

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.

References

- Lam Duc Dinh. 1995. Report of the Governmental Scientific Research Project KN 04-15: on "Upgrading of Quality of frozen Seafood".
- NAFIQACEN. Annual Report of NAFIQACEN: 1997-1998-1999.
- Vietnam Ministry of Fisheries. 1995. General report on Five-year Plan (1991-1995) and development direction for the next five years (1996-2000).
- Vietnamese Ministry of Fisheries. 1999. Report on results of the Vietnamese Seafood Export and Quality Improvement Project (SEAQIP).
- Nguyen Xuan Ly. 1999. Increasing quality management and food safety assurance for Vietnamese fishery products (presented in the National Seminar on Quality of Fishery Products).
- Le Dinh Hung. 1996. Development and implementation of a national HACCP training programme: The experience of Vietnam. In: Proceedings of the Seminar on Advances in Fish Processing Technology in Southeast Asia in Relation to Quality Management, 1996, Singapore: 234-239. Marine Fisheries Research department, Southeast Asian Fisheries Development Center.

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
1. Training course on premises of fishery processing plants				
<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	—
2. Training courses on prerequisites for implementation of HACCP (GMP, SSOP)				
<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	—			
3. Train-the-trainers HACCP courses				
<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	—	—	—	—
4. Training courses on basic HACCP and regulations for implementation of HACCP				
<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
5. Audit HACCP training courses				
<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