# Present Status and Perspective on the Implementation of HACCP in Malaysian Fish Processing Industries

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## ■ ABSTRACT

*The fisheries sector in Malaysia plays an important role with regards to foreign exchange, generation of income, employment and for the supply of food protein to the country. Basically, the fish processing industries in Malaysia can be divided into traditional, small and medium scale and commercial. The processing industry is dominated by the small and medium scale enterprises (SMES). HACCP system was actually first introduced and adopted by low acid canners in Malaysia in the early 90's. The interest was further compounded by the mandatory requirements for HACCP certification on seafood imposed by EU in 1996 and US in December, 1997. The implementation of HACCP is presently on a voluntary basis in Malaysia. Presently there is no single government authority responsible for quality and safety control of fish and fish products. The role is fragmented to various* agencies but lately there are three government agencies *that advocate and are actively involved in the implementation of HACCP i.e. the Ministry of Health, Department of Fisheries and Department of Veterinary Services. Imple-mentation of HACCP is at the initial stage and much commitment from the government agencies and also from the private sector is needed. Further to this development, lately all the agencies concerned have put a lot effort to standardise and come up with a standard HACCP for Malaysian fish products.*

## ■ Background to the Fish Processing Industries in Malaysia

Basically, the fisheries sector in Malaysia can be classified into marine capture fisheries, aquaculture and inland fisheries. Landings from the marine capture fisheries is about 1,168,973 tonnes or 91% of total production in 1997 while production from aquaculture and inland fisheries was 107,984 tonnes or 8.4% of total production.

In terms of value, marine capture fisheries accounted for 86% of total value of about RM3.68 billion while contribution from aquaculture was 14% or about RM609.04 million. In Malaysia, marine capture fisheries comprises of the inshore fisheries and deep sea fisheries. The production from the inshore fisheries in 1997 was 1,037,887 tonnes and accounted for 88.8% of total marine landings. Deep sea fisheries contributed 11.21% of total marine landings at 131,086 tonnes.

Malaysia has the potential and the necessary resources to further increase its fish supply to meet both domestic and export demand. This is considering the availability of fish resources in the Exclusive Economic Zone (EEZ) waters whereby the deep sea fishing industry can be further developed. The inshore fisheries contribution is sustained through prudent management program. Another advantage for Malaysia is the availability of suitable lands and water bodies for the further development of the aquaculture industry. It is anticipated that the contribution of aquaculture production to total national fish supply will increase from 11% in 1995 to more than 30% by the year 2010.

Under such favourable supply conditions the projected national production of fish is expected to increase from 1.24 million tonnes (1995) to 1.93 million tonnes by the year 2010. The increase in fish supply will provide vast opportunities for the development of the processing and downstream activities such as

production of feed and fish fry as well as the construction and repair of fishing vessels.

Malaysia is a net importer for fish and fish products mainly from Thailand, Japan and Singapore. In 1995, Malaysia imported about 260,568 tonnes of fish and fish products valued at RM828 million while exporting about 247,839 tonnes valued at RM892 million.

Fisheries sector also play an important role in the supply of raw materials to the fish processing industry. It is estimated that about 30% of the national fish production are being processed. The main products include chilled, frozen and canned fish, surimi and surimi-based products, dehydrated and fermented fish products.

It was estimated that in 1995, the total demand for fish products was about 810,000 tonnes. Out of the total national production, consumable supply was estimated at about 765,000 tonnes achieving 94% self -sufficiency level.

Demand for fish and fish products is expected to increase due to population growth, rise in per capita income, life style changes and the growing preference for fish consumption. The present per capita consumption is about 40 kg and is projected to be about 45 kg in the year 2000 and 60 kg in 2010. It is estimated that the total demand for fish and fish products in Malaysia by the year 2010 will be 1.6 million tonnes (Kamaruzaman and Lim, 1999).

At the international level, the demand for high value fresh fish products and processed products such as convenience fish products, fish oils, surimi, surimi-based reformulated fish products and fish protein concentrates is also expected to increase.

In terms of value, Malaysia is a net exporter of fish and fishery products. However the country is a net importer in terms of quantity.

## ■ Development of Fish Processing in Malaysia

Fish processing activities has been in existence in the country mainly as a traditional industry for own and local consumption. Basically, fish processing in Malaysia can be divided into traditional, small and medium scale and commercial. The processing industry is dominated by the small and medium scale enterprises (SMES) with capital assets of less than RM100,000. Most of the plants are small operations and located mainly in coastal areas, close to fish landing ports except for fish canning factories, surimi and surimi-based products, prawn/fish freezing plants which are situated inland. Products produced include salted-dried fish, fish crackers, shrimp paste, fermented fish/anchovies, fish satay, frozen squid/prawn/fish and fish meal for animal feed. Canned, frozen and surimi-based products are produced on a commercial scale aimed for export market. These factories are fully mechanized and have implemented quality control.

At present, there are more than sixty fish processing industries in Malaysia, which are registered and members of the Federation of Food Manufacturer of Malaysia (FFM) and few of them are also associated with the ASEAN Fishery Federation Malaysia. However the total figure may be more than what is shown here as many are operating at the cottage industry level.

In Malaysia, there is a growing trend to produce all kinds of ready-to-cook and ready-to-eat products for domestic market as well as for export. Traditionally, seafood consumption is high in Malaysia and some of the fishery products are still imported from neighbouring countries.

This is a good sign for the fish processing industry in Malaysia. The vision for the fish processing industry in years to come is to minimize the locally available resources and develop value-added products to meet the growing number of quality conscious consumer as substitutes for imported ones. Health, no (less) additives, convenience, safety, HALAL and ready to cook products are the preference.

The potential areas/products for future development in fish processing includes:—

(a) Minced fish meat (otoshimi) production
(b) Surimi and surimi — based products
(c) Battered & breaded fish products
(d) Freezing/cold storage/frozen products
(e) Fish cracker (by modified traditional methods)
(f) Dried products
(g) Fermented products/Fish sauce
(h) Fish paste
(i) Smoked shrimp
(j) Utilization of aquaculture produce — fillet, breaded fillet, frozen, MC Nugget
(k) Canned fish/products
(l) Pharmaceutical/nutriceutical — fish oil, O-mega 3, chitosan
(m) Fish gelatin

## ■ Development of Food Quality Management

The demand for fresh and safe seafood has increased both locally and internationally. Present consumers are more conscious about food quality and safety. The international trade has also become more competitive. With such increasing demand for fish and fish products, the challenges facing the fisheries industry in Malaysia is not only to increase production but also to achieve global needs in the international trade for safe and high quality food.

Today, the recognition of HACCP as the most effective means of managing food safety is increasing worldwide, and more countries both importing and producing are making HACCP mandatory. For instance, the European Union (EU), under the provision of various EU Directives have put HACCP as being mandatory for the export of fish and fish products to the EU countries since 1996, followed by the US in 18 December, 1997 under the Code of Federal Regulations. Other importing countries such as Australia, Japan, Thailand and Singapore are working towards enforcing of HACCP for imported fish and fishery products. Most Malaysian fish and fishery products are exported mainly to Japan, EU countries, USA, Singapore, Hong Kong and Thailand.

In this respect, the Malaysian Government has formulated the Third National Agricultural Policy (NAP 3), in which the main objectives for food products are:

(a) to ensure adequate and stable supply of quality, safe, nutritious and reasonable priced food to meet the needs of the nation; and

(b) to position Malaysia as a global player in selected food products.

In line with this, the Department of Fisheries Malaysia is moving towards this direction of strengthening competitiveness and liberalizing industry through enhancing the quality and safety of fish and fish products. These are also supported by the various provisions under the Fisheries Act 1985 which among others include the quality assurance system.

There are also provisions under The Food Act 1983 whereby the Ministry of Health (MOH) is given the power to enforce this Act. The Food Act 1983, among others is to protect the public against health hazards and fraud in the preparation, sale and use and for matters incidental thereto or connected therewith.

Lately, the Government of Malaysia has set priority for quality and safety control, and several measures are being taken especially to incorporate food safety aspects in the quality control system of fish and fish products. These could be seen as a leading step to realize a system which can equip the fish processing industry for global demands and local needs of HACCP.

## ■ Application of HACCP Programme

Implementation of HACCP is voluntary in Malaysia. However, the industry have to implement it in order to comply with the requirements of the importing countries. Fifty fish processing companies have already submitted their application for HACCP certificate. To date only twenty factories have been successfully certified by Ministry of Health (MOH) and the rest are at different stages of certification.

HACCP system was actually introduced and adopted by low acid canners in Malaysia in the 90's. The interest was compounded by the mandatory requirements for HACCP certification on seafood as imposed by EU in 1996 and US in late 1997. These developments have made it mandatory for food industry wishing to export to these countries to implement HACCP.

Presently in Malaysia there is no single government authority responsible for the quality and safety control at fish and fish products. The role is fragmented to various agencies namely, Department of Fisheries, Fisheries Development Board of Malaysia (LKIM), Malaysian Agricultural Research and Development Institute (MARDI), Ministry of Health (MOH) and the Standards and Industrial Research Institute of Malaysia (SIRIM). Each agency has different role to play, but not one agency is responsible for coordinating. Lately there are three government agencies that advocate and are actively involved in the implementation of HACCP i.e. the Ministry of Health, Department Of Fisheries and Department of Veterinary Services. The Ministry of Health has taken the lead to introduce the National HACCP Certification Scheme based on the CODEX Guidelines. All this agencies are required to standardise and come up with the standard HACCP for Malaysian fish products.

Currently, the Ministry of Health (MOH) have being given recognition by EU and lately by the US to issue the HACCP certificate whereas the Malaysian Agricultural Research and Development Institute (MARDI) is given the mandate to audit HACCP plans for fish processing in Malaysia.

With a view to help the fish processing industries, the Department of Fisheries has taken various steps to upgrade its current programmes to emphasise on HACCP. The programmes include giving HACCP awareness talk to small-scale fish processors and conducting training courses on HACCP. The Department is also building up its personnel capacity on quality and safety aspect. A Fish Inspection Quality Center (FIQC) will also be set up at an identified state to facilitate the program under the Eighth Malaysian Plan.

Along this line, the programmes implemented by the Department are as follows:—

## 1. Extension Programme

Under the Extension Programme, the Department provides technical training, seminars and talks on HACCP, Good Manufacturing Practices (GMP), Good Hygiene Practices (GHP), hygiene and sanitation and other safety related subjects to the various personnel from the industry and the fishermen. These include:

### (a) HACCP awareness course for the seafood Industry

This programme is aimed at the managerial level to create awareness and better understanding of the importance of HACCP implementation and has been carried out since 1998. So far about 8 programmes have been conducted which involved more than 253 managers and supervisors. The programme is conducted in collaboration with MARDI and the Ministry of Health.

### (b) Awareness of hygiene and sanitation for the small scale fish processing industry

This programme is targeted towards the small scale fish processors to provide a better understanding on hygiene and its principles in order for them to produce better quality and safe products. It is carried out by the State Fisheries Offices as part of their monthly extension programme with the collaboration of the Ministry of Health. Emphasis is given to Good Manufacturing Practices (GMP), Good Hygiene Practices (GHP), personal hygiene and the Food Act 1983. At the end of the course, the participants are also given typhoid injections, paid for by the Department.

### (c) Fish handling training programme for the fishermen

This programme is to educate fishermen on good fish handling practices with the objective of reducing post-harvest losses. The use of better fish handling technology such as refrigerated sea-water (RSW), proper and adequate icing and usage of insulated fish boxes are taught to the target group. Training on fish handling and inspection is being currently carried out at the Fisheries Training Institute at Chendering,Terengganu.

### (d) Training course on HACCP competencies

Specific HACCP training courses for various levels of workers were conducted by the Department of Fisheries. In this regard, the Department of Fisheries has designed a training course on HACCP competencies for quality supervisor and on-line workers who are involved directly in food production in the fish processing industry. The course on HACCP competencies is divided into two modules, which is based on the ASEAN-CANADA Fisheries Post-Harvest Technology Project (Phase II) training manual. The response to these courses is very encouraging and to date nine courses have been implemented for 180 quality supervisors from 40 fish processing companies.

## 2. Educational materials

With assistance from the ASEAN-CANADA Fisheries Post-Harvest Technology Project (Phase II) whereby Malaysia (Department of Fisheries) has been selected to be the Regional Center for Information Preparation and Dissemination of HACCP materials on various subjects for the ASEAN region. Materials produced include subjects on processing and hygiene for fish processing plants and Training Module of Hygiene for Fish Processing Plants (Module 1 to Module 4).

These materials are being widely used to assist in the extension programmes and as a guide to develop a quality control system for fish processing industry in the various ASEAN countries.

## 3. HACCP at source for fisheries sub-sector

With globalization and imposition of SPS through WTO, the principle of HACCP in fisheries sector is then applicable throughout the food chain from the primary

production to the final consumers — that is, on board fishing vessels, on aquaculture farm, fish landings, distribution to and from factories, transportation, wholesale markets, storage and at retail outlets.

It is important to note that primary products in fisheries may either come from marine fisheries (capture fisheries) or aquaculture (culture fisheries). In most instances the poor quality of raw material is the primary reason for end product to be categorized as decomposed. In most industries, improper handling and storage of both raw material as well as finished products further aggravated the poor quality of raw materials (Subasinghe, S., 1997).

Therefore, there is a need to have a HACCP at source programme that will ensure safety of products at the primary production level. There are two main HACCP at source plans being implement currently by the Department of Fisheries namely:

### (a) Monitoring programme for marine fisheries

The monitoring programme for marine fisheries is conducted by the Extension and Training Division with technical assistance from the Fisheries Research Institute. The aims of this programme is to ensure that fish caught from the sea is free from pollution, high quality and safe for consumption.

The programme involves collecting sample from various sites (landing jetty and fisheries waters), followed by laboratory work for analysis of the samples. In line with the significant requirement of HACCP at source, this programme is designed to conduct seven types of analysis, namely, bacterial contamination in shellfish, biotoxin content in fish and shellfish, histamine content in fish, plankton identification in water, heavy metal residues in fish and shellfish, pesticide residues in fish and shellfish and sensory evaluation for freshness of fish.

Thirty-three areas has been identified throughout Peninsular Malaysia (28 areas), Sarawak (4 areas) and Labuan (1 area). The areas in Sabah will be identified later under the jurisdiction of Sabah State Fisheries.

This programme has been carried out on a trial basis this year and will be fully implemented by year 2001 since the budget and allocation for these programme has already being approved under the Eighth Malaysian Plan.

### (b) Code of Practice (COP) For Aquaculture

Aquaculture products need special attention during both pre-harvest and post-harvest handling. The COP for Aquaculture is a non-binding document that is developed to achieve the main goals towards a sustainable development in aquaculture through caring for the environment and products safety and quality.

Four major areas have been outlined in the COP, as stated below:

(i) Site selection
(ii) Design and construction of farm
(iii) Management and post-harvest
(iv) Aspects on safety and quality.

Guidelines regarding hygiene and sanitation practices for the site-selection and the design and construction of farm have been documented. The importance of safety and quality are also provided in the guidelines for farm management (such as the control use of drug and chemical) and for post-harvest (such as proper handling of products and temperature control during storage).

In future, it is hoped that COP will be used fully by the fish farmers as guidelines in their aquaculture practice which is both beneficial for them and the country.

### 4. Complementary role with other Government agencies

The Department of Fisheries has actively participated in a number of committee under various agencies in relation to food quality and safety. Among others this include the HACCP committee, SPS committee For Food safety and CODEX committee. At present, the HACCP committee has come out with a draft for Malaysian HACCP standard.

## ■ Future Development

The National Agriculture Policy placed a high priority on efforts to increase food production. The 7th Malaysian plan (1996 - 2000) and the Industrial Master Plan 2 - 1MPZ (1996 - 2005) further emphasized this aspect by defining the priority areas.

In view of the increase in fish utilisation and strengthening of fish quality management system the main future plans are:

(1) Marine biotechnology work encompasses biodiversity, biomining/marine natural product,

bioremediation and biomonitoring and marine culture biotechnology. These will include processing of seaweed - based product, chitosan, functional food from fish (fish oil), reformulated fish product, fish gelatin, fish protein concentrate, and by-products from fish (skin leather and pet food).

(2) Product development targeting at improving traditional products, and their presentation.

(3) Utilization of by-catch by reducing post-harvest losses through maximizing fish utilization and improving fish handling practices.

(4) Effort in increasing fish production through aquaculture. Using aquaculture produce for value-added product.

(5) Emphasis on fully implementing HACCP programmes in the fish processing industry.

(6) To develop generic HACCP plans for marine products especially for small and medium scale processing.

(7) To develop generic HACCP plans for aquaculture products.

(8) Development of standard and quality assurance programme in the production of wholesome, HALAL, safe and healthy aquatic produce.

(9) To carry out field training in fish quality control and quality assurance program intended for plant manager, quality control supervisor and line worker involved in fish processing.

(10) To implement a massive extension service programme on HACCP, GHP and GMP in the fish processing plants for effective and immediate transfer of technology at the regional level.

However, for this industry to be sustainable and competitive there are certain issues/constraints that should be addressed, namely:

(1) Regular supply of raw materials.

(2) Assurance of good quality of raw materials.

(3) Labor shortage.

(4) Availability of skilled and unskilled workers.

(5) Awareness and commitment for HACCP implementation.

(6) Suitability of factory site.

(7) Availability of basic infrastructure for processing plant.

(8) Product development and promotion.

(9) Product presentation (packaging techniques).

(10) Existing factory not complying GMP/GHP/SSOP.

(11) Low technology in fish processing.

## Conclusion

Increasing fish production will be the utmost important agenda in the next decade. Nonetheless, this has to be done in a manner not at the expense of reducing the quality life of aquatic organisms. Aquaculture practices with strict quality management would provide an important source of reliable raw materials, an essential factor very much needed by the fish processing industry. Capture fisheries will still be maintained in a sustainable manner. Seafood quality and safety issues will be addressed in a more serious and orderly manner with the drafting of new regulations which would encompass quality management tools such as GMP, HACCP and ISO 9000; and with the full implementation of the Fish Health and Quality Assurance mechanism under the Department of Fisheries during the 7th Malaysian Plan, mechanization and high technology will gradually replace the existing practices. The government will continue improving infrastructure facilities to further strengthen the fish and fish products industry. With these positive indications, the fish processing industry in Malaysia can look forward to a challenging future with confidence.

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