

# 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	Crab 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:

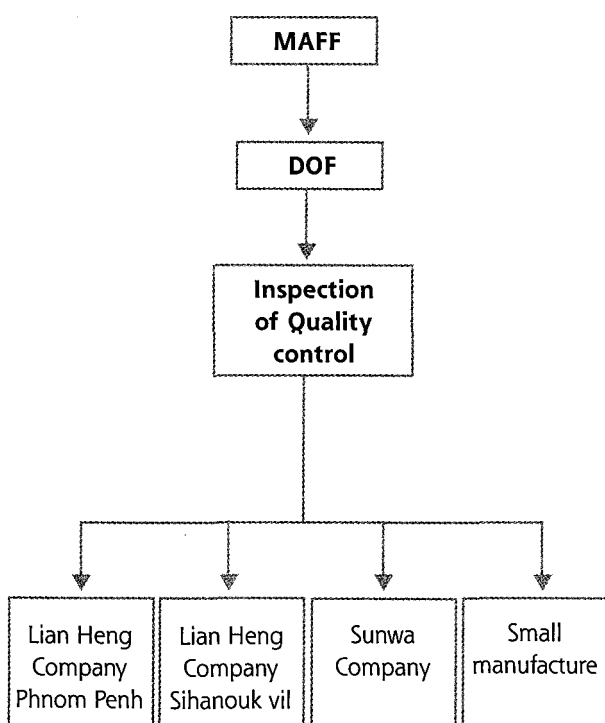
- Product specifications that are designed to ensure that the product is not adulterated/have been processed under unsanitary conditions
- Affirmative steps that may include any of the following:
  - Obtaining from the foreign processor, the HACCP and sanitation monitoring records. Required by this part 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:**  
**Method of Storage and Distribution:**  
**Intended use:**  
**Intended Customers:**

**Block Frozen Shrimp (HOSO, HLSO and PD)**  
**Deep-frozen products at -18°C or 0°F or less.**  
**Thaw and well cooked before eating.**  
**Human food, general public.**

CCP	Significant Hazards	Critical Limits	Monitoring Measures				Corrective Actions	Records	Verification
			What	How	Frequency	Who			
Interim cooling	*Bacterial pathogen growth	*Temper-ature of chill store < 5°C or 41°F.  *Time of chilling < 4 hrs	*Temper-ature  *Time	*Thermo-meter  *Watch	*Once per hr  *Same	*QC staff  *Same	*Separate the lot and evaluate to decide: <ul style="list-style-type: none"> <li>• Divert intended use.</li> <li>• Immediate freezing</li> <li>• Ice addition.</li> <li>• Repair, correct chill store operation.</li> </ul>	*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	*Rework any product rejected by metal detector. *Identify source of metal found in product. *If product is processed without metal detection, hold for metal detection. *Repair, correct metal detector.	*Metal detector operation lot.	*Test metal detector with 2 testing units before production each day and recalibrate when needed. *Weekly record review.