

# **Proceedings of the 1st Regional Workshop on the Application of HACCP in the Fish Processing Industry in Southeast Asia**

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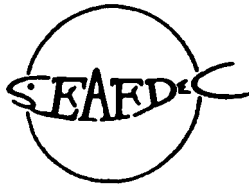
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**Southeast Asian Fisheries Development Center (SEAFDEC)**

in collaboration with

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# Contents

■ <b>Introduction</b>	vii
■ <b>Resource Papers</b>	
<b>Application of HACCP System in the Japanese Seafood Industry</b>	3
• Naoki Takatori	
<b>Introduction of HACCP in Kibun Foods Inc.</b>	12
• Noboru Kato	
<b>Reaching Equivalence through the Application of HACCP</b>	18
• Sirilak Suwanrangsi	
■ <b>Country Papers</b>	
<b>Brunei Darussalam</b>	31
• Mariani Haji Sabtu and Awang Yussof Bin Awang Haji Ali	
<b>Cambodia</b>	33
• Lek Sophat and Kong Chea	
<b>Implementation of HACCP in the Fisheries Industry in Indonesia</b>	44
• Setia Mangunsong	
<b>Lao P.D.R.</b>	52
• Khamphet Roger and Chanthaboun Sirimanotham	
<b>Present Status and Perspective on the Implementation of HACCP in Malaysian Fish Processing Industries</b>	59
• Abdul Hamid Abd. Shukor and Bah Piyan Tan	
<b>Present Status of Fish Processing Industry in Myanmar and Implementation of HACCP System</b>	66
• Tin Hla and Tint Wai	
<b>The Philippines' HACCP-Based Fish Inspection System</b>	73
• Flor F. Abella, Consuelo C. Baltazar and Muriel B. Camu	
<b>Overview of HACCP Implementation in Singapore's Fish Processing Industry</b>	81
• Chew Su-Pei and Chiew King-Tiong	
<b>Application of HACCP Programmes in Thailand</b>	87
• Suwimon Keerativiriyaporn	
<b>Development and Implementation of HACCP in the Fishery Industry of Vietnam</b>	92
• Tran Bich Nga and Vo Thi Thu Huong	
<b>Brief information on the National Fisheries Inspection and Quality Assurance Center</b>	102
• Tran Bich Nga and Vo Thi Thu Huong	
■ <b>Report of the Workshop</b>	109
■ <b>Appendices</b>	
<b>List of Participants</b>	119
<b>Workshop Programme</b>	123





# Introduction



# Introduction

Since its development in the early 1960's, the Hazard Analysis and Critical Control Point or HACCP system has become the system of choice for ensuring food safety in many developed countries. The application of HACCP in the seafood industry has also taken on a truly global perspective in the production and inspection of fish and fishery products. HACCP has been endorsed worldwide by the Codex Alimentarius Commission of FAO/WHO, the European Union (EU) and by several countries such as the United States of America (US), Canada, Australia, New Zealand and Japan. In the ASEAN region in the past five years or more, many of the ASEAN countries have implemented or are in the process of implementing national HACCP programmes for their fish processing industry in line with international trends and also essentially to comply with the regulations of the importing countries especially the EU and the US. In addition to export products, the ASEAN countries are also now looking into HACCP application for their traditional fish and fishery products.

## **1st Regional Workshop on the Application of HACCP in the Fish Processing Industry in Southeast Asia**

In view of the increasing importance and rapid development of HACCP application in the region, MFRD has embarked on a 4-year project (2000-2003) to document HACCP application in the fish processing industry in the region and provide a platform to share information and experiences on HACCP application among the ASEAN member countries. The project is sponsored under the Japanese Trust Fund of the Fishery Agency of Japan. This workshop is the first in an annual series under the project and its objectives are:

1. To serve as a platform for ASEAN member countries to provide an update on HACCP application in the fish processing industry of their respective countries and to share experiences in implementing HACCP programmes – problems/difficulties encountered, strategies/policies adopted, future directions.
2. To identify and brief Country Coordinators (CCs) for the project. The CC will collate information and data on national policies and legislation, the extent of HACCP implementation in the fish processing industry, case studies on HACCP implementation, etc.

At the end of the project, MFRD will produce a publication on the application of HACCP in the fish processing industry in Southeast Asia. The publication will include country status reports on HACCP application covering description of HACCP programmes implemented, problems/difficulties encountered, strategies/policies including national legislation, and future directions. Case study examples of HACCP implementation in the various fish processing industry will also be included in the publication.







**Resource**

**Papers**



# Application of HACCP System in the Japanese Seafood Industry

**Naoki Takatori**

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## ■ Preface

The Japan Fisheries Association (JFA) was established in 1882, as a non-profit organization and has been functioning as the umbrella organization for the entire fishing industry and seafood processors of Japan. JFA has more than 400 members including associations, private companies and individuals, contributing approximately ¥200 million annually in dues. Our purpose is to promote Japanese fishing and seafood industries and contribute to the economic well-being and cultural heritage of our country.

The fishing industry in Japan, with recent annual production of more than 7 million tonnes, has been striving to satisfy our nation's demand for food. On the other hand, seafood processing industry has been providing hundreds of kinds of products for our market. At the same time, these industries are facing several difficult problems both domestically and internationally. To address these problems, JFA has been working to coordinate the views and positions within the industries and to establish the necessary measures, as well as appealing the industry positions to the Japanese government and the general public. JFA also seek to maintain close relations with international and domestic organizations pertinent to fisheries and seafood processors around the world with the hope to achieve the sound and sustainable development of our industries on a global base.

From ancient time, fish and fishery products have been a major protein source for Japanese people, because of its excellent nutritional value. There are so many varieties of seafood now in Japan, and more than 15,000 processors are providing these products to the market. These seafood processors vary from large to small or tiny in its production scale.

For the quality aspect, world market has long been admiring Japanese seafood products, many kinds of fresh and processed seafood products, such as fresh tuna and

skip jack, imitation crab, and seaweed, have been exported to the US and other countries for direct consumption or further processing.

Currently, Japan is the world's biggest importer of seafood, and is buying 3.4 million tonnes of seafood, which is equivalent to 16% of the total world import. Seafood import, especially primary processed fish and shellfish, is increasing in the market share due to its convenience for use. On the other hand, domestic fish and shellfish production has been declining mainly due to resource depletion and fluctuation. The tonnage (for food use only) is 5.0 million tonnes. Also it must be noticed that the difference between the imported and the domestic has been decreasing.

In order to maintain the market share of domestically processed seafood in our country, it is absolutely necessary to maintain the confidence in the safety of seafood products of our consumer, to compete with imported final products, and to take the advantage that seafood products are still, much safer than other kinds of protein foods, such as meat, poultry, and egg products.

Again, taking into account the fact that Japanese consumers generally demand good quality and safe foods, it seems to be absolutely essential that Japanese seafood industries, from catching fish to processing final products, duly implement HACCP-based control to ensure high quality and safety of the products.

## ■ Background and History of HACCP Introduction in Japan

### 1. Production

In 1997, fishery production of fish caught domestically in Japan was 7.4 million tonnes in total, which is equivalent to US\$ 20 billion. Main fish species caught are jack mackerel, saury, sardine, mackerel, squid, pollock, crab, tuna, skip jack, and salmon. Almost

all of the fish and shellfish that are harvested at sea, are as follows:

<i>Total production:</i>	7.4 million tonnes
<i>at sea:</i>	7.3 million tonnes
<i>wild:</i>	6.0 million tonnes
<i>aquaculture:</i>	1.3 million tones
<i>others:</i>	0.1 million tonnes

In Japan, there are 156,000 companies or individuals engaging in fishing, of which individuals manage 148,000 and companies manage the remaining 8,000.

On the other hand, world production of fish and shellfish now reaches almost 130 million tonnes, of which main species are sardine, jack mackerel, and mackerel. Major fishing countries are currently China, Peru, Japan, Chile, and the US. About 70% of the world production is derived from fishing, whilst the remaining 30% is derived from aquaculture.

## 2. Processing

Concerning the world trade of fish and shellfish, import is 21 million tonnes (US\$ 57 billion) and the export is 22 million tonnes (US\$ 53 billion), while Japanese import is 3 million tonnes, of which major fish species (or products) are fishmeal, shrimp/prawn, tuna, swordfish, salmon, and cod. The tonnage of Japanese import is equivalent to 16% of the world import. While the value is USD 17 billion, that is equivalent to 30% of the world import. About 150 countries are exporting fish and shellfish to Japan, and the major exporting countries are the US, China, Chile, Norway, and Russia.

In Japan, fish and shellfish still remains the most important source of animal protein. Total animal protein supply is currently 47 grams/day/person, and 40% comes from seafood.

Major seafood products are surimi products (e.g., kamaboko, crab analogue, and tempura), frozen products, salted and/or dried fish and shellfish, and canned seafood. For seafood manufacturing, there are about 14,000 or 15,000 seafood processors, about 98% of which are hiring less than 100 employees and about 95% of which annual sales is less than US\$10 million.

Due to poor economic conditions and recent change of life style in eating, Japanese seafood industry have now been suffering from many difficult problems, such as high price of raw materials, decrease in supply of raw fish/shellfish, depression of sales, competition of price & quality with meat and meat products, decrease in benefit

rate, increase in loan, increase in financial troubles, difficulty in employment, and increase in labor cost.

In order to overcome these hurdles and move to future prosperity, our industry people strongly feel that they should have new strategies to:

- (1) develop new products;
- (2) seek cost down measures by improving productivity;
- (3) improve productivity by introducing high performance instruments;
- (4) expand sales network.

## 3. Food-borne disease

Outbreaks of food-borne disease in Japan are as follows:

Year	Cases	Patients
1997	1,960	39,989
1998	3,010	46,179
1999	2,631	34,055

The main pathogens and their outbreaks are as follows:

<i>Salmonella</i>	830 cases (12,000 patients)
<i>V. parahaemolyticus</i>	670 cases
<i>Campylobacter jejuni</i>	490 cases
Pathogenic <i>E. coli</i>	240 cases
SRSV	120 cases (5,200 patients)

Other reasons for outbreaks mentioned above are parasites, histamine, and biotoxins, such as tetrodotoxin and mushroom toxins. Among all others, seafood occupies 22% of the incidence and is the biggest identified reason of food-borne diseases in Japan.

In our country, people prefer to eat seafood raw or without further cooking, consequently, the outbreaks occur most often especially in summer time, that are due to *Vibrio parahaemolyticus* associated with consuming raw seafood, such as sashimi and sushi. Illness from SRSV especially in wintertime has been quite frequently reported as associated with eating raw or partially cooked oysters.

In recent years, food-borne diseases have been increasing in Japan. The reasons for this phenomenon are supposed to be that:

- (1) people are eating out of their home more often than before due to the increase of food service facilities;
- (2) more diversity of food ingredients are used, many of which are imported;

- (3) many people, especially young generations, are lacking even in the basic knowledge for hygienic food preparation;
- (4) especially children and aged persons are losing immunity; and
- (5) environmental pollution is increasingly emerging.

## ■ **Mandatory Programme**

### 1. **Comprehensive Food Safety Control System**

The Ministry of Health and Welfare (MHW) is regulating food safety and hygiene to protect consumers in Japan. To respond to the request that the government should institute a mandatory HACCP-type regulation for food, MHW revised relevant sections of the Food Sanitation Law, and newly established “the Comprehensive Food Safety Control System” in May, 1995.

According to the explanations given by MHW, this new control system is basically designed in compliance with the provisions of Codex general principle for food hygiene and the related texts, and is primarily based on own-control by each premise, rather than by old-styled official inspection of the final products.

However, this new system is not really compulsory for all processors, instead, only processing plants that apply to MHW and are approved as in compliance with the standard can be registered by the Government. Further more, the system is only applied to several food categories listed by the Minister of MHW. Food categories currently available for the application and the number of registered processing plants are as follows:

- Meat products (82)
- Milk and milk products (294)
- Canned foods (6)
- Surimi products (12)
- Soft drinks (0)

The Comprehensive Food Safety Control System requires processing plants to prepare an adequate level of physical conditions and basic hygiene control procedures necessary to manufacture safe food, as the pre-requisite requirements, and of course prepare HACCP plan(s) and written SSOP. At the time of first application and prior to every amendment to the documents, each company has to submit all the completed documents, as follows:

- (1) Product explanation
- (2) Process flow diagram (step, performance/ specification, time/temp.)
- (3) Layout of the premises (separation of sanitation level)

- (4) Hazards Analysis
- (5) Preventive measures
- (6) Corrective actions
- (7) Written SSOP
- (8) Verification
- (9) Record
- (10) Training, management, and acceptance of official audit

### 2. **Approval and registration of processing plants exporting to EU**

The European Union (EU) has been laying down health conditions for the production and the placing on the market of fishery products from 1991, by placing EC Directive 91/493/EEC in force. Any nation outside the EU has to have an agreement with European Committee that ensures only the processing plants complying with relevant EC Directive and Decision can export seafood to nations in EU territory.

In order to report the list of officially approved processing plants to European Committee, in 1993, the MHW elaborated new regulations and rules requiring each exporting processing plant to processes the seafood to EU under its own-control system, in compliance with all of the pertinent EC requirements. Currently about 10 processing plants are listed.

## ■ **Voluntary Programme**

There is a diversity of seafood distributed in the Japanese market, many of which are manufactured using old-fashioned traditional technologies specific to each type of product, and also processed in facilities with inadequate working space. For that reason, there seems to be a lot of difficulties for these processors to try to introduce new process control systems, such as HACCP. Therefore, the programmes for facilitating the introduction of HACCP should be of a nature that fit well into the actual condition of traditional processing procedures and of the limited work space available to small premises.

Many traditional seafood processors are facing the troubles and anxieties that:

- (1) processing plant would need to be re-constructed so as to fulfill the hygienic conditions equivalent to those required for “hospitals”;
- (2) the goal of HACCP-based control is said to be very high and strict;

- (3) huge cost (including time and manpower) must be borne just for documentation of HACCP-plan and SSOP;
- (4) documentation and record keeping seems to be very difficult and complicated to small entities;
- (5) training and education burden would increase the cost;
- (6) there are a few interpretations to HACCP system. Each buyer requires a different HACCP; and,
- (7) many of the seafood processors are feeling strong pressure from retailers and supermarkets that are obliged to promptly start HACCP-based control for consumer confidence.

Our programmes must be of the nature that can solve these anxieties or make these hurdles as low as possible. In this connection, JFA has been working to strongly promote the introduction and implementation of HACCP-based controls especially in the food items other than those covered by the Comprehensive Food Safety Control System Programmes.

The programme by JFA is designed to promote especially small size processing plants to prepare an appropriate level of pre-requisite hygiene conditions and GMPs, and then to start HACCP-based control. The programme covers all steps of seafood production, including aquaculture, fishing, harvesting, fish market, processing, transportation, and retail.

### 1. Fishing vessel

Fishermen are expected to handle fish and shellfish after capture in an appropriate manner to avoid excessive contamination by pathogens and extraneous substances during fish handling on deck and in the plant, and also to maintain the freshness of catch by controlling the time and the temperature during preparation and storage of fish and shellfish.

In order for fishermen to be aware of the good handling practices for preparing fish hygienically and maintaining a high quality of fish, there must be many opportunities that they can learn why proper handling itself is necessary, and how it can be accomplished in the vessel. At these lectures explanations should be made also for economical and commercial necessity, food safety regulations and rules, and consumer satisfaction. Appropriate texts and audio-visual presentations for these are to be elaborated.

There still remains many old fishing vessels of which facilities are out-dated and the layout is not

adequate for proper fish handling. For this reason, new design of vessels and better handling practices are now under the elaboration.

### 2. Fish market (off-load and auction)

There are hundreds of fish markets in Japan, almost all of which are old and small. These markets are suffering from decrease in offload volume, decline in number of auctioneers thereby, and the decrease in market price forming ability by fish market.

Because each fish market handles a different type of fish in different quantities, it is almost impossible and not practical to imagine having a single uniform guide for HACCP-based control for all of the fish markets in our country. Instead, for improving hygiene conditions of fish market, detailed research for each type of incoming fish at each fish market must first be done to analyze the actual condition of contamination on the surface of premises and equipment, and water used, as well as on the surface of fish during handling.

At the fish market, a variety of people, such as fishermen, auctioneers, buyers, and garbage collectors, are working in a small space, therefore everybody should be properly informed about the importance and key issues of food hygiene and proper handling in order to share the responsibility of safe food. Sometimes these people do not understand that they are handling fish as "food" and have not had any opportunity to learn about quality control and food hygiene. To this end, education and training seems to be definitely important as the first step, preferably with audio-visual aids. We are planning to start these training sessions at major fish markets first, and then extend to smaller ones.

For proper handling of fish and shellfish at the fish market, suitable guidelines, to which everybody can refer to for good hygienic practices and good handling practices, are now under the elaboration. At the same time, case studies at major fish markets have been conducted with respect to getting enough scientific information and technical data for future HACCP introduction in this area.

### 3. Processors

Many programmes to promote introduction and implementation of HACCP-based own-control in seafood processors are now in progress from 1995 by JFA, in collaboration with the Fishery Agency. Such programmes

are composed of two major activities, which are education and training of industry people, including top management and factory technicians, and publication of technical guides for HACCP and GMP showing proper hygienic and quality control of seafood.

#### a. Symposium

Because HACCP is a brand-new concept to seafood industry, it is very important for seafood processors to first know what HACCP is, and how it can be started, despite the fact that Japanese seafood has long been recognized as safe and of a high quality.

In this context, JFA is holding international HACCP symposium, for which JFA invites guest speakers from the countries where HACCP is already in place, in order to share their experiences and the key issues for introducing and implementing HACCP. The following are the countries from which speakers are already invited:

Country	Department
U.S.A.	FDA, Office of Seafood
	DOC/NOAA/NMFS
	Oregon State Agricultural Department
	American Seafood Institute
France	Alaskan Seafood Marketing Institute
	IFREMER
Norway	Fish Directorate

To encourage the small companies, which hesitate to take up the challenge of the new system, domestic symposiums are also held. At the symposiums, company representatives are invited to report their experiences of HACCP. Many of the speakers gave the impression that they could first understand the real meaning and burden of HACCP-based control before they actually introduce this new system.

In addition to symposiums, which can be held only once or twice a year in Tokyo, the capital of Japan, dissemination of printed matters, such as small pamphlets and booklets explaining about HACCP and GMP, is indispensable in order to make the majority of the 15,000 seafood processors aware and understand HACCP and GMP.

#### b. HACCP training

The success of a HACCP system depends on education and training to company managers and employees. In this regard, since 1994, JFA has been holding HACCP training courses mainly for industry people responsible for production or quality control. After completing the course, these people are expected to become HACCP team leaders in each processing plant, or special consultants for the seafood industry.

The standard HACCP training course is a 3-day course, where the theory (the 7 principles and 12 steps of HACCP) and skills necessary to make HACCP-based own-control system function properly are repeatedly lectured by instructors, and workshop of several students in a group is done to prepare a model HACCP plan as the case-study. Furthermore, to those who want to master more advanced aspects of verification and record/document scrutiny, another 3-day course is available for the people who have already completed the standard HACCP training course successfully.

For management people, 1-day courses are available, where they can learn the importance and merit of producing safe foods, by improving hygienic conditions of their processing plant and introducing HACCP-based control as a company-policy. Short training courses for plant sanitation and SSOP are also scheduled.

#### c. Research and study

Because we have not yet enough database that can be used to identify significant hazards for each of the seafood products distributed in our country, scientific research is under the way by JFA. In the research, significance of various hazards in each seafood, technical data for the control of various hazards, monitoring procedures at CCPs for preventing different types of hazards, and quality evaluation criteria and methodologies for incoming and in-process materials are collected. The most important hazards we usually need to pay attention to in hazard analysis of Japanese seafood products are histamine, *V. parahaemolyticus*, parasite, and bio-toxins. For quality purpose in conjunction with HACCP-based control, technologies for evaluating important quality attributes, such as freshness, texture, and labeling, is also being summarized.

JFA has also been collecting and analyzing seafood product samples in the market to evaluate the actual contamination by several bacteria and histamine.

#### d. HACCP guidelines (manuals)

To facilitate the seafood industry's efforts at improving sanitation and quality control procedures by voluntarily introducing HACCP-system, JFA's guidelines have been published for main seafood products distributed in Japan from 1995. The guideline consists of three sections, i.e., good manufacturing practices, HACCP plan (control measures, model record forms), and SSOP for specific seafood.

Seafood products for which HACCP guidelines have already been published are as follows:

Scallop (adductor mussels, and steamed/boiled scallop meat), Mackerel fillet, Frozen Surimi, Dried Capelin, Cooked fish, Boiled/steamed octopus, Surimi products (kamaboko and tempura), Canned sardine, Dried skip jack, etc.

#### e. Traditional seafood industry

The Japanese seafood industry has been suffering from decreasing of profits because of many reasons, such as decrease in raw fish supply due to the depressed domestic wild catch, increase in price of imported fish and shellfish for raw materials, and difficulty to raise the price of final products due to long lasting bad economy in Japan. The other reason is that it is fairly hard to secure enough number of employees, due to relatively bad working environment and less favorable payment compared with those of other industries.

However, despite these handicaps, many traditional seafood processors wish to change the situation by introducing advanced technologies thereby securing a predominant position in the market place.

Because there are a variety of seafood products in our country, many of which are manufactured by traditional processing methods, these processors are longing for strong support, in which specific conditions of the industry, e.g. old fashioned manufacturing process, small-scale business, are considered and the counter measures are incorporated.

Inversely, there is little scientific data, which can be used by the industry for preparing HACCP plans. Microbiological change during processing of the variety of traditional seafood is of vital importance. To this end, a database that everybody can access freely is an area is one of our programme goals.

Recognizing the above mentioned, JFA has been conducting "Model Hazard Analysis" for each type of

traditional seafood, which includes preparing the process flow diagram, identifying the process conditions (time/temperature conditions and handling procedures), and sampling and analyzing the raw fish, in-line products, and finished products for pathogenic bacteria and histamine, if applicable.

The next programme is summarizing the actual problems influencing traditional seafood industry, such as small working environment, lack of adequate employment and successor, difficulty of cost reduction. Attention is also being paid to other factors, such as safer working environment, reduction of waste, recycling of waste and packaging materials, and co-operative procurement of raw materials.

#### f. Small scale operations

As previously described, many of our seafood processors are small, therefore, the lack of appropriate knowledge about HACCP and GMP, and the in-sufficient level of premises for introducing HACCP-based control is generally anticipated. For premises, however, it is very hard for these small processors to invest in another facility, or rebuild the existing facility, in order to expand the production or to improve the sanitary conditions, mainly because of a long lasting bad economy these days. Financial support described below might help to decrease the burden.

On the other hand, knowledge can be learned fairly easily. Our strong feeling is that many small companies have yet to learn or hear about the real meaning of HACCP. There is a lot of misunderstanding about HACCP. Many of these processors fear even to face this brand-new "Black Ship".

One of the tools to solve the above problem is to offer them as many education and training opportunities as possible. To this end, JFA has been sending on-site professional instructors of HACCP, upon requests. And also for mainly management of people, small size training courses are held regionally to teach why it is necessary to introduce HACCP from view points such as management policy, social responsibility of food safety, and international competition. By doing these, JFA is trying to have all the small seafood processors understand and wish to implement HACCP, which would bring them a new horizon of the business.

For another driving force to HACCP introduction in this group, we help small scale processors acquire



third party certification by our organization. Many small scale operators think that it is almost impossible for them to implement HACCP, without even hearing about HACCP from JFA. In order get out of such situation, JFA approves the qualified processors, and issues HACCP implementing certificate, and then open the list in our web-site, so as to make these silent majority know success stories of HACCP introduction and become interested.

#### 4. Aquaculture

In recent years, concerns are raised internationally on the safety of farm-raised fish. Therefore, the Codex Committee for Fish and Fishery Products has been elaborating Codex Code of Practice for Aquaculture, with the assistance of FAO. The Code of Practice incorporates the concept of HACCP.

Also in Japan, consumers raise concerns on the safety of cultured seafood. The main domestic cultured fish species are yellowtail, sea bream, scallop, oyster, and seaweed.

At the beginning, fishermen should know the importance of safe fish and shellfish and the need to introduce HACCP-based control in aquaculture. To this end, JFA has been providing the industry with training and educational courses to illustrate the necessity of greater safety control and HACCP-system, using video and pamphlets. Also JFA has been elaborating HACCP guidelines for main farmed fish and shellfish species, i.e., yellowtail, nori, and scallop. The possible hazards to be controlled in aquaculture include chemical contaminants in waters and the residue of animal drugs used.

#### ■ Japan HACCP Alliance

The Japan HACCP Alliance is the central training body for all kinds of foods in Japan, and is administered by the Japan Food Hygiene Association. The Association serves as the main organization for food hygiene of manufacturers, restaurants, and other food suppliers. The Alliance was established in March, 1998, under the support of two Government authorities, i.e., the Ministry of Agriculture, Forestry and Fisheries, and the Ministry of Health and Welfare. Its scope is to:

- (1) train-the-trainers (270 persons were trained already);
- (2) establish standard curriculum for HACCP training;
- (3) maintain nationally organized and harmonized approach to HACCP;
- (4) develop database necessary for HACCP training.

The Steering Committee of the Alliance consists of:  
 Japan Food Hygiene Association;  
 Japan Milk Association;  
 Japan Meat Processors Association;  
 Japan Inspection Association of Food and Food Industry Environment;  
 Japan Fisheries Association; and  
 Japan Food Industry Center.

The number of members is currently 65 and consists of industrial organizations and private companies having interest in the training of HACCP.

The Japan HACCP Alliance training course:

Day	Courses
Day 1	Food Sanitation Law and HACCP principles
	Comprehensive Food Hygiene Control System
	HACCP 7 principles and 12 steps
Day 2	Field study for HACCP plan preparation in groups at the actual plant
Day 3	HACCP plan preparation in groups at lecture room
Day 4	Presentation of HACCP plan for each group
	Discussion and evaluation

#### ■ JFA's New Support Programme

In 1998, JFA established a new support organization, the Seafood Quality Promotion Conference, whose members comprised of processors, fishing companies, fish markets, retailers, wholesalers, consumer associations, construction companies, consultants, officially approved laboratories, etc.

The Steering Committee of the Conference consists of 100 organizations (members) from each sector of these industries. The main activities of the Conference are to:

- (1) train HACCP specialists;
- (2) issue third party certification for HACCP-based processing;
- (3) supply information about seafood quality and safety, HACCP, and ISO9000;
- (4) develop HACCP guidelines; and
- (5) others.

### ■ **Third Party Certification for HACCP-based Processing**

Many countries have HACCP-based safety control in place as the mandatory requirements. This means no processing plant needs to be approved nor registered by any third party in such a country. However, this is not the case in Japan. In fact, the only one HACCP regulation in our country, i.e., the Comprehensive Food Safety Control System, has official jurisdiction only to processing plants that have applied to the system and registered by the MHW on their own accord. Without mandatory regulations, each company must introduce HACCP-system voluntarily and seek the best way to declare what they are doing to the consumers.

For the reason above, JFA, as the central body in seafood industry, started a general, or in other words universal, HACCP certification service, designed to cover all types of seafood products and processors other than those covered by the Comprehensive Food Safety Control System. The first step of the service is certification for the products exported to the US.

In 1997, the USDA has enforced new rules of 21CFR part 123, basically requiring seafood processors to process in accordance with HACCP-based safety control. For ensuring good manufacturing practices in all kinds of food, GMP rule (21 CFR part 110) has already been in place from 1973. Imported seafood is also regulated by these rules.

For imported seafood, according to 21 CFR part 123, US importer has to ensure the safety of the lot. An example of the alternatives for an importer to choose to comply with these rules is to:

- (1) import the lot from a processor in the country with MOU, or
- (2) verify compliance with these two rules by:
  - (a) having HACCP/SSOP records from the processor
  - (b) getting third party certification of HACCP/ GMP implementation, or
  - (c) others

In order to make it possible for Japanese seafood processors to export their products to the US, third parties listed below are currently issuing HACCP-based processing certificates:

- (1) MHW, as a government inspection authority
- (2) JFA, as a competent third party
- (3) Others, such as SGS and Surefish

### ■ **Challenge to HACCP Under JFA Programme**

The JFA has established the system, which enables Japanese seafood processors to be registered and certified by introducing and implementing HACCP-based own-control, thereby, to be recognized that these processing plants are duly manufacturing safe, and high quality seafood.

For the above objective, at first, JFA provide HACCP training courses (3-days) to teach the basic theory and application of HACCP, together with group activities for preparing model (hypothetical) HACCP-plan for specific seafood products. This group activity imitates the actual activity by HACCP-team in each company.

Under the JFA's programme, many other training opportunities and on-site consultations are now available to the companies wishing to start the new system, because HACCP is still unfamiliar to almost all the local seafood processors in our country and is quite hard for the industry to understand the real concept of the system and how to start the application, and its appropriate relationship between SSOP and GMP. To this end, our members, including officially approved inspection bodies, consultation companies, and consulting engineers, are working as competent external professionals in cooperation with JFA.

Our member seafood processors are firstly required to send responsible persons to JFA's HACCP training courses, and then the trained persons will elaborate HACCP-plan and SSOP monitoring procedures. At this stage, a processing plant would invite external professionals, when it does not have enough technical background. In our system, the processing plant is required to duly implement, verify, and record the HACCP-based own-control as described in its own plan, and also to accept external verification by JFA approved auditors at least every 6 months.

Standard procedures for which a processing plant should proceed when applying the system are to:

- (1) assemble the HACCP team (by company policy)
- (2) complete the HACCP training course
- (3) ask for consultation, if necessary
- (4) prepare and implement HACCP plan and SSOP
- (5) correct the system by pre-audit, if necessary
- (6) apply to JFA for registration
- (7) accept audit/verification, and get certification
- (8) accept audit/verification for renewal or new food items.

## ■ Financial Support

In order to help Japanese seafood processors improve their premises and equipment before starting HACCP introduction, there are currently two types of official financial support managed by two Government organizations, i.e., the MHW and the MAFF, and by the Fishery Agency.

The support provided by the MHW and the MAFF is operated under a specific law. The law was established in July, 1997 and is valid for 5 years. In this system, financial support is available for long-term, with low interest rate finance for construction or improvement of food process building and equipment, and tax exemptions for some of the related activities.

Another financial support administered by the Fishery Agency is designed to provide a variety of finance to seafood processors taking into account the broad aspect of situation pertaining to the renewal of processing facility, and the cost for quality control of seafood.

## ■ Future Work

The JFA spent almost 6 years promoting HACCP in our seafood industry. As a general conclusion so far, the programmes seems to be a success. There has been a great increase in knowledge, understanding, and expertise of HACCP in our industry. But it is also true that only a small fraction of the industry is actually

practicing HACCP-based own-control. We are still far from the goal to acquire entire consumer satisfaction of food safety and high quality. There are a huge number of seafood manufacturers in our country; therefore, a much more stronger and broader foundation and more effective and efficient strategies are necessary in order to have HACCP prevail in all of the Japanese seafood industry.

Recognizing the above, the following should be our future work and theme:

- (1) For ensuring stronger consumer confidence in seafood products, HACCP implementation "from farm to table continuum" is necessary in each step of fishing, offload, processing, auction/wholesale, retail, and home.
- (2) Adequate training for each step of the above continuum is essentially warranted for proper HACCP introduction.
- (3) Adequate guidelines for proper handling of fish and shellfish at each step are expected to be developed.
- (4) Technical support especially to small enterprises is necessary.
- (5) Programmes for consumer education of food hygiene should be designed on a step-by-step basis.
- (6) Cooperation with exporting and importing countries, with respect to harmonized food safety and quality control, should be promoted.

# Introduction of HACCP in Kibun Foods Inc.

**Noboru Kato**

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Kibun Foods Inc. is a surimi-based product manufacturer in Japan. The market and technical trend of the surimi-based product in Japan are explained, and development of the circumstances of HACCP introduction in the present and future are described.

## ■ The Market of Surimi-based Products in Japan

The fish-based products are classified into surimi-based products, frozen foods, and other fish-based products. The total production of the fish-based products in 1998 was 6 million tonnes, in which surimi-based products shared 12% of the fish-based products (Fig 1). The surimi-based products are further classified into 5 categories: fried kamaboko, baked chikuwa, flavored kamaboko such as crab-leg type kamaboko, boiled kamaboko called "Hanpen", and other types. The profile of the surimi-based products market in Japan is shown in Fig 2. The production was 754,459 tonnes comprising of 33.5% fried kamaboko, 21.8% baked chikuwa, 16.6% kamaboko, 6.9% flavored kamaboko, and 5.6% boiled kamaboko, 8.3% fish sausage and fish loaf, 2.5% of other products.

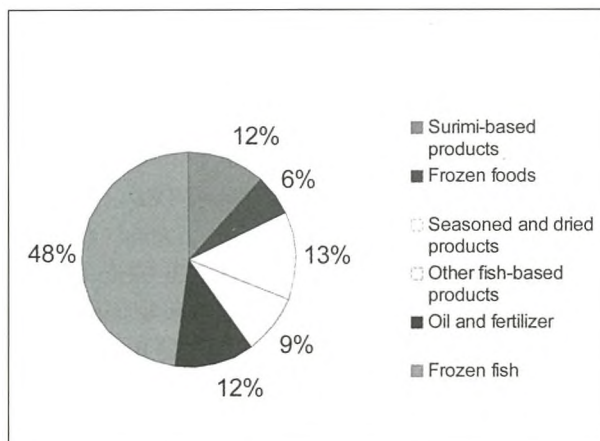
## ■ Processing Technology of Surimi-based Products

The manufacturing process of surimi-based products from frozen surimi requires four steps. First, thawing of surimi; second, mixing surimi with salt; third, preheating; and fourth, heating.

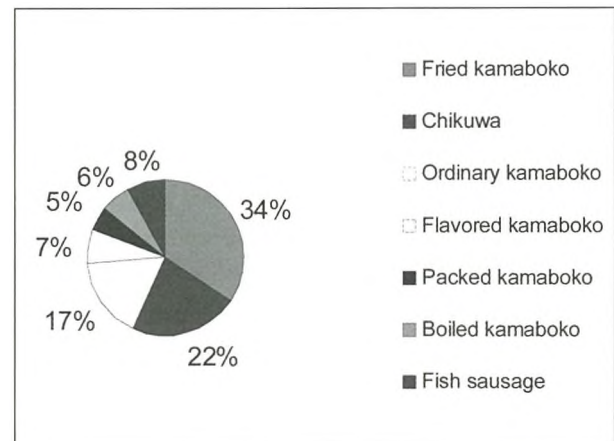
The raw material of the surimi-based products are based on several fishes, such as thread-fin bream called "itoyori-dai" in Japanese, white croaker, lizard fish, walleye pollack and so on.

Mixing surimi with salt was believed to be the most important factor in the surimi-based production process in terms of quality. A stone mortar mixer, silent cutter and high-speed mixer have been used in the process. The demerit of these mixers was evident in the inconsistent quality of the final products. Because these mixers raised the temperature of the paste during the mixing process and required long standing time till the paste goes to the next heating process.

In order to solve these problems, we have developed a continuous kneader that could supply the raw material continuously and control the temperature of the product at low levels. It requires a short period



**Fig. 1: Breakdown of Production of Fish-based Products in 1998**



**Fig. 2: Breakdown of Production of Surimi-based Products in 1998**

of time without long standing time of salted fish paste. Under unsuitable operating condition, the denaturation of myofibrillar protein in the salted fish paste took place and the quality of the final products became clearly inferior under the effect of the rise in meat temperature.

In the heating process, the production technology which used joule heating was recently developed and applied to various kinds of surimi-based products wherein this heating method enables temperature of paste to rise in a short period of time.

The development of treatment machine and processing equipment of fish meat products was done effectively by studying the change in the myofibrillar protein of fish meat. The texture of food is largely influenced by myofibrillar protein. Therefore, the development of a new processing machine may be expected to progress from the same point of view.

#### ■ Introducing HACCP into Kibun Foods Inc

In recent years, food hygiene and microbiological control has become the object of public interest in the food industry. HACCP, a new hygiene control system, was introduced to the world.

In Japan, massive food poisoning by *E. coli* O-157 in the summer of 1996 was of serious concern. This summer, the milk plant controlled by HACCP produced milk polluted by *Staphylococcus aureus*, resulting in over 15,000 people falling sick.

**Table 1: Outbreak of Food Poisoning in Japan**

Year	1996	1997	1998
Number of outbreaks	1,217	1,960	3,059
Number of patients	46,327	39,989	46,645
Number of death	15	8	9

Note:

*Vibrio parahaemolyticus* (850 outbreaks)

*Salmonella* (771 outbreaks)

*Campylobacter*

Pathogenic *Escherichia coli* (301 outbreaks)

Over 30 % of the total catch of marine products are traded in the world. It becomes well known in Europe and America that the marine products prevent the thrombosis in the brain and the blood vessels and the geriatric diseases such as cardiac infarction. The trading amount of the marine products increases

year by year. However, the difference of the food regulations of each country is dependent on the world food trading.

On the other hand, the changes of consumers' taste call for the refraining of food from heat treatments, lower salt concentration and softening, resulting in the increment of microbiological problems. Manufacturer must be more responsible for its products' safety by the indication of expiration periods, introducing PL regulation and amendments of food hygiene regulations. It becomes more and more important to introduce HACCP idea and control into manufacturing systems.

#### 1. Outline of Kibun Foods Inc.

Company name:	Kibun Foods Inc.
Address:	7-14-13, Ginza, Chuo-ku Tokyo, Japan
President:	Masahito Hoashi
Started:	June, 1938
Establishment:	September, 1947
Business contents:	Manufactures and sale of total processed foods, mainly fish surimi products.
Commodities:	1. Kamaboko, Hanpen, Satsuma-age, Oden and the special dishes for the New Year Holidays. 2. Chilled Chinese dishes so called Gyoza and Shumai in Japan. 3. Tamago tofu made from egg and sweeteners.
Capital:	3,926 million Yen
Employee:	2,000 persons
Total sales:	74,600 million Yen
Branch and Business sections:	27 Branches and 4 business sections
Factories:	Located in Eniwa, Ishinomaki, Shiogama, Tokyo, Shirakawa, Funabashi, Yokohama, Shizuoka, Osaka, Kyoto, Hiroshima and Saga.
Group companies:	25 domestic companies and 16 overseas companies (in 10 foreign countries).

## 2. The progress of introducing HACCP into Kibun Foods Inc.

### (a) EU

1991	Application of HACCP for the marine products was ordered
March 1995	Inspection by the observers from EU.
April 1995	The export of the marine products to EU was prohibited.
December 1995	8 companies and factories were authorized to export the marine products to EU.
January 1998	Tokyo Factory in Kibun Foods Inc. was authorized to export to EU.

### (b) US

12 December 1997	HACCP for marine products was enforced.
January 1998	39 companies and factories were licensed to export to US. Tokyo Factory was authorized to export to US.

### (c) Japan

May 1995	Amendment of Japan Food Hygiene regulations. Establishment of admission system for the food manufacturing by HACCP.
May 1996	Enforcement of the admission system of milk, milk products and meat products.
November 1997	Enforcement of the admission system of canned foods and surimi products.
July 1998	Application HACCP in Tokyo Factory.
August 1998	Inspection of Tokyo Factory by officers from the Ministry of Health and Welfare, Chiba Prefecture and Sakura City.
January 1999	Inspection of Tokyo Factory by officers from Ciba prefecture and Sakura City
April 1999	HACCP of Tokyo Factory was approved.
June 1999	ISO-9002 of Tokyo Factory was approved.

## 3. HACCP in Tokyo Factory

### (a) Outline of Tokyo Factory

Company name:	Tokyo Factory, Kibun Foods Inc.
Address:	2-1-1, Yaguchishinmei Sakae-own, Inba-gun, Chiba Prefecture, Japan
Start construction:	June, 1996
Completion:	19 August 1997
Start production:	August 1997
Main Products:	Chikuwa, Satsume-age, Crab-leg analogue, Chinese dishes, Hanpen, Kamaboko, assorted Oden and Nabe-dane.
Grand Area:	46,392.78 m <sup>2</sup>
Building area:	14,987.36 m <sup>2</sup>
Total floor area:	19,806.69 m <sup>2</sup>
Tree-planting area:	10,052 m <sup>2</sup> 4,365 trees are planted.
Lawn area:	6,470 m <sup>2</sup>
Factory size:	140m(L) x 100m (W) 1st floor: Production, Shipping and Transporting section. 2nd floor: Office, Welfare facilities and Utilities.
Number of Production lines:	16 lines for surimi products and 10 lines for other dishes

### (b) Purpose of Tokyo Factory

1. Purpose for introducing HACCP into Tokyo Factory Idea of Quality and Hygiene in the supplying of safe food:
  - (i) Improving the quality and hygiene system.
  - (ii) Reducing the time between order and delivery.
  - (iii) Cost reduction of production and transportation.
2. Hygiene facilities
  - (i) Separate the movement of persons and materials.
  - (ii) Factory area is divided into hygiene zones.
  - (iii) Each hygiene zone separated by partitions.
  - (iv) Production area has no windows and its atmospheric pressure is higher than outside.
  - (v) Packing is carried out in the clean room.

- (vi) The ventilation, laying pipes and electric wiring are connected to the processing machine and are supplied vertically from the ceiling and floor pits.
  - (vii) The inside wall and ceiling are constructed of coldroom panels.
  - (viii) Air conditioning in all areas except heating (cooking) room.
  - (ix) The room temperature and the temperature of main facilities are monitored continuously.
  - (x) The room lights in the pre-processing rooms, mixing rooms and cooking room are coated with anti-scattering films.
- 3. Sanitary control
    - (i) Cocking, cooling and metal-detection processes are controlled by the central administration office.
    - (ii) Sanitary standard operation procedures are set up.
    - (iii) Sanitary education for employee is done.
    - (iv) Individual sanitary control such as uniform, shoes, hat, hand-washing method and air-shower to each zone is carried out.
    - (v) Raw materials are unpacked and then sent into factory.
    - (vi) Soaps and sterilizing agents are kept in exclusive cabinets.

### Comparison of HACCP Standards in EU, US and Tokyo Factory

EU (Directive 91/493)	US (GMP, 21 CFR110)	Tokyo Factory
<b>Facilities</b> Dock shelters at entrances and exits of material rooms are necessary.	Dock shelter is preferred, but double doors are enough to prevent rising temperature and entry of rats and insects.	EU standard.
Unclean areas, semi-clean areas and clean areas are separated by individual partitions.	Prevention of cross-contamination by time difference, air flow, forming pipe lines and covering. Not necessary to separate by partitions.	EU standard.
The work overalls should not be in contact with personal clothes on the racks.	It is enough to wear clean and sanitary overalls during the working period. Practically, the dressing room must be neat and clean.	EU standard.
The wall should be constructed of non-porous material.	Painted wooden walls without gaps and easily washable is acceptable.	EU standard.
The movement of people and products do not cross each other.	Times difference, air flow and closed systems are available.	EU standard.
Regulation for fishing boats are prescribed.	Regulations are not prescribed for the fishing boats, the procedures of removing the head and guts and the freezing store on the boat.	
Sanitary regulations for market on the land are prescribed.	Market on the land is classified as processor, therefore it must pass the regulation of GMP and HACCP.	Only for exports.
<b>Raw Materials</b> Raw materials before and after unpacking and products before and after packing are separated by partitions.	Not necessary.	EU standard.

### Comparison of HACCP Standards in EU, US and Tokyo Factory — continued

EU (Directive 91/493)	US (GMP-21 CFR 110)	Tokyo Factory
Raw materials and products should not be stored in the same coldroom.	It is possible to store raw materials and products in the same coldroom only if the distance between them is over 1m.	EU standard.
<b>Administration</b> Strict checking of water for use.	Water is sanitized and safe.	EU standard.
It is necessary to monitor the mercury by the authority.	Not necessary.	US standard.
GMP is carried out, but checking lists are not prescribed.	General sanitary checking are carried out in the 8 sanitation areas with records. The improvements must be reported.	US standard.
HACCP is carried out, but detailed regulations are not prescribed.	Detailed HACCP regulations and requirements are prescribed.	US standard.

#### ■ Subjects in the Future and Problems of HACCP Introduction

1. Effects of introducing HACCP (see Table 2)
2. Subjects in the future
  - (a) Reduction of cost of HACCP

The costs of introducing and managing of HACCP is very expensive. However, these costs include the cost of GMP, which is the prerequisite of HACCP, which includes the costs of new or upgraded facilities. GMP requires the improvement of the manufacturing environment such as the individual storage place of the raw materials and packing materials, floor, drains and partitions between clean and non-clean areas. Most of cost is spent in this area. Also the purchase and running cost of

indicators by which the important administration points can be observed and monitored is needed.

From USDA's calculations in the case of small scale factory, the cost of HACCP with GMP improvements is a half of that without GMP. For example, the cost of improvement on the point of GMP and HACCP is almost 120 million dollars per year. On the other hand, the cost of HACCP itself is only 60 million dollar per year. The cost at the receiving place of materials, the administration cost, and the cost of the cleaning and sterilizing of the machines are very expensive.

#### (b) Verification

It is very important to verify that the HACCP plans are suitable with regards to food-safety, main critical control points, the setting of the critical limits, the

**Table 2: Effects of HACCP on the Claims in Tokyo Factory and Others**

Factory Name	Claim (%)	Physical Claims	Chemical Claims	Biological Claims
Tokyo Factory with HACCP	33	17	1	6
Yokohama Factory without HACCP	62	14	2	21
E Factory without HACCP	80	5	1	10

Comments:

1. First purpose is that the number of claims be reduced by 1/10 through HACCP. The number of claims actually decreased by 1/2 to 1/3. It is indicated that HACCP resulted in decrease of the biological claims and increase of the shelf-life.
2. Physical claims are mainly the contamination of wrapping films.
3. In Tokyo Factory, HACCP controls the products' quality and ISO manages the systematic quality.



evaluation of monitoring data, and the corrective methods. These verifications need the scientific knowledge and skill. After mastering HACCP, the suitable evaluations can be done.

**(c) Applying HACCP for high-risk products**

HACCP is introduced into the chilled foods, the vacuum packed foods, the cooked and chilled foods for preventing microbiological contamination. To increase the shelf life, new technical inventions such as packing with inactive gases are utilized in many new age foods. However the microbiological safety of these techniques is not verified yet. US and EU apply HACCP for the seafood industries which have high risks and in which people are interested about its healthy aspects.

**(d) Introduction of HACCP in phases**

The food industries are already making efforts to supply foods to consumers that are safe even before the introduction of HACCP. Fish decreases in freshness immediately and become easily contaminated by

microbes. Therefore, HACCP must be introduced and improved upon in phases.

**(e) HACCP monitoring equipment**

HACCP is based on the control and monitoring of critical control points in as close to real time as possible. Sensors and indicators with high sensitivity, high accuracy and high specificity are needed. In the future, the developments of biosensors and non-destructive monitoring equipment would be unavoidable.

**(f) Protection of the companies' secrets**

HACCP requires the recording of important critical control points and its data, which are the secrets of the company, such as machine name, layouts, flow diagrams, material used, recipe, pH, and cooking temperature and time. The protection not to leak such secrets is very important. The privacy of the data and know-how accumulated should be respected.

# Reaching Equivalence through the Application of HACCP

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## ■ ABSTRACT

*Globalization of fish trade has focused on strengthening measures taken to ensure the safety and quality of fish and fishery products. The application of HACCP based control system is the choice of major fish importing and exporting countries, with the expectation that the exporting country will meet similar or equivalent HACCP requirement. However, in practice, there are large differences in the current HACCP-based regulations and system for fish and fishery products. The paper discusses the concept of equivalence as appeared in the WTO sanitary and phytosanitary agreement and various countries' regulations and the procedures for determining equivalence. The relation between HACCP and equivalence agreement, including steps and lesson learnt in reaching equivalence agreement on inspection and control system for fish and fishery products between countries will be elaborated.*

## ■ Introduction

A common issue in all seafood consuming nations is the concern over safe, high quality and accurately described food at the lowest possible price. With increased economic integration of world economies, including expanding trade in seafood as primary and value-added products, the importance of sanitary and quality standards has been elevated. Countries often have elaborate programmes for the assessment and management of risk to determine the measures needed to ensure safe food supplies for humans and to protect consumers' health. The diversification of foods, of non-traditional production methods and of sources of supply have also given impetus to the application of food quality standard, which address attributes other than food safety and which are intended to facilitate commerce and protect consumers against deception and fraud. The WTO recognizes the right of countries to maintain such measures subject to the requirement that

the measures do not arbitrarily or unjustifiably discriminate between countries where the same conditions prevail, or are not a disguised restriction on international trade (Article XXb) (GATT, 1992). The SPS Agreement recognizes that there may be varied ways of ensuring food safety in different countries, but provides that WTO members should accept each other's regulations as equivalent whenever the same level of human, animal or plant health protection is achieved. Thus, mutual recognition agreements acknowledging the equivalence of health protection measures enforced by different approaches are negotiated on a bilateral or regional basis, and can help, for example, overcome any lack of international standards.

The concepts of harmonisation, equivalence, mutual recognition, and food safety assurance measures have a key role to play in international trade of food.

## ■ Harmonisation of Fish and Fishery Products Standard

Harmonisation of standards means the adoption of the same standards by different countries. Typically, the reason countries seek to harmonise their standards with other countries is so that they may trade more freely with each other. Where harmonised standards are in place, fish and fishery products produced in a country to meet its standards will be capable of being sold freely in another country which applies the same standards. The absence of harmonised standards will result in increased costs for food exporters and importers. Another incentive to international harmonisation is that if countries are able to rely upon a common authoritative source of food standards there will be less need at the national level to devote scarce technical resources to the formulation and validation of unique national standards.

Additional impetus towards harmonisation is given

by the obligation which members of the WTO have accepted under the SPS and TBT Agreements to harmonise their measures with relevant international standards, including Codex norms, wherever appropriate. Under the SPS Agreement, WTO members may be called upon to justify a decision to apply a measure which is more trade restrictive than would be consistent with a relevant Codex standard, guideline or recommendation. Under the TBT Agreement, members proposing to make a technical regulation which is not in accordance with a relevant international standard and which may have a significant effect on trade are required to advise other Members, explain their intentions and take comments into account.

If standards are to be applied in common between different countries they must meet the requirements of each country in terms of protection of consumer health and protection against deceptive or fraudulent practices. Each country has the sovereign right to determine the level of health protection the food standards should provide for their populations, and this level can and does vary from one country to another. Moreover there is great diversity worldwide in dietary patterns and the circumstances in which food is handled and consumed. Despite this diversity it has been possible for Codex to develop international food standards which can and do provide the focal point for harmonisation.

### 1. Harmonisation: Related activities

To date, there are only 16 Codex standards for fish and fishery products They are:

- Canned Salmon, CODEX STAN 3-1991, Rev. 1-1995
- Canned Shrimps or Prawns, CODEX STAN 37-1991, Rev. 1-1995
- Canned Tuna and Bonito, CODEX STAN 70-1981, Rev.1-1995
- Canned Crab Meat, CODEX STAN 90- 1981, Rev.1-1995
- Canned Sardines and Sardine-Type Products, CODEX STAN 94 –198, Rev. 1-1995
- Quick Frozen Lobsters, CODEX STAN 95-1981, Rev 1-1995
- Canned Finfish, CODEX STAN 119-1981, Rev. 1- 1995
- Quick Frozen Blocks of Fish Fillet, Minced Fish Flesh and Mixtures of Fillets and Minced Fish Flesh CODEX STAN 165-1989, (Rev. 1-1995)
- Quick Frozen Fish Sticks (Fish Fingers), Fish Portions and Fish Fillets — Breaded or in Batter CODEX STAN 166-1989, Rev 1-1995
- Dried Shark Fins, CODEX STAN 189-1993
- Salted Fish and Dried Salted Fish of the Gadidae Family Of Fishes CODEX STAN 167-1989, Rev. 1-1995
- Quick Frozen Raw Squid, CODEX STAN 191-1995
- Quick Frozen Fish Fillets, CODEX STAN 190-1995
- Quick Frozen Shrimps or Prawns CODEX STAN 092-1982, (Rev. 1-1995)
- Quick Frozen Finfish, Uneviscerated and Eviscerated CODEX STAN 36-1981 (Rev. 1-1995)
- Sensory Evaluation of Fish and Shellfish in Laboratories CAC-GL 31-1999

The Code of Practices for Fish and Fishery Products is currently under revision to incorporate HACCP concepts. The revised Code of Practices includes two standards directly related to ASEAN countries, i.e., Fish Cracker (which was already proceeded for adoption as Codex standard in the 24<sup>th</sup> meeting in June 2000) and Salted Anchovies (which is pending at step 6, due to the request of Thailand for consideration of not using histamine as a decomposition index). A new standard will be drafted for the 25<sup>th</sup> session in 2002 which includes standard for scallop meat.

### 2. Harmonisation: Issues for the future

Codex norms will achieve wider use as a basis for international harmonisation the more effectively they meet the needs of the 165 member countries of the Codex Alimentarius Commission. Member countries need standards which are technically sound and which fully address contemporary risks, whether these risks are to human health or are risks of deception or fraud. In addition, countries need standards which have a high degree of credibility with both consumers and trading partners, and which are capable of being applied by both developing and developed countries. The following considerations are therefore particularly important:

- Codex standards which address health risks must be based on sound science and thorough risk analysis, following agreed principles.
- Codex standards must be based on consensus.
- Codex standards must be developed in a transparent manner which aids acceptance by consumers and therefore by member countries.
- Codex standards must address contemporary health and trade issues, whenever possible anticipating the need for work in new fields.

- Codex standard, in particular fishery product standard should be open for as many species being traded internationally as possible.

On the last of these points, the ASEAN countries need to consider to what extent and how it can assume a leadership role in the development of standards which address regional differences in fish species, products and climate, microbes and new and emerging issues of the region. At present there is, for example, an increasing propensity for countries to develop and implement quantitative limits on microbiological contaminants. Historically, the members of Codex have elected to await the development of a degree of convergence between the separate national approaches of the major developed countries before deciding that an applicable Codex norm should be developed. Such will continue to be the case if the consensus basis of Codex norms is to be preserved. Thus the question is how the framework and mechanisms which the Codex system provides can be better used to facilitate the development of consensus on the basis of which appropriate new norms can be elaborated.

### 3. Harmonisation: Recommendations

The Codex Alimentarius system has a long history of producing technically credible food standards through a consensus approach. The challenge for ASEAN now is to enhance:

- Participation and inputs of ASEAN countries in CODEX/COA meeting.
- Standards for regional products traded internationally.
- Science based information to support development of standards, practices and control measures.
- Addition of species to existing species specific standards.
- The utilisation of Codex standards at national level.

#### ■ Equivalence

The process leading to the preparation of an international standard can be lengthy and costly. Reaching consensus on technical details can take several years. The time gap between the adoption of an international standard and its implementation by national regulators can also be significant. Equivalency is the best option when harmonization of standard is not desirable or when international standards are lacking or inappropriate. For ASEAN countries, which face

climatic, developmental and technological conditions rather different from those prevailing in many importing countries, the recognition of equivalency of their inspection and control system to those applied by importing countries would represent the key instrument to enhance market access for their products.

For these reasons, negotiators introduced in the WTO — TBT and SPS Agreement a complementary approach to technical harmonization, known as equivalence. Technical barriers to international trade could be eliminated if members accept that technical regulations or SPS measures different from their own fulfil the same policy objectives even if through different means.

An importing country usually judge the safety, wholesomeness and other attributes of imported food, but these attributes cannot necessarily be reliably and efficiently ascertained by inspecting products at the time of importation. It is an increasing practice for the regulatory authority of an importing country to rely upon the effectiveness of food inspection and/or certification measures undertaken in the exporting country. However food inspection and certification systems operating in exporting countries often differ from those in the importing country, and such variation may be evident in any component of a food control system. International recognition of the legitimacy of diverse approaches has led to the principle of equivalence being included in trade agreements.

WTO encourages countries to give consideration to accept as equivalent the measures of other members, even if these measures differs from their own or those used by other countries, if the exporting countries demonstrate that its measures achieve the the importing member's appropriate level of health protection (Article 4: "Members shall accept the sanitary and phytosanitary measures of other Members as equivalent, even if these measures differ from their own or those used by other Members trading in the same product, if the exporting Member objectively demonstrates to the importing Member that its measures achieve the importing Member's appropriate level of sanitary or phytosanitary protection. Members shall, upon request, enter into consultations with the aim of achieving bilateral or multilateral agreements on recognition of the equivalence of specified sanitary or phytosanitary measures." )

The TBT Agreement (Article 2.7) states: "Wherever

appropriate, Members shall specify technical regulations based on product requirements in terms of performance rather than design or descriptive characteristics.”

In relation to the application of the principle of equivalence to food, the CAC has adopted *Principles of Food Import and Export Inspection and Certification* which state: “Countries should recognise that different inspection/certification systems may be capable of meeting the same objective, and are therefore equivalent. The obligation to demonstrate equivalence rests with the exporting country.”

The Codex Alimentarius Committee has also adopted *Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification Systems* which states (Section 5): “The recognition of equivalence of inspection and certification should be facilitated where it can be objectively demonstrated that there is an appropriate system for inspection and certification of food by the exporting country in accordance with these guidelines. For the determination of equivalence, governments should recognise that:

- inspection and certification systems should be organised for the risks involved, considering that the same food commodities produced in different countries may present different hazards; and
- control methodologies can be different but achieve equivalent results. Controls on imported food and domestically produced food should be designed to achieve the same level of protection.

Applying the concept of equivalence to different food control sanitary measures used in different countries according to the provisions of the WTO Agreements has a number of benefits such as:

- Maximising food safety outcomes and improvements in public health for a given level of resource input, for both exporting and importing countries.
- Facilitating food control systems that apply innovative, risk-based sanitary measures.
- Decreasing reliance on routine end-product testing (eg at port of entry), which may be of limited effectiveness in protecting public health;
- Decreasing reliance on certification.
- Promoting harmonised food standards in different countries.
- Achieving comprehensive bilateral or multilateral agreements on the equivalence of overall food control systems in different countries.

## 1. Equivalence: Related activities

Equivalency of regulation is at present taking place, as for example, among the member countries of the European Union (EU), among those of the North American Free Trade Agreement and more recently, between Australia and New Zealand. In case of the EU, even though there is an EU decision explicitly stating that nations were free to maintain and enforce their own regulations for products produced within their jurisdiction but that they could not legally prevent their citizens from consuming the products that meet legal standard of another country, as long as they offered equivalent level of protection of the public interest issues.

However, it seems that where technical regulation play a significant role, equivalency only works if there is a formal arrangement or harmonized standard has been developed. This is particularly the case when there are serious concerns about health and safety. In February 1995, the EU Council agreed to a mandate authorizing the Commission to conduct negotiations with a view to the conclusions of agreements with the third countries on sanitary and phytosanitary measures. Following this mandate, the EU Commission has conducted negotiations with a number of countries. Agreement has been concluded with New Zealand in 1997, USA in 1999 and Canada in 1999, while negotiations are continuing with Australia, Argentina, Uruguay and Chile. Negotiation with Thailand was initiated in 1998, however due to lack of staff and priority from EU side progress has been very slow. The EU agreement with those countries is aimed at facilitating trade in live animal and animal products including fish and fishery products.

The NAFTA Treaty for Mutual Recognition of SPS measures if exporting country’s regulation achieves the importing country’s appropriate level of protection. The burden of proof is on the exporter. If the importing country does not accept the exporting country’s SPS measure as equivalent, then it has to give reasons in writing upon request (Article 714). The final decision about equivalency stays with the authorities of importing country that take decision on a case-by-case basis. Currently, there is no equivalency agreement among NAFTA members on SPS measures. The US and Canada is in the process of developing equivalency agreement on Fish Inspection and Control System. Once the technical issues are solved, there are still the process of drafting the agreement, public hearing and conclusion

of agreement, as required by the procedures set by USFDA in entering into agreement.

Australia and New Zealand have agreed, under the Trans Tasman Mutual Recognition Agreement, to recognize each other's regulation on food. This means that a product legally sold in one market can be sold in the other without having to comply with additional requirements. In the food sector, the two countries have implemented mutual recognition of their respective regulations. A joint food standard system has been in operation since 1999 through Australia—New Zealand Food Authority (ANZFA).

The Government of Canada and Thailand established the Equivalence Agreement on Fish Inspection and Control System in 1998. The agreement aimed at facilitating trade of fishery products between the two countries. Details of this agreement will be elaborated in the following section.

There are guidelines for the recognition of equivalence and development of agreement regarding food import and export inspection and certification systems developed by major importing countries include USA, EU, Australia and New Zealand, Canada and etc. These countries guidelines are based on Codex principles that:

- Legal authority exists to discuss and enter into such agreement.
- Consultation between two parties takes place.
- Importing country provide information on food safety objective to exporting countries.
- Exporting country demonstrates that its own food safety control achieves importing country food safety objective or level of protection.
- Agreed (preferably CODEX) standards, recommendations, and guidelines be used.
- Exchange or review of information that include:

- Legislative framework

Both responsible authorities should have the authority, based on adequate legislation, to establish and enforce regulatory requirements. Legislation should provide the necessary authority to carry out controls at all stages of raw materials, holding, handling, transporting, processing, packaging, and trade in fish and fishery products.

- Control program and operations

Appropriate policies and procedures for conducting inspections should formally document inspection working methods and techniques.

The inspection program should be based on identified objectives and appropriate risk evaluation. In the absence of sufficient scientific information, inspection programs should be based on the authority's best scientific judgment, taking into account current knowledge and practice. Procedures should be in place to ensure that inspections are carried out using priorities based on risk, to address known or suspected non-compliance situations; and in a coordinated manner between different regulatory authorities, if several exist. Both responsible authorities should identify the main objectives to be addressed by their fish and fishery products inspection and control systems. Where different authorities in the same country have jurisdiction over different parts of the food chain, conflicting requirements should be avoided to prevent legal and commercial problems and obstacles to trade. This system should include, but not be limited to:

- The responsible authority should have in place a management structure that can set priorities, establish policies, decide personnel issues, and monitor that authority's activities.
- The responsible authority should have in place an effective code of ethics for its personnel, addressing both bribery and conflict of interest, with effective means of taking action to prevent or correct problems.

- Decision criteria and actions

- Facilities, equipment, transportation and communication as well as basic sanitation and water quality. The responsible authority should have in place the necessary controls, procedures, standard setting mechanisms, enforcement options, facilities, equipment, laboratories, transportation, communications, personnel and training to support the objectives of the fish and fishery products inspection and control program.

- Laboratories, including information on the evaluation or accreditation of laboratories, and evidence that they applied internationally accepted quality assurance techniques. Each party should have in place a system for requiring the reliability of laboratories used for sample analysis. Laboratories should demonstrate that they have consistently acceptable performance through programs that include adequate quality assurance

controls, the use of validated analytical methods, and other measures necessary to document the reliability of test results.

— Details for assuring competent and qualified inspection, through appropriate training, certification and authorization of inspection personnel, the number and distribution of inspectors. Training for inspection personnel should include a standard basic level of training in the procedures and the scientific basis for conducting inspections, including the basic elements of sensory examinations; specialized and/or advanced training for specialists and advisory staff; and a program for continuously maintaining and upgrading the skills of inspection staff. Training for laboratory personnel should include instruction, where appropriate, in regulatory requirements, chemical, microbiological and sensory analytical methods, and maintaining the integrity of evidence.

— Procedures for audit of national systems, including assurance of the integrity and lack of conflict of interest of inspection personnel. Each party should periodically conduct self-assessment or third-party audits at various levels of the fish and fishery products inspection and control system, using internationally recognized assessment and verification procedures.

— Details of the structure and operations of any rapid alert system.

Currently, there are negotiation among countries for equivalence agreement on fish inspection and control system. However, the process are still under development due to the fact that :

- Document review process or side by side comparison is time consuming requiring thorough examination of legislation, authority, policy, procedures, capacity, capability, competence. This process often takes years for both exporting country to prepare the document and years for reviewing of another party.
- Differences in culture and structure of law, make it usually difficult to identify single authority for overall control of system, especially if two-way agreement is being negotiated.
- Differences in policy, procedures, methods is often the case of different inspection and control system, while judgement of equivalency is still qualitative. In most cases it cannot be concluded that different

procedures can produce same level of protection. This often results in compromising measures to deal with differences or each party has to still meet another country's standard or use measures as prescribed by the law of another contracting party.

- Judgement of equivalence of food control systems in different countries is a critical issue. It is evident that international guidelines are needed for systematic application. Codex principles and guidelines associated with determination of equivalence will facilitate this process. In this respect, the Codex Committee on Food Import and Export Certification and Inspection Systems (CCFICS) has developed the Guidelines for the Development of Equivalence regarding Food Import and Export Inspection and Certification Systems, and Guidelines for Judgement of Equivalence.
- Product standard is still being used as appropriate level of protection while there is not always a standard existing for every hazard. In addition meeting standard does not always guarantee safety.

## 2. Equivalence: Issues for the future

Currently, determination of equivalence is based on qualitative assessment. However, the concept of performance standard based on quantitative risk assessment are being considered, but still under development.

As interest in applying the concept intensifies in exporting countries, so does the need of importing countries for methodology which will allow them to make judgments in an objective and coherent way about whether proposed standards and systems are equivalent to their own internal requirements. Agreed methodology for judging equivalence is urgently needed. International recognition methods is preferable. The absence of guidance from Codex will be a severe disadvantage if a WTO dispute settlement panel or Appellate Body is called upon to rule whether a member country has proceeded appropriately in whether equivalence has been objectively demonstrated by the exporting party.

Usually, importing countries will give priority to negotiate to a country that have significant trade volume and those who have a history of good compliance. All in all, negotiation also depends on politics and trade issues between the two countries as well.

One of the most challenging area in equivalence

recognition is the assessment of equivalence through audit of contracting party's fish inspection and control system. The contracting party must be able to maintain the equivalence. This is usually done by onsite review of fish inspection and quality control system of regulatory agencies and review of industry control performance. To date, there is no standard audit procedures and guidelines for assessment of results. Audit procedures is usually based on ISO 10011 and the Codex Committee on Food Import and export Certification and Inspection System has developed guidelines for audit. The success of the audit will depend on consultation of purposes, objectives, procedures and scope between the two parties, otherwise this exercise will only serve the assurance of compliance to standard or procedures of a single party.

### 3. Equivalence: Recommendations

Development of Codex guidance on the judgment of equivalence, initially in a generic sense and subsequently in relation to specific topics such as equivalence of inspection and certification systems, and measures to ensure food hygiene.

It should be noted that while such guidance is needed urgently Codex processes are unlikely to allow finalisation of guidelines on this topic until 2003 or later.

ASEAN countries should give attention to the development of the guidelines as well as to prepare the research program on risk analysis to prepare for the development of level of health protection

#### ■ Hazard Analysis and Critical Control Point (HACCP)

In the 1990s, the EU, Canada and the US initiated seafood safety regulations that follow HACCP plans. HACCP principles stress identifying where hazards are likely to occur in a processing chain, the critical control points for the hazards, preventative measures to be taken to keep hazards within critical limits at each critical control point, establishment of monitoring procedures, clear response to deviations of critical limits at each critical control point, record keeping, and continued validation and updating of the HACCP system. Consistent sets of HACCP principles have been set by the United Nation's food standards body, the Codex Alimentarius Commission. While Codex has adopted the HACCP principles, they

do not give detailed guidance on implementation. The plans in place apply to both domestic supplies and imported supplies.

Under the Food and Drug Administration (FDA) procedures, US suppliers of seafood are required to have a HACCP plan of their own, and to obtain HACCP plans from their foreign suppliers or otherwise ensure that the suppliers' programmes are equivalent to the US's. The EU and Canadian plans, while initiated earlier, have a similar focus. For regulators, trade facilitation is an important but secondary goal of HACCP adoption. Importers are required to take affirmative steps to ensure that their suppliers are in compliance with HACCP. The programme offers several ways to meet this requirement, including inspecting overseas plants, obtaining certification of foreign inspections, or testing the product. This requirement is deemed to have been met if the importer's foreign supplier is located in a country that has entered into a mutual recognition agreement (MRA) for seafood with the US. A MRA would establish that the foreign country has in place a mandatory, HACCP-based safety system equivalent to the US system.

### 1. HACCP: Related activities

Application of HACCP in the seafood industry has caught global interests since 1996. The seafood industry worldwide has responded to the implementation, training and audit of HACCP, while regulatory control agencies has progressively developed a HACCP-based control system.

Training modules and materials, technical information and references, websites on HACCP has been widely available for the industry, government, research and academia.

Training courses on HACCP principles and application, HACCP audit and advanced implementation are available from international organizations, Governments, private consulting firms and academia worldwide.

For the past four years, positive reports from various seafood producing, exporting and importing nations on HACCP implementation has been published and discussed in various regional and international forums. HACCP concepts applied internationally are based on CODEX principles and steps for application. However, as the implementation procedures are left open, there appears to be different



expectations largely from importing nations on:

- Documentation of HACCP programme or HACCP plan, details of information to be maintained or established.
- Training of staff.
- Requirement for prerequisite and hygiene control.
- Hazard to be controlled.
- Hazard analysis procedures.
- CCP determination.
- Control and monitoring procedures to be used.
- Critical limits to be applied.
- Corrective actions and control of process and products required.
- Records to be kept, retention time and procedures.
- Verification of HACCP system and validation of critical limits.

In addition, on the part of regulatory agencies, whether a HACCP regulation is necessary, knowledge

and experience of inspectors, standard procedures for HACCP audit, supported fund and availability of staff.

In relation to harmonization, guidelines for regulatory HACCP audit and HACCP documentation is necessary, to ensure consistent approaches by different countries and authorities.

In relation to equivalency, regulatory HACCP-based programmes becomes an essential part for equivalency determination, especially where importing countries regulate HACCP in their food control measures. Only the USFDA and EU spell out very clearly the requirements of HACCP for imported fish and fishery products. According to US Seafood HACCP regulation, the individual establishment must demonstrate their compliance to HACCP requirements in order to export products to US market. The establishment can demonstrate their compliance in various ways, through the importers (Table 1).

**Table 1: Procedures to Demonstrate Compliance to US Seafood HACCP Regulations**

Regulation	Description of procedures	References
USFDA	<p>Every importer of fish and fishery products shall either:</p> <ol style="list-style-type: none"> <li>1. Obtain the fish or fishery products from country that has an active MOU or similar agreement with USFDA that covers fish and fishery products.</li> <li>2. Have and written verification procedures. The procedures shall list at a minimum:               <ol style="list-style-type: none"> <li>2.1 Product specification that are designed to ensure that the product is not adulterated.</li> <li>2.2 Affirmative steps that may include any of the following:                   <ol style="list-style-type: none"> <li>(1) Obtain from foreign processor the HACCP and sanitation monitoring records with specific-to-specific lot of fish or fishery products being offered for import.</li> <li>(2) Obtain either a continuing or lot-by-lot certificate from an appropriate foreign government inspection authority or competent third party.</li> <li>(3) Regular inspection of foreign processors facilities by importers.</li> <li>(4) Maintaining on file a copy (in English) of the foreign processors HACCP plan.</li> <li>(5) Periodically testing the imported products, and maintaining on file a written guarantee from the foreign processors that product is processed under HACCP.</li> <li>(6) Other verification measures as appropriate that provide an equivalent level of assurance of compliance with the requirement.</li> </ol> </li> </ol> </li> </ol>	21 CFR Parts 123 and 1240; Section 123.12 Section 402 of the Federal Food, Drug and Cosmetic Act

In order for a country to establish a MOU under US Seafood HACCP regulation, the government authority in the exporting country must demonstrate that their HACCP based control programme is equivalent not only to US Seafood HACCP regulation but other regulations as well.

Until now, there is no MOU between FDA and any authority in an exporting country, although the discussions on MOU between USFDA and Canadian Food Inspection Agency were well advanced, and FDA has for the past three years discussed with various countries such as New Zealand, Japan, Thailand, Ecuador, Iceland, etc. According to FDA, none of the 6 affirming step are superior to the rest. FDA has published on 16 April 1998 a "List of Foreign Processors Approved by Governments" covering three countries: Canada, New Zealand and Thailand. The list is based an affirmative steps 2.2 (2). This alternative is an affirmative step that involve the participation of inspection authority in exporting country without reaching equivalence agreement. This step is to avoid the extensive use of certificate from exporting countries.

As for the EU, the approved processors must implement own "check-system" according to EU Directive 91/493 and EC Decision 94/356 to be approved by competent authority and authorized for export by the EU Commission. For harmonized country, where the system of fish inspection of the competent authority is recognized as equivalent to EU, the competent authority is responsible to ensure that the approved establishment consistently complies to EU Directives, as follows:

- EC Directive 91/492/EEC (Health conditions for the production and placing on the market of bivalve mollusc products)  
Other relevant legislation include:
- Fishing vessel
- Potable water Directive 98/83/EC
- Drug Residue Directive 96/23/EC
- Additives authorized in fishery products (Directive 95/2/EC)
- Decision 93/140/EEC — Parasite
- Decision 93/351/EEC — Mercury
- Decision 93/51/EEC — Microbiological criteria, shellfish/crustaceans
- Decision 95/149/EC — TVB-N
- Decision 95/328/EC — Health Certificate
- Directive 88/320/EEC — Good Laboratory Practices
- Regulation EC No 2406/96 — Organoleptic criteria

## 2. HACCP: Issues for the future

Even though application of HACCP in the fishery industry is making progress, it is recognized that the past five years is a learning experience for both the industry and regulatory agencies. It was discovered that there are regulations that does not support the implementation of HACCP existing in all countries, especially those that require lot by lot testing, or regulation that require non safety issues determination.

For industry application, weakness in technical knowledge for hazard identification and analysis do exist. Education, training and information dissemination should still be continued especially for a more quantitative assessment of risk and significance of hazard.

Validation of critical limits is an urgent issue to be complied by the industry. Technical research is urgently needed.

HACCP documentation and records are issues to be sorted at international level. Currently, it seems like the industry is cutting the tree to build the HACCP programme, where a lot of information both useful and non useful are required to be kept and maintained.

Verification of the effectiveness of HACCP plan and programmes must be implemented by the industry or third party as appropriate. The industry still relies on regulatory verification and third party. However, the objective of regulatory verification is far broader and is at random, this may not in all cases indicate the effectiveness of industry's HACCP control programs.

Harmonization of regulatory verification at national level, where there are many agencies providing services; at international level or at regional level, where hazards, or production conditions are alike, will serve the effectiveness of HACCP implementation by the industry and the credibility of regulatory audit as well.

HACCP is often only required for products for export. HACCP concepts should be applied at all levels from primary production through marketing of products. Small scale processors usually face technical limitation, and need to be assisted.

## 3. HACCP: Recommendations

ASEAN countries should continue to works jointly on hazard identification and hazard analysis for regional raw materials or products. Research work on microbiological and chemical hazards related to raw

materials, process environment and products of the region should be carried out regionally.

Research work to support risk and significant analysis for hazard is useful and should be looked into. ASEAN should consider compiling a regional fishery product hazard and control guides. A harmonized HACCP system for implementation and audit within the region is recommended.

Small scale and domestic processors should be assisted to ensure implementation of HACCP for the whole industry.

## ■ Conclusion

The establishment of Mutual Recognition Agreements (MRA) on the equivalence of fish inspection and control systems based on HACCP is the aim of fish exporting nations in the absence of harmonized standards. MRA is the outcome of a process of evaluation which leads two or more countries to agree that the standards and/or associated systems employed by each country are such as to allow goods marketed in one country to be freely marketed in another country which is a party to the agreement. The purpose of such agreements is to allow goods to flow more freely in international trade, unimpeded by differences in the national requirements of trading partners, provided that each participating country's appropriate level of protection is achieved. Typically a MRA would facilitate trade by reducing or eliminating the need for inspection control of goods at the point of entry, relying instead on the effectiveness of control systems in the exporting country.

Mutual recognition may apply to all foods traded between countries which are a party to an agreement or only to specified foods, and to all requirements applicable to specified foods (including food standards) or only some (such as conformity assessment procedures). Countries may elect to enter into an umbrella agreement consisting of general provisions and specific sectoral arrangements made under the umbrella agreement.

The feasibility of establishing mutual recognition will be greatest between countries which have broadly similar attitudes to the appropriate level of protection against health risks or deception of consumers, and between countries which have

broadly similar capabilities in relation to the monitoring and enforcement of requirements. Mutual recognition is more likely to be established between countries which are in some kind of political or legal association with each other; often such countries will be neighbours with a long tradition of trading food. To date most MRA is limited to a government to government certification arrangement; examples are EU, Australia and New Zealand, Japan and the trading partners. There are a few cases of equivalence arrangements, where the importing countries agreed that the inspection system of the exporting country deliver an equivalent food safety outcome that is delivered by the system in place in importing countries, such as the MRA between Thailand and Canada.

An exporting country will have to demonstrate and prove that their system can provide acceptable level of protection. Initiative has to be made by importing countries for consultation, exchange of information, evaluation and assessment of equivalence both qualitatively and quantitatively. Assurance of food safety protection cannot be provided by HACCP system alone but HACCP is an integral part. Therefore, implementation of HACCP by industry and an integrated HACCP-based food safety control system operated by the regulatory agency is crucial for MRA development.

## ■ Mutual Recognition Agreement (MRA): Recommendation

In the development of MRA, the individual country should:

1. Document its legislation, policy and procedures relating to fish safety and quality control. The document must describe all information as recommended by Codex.
2. Law or legislation may need to be reviewed to cover or spell out clearly control from water to marketing, and controlling of non-complying products. In addition, it has to be HACCP based.
3. For some ASEAN countries, authority for inspection and control of fishery products is not by one authority. Technical competent authority usually do not have full legislative authority for inspection and quality control but mainly for research and development as well as conservation enforcement.

This creates an even more difficult position in negotiating equivalence agreement. The authority to establish agreement has to be clear.

4. Laboratory system is one of the components to be also considered for equivalence. The laboratories have to implement quality system equivalent to ISO 17025. Some countries prefer that the laboratories are accredited. More importantly, laboratory collaboration to ensure reliability of test results is a prime concern.
5. Perform the internal audit of the effectiveness of the fish inspection and control system.
6. Maintain competence of personnel involved in the system.
7. Maintain close consultations with importing countries relating to procedures, guidelines, and framework for establishment of equivalence agreement.

Regulatory agencies in ASEAN need to network to cover inspection and control activities so as to strengthen their control system and image as regional bodies, to deal with issues related to technical information, standard, code of practice at international level. This will in the future lead to a regional MRA once the system is well established in all countries. An example of the networking in other region such as the MERCOSUR countries should be followed.

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**Country**

**Papers**



# Brunei Darussalam

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### ■ Export of Fishery Products

The total commercial exports of seafood products in 1999, was 425 tonnes, to countries such as Hong Kong, Japan, Egypt, Taiwan and Malaysia. The products include frozen shrimp, live fish and lobster and fresh chilled fish.

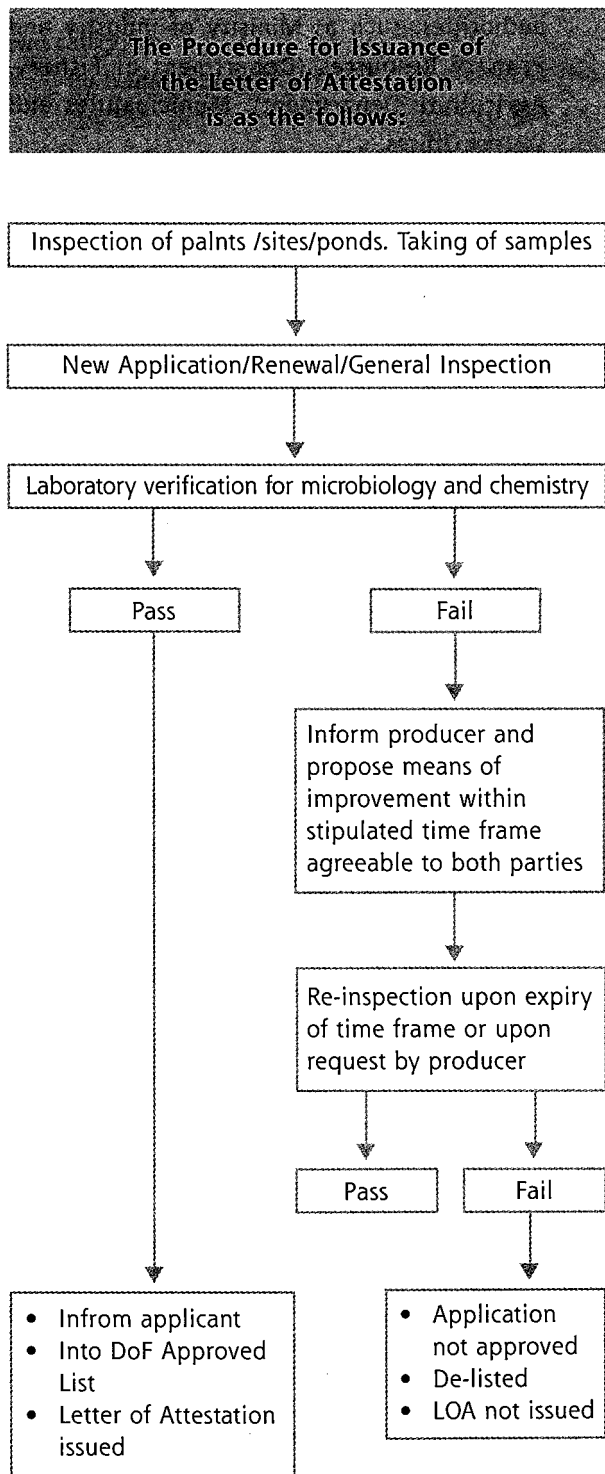
Even though the volume is "minute" as compared to the other Asian countries, the issues faced in respect of product control, inspection and subsequently procedures allowing exportation of these products are believed to be similar to the others. Although the importing countries concerned has not made the implementation of HACCP as a pre-requisite requirement for Brunei Darussalam's product to enter their country, however, they do require Health Certification from relevant authorities. In this respect, Brunei Darussalam has only been able to do in the form of Letter of Attestation (LOA).

These Letters of Attestation are issued administratively by the Department of Fisheries since 1998. The issuance of a Letter of Attestation is based on the Guidelines provided by Codex as well as adhering to the specific requirements of the importing countries concerned, such as microbiological and chemical limits.

### ■ Seafood Quality and Safety Assurance Program in Brunei Darussalam

The food manufacturing industry including seafood industry in Brunei Darussalam has to be operated within the guide lines provided by pertinent laws and regulations. These are:

- The Municipal Boards Act (1984) and the Miscellaneous Licensing Act (1978).
- These Acts are under the executive purview of the Municipalities and the District Offices.
- They encompass the aspects of inspection of premises of food preparation, outlets and places where food are sold to the general public.



- Inspections are done by appointed officers of the Ministry of Health.
- Compliance is assured through conditions of the license issued under these Acts.
- These Acts however need improvement in specific areas required by seafood processing plants as those stated by Codex.
  - Food Safety Act and Regulation (1998)
- This Act is under the executive purview of the Ministry of Health, with liaison with other relevant authorities, such as Ministry of Industry and Primary Resources (Department of Fishery, Agriculture Department), Municipalities and District Offices.
- The Regulation lay down specific requirements, chemical and microbiological standards, labeling, composition, etc for foods industry including fish and fish products.

#### ■ **HACCP Implementation in Brunei Darussalam**

Even though the HACCP concept is still relatively new in Brunei Darussalam, its importance as the best tool currently available towards achieving the quality and safety levels required of food products produced is by no means unappreciated. Various government efforts had been made to initiate the implementation of HACCP into the food manufacturing industry.

The program includes introductory talks and seminars to various Government officials, as well as implementation of specific projects to set up HACCP program for specific food products through consultative joint projects.

In the seafood processing industry, introductory seminar on HACCP principles was first conducted for relevant officers in 1996. However, the implementation of the system is not yet widespread as in the other member countries of ASEAN. This is mainly due to the fact that most seafood processing plants in Brunei Darussalam are small, and usually only serving the local and the immediate neighbouring countries.

Therefore, there is hardly any “pressure” from importing countries, as experienced by the other exporting countries.

In addition, as most of the seafood processing plants are small, there is hardly any organized structure whereby the HACCP system could be implemented at a cost effective level, since in most cases, implementation of HACCP means minor to major changes to the existing plant or its operations.

To date, only one seafood-processing company is taking steps towards implementing HACCP in its processing plant. This is in readiness for the plant’s intention to export its products to the EU.

#### ■ **Conclusion**

Even though, the HACCP system has yet to be implemented in the seafood processing industry in Brunei Darussalam, it is however becoming more apparent that Brunei Darussalam will need to do so in the near future, if it is to maintain the safety and quality “edge” which had become synonymous with HACCP. Furthermore, several seafood processors intend to export their products to the EU. Therefore, Brunei Darussalam intends to initiate voluntary implementation of HACCP in seafood processing plants by 2001.



# Cambodia

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## ■ Introduction

Cambodia is situated in Southeast Asia between latitude of 8 and 12 degrees North and 120 to 108 degrees longitude East. The country occupies about 181,035 sq. km and has an estimated population of about 11, 437,655. Thailand borders on the northwest, Laos on the northeast and Vietnam on the east and southwest. The coastline extends for 435 km along the Gulf of Thailand.

Cambodia is rich in water resource. These include the Mekong, Tonle Sap and Brasac rivers and many of their tributaries. Next to rice, fish is the most important component of the Cambodian diet. Up to 75% of the population's animal protein requirement are said to have come from fish.

The Tonle Sap is one of the richest inland fishing lakes in the world. Fish products come from the inland, marine and aquaculture sources. Inland fisheries are based in the Tonle Sap, its adjoining river system and to a lesser extent, marine fisheries cover inshore and offshore areas. Aquaculture is practised principally in the inland areas of the country. The inland capture fisheries are Cambodia's most important fisheries, both in production and in terms of value. Fish production of inland and marine capture and culture are shown in Table 1.

## ■ Fish Processing Industry in Cambodia

Fish products in Cambodia can be divided into two categories:

- by traditional methods: fish sauce, smoked fish, dry fish, prahok, salted and fermented fish.
- by modern technology: frozen fish, shrimp, crab, cooked crab, dried fish, dried shrimp, salted fish, frozen pangasid, fish paste, frozen Sangoby, frozen prawn, frozen marine-fish.

Table 2 shows the total fish products from small, medium and industrial scale. Fish products exported by Cambodia is shown in Table 3.

**Table 2: Fish Products Processed in Cambodia 1999**

Name of Product	Fresh fish (tonnes)	Marine fish (tonnes)
1. Fish sauce	10,000,000 liters	4,000,000 liters
2. Dried fish	1162	82
3. Smoked fish	412	—
4. Cooked fish	—	513
5. Dried shrimp	41	53
6. Shrimp meat	—	239
7. Crab meat	—	224
8. Prahok	4297	—
9. Fish Powder	—	540
10. Dried ray	—	23
11. Phork	455	—
12. Dried squid	—	14
13. Salted fish	2033	—

**Table 1: Total Fisheries Production of Cambodia from 1997-1999**

Year	Fresh water fish (tonnes)	Marine fish (tonnes)	Cultured (tonnes)		
			Fish	Shrimp	Crocodile head
1997	73	29.8	11.534	266	17
1998	75.7	32.2	13.903	197	40.7
1999	231	38.1	14.938	62	25.38

Table 3: Fish Products Exported by Cambodia (tonnes)

Years	Country	Salting Fish	Drying Fish	Drying Shrimp	Grab Flesh	Frozen Pangasids	Smoking Fish	Prahok	Frozen Shrimp	Fish Paste	Frozen Sangoby	Frozen Prawn	Frozen Seafish	Total
1995	Singapore	0.370	49.427	—	—	—	—	2.444	—	1.675	—	—	—	55.075
	Malaysia	—	—	0.244	—	—	—	—	—	—	—	—	—	—
	Australia	—	1.481	—	—	—	0.050	—	—	—	—	—	—	—
1996	Singapore	—	1.286	—	—	—	0.469	—	4.737	2.140	—	—	—	8.634
	H K	—	—	—	—	—	—	—	0.460	—	—	—	—	—
	Malaysia	—	30.000	—	—	—	—	—	0.340	30.623	—	—	—	60.963
	Vietnam	150.000	—	—	—	—	—	—	—	—	—	—	—	—
	Australia	—	0.804	—	—	—	—	—	—	—	—	—	—	—
1997	Singapore	—	—	—	—	—	—	—	—	1.385	—	—	—	1.385
	H K	—	—	—	—	—	—	—	—	0.075	—	—	—	0.075
	Malaysia	—	0.825	0.384	—	—	0.312	—	—	5.468	—	—	—	6.989
1998	Singapore	—	0.030	—	—	—	—	—	0.144	—	—	—	—	0.174
	Malaysia	—	—	—	1.586	0.920	—	—	—	0.240	—	—	—	—
	Australia	—	—	—	—	4.900	—	—	—	9.356	—	—	—	22.512
	Thailand	—	0.360	—	—	—	—	—	—	—	—	—	—	—
	U S A	—	—	0.030	—	—	0.120	—	—	—	—	—	—	—
	China	—	—	—	—	—	0.090	—	—	—	—	—	—	—
1999	Singapore	—	—	—	—	—	0.101	—	0.090	—	7.284	0.089	0.196	—
	H K	—	—	—	—	—	—	—	—	—	1.259	—	—	—
	Malaysia	—	—	—	—	—	—	—	—	—	8.543	—	—	—
	Vietnam	—	—	—	—	—	0.805	—	—	—	—	—	—	—
	Australia	—	3.317	—	—	—	0.590	—	—	26.908	—	—	—	—
	Thailand	—	0.090	—	—	—	1.110	—	—	—	—	—	—	—
U S A	—	0.450	—	—	—	1.212	—	—	—	—	—	—	—	

## ■ Fish Inspection and Quality Control System

The Department of Fisheries (DOF) has legislation on:

### 1. GMP:

- Disease control
- Cleanliness
- Sanitary and operation
- Pest controls
- Processes and control
- Manufacturing operation

### 2. HACCP:

#### A. The HACCP plan

Every processor shall have and implement a written HACCP plan whenever a hazard analysis reveals one or more food safety hazards that are reasonably likely to occur for each kind of fish and fisheries products. HACCP plan shall be specific to:

- (i) Each location where fish and fisheries products are processed by that processor;
- (ii) Each kind of fish and fisheries products processed by the processor.

The plan may group many different types of fish and fisheries products together or group according to different production methods based on the food safety hazards, critical control points, critical limits and procedures.

#### B. Contents of the HACCP plan

The HACCP plan shall, at least list, the food safety hazards that are most likely to occur for each fish and fisheries product. Considerations should be given to whether any food safety hazards are likely to occur as a result of the following:

- (i) Natural toxins
- (ii) Microbiological contamination
- (iii) Chemical contamination
- (iv) Pesticides
- (v) Drug residues
- (vi) Decomposition in scrombroid toxin-forming species or any other species where food safety hazards have been associated with decomposition.
- (vii) Parasites, where the processor has knowledge or has reason to know that the parasite-containing fish or fisheries products will be

consumed without a process sufficient to kill parasites present or where the processor represents, labels or intends for products to be so consumed

- (viii) Unapproved use of direct or indirect food or colour additives
- (ix) Physical hazards

### C. Special requirements for exported products

This section sets forth specific requirements for exported fish and fisheries products.

Exporter verification — every exporter of fish or fisheries products shall either:

- (i) Have and implement written verification procedures for ensuring that the fish and fisheries products that the customers order for export into the International markets, are processed in accordance with the requirements of this part. The procedures shall list, at a minimum:

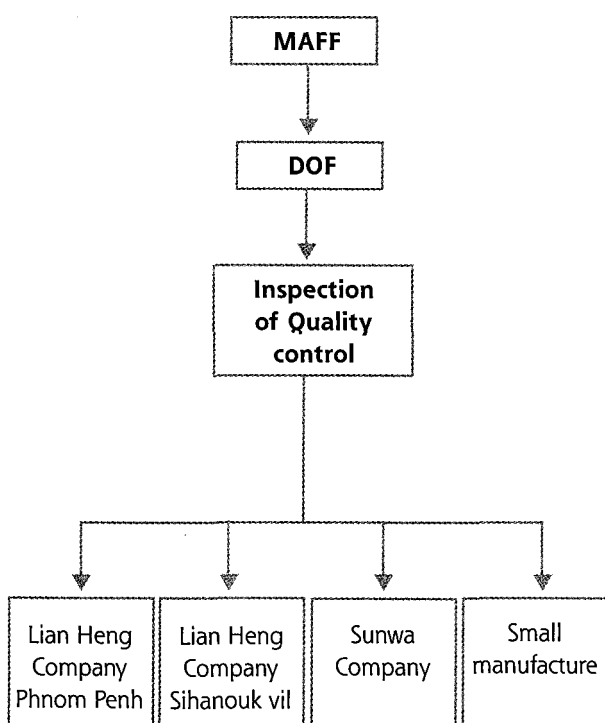
- Product specifications that are designed to ensure that the product is not adulterated/have been processed under unsanitary conditions
- Affirmative steps that may include any of the following:
  - Obtaining from the foreign processor, the HACCP and sanitation monitoring records. Required by this part that relate to the specific lot of fish or fishery products being offered for export
  - Obtaining either a continuing or lot-by-lot certificate from an appropriate foreign government inspection authority or a competent third party certifying that the exported fish or fisheries products have been processed in accordance with the requirements of this part
  - Regularly inspecting the foreign processor's facilities to ensure that the exported fish or fisheries products are processed in accordance with the requirements of this part
  - Maintaining on file, a copy in English of the foreign processors' HACCP plan, and a written guarantee from the foreign processor that the exported fish or fisheries products are processed in accordance with the requirements of this part;
  - Periodically testing the exported fish and fishery products and maintaining on file, a

copy in English of a written guarantee from the foreign processor to prove that the exported fish or fisheries products are processed in accordance with the requirements of this part; or

- Other such verification measures as appropriate that provide an equivalent level of assurance of compliance with the requirements of this part.

**D. Chart of inspection authority**

Inspection group of DOF controls HACCP team of factory that is responsible for implementation of HACCP system on processing line.



**E. Implementation of HACCP programme in Cambodia**

(i) Inspection group on quality control of DOF guide the HACCP team from the factory to do HACCP management such as:

- Raw materials
- Guarantee sheet

- Metal detector operation lot
- Result of detecting
- Report of freezing
- Corrective action report
- Equipment calibration report
- Training report
- Pest killing monitory
- Sanitizing agent
- Water quality control report
- Pest extermination check list
- Chemical and storage
- Daily sanitation report
- Periodic sanitation report

The factory send HACCP management to inspection group on quality control of DOF for each export lot. Inspection group on quality control of DOF inspect and verify the implemented HACCP program.

(ii) The implementation of HACCP program and its difficulty:

- Laboratory personnel do not have enough experience on quality control of fish processing.
- Laboratory has no materials and chemicals to examine samples.
- Not enough Legislation to manage HACCP

(iii) Strategy and policies:

- Training of staff
- Explain the HACCP system to processor
- Assistance from country with experience to improve HACCP program in Cambodia
- Develop laboratory facilities

(iv) Future plans and direction:

- Develop HACCP Program in Cambodia similar to country that has implemented good HACCP program.

— Reform legislation

(v) Case Study Lian Heng Trading Co. Ltd:

## PRODUCT DESCRIPTION

S/No.	Characteristic	Description
1	Product name	Block frozen shrimp HOSO, HLSO and PD
2	Raw material	<ul style="list-style-type: none"> <li>— Giant freshwater shrimp (<i>Macrobrachium lanchesteri</i>)</li> <li>— White shrimp (<i>Penaeus indicus, P. merguensis</i>)</li> <li>— Tiger shrimp (<i>P. monodon, P. semisulcatus</i>)</li> <li>— Yellow shrimp (<i>P. latisulcatus</i>)</li> <li>— Pink shrimp (<i>Metapenaeus ensis, M. affinis</i>)</li> </ul>
3	Method of transportation and raw material receipt	Raw shrimp received at catching areas, iced in plastic container at 0-5°C or 32°F-41°F and directly transported by refrigerated truck to factory. Maximum transport time less than 6 hours.
4	Raw material harvesting areas	<ul style="list-style-type: none"> <li>— For freshwater shrimp caught from downstream of Mekong rivers.</li> <li>— For marine shrimp caught from coastal areas in Shihanouk Vil, Thmor Sar and Kom Pot province</li> </ul>
5	Final products	Block frozen shrimp: 2,000g/block and 1,000g/block for HOSO, HLSO and PD.
6	Other ingredients	No
7	Processing steps	(1) Raw materials (2) Washings (3) Handling (4) Sizing (5) Washing (6) Weighing (7) Molding (8) Interim (9) Cooling (10) Freezing (11) Glazing (12) Packaging (13) Cold storage
8	Types of packaging	Block frozen shrimp: <ul style="list-style-type: none"> <li>— HSO, HLSO and PD: 2,000g/block in PE with 6 blocks per carton;</li> <li>— HOSO, HLSO and PD: 1,000g/block in PE bag with 12 blocks per carton</li> </ul>
9	Storage conditions	Finished products stored at < 18 °C or 0 °F
10	Transport and Distribution	At ≤-18 °C or 0 °F
11	Shelf life	12 months from production date
12	Labeling requirement	Name of products, types, size, net weight, production date, company' name and address, " Made in Cambodia", Expiry date, directions for use.
13	Intended use	Well cooked before eating
14	Intended customer	Human food, general public
15	Regulations, standards must be met.	According to recommended code of FAO/WHO-code NR-CAC/RCD 17-1978 and based on requirements of customers.

## PROCESS FLOW CHART

Product: Block frozen shrimp

Processing Steps	Main Technical parameter	Descriptions
Raw material receipt	Temperature of raw materials < 10°C or 50°F. Sensory evaluation of fresh raw materials according to FAO/WHO Code NR-CAC/RCD 17-1978.	Raw material are tested and evaluated based on FAO/WHO-Code NR-CAC/RCD 17-1978.
Washing	Washing water: 50ppm chlorine, 5°C or 41°F or less	Cleaning foreign matter from shrimp by washing in chilled potable water with 50ppm chlorine. Change washing water after every 50-60kg of fresh shrimp. Ice to be layered with shrimp if not processed immediately.
Heading, De-veining (HLSO) OR Heading, Peeling, De-veining (PD) OR Head-on, Shell-on (HOSO)	Temperature of shrimp: 5-7°C or 41-45°F	Ice must be layered on the shrimp enough to keep the temperature at 5-7°C or 41-45°F. Remove foreign matter (visual metal fragment, wood stick). According to type of product, shrimp are handled as follows: — manual headed and peeled — de-veined by small knife
Washing	Washing water: 20ppm chlorine, 5°C or 41°F.	Wash 2 times: — first, in chlorinated chilled potable water: 20ppm chlorine, 5°C or 41°F — then, in chilled potable water
Sizing	—	Sizing of products based on the size of finished products (count by amount of pieces per pound)
Washing	Washing water: 10°C or 50°F	Wash each batch of shrimp in chilled potable water (5°C or 41°F or less). Drain for 5 minutes.
Weighing and Molding	—	Must achieve a minimum nett weight on destination 2,000g & 1,000g for HOSO, HLSO and PD. Molding shrimp in tray accordance with the specification.
Interim cooling	Temperature: 5°C or less Time: 4 hours or less	If necessary, shrimp must be stored in chill store at 5°C or less
Freezing	Core temperature of product: < -12°C or 10°F, Freezing time < 5 hours	Freezing in contact freezer. Freezing time must be adequate to obtain a core temperature of < -12°C or 10°F, within 5 hours.
Glazing	Glazing water < 5°C or 41°F	Shrimp blocks must be glazed in chilled potable water (< 5°C or 41°F) Put into PE bags and seal.
Packaging Labeling Metal detecting	—	HOSO, HLSO and PD products put in Duplex box before packing into master carton. Detecting metal by running every block of shrimp through the metal detector. Packed in cartons. Cartons must be clearly marked with name of goods, type, size, net weight, production date, name and company's address, "Made in Cambodia", expiry date, directions for use.
Cold storage	Temperature -18°C or 0°F or less	Finished products must be kept in cold storage -18°C or 0°F or less

## HAZARD ANALYSIS WORKSHEET

Product: Block frozen shrimp

Ingredient/ pro-cessing step	Identify Potential hazards, introduced controlled or enhanced at this step	Are any potential food safety hazards significant? (Yes/No)	Justify your decision for column 3	What preventive measures can be applied to prevent the significant hazards?	Is this step a critical control point? (Yes/No)
1	2	3	4	5	6
Raw material receipt	BIOLOGICAL *Bacterial pathogen	No	Raw material must be well cooked before eating	—	—
—	CHEMICAL *Pesticide residue	No	*Not likely to occur because shrimp are harvested naturally in coastal areas far from the main agriculture areas and industrial areas.	—	—
—	*Aquaculture drugs	No	*Not likely to occur because shrimp are harvested naturally without using aquaculture drugs.	—	—
—	PHYSICAL *foreign matter (metal, wood stick)	Yes	Shrimp may be contaminated with metal, wood stick during harvesting and transportation.	In handling step (heading, peeling de-veining) and metal detection step, foreign matter will be eliminated.	No
Washing	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	No No	* Controlled by SSOP * Controlled by GMP	— —	— —
—	CHEMICAL *Chlorine residue	No	*Controlled by SSOP & GMP	—	—
—	PHYSICAL None	—	—	—	—
Handling (heading, peeling, de-veining)	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	No No	*Controlled by SSOP *Controlled by GMP	— —	— —

## HAZARD ANALYSIS WORKSHEET — Continued

Product: Block frozen shrimp

Ingredient/ pro-cessing step	Identify Potential hazards, introduced controlled or enhanced at this step	Are any potential food safety hazards significant? (Yes/No)	Justify your decision for column 3	What preventive measures can be applied to prevent the significant hazards?	Is this step a critical control point? (Yes/No)
1	2	3	4	5	6
—	CHEMICAL None	—	—	—	—
—	PHYSICAL *Foreign matter	Yes	*Foreign matter is not absolutely removed at receiving step.	Detect and remove at the packaging step by metal detector.	—
Washing	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	No  No	*Controlled by SSOP  *Controlled by GMP	—	—
—	CHEMICAL *Chlorine residue	No	*Controlled by SSOP & GMP	—	—
—	PHYSICAL None	—	—	—	—
Sizing	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	No  No	*Controlled by SSOP  *Controlled by GMP	—	—
—	CHEMICAL None	—	—	—	—
—	PHYSICAL None	—	—	—	—
Washing	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	No  No	*Controlled by SSOP  *Controlled by GMP	—	—
—	CHEMICAL *Chlorine residue	No	*Controlled by SSOP & GMP	—	—
—	PHYSICAL None	—	—	—	—



**HAZARD ANALYSIS WORKSHEET — Continued**

Product: Block frozen shrimp .

Ingredient/ pro-cessing step	Identify Potential hazards, introduced controlled or enhanced at this step	Are any potential food safety hazards significant? (Yes/No)	Justify your decision for column 3	What preventive measures can be applied to prevent the significant hazards?	Is this step a critical control point? (Yes/No)
1	2	3	4	5	6
Weighing & Molding	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	— —	*Controlled by SSOP  *Controlled by GMP	— —	— —
—	CHEMICAL None	—	—	—	—
—	PHYSICAL None	—	—	—	—
Interim Cooling	BIOLOGICAL *Bacterial pathogen contamination *Pathogen growth	No  Yes	*Controlled by SSOP  *Heat stable toxin formed due to time and temperature abuse	Controlling time and temperature of interim	Yes
—	CHEMICAL None	—	—	—	—
—	PHYSICAL None	—	—	—	—
Freezing	BIOLOGICAL *Bacterial pathogen contamination	No	*Controlled by SSOP	—	—
—	CHEMICAL None	—	—	—	—
—	PHYSICAL None	—	—	—	—
Glazing	BIOLOGICAL *Bacterial pathogen contamination	No	*Controlled by SSOP	—	—
—	CHEMICAL None	—	—	—	—
—	PHYSICAL None	—	—	—	—
Packaging Labeling/Metal detecting	BIOLOGICAL *Bacterial pathogen contamination	No	*Controlled by SSOP	—	—

## HAZARD ANALYSIS WORKSHEET — Continued

Product: Block frozen shrimp

Ingredient/ pro-cessing step	Identify Potential hazards, introduced controlled or enhanced at this step	Are any potential food safety hazards significant? (Yes/No)	Justify your decision for column 3	What preventive measures can be applied to prevent the significant hazards?	Is this step a critical control point? (Yes/No)
1	2	3	4	5	6
—	CHEMICAL None	—	—	—	—
—	PHYSICAL *Metal fragments	Yes	*Metal fragments may be existed in raw material or contaminated in processing	Metal fragments are eliminated completely by metal detector.	Yes
Cold storage	BIOLOGICAL *Pathogen growth	No	*Not likely to occur because product is frozen	—	—
—	CHEMICAL None	—	—	—	—
—	PHYSICAL None	—	—	—	—

Approved by:  
Director of Company

Written by:  
Ty Thnay, M. Sc.  
Food Processing Engineer  
Phonm Penh 9 Mar 99

**HACCP PLAN**

**Firm Name:** LIAN HENG TRADING CO. LTD  
**Firm Address:** #16, 206 Road, Phnom Penh, Cambodia  
 Tel:(855)23 366039 Fax:(855)23 428939

**Products Description:** Block Frozen Shrimp (HOSO, HLSO and PD)  
**Method of Storage and Distribution:** Deep-frozen products at -18°C or 0°F or less.  
**Intended use:** Thaw and well cooked before eating.  
**Intended Customers:** Human food, general public.

CCP	Significant Hazards	Critical Limits	Monitoring Measures			Corrective Actions	Records	Verification
			What	How	Frequency			
Interim cooling	*Bacterial pathogen growth	*Temperature of chill store < 5°C or 41°F. *Time of chilling < 4 hrs	*Temperature	*Thermometer	*Once per hr	*QC staff	*Interim cooling report	*Weekly report review. *Weekly calibration of thermometer. *Weekly microbiological testing.
Packing/ Labeling/ Metal detection	*Metal fragment	*No detectable metal fragments in finished products	*Presence of metal fragments < 2mm in finished products	*Metal detector	*Every finished product block	*Operation	*Metal detector operation lot.	*Test metal detector with 2 testing units before production each day and recalibrate when needed. *Weekly record review.

# Implementation of HACCP in the Fisheries Industry in Indonesia

**Setia Mangunsong**

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## ■ ABSTRACT

*It is well realized that the international market for seafood has become more competitive in this globalization era. The major issues in the fish industry, which are mainly, environment and safety of seafood, have influences on fish trade relations between exporting and importing countries. Those issues have been reflected in various legislation on environmental conservation and seafood applied by developed countries.*

*As a producing country, the Indonesian fishery industry has, inevitably, to keep pace with the requirements imposed by the importing countries. Therefore, equivalence of quality assurance system with the importing countries is very important in facilitating fish trade flow.*

*As far as fish export market development is concerned, the Directorate General of Fisheries has positioned itself to meet all those challenges by implementing a HACCP Program in the fishery industry, which is adopted from FAO-WHO Guidelines of HACCP. The Ministry of Agriculture stipulated the program in 1998 and all fishery industries shall take part in the program for fish handling and processing.*

*To provide quality assurance of seafood safety and to meet equivalence of the system, implementation of the program has been supported by strengthening the fish inspection system through provision of training to instructors, fish inspectors, quality control personnel etc., provision of training workshops to industries, supervision on the application of HACCP, empowering network organization of fish inspection and establishment of legislative support on the application of HACCP.*

*Additionally, on agribusiness-led approach in the fishery industry development policy is taken which is consistent with HACCP, which requires good practices*

*in every subsystem of the agribusiness system. The objective is aimed to maximize the utilization of resources and minimize the "losses" and maintain the safety of seafood production.*

## ■ Introduction

Indonesia is an archipelago comprising about 17,500 islands with a total coastline length of about 81,000 km. It is located on the crossroads between two oceans, the Indian and the Pacific, and bridges two continents, Asia and Australia.

The islands have a land area of over 2 million sq. km and 5.8 million sq. km of marine waters, 3.1 million sq. km of which comprise archipelago and territorial waters. The remaining 2.7 million sq. km is in Indonesia's Exclusive Economic Zone (IEEZ). About 775,000 sq. km of marine waters are coastal areas of less than 200 meters deep.

With her vast area of inland, coastal and marine waters, fishery is considered to play an important role in socio-economic life of the Indonesian population since a long time, especially for coastal community. The sector provides employment for more than 4.5 million fishermen/fish farmers. Currently, while most sectors suffer from the current economic crisis, fisheries demonstrate its sustained contribution to the national economy through significant export growth. In 1998, fisheries generate about US\$2.0 billion from the fish export of more than 700 metric tones.

## ■ Fisheries Resources

### 1. Marine Fisheries

The estimated potential resources of marine fisheries are around 6.19 million tonnes per year and consist of small pelagic fish, large pelagic fish, demersal fish, shrimp, cuttlefish, coral fish, ornamental fish, etc.

Table 1 shows potential of marine fisheries' resources.

The main fishing grounds are the waters of Northern Java, Bali Strait, Malaya Strait, Western Sumatra, Eastern Sumatra, Eastern Nusa Tenggara, Eastern Kalimantan, Western Kalimantan, Southern Sulawesi, Northern Sulawesi, Maluku, Irian Jaya, etc.

**Table 1: Potential of Marine Fisheries Resources**

No.	Variety of Resources	Potential Resources (tonnes/year)
1.	Big Pelagic	977,000
	• Large Tuna	219,000
	• Skipjack	374,000
	• Spanish Mackerel.	127,000
	• Frigate Mackerel/ Eastern Little Tuna	205,000
	• Sharks, Marlin, Sword fish, etc.	52,000
2.	Small Pelagic	3,244,000
3.	Demersal fish	1,786,000
4.	Shrimp	79,000
	Penaeid shrimp	74,000
	Lobster	5,000
5.	Coral Fish	76,000
6.	Squid	28,000
	Total	<b>6,190,000</b>
7.	Ornamental Fish	1.5 billion pieces

## 2. Fish Culture

In fish culture (i.e., freshwater culture, brackish water culture, marine cage culture, open water cage culture), there is still ample opportunity for expansion and development. Indonesia has 4.29 million ha of mangrove. In order to maintain ecological balance, about 830,000 ha or more than 20% mangrove could be developed for brackish water culture. If 30% of the potential area is utilized for polyculture (shrimp and milkfish), 40% for milkfish monoculture, 30% for shrimp monoculture, the potential production is estimated at 810,000 tonnes per year & consist of 358,000 tonnes shrimp, and 452,000 tonnes milkfish including other fish such as tilapia (*Tilapia spp*), mullet (*Mugil spp*) and giant sea-perch (*Lates calcarifer*).

Potential production of freshwater fisheries mainly comprises: (i) part of irrigation system (about 4 million

ha), and (ii) about 1% of open water area of 14 million ha (about 140,000 ha). If for example, 60% of the irrigation areas are utilized for polyculture and 40% for monoculture, the production of freshwater culture is estimated to be about 805,000 tonnes per year.

In open waters (i.e., lakes, rivers, dams, swamps), fish is to be cultured in floating and static cages. The potential production from the areas of 140,000 ha is estimated to be about 350,000 tonnes per year. Paddy field could be also used for culturing fish together with paddy. There are around 1,700,000 ha of paddy field and half of these areas could be utilized for paddy-fish culture. The potential production is estimated about 230,000 tonnes per year.

## 3. Production Trends

Fishery production over the period of 1994-1998 steadily increased. It grew from 4,013,830 tonnes (1994) to 4,761,270 tonnes (1998) by volume with an average increase of 4.37 % per year. Table 2 presents fisheries production by fisheries sub sectors, 1994 – 1998.

The production comprises marine, inland open water, brackish water and freshwater fisheries. In 1998, marine fisheries contributed to 75.95%, inland open water, 7.17%, brackish water fisheries, 9.42%, and freshwater fisheries, 7.46%.

## 4. Trade on Fishery Products

Export of fishery products steadily increased during the period between 1994-1998. Total volume increased by 7.01% from 545,371 tonnes in 1994 to 714,427 tonnes in 1998. By value, it increased by 4.9% from US\$ 1,678,720,000 (1994) to US\$ 2,030,725,000 (1998). During this period, the major importing countries of fishery products were Japan, other Asian Countries, US and European countries. Frozen shrimp and products thereof were the first major contribution to the national revenue, followed by tuna and other products. By value, shrimp accounted for 53.09% of the total export value in 1998.

Import of fishery products decreased by 11.95% (by volume) and increased by 0.97 % (by value) per year in 1994-1998. Fishmeal was the major imported fishery product during this period. Origins of the products were dominated by Peru, Chile and Germany.

**Table 2: Production by Fisheries Sub Sectors of Fishery, 1994 – 1998**

Sub Sector	1994	1995	1996	1997	1998	Annual Rate of Increase (%)
<b>Total</b>	<b>4,013.83</b>	<b>4,263.59</b>	<b>4,452.27</b>	<b>4,581.22</b>	<b>4,761.27</b>	<b>4.37</b>
Marine fishery	3,080.17	3,292.93	3,383.46	3,481.89	3,616.14	4.11
Inland fishery	933.66	970.66	1,016.81	1,099.33	1,145.13	5.27
• Inland Open water	336.14	329.71	335.71	337.91	341.10	0.38
• Culture	597.52	640.95	733.10	761.42	804.03	7.78
Brackish water	346.21	361.24	404.34	421.51	448.47	6.73
Freshwater pond	140.10	162.20	182.92	188.71	199.22	9.32
Cage	33.01	39.86	44.63	45.47	46.80	9.38
Paddy field	78.20	77.66	101.21	105.73	109.54	9.43

## 5. Annual Fish Consumption Per Capita

Supply of fish for domestic consumption grew by 2.53% per year between 1994 and 1998. Average consumption per capita increased from 18.54 kg (1994) to 19.25 kg (1998). According to the national target of 26.55 kg/capita/year, the level of fish consumption was only 72.50%. The rates of fish consumption during the period are presented in Table 4.

## 6. Development of Fish Processing Industry

Over 50% of the total fish production was distributed in the fresh state in 1998 and the rest were processed products, such as salted-dried, salted-boiled, smoked, fermented, frozen, canned and fish meal.

The modern processing plants, orienting for export of quality products, comprise over 249 freezing units, 30 canneries, 44 salting/drying units and 22 chilling (fresh) factories. Also in operation are traditional processing units engaged in salting, drying, steaming, cooking, smoking and fermentation. Small-scale processors mostly operate those. Industrial scale fish processing plants are accorded high priority in the export markets. The main type of commodities include

**Table 3: Trade of Fishery Products, 1994-1998**

Year	Volume (tonnes)		Value (US \$ 1,000)	
	Export	Import	Export	Import
1994	545,371	276,829	1,678,720	136,713
1995	563,065	163,240	1,763,989	115,917
1996	598,385	154,895	1,785,799	126,972
1997	651,568	147,029	1,904,491	129,411
1998	714,427	152,049	2,030,725	139,285
Annual rate of increase (%)	7.01	-11.95	4.90	0.97

shrimp, tuna/skipjack, frog legs, ornamental fish, seaweed and other fish.

Shrimp is marketed either live, fresh/chilled, frozen, canned or dried. Product styles include headless shell-on, head-on, peeled and undeveined, individual quick-frozen or block frozen depending on the requirements of the intended market.

A slight difference was observed that tuna/skipjack are marketed fresh, frozen, canned or dried for domestic and for export. Products other than shrimp

**Table 4: Fish Consumption Per Capita, 1994 – 1998**

	1994 (kg)	1995 (kg)	1996 (kg)	1997 (kg)	1998 (kg)	Annual Rate of Increase (%)
Total Consumption	3,534,87	3,653,39	3,728,88	3,805,20	3,906,53	2.53
Consumption/ Capita/year	18.54	18.86	18.95	19.04	19.25	0.95

and tuna/skipjack that play an important role to the economic development include frog legs, seaweed and other species of potential market value (red snapper, lobster, etc.).

## ■ **Fish Inspection and Quality Control System**

### 1. Historical Development of Fish Inspection and Quality Control

Since the enactment of the Foreign and Domestic Investment Acts, the development of industrial fisheries has brought about significant progress to the exported fisheries products. In 1970-1972, frozen shrimp was thought as prime product to be marketed to Japan, US, and Europe. Despite the evidence that the export of fish and fishery products continue to expand, Indonesia still is unable to take advantage over the export of shrimp, particularly to US. Due to inferior quality, Indonesia used to be included in the "block list" and the import of Indonesian shrimp product was subject to "automatic detention".

This market access restriction led the government to establish a Memorandum of Understanding (MOU) between the Minister of Health and Agriculture in setting-up jointly a compulsory Fish Inspection and Quality Control Regulation in 1975, based on the Health and Hygiene Acts of 1960 and 1962, respectively. In the MOU, Directorate General of Fisheries (DGF) took over responsibility for inspection and quality control of fish and fishery products. The fish inspection and quality control program administered by the DGF included development of fishery standards and hygiene and sanitation; of which DGF adopted CAC FAO/WHO- Codes of Practices for infrastructure, environment, facilities, plant personnel and operation of fish processing plant. The programs include development of standards, fish inspection and certification of fish production facilities in accordance with Good Manufacturing Practices (GMP), certification of competence, and the certification of the quality of the final product for export.

Since the issue of promoting quality assurance became a growing concern of several Ministries, National Council of Standardization was established and later issued regulations setting forth the Indonesian National Standardization (INS) and its implementation of the system. The regulations require, among others compliance on: (i) code of practices, (ii) technical specification, (iii) method of testing, (iv) safety and health requirement, (v) methods

of packing, marking and labeling, and (vi) methods of producing and description.

Additionally, the INS has the aims to: (i) provide consumers with safety and health protection, (ii) provide quality assurance, (iii) promote efficiency and productivity of fish processing plant and meet the standard, (iv) promote competitiveness in international trade/market, and (v) take part in environmental conservation.

### 2. Current Legislation and Jurisdiction

There are a number of legislative decrees concerned with regulation of quality control and inspection of seafood products. These are:

- (1) Government regulation No. 15/1991 issued on March 1, 1991 laying down the Indonesian National Standardization.
- (2) Presidential Decree No. 12/1991 issued on March 1, 1991 setting forth the National Standardization Agency.
- (3) Presidential Decree No. 13/1997 issued on March 26, 1997 setting forth the National Standardization Agency.
- (4) Decree of Minister of Agriculture No. 41/Dpts/IK.210/2/98 issued on February 9, 1998 setting forth the HACCP based on Integrated Quality Management System of Fishery Products.
- (5) Decree of Director General of Fisheries No. 14128/Kpts/IK.130/XII/98 issued on December 17, 1998 setting for the Implementation Guidelines of HACCP based on Integrated Quality Management System of Fishery Products.

The above legislation also stipulates the following compliance under respective jurisdiction of the Ministries concerned:

- (1) Fish Inspection and Quality Control Supervisory Program under jurisdiction of the Ministry of Agriculture viz. Directorate General of Fisheries.
- (2) Accreditation Program for Testing Laboratories of Fish and Fishery Products for export purpose under jurisdiction of National Standardization Agency.
- (3) Control of Additives in Handling and Processing of Fish and Fishery Products for export purpose under jurisdiction of National Standardization Agency.
- (4) Control of Additives in Handling and Processing of Fish and Fishery Product under jurisdiction of the Ministry of Health viz. Directorate General of Food and Drugs Control.

### 3. Inspection and Quality Control Institution

The Directorate of Fishery Enterprise and Processing Development, Directorate General of Fisheries is responsible for coordinating technical matters concerning the supervision of inspection and quality control, which is operationally carried out by Sub-Directorate of Fish Inspection and Processing Development.

There are two Sections assisting the Sub-Directorate dealing with: (1) Fish Processing Technology Development, and (2) Standardization and Accreditation. These sections have their functions in: (i) providing supervision and guidance on handling and processing technology of fish and fishery products, (ii) providing technology packages on fish engineering, (iii) setting up and monitoring the application of Code of Practices and Quality Standards, and (iv) developing, monitoring and controlling the implementation of HACCP plan.

At the provincial level, the Fisheries Services operationally assisted by Sub-Directorate of Quality Control, coordinates local inspectors to conduct supervision, inspection and quality control, on a daily basis, whilst fish inspectors engaged to the central office supervise, and monitor the conduct of local inspectors and also do cross-inspection in the processing plants periodically. The Provincial Laboratory directly performs the fish quality control, including certification of fishery products for Fish Inspection and Quality Control. In total, there are 38 laboratories located in different provinces. The National Center for Fish Quality Control and Processing Development acts as a reference laboratory to provide supervision to the provincial laboratories in terms of analytical methods, processing technology development and training packages.

#### ■ Implementation of HACCP in the Fishery Industry

##### 1. Fishery Industry Development Policy

Strategic policy in the development of the fishery industry is taken through an agribusiness development approach. The introduction of agribusiness subsystems comprising stages of pre-harvesting, harvesting, post-harvesting, marketing is taken in consistent with implementation of HACCP. This approach is supported with improvement of infrastructure, facilities and human resources.

##### 2. HACCP Development Program

The export market of seafood products is becoming more competitive in this global era, due to the following reasons:

- (1) A supply-led approach in the fisheries development policy in most parts of the world tends to outstrip global demand.
- (2) Growing concern over public health and consumer protection based on food safety in the developed countries leading to a tightening of requirement by importing countries.
- (3) Environmental issues, which have been forcing the exporting countries into a difficult position, and has been used by some importing countries to protect their interest. Up to date issues are the dolphin issue, antibiotic, pesticides, etc.

The government and the private sector have addressed all the challenges above. As far as quality and safety are concerned, the fishery industry inevitably, has to keep pace with the requirement.

The traditional approach in quality control, which puts too much stress on the inspection of end product is no longer able to cope with the challenges. It has been replaced by a new approach, which encompasses the complete system of production, which is based on HACCP.

Many plants have used some process control and record keeping procedures similar to those required in HACCP-type program in terms of self-monitoring quality control. However, they should be provided with more support to disseminate the implementation of the program nationwide. For this reason, the HACCP supervisory program in the fishery industry has been enhanced to:

- (1) Improve seafood quality and safety.
- (2) Improve the Indonesian product reputation in the international market.
- (3) Reduce cost in the quality control and inspection in the Indonesia fishery industry.
- (4) Establish self-regulatory quality control in the Indonesian fishery industry based on HACCP concept.

To achieve these objectives, the Directorate General of Fisheries carried out development program consisting of:

- (1) Strengthening the fish inspection and quality control institution by conducting training programs both in the country and overseas on HACCP. The target group for training programs is senior



fish inspectors and quality controllers from the DGF who were trained as trainers (TOT) on application of HACCP-based program.

- (2) Training workshop for provincial fish inspectors engaged in both government and private sector. This program emphasizes the implementation of HACCP in the fish processing industry.
- (3) Supervising on the complete implementation of HACCP at selected fish processing plants based on the results from the provincial training workshop.
- (4) Disseminating the implementation of HACCP in the Indonesian seafood industry.
- (5) Legislative support for the implementation of HACCP. The implementation of HACCP in the fishery industry needs to be accompanied with adequate legislation, which will govern the relationship between the government and private sector. The role in the government (fish inspector and quality controller) and the task as well as benefits that will be gained by private sector having applied the new system should be clearly identified. This has been outlined clearly in the Ministerial Decree of Agriculture No. 41/Kpts/IK.210/2/98, and the Director General of Fisheries Decree No. 14128/Kpts/IK.130/XII/1998.

The implementation of the program has partly been funded within the auspices of the Asean-Canada Fisheries Post Harvest Technology Project Phase II and the US-AID supported Project on Development of Agribusiness.

### 3. Problems in the Development of HACCP

The development of HACCP is hindered mainly due to technical, social and economic reasons. A number of constraints remain in the way of developing an effective HACCP. Some of the constraints include:

- (1) Lack of enforcement in complying with the regulation.
- (2) Lack of a harmonized basic concept by the regulatory agencies on strategic approach of promoting quality assurance for the enhancement of Indonesia's share in the international market.
- (3) Lack of understanding of HACCP by fish processors.
- (4) Lack of effective training method provided to all levels from the inspectors to the processors.
- (5) Lack of education and extension on the part of fishermen and traders.
- (6) Lack of budget to develop the system.

The inspection and quality control program carried out by the government personnel, as well as the "self-regulatory quality control" carried out by the processor needs to be effectively and efficiently implemented. The program needs to:

- (1) Empower more skilled and experienced fish inspectors and in-plant quality control personnel.
- (2) Upgrade educational level of fishermen.
- (3) Enhance awareness and understanding of processors with regard to the task of fish inspectors.
- (4) Provide sufficient facilities and equipment for laboratories, fish landings, fish auctions and fishing vessels.
- (5) Empower qualified laboratory analysts.

### 4. Expected Goal of HACCP Implementation

The prospect for continual growth of export earning from fishery products is expected to be much brighter in the future. Indonesia possesses all the requisites for rapid growth thanks to an excellent natural fish supply and good condition for fish farming, proximity to major markets, a favorable climate and the beginning of a commercially sound processing industry.

For the recent National Development Plan, as far as fish export markets development is concerned, the DGF has positioned itself to meet these challenges by development of an integrated quality management system in the fishery industry. This program would pursue the improvement of the system developed so far that covers all aspects of fish production, both at pre and post-harvest stages, in order to provide high quality assurance of seafood to consumers. The goal of the system would be to enhance the safety of seafood. To implement the integrated quality management system on fishery products requires good practices in all aspects of production, which are:

- (1) Good Farming Practices  
These practices cover all key hygiene and sanitation aspects from site selection for farming establishment to the final phase of fish production.
- (2) Good Handling Practices  
These practices include hygiene and sanitation aspects during harvesting and loading, transportation or handling on board of fishing vessel before further handling and processing stages.
- (3) Good Manufacturing Practices  
These practices deal with hygiene and sanitation

aspects of handling and processing techniques, construction, facilities and equipment, personnel and self-regulatory quality control management in fish processing plant.

(4) Good Laboratory Practices

These practices include laboratory management for conducting quality control of fishery products at all stages of production and require an establishment of standardized laboratories.

(5) Good Inspection Practices

These practices include improvement of inspection system and its implementation does apply not only to government fish inspectors but also to the processing plants in their self-regulatory quality control to enhance preventive measures at critical control point.

(6) Improved Standardization System

Under the coordination of the National Standardization Agency, DGF develops standards for fishery products and other related measures, and procedures and implement adopted Indonesian National Standards.

## 5. Inspection and Quality Control Supervisory Program

Within the Ministerial Degree of Agriculture, regarding HACCP based Integrated Quality Management System on Fishery Products, the scope of activities of inspection and quality control supervisory program covers harvesting, transportation, handling, processing, packaging and storage up to distribution, in order to obtain fish and fishery products which are wholesome and safe for human consumption.

The objectives of inspection and quality control are to:

- (1) Improve quality of fishery products
- (2) Protect consumers from adverse effect to health, fraud and adulteration.
- (3) Increase competitiveness of fishery products in international market.
- (4) Supervise processors in implementing HACCP plan in terms of a "self-regulatory quality management system".

For these reasons, the programs are targeted towards those who deal with fish harvesting, handling, processing, packing, storage, distribution, at production sites (vessel and pond-sites), auction and landing places, distribution sites, processing plants, fish markets, and

cold storage; such as fisherman and fish farmer, collectors, traders, processors, quality control personnel, and fish inspectors, to implement good handling, harvesting and manufacturing practices according to the prescribed Code of Practices.

To carry out these activities, DGF have registered 183 fish inspectors who serve fish processing plants in different provinces of Indonesia. The fish inspectors can be from the local government or central government, namely Provincial Fish Inspector and National Fish Inspector respectively.

Activities of fish inspectors are as follows: (1) assessment of prerequisites of processing plants, (2) performing pre-validation, (3) validation, (4) audit and (5) audit verification of the implementation of HACCP. Activities (2) and (4) are performed by Provincial Fish Inspectors whilst (3) and (5) are by National Fish Inspectors.

The Quality Control and Inspection program for processing plants is manifested in certification, namely:

- (1) Certificate of GMP/SSOP issued by Directorate General of Fisheries.
- (2) Certificate of HACCP implementation issued by Directorate General of Fisheries
- (3) Certificate of Competence Required by Plant Quality Control Supervisor issued by Directorate General of Fisheries
- (4) Certificate of Quality or Health Certificate for Export Product issued by Provincial Laboratory and Inspection Services

## 6. Other Matters

It is widely anticipated that the international market for seafood will become more competitive in this global era. The major issues in the fishery industry, environment and safety, have an influence on fish trade relation between exporting and importing countries. These issues have been reflected in fish hygiene legislation applied by the developed countries (importing countries), such as EU's Commission Decisions, Council Directives, and US Federal Regulation etc.

To deal with the "new trend" in the business climate, the government has been making efforts to establish a cooperation or mutual arrangement with fish importing countries. Such an arrangement is very important in building up an understanding,

with respect to interpretation of all aspects of trade issues between both sides:

- (1) According to EU's Commission Decision No. 94/324/EC, dated 19 May 1994, the Commission has adopted that Ministry of Agriculture, Directorate General of Fisheries shall be the Competent Authority in Indonesia for verifying and certifying compliance of fishery and cultured products.
- (2) MOU with Australia Quarantine and Inspection Services.
- (3) MOU with the Canadian Government (Department of Fisheries and Oceans) on joint inspection of the implementation of HACCP has been signed by both parties.
- (4) Initiation of MOU with US-FDA.

Development of MOU between Indonesia and USA, regarding Fishery Product Inspection and Certification has been initiated. Progress of the MOU has been achieved, such as side-by side evaluation, exchanges of information (regulation, and procedures) and field visits to fish processing plants. The results indicate that MOU between the two countries will be achieved in reasonable time.

## ■ Conclusion

- (1) As the fishery sector's contribution to the country is expected to escalate by generating foreign exchange, and on the other hand the international market is becoming competitive, the country will cooperate to achieve harmonization or mutual recognition of national sanitary measures (national

quality assurance system) and certification programs as appropriate and explore possibilities for establishment of mutually recognized control and certification agencies.

- (2) The Directorate General of Fisheries has responded to meet all these challenges by implementing consistently HACCP system and other appropriate requirement issued by international bodies, such as FAO/WHO.
- (3) To set standards for safety and quality assurance and make sure that the standards are effectively applied throughout the fishery industry. Some improvements have been made by strengthening the fish inspection system by providing training program for instructors, fish inspectors, quality control personnel; providing workshops to industries; supervision on application of HACCP and establishment of legislative supports on the application of the HACCP.
- (4) In addition, agribusiness-led approach in the fishery industry development policy is taken in consistent with HACCP, which require good practices in every subsystem of the agribusiness system. The objective is aimed at maximizing the utilization of resources and minimizing the "losses" and maintaining safety in seafood production.
- (5) In the implementation of HACCP, DGF as competent authority performs consistent validation, audit and verification audit of the fishery industries.

# Lao P.D.R.

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### ■ Introduction

Lao PDR is landlocked country of 236,800 sq. km, bordered by Cambodia, Vietnam, Myanmar, Thailand and China, with an estimated population in 1987 of 4,845,800 people. It is a poor and underdeveloped country, numbering 138 out of 174 countries, on the UNDP 1996, Human Development Index. Still relatively isolated, Lao PDR has a high degree of geographic, cultural, and linguistic diversity. Agriculture continue to be the major industry in Lao PDR and 83% of the country is classified as rural areas. The country is subject to a monsoon climate and agricultural production and availability are adversely affected by flooding in the rice growing areas. Drought is also commonly experienced.

There is a large gap in income and general living condition between the urban and rural areas, with the people in the rural areas being the most disadvantaged. The World Bank has measured the national poverty level at almost 50%.

The fisheries development in Lao PDR is considered in a very early stage when compared to neighbouring countries such as Thailand, and Vietnam. Lao PDR is a landlocked country where there is no direct access to the sea. Fisheries resources are derived purely from fresh water sources. In 1996, the total sources of fisheries in the country was established as 791,720 ha, and in the year 1996, the total production was 38,000 tonnes (Table 1). The sources originated from the Mekong River and its tributaries (44.7%). Reservoirs, (4.6%), swamps, wetlands, flood plains and paddy fields (20.6%), aquaculture such as fishponds culture, cage culture, and rice-cum-fish culture (30.1%)

### ■ Marketing and Transportation

According to the regulation on fishing in Nam Ngum Reservoir, the purchase and sale of fish in the reservoir is assigned to an individual or group or a

company alone as contractor, who will remit taxes to the Governor/provincial authority according to the annual volume of sale. The individual or company is awarded the sole purchase and sale through bidding. The current company awarded this monopoly right has paid 16,500,000 kips (US\$ 4,125), in the year 1998 for the last existing contract. However, the contract ended last September 1998 and there has been no new open bidding until now. The company still has the monopoly of the fish-landing place in front of the dam site, in Keo Oudom district, Vientiane Province. Fishermen are strictly forbidden to sell fish to others without going through the awarded company, i.e. any sale shall be made at the company's landing place only.

It is specified in the regulation that the price for the sale and purchase of fish shall be agreed between the awarded company and fishermen, based on the market prices either by fishing season and/or fish species for mutual benefit. The company shall not excessively lower the price for fish sold by fishermen. However, fishermen in Nam Ngum Reservoir may find that the price offered by the company is rather low. It is estimated that only 50% of inland and capture fisheries from the Nam Ngum Reservoir are using the landing centre at Ban Tha Heua (belonging to the Vangvieng District, Vientiane Province) since there are markets selling fresh fish and processed fisheries products.

Fishing in the Reservoir is on a small scale where fishermen's catch range from 5 - 50 kg per day, per fishing boat, with an average fish catch about 10 -20 kg/ day, (figures from interviews with fishermen in Ran Xay Oudom. Nam Ngum Reservoir). It is not worth to transport the small amount of daily catch to the authorised landing place, because of the long distance which takes at least one hour from the fishing village to the fishing pier. There are local middlemen coming to

Table 1: Sources of Aquatic Animal Production in Each Province

No.	Name of Province	Hydro power reservoir	Irrigation reservoir	Rivers	Swamp	Production (Tonnes)					Total
						Rice Fields		Fish Ponds		Cage Culture	
						Rice Field	Rice + Fish	Fish	Natural		
1	Pongsaly		20.4	269.0			13.5	40.2	10.0		353.1
2	Luang Namtha		11.8	514.9		140.1	1.0	150.0	10.5		828.3
3	Bokeo		11.7	177.0		895.3	0.5	79.2	6.0		1,169.7
4	Oudomxay		19.0	77603		117.5	2.1	114.0	27.0		1,055.9
5	Luang Prabang	81.0	32.7	1,598.5		131.3	1.5	225.7	80.0		2,150.7
6	Huaphanh		20.5	435.0		111.9	100.0	52.0	50.0		769.4
7	Xiengkhouang		15.3	149.7		461.2	329.7	421.0	69.0		1,445.9
8	Sayaboury		28.0	1,425.0		45.4	3.3	174.3	188.0		1,864.0
9	Vientiane	852.9	47.1	1,006.3		93.0	51.2	2,079.2	400.0		4,529.7
10	Special area Xaysomboun		3.8	31.1				15.0			59.9
11	Vientiane Municipality		237.1	360.8	13.1	1,342.0	42.7	2,317.0	188.0	175.0	4,675.7
12	Bolikhamxay		4.1	1,482.9	28.7	262.8	0.2	134.7	84.0		1,997.4
13	Khammouane		89.5	252.8		1,337.0	0.2	196.6	128.0		2,004.1
14	Savannakhet		99.0	1,728.0	547.0	131.0	1.8	597.0	1,778.0		4,881.8
15	Saravanh		14.3	503.4		507.7	0.1	187.7	30.0		1,243.2
16	Champasak	94.0	31.6	5,992.0	222.3	878.0	0.1	672.4	624.5		8,514.9
17	Sekong		1.6	137.7				26.0	24.0		241.4
18	Attapeu		1.5	145.6				38.0	40.0		225.1
	<b>Total</b>	<b>1,060.0</b>	<b>689.0</b>	<b>16,986.0</b>	<b>811.0</b>	<b>6,454.2</b>	<b>548.0</b>	<b>7,540.0</b>	<b>3,737.0</b>	<b>175.0</b>	<b>38,000.2</b>

Source: Department of Livestock and Fisheries (DLF, 1997)

collect fish caught from the fishermen and then transporting to sell at the authorised landing place. However, during observation at the Nam Ngum Reservoir, there were fishermen landing and selling their catch directly to the fish landing centre as well. The company has the responsibility to invest in fishing gears for fishermen, in order to encourage fishermen to conduct fishing activities for sale to them. In this case the company buy fishing gears such as gill net, small, engine boat, hooks, and other gears for the fishermen communities. The fishermen pays back the loan from sale of their catch daily at a minimum amount of 10,000 kip, which is about US\$ 2.50 in 1998.

## ■ Utilization of Fish Caught

The fish caught from reservoir can be grouped into 3 categories (i) for own consumption, (ii) sold as fresh fish. (iii) for processing use. Since fish is the cheapest source of protein for Lao people throughout the country, priority is given to family. When fish are traded, large size fish will be sold for additional income. Fresh or good quality of fish are processed into a variety of fish fermented products (Pa Som and Pa Dek), or smoked and dried fish while low quality or rotten fish will be processed to Pa Som, Pa Dek, Pa Heang and Pa Yang.

### 1. Use of ice and the quality of fish

Use of ice is limited to areas around the reservoir. The company is responsible for provision of ice to the middlemen and fishermen. The company buys crushed ice from Tha Lat market daily for 300,000 kips at 200 kips / kg. Middlemen and fishermen will estimate how much ice they need then go to take the ice from company. Ice is normally stored in bamboo basket, which is used to contain fish without insulation and will be kept and used on the following day. Hence, most of the ice melts on the way to their home by small engine boat.

Some middlemen may store ice in insulated containers. From observations made at an ice making plant in Tha Lat market which supplies ice to the landing centre, ice is made directly from the Nam Ngum Reservoir water with out any prior treatment.

Upon arrival at the fishing boat piers, fish are laid on the wooden platform and sorted by size and weight. The sanitation condition of the fish landing place at Nam Ngum Reservoir was rather poor. Most of the fish

at the landing site were still fresh because the fish were collected from gill nets and hooks that morning and transported to the fishing pier areas almost immediately. If the catch is too small, fishermen will take the fish back to their home and sell to middlemen. Some fish may be of low quality due to the time they spend in the net before it was retrieved.

Sorted fish are then packed in 10 kg double layer plastic bag and placed between ice layers in bamboo baskets. Fish are not packed in direct contact with ice because the ice may alter the natural colour of some fish, which may cause rejection by some consumers. Higher value fish may be packed in bags and iced in the same manner but in insulated plastic containers instead of bamboo baskets.

Fish are then loaded into an open truck for further transport to Vientiane municipality fish market. A truck will leave only when it is fully loaded. It is noticed that during the delay while waiting for a full load, fish containers were left under the sun without additional ice. Trucks were also left uncovered during transport to markets in Vientiane municipality. Both factors will cause drastic deterioration of fish quality. The distance between Tha Lat landing place to the fish market in Vientiane municipality is approximately 90 km. The transportation by trucks takes approximately 2 hours. Sale to the authorised company starts at 8:00 am and end at approximately 3:00 pm. The amount of fish landed at this fish landing centre, range from 400 to 2,000 kg/day, from June till March. During the season from April to May, the amount of fish landed is approximately 300 to 500 kg/day.

### 2. Quality of fish

Processing and marketing of fisheries products around Nam Ngum Reservoir is facing constraint. This is due to the fact that the authorised company has the right to the purchase and sale of all the fish in the reservoir. The company would prefer to buy fresh fish as much as possible from the fishermen. Although processed fish may add value to fresh fish and provide additional income to the fishermen's families but this is in conflict with the interest of the company. If processing is continued and the scale is enlarged, less fresh fish would be traded. In order to discourage fishermen or their wives to process fish for sale, the company confiscates or tax all fisheries products that pass through the fish landing center. This may hamper the

improvement of processing and marketing of fisheries product at other piers. Responsible official authorities should look into this matter, otherwise fish processing will slowly diminish. The people in the area will then have less chance of generating income through these activities. More smuggling of fish and fisheries products through other fishing boats piers may be encouraged. This will affect the collection statistics of fish caught in the reservoir as well.

### ■ Fish Processing

Fish processing in Lao PDR is limited to household scale. Fishermen's wives do the processing. Fish used as raw material are mostly low quality or low value fish. Fisheries products are limited to a few types of fermented products such as Pa Som, Pa Dek, Pa Heng, Pa Kern and Pa Yang. Take for example, a case study of fish processing at Ban Xai Oudom village ( Ban Xai Oudom ), where almost 100% of the village adopts fishing as a major profession. If Pa Khem is caught on a sunny day, fishermen's wives will dry them under the sun all day and sell to the middlemen who will come and collect fish and fisheries products in the village. The demand for fisheries products is higher than supply. If the villagers in Ban Xai Oudom can sell their products freely, without restriction by the authorised fish landing centre, the processing in this village is likely to expand to small or medium scale. This is due to the fact that raw materials are abundant since it is a fishing community and the fish processors are motivated by the better prices of processed products. However, upon observation, there is no electricity supply in this village. Ice must be bought and carried from the other side of the reservoir. Insulated containers are not widely used because of the high prices and lack of access of ice.

### ■ Food Inspection and Quality Control in LAO PDR

Food standards and regulations, have not been officially established. Hence, the inspection for import is limited to checking of documents and the correct identification of food products. Temperatures of refrigerated trucks containing frozen food such as fish and seafood imported from Thailand are regularly checked upon entry. Importers must submit a list of proposed goods to be imported to the Fisheries Development Division (FDD). Currently there are 10

inspectors stationed in Vientiane municipality.

To control the quality of manufactured food in Lao PDR, the Food and Drug Department inspectors occasionally go out and conduct random sample checks on processed food; such as canned and bottled products from the market and then send them for analysis at FDQCC laboratories. Quality control of traditional products is not on the top priority list as priority is given to industrial oriented products. Quality control of fresh animal products such as meats is directly under Ministry of Agriculture and Forestry (MAF). The Department Of Health is responsible for disease and health control. However, considering laboratory facilities and the competency of the staffs of FDD and FDQCC, if a national inspection agency for fish and fisheries products is to be established, the Ministry of Health should play a leading role.

#### 1. Pathogens in fish

The processors can control this hazard by proper cooking, pasteurizing or retorting. The proper application control is essential because of the likelihood that any pathogens, which may be present in seafood products, are introduced through poor handling practices (e.g. by the aquaculture producer, the fishermen or the producer). It is very important to develop Good Manufacturing Practices (GMP).

Freshwater fish are the most important intermediate reservoir of food-borne trematodes. The fish belonging to the family Cyprinidae (carp) are the major intermediate hosts of *Clonorchis sinensis* and *Opisthochis* sp. More than 100 species of freshwater fish have been shown to be naturally infected with *Clonorchis sinensis* and more than 35 species with *Opisthochis* sp.

In Lao PDR, some species of freshwater fish are potential intermediate reservoir host of *Opisthochis viverrini* and *Haplorchis* sp. *Cyclocheilichthys repassan* (Pa Tjok), *C. apogon*, *C. siaja*, *C. armatus* (Mekongensis), *Hampala dispa* (Pa Sout), *H. macrolepidota*, *Puntius orperoides* (Pa Pok), *P. gonionotus* (Pa Pak), *P. vichoever*, *Pleicanthus* (Pa Bee) and *Cirrhinus jullini* (Pa Soi).

#### 2. Controlling parasites

The process of heating raw fish to a temperature sufficient to kill bacteria pathogens is also sufficient to kill parasites. However, in many countries, the traditional

habit of eating raw or undercooked seafood pose as a big problem, especially in endemic countries of fish-borne trematode disease like China, Thailand (Northeast), Lao PDR (Southern province), Cambodia and Vietnam (North and Central).

In Lao PDR, special interest is paid to these products like the “Koipa” (raw fish in spicy salad) or Pa Dek, Pa Som (salted semi-fermented fish).

### 3. Safety assurance

Traditionally, fish processors have regarded safety assurance or quality assurance as the responsibility of the Government agencies and the means used by these agencies have been the formulation of food laws and regulations, inspection of facilities and processes and final products testing.

In contrast to the principles in traditional quality programmes relying heavily on quality control of end products, a preventive strategy based on a thorough study of prevailing conditions is much more likely to provide a better guarantee of quality and safety even at a reduced cost.

The need for an effective safety assurance system is increasing. Quality assurance is the modern term for describing the control, evaluation and auditing of food processing systems. The primary function is to provide confidence, for both the management and then the ultimate customers that the company is supplying products to. Such a strategy was first introduced by microbiologists more than 20 years ago to increase the

safety of food products and is named the Hazard Analysis Critical Control Point (HACCP) systems.

The main elements of HACCP systems are:

1. Identify potential hazards, assess the risk (likelihood), of occurrence.
2. Determine the critical control point (CCPs) to determine the steps that can be controlled to eliminate or minimize the hazard.
3. Establish the criteria (tolerances, target level) that must be met to ensure that a CCP is under control.
4. Establish a monitoring system.
5. Establish the corrective action when CCP is not under control.
6. Establish procedure for verification.
7. Establish documentation and record keeping.

#### 4. Define and implement the HACCP system

HACCP can be defined and implemented at aquaculture areas and processing areas as parasite hazards are different between these two areas. A multidisciplinary “HACCP Team” including experts in public health, phraseology, epidemiology, aquaculture, fisheries biology, fisheries extension, fisheries inspection carries out the work to design a HACCP based quality assurance programme.

HACCP work plan of the aquaculture areas to give final products of “clean fish ” or fish free from *Opisthorchis* infection. There are 4 critical control points that must be under controlled:

S/N	Affected Source	Hazards	Control
1.	Water Quality	<ul style="list-style-type: none"> <li>• Presence of <i>Opisthorchis</i> eggs as a result of human and/or animal faecal contamination.</li> <li>• Presence of fish infected with <i>Opisthorchis metacercariae</i>.</li> <li>• Presence of infected or non-infected fish host snails (<i>Bithinia</i> and <i>Melania</i> sp.), with <i>Opisthorchis</i> sporecysts.</li> </ul>	<ul style="list-style-type: none"> <li>• Dry well the ponds for several days (2 days) and treat the ponds with chemicals such as calcium oxide,</li> <li>• Rainwater used to refill the fish pond (the water must be free from parasite eggs, snails and infected fish)</li> </ul>
2.	Fish fry	<ul style="list-style-type: none"> <li>• Fish fry infected with <i>Opisthorchis metacercaria</i></li> </ul>	<ul style="list-style-type: none"> <li>• Check that fish fry are free from parasite infection before releasing. May be taken from non-endemic areas.</li> </ul>
3.	Fish feeds	<ul style="list-style-type: none"> <li>• Presence of <i>Opisthorchis</i> eggs as a result of human and/or animal faecal contamination.</li> </ul>	<ul style="list-style-type: none"> <li>• Use fishmeal pellets which has been checked and are free from parasite eggs.</li> <li>• The use of animal or human faeces for feeding is prohibited.</li> </ul>



S/N	Affected Source	Hazards	Control
4.	Fishponds' conditions	<ul style="list-style-type: none"> <li>The contamination of fishpond water with <i>Opisthorchis</i> eggs from human and/or animal sources as well as invasion of the fishponds by infected snails.</li> </ul>	<ul style="list-style-type: none"> <li>The fishponds must be isolated from sources of contamination such as latrine, pig-pen, cat, dog, and drainage by establishing a fence around the fishponds.</li> <li>Faeces are collected from the fish farms and its family members. They must be free from <i>Opisthorchis</i> infection. Basic education about hygiene is provided to everyone in the family.</li> <li>A regular visual monitoring inspection will be done every day to check for any abnormality. Aquatic weeds overgrowth on the experimental ponds bank is constantly removed since leaves can serve as the best breeding place for intermediate snails hosts.</li> </ul>

#### ■ Future Post-harvest Activities

Team Leader and Expert in fish-borne parasite/food safety (Dr. Paiboon Sithithaworn) have discussed with Chief Technical Advisor (CTA) of the National Aquatic Resources Institute (NARI) project, Mr. Sten Sverdrup Jensen, about post-harvest technology activities to be included in the scope of Living Aquatic Resources Research Institute (LARRI). The consultants were informed that although such activities are considered to be important areas for inclusion in the scope and mandate of LARRI, the DLF does not expect research activities within these subject areas to be initiated from the onset. Initially, it would be appropriate to maintain these areas on an awareness level that is monitoring development outside LARRI. In the near future, LARRI will be transferred to operate under the National Agriculture Forestry Research Institute (NAFRI), directly reporting to Ministry of Agriculture and Forestry (MAF), instead of DLF as originally planned. LARRI activities will emphasize on research activities on aquatic resources, reservoir fisheries management, wellands, management, aquaculture and establishment of national fisheries information and statistics.

LARRI has of 17 staff including the National Project Director (NPD). All staff have been transferred from FDD. Seven technical staff of LARRI have acquired MSC in Fisheries or relevant areas from various international

academic institute. There are also five BSc and four Diploma graduates that have majored in Fisheries and Chemistry, and a Certificate graduate in basic computer. However, there is no staff specialist in post-harvest technology.

After the transfer of many qualified staff to LARRI, the FDD consist of 9 technical staff, including the Director and Deputy Director of FDD, and one NPD of FAO/TCP/8823 Project and 3 technical staff involved in the Fisheries Extension Project Lao 97/007, FAO/UNDP Project. Almost all the staff working at FDD, have acquired a MSc and Postgraduate Diploma in Fisheries Sciences.

The FAO/TCP/8823 Project has set aside some budget for equipment procurement with an aim to promote the continuation of the project in terms of research and extension of post-harvest technology improvement and marketing of traditional fisheries products as well as the control of food-borne trematodes (FBT). Extensive training on basic post-harvest technology as well as parasite identification must be given to the potential staff of the FDD, or DLF whichever office is determined to carry out the work in this field. FAO, under the TCP project may contribute by allocating some budget for such intensive training (minimum of 3 months period). The livestock and fisheries inspection laboratory has the potential to expand to cover fish

inspection and quality control aspect. This is due to the fact that the laboratory facilities already exist and the staff possesses basic knowledge in the areas of meat inspection and food analysis, which can apply to both fish and fisheries products.

### ■ **Conclusion and Recommendations**

In order to follow up and continue the activities of this project, both within the project duration and the future, the following recommendations are given below:

- (1) For future improvement in the areas of handling of fresh fish, processing of traditional fisheries products and control of FBT, the FDD should conduct basic surveys and develop the quality and safety of fish and fisheries products in the market, both in terms of general hygiene and FBT. The staff should be given extensive training on parasite identification since FBT will adversely affect consumer health.
- (2) Staff of FDD and provincial staff of DLF should be given opportunities to upgrade through extensive training in post-harvest technology including basic chemical, microbiological, and physical analysis. If new staffs are recruited, at least one staff should pursue a BSc or MSc in food science and technology, fisheries products, food microbiology or food chemistry.
- (3) The FDD should decide on its policy and direction in the areas of post-harvest technology, safety and quality control as soon as possible. The equipment list should be justified and based in accordance with the activities to be conducted and relevant to the scope and objective of this project.
- (4) Sanitation and hygiene of the fish landing place at Nam Ngum Reservoir should be improved. People handling fish and involved in marketing and transportation should be aware of the importance of fish quality and the use of ice. This will increase the supply of good quality fish to the consumers.
- (5) In order to improve handling and sanitation of fresh fish in the market place, DLF may cooperate with the local authority and create awareness among fish traders on food safety and hygiene.

# 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. Implementation 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/nutraceutical — 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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# Present Status of Fish Processing Industry in Myanmar and Implementation of HACCP System

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## ■ Introduction

The Department of Fisheries (DOF), under the Ministry of Livestock & Fisheries, is the government agency responsible for the inspection and licensing of all export oriented fish processing industries in Myanmar.

The Department is concerned for the export-oriented fish processing industries to ensure food safety and to meet with the health and sanitary requirements of the importing countries. During the last four fiscal years (1995-2000), the development of the fisheries sector of Myanmar have achieved significant results. Annual fishery production, catching and aquaculture, has increased from approximately 673,000 tonnes in 1995 to around 1,032,000 tonnes in 2000 (Table 1), while the export for the corresponding year from approximately 54,324 tonnes to 116,591 tonnes in 2000 (Table 2). In comparison with the other economic sectors, Myanmar fishery sector is now ranked in third position in export value and it is the fastest growing sector in the economy.

## ■ Present Status of Fish Processing Activities in Myanmar

The traditional processing factories produced salted, dried, smoked and fermented fish products. They are mostly operated by small scale processors to cater to the domestic market while a number of medium and large scale factories recently found are also oriented for export market.

The export oriented processing industries comprise of 85 freezing plants and 5 fish meal factories in Yangon and all along coastal area (Fig 4). These factories target their products mainly for export market. The main export commodities include shrimp, fish fillet, surimi, whole/

guttled (marine/ freshwater fish), dried fish/shrimp, live crab, eel and live lobster which are exported by normal and border trade system.

The main shrimp species include tiger (*P.monodon*), white shrimp (*P. merguensis*), pink shrimp (*Metapeneaus* spp.), freshwater prawn (*M.rosenbergii*), lobster (*Panularius*) and mud crab (*Scylla serrata*). Shrimp are marketed either live, fresh (chilled), frozen or dried. Product is categorized as head-on, headless, peeled, peeled and deveined. (PND), peeled and undeveined (PUD), peeled tail-on (PTO), individually quick frozen (IQF) method or block frozen method according to the requirement of intended market.

Presently, the 85 processing plants can produce 380 tonnes/day of frozen products and total cold storage capacity in these plants is 16,244 tonnes. Ice-making facilities provide daily the production of 4,241 tonnes/day. Delivery to shipping port uses refer containers and transportation of raw materials and products for domestic market uses insulated trucks.

Some customers of Myanmar seafood are companies which reprocess and repackage with their trademark. These products are then re-exported. For example, most of the product exported from Myanmar to Hong Kong and Singapore are re-exported to Japan and EU countries. So far there are no complaints from buyer because most of the products are reprocessed as consumer packs. Seafood quality of Myanmar product is still accepted by buyer who buy them for reprocessing and sent to direct market.

If Myanmar seafood industry wants to enlarge its market and raise the value of its product, it should improve management and seafood quality by investing proper infrastructure facilities, upgrading production condition and ensuring hygiene standard in order to

meet the requirements of importing countries where the products are sold directly to consumers.

### ■ Present Fish Inspection System

The Export Quality Control Section under the DOF is the main organization providing services to the export-oriented fish and fishery product industries on fish inspection and quality assurance. Export Quality Control Section inspects mostly have pre-shipment inspection. Export Quality Control Section of DOF inspect fishery products for compliance with international standards for export where applicable and the imported requirements related to health, quality, safety and identity.

The DOF recognized that end product inspection alone is not enough to ensure the quality and safety of the products, so starting from 1999, the inspection system was based on HACCP. Inspection procedures and operations were revised with reference to CODEX guidelines, standard and code of practices on HACCP and GMP.

#### 1. Plant inspection

Starting from year 2000, plant inspections were done by DOF inspectors according to plant rating system (A, B, C, D) based on CODEX and various importing countries' standards.

#### 2. Pre-shipment inspection

The exported fish product is subject to mandatory inspection by DOF according to the Ministry of Trade.

#### 3. Inspection laboratory facilities

The DOF recently reorganized the laboratory in Yangon and equipped it to analyze physical, chemical and microbiological parameters.

#### 4. Physical assessment

The following physical assessment parameters are checked before stuffing of the cargo: weight, size, color, product temperature, foreign matter, dehydration, black spot, packaging and labeling.

#### 5. Microbiological assessment

Bacteriological tests are done as follows: standard plate count, coliform, faecal coliform, Staphylococcus aureus, Salmonella and V. cholera.

## 6. Chemical Assessment

### Proximate Analysis Lab

Protein, fat, moisture, ash, salt

### Food Additive Lab

Boric acid, sulphur dioxide, nitrite

### Contaminant Lab

Arsenic, cadmium, mercury and lead

### Toxicology Lab

Histamine, pesticide residue, antibiotic residue (under process)

### ■ Current legislation and jurisdiction

- (1) Myanmar Marine Fisheries Law (1990).
- (2) Ministry of Livestock & fisheries, Department of Fisheries Notification 6/94, 10/94
- (3) Ministry of Livestock & fisheries, Department of Fisheries Directives 1/95, 7/96 to 12/96, 1/98 to 9/98.
- (4) The National Food Law (1997), Ministry of Health.

### ■ On-going Implementation of HACCP System

HACCP system has been implemented in 7 processing plants in Myanmar since 1998. Ministerial competent authority was formed to take responsibility for food safety of exported fish and fishery products from Myanmar. Subcommittee was formed for supervision and for regular check of HACCP system application with reference to EU/FAO HACCP regulations. HACCP directive of Myanmar were issued for implementation of HACCP system. Processing plants are subjected to be checked by DOF inspectors on whether regulations issued by DOF are followed or not. Personnel also introduce verification and auditing of HACCP system from DOF.

Training for processing plant personnel as well as DOF inspectors were found to be essential. Inspection/testing equipment such as metal detectors and laboratory equipment are required as mandatory for processing plants. It is found some plants can afford to invest in

those equipments. Although DOF has installed major laboratory equipment, technology is not still lacking. It is required to encourage the plant owners to install full equipment for inspection of food safety.

Among 85 processing plants at present in Myanmar, Ninety percent of existing plants still need to implement HACCP system. Process flows have to be changed with respect to HACCP system. In order to meet HACCP requirements for new processing plants, directive relevant to the construction of new plants should be issued by DOF.

Biotoxin such as CFP, DSP and PSP are to analyzed seasonally and area wise.

#### ■ **Problems Facing the Fish Processing Industry**

- Rules and regulations for quality management are to be adhered fully.
- The fishermen in fishing vessels and workers in fish farms are not fully trained for proper handling of raw materials to reduce post harvest losses.
- The fishing vessels, the equipment for landing, transport and storage of fish and fishery product not in good hygienic condition and not in proper boxes, resulting in deterioration and postharvest losses.
- In processing plants, the layout of production lines must be rearranged and HACCP system must be implemented to ensure the quality and safety of food.
- The aquaculture fisheries have not been developed to supply enough raw materials to the processing industries.
- Fluctuation in the supply of raw materials, unstable supplies resulting in excessive competition among fish processing industries.
- Lack of technology and know-how on quality management system.

#### ■ **Future Plans**

- Expansion of the post-harvest services to improve fish handling and distribution through additional infrastructure facilities such as fishing ports, wholesale markets, etc.
- Establishment of quality control standards for fish and fishery products to ensure product acceptability.
- To provide additional advanced equipment and apparatus for the quality control laboratory in order to make services more responsive to the need of industries. There is also need to establish fish inspection and quality control laboratories in state and division.
- To increase the number of trained fish inspectors.
- Extension services program on good fish handling practices, quality consciousness and good manufacturing practices in the fish processing industries.

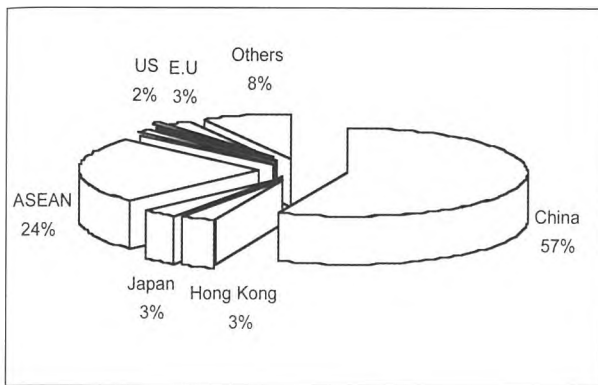


Fig. 1: Fisheries Product Export by Country in 1999-2000

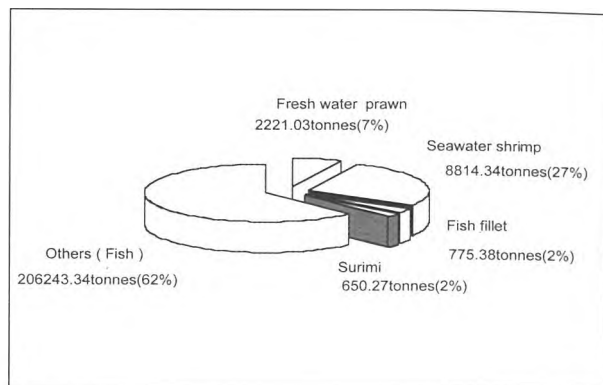


Fig. 2: List of Major Export of Fish & Fisheries Product by Normal Trade from Yangon in 1999-2000

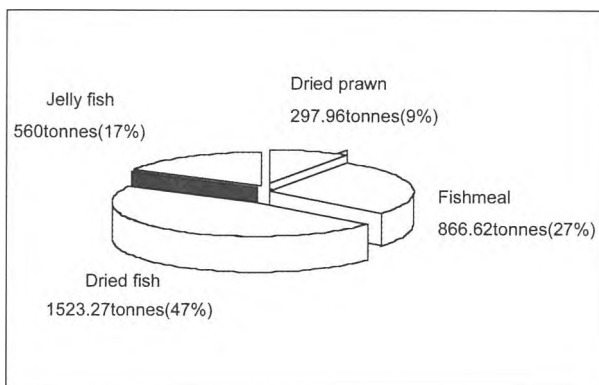


Fig. 3: List of Major Export of Fish & Fisheries Product from Yangon by Normal Trade in 1999-2000

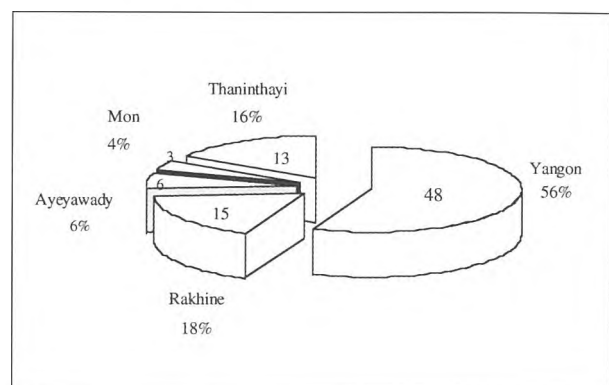


Fig. 4: Processing Plants in Yangon & Coastal Area

Table 1: Production of Fishery Product (1995 to 2000)

(MT— 000)

Particular	1995-96	1996-97	1997-98	1998-99	1999-2000
<b>Fresh water fisheries</b>	<b>218.002</b>	<b>229.758</b>	<b>231.244</b>	<b>238.605</b>	<b>252.737</b>
Culture fisheries	71.508	80.690	81.965	84.963	91.423
(a) Fish	—	78.618	79.573	82.523	87.733
(b) Prawn	—	2.072	2.392	2.440	3.690
Leasable fisheries	61.005	62.572	62.618	64.262	69.710
Open fisheries	85.489	86.496	86.661	89.380	91.604
<b>Marine fisheries</b>	<b>455.395</b>	<b>633.277</b>	<b>680.838</b>	<b>719.328</b>	<b>780.160</b>
Fish	—	604.018	652.850	687.260	746.962
Prawn	—	29.259	27.988	32.068	33.198
<b>Total</b>	<b>673.397</b>	<b>863.035</b>	<b>912.082</b>	<b>957.933</b>	<b>1032.897</b>

Source: Department of Fisheries, Myanmar

Table 2: Fisheries Product Export by Country (1995-2000)

Country	1995-96		1996-97		1997-98		1998-99		1999-2000	
	MT	Value (US\$)	MT	Value (US\$)	MT	Value (US\$)	MT	Value (US\$)	MT	Value (US\$)
China	7340.98	4721185	10001.08	6613237	18827.68	14373770	61163.93	56328983	65410.75	54525954
Hong Kong (PRC)	4648.65	21029661	8129.57	29515372	5294.54	24529068	4410.29	18981879	3956.61	16788563
Japan	2566.18	11944750	4312.67	20817392	3485.40	17618631	3248.90	21130154	3868.17	20476237
Asean	37945.05	66769179	41881.50	92411129	40853.08	92815541	47847.49	78791032	27894.91	59138323
US	96.62	499786	240.13	1419887	444.36	1645758	730.16	2184563	1999.12	7383558
Canada	35.84	276639	73.12	429313	305.55	996357	497.48	3250403	535.91	2904304
E.U	508.34	3744474	729.30	4817144	1445.97	9933762	7577.64	10232063	3596.04	6317002
Others	1183.16	4702204	2033.45	7029348	3523.33	5177371	1397.84	10429547	9329.69	16171802
<b>Total</b>	<b>54324.82</b>	<b>113668788</b>	<b>67400.82</b>	<b>163052822</b>	<b>74179.91</b>	<b>167090258</b>	<b>126873.73</b>	<b>201328624</b>	<b>116591.20</b>	<b>183705743</b>

Source: Department of Fisheries, Myanmar

Table 3: List of Major Export of Fish &amp; Fishery Products from Yangon by Normal Trade in 1999-2000

S/No.	Items	Quantity (tonnes)	Value (US\$)
	<b>Frozen/chilled</b>	<b>33085.36</b>	<b>96,307,138.93</b>
1	Fresh water prawn	2221.03	17,414,791.29
2	Seawater shrimp	8814.34	54,150,179.34
3	Pomfret	1932.78	3,671,196.20
4	Hilsa	7769.86	7,653,205.95
5	Ribbon fish	1107.90	726,834.20
6	Rohu	3680.08	3,862,810.32
7	Rosy jewfish	948.98	488,826.50
8	Fish fillet	775.38	1,942,270.90
9	Surimi	650.27	535,682.00
10	F.W.F	1610.23	2,230,033.20
11	Yellow crocker	695.70	551,177.50
12	Threadfin	228.73	534,278.65
13	Tongue sole	486.15	192,808.35
14	S.W. F	2163.93	2,353,044.53
	<b>Alive</b>		
1	Mud crab	1251.44	3,744,304.75
2	Lobster	235.60	659,528.40
	<b>Dried</b>		
1	Dried prawn	297.96	659,528.40
2	Fishmeal	866.62	470,155.10
3	Dried fish	1523.27	1,834,408.93
4	Jelly fish	560.00	576,347.90
	<b>Total</b>	<b>37820.25</b>	<b>104,251,412.41</b>

Table 4: Case Studies of Block Frozen Shrimp (HO, HI, PUD, P&amp;D, PPV)

HACCP												
PRODUCT NAME(S): (SEA/FRESH WATER SHRIMP) FRESH BLOCK FROZEN (HL, PUD, P&D, PPV)												
(1) Critical Control Point	(2) Significant Hazard	(3) Preventive Measure	(4) Critical Limit	(5)			(7) Frequency	(8)		(9) Corrective Action(s)	(10) Record	(11) Verification
				(6) Monitoring				Who	Who			
				What	How	How						
1. RECEIVING RAW MATERIALS	Sulfite	Inspection	< 10ppm	Sulfite	Sulfite Checker	Each Received Lot	Reception	Reception	Reject	Material No. 1	Weekly Review	
	Iron	Inspection	Nil	Metal	Metal detection	Each Received Lot	Reception	Reception	Reject	Material No. 2	Daily Record	
2. SORTING	Bacterial growth	Control temperature	< 10°C	Temperature matter	By thermometer	Every 15 minutes	Line QC	Line QC	Adjust temperature	Material No. 3	Daily Record Review	
3. STORAGE	Bacterial growth	Control temperature	< -18°C	Temperature	By thermometer	Every 2 Hour	Cold storage operator	Cold storage operator	Adjust temperature	Temperature Monitoring Report	Biological test Daily Record Review	



# The Philippines' HACCP-Based Fish Inspection System

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## ■ Introduction

Fish is economically and nutritionally important in the diet of every Filipino. Most of their protein requirement is derived from fish with a high capita consumption of 36 kg per annum (24 kg as fresh, 12 kg as dried, processed, crustaceans and molluscs).

The fisheries sector is important in the national economy with its contribution of P80.4 billion (2.7 %) to the country's Gross Domestic Product (GDP) which is 15.4 % of the Gross Value added (GVA) of P523.5 billion in Agriculture, Fishery and Forestry sectors at current prices next to agricultural crops.

The fishing industry provided employment to about 1 million or 5% of the country's labor force. Municipal fisheries contribute the largest labor force of 68 %, followed by aquaculture (26%) and commercial fisheries of about 6%.

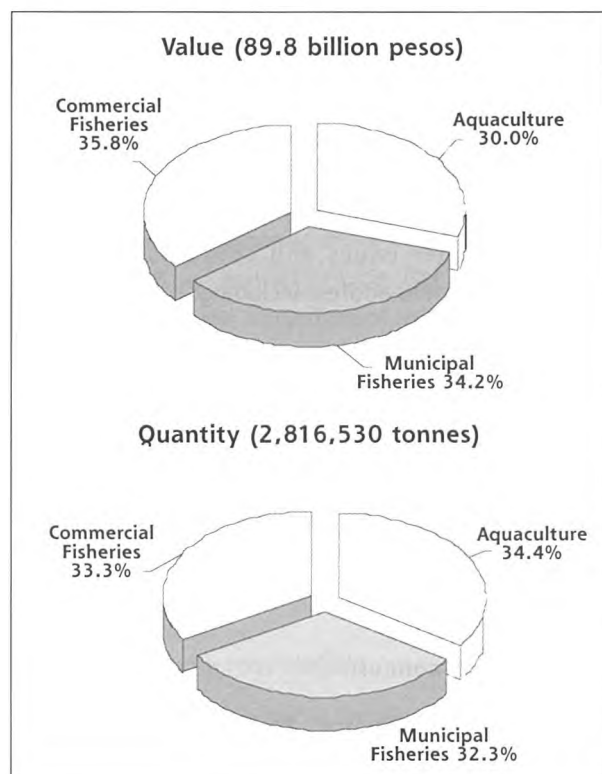
## 1. Fish Production

The output of the fishing industry in 1999 was over 2.8 million tonnes contributed by commercial fisheries (33.3%), municipal fisheries (32.3%) and aquaculture (34.4%) (Fig 1).

From 1995 to 1999 the very minimal increase was brought about by the commercial sector. The slowdown can be attributed to the warm temperature experienced from 1997 to the present. A negative 2.91% drop in total production in 1997 was due to the decline in aquaculture production as a result of the shrimp disease. However, the industry recovered a 5.8% increase in 1999 over the 1998 total production (Table 1).

## 2. Processed Fish Products

Fish products manufactured both for domestic consumption and for export include dried, smoked, salted, canned and fermented products. Considerable improvements have been done in terms of product formulations and packaging over the last few years. New products have been developed with the traditional ones modified to suit the demands of the consumers both on food safety, high quality and other considerations such as low salt, spicy products, marinated, acidic, fried, etc.



**Fig 1: Total Production by Quantity and Value - 1999**

### 3. Fisheries Export and Import Performance

Fishery exports are a very significant source of foreign exchange. In 1999, fishery export amounted to P19,345 billion (173,051 tonnes), a decrease of 5.8% in value and 6.8 % in volume as compared to 1998 performance. Shrimp which used to be the top export was replaced by tuna in 1997 up to 1999. Shrimp continues to suffer significant setbacks as a result of the shrimp disease outbreaks. Major exports in terms of value were the following: tuna, (P5, 533 billion); shrimp/prawn (P5,142 billion), seaweeds (P3,483 billion). Other products are octopus, pearls, cuttlefish/squid, live ornamental fish, lobster and live grouper.

Foreign buyers of fish and fishery products in descending orders were Japan, US, EU member states, Hong Kong, Canada, Korea and Singapore.

Import of fishery products is allowed as long as these are raw material inputs of processing plants that may be re-exported as high value product. From 1995 to 1999 there was an increase of volume of import except in 1998. The bulk of fishery imports comprised tuna, sardines and mackerel that go to the local canneries and fish meal companies, as a vital component of animal feeds (Table 2).

#### ■ Issues and Concerns

The major concern in the fisheries sector is the need to maintain a balance between the requirement for increased production to contribute to the country's food security against the intervention of conservation, and protection of resources for long-term sustainability. There are other issues and concerns which the government should address including:

#### 1. Resource management and environment

The shrimp disease problem that plagued the industry over the past 5 years and the over exploitation of the coastal areas and inland waters show a negative impact on the country's fish supply situation.

#### 2. Industry concern

**Trade Liberalization.** There is a need to review foreign policies on trade liberalization, tariff reduction on equipment and machinery inputs.

**Table 1: Volume (tonnes) of Fish Production by Sector 1995-1999**

Year	Aqua-culture	Muni-cipal	Commer-cial	Total
1999	948,995	918,781	948,754	2,816,530
1998	954,656	891,146	940,533	2,786,335
1997	957,390	942,466	884,651	2,766,507
1996	980,829	909,248	879,073	2,769,150
1995	919,810	972,043	893,232	2,785,085

**Table 2: Export and Import of Fish and Fishery Products, 1995-1999**

Year	Quantity (MT)	FOB-Value	
		(P000)	(\$000)
<b>Export</b>			
1999	173,051	19,344,634,000	480,055
1998	185,758	20,553,378,000	529,999
1997	173,887	16,337,349,000	549,831
1996	164,673	15,110,548,000	549,331
1995	169,746	15,656,803,000	606,038
<b>Import</b>			
1999	255,066	4,399,002,000	107,272
1998	165,989	3,287,760,000	83,319
1997	295,016	4,020,376,000	138,120
1996	262,586	3,178,130,000	120,996
1995	270,213	2,923,590,000	112,114

**Post-harvest losses.** There is a need to reduce fish post-harvest losses in order to bridge the widening gap between demand and production. The actual quality losses occur mostly in remote coastal areas where infrastructure facilities are still wanting.

**Trade barriers.** The growing concern for food safety has often led to unjust trade barriers in the guise of more stringent food safety and quality standards. The implementation of HACCP in the seafood industry as required by the key market has put some pressure on both the government authority and the industry. In addition, other semi-technical barriers related to environment and tariff continue to emerge such as BADGE, GMO, etc.

**Increasing cost of production inputs.** The continuing oil price hike and of other production inputs has also caused the increase in production inputs, thus making the product cost much higher and less competitive.

### 3. Institutional concern

- (1) Institution strengthening and human resources development. Need for institutional strengthening and human resources development especially on fishery inspection and quarantine.
- (2) Information system. Need for efficient delivery of information on seafood trade. The government needs an efficient and up-to-date information delivery system to enhance access to trends in seafood trade particularly with regard to standards of seafood trading partners.

#### ■ The Philippines Fish Inspection and Quality Control System

The current international seafood market is characterized by consumers demand for better and more transparent food safety standards. Meeting the new standards of the importing countries has placed great stress on both industry and government inspection agencies in countries such as the Philippines. Although the traditional role of the inspection agency in sampling and analysis has been reduced, there are enormous responsibilities in reorganizing the agencies' role to face the new realities in assisting the industry to comply with the requirement. This task entails a substantial amount of work for both parties.

In the Philippines, the government agency responsible to regulate the import and export of fish and fishery products is the Bureau of Fisheries & Aquatic Resources (BFAR). Other agencies have their specific mandates and roles on the national food control system. Such agencies share their limited manpower resources, facilities and technical capabilities to respond to the current needs of the industry.

In the process of implementing a HACCP-based inspection system, the government has taken steps to harmonize the implementation of the system among the agencies concerned. The government has also realized to further strengthen its capability to effectively implement its mandate and responsibilities to meet the demand for food security, food safety and global competitiveness.

#### 1. Legislative framework

Even long before the mandatory implementation of the HACCP system, the Philippines has already established legislations to ensure the

safety and quality of its seafood products. As early as 1975, the basic minimum requirements prescribed for the operation of fish processing establishments have been set in place such as:

- **Fisheries Administrative Order No. 117 s. 1975** — rules and regulations governing the operation of processing plants for fish and fishery/aquatic and prescribing/requiring standards, quality control and inspection of processed fish and fishery/aquatic products.
- **Fisheries Administrative Order No. 117-1 series of 1994** — amending Sections 3, 4 and 5 of FAO 117 to include provisions for the minimum requirements for fish processing plants, personnel hygiene and plant premises and hygiene and sanitation.
- **Presidential Decree No. 856 of 1976** — known as the Sanitation Code of the Philippines, which provides for public services directed towards the protection and promotion of health, integrating sanitary laws of the Philippines.

This was followed by other legislations to respond to the changing needs of the seafood trade. Current legislations being implemented include the following:

- **Republic Act 8550 (Fisheries Code of 1998)** — an act providing for the development, management and conservation of the fisheries and aquatic resources of the country and for the implementation of HACCP-based inspection in the fish processing industry.
- **Fisheries Administrative Order No. 195, series of 1999** — rules and regulations governing the importation of fresh, chilled and frozen fish and fishery aquatic products.
- **Fisheries Administrative Order No. 199, series 2000** — guidelines on fish transshipment, defining the unloading of fish caught by foreign fishing vessels outside of Philippine waters.
- **Republic Act No. 7394 (Consumers Act of the Philippines of 1992)** — rules and regulations pertaining to the production and sale of all consumer products to protect the interest of the consumer, promote his general welfare and establish standards for products.

#### 2. Authority responsible

By virtue of Republic Act No. 8550, BFAR is now a line bureau of the Department of Agriculture with fifteen (15) Regional Offices nationwide including the

autonomous regions of Cordillera and Muslim Mindanao. The BFAR is the government authority responsible for implementing the Philippines food safety control programme for fish products under the MakaMASA Fisheries Programme, Fish Quality Assurance Component. The programme is designed to provide directions and framework to develop and manage the country's fisheries resources.

### 3. Facilities

The Fish Product Testing Laboratory at the BFAR's headquarters serves as the central fish product-testing laboratory. It has already established four Regional Quality Control laboratories in Cebu, Zamboanga, Davao and General Santos City. Other government and private accredited laboratories recognized by BFAR provide assistance on the physico-chemical and microbiological testing of fishery products for verification purposes in support to the implementation of the country's seafood control programme.

### 4. Certification System

- (a) Certification of fish and fishery products as required by importing countries are issued by BFAR based on the following:
  - (i) Result of the regular check of processing plants.
  - (ii) Test results (chemical, microbiological and sensory) on products inspected conducted by BFAR laboratory, other government or recognized private laboratory.
  - (iii) Evaluation of the quality assurance programme.
  - (iv) Inspection specifically required for the issuance of a certificate.
- (b) Certificates of product analysis for fish and fishery products are issued by the Product Testing Laboratory and its Regional Quality Control Laboratories. Other government laboratories like the Bureau of Food and Drugs of the Department of Health, and the Food Development Center, National Food Authority, and other accredited laboratories can also issue laboratory analysis stating the test result of the fishery product as basis for product certification required by the importing country.
- (c) Certification of quality is also issued as required by the

importing countries based on specific requirement.

- (d) Health Certificate is issued for fishery products except bivalve mollusks exported to EU member countries. BFAR issues this certificate on the basis of competence to EU requirements as well as for Philippines requirements for food safety.
- (e) Certificate of HACCP Compliance for exports to US. In the absence of an MOU between the Philippines and US, this certificate is issued to seafood processors based on verified compliance to the USFDA Title 21 CFR 123 regulation.

## ■ Status of HACCP System Implementation

### 1. Manpower reinforcement

The implementation of HACCP as a system to ensure food safety is an interplay of the key players involved from production to consumption. The major players being the government and the industry sector saw the need to train their manpower resources in order to implement the system effectively.

The government through BFAR prepared the inspectors through collaboration of national and international bodies such as USFDA, WMFS, AQIS, FAO-UN and CIDA among others. The inspectors were trained on HACCP concept, principles, application, HACCP plan development, regulatory assessment and documentation. Analysts were also trained in good laboratory practice and on advanced methods of fish product analysis.

In like manner, the industry participated in national and international training on HACCP principles and application of new development, monitoring, internal audit and documentation. Such contribution from both sectors have made the implementation of HACCP more relevant to the current market requirement.

Aware of the importance of the Philippines' position in the seafood trade, the government took several initiatives to cope with the challenges and requirements in the international market.

The application of the concept of HACCP in the Philippines is generally accepted by the seafood industry, although there are apparently different levels of understanding and application.

### 2. Accreditation system of inspection

Based on the emerging stringent global requirements on seafood trade the government took a bolder move by instituting an inter-agency accreditation

programme for food processors and exporters as part of its trade and investment promotion activities.

The US and EU markets require the application of the Hazard Analysis Critical Control Point (HACCP) system for exports of seafood into their market to ensure food safety. Due to this reasons, the government has adopted an accreditation system of inspection on a voluntary basis for exports to US and on a mandatory basis for exports to EU with BFAR as the designated government competent authority.

The implementation of the USFDA Seafood Mandatory HACCP regulation is currently carried out by three different government agencies namely BFAR, BFAD and FDC through a voluntary accreditation programme. These three agencies comprised the Joint Management Committee whose responsibilities are inspection, audit/verification, certification and provision of training. The committee issues a HACCP and GMP compliance certificate based on compliance to regulatory requirements to ensure food safety also on a voluntary basis. This has led to a harmonized system of inspection for fish products and fish processing plants.

The EU accreditation is based on the principles of "equivalence" to those regulations governing the production and placing on the market of the fish and fishery product. BFAR as the competent authority to verify the application of Council Directive 91/493/EEC and other EU regulation in force, recommend for accreditation fish processing plant on the basis of compliance. Guidelines and procedures have been established for the accreditation of processing plant including freezing vessel and carriers supplying frozen fish to EU accredited plant. To date, there are 40 fish processing plants and 68 freezer accredited to export the fish products to the EU market.

### 3. HACCP-based inspection capability

Since 1994, a series of training on HACCP principles, concept and application and HACCP development for fish inspector, quarantine officers, technical personnel and training staff, have been conducted nationwide. This is also done in coordination with BFAR-Regional Offices and other agencies with BFAR headquarter providing the training expert.

Training for fish inspectors is an on-going activity to increase their understanding, skill and competency in the application of the HACCP system including verification of the pre-requisite programmes.

Participation of fish inspectors in national, regional and international trainings, seminar and symposia were likewise encouraged to further enhance the capability to implement a HACCP-based fish inspection and quality assurance system in the seafood industry.

### 4. Training for industry

To enable the industry to meet the requirements, the government through BFAR has conducted a series of training courses for the industry personnel nationwide with priority in the seafood export-active regions. The training course comprised of HACCP principles, concepts and application for managers; HACCP plan development for QC supervisors and SSOP for line workers.

A recent training on Monitoring and Internal Verification/Audit of HACCP programmes was conducted wherein seventy-seven Quality Assurance Manager/ Supervisors from 35 seafood companies have participated.

### 5. Regulatory assessment of fish processing plants

The BFAR national and regional fish inspectors conduct regular inspection, monitoring and audit/ verification of exporting fish processing plants to ensure that they consistently comply with regulatory requirements. Inspection of fish plants processing products for domestic market is mainly on compliance to GMP requirements.

### 6. Laboratory capability building

Quality control laboratories have been established in four seafood export-active regions of the country. These laboratories conduct physico-chemical, microbiological analysis of fish and fishery not only for exports but also for domestic consumption. They also conduct analysis for environmental contaminants that affect the safety of fish and fishery products including heavy metals, and Paralytic Shellfish Poisoning (PSP). Analysts have been trained on Good Laboratory Practices (GLP) to update themselves on the procedures and methods acceptable to international standards.

### 7. Technical assistance to the seafood industry

This is a continuing activity both in the national and regional level. This consists of one-on-one

consultations, walk-in inquiries, advisory assistance and requests for training and preliminary plant inspections.

## ■ Problems in HACCP Implementation

### 1. Lack of trained manpower

There is a need to train the local government units concerned with implementation and enforcement of regulations to ensure the safety of domestic products. On the part of the seafood industry, the lack of skilled and competent manpower is due to the rapid turnover of its personnel resulting in a continuing need to train new quality managers, supervisors as well as workers.

### 2. Sustainability of HACCP implementation

The rapid turnover in personnel in the industry poses a significant effect on the sustainability of HACCP implementation. This indicates that a series of training on monitoring and verification of HACCP programme should be made available to the industry on a continuing basis. To sustain the implementation of HACCP, adherence to GMP as pre-requisite requirements is especially important.

## ■ Current Policies

As the regulatory agency for the import/export of fish and fishery/aquatic products, BFAR has adopted the following policies:

- (i) Implement a HACCP-based fish inspection system.
- (ii) Conduct research on food safety hazards specific to processed, Philippine fishery products.
- (iii) Implement interventions to reduce post harvest losses.
- (iv) Optimum utilization of fishery resources through the development of value-added products from under-utilized fish species.
- (v) Provide favorable environment conducive to increased investment and global competitiveness.
- (vi) Increase in public investment particularly on post harvest facilities;
- (vii) Tap the expertise of state universities and colleges (SUC's) in accessing appropriate technologies, providing a form for research-extension linkages.
- (viii) Provision of infrastructure, marketing and support facilities.
- (ix) Cooperate in achieving harmonization or mutual recognition of fish inspection and certification system.

- (x) Support and participate in regional and international affairs and commitment.

A number of guidelines, rules and regulations through Fisheries Administrative Orders (FAO) have been established. These guidelines, rules and regulations are:

- (i) Rules and regulations on the exportation of fresh, chilled and frozen fish and fishery/aquatic product.
- (ii) Guideline on the implementation of Hazard Analysis Critical Control Point System.
- (iii) Guideline setting the requirement for pre-processing and processing plants, the Sanitation Standard Operating Procedures thereof, and the processing and quality requirements for shellfish.
- (iv) Guideline on the establishment and maintenance of BFAR's quality control laboratories.
- (v) Guideline on the registration and licensing of fishery post-harvest facilities by the local government unit.
- (vi) Guidelines on the production, harvesting, handling and transportation of shellfish for implementation by the local governments.

## ■ Future directions

Under the MakaMASA-Fisheries Programme, HACCP shall be promoted not only in fish processing establishment but also in other fish post-harvest facilities. With the objective clearly defined, future direction shall focused on:

- (a) Harmonize fish inspection and quarantine system in the Philippines:
  - (i) Develop a harmonize inspection procedures and guidelines.
  - (ii) Establish rules and regulation on the importation of live fishery products with emphasis on Import Risk Analysis (IRA).
  - (iii) Prepare guidelines and procedures for the movement of live fishery products.
  - (iv) Conduct cross regional inspections.
  - (v) Conduct meeting of fish inspectors to discuss inspection/audit issues and concern.
  - (vi) Each government agency tasked with the mandate shall develop each own expertise and involvement.
- (b) Establish an accreditation/certification system for fish inspector/audit to upgrade their level of competency:
  - (i) Identify the government agency responsible.
  - (ii) Develop policy and procedures in the implementation.

- (c) Preparation of training manuals on regulatory assessment (external verification/audit) of fish processing for fish inspectors and monitoring and internal verification/audit of HACCP programmes for industry.
- (d) Provide extensive human resources development for fish inspector, quarantine officers, industry personnel and local government units:
  - (i) Training on HACCP plan development for fish inspector, quarantine officers, and QC managers and supervisors for the industry.
  - (ii) Training on regulatory assessment (external verification/audit) of fish processing for fish inspectors.
  - (iii) Training course for Low Acid Canned Food (LACF).
  - (iv) Training on monitoring and internal audit of HACCP Plan for the industry personnel.
  - (v) Refresher courses on fish post harvest technology, fish drying, smoking, freezing, etc. for local government units.
  - (vi) Training on HACCP for Aquaculture for fish inspector, quarantine officer and industry personnel.
  - (vii) Training on Import Risk Analysis (IRA), disease surveillance and contingency planning for quarantine officers.
- (e) Develop a generic HACCP Plan to include economic fraud and regulatory issues.
- (f) Development of potential hazard list for Philippine fish and fishery products.
- (g) Establish Mutual Recognition Agreement (MRA) Memorandum of Understanding (MOU) between the Philippines and its seafood trading partners.
- (h) Encourage the participation on regional and international meeting, conferences, training and forum on fish inspection and quality assurance.

## ■ Conclusion

The implementation of HACCP to ensure food safety is now the responsibility of the seafood industry. The regulatory agency has played a very important role

to support the seafood industry to sustain its compliance to the system. With the mandatory implementation of HACCP in the international markets and in the light of the emerging strict requirements in the global seafood trade, the role of the government regulatory agency has become more profound. The government has become the vital partner of the industry — the industry's guide, mentor and compatriot to help them improve their operations, maximize resources and make Philippine exports become "true winners".

Generally, the implementation of HACCP has established a more cooperative working relationship between the regulatory agencies and the private sector. The industry is now capable of providing a record of assurance that their products are in compliance with food safety standards and fit for human consumption. To sustain the implementation of HACCP in the seafood industry, the amount of training from both inspectors and industry personnel has become an activity of the compliant authorities.

While HACCP is not a stand-alone system, its implementation requires the interplay of the key players in the food production chain from the harvest area to the table. Key players need to be trained on the principles and concept of HACCP so that they will understand their role better and contribute to the production of safe fish products.

HACCP implementation was also able to minimize end-product testing and allow easy market access for fish products. It has also paved the way for more interesting interaction and collaboration with national government and international bodies concerned with fish safety and quality assurance. The accreditation system of inspections for fish processing plants was able to inspire confidence that the industry is capable of meeting the regulatory requirements to ensure safe fish products.

The training materials generated in the process of instituting the HACCP system provide useful information and ready reference for new processors/ exporters and would be entrepreneur and in the seafood trade.

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# Overview of HACCP Implementation in Singapore's Fish Processing Industry

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## ■ ABSTRACT

The Hazard Analysis Critical Control Point concept (HACCP) is gaining increasing attention internationally as the system of choice for ensuring food safety and is also becoming an important component for international trade and market access. In Singapore, the Veterinary Public Health and Food Supply (VPHFS) Division of the Agri-food and Veterinary Authority (AVA) has recently mandated HACCP requirements for meat, poultry and fish processing. This paper reviews the current status of the fish processing industry in Singapore and their progress in the application of HACCP.

## ■ Introduction

The Veterinary Public Health and Food Supply (VPHFS) Division of the Agri-food and Veterinary Authority of Singapore (AVA) is the competent agency responsible for the inspection and licensing control of all fish processing establishments in Singapore. AVA's primary concern for the local fish processing industry is to ensure the wholesomeness and public health safety of the fish and fishery products for human consumption as well as to meet with the health and sanitary requirements of the importing countries in respect of the plants' exports and premises.

Presently, AVA licenses a total of 103 fish processing establishments. A wide range of fish and fishery products are manufactured at these establishments. They include comminuted fish products which mainly consist of the traditional fish jelly products such as fish balls and fish cakes, Chinese delicacies such as shark's fins and sea cucumber, frozen and chilled raw seafood of a wide variety of species, crustaceans

and molluscs as well as canned seafood products. The majority of the fish processing establishments produce for the domestic market. However, there are those that process mainly for export.

Regular inspections are carried out at the processing establishments to ensure their compliance with AVA's mandatory requirements and to monitor closely their performance and standards of hygiene. AVA adopts a Hazard Analysis Critical Control Point (HACCP) approach in conducting food safety inspections at these establishments.

## Fish Processing Industry

■ The fish processing industry in Singapore can be divided broadly into two categories, namely the export-oriented processing establishments and the local processing establishments.

### 1. Export-Oriented Fish Processing Establishments

Export-oriented fish processing establishments export their fish and fishery products to a number of countries such as the European Union, Australia, China, Cyprus, Hong Kong, Indonesia, Israel, Korea, Maldives, South Africa, Switzerland, United States of America, etc. Some of the common fish and fishery products exported overseas are, frozen raw fish, crustaceans and shellfish such as tuna, shark, swordfish, dory, prawn, shrimp, mussel, scallop, squid etc. and processed fishery products such as frozen surimi-based products, canned seafood products etc. To facilitate the industry's exports abroad, AVA provides health certification services for them. As part of the certification programme, production

processes of the products destined for exports are monitored closely to ensure that they comply strictly with the requirements imposed by the importing countries and that the sanitary and hygiene standards of the establishments are maintained at the highest level at all times. Besides regular inspections of the facilities and production lines, HACCP records and documents are also audited and verified at the premises. Samples of the products are also collected for the relevant laboratory tests i.e. microbiological tests, chemical tests, heavy metals, freshness test etc. Health certificates are then issued pending satisfactory laboratory results.

Many of the export-oriented processing establishments have readily adopted Good Manufacturing Practices (GMP) at their premises and have set HACCP in place to meet with the importing countries' standards and requirements. Workers are also usually trained and have been cultivated to observe food hygiene and sanitary practices at all times during processing.

## 2. Local Fish Processing Establishments

Local fish processing establishments consist of mainly small to medium sized enterprises. Many of which are family-owned businesses with operations that rely heavily on labor intensive methods. Some of the products processed by the industry include fish jelly products such as fish balls, fish cakes, chilled /frozen seafood, shark's fins, sea cucumber and dried seafood products.

Most of the fish processing establishments are relatively small, typically of 90 - 120 square meters. The physical space constraints can give rise to poor housekeeping and maintenance of the premises and increase chances of cross contamination between the cooked and raw food. In addition, many of the workers have inadequate knowledge of food hygiene and sanitation. Hence, personal hygiene, quality control and food safety programmes are more often than not given sufficient attention.

### ■ Progress and Status of Implementation of HACCP in Local Fish Processing Industry

The application of HACCP concept to the fish processing industry has gained an increasing popularity in many developed countries in recent years as a system of choice for enhancing food safety and quality. It has been greatly recognized and accepted that the basic principle underlying the HACCP concept is that it is

possible to identify and control potential hazards and faulty problems at an early stage in food production, and thereby, preventing them from constituting risks to consumers or economic burden to the industry. This is the key advantage of HACCP over the other conventional approaches such as inspection and end-item testing, where a negative result can only be remedied when detected but does not prevent the occurrence of the hazard in the first place. As a result, many of the developed countries have integrated this system into their food inspection services programme and national legislation. Some of these countries now required their domestic industry as well as those that export fish and fishery products into their markets to adopt the same concept in their operations.

The concept of HACCP was brought into the food legislation in the European Union (EU), after the adoption of the EU Food Hygiene Directives in June 1993. Under the directive, food business operators are required to identify steps in their processes and activities that are critical to achieving food safety, and to ensure that adequate safety procedures are identified, implemented, maintained and reviewed based on the principles of the HACCP concept. To comply with this directive, the EU-approved fish processing establishments in Singapore have readily adopted the principles and applications of this concept and implemented it into their production operations

The introduction of the US Food and Drug Administration regulation which mandates the application of HACCP in the processing of all fish and fishery products imported into the US in December 1998 was another compelling force for export-oriented processing establishments to adopt and implement HACCP.

Over the years, some export-oriented fish processing establishments have taken a leap in progress as they move from quality control to company-wide quality assurance by achieving ISO 9002. With increasing awareness of the HACCP concept, more plants have also developed HACCP Plans in addition to their quality management systems to achieve both safe and quality products for consumers. This definitely enhances their sales and exports to overseas markets. In fact, meeting the export requirements of importing countries has generally been a strong motivation to the application of the HACCP concept by the establishments. Thus, the concept is better accepted and increasingly integrated

by fish processing industries that are targeting their products towards the export market.

Export-oriented processing establishments are generally those which are better supported by resources in terms of financial capabilities, qualified personnel and facilities. With these, they are able to advance themselves to compete with the world market.

On the other hand, local establishments have not embraced this concept into their operations so readily. Most of the progress achieved in implementing the HACCP concept has been found in the larger processing establishments. Small business is bound to have greater difficulties in adapting to this system as they have little or no incentive to do so. Unlike the export-oriented processing establishments, the implementation of this concept in the smaller enterprises is also hampered by insufficient technical resource base and training and the high turnover of plant personnel.

Nevertheless, considerable improvements have been made at the local processing establishments over the past 5 years. Many of these establishments have striven to improve on the standard of hygiene and sanitation and Good Manufacturing Practices (GMP) at their premises. They have also begun to be more receptive towards the use of new technology in processing and are more willing to work towards automating their production process. Many of the processing establishments have also been resettled or upgraded to newer and larger premises where better production operations and flows can be achieved. AVA continually provided assistance to licensees who are interested in setting up new establishments as well as those who have intentions to upgrade their existing premises. At the same time, AVA also provided them with technical and scientific guidance and advice on public health safety, hygiene and sanitation matters and ensure that all the mandatory requirements are clearly understood.

New and upgraded premises are generally well designed and equipped with appropriate facilities for food processing operations. The management of these processing establishments have also come to acknowledge the increasing and pressing need and importance to train their employees in GMP and imparting to them principles of food hygiene and sanitation. With the knowledge and understanding, employee will be more aware of the critical role they play in ensuring food safety and the

possible consequences that may take place resulting from their negligence.

#### ■ **AVA's Approach to the Implementation of HACCP**

In December 1999, The Wholesome Meat and Fish Act was enacted. AVA is responsible for the administration of the new Act, which regulates the slaughtering of animals and the processing, packing, inspection, import, distribution, sale, trans-shipment and export of meat and fish products.

One of the key features of the new Act is the requirement for all meat and fish processing establishments in Singapore to develop and implement a food safety programme at their premises. In view of the numerous benefits arising from the implementation of HACCP and the need to align itself with international food safety requirements, AVA mandated the HACCP requirement for all meat, poultry and fish processing. The details and scope of each system would be dependent on the size and nature of the business as well as the risk of the food products.

Although the implementation of a complete and fully documented HACCP system was only made a mandatory requirement recently, AVA had been encouraging the industry to move in this direction as early as 1995. AVA had been actively communicating the basic principles and necessary information required for its effective implementation to the various establishments. As the regulatory authority, AVA had continually assessed the appropriate means of implementation of the HACCP system by the establishments. Follow-up inspections to these establishments to ensure their consistent application of the system and to verify and audit their relevant documents are also performed regularly.

The implementation of HACCP in production systems in Singapore is still in the infancy stage, although marked progress have been seen in the export-oriented fish processing establishments. In recent years, some of these processing establishments have enlisted third party accreditation organizations to audit their HACCP plans and systems. Following successful auditing of the system, processing establishments had been awarded certifications under various HACCP schemes. Audit checks are performed regularly to ensure that the HACCP plans are correctly administered and that the system is working effectively. The HACCP plans and systems are also

reviewed continuously and verified accordingly to reflect the most current changes of production processes.

Following the many episodes of food poisoning outbreaks around the world, many processing establishments have begun to realize the importance and urgency of implementing a reliable and effective food safety system for their production processes. Many have come to acknowledge the long-term benefits brought about by HACCP as more processing establishments are seen engaging expert consultants in the design and implementation of HACCP plans and systems.

Although the government has made HACCP a mandatory requirement, the driving force lies heavily on the industry's eagerness and commitment to develop and implement effective food safety systems to make this initiative a success.

With the advent of mandatory HACCP at the processing establishments, the roles and responsibilities of inspectors have also evolved from traditional inspection methods towards one involving assessment and verification of systems. Inspectors would now need to shift the emphasis from end-product examinations to a more preventative approach. With HACCP, results of the monitoring reports and relevant information and data captured in records will offer inspectors the opportunity to obtain a complete and accurate picture of the effectiveness of the control over a process for a long period of time.

#### ■ **Problems/Difficulties Encountered by Industry**

Unlike the export processing establishments, the implementation of HACCP in smaller enterprises has generally been slow.

Time constraint and resource requirements of HACCP implementation are the common deterring factors cited by processing establishments. Economic concerns such as high cost of training employees and operating the system are also some of the reasons processing establishments hesitate in adopting the HACCP system. This is especially so in the smaller establishments. Another critical factor that has been hindering the acceptance and practical implementation of HACCP in processing establishments is the limited understanding of its principles and application as well as the misconceptions of the HACCP strategy.

The following are some common misconceptions of the HACCP strategy:

#### 1. **HACCP is a quality control programme**

HACCP is commonly misinterpreted as a quality control programme. It must be stressed that HACCP is a food safety programme. The quality of the product may improve, however, as a side benefit of the HACCP activities. By introducing quality enhancement components into HACCP plans is highly discouraged as the plans would become too complex and the focus of the system, which should be to improve food safety can often be undermined.

#### 2. **HACCP replaces GMP**

It must be understood that neither programmes are replaceable. Instead they are complementary to one another. Both programmes must be in place to ensure that production operations and the factory environment are in optimal conditions for producing safe and wholesome foods. HACCP is not a stand-alone programme. For its effective implementation, essential pre-requisite programmes such as GMP and Sanitation Standard Operating Procedures (SSOP) have to be in place.

#### 3. **HACCP is a paper exercise**

In some processing establishments, HACCP is sometimes treated as a paper exercise. It must be stressed that a HACCP system is a living and dynamic programme. In practice, a plan should reflect the status and changes in the production operations. In certain ways, it may be true that HACCP inevitably introduces more paper work. However, records and documentation are critical for the system to work systematically and effectively. More importantly, it allows for traceability.

#### 4. **HACCP implementation involves only the HACCP team and consultants**

Contrary to the misconception, HACCP involves the whole company. The top management has to be committed in providing full support to the HACCP team who in turn has the responsibility to guide and lead employees at the production lines. The empowerment of employees is often lacking at the processing establishments. The devolution of responsibility at some

traditional processing establishment seemed to be difficult for management and supervisory staff to accept. By empowering suitable and competent employees, problems can be arrested rapidly with little or no loss in process control. At the same time, employees will develop a sense of responsibility and pride as they discharge their duties.

#### 5. HACCP is intended to add a new layer of technically trained personnel

Some processing establishments may employ a few technically trained personnel or consultants to aid in the design and implementation of the system. However, the core group of people administering the HACCP plan should be the present employees, who are familiar with the establishment's facilities and production operations. Processing establishments need not re-hire. Instead, more relevant training should be provided to their existing workforce. The tendency is that many processing establishments rely solely on their consultants to develop HACCP schemes that may be unrealistic in practical terms.

#### 6. HACCP cannot work in Small and Medium Size Enterprises (SMEs)

SMEs often associate the adoption of HACCP as a criterion with which only those who intend to export their products overseas must comply. With the HACCP mandatory requirements, all processing establishments would be required to develop and implement an effective system. Where potential food hazards exist, HACCP can be applied to control them in all food producing situations.

#### ■ **Strategies to Overcome Problems/ Difficulties Encountered by Industry**

In Mar 2000 the Singapore Productivity and Standards Board (PSB) in collaboration with AVA and the Ministry of the Environment (ENV) initiated a project entitled "Journey to HACCP" for the industry. The objectives of the joint project were to introduce HACCP to the local processing industry and to equip them by means of training with the necessary skills and tools for the effective implementation of HACCP system. It shall serve as a springboard from which the local industry can be trained in HACCP, learn to apply the concept practically in their production operations and

eventually implementing it at their premises and having full ownership of the system.

The key features of the project are:

- Training sessions based on generic HACCP plans (product specific) would be conducted for the processing establishments.
- Processing establishments shall adopt and make adjustments to the generic HACCP plans to suit the production activities at their premises.
- During the implementation phase, processing establishments can engage a "shared HACCP Manager" to assist with the monitoring and verification of the system. At the same time, the HACCP manager can also provide ongoing training for the employees of the establishment. The cost of hiring the HACCP manager could be shared amongst the processing establishments.

During the development and implementation stages, processing establishments could engage the assistance of consultants whenever they deem necessary. By enlisting help only when required, the cost of implementation could be kept to a minimum. Besides defraying cost, this scheme also allows the processing establishments to be fully involved throughout the design and implementation phases of HACCP at their premises.

This scheme is optional. Processing establishments may explore other avenues to implement HACCP successfully.

To facilitate the processing establishments' implementation of HACCP, AVA would continue to support the industry by providing them with technical assistance in the form of training, talks and seminar as well as undertaking collaborative studies and initiatives with the processing establishments.

As an incentive for the local industry, the Government has also provided financial assistance for consultant cost under the Local Enterprise Technical Assistance Scheme (LETAS). Processing establishments can apply for grants of 70% (up to a maximum of S\$14,000) are provided for consultant cost and 50% (up to a maximum of S\$5,000.00) for certification cost.

#### ■ **Audit and Certification of HACCP Systems**

Once a HACCP system is implemented, continuous assessments of the systems are essential to ensure that it is working effectively and accurately. Assessments may be carried out at two levels: (i) internal audit carried

out by the processing establishment and (ii) independent assessment carried out either by the regulatory agency or third party organizations.

The audit and certification process would validate the effectiveness of a HACCP plan and provide verification of compliance of the HACCP system with the HACCP plan. Certification also confirms that HACCP system is able to provide adequate and appropriate food safety controls to ensure that the food produced are safe and wholesome.

Anticipating the growing number of HACCP systems that will be implemented at processing establishments, AVA is currently looking into the possibility of accrediting third party organizations that are competent to perform the audits and certifications. Such third party auditors will have to be certified and possess the key competencies relevant to the food operations they audit. Accredited auditors will audit and certify HACCP systems implemented in the processing establishments on behalf of the regulatory authorities/AVA.

### ■ Future Developments

HACCP has evolved over a number of years and without doubt, it has been accepted by both regulatory agencies and industries worldwide as a revolutionary system for improving food safety. It is also rapidly becoming the “food passport” to the international market place as more countries are making the application of HACCP mandatory in their legislation. In recent times, having a fully implemented HACCP system in a processing establishment is no longer considered an added advantage but a necessity to meet with regulatory requirements and to engage in international trade.

Entrusted with the responsibility of controlling and monitoring the fish processing industry in Singapore, AVA takes on an active role in helping the processing establishments in improving and upgrading their standards of hygiene and sanitation at their premises, enhancing the application of HACCP

in their production operations as well as in the advancement of processing technology.

In this connection, AVA will continue to vigorously pursue the following:

- To assist processing establishments in enhancing the safety and quality of their food products by providing relevant technical training courses, seminars and talks on GMP, public health and food safety concerns and specialized subjects such as HACCP to the various levels of personnel from the industry. This aims to create a constant awareness on the issue of food safety amongst the industry and to help train their personnel.
- To assist the fish processing industry in the application of HACCP in their production operations by means of relevant schemes and available funding. The HACCP committee is also currently reviewing the Third Party Auditors Scheme where HACCP Audit and Certification Procedures and Auditor Approval Criteria would be developed.
- To encourage the fish processing industry to move into areas of research and development to improve their processing technology and produce value-added fish products. As Singapore has limited natural marine resources, it is crucial that her local fish industry constantly upgrades and improves itself to stay competitive and to continue to create a niche for itself in the overseas markets.

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# Application of HACCP Programmes in Thailand

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## ■ Background of Fish Processing Industry

For decades, fisheries have been an economically important industry to Thailand. It is so not only because of its benefit in providing food supply, local employment, and the generation of other related industries, but it is also one of the major earners of foreign exchange for the country. In 1997, the total fish production was 3.5 million tonnes, of which 2.9 million tonnes was from wild catches and the remainder from aquaculture.

With regards to export, fishery product has ranked as one of the top five leading exported agricultural commodities in Thailand among which, frozen shrimp and canned tuna are the leading items. The major export markets for Thailand are Japan (36%), US (35%), EU (13%) and Canada (4%). The remainder of the exports goes to Australia, New Zealand, Asia, Middle East, South Africa, Eastern Europe, and many others. In 1997, the fishery industry achieved a total of 138.6 billion bahts in export earnings that accounted for 7.7 % of the total export value of the country.

The main contribution to the country's income is from the freezing and canning industry. Exports of traditional products, like dried, salted and fermented products are smaller in quantity and value, compared to frozen and canned products.

### 1. Freezing industry

The species that are of economic importance and the main raw materials utilized for this industry are shrimp and cephalopods. Despite the decline of shrimp landings in the past decades, shrimp exports have not declined but risen from 121,000 tonnes in 1991 to 156,176 tonnes in 1999. The rise in export is due to the sharp increase in shrimp culture productivity. During the period from 1982 to 1996 the production

percentage of cultured shrimp in total shrimp production went up from 6 percent to 85 percent. The aquaculture shrimp production achieves approximately 220,000 tonnes per year. The products exported have been diversified to various major items, such as, cooked PD tail-on, breaded shrimp, raw whole, raw H/L, straight shrimp, and other value added products.

Catches of squid, cuttlefish and octopus have fluctuated widely over the years. Export of frozen cephalopods increased slowly from 68,000 tonnes in 1987 to 72,000 tonnes in 1989 and in 1999, increased to 85,309 tonnes. Japan is the predominant market for Thai cephalopods, followed by Italy and Spain.

Fish and shellfish make up some fractions in export commodities contributing to the country's incomes. The major species are mackerel, threadfin bream, baby clam and mussel. Compared with frozen products, the export value and quantity of shellfish is smaller. Frozen fish fillet is now seldom processed due to the high cost and shortage of economical raw materials. Threadfin bream is mainly used in surimi product and shellfish is used as a component in frozen seafood mix product.

### 2. Canning Industry

Presently, there are 52 canneries operating in Thailand. Canned tuna is the predominant export item in making up the value of 15.6 billion bahts from 1993 to 17.3 billion bahts in 1997. 1,200 tonnes of tuna is used daily for the total production in Thailand. 80% are imported from overseas comprising the predominant species of skipjack, yellow fin, and albacore. Local tuna like tongol and bonito are also used but in a smaller quantities. The US is a major market, followed by Canada, Japan and EU.

Canned sardine and mackerel are produced in smaller amounts compared to tuna. Major markets are mainly limited to EU, Middle East and Asia.

### 3. Traditional Products

The small-scale processors mainly engage processing of traditional product and not much modernized technology is used. Most of the products are processed for domestic markets rather than export. Examples of this type of products are dried fish and shrimp, salted fish and shrimp, fermented fish and shrimp and fish sauce. However, there is a trend towards export of some of these products, particularly fish sauce, dried shrimp and shrimp paste.

#### ■ Important Issues Facing the Industry

##### 1. Raw material supply and quality

To serve the increasing production capacity of fishery product, large amount of raw material is required to sufficiently supply the industry. Unfortunately, it is not always the case that the demand will perfectly match the supply. As a consequence of over-fishing and prevalence of diseases in aquaculture, shortage of raw material inevitably occurs at one time or another. In such situation, imported raw materials will be used.

Quality is also another issue. Good product quality can only be achieved from good quality raw material. In many cases, raw material quality cannot be controlled by the industry. The problem is more prevalent in fish caught from the sea than the culture farms.

##### 2. Trade competition

Competition among the processors in the country as well as other exporting countries has become intense. Thailand is no longer considered a place where things can be produced at a lower cost. The cost of basic infrastructure, labor, and raw material are some of the factors influencing the final price of finished products. In addition, to achieve a good quality product, additional cost is unavoidable to be used for maintaining the quality system. To overcome this situation, processors need to move away from primary processing to more diversified and value added production.

##### 3. Trade barriers

Presently, tariff and non-tariff barriers such as high tax rate in some importing countries, requirements on labor practices, environment and specific product standard to another are becoming important issues facing the industry. The tariff problem is more difficult

to solve, since the decision is dependant upon and made by the importing countries.

#### ■ Inspection and Quality Control System

The Department of Fisheries (DOF) under the authority of the Fisheries Acts B.E.2444 (1901) is the principle Government agency interacting with the fishery industry and is responsible for the development of this sector including introduction to new technologies, extension, research, regulation and inspection.

The Fisheries Act provides authority for the competent official to lay down conditions for registration of establishments that are involved in trading of fish and fishery products and the fishery industry (Section 25 of the Act).

Under this authority, the DOF lays down conditions and guidelines for approved fish processors.

Currently the DOF has been authorized under the Import and Export Control Acts B.E.2522 (1979) to inspect and control fish and fishery product exported to other countries under condition specified in the Ministerial Notification of the Ministry of Commerce.

The relevant policy to the quality control system states as follows:

- (a) To achieve and maintain fish harvesting, aquaculture and processing industry and market where consumers and industry alike are assured of the value, wholesomeness and marketability of fish and fish products - both those consumed in Thailand and those produced for export markets.
- (b) To develop and promote appropriate product and process standards which will contribute to the achievement of acceptable quality, safety and identity of fish and fish products, and to provide reasonable assurance of compliance with these standards.
- (c) To have in place a fair, visible and effective system that provides reasonable assurance of compliance with product and process standards that includes the requisite trained personnel, equipment, laboratories, protocols and procedures.
- (d) To achieve and maintain a high standard of quality in all aspects of the work of the laboratory and field inspection.

The role that the DOF play is to:

- (a) Improve quality of fish as raw material through research development on fish handling and transportation.



- (b) Provide reasonable assurance that fish used as raw material are free of chemical contaminants, environmental contaminants and toxin through a regular monitoring programme that tests for level of these contaminants.
- (c) Apply a risk based and preventive control inspection by implementing a quality management programme based on Hazard Analysis and Critical Control Point.
- (d) Ensure the implementation of basic food hygiene, good manufacturing practices and preventive control quality system by the fish-processing establishment.
- (e) Provide assurance to the import authorities of the effectiveness of inspection and control system and assurance of product safety and compliance, where relevant.
- (f) Ensure that allocated resources are effectively utilized.

Fish inspection and quality control activities of the Department are carried out by the Fish Inspection and Quality Control Division (FIQD) which is authorized as a competent authority for fishery products. FIQD is organized according to the two main different activities, administration services and inspection activities. The inspection activities are performed by the four Regional Centers located in Bangkok, covering Central and Eastern seaboard areas; Samutsakorn, covering provinces around Gulf of Thailand; Suratthani, covering upper Southern provinces; and Songkhla covering lower Southern provinces. The Administration Subdivision, Standard and Inspection Agreement Subdivision and Certification Subdivision carry out the administration services. These three Subdivisions are based in Bangkok.

The Regional Fish Inspection Centers' responsibilities include establishment and process inspection, quality and safety inspection of products and evaluation of the quality control programme of the processors. Each Center consist of 5 sections covering all aspects of inspection as follows: field and facility inspection, physical and sensory assessment, microbiological analysis, chemical analysis and administrative section.

The administration services cover the handling of inspection application, developing of policies, procedures and quality system of inspection programme, interacting with international agencies, providing training programme, and issuing certificate upon requests.

## ■ Current Inspection Programme

The current fish product safety and quality control programme is based on Good Manufacturing Practices and General principles of Food Hygiene as prerequisite programmes. In addition, all processors under DOF approval are required to implement the Hazard Analysis and Critical Control Point principles. The programme emphasizes continuous problem solving and prevention; from the quality of water used to marketing rather than relying on analysis of product samples prior to exporting.

According to the conditions laid down for approval of processors and products for export, all fish processed and destined for export to countries where DOF is authorized as a competent agency or have agreement with, must be carried out in a DOF registered and approved establishment. To qualify for registration and approval, the establishment is required to meet the Construction, Equipment and Basic Food Hygiene Requirements set out by DOF and have a documented HACCP based Quality programme in operation. To maintain the approval status, the establishment needs to maintain a compliance with the previous conditions and demonstrate that their products consistently comply with the DOF criteria.

The inspection frequency is based on the plant's hygiene and quality system compliance rating, product risk categories and past history of product compliance. The frequency is generally set at 2-4 times per year. If the plant is found not in compliance to the requirements, follow up inspection will be required in a time frame set by both parties.

Besides the regular plant inspection, DOF also monitor the products from the approved processors. The product-monitoring programme is aimed to check the product quality, safety and compliance to DOF criteria or criteria agreed with the import authorities. Frequency of sampling is dependant on performance history of the processor and risk category of the products. Samples will be collected according to the sampling plan and transferred to the laboratory for microbiological, chemical and sensory assessment.

## ■ Implementation of HACCP Programmes

Since many countries has accepted HACCP as a tool to control food safety and made its application mandatory for fishery products over the past few years, the Thai DOF, as a competent authority, has followed the international trend.

HACCP system was first introduced to the fish processing industry in Thailand in 1991. Following the given training course, the pilot programme of HACCP implementation by the volunteer processors was carried out. The programme involved the development of HACCP documents for the industry and HACCP audit by the DOF. The first outcome of the programme at that time was not very successful due to the confusion of participants on HACCP principles, its development, as well as lack of practical experience on HACCP application itself. As a consequence, continuous training programmes have been conducted for the industry and the DOF inspectors. Generic HACCP plans have been developed for major commodities through workshops. Guidelines for development of documented programme have been provided and updated to meet the international guidelines and importing countries requirements on HACCP.

In 1996, the programme became mandatory for approved fish processors under jurisdiction of the Department. Approved processors must have the HACCP programme implemented, documented and verified by the Department.

Currently there are a total of 201 registered processors with the DOF, of which, 70% have been approved for HACCP. The remainder are in the process of verification.

### ■ HACCP Requirements for Industry

Processors must institute and maintain prerequisite programmes that meet the requirements specified in Basic Food Hygiene and Good Manufacturing Practices specific for the processing conditions and products. They must also develop a documented HACCP programme for an individual product or process and implement it effectively. To develop a HACCP plan, all food safety hazards concerned must be analyzed and control measures must be established. For each critical control point, the processors must establish critical limits, monitoring procedures, corrective action and verification procedures. Record keeping is required to demonstrate the effectiveness of implementation.

### ■ DOF's HACCP Verification

The assessment of a processor's HACCP programme will be conducted in two phases: document review and on-site audit.

The document review will be conducted based on the Fish and Fishery Products HACCP Programme —

Conditions Laying Down for Processors under the Department of Fisheries Approval. The evaluation of the document is to verify that the company has identified all of the significant safety hazards concerned with the specified operation, and that effective control measures have been established.

When the written HACCP Programme of the company is evaluated and deemed to be sufficient, the Department will perform an on-site audit according to the written Programme.

The on-site audit will be conducted to assess that the written quality document is actually implemented and meet food safety objectives. The audit will be carried out through observation of the processors' activities, interviewing of the personnel involved, and examining of related documents and control records. All non-compliance identified must be corrected within an agreed time frame.

### ■ Problems Encountered in HACCP Implementation

Over the past few years in HACCP audit by the DOF, problems encountered regarding the implementation of the industry are basically listed as follows:

- (1) Validation of critical limits: Critical limits are borderlines to define acceptability and unacceptability of the product. If the critical limits set for controlling the hazards are not properly validated, for example, temperature and time used in pasteurization, or cooking of the product, the HACCP plan will not be able to provide a food safety assurance for the product. In some cases, scientific support for all critical limits selected is not available and the support is not relevant to the processing conditions present in the facility. For those critical limits taken from and supported by the existing criteria/standards set by importing countries (e.g. histamine, water activity content), less problems would be encountered. However, the criteria/standards are still limited and in many cases they differ from country to country.
- (2) HACCP verification: Confusion always arises when the company establishes its verification procedures especially for the overall plan. Many companies establish only an annual sanitation check as a tool to determine an effectiveness of their HACCP system. Calibration of monitoring equipment,

review of HACCP plan, and internal audit are unintentionally left out.

- (3) Experience and qualification of industry personnel: Some companies have limited personnel to carry out the quality programme. Moreover, the designated personnel have little experience and knowledge of HACCP. Success of HACCP development and implementation in such companies is consequently more difficult to achieve. In addition, support from the top management to the HACCP team ultimately is important. It is obvious that for a company with no support from its top management, it is absolutely hard to develop and maintain a HACCP programme for it to work effectively.
- (4) Development of HACCP documentation: Although Codex has established a guideline for HACCP development to be used in the industry, in practice there are still some differences in formats and details required by different customers and audit agencies. Some customers or agencies require the company to identify a particular processing step as a CCP, while the other suggests not to. The completeness of HACCP document is also other issue, how detailed and complete it should be before executing the audit. Judgment still remains to the individual audit agency.

#### ■ Conclusion

HACCP is a preventive approach to assure food safety. Having completed the HACCP plans

documentation does not imply the success of HACCP implementation unless the ongoing maintenance of the HACCP in a system is underway. Success of HACCP implementation is not achieved overnight. DOF spend many years promoting HACCP to the export fishery industry. There has been an increase in knowledge and understanding of HACCP by the fishery industry as well as DOF itself. Problems encountered in HACCP application would be minimized through practical experiences of the industry. HACCP audit also needs to be standardized among the agencies and at the international level in order to obtain the same understanding and expectation of food safety.

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# Development and Implementation of HACCP in the Fishery Industry of Vietnam

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## ■ Brief Introduction to the Fish Processing Industry in Vietnam

Fishery sector is one of the most important industries in Vietnam and is the fourth largest hard currency earning industry of the country. The fish processing industry has made a lot of progress during the last 25 years.

### 1. Processing plants

Before 1975, the Vietnamese fish processing industry developed slowly, production scale was small with only dried products and fish sauce as the main products. There were only 10 frozen fish processing factories in the south and only one fish-canning factory in the north.

In the 1980s, there was a rapid growth in the fish processing industry. In 1989 there were already about 100 frozen fish processing factories with a total production volume of 62,000 tonnes of frozen products. There were 73 state owned fish sauce-processing factories of a small scale and many household fish sauce processing industries.

In the 1990s, fish processing industry grew dramatically not only in quantity, but also in quality. At present, in Vietnam there are about 200 frozen seafood-processing factories, 5 fish canning factories and many establishments producing dried fish and fish sauce. The factories are concentrated in the South (approximately 60%). Many factories were upgraded, rebuilt and had implemented HACCP to process high quality and safe products to meet the requirements of the markets. There are now 58 seafood-processing factories that have implemented HACCP effectively, of which, 40 seafood-processing factories are permitted to export directly into the EU.

### 2. Main products

#### (a) Frozen fish products

The main frozen fish products are frozen shrimps, fish, squid, cuttlefish, octopus, swimming crab, and baby clam, etc. Fish products are frozen in contact freezers, air blast freezers or belt freezers. Block frozen products and IQF products are popular.

Frozen shrimp is the most important product accounting for 35% of the total export volume. In 1999, the total frozen shrimp production was 60,000 tonnes. The shrimp are usually packed in 2 kg block (PUD, PD, HLSO, HOSO). There are also value added IQF products such as PTO, C&P, breaded shrimp, butterfly cut shrimp. The shrimp species used are mainly black tiger, pink, cat tiger, white and yellow.

Frozen fish is the second most important export product. In 1999, fish products contribute to 30% of the total export volume; with about 46,000 tonnes. Fish is exported in the following forms: whole fish, fillet, gutted and headless and exported as value added products such as breaded fish fillet. The main export species are red snapper, Spanish mackerel, yellow strip fish, pacific dory, sole, tuna, leather jacket, sillago, fresh water catfish, groupers, and sea bream.

**Table 1: Volume of Export Frozen Products**

Type of products (tones)	1997	1998	1999
Frozen shrimp	49,522	64,181	59,845
Frozen fish	34,400	35,050	45,910
Frozen cephalopods	28,310	30,771	41,162
Other frozen products	13,093	7,965	15,393
Total	125,325	137,967	162,310

Frozen cephalopods contribute to about 23% of the total export volume. In 1999, the export volume was about 41 tonnes. Previously, squid, cuttlefish and octopus were mainly processed as block frozen whole and fillet. Though for the last four years, companies have been increasing the production of value added products such as squid tube, squid ring, pineapple-cut cuttlefish, sushi and sashimi products. The other products are frozen (IQF and block) crab, swimming crab and bi-valve mollusc.

#### (b) Dried products

Dried fish are traditional products of Vietnam. These include dried fish, squid and shrimp. Raw materials for dried production are anchovy, leather jacket, squid and small shrimps. The dried products are distributed domestically and exported to Japan, China and other Asian countries. Total export volume of dried products in 1999 was about 15,000 tonnes.

Dried products and dried salted products are being produced in primitive conditions, using mainly bamboo supporting frame and net. The products are dried by solar energy except in bad weather when drying will be carried out in the artificial dryer. The main dried products are dried skin-on squid, dried skinless squid, dried anchovy, dried leather jacket.

**Table 2: Volume of Exported Dried Products**

	1997	1998	1999
Dried products (tonnes)	7,025	14,951	15,046

Besides the traditional dried products, fish processing factories have also produced high value products such as skinned dried squid, dried rolled squid, seasoned fish and squid. The raw materials are usually dried and semi-dried fish and squid. As the products are ready-to-eat, the hygienic requirements for production, equipment and workers are stricter.

#### (c) Fish sauce

The production of fish sauce is traditional in Vietnam. The processing method is simple and mainly based on the fermentation and autolytic changes in the salted fish and salted shrimp. The main production equipments are concrete and wooden tanks. Fish sauce is processed by two different methods: pressing or

agitating. The processing time of fish sauce is from six months to one year depending on the ambient temperature. The total production volume of fish sauce is about 170 million liters. Presently, fish sauce is exported to EU, US and Australia.

#### (d) Other products

The volume of canned fish production is small. The statistics on its volume is not available. The main canned fish are tuna and spanish mackerel.

During the last few years, some factories started the production of surimi for export, but its quantity is small. Some factories have also started the production of fish cake, shrimp cake, shrimp paste around the sugar cane, shrimp paste around the crab leg, spring rolls, shrimp dumpling, etc.

### 3. Market

In the last ten years, seafood export from Vietnam has increased dramatically. The seafood market is expanding all the time. In 1999, seafood products from Vietnam were exported to 64 countries.

Japan is the largest market for Vietnamese seafood accounting for about 40-50% of the total seafood export volume. In 1999, Vietnam exported about 68,000 tonnes of seafood and 45% of this volume is frozen shrimp.

EU is the second most important market. In 1999, this market accounted for 14% of the total export volume of Vietnamese seafood, which amounts to 25,000 tonnes. The main export products to EU are frozen shrimp and cephalopod.

The United States is in the third place. In 1994, the first 500 tonnes of frozen shrimp was exported to this market. In the ensuing years, the export volume was almost

**Table 3: Volume of Products (tonnes) Exported to Main Markets**

Markets	1997	1998	1999
Japan	54,000	60,300	67,227
EU	23,800	27,050	25,021
USA	4,900	12,000	17,912
Southeast Asian region	5,170	11,407	11,416
Taiwan	17,078	14,360	16,992
Others	26,924	25,564	37,418

double for each year. The export volume in 1999 was about 18,000 tonnes or 10% of the total export volume.

China and Hong Kong are important markets for Vietnam. The favorite products of these markets are iced fish, iced shrimp, iced cuttlefish, dried squid, etc. Vietnamese companies also export their products to Taiwan, Korea, Singapore and Thailand.

#### 4. Issues facing the industry recently

- (a) The national food safety regulations have not been developed sufficiently to cover all kinds of products and all types of processing and trading establishments. At present, the Ministry of Fisheries is working on the draft proposals for future seafood safety regulations. It has been planned that the regulations in question will be issued this year. These regulations will be applicable for all the establishments in the fishery chain from the fishing ports and landing sites through the fish markets and transport vehicles to fish processing plants.
- (b) Recently, regulations on production conditions of the fishery sector have been enforced. According to this regulation; only the enterprises with proper production conditions will be allowed to continue their activity. The others will have to close down until they can upgrade their factory. To upgrade about 100 frozen processing factories and a big group of other factories within about two years from now is a big task for the sector (financially and technically).
- (c) A large quantity of export products is products that have undergone minimal processing. There is a trend in the industry to increase the production of value added products and it is expected that the percentage of value added products to increase.
- (d) Sea-caught raw materials are poorly preserved leading to high post harvest losses (about 20%). To solve this problem, the Ministry of Fisheries will organize training courses for fishermen and middlemen to teach them to how to handle raw materials properly.

#### ■ **Changes from Traditional Quality Management into Quality Management Based on HACCP in the Fishery Industry of Vietnam**

Before 1991, quality control in the fishery industry of Vietnam was mainly based on the inspection of the final products. The results of sample

analysis were used for quality assessment.

After 1991, the Vietnamese fishery sector started to get acquainted with quality management based on HACCP. With the collaboration of INFOFISH and UNDP/FAO, the Ministry of Fisheries (MOFI) held a training course on HACCP concepts for Vietnamese fishery industry in May 1991. This is the first training course in Vietnam with many experienced international lecturers. Many thanks to Mr. Henri de Saram (Director of Infofish), Dr. Carlos Limas Dos Santos (UNDP/FAO Training Programme) and Ms. Sirilak Suwanrangsi (DOF, Thailand) who contributed a great deal in the introduction of HACCP concepts to the fishery sector of Vietnam. After that, interest in HACCP application waned. The introduction of ISO 9000 also made the fish processors confused, as to which quality programme is appropriate. However, under pressure from the import markets on seafood safety, HACCP has really taken root in Vietnam fishery industry since 1995.

With the aim of market expansion and increasing seafood exports together with the assurance of seafood safety for both export and domestic consumption, the Ministry of Fisheries conducted concrete activities in order to speed up the changes in seafood quality management and to step by step replace the traditional inspection with HACCP based programmes.

The EU and US markets have greatly influenced the HACCP implementation process in Vietnam. The Directive 94/356/EC requires all fish-processing establishments that export their seafood products to EU market to carry out HACCP called "own check". According to the FDA regulations, all fish processing plants that export their seafood products to US must have adequate HACCP plan(s) in place. Such brought fish processors towards the quality management programme based on HACCP concepts.

#### ■ **Development and Implementation of HACCP in the Fishery Industry of Vietnam**

##### 1. HACCP training

##### (a) HACCP training of trainers with international training courses

In order to introduce HACCP concepts widely and rapidly to speed up the process of HACCP application in the country, MOFI considered HACCP trainer building as a main key for success. With this point of view, MOFI sent officers with adequate knowledge and experience to take part in train-the-trainer HACCP courses held both in Vietnam and abroad. Between 1990 to 1999, five

train-the-trainer of HACCP courses were held in Vietnam with 36 participants from authority agencies (Science and Technology Department, NAFIQACEN), Fishery University and college, research institutes and fish processing plants.

HACCP trainers were chosen after their presentation in some HACCP training courses. Presently, MOFI have a team of HACCP experienced trainers who are highly appreciated by international experts.

#### **(b) Development of HACCP training materials**

The team of HACCP trainers surveyed the HACCP concepts with regards to Codex, FAO, Canada, US and the EU and on the situation of Vietnamese fishery industry, which is typically small and medium scale and mainly based on manual technologies. The main proportion of seafood product is still the semi-preserved product.

Together with the results from the above survey and the HACCP training materials that were developed by the ASEAN-CANADA Fishery Post Harvest Technology Project, Phase II), the Vietnamese HACCP trainers developed a set of HACCP training curriculum and materials in Vietnamese for use in national HACCP training courses.

There are specific training materials for specific target participants based on the ASEAN-CANADA project's training materials (for Managers, for QC supervisors). In addition, many reference documents were translated into Vietnamese (see appendix 2). After each training course, HACCP materials were amended and updated.

#### **(c) National HACCP based training for officers of Fisheries Ministry, leaders and QC of fishery industry**

In Vietnam it has been determined that HACCP training needs to be carried out in a combination with training on basic knowledge of requisites for effective HACCP application such as GMP, SSOP, production conditions as well as other regulations and legal documents concerned.

With qualified HACCP trainers and in collaboration with international agencies (UNDP, FAO, INFOFISH, US-VIE 93/058, GCP/INT/609/DEN, SEAQIP, NMFS, NOAA, ASEAN-CANADA FPHTP Phase II, Japanese Association for Overseas Technical Scholarship (AOTS),

Swiss Supportive Development Programme (SIPPO)) and overseas establishments that wanted to increase trading with Vietnam such as Amanda Food Company Ltd. (Singapore) and Darden Restaurants Inc. (USA), MOFI conducted many training courses and workshops on HACCP implementation for the Vietnamese fishery industry.

In order to increase the appropriateness and effectiveness of HACCP training courses, two groups have been trained separately:

Group 1: Officers from authority agencies of MOFI. A total of 381 HACCP participants were trained in the duration of 1990 - 1999.

Group 2: Participants from fishery industry (Leaders and QC). From 1990-1999, with a total of 1,084 HACCP participants in all.

Between 1990-1999, the total number of training courses for both groups were up to 37 courses (see appendix 1 for overview).

#### **(d) HACCP training courses conducted by fishery industry themselves**

After participating in the national HACCP training courses held by MOFI and other international organizations, the fishery industry realized the importance and benefits of HACCP application. They held HACCP-based in-house training courses for their employees. Some were in collaboration with NAFIQACEN. Between 1998-1999, 22 establishments conducted training courses on GMP, SSOP, HACCP and related information concerning HACCP implementation in fish processing plants for about 700 participants.

Some plants carried out specific training courses on HACCP implementation for employees concerned following HACCP-based training courses.

## **2. Legal foundation of HACCP implementation**

The Vietnamese Government established a general policy on product quality that includes safety control and quality assurance for aquatic products of Vietnam intended for human consumption. MOFI established authorities responsibility for seafood safety and strengthened their competence as well as legal documents, standards concerning seafood safety hazards.

The MOFI established the National Fisheries Inspection and Quality Assurance Center (NAFIQACEN) in 1994. NAFIQACEN is the competent authority on

seafood products safety control including implementation of quality management programme based on HACCP in the fish processing plants nationwide.

MOFI promulgated regulations on mandatory HACCP application in fish processing plants registered for export to EU and US markets. HACCP application will be made mandatory in all fish processing plants throughout the country from 1 January 2001 (both for export and domestic consumption).

With the assistance of SEAQIP, MOFI established 11 technical standards on control of common potential food hazards and set out governmental roles on development and implementation of systematic potential hazards monitoring. Regulations on auditing and approval of quality management programmes based on HACCP concepts are also being developed. MOFI have interpreted and promulgated standards and relevant regulations of the import markets as well. MOFI promulgated mandatory application of EU Directives for fish processing plants registered for export to EU markets such as directive 41/493 EEC, 80/778 EEC, etc.). US as well as other potential markets' regulations and standards have also been translated into Vietnamese and disseminated to the export fish processing plants.

### 3. Development and Implementation of HACCP in Vietnamese fishery industry

HACCP development and implementation in Vietnamese fishery industry comprise of three stages:

- Stage 1: Trial implementation of HACCP in some fish processing plants.
- Stage 2: Mandatory application for fish processing plants that export their products to EU and US markets; and encourage HACCP application in other plants.
- Stage 3: Mandatory application for all fish processing plants throughout the country.

#### (a) Trial implementation of quality management based on HACCP

After training officers of MOFI and representatives of fishery industry on basic HACCP, MOFI approved a governmental scientific research project No. KN 04-15 titled "Upgrading of Quality of Frozen Seafood" using HACCP approach for food safety assurance.

Five fish-processing plants (1 in the northern area,

1 in the middle area and 3 in the southern area) were chosen for the trial on a voluntary basis. After the total implementation, some conclusions drawn are as follows:

- Knowledge, facilities, potential human resource, are available in the Vietnamese fishery sector, to carry out a quality management system based on HACCP successfully.
- Before applying HACCP, Vietnamese fish processing plants should know how to control hazards that may occur under their own production conditions and how to minimize the risks of the potential hazards, through implementing prerequisites programmes. Implementing programmes such as GMP and SSOP. GMP was recommended as an important prerequisite prior to development and implementation of an adequate HACCP Plan.
- A better understanding of HACCP in the fishery industry is needed, especially on how to conduct a potential hazard analysis successfully, and setting up preventive measures that are very important to establish an adequate HACCP plan.
- Fish processors did not pay adequate attention to documentation and record keeping. They have to realize that without records, their HACCP plans would not be in place.

#### (b) Progress of implementation of HACCP

Following the trial implementation, HACCP development and application was made mandatory for fish processing plants that export their products to EU or US markets.

In terms of authority agencies, NAFIQACEN have established checklists for health condition assessment of fish processing plants that intend to export their products to EU markets. After several revisions and amendments, these checklists are considerably sound.

Presently, all forty fish processing plants that export to EU markets have obtained approval for their HACCP plans and have implemented HACCP.

With regards to US-FDA regulations, all fish processors must implement HACCP to ensure food safety for fishery products to be exported to the US market with effect from 18 December 1997. As the USA market is a target market of many Vietnamese fish-processing establishments these regulations have made an impact on those fish processors and forced them to implement HACCP.

In the interim from now to the year 2001, MOFI has promulgated regulations on health condition and



mandatory HACCP application for EU registered fish processing plants from 18 November 1999 and will be mandatory for all from 1 January 2001 nationwide.

With Vietnamese regulations and pressures from target markets, development and implementation of HACCP in Vietnamese fishery industry has made great progress in a sensible manner (HACCP training, development, trial, approval, revision, audit and certification of HACCP Plans). As of December 1999, there are 81 fish-processing plants that have HACCP Plans and implemented HACCP. HACCP implementation status in 238 fish processing plants throughout the country is as follows:

**Table 4: Status of HACCP Implementation in Vietnamese Fish Plants**

	No. of Plants as of June 1999
1. Approved HACCP Plants (for EU and US markets)	58
2. Proposed HACCP Plans for approval	8
3. Under development of HACCP plan	15
4. Non-HACCP Plants	157

(c) Tentative assessment of HACCP application and its benefits

HACCP application in Vietnam has met market requirements as well as regulations of importing nations, especially EU and US market (EU have approved Vietnam's first list of 40 fish processing establishments and 58 establishments obtained approval by US-FDA for their HACCP plans).

Quality management based on HACCP in fish processing plants has upgraded the quality of final product and help minimize inferior product and increase the reputation of Vietnamese seafood. This in turn has

helped Vietnam increase its total export turnover as well as international harmonization (In 1999, the total volume of seafood exports reached USD 971 million).

From 1997 to 1999, reduction of rejected products due to inferior quality as a result of HACCP application is as shown in Table 5.

4. Main drawback and shortcomings of HACCP application

During the period of development and implementation of HACCP, some of the drawbacks and shortcomings that have surfaced and caused a negative impact on HACCP application progress in Vietnamese fishery industry are:

- Understanding on potential hazards is still insufficient. Further scientific research on potential hazards and their risks, have not been conducted yet.
- Updated scientific manuals and information related to potential hazards and seafood safety concerns have not been constantly provided.
- Insufficient national programmes to support HACCP by controlling food safety hazards such as: toxin residues in aquaculture products, potential hazards related to the raw material collection, storage and transportation to processing plants. Raw materials have not been adequately controlled from the safety point of view.
- In terms of HACCP introduction and training, some HACCP trainers do not have enough practical experience in implementation so some training courses were not considered successful.
- Misunderstanding of HACCP concepts by some processors. The traditional quality management is still preferred and they seem to doubt the benefits from HACCP implementation. They have not realized the need to control the whole production in order

**Table 5. Records of Quality Inspection of Seafood Product for Export (1997-1999)**

Description	1997		1998		1999	
	Quantity MT	Ratio (%)	Quantity MT	Ratio (%)	Quantity MT	Ratio (%)
Products inspected	145,517	100	144,344	100	170,148	100
Products certified	133,616	91.82	140,276	91.18	166,566	97.89
Products rejected	11,541	7.93	4,068	2.81	3,581	2.10
Due to bacteria	7,532	5.17	2,157	1.49	2,036	1.19

to assure food safety. Some processors are even totally unaware of HACCP concepts.

- Poor knowledge of workers on hygiene and their poor personal habits cause difficulties for hygiene control.
- Training on internal audit and verification for fish processing establishments was insufficient. Validation and verification of HACCP implementation have not been systematically conducted.
- Technically, the prerequisite conditions in all fish processing establishments are not the same. So hygienic condition assurance as a prerequisite could not be made in some fish processing plants. Lack of financial resources is another problem for some processors to upgrade their production condition for HACCP application as required.
- With changing product specifications and market requirements and quality of raw materials that are not always consistent, fish processors find it difficult to update and amend their HACCP plans. Consequently, compliance with HACCP plans (HACCP itself is very dynamic but easy to be amended) is not so good.
- Consultancy service in development and implementation of HACCP plan for fish processing plants have not been always available due to lack of competent consultancy agencies on HACCP in the country.

#### ■ **Direction of HACCP Development and Implementation in Vietnamese Fishery Industry**

MOFI has targeted the year 2001 for 100% of fish processing plants to meet national standards on food safety conditions. Fish processing plants shall be trained in HACCP knowledge and they will be able to apply HACCP concepts (especially hazard analysis and preventive measures) in their own quality management systems. This policy on quality assurance is one of the main elements that can boost the total seafood export turnover reaching the expected value of USD 2 billion in the year 2005.

To realize the above target, MOFI determined the tasks of main partners as follows:

##### 1. Tasks of MOFI

- MOFI has been developing specific safety control and monitoring programmes in related areas (such as landing sites, fish markets, fish farms, etc.) on hygienic conditions, toxic residues, and aquaculture drugs. The Ministry has also assigned competent

authorities on this task that is considered an important element for HACCP development and implementation in Vietnamese fishery sector.

- To draw out regulations on HACCP audit and HACCP certification as well as to strengthen the competence of the authorities on these tasks.
- MOFI shall supplement and complete standards and legal documents on mandatory implementation of HACCP for fishery establishments as one of pre-conditions before granting production license.
- To conduct training courses on basic knowledge of hygiene, food safety and related regulations for fishermen, middlemen, fish processors, fish farmers and other people concerned.
- To conduct adequate HACCP audit training courses for fishery industry to conduct audit on their own.
- To provide support and guidelines on risks assessment of potential food safety hazards.

##### 2. Tasks of competent authorities

- Authority agencies of MOFI are continuously carrying their tasks on health conditions to ensure seafood safety based on the legal documents and regulations promulgated by MOFI.
- To carry out successfully the tasks assigned and other respective objectives such as landing sites, fish markets, fish brokers, fish farms (hygienic condition, contaminant residues, drugs).
- To continue technical training activities in order to carry out the tasks successfully.
- To strengthen the competence of laboratories to provide support for HACCP verification and audit.

##### 3. Tasks of fishery establishments

- Fishery establishments shall strictly follow established standards and regulations, especially general conditions for food safety in fish processing establishments and HACCP implementation.
- Fishery establishments shall upgrade facilities to acceptable level for fish processing and effective HACCP implementation.
- Fishery establishments shall control the origin of raw materials for productions.
- To conduct training courses on GMP, SSOP, HACCP for employees and others concerning HACCP implementation.
- To buildup capacity to carry out internal audit on HACCP plan.

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## Appendix 1 HACCP-Related Training Courses in Vietnam (1990-1999)

(national and international training courses, except HACCP training courses held by processors themselves)

Type of training courses	1990-1996	1997	1998	1999
<b>1. Training course on premises of fishery processing plants</b>				
<input type="checkbox"/> Total courses were conducted	4	1	1	2
<input type="checkbox"/> Total participants	62	19	30	41
In which,				
• Experts of MOFI	4	—	1	—
• NAFIQACEN	28	19	28	41
• Educational, Research Institutes	2	—	—	—
• Fish Processors	27	—	—	—
• Other Institutions	1	—	1	—
<b>2. Training courses on prerequisites for implementation of HACCP (GMP, SSOP)</b>				
<input type="checkbox"/> Total courses were conducted	4	(See data of these years in item 4.)		
<input type="checkbox"/> Total participants	150	Included in HACCP training courses (described in item 4.)		
In which,				
• Experts of MOFI	4			
• NAFIQACEN	30			
• Educational, Research Institutes	2			
• Fish Processors	114			
• Other Institutions	—			
<b>3. Train-the-trainers HACCP courses</b>				
<input type="checkbox"/> Total courses were conducted	3	2	—	—
<input type="checkbox"/> Total participants	5	31	—	—
In which,				
• Experts of MOFI	—	5	—	—
• NAFIQACEN	5	20	—	—
• Educational, Research Institutes	—	6	—	—
• Fish Processors	—	—	—	—
• Other Institutions	—	—	—	—
<b>4. Training courses on basic HACCP and regulations for implementation of HACCP</b>				
<input type="checkbox"/> Total courses were conducted	7	13	1	4
<input type="checkbox"/> Total participants	282	535	88	240
In which,				
• Experts of MOFI	3	2	—	1
• NAFIQACEN	18	59	13	10
• Educational, Research Institutes	2	5	1	—
• Fish Processors	257	467	74	173
• Other Institutions	2	2	—	51
<b>5. Audit HACCP training courses</b>				
<input type="checkbox"/> Total courses were conducted	—	—	1	2
<input type="checkbox"/> Total participants	—	—	29	32
In which,				
• Experts of MOFI	—	—	2	1
• NAFIQACEN	—	—	19	16
• Educational, Research Institutes	—	—	—	—
• Fish Processors	—	—	7	15
• Other Institutions	—	—	1	—

**Appendix 2**  
**Main Materials Used for HACCP Training Courses**  
 (Developed in Vietnamese or translated into Vietnamese)

Item	Materials	Sources or references	Languages
1	HACCP introduction to fish processors	ASEAN-CANADA Fisheries Post-Harvest Technology Project, Phase 2	English Vietnamese
2	NMFS HACCP training manual	NMFS - FDA	English Vietnamese
3	Reference materials for HACCP training courses	MOFI, SEAQIP	English Vietnamese
4	HACCP competencies for + Managers + Quality Supervisors	ASEAN-CANADA Fisheries Post-Harvest Technology Project, Phase 2	English Vietnamese
5	Frequently asked Questions on HACCP implementation	FDA	English Vietnamese
6	HACCP regulations and related regulations of USA	FDA	English Vietnamese
7	Industrial HACCP Exercises	GCP/INT/609/DEN (FAO)	English Vietnamese
8	Hygiene in fishery processing plants	ASEAN-CANADA Fisheries Post-Harvest Technology Project, Phase 2	English Vietnamese
9	Videotape on Hygiene in Fish Processing Plants (translated into Vietnamese from the original tape)	ASEAN-CANADA Fisheries Post-Harvest Technology Project, Phase 2	English Vietnamese
10	Fishery HACCP Guides	FDA	English Vietnamese
11	HACCP training curriculum	FDA	English Vietnamese
12	Vietnamese HACCP training curriculum (first edition)	MOFI	Vietnamese
13	Vietnamese HACCP training curriculum (second revision)	MOFI	Vietnamese
14	Vietnamese standards on conditions of fishery processing establishments (inclusive of HACCP implementation)	MOFI (28 TCN 130:1998)	Vietnamese English
15	Training curriculum for NAFIQACEN staffs	NAFIQACEN	Vietnamese
16	Related EU Directives (91/493/EC, 91/492/EC, 94/356/EC, etc.)	EU	English Vietnamese

# Brief Information on the National Fisheries Inspection and Quality Assurance Center

**Tran Bich Nga\* and Vo Thi Thuong\*\***

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*\*\*Fish Processing Technologist, Science and Technology Department, Ministry of Fisheries, Vietnam*

In order to strengthen competent authority on seafood safety and quality assurance and meet technical criteria as well as international trade harmonization in general and fishery industry in particular, the National Fisheries Inspection and Quality Assurance Center (NAFIQACEN) was setup in 1994 by the Decision of Minister of Fisheries (Ministry Decision No. 648 TS/QD dated 26 August, 1994). NAFIQACEN is the national competent authority to assist Minister of Fisheries on quality control and quality assurance in fishery production and trade in Vietnam from aquaculture, capturing and harvesting, transportation, storage, handling to processing of fishery products for import- export as well as domestic consumption throughout the country.

## ■ Main Responsibilities and Duties

1. To carry out inspection on health conditions of fish processing establishments throughout the country.
2. To inspect and issue quality / health certificates for import and export as well as for domestic consumption.
3. To implement monitoring programme on toxic residues in aquaculture animals and their products.
4. To carry out the monitoring programme on harvesting areas of bivalves.
5. To make proposals for building, supplementing as well as amending policies, regulations, guidelines on quality and safety of fishery products.
6. To conduct research and apply advanced methods for quality control and quality assurance for health conditions of fish processing establishments. To apply advanced analytical methods in order to improve constantly competencies on quality and safety control of fishery products.
7. To carry out international co-operation,

investigation and research programmes concerning seafood safety control and quality assurance as assigned by Ministry of Fisheries (MOFI).

## ■ NAFIQACEN Structural Organization

After referring to several models of structural organization of fish inspection and quality assurance authorities in several countries especially in ASEAN in early 1995, NAFIQACEN submitted a structural organization comprised of one central office located in Hanoi and six branches in six regions where most of the fishery products come from (Haiphong, Danang, Nhatrang, Hochiminh City, Cantho and Camau).

## ■ Facilities and Equipment

With support of SEAQIP Project, NAFIQACEN occupies spacious premises. Six branches have adequate equipment and instruments for analytical activities (approximately USD 2 million) that facilitate us to carry out organoleptic, chemical and microbiological requirements and specifications for safety and quality assessment. In addition, the laboratory of NAFIQACEN IV is equipped with AAS, HPLC, and GC equipment; for special chemical analysis such as heavy metals, antibiotic and pesticide residues as well as mycotoxin, toxic algae, and biotoxin (ASP, PSP, DSP).

## ■ Personnel

All the staff that works for NAFIQACEN have been carefully selected. The main criteria being, background, education, knowledge and behavior. Candidates with experience will have an added advantage.

Candidates who are accepted must go through a professional training scheme before being put in

Fig. 1: NAFIQACEN Structural Organization

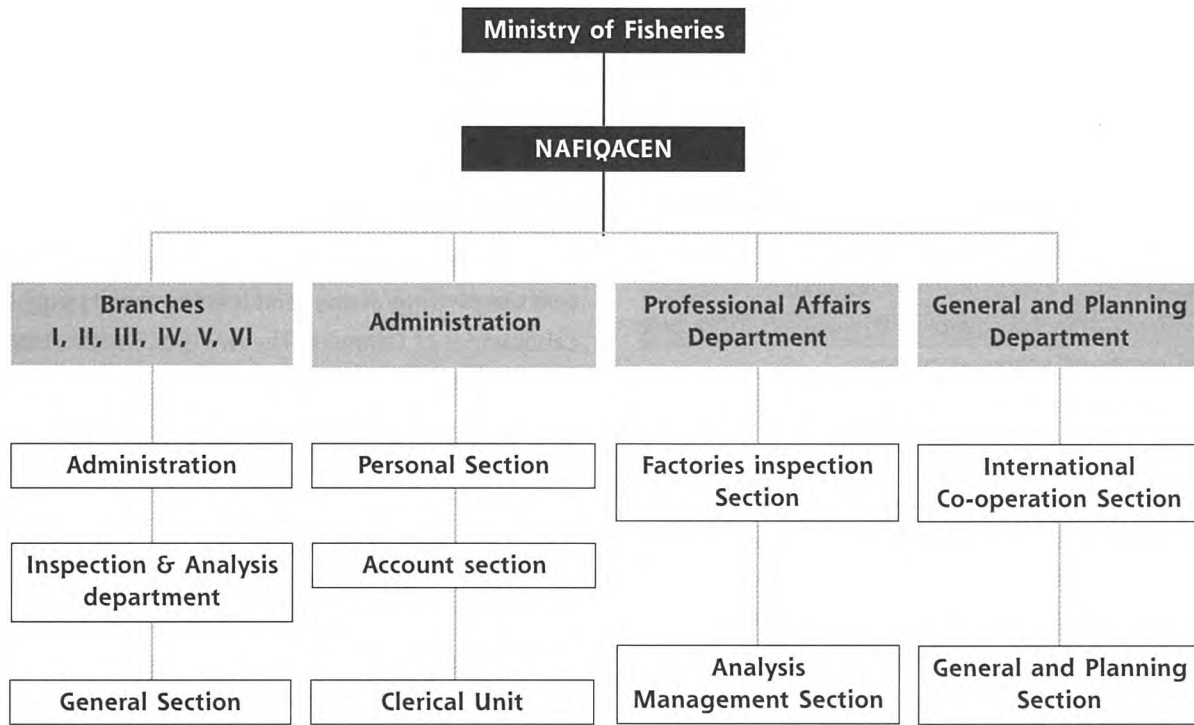
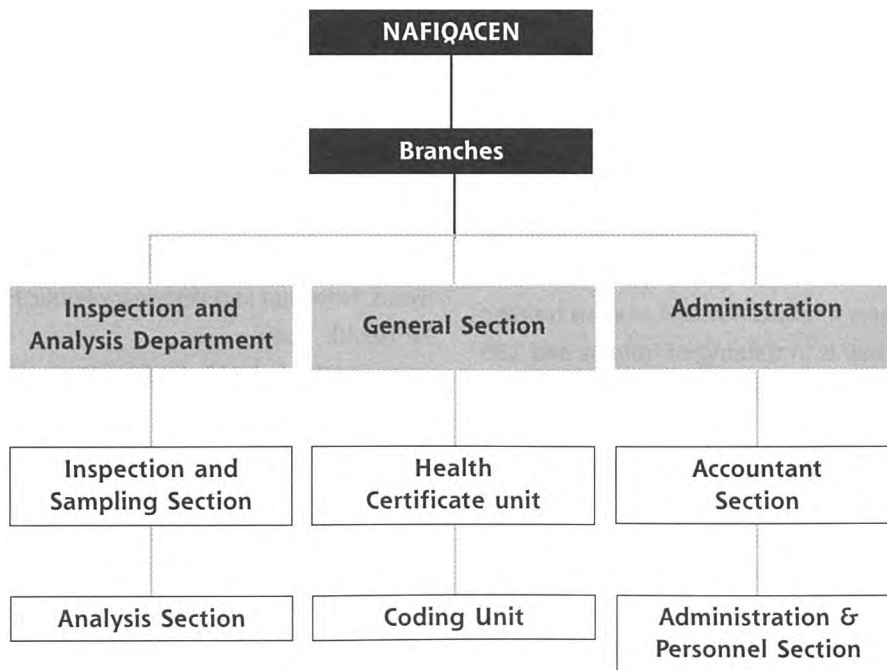


Fig. 2: Organization Chart of NAFIQACEN Branches



\* NAFIQACEN IV has almost the same structural organization as other NAFIQACEN branches. However, NAFIQACEN IV has two separate Department of Inspection & Sampling and the Analysis Department instead of one Inspection and Analysis Department.

charge of a certain task. NAFIQACEN leaders have considered manpower building as a decisive factor for the success of NAFIQACEN.

### 1. Criteria of NAFIQACEN staff

Inspector and analyst: must have university diploma related to the job he will be in charge of, such as background education on fish processing technology, food technology, microbiology, etc. In addition, computer skills and English are required.

Technician and other staff: must be a graduate from vocational school or college.

### 2. Recruitment procedures

Each employee has to go through a two-month probation period. The office that directly manages him will then make a report about his capability in relation to the criteria for his position that will be submitted to the Director of NAFIQACEN and the Director of the branch. If accepted, each one would have to be trained in several professional training courses and achieve acceptable results in each training course. Before carrying out his job independently, he needs to gain enough experience for the job. For inspectors, he will have to go through a period of on-the-job training with other seniors until he is considered experienced enough to perform his job independently.

### 3. Professional and HACCP training

Presently, NAFIQACEN have 177 staff with 68 inspectors, 46 analysts and 63 administrative staff. Almost all the NAFIQACEN staff are university graduates. It has been recorded that training courses held over the past few years have a total of 748 participants, of which, 580 participants were in inspection and analysis training courses, 25 participants in training of trainers and 135 staffs who were trained on HACCP.

#### ■ Quality Management in Laboratories

All the laboratories of NAFIQACEN apply Good Laboratory Practice. They are also in the process of applying for ISO/IEC/17025.

In order to ensure the accuracy in job performance, the laboratories have taken part in in-house split sample programmes and external programmes at the international level.

In 1997, the two laboratories of NAFIQACEN (NAFIQACEN II and IV) took part in ASEAN split sample programme under supervision of Canadian experts and obtained good results.

In 1998, a split sample programme between laboratory of NAFIQACEN IV and laboratory of Analytical Service Center, Ho Chi Minh City (an ISO 9002 certified lab.) was initiated for testing DSP, PSP and ASP in bivalve molluscs flesh.

In 1999, NAFIQACEN laboratories participated in split sample programme conducted by Alfred Jorgensen Laboratories of Denmark. The NAFIQACEN laboratories were evaluated as good laboratories.

#### ■ International Recognition and MOU

With NAFIQACEN's effort, on 16 November 1999, with Decision No. 1999/813/EC, the European Commission accepted Vietnam's first list of 18 establishments. The European Commission accepted the competence of Vietnamese authorities on fishery quality control, NAFIQACEN. On 25 April 2000, with Decision No.2000/331/EC, the European Commission accepted 22 more establishments adding up to 40 establishments with approval for export to EU market.

On 25 April 2000, with Decision No. 2000/333/EC, the European Commission allowed bivalve mollusc and marine gastropods from Vietnam into the EU market.

On 8 February 2000, with the Decision No.2000/159/EC, the European Commission approved the monitoring plan on toxic residues and other substances in aquaculture animals and aquaculture products of Vietnam.

On 7 July 2000, NAFIQACEN signed an agreement on co-operation programme with Italian Department of Food, Nutrition and Veterinary Public Health of Ministry of Health, Italy.

On 7 July 2000, NAFIQACEN and National Fishery Inspection Authority of South Korea signed an MOU on mutual recognition in fishery inspection for export and import between the two countries.

NAFIQACEN also has a good relationship with the United States Food and Drug Administration (US-FDA). Presently, NAFIQACEN is preparing necessary conditions for signing MOU concerning sanitary control in harvesting areas of bivalve molluscs with US-FDA.

NAFIQACEN is now a member of the International



Association of Fisheries Inspectors (IAFI).

From the time NAFIQACEN was established until now, under the close direction of MOFI and support of SEAQIP project as well as collaboration of other agencies both in the country and overseas, NAFIQACEN has constantly strengthened its competence as well as its position on safety control and quality assurance in Vietnam that is greatly appreciated by MOFI, Ministry of Environment, Science and Technology and the authorities of importing countries as well as international organizations.

### References

- Decision No.648 TS/QD of Minister of MOFI dated 26 August 1994 on authorities and responsibilities assignment of NAFIQACEN.
- Decision No. 569 QD/TCCB-LD of Minister of MOFI dated 5 July 1995 promulgates regulations on principles of NAFIQACEN organization and activities.
- Nguyen Dinh Thu. 2000. HACCP development and implementation status in Vietnam (presented at the Seminar on ISO 9000, Ho Chi Minh City).





**Report**

**of the**

**Workshop**



# Report of The 1<sup>st</sup> Regional Workshop on the Application of HACCP in the Fish Processing Industry in Southeast Asia

## ■ Introduction

1. The 1<sup>st</sup> Regional Workshop on the Application of HACCP in the Fish Processing Industry in Southeast Asia was hosted by the Marine Fisheries Research Department (MFRD) of the Southeast Asian Fisheries Development Center (SEAFDEC) in Singapore from 28 August to 1 September 2000.

2. The Workshop was attended by representatives from Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam as well as resource speakers from Japan and Thailand. The Workshop was also attended by officers of SEAFDEC Secretariat and MFRD. The list of participants appears as *Appendix 1*.

## ■ Opening of the Meeting

3. The Chief of MFRD, Mr. Tan Sen Min, welcomed all participants and the resource speakers to the Workshop. He highlighted the importance of HACCP application to the seafood processing industry worldwide as a means to ensure food safety and increase consumer confidence. He also referred to the ASEAN-Canada Fishery Post Harvest Technology Project which played a significant role in promoting HACCP application in this region. He further informed the Workshop that the Project on Application of HACCP in the Fish Processing Industry in Southeast Asia has been taken up under the ASEAN-SEAFDEC Fisheries Collaborative Group programme, which will look further into the implementation of this important food safety system.

4. He also emphasized the benefits of the programme not only to the current SEAFDEC member countries but also to non-SEAFDEC but ASEAN member countries in the application of HACCP in the region as a whole. He reiterated the objectives of the Workshop, which were (a) to serve as a platform for ASEAN countries to exchange experience and update information in HACCP application as well as HACCP programme

implementation in fish processing industry and (b) to identify and brief Country Coordinators for the 4-year (2000-2003) project on HACCP application in the fish processing industry in Southeast Asia. As one of the outputs of the project, he informed that the papers presented in the Workshop would be published and disseminated to publicize the issues worldwide. He finally thanked the Government of Japan for supporting the Workshop through the Japanese Trust Fund under its Fishery Agency.

5. After the introduction of the participants, Mr. Tan Sen Min briefly introduced the agenda, timetable and arrangements for the sessions, the details of which appear as *Appendix 2*.

## ■ Status on the Application of HACCP

6. The following is a brief background on the application of HACCP in the fish processing industry in the various Southeast Asian countries summarized from the country papers presented:

### Brunei

HACCP was introduced in 1996, but the concept is still relatively new. Various government efforts have been made to initiate implementation but implementation is still not yet widespread. To date, only one seafood-processing plant is taking steps towards implementing HACCP.

Competent authority: Department of Fisheries (DOF) issues Letters of Attestation as a form of Health Certification - based on guidelines provided by Codex Alimentarius as well as specific requirement by various countries.

### Cambodia

DOF has set up HACCP team to look into implementation of system and legislation exists for GMP and HACCP.

Competent authority: DOF of the Ministry of Agriculture, Forestry and Fisheries (MAFF).

### Indonesia

HACCP implementation started in 1991 and is mandatory for all processors since February 1998. Approved processors must have HACCP programmes implemented, documented and verified. 453 processors have been registered. 393 processors are export-oriented. Out of the total number, 235 processors have already implemented HACCP and have been validated.

Legislation supporting implementation of HACCP-based Integrated Quality Management System for Fishery Products established in 1998. Improvement of infrastructure, facilities and human resource in the stages of pre-harvesting, harvesting, post-harvesting, marketing is taken in consistent with implementation of HACCP.

Competent authority: Directorate General of Fisheries, Sub-Directorate of Fish Inspection and Processing Development.

### Lao PDR

The fisheries development in Lao PDR is in a very early stage and food standards and regulations have not been officially established. Fisheries resources are entirely from freshwater sources such as ponds, swamps, rivers, wetlands, paddy fields, reservoirs as Lao PDR is landlocked with no direct access to the sea. Fish processing is on a household scale. No exports but import from Thailand. Inspection of imports by end-product testing.

Competent authority: None. Ministry of Agriculture and Forestry (MAF) is responsible for the quality control of fresh animal products. Food and Drug Department of Ministry of Health samples processed food such as canned and bottled products for analyses at its laboratory.

### Malaysia

HACCP was introduced in the 1990s but implementation of HACCP is on a voluntary basis at present. Industries have implemented HACCP to comply with the requirements of the importing countries. 50 fish processors have submitted their application for HACCP certificates, 20 were successfully certified and the rest are at different stages of certification.

Competent authority: Ministry of Health (MOH). MOH has introduced the National HACCP Certification Scheme based on Codex Alimentarius and is the competent authority recognized by EU. The Malaysian Agricultural Research and Development Institute (MARDI) has been given the mandate to audit HACCP Plans for fish processing. DOF plays an active role to promote HACCP implementation through its training and education programmes to the fish processing industry.

### Myanmar

HACCP has been implemented since 1998 in 7 fish processing plants. 90% of the existing plants (presently, there are 85) has yet to implement HACCP.

Competent authority: DOF of the Ministry of Livestock and Fisheries.

### Philippines

HACCP implementation started in 1994. HACCP compliance is voluntary and there are different levels of understanding and application of the concept. To date, there are 40 plants and 68 vessels accredited for export to EU, and 10 plants issued with HACCP Compliance Certificate for export to US.

Competent authority: For US: 3 governmental agencies – Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture (DA), Bureau of Food and Drugs of the Department of Health, and Food development Center of the National Food Authority. For EU: BFAR-DA.

### Singapore

Voluntary HACCP implementation since early 1995 especially for export plants to EU and US. Under the Wholesome Meat and Fish Act enacted in Dec 1999, HACCP implementation is now mandatory for all fish processors. HACCP concept is better accepted and integrated in export-oriented fish processors than in local establishments. Many export-oriented plants also have third-party certification.

Competent authority: Agri-food and Veterinary Authority (AVA) of Singapore.

### Thailand

HACCP implementation started in 1991 and is mandatory for all fish processors since 1996 - approved processors must have HACCP programme implemented,

documented and verified. Guidelines for development of documented programme have been provided and updated to meet international standards. 201 registered processors: 70% of processors have been approved and 30% in the process of verification.

Competent authority: DOF of Thailand

## Vietnam

HACCP was introduced since 1991. Three stages in the development and implementation of HACCP – trial programme, mandatory for export-oriented industry and mandatory for all. HACCP is mandatory for EU registered fish processing plants from Nov 1999 and will be mandatory for all processors from Jan 2001.

Competent authority: National Fisheries Inspection and Quality Assurance Center (NAFIQACEN) of the Ministry of Fisheries in Vietnam.

7. The Workshop identified the following shared problems and issues among the ASEAN countries.

- Lack of understanding / knowledge in HACCP by regulatory agencies and fish processors. (most countries e.g. Vietnam, Myanmar, Indonesia, Lao).
- Lack of experience in the implementation of HACCP (Cambodia, Thailand, Vietnam, Lao).
- Inadequate resources such as trained personnel, laboratory facilities, equipment, etc. (Indonesia, Cambodia, Malaysia, Myanmar, Lao).
- Inadequate legislation / enforcement (Indonesia, Cambodia, Myanmar, Lao).
- Lack of valid critical limits that are relevant to local processing conditions (Thailand, Vietnam).
- Hygienic condition/plant layout as prerequisite for HACCP implementation is not in place (Vietnam, Myanmar, Malaysia).
- Economic constraints/no pressure/not cost effective /no incentive for some to implement HACCP (Brunei, Singapore, Indonesia, Lao, etc).
- No standard procedures for HACCP documentation and verification (Thailand, Vietnam).

8. In view of solving or improving the above problems and issues, the Workshop identified the following programmes which have been implemented by the various ASEAN countries at the national level:

- Seminars, talks, training courses for government, and industry to enhance awareness and impart knowledge and skills on HACCP implementation (most countries).

- Development of legislation and guidelines on HACCP implementation - standards and regulations for HACCP implementation (Thailand, Myanmar, Malaysia, Singapore, Vietnam, Indonesia).
- Improvement of infrastructure or facilities for HACCP implementation (Philippines, Myanmar).
- Trial implementation of HACCP in selected processing plants (Thailand, Vietnam).
- Provision of financial assistance such as grants for consultation and certification costs and "shared HACCP Manager" programme (Singapore).

9. The Workshop also reviewed existing national policies with respect to the application of HACCP in ASEAN countries as follows:

- Decree of Minister of Agriculture NO.41/Kpts/IK.210/2/98 establishing the HACCP-based IQM System for Fishery Products; Decree of DGF establishing Implementation Guidelines of HACCP-based IQM (Indonesia).
- HACCP application made mandatory on 1<sup>st</sup> January 2001 (Vietnam).
- Third National Agricultural Policy (Malaysia).
- Wholesome Meat and Fish Act 1999 (Singapore).
- Fisheries Act and Import and Export Control Act (Thailand).
- Fisheries Administrative Orders (Philippines).

10. The following practical solutions and ways to improve or solve the issues and problems were shared among ASEAN countries:

- To conduct seminars, talks, training courses to improve understanding and knowledge of regulatory agencies and processors (most countries).
- To gain practical experience by conducting trials for HACCP implementation in selected processing factories (Thailand, Vietnam).
- To improve infrastructure and facilities for HACCP implementation – development of labs (Vietnam, Cambodia, Myanmar, Philippines).
- To layout legislation and regulations for HACCP implementation (Vietnam, Philippines, Indonesia).
- To conduct research on food safety hazards specific to local processing conditions (Philippines).
- To develop programmes for training and monitoring and develop codes of practice to improve knowledge and safety and quality standards (Myanmar, Malaysia).
- Fish processors to upgrade facilities to

acceptable level for effective HACCP implementation (Vietnam).

- To provide government grants and subsidies for HACCP implementation (Singapore) Consumer awareness on food safety.
  - To standardize procedures and requirements for HACCP verification, validation and audit (Thailand, Vietnam).
  - To develop generic HACCP plans for small and medium scale processing operations (Malaysia).
11. The Workshop also highlighted some regionally specific issues to identify solutions as follows:
- Harmonization of HACCP procedures and documentation in the region.
  - Lack of valid critical limits specific to processing conditions of products in the region (Thailand, Vietnam).
  - HACCP audit need to be standardized among agencies and at international level to obtain the same understanding and expectation of food safety. Emphasis on import risk analysis (Thailand, Philippines).
12. Some areas of regional collaboration among the ASEAN countries to improve or solve the problems or issues were also proposed:
- Establish Mutual Recognition Agreement (MRA) and Memorandum of Understanding (MOU) between seafood trading countries in the region (Philippines).
  - Formation of regional HACCP committee to harmonize HACCP in region (Malaysia, Philippines).
  - To implement massive extension service programmes on HACCP, GHP, GMP in the fish processing plant for effective and immediate transfer technology at the regional level (Malaysia).
  - Standardization of laboratory procedures for inspection purposes.

#### ■ Resource Paper Presentation

##### 13. Application of HACCP System in the Japanese Seafood Industry

— by Mr. Naoki Takatori, Manager, Quality Division, Japan Fisheries Association

The paper describes national HACCP-based programmes implemented by the Japan Fisheries Association, in collaboration with the Fishery

Agency, the Ministry of Health and Welfare, and the Japanese HACCP Alliance. The paper also discusses issues for consideration in future for the promotion of HACCP in Japan.

##### 14. Introduction of HACCP in the Kibun Foods Inc.

— by Dr. Noboru Kato, Manager, Surimi Division (R&D), Kibun Foods Inc.

The paper illustrates the application of HACCP in the Tokyo plant of Kibun Foods Inc., a surimi-based manufacturer in Japan. A comparison of HACCP standards applied in the EU, US and the Japanese company is included and the paper also discusses some of the problems and constraints in the HACCP application.

##### 15. Reaching Equivalence through the Application of HACCP

— by Ms. Sirilak Suwanrangsi, Chief, Fish Inspection Center (Bangkok)

As there are large differences in the current HACCP-based regulations and system for fish and fishery products, the paper discusses the concept and issues related to the harmonization of fish and fishery product standards. In addition, the paper also covers the concept of equivalence under the WTO Sanitary and Phytosanitary (SPS) Agreement and Technical Barrier to Trade (TBT) agreement as well as various countries' regulations and the procedures for determining equivalence. The relationship between HACCP and equivalence agreement, including steps and lessons learnt in reaching equivalence agreement on inspection and control system for fish and fishery products between countries are also elaborated.

#### ■ Conclusion and Recommendations

16. The Workshop was divided into three discussion groups by countries (Brunei, Singapore and Thailand; Indonesia, Lao PDR and Philippines; Cambodia, Malaysia, Myanmar and Vietnam) and following the discussion the Workshop identified the following common problem areas and issues, as well as required concepts, strategies, technical support needs and potential projects for the application of HACCP in the fish processing industry in Southeast



Asia as the conclusion and recommendations.

17. Common problem areas and issues identified are:

#### At the industry level

- Misperception on the concept and application of HACCP by fish processors particularly in the local enterprises.
- Lack of technical know-how or insufficient consultancy services in the development and implementation of HACCP plan.
- Lack of experience and qualification of industrial personnel (both harvesting and post-harvest sub-sectors).
- Complication and confusion in the development of HACCP plan and documents as well as judgement for their completeness.
- Substantial financial implication to change to HACCP system.
- Lack of incentives to change to HACCP system in local enterprises.
- Difficulties encountered in validation of standards (i.e. critical limits, etc.).

#### At the national level

- Lack of or insufficient basic infrastructure and facilities.
- Lack of rule and regulation for safety and quality control and assurance.
- Involvement of various authorities or unclear responsible authorities in food safety control causes confusion and complication.
- Insufficient HACCP verification and auditing experience.
- Insufficient supporting system including resources, qualified personnel and relevant information, etc. to cope with the increasing number of food processors.
- Enforcement and sustainability of HACCP implementation.
- Recognition of importing countries on certificates issued by national/competent authorities.

#### At the regional/global level

- Variation in requirements of importing countries causes confusion and complication for developing HACCP plan and documents.
- Lack of updated scientific manuals and

information related to potential hazards.

- Use of HACCP as a non-tariff trade barrier, which would lead to segmentation of the world seafood market into a developed-countries market and developing countries market.
- Inactive participation of ASEAN countries in the international forum including Codex Committee to jointly develop international food safety and quality standards.
- Differences in fisheries structure and development gap among ASEAN countries.

18. Required concepts, strategies, technical support needs for HACCP application at the small-scale fish processor level:

**Concepts:** GMP, basic hygiene, "mini-HACCP"

#### **Strategies/solutions:**

- Technical training and advice prior to mandatory HACCP implementation.
- Training on the pre-requisite requirements for HACCP – simplified approach to hygiene and sanitation.
- Create awareness on food with promotional and extension activities.
- Voluntary scheme for model plant .
- Incentives for plants that have implemented HACCP.
- Law enforcement: with time frame for adjustment: GMP.
- Continual training scheme.
- Time frame for implementation (each country to decide on its own time frame).

#### **Technical Support Needs:**

- Criteria for GMP
- Advice on plant design and lay out for HACCP
- Information on relevant requirements
- Market information, product development
- Hazards to control
- Shared manager, consultants, adviser

19. Required concepts, strategies, technical support needs for HACCP application at the export-oriented industry level:

#### **Concepts:**

- Control from source to production.
- HACCP, regulations, market access.

#### **Strategies/solutions:**

- Responsible raw material control programme – reliable supplier control programme.
- Constant HACCP programme review, internal audit.
- Constant in-house training for employee.

- Technical works on hazards, critical limits.
- Strengthen monitoring (laboratories) capacities, shared laboratories.
- Take part in industry association .
- Training on specific HACCP principles.
- Model HACCP plan for the industry — harmonize practices.

**Technical Support Needs:**

- Criteria for GMP and HACCP.
- Advice on plant design and lay out for HACCP.
- Information on relevant requirements.
- Importing countries' requirements.
- Hazards to control.

20. Required concepts, strategies, technical support needs for HACCP application at national level:

**Concepts:**

- National food safety council (programme) or inter-agency efforts.
- Control from source to market (consumers).

**Strategies/solutions:**

- Review national legislation to accommodate international requirements.
- Inter-agencies collaborations at national level.
- Provision of additional infrastructure required to improve post harvest handling.
- Standardize food safety standards and regulations at national level.
- Strengthen monitoring activities at primary production level.
- Implement a harmonized system of inspection based on international standards.
- Strengthen and harmonize enforcement.
- Develop generic HACCP plans for each product/ sector in fish processing industry.
- Identify one single authority to be responsible for the implementation of the national food control programme specific to fish and fish products.
- Encourage industry to conduct internal audit and strengthen the government capability on external audit.

**Technical Needs:**

- Scientific information
- Processing techniques
- Water quality
- Tropical microbiological hazards and food-borne hazards
- Chemical hazards and contaminants
- New methods and technology
- Processing

- Laboratories

21. Required concepts, strategies, technical support needs for HACCP application at regional/international level:

**Concepts:** Regional Consultative Group.

**Strategies/solutions:**

- SOM-AMAF to provide agenda on fishery products.
- Widen scope of Subcommittee on Fishery Products.
- Cover all fish products.
- Technical and quality aspects.
- ASEAN Fisheries Federation should be revitalized to discuss food safety aspects/pre-harvest and post harvest fisheries.
- Standardize food safety standards and regulations at regional level.
- Research and development on potential hazards specific to national and regional level.
- ASEAN should adopt HACCP as the standard for consistent and uniform compliance to importing countries' requirements.
- Active participation of all ASEAN countries in Codex Committee meetings; recommend a qualified personnel as official representative.
- Consultative group on fishery product control should be formed. (details TOR should be discussed).
- MFRD should widen scope to cover.
  - food safety control at pre and post harvest level.
  - set-up of information network: directory of experts, databases, etc.
- Harmonize procedures, requirements, approach for controls.
- Common standing at international forum on standard setting.
- Exchange programmes among regional countries
  - to understand auditing practices.
- Regional training on capability building; research and information.
- More scientific research work particularly on safety standards to be conducted at regional level on fish and fishery products.
- Facilitate fish trade among ASEAN.
- ASEAN tropical fish products standards.
- Intensified information dissemination and educational campaign.

22. Potential projects to promote HACCP application:

**Project 1:** Development of food safety concepts and control for

- Dried fish.
- Fermented fish.
- Fish cake and fish jelly products.
- Fresh and frozen fish products.

**Elements:**

- Development of materials, HACCP control elements.
- Training at MFRD.
- Model plant in host country.
- Trial on HACCP control.
- Exchange of visits.
- Harmonization of standards.

**Project 2:** Advanced application of HACCP in ASEAN

- Development of ASEAN hazards and control guide.
- Audit training and critical limits validation.
- Research on key hazards.
- Pathogens.
- Chemicals: drugs, additives, etc.
- Exchange of regional experts.

**Project 3:** Joint scientific research activities

- Histamine in salted anchovies

## ■ Presentation and Discussion on MFRD's HACCP Project

23. Mr. Yeap Soon Eong, the MFRD Chief Coordinator of the project, presented the 4-year project on the Application of HACCP in the Fish Processing Industry in Southeast Asia covering the period of 2000-2003. The objectives of the project is to collate and document information and case studies on HACCP application in the fish processing industry in the SE Asian region and provide a platform for member countries to share information and experiences on HACCP application in their respective countries. It is envisaged that after the project ends in 2003, a publication on the application of HACCP in the fish processing industry in Southeast Asia will be one of the major outputs.

24. The Workshop noted that implementation of HACCP should be carefully considered. In this connection, regional guidelines (ASEAN approach to HACCP) on the implementation of HACCP taking into consideration regionally specific situation should be promoted. The same applies to generic HACCP plans for each specific fish and fish product.

25. The Workshop agreed that each country would submit their nomination of a country coordinator to further cooperation on the project.

## ■ Closing of the Workshop





# Appendices



# Appendix 1

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# Appendix 2

## Workshop Programme

DATE/TIME	PROGRAMME
<b>27 Aug 2000 (Sunday)</b>	<b>Arrival of participants &amp; resource speakers</b>
<b>28 Aug 2000 (Monday)</b>	
9.30am – 10.00am	Registration of participants
10.00am – 10.30am	Welcome by Chief, MFRD
10.30am – 11.00am	Introduction by participants
11.00am – 11.30am	Coffee break
	<i>Session Chairperson: Ms Flor Abella</i> <i>Rapporteur: Mr Norman Kok</i>
11.30am – 12.00pm	Country Paper Presentation – Vietnam
12.00pm – 12.30pm	Country Paper Presentation – Thailand
12.30pm – 2.00pm	Lunch
	<i>Session Chairperson: Ms Suwimon Keerativiriporn</i> <i>Rapporteur: Mr Norman Kok</i>
2.00pm – 2.30pm	Country Paper Presentation – Singapore
2.30pm – 3.00pm	Country Paper Presentation – Philippines
3.00pm – 3.30pm	Coffee break
	<i>Session Chairperson: Mrs Esther Yoo-Cheong</i> <i>Rapporteur: Mr Norman Kok</i>
3.30pm – 4.00pm	Country Paper Presentation – Myanmar
4.00pm – 4.30pm	Country Paper Presentation – Malaysia
7.30pm	Welcome Dinner
<b>29 Aug 2000 (Tuesday)</b>	
	<i>Session Chairperson: Ms Mariani Haji Sabtu</i> <i>Rapporteur: Mr Ronnie Tan</i>
9.00am – 9.30am	Country Paper Presentation – Laos
9.30am – 10.00am	Country Paper Presentation – Indonesia
10.00am – 10.30am	Coffee break
	<i>Session Chairperson: Mr Abdul Hamid Bin Shukor</i> <i>Rapporteur: Mr Ronnie Tan</i>
10.30am – 11.00am	Country Paper Presentation – Cambodia
11.00am – 11.30am	Country Paper Presentation – Brunei
	<i>Session Chairperson: Mr Yeap Soon Eong</i> <i>Rapporteur: Ms Lee Woan Peng</i>
11.30am – 12.30pm	Resource Paper 1 (Mr N Takatori)
12.30pm – 2.00pm	Lunch
	<i>Session Chairperson: Mr Yeap Soon Eong</i> <i>Rapporteur: Ms Lee Woan Peng</i>
2.00pm – 3.00pm	Resource Paper 2 (Dr N Kato)

DATE/TIME	PROGRAMME
<b>29 Aug 2000 (Tuesday)</b>	
3.00pm – 3.30pm	Coffee break <i>Session Chairperson:</i> Mr Yeap Soon Eong <i>Rapporteur:</i> Ms Lee Woan Peng
3.30pm – 4.30pm	Resource Paper 3 (Ms Sirilak Suwanrangsi)
<b>30 Aug 2000 (Wednesday)</b>	
	<i>Session Chairperson:</i> Mr Tan Sen Min <i>Rapporteur:</i> Mr Suriyan Vichitlekarn
9.00am – 10.30am	Group Discussion
10.30am – 12.30pm	Group Presentation and Summary
12.30pm – 2.00pm	Lunch
2.00pm – 4.30pm	Project Presentation by MFRD Chief Coordinator Discussion and closing remarks
<b>31 Aug 2000 (Thursday)</b>	
	<i>Session Chairperson:</i> Mr Tan Sen Min <i>Rapporteur:</i> Mr Suriyan Vichitlekarn
9.00am – 4.30pm	1 <sup>st</sup> Regional Technical Consultation on Preparatory Work for the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millenium –“Fish for the People”
<b>1 Sep 2000 (Friday)</b>	
9.00am – 1.00pm	Visits to Fish Processing Plants (2)
1.00pm – 2.00pm	Lunch
2.00pm – 4.30pm	Visit to MFRD (Video & tour)
<b>2 Sep 2000 (Saturday)</b>	
<b>Departure of participants &amp; resource speakers</b>	