fisheries, 1994). Some studies have been conducted on the suitability of local raw materials for surimi production, their gel strength and shelf life (Wan Rahimah *et. al.*, 1994). Che Rohani and Indon (1994) have developed high protein and low fat products which range from steamed, boiled, fried and breaded products thus paving the way for more varied products on the market.

3. Products From Aquaculture Produce

With the expected increase in aquaculture production to 200,000 tonnes in the year 2020 under the National Agricultural Policy, efforts have been concentrated on better utilization of aquaculture species. Presently, the uses of freshwater and brackish water species are not fully exploited and these are mainly in the form of dried, salted and fermented products.

Research on the utilization of aquaculture produce included the development of surimi, breaded and smoked products. Red tilapia and grass carp have been found to yield high grade surimi comparable to threadfin bream and bigeye snapper (Che Rohani *et. al.*, 1994). Breaded tilapia has also been developed (Jamilah, 1994). Catfish, tilapia, grasscarp and *sultan* fish have been found to yield quality smoked products using *meranti* sawdust or wood shavings as the smoke source.

The above research activities show that the scope for developing quality products using appropriate technology to complement the rapid growth of the aquaculture industry in the country is tremendous.

Constraints Faced by the Fish Processing Industry

There are at present, more than sixty fish processing industries in Malaysia (Mohd. Khairuddin, *pers. comm.*) and mostly associated with the

Federation of Food Manufacturers of Malaysia. However very few are in fact associated with the ASEAN Fishery Federation - Malaysian Chapter. There are probably more than double this figure as there are fish processors operating at the cottage industry level. Besides the fishmeal processing industries, the big players are mainly canneries, frozen fish processors and surimi-based industries. Others include the fish cracker industry, salted-dried fish, fermented products and boiled products.

1. Raw Materials

There is just not enough suitable raw materials with regular supply to meet the need of the industries. As such, competition for limited raw materials always result in a higher sales price for raw materials. This situation is not conducive to the small operators and even some big players have also expressed their grievances. As such, supplies from aquaculture are very much in demand.

2. Manpower

Due to the shortage of manpower, the use of foreign workers is seen as just a short term measure. Upgrading the technology from labour-intensive to mechanization would seem to be the logical move. But such move would entail high initial capital cost. This is where the management would have to decide the priorities for sustainable operation, taking into consideration the possible scale of operation.

3. Processing Technology and Quality/Safety Compliance

There are still a lot of venues for improvement since the rate of processing technology development is very much faster than the adoption of such technology by the industry. Obviously the fish processing industry has improved, so as to keep up with the keen competition in this arena, but generally, at a slower pace as compared to other food processing industries. Faced with stricter rules and regulations pertaining to food safety and quality, the fish processing industry has no choice but to keep pace with the latest technology available and adapt wherever appropriate. GMP, HACCP and possibly ISO 9000 series or even ISO 14000 will have to be considered as part of the quality management program, to ensure product integrity. Perhaps, for big operators, implementing such a quality management program would not be that difficult. But for small operators, government intervention is really a necessity. Towards this end, government agencies are actively involved in promoting quality management practices through

training courses, preparation of audio-visual aids, through extension services and also through collaborative R & D efforts.

Future Developments

The National Agricultural Policy placed a high priority in an effort to increase food production. The 7th Malaysian Plan (1996-2000) further emphasized this aspect by defining the priority areas. In view of the increase in fish utilization, the thrust areas in fisheries post-harvest sector, amongst others, include :

- a. Marine Biotechnology work encompassing Biodiversity, Biomining/Marine Natural Products, Bioremediation and Biomonitoring, and Mariculture Biotechnology.
- b. Development of standards and quality assurance programs in the production of wholesome, *HALAL*, safe and healthy aquatic produce.
- c. Product development targeting at improving traditional products, utilization of by-catch and reducing post-harvest losses through maximizing fish utilization.

Efforts to increase fish production through aquaculture essentially in off-shore cage culture, joint-venture in deep-sea operation and greater impetus in R & D in down-stream activities are very much encouraged. The industry is also encouraged to move from labour intensive production systems to capital intensive and to use of non-traditional labour force. The private sectors' participation in Science and Technology development together with research organizations and universities is very much needed to accelerate further the phase of development.

Yu (1995) had rightly outlined the direction of research for fish processing industry. In surimi and surimi-based products, these include studies on the use of new species, salt substitution for low salt surimi and the substitution for MSG (Monosodium glutamate). The use of lactic acid bacteria (LAB) and the application of enzymes in biopreservation of seafood, has attracted much interest of late. Concern on aquatic environmental pollution has generated interest on effort in evaluating treatments for waste generated from processing, refrigeration and packaging. Perhaps, academia and related research institutions would undertake further research in this regard.

In terms of ensuring food safety and quality, the Department of Fisheries has embarked on setting up an FIQC (Fish Inspection and Quality Control) mechanism to assist the Health Ministry to enforce Food Regulation 1985 essentially for fish and fishery products. New Food Import and Export Regulations are also being

drafted to assist the food industry in fair trading and complying with quality and safety standards. Sanitation and hygiene as prerequisites for HACCP and the importance of implementing HACCP is greatly emphasized in the new draft. The draft which is still in the evaluation stage, is being perused by the relevant agencies and government authorities, before being tabled in the Cabinet. In product development, MARDI would still be the leading agency, with more active participation from the private sector and academia anticipated.

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Discussion

With regards to the procedure used in Malaysia for grading fish as reported in the paper, the representative from Malaysia clarified that grading was made according to species, so that low-priced fish were graded lower than high priced fish.