



Safety standards in shrimp export from Bangladesh to the world's market

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Abstract

Shrimp, the second largest export earner, is potentially the next to garment sector of Bangladesh. The EU, USA and Japan are the world's major importers of shrimp from Bangladesh. It is already among the top 10 exporters in the world. As the continued success in Bangladesh shrimp industry depends on the ability to successfully confront the challenges currently shaping the global food industry, increasing focus is being placed on the safety of foods along with buyers' changing requirements. On the international level, buyers and consumers are increasingly demanding that shrimp is produced and exported in compliance with the recognized codes of conduct. This study aims to sketch out various activities of different stakeholders in the value chain from the production level to export market in conformity with the food safety standards. Field surveys, interviews, discussions, communications, consultations and interactions with different stakeholders were conducted, analyzed and used as the basis of the paper. The results reveal that shrimp farming is very much profitable and work environment is being improved. Department of Fisheries monitors the hygiene and sanitation condition of different stakeholders. Processors-cum-exporters implement HACCP principles about 85% in all stages of production, distribution, processing and export of shrimp. They are trying to practice traceability. Some international organizations are working as third party certification agency. However, it is recommended to ensure traceability from the farm level to shipment as well. It is also recommended to recover the illegally occupied government land and distribute those to the real shrimp farmers and processors to augment its production and export volume.

Key words: Safety standards, HACCP, shrimp, traceability, Bangladesh.

Introduction

Agricultural production and consequent food security of the nation is determined in farmers' field. Increase in production is not the goal this time. Rather, 'quality' has become the driving force in the current restructuring of the global agro-food system¹. Therefore, effective national food control systems are essential to protect health and safety of consumers. Consumers are showing keen interest in how food is produced, processed and marketed. The Food and Agriculture Organization (FAO) and the World Health Organization (WHO) have a strong interest in promoting national food control systems that are based upon scientific principles and guidelines, and which address all sectors of the food chain².

Shrimp, the second largest export sector and labor-intensive in production, is potentially the next to garment sector of Bangladesh, having tripled in export value over the past decade to about US\$ 500 million. Located in the coastal regions, the sector provides employment and livelihood to nearly one million rural people. It has the highest potential for further development, enough to culture shrimps to earn US\$ 1.5 Billion³. The expansion of export market for fish and fishery products plays a crucial role in poverty reduction strategies in Bangladesh.

Bangladesh is already among the top 10 exporters of shrimp in the world and accounts for some 3 percent of global production. The EU (45%), USA (35%) and Japan (4%) are the world's major importers of shrimp from Bangladesh. However, the export of

shrimp to developed country markets is becoming increasingly difficult because of the emerging sets of food safety and agricultural health standards, along with buyers' changing requirements⁴.

On the international level, buyers and consumers are increasingly demanding that shrimp is produced in compliance with recognized codes of conduct regarding food safety, human rights, fair labor practices and environmental protection. The quality of shrimp exported from Bangladesh continues to be appreciated for both taste and health standards. The success in international market also depends on the performance of the shrimp processing plants in terms of product quality, price, and timeliness in delivery and other services.

Ponte⁵ analyzed the structure and transformation of the Nile perch export industry in Uganda in the context of tightening food safety standards for fisheries and other EU agro-food imports. Gibbon and Ponte⁶ have sought to specify the historical dynamics of the rise of buyer-driven global value chains in the context of changing regulatory environments and corporate strategies. Humphrey⁷ analyzed the new challenges arise in the areas of markets and competition from a global value chain perspective and examined their implications for policies at both the micro and macro levels. Krajewski and Ritzman⁸ highlighted the linkages of processes and value chains and the strategic importance of operations within a firm. Nadvi and Thoburn⁹ explored links within the Vietnamese garment and textiles sectors, and considered the

impact of global challenges on Vietnamese firms and workers. However, there have been no attempts particularly to sketch out various activities in Bangladesh shrimp industry inconformity with the food safety standards. Therefore, this study deals with the activities of different stakeholders in shrimp industry in order to comply with the HACCP principles and requirements of other import countries.

Materials and Methods

Different sets of questionnaires were used for the stakeholders at various levels in order to conduct field survey followed by a series of interviews and telephonic discussions. Primary data were collected for three weeks in July 2007 for this paper. In order to measure productivity and profitability in shrimp farming, a small sample survey was conducted in three sub-districts of Khulna and Satkhira districts. Data were collected from a total of 30 sample farmers, selected through stratified random sampling techniques. To identify the quality control performance, data were collected through random sampling from general managers and executive directors of 17 processing plants in Khulna district. Semi-structured interviews were also conducted with personnel of other stakeholder organizations such as Khulna District Shrimp Farmers Association, Bangladesh Frozen Foods Exporters Association, Department of Fisheries, Export Promotion Bureau and other knowledgeable persons including Khulna University professors. Besides, secondary information sources in the form of handouts, reports, publications, notifications, etc. having relevance with this study were also consulted. The data and information from these field surveys, interviews, discussions, communications, consultations and interactions were analyzed and used as the basis of the paper.

Results

Potentiality of shrimp cultivation in Bangladesh: Benefit-cost ratio (BCR) in Table 1 clearly indicates that even with the extensive culture practice, there is enough scope to increase the production and income in Bangladesh. The yield of shrimp is very low compared to other Asian countries. It is noted that Bangladesh has realized only a fraction of its potential. Therefore, cultivation could be expanded following a transparent land use policy based on land topography, soil quality and other environmental factors. Although shrimp culture degrades soil fertility, majority of the farmers mentioned for crop rotation in order to have environment friendly farming.

Table 1. Costs and returns per hectare of shrimp culture.

Item	Amount
a. Fixed cost, US\$	250.7
b. Variable cost, US\$	293.2
c. Gross cost (a + b), US\$	543.9
d. Shrimp yield, kg	257.0
e. Shrimp price, US\$/kg	6.2
f. Gross return (d x e), US\$	1593.4
g. Gross margin (f - b), US\$	1300.2
h. Net return (f - c), US\$	1049.5
i. Benefit-cost ratio (BCR), (f / c)	2.9

Source: Field survey, 2007.

Shrimp markets of Bangladesh: Shrimp farmers sell their products mostly (i.e., 80% of the total production) to export market chain as

they get full payment instantly. It is revealed from the field survey that only 16% and 4% of the total production is sold to the local retail markets/local customers and supermarkets (e.g., 3H, PQS, Agora, Nondon, etc.), respectively. Presently, investors are getting attracted and are coming up with the endeavor to develop supermarket in Bangladesh.

Bangladesh offers various types of fresh frozen raw and cooked shrimps for the world's market such as sea water black tiger shrimp (i.e., bagda: 63% of the total export), fresh water prawn (i.e., golda: 19% of the total export), sea water brown/grey shrimp (i.e., honna: 10% of the total export) and sea water white/pink shrimp (i.e., chaka: 8% of the total export). In catering and retail sectors in the USA, EU and also in Japan, market demand for specific value added products have been rising. The exporters are increasingly turning to export shrimp as value added products like peeled, deveined, skewers, marinated, pullvein, stretched, etc.

Value chain analysis of shrimp: Value chain analysis focuses on the institutional arrangements that link producers, processors, marketers, distributors and consumers. Supply chain analysis focuses on the way of goods move from producers to consumers; the exchange of payment, credit and capital among actors; price signals, pricing behavior and value added; the dissemination of technology and the flow of information across the chain. A value chain analysis augments this approach by identifying and exploring the spaces where returns are generated. It recognizes that various configurations of actors may influence capabilities, possess different levels of bargaining power and subsequently affect outcomes along the chain¹⁰. The value chain describes the full range of activities which are required to bring a product or service from initiation, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers and final disposal after use¹¹.

Fig. 1 shows that brood (mother) shrimp is collected/caught from the deep sea by specialized trawlers. The brood shrimp is put in hatchery tank for induction of egg hatching and shrimp fry is produced in the hatchery. Nursery is used to become accustomed fries with the local water environment and water chemistry like salinity. In the shrimp farm/gher, almost all of the farmers follow

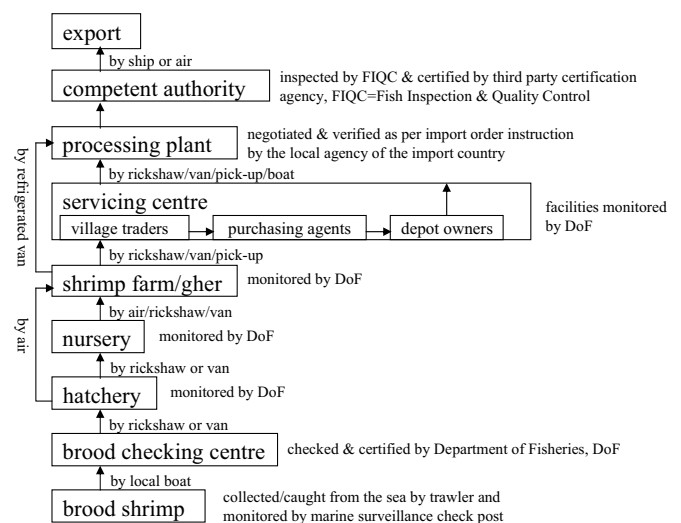


Figure 1. Value chain of shrimp.

natural and extensive aquaculture method. Then those shrimps are carried into processing plants through servicing center. Competent authority like FIQC and third party certification agency perform inspections and verifications based on the Codex guidelines, code of practice, standards and directives of EU, HACCP regulations and requirements of other import countries. After having health certificate from the competent authority, the product is exported.

Department of Fisheries (DoF) monitors the hygiene and sanitation condition, source of PL (post larvae), workers' health condition, water supply and quality management, feeding system and feed quality-whether unapproved drugs or toxic elements have been used, farmers and region code (to track source of farming) and tags for recording when farmers began to culture and when they harvested. It also inspects plastic basket, harvesting equipment, trapping and netting system, aquaculture residue monitoring, shrimp landing and preservation, transportation vehicles, ice quality, time of primary received, time of delivery to the processing plants, utensils used, packing system, and so on.

Compliances of Bangladesh shrimp with HACCP: In order to supply safe and quality seafood to the importers and consumers, the government as well as processors-cum-exporters has undertaken stringent measures to improve quality assurance practices as well as management practices by strong compliances of HACCP (Hazard Analysis and Critical Control Points) guidelines. HACCP is a systematic study of the ingredients, the food product, conditions of processing, handling, storage, packaging, distribution and consumer use. Most of the standards involve the use of HACCP for ensuring food safety - a standard that has been approved by the Codex Alimentarius Commission¹². It has also been endorsed worldwide by the European Union and by several other countries including Canada, Australia, New Zealand and Japan.

Table 2 shows that processing plants implement HACCP principles about 85% in all stages of distribution, processing and export of shrimp. Categorically, processing plants should upgrade their corrective action and verification in compliances of HACCP principles. It is reported that only the processing plants are legally liable to bear the risks of export for any possibility of non-compliance of standards. Therefore, processing plants need to a large extent of concentration to comply with the standards.

Processing activities in compliance with HACCP principles: All the processing activities in the plant are strictly controlled under good manufacturing practices (GMP). Processing and quality assurance monitoring activities are pre-fixed with pre-set

Table 2. Compliances of shrimp processing plants with HACCP principles.

Principles	Compliances (%)
(i) Hazard analysis	91
(ii) Critical control point	90
(iii) Critical limits	91
(iv) Monitoring	90
(v) Corrective action	87
(vi) Verification	86
(vii) Record keeping	89

Source: Field survey, 2007

parameters. A written HACCP manual is prepared for all the processing activities. It is found that mass of the activity-wise performance level of production line is more than 90% in compliance of HACCP principles (Table 3). However, plants need to improve in receiving and grading section as these are done manually.

Compliances of work environment of the shrimp processing plants: There is an urgent need to improve work environment of the shrimp processing workers to maintain the international standards. Relationship between the plant owners and the workers, workers' mental satisfaction and good health also influence the product's quality.

Although 100% workers receive uniform, training, sanitation and treatment but only a small portion enjoys satisfactory salary, leave with salary and maternity leave (Table 4). Low wage, no job security, no festival bonus, no allowances other than salary, no advance payment, no credit facility etc. are the common problems among the workers in the shrimp processing plants.

Standards in shrimp export: Standards set entry barriers to new participants to a value chain and raise new challenges to existing developing country suppliers. On the other hand, the challenge of rising standards may provide the opportunity for selected suppliers to add value, assimilate new functions, improve their products, and even spur new or enhanced forms of cooperation among actors in a specific industry or country¹³.

The standards and requirements by different import countries are more or less the same (Table 5). Import countries negotiate with the exporters on product price, product quality, reliability of delivery, speed of response, product design and product performance standards. Normally, local agents of import country inspect the operational culture in the processing plants. They provide specification on color, shape, size and packaging materials. It is known that Japan is not so much concerned about HACCP, although Japanese importers ask 100% organic product.

Assurance of shrimp quality: FIQC (Fish Inspection and Quality Control Department under the Ministry of Fisheries, Government of Bangladesh), a highly qualified quality assurance management does provide an excellent standard quality assurance program, strictly complying with the suggestions of EU, Codex guidelines, code of practice, HACCP principles and requirements of other import countries. Apart from this, some independent international quality assurance organizations namely SGS (Societe Generale de Surveillance, France), Lloyd's (UK) and Baltic Control (Denmark) are engaged in improved food safety, quality and nutrition as third party certification agency. They offer comprehensive inspection and superintendence to both at the company and at shipping ports as per instruction of the import countries. The core services offered by these companies are: inspection services, testing services, certification services and verification services.

Traceability in shrimp export: Recently, traceability of food and fisheries items has emerged as a burning issue in the world market. Under EU law, traceability means the ability to track any food, feed, food-producing animal or substance that will be used for consumption, through all stages of production, processing and

Table 3. Activity-wise performance level in compliance with HACCP principles.

Activities	Performance level %	Activities	Performance level %
(i) Receiving	85	(viii) Weighing	95
(ii) Weighing	95	(ix) Panning	98
(iii) Washing	97	(x) Labeling	95
(iv) Chill storing	95	(xi) Freezing	95
(v) Beheading	90	(xii) Packing	95
(vi) Export grading	86	(xiii) Cold storing	96
(vii) Pressurized washing	96	(xiv) Dispatch	98

Source: Field survey, 2007.

distribution¹⁴. According to the International Standard-Setting Organization (ISO), traceability refers to the ability to trace the history, application or location of an entity by means of recorded information. This principle is known as ‘one step up and one step down’. Traceability is a way of mitigating risk. It helps to recall easily a product from the market and hence, the chances of consumers’ life threatening risk are greatly reduced.

Bangladesh starts to implement traceability in order to comply with the requirements of the import countries. Initially shrimp processing plants ensure ‘shrimp suppliers certificate’ and ‘farmers and region code’ where suppliers certify that the shrimps are not contaminated by any kind of pathogenic bacteria and no chemical drugs are used during rearing; the shrimps are harvested, preserved and transported in a hygienic manner. Besides, in the processing plants of Bangladesh, all master and inner cartons (boxes) as well as poly-bags are labeled and printed with all necessary information and specifications for the foreign buyers inconsistent with their country regulations. These are: approval number, FDA registration, place/country of origin, processors name or ID, lot number, brand name, size grade/count, size of pack, date/method of production, net/gross weight, expiry date, nutrient facts and consumer and using instruction along with all other required specifications.

Discussion

The results indicate that there is a bright prospect of shrimp culture in Bangladesh. HACCP principles are applied on an average 85% to all of the shrimp processing plants and all of them are fully aware of the food safety requirements. Sanitary and phyto-sanitary measures are followed. Work facilities are being improved. In response to the emerging food safety, the government and processors-cum-exporters take joint initiatives to upgrade processing plants, standardize quality control process, maintain constant monitoring, renovate laboratories and provide training for officials and workers in shrimp industry. To avoid post harvest contamination and to ensure the quality, receipt of ‘head on shrimp’ with plastic baskets has been made mandatory. Licensing system is made compulsory for servicing centre, depot owners, ice plants,

Table 5. Standards and requirements demanded by the world’s major import markets.

Japanese market	USA Market	EU market
-organic product	-HACCP standard	-HACCP standard
-uniformity in size	-precise grading and weighing	-average standard size
-precise grading	-color separation with uniformity	-precise grading and weighing
-accuracy in weight	-trace code	-good packaging with their own language and sticker
-color separation	-natural taste, freshness	-accuracy in labeling and trace code
-good looking		-free from chemicals
-freshness and good in quality		

Source: Field survey, 2007.

Table 4. Facilities enjoyed by the workers in shrimp processing plants.

Items received	% of workers received
Uniform	100
Training	100
Sanitation	100
Treatment	100
Satisfactory salary	20
Leave with salary	50
Maternity leave	20

Source: Field survey, 2007.

etc. as per FIQC rules. Practices of ‘shrimp suppliers certificate’ as well as ‘farmers and region code’ have been started. Awareness building, training on traceability and eco-labeling act are given to the processors and suppliers. Transportation network is being developed to some extent. Waste water treatment plants are installed. Annual residue monitoring activities are strengthened. All these indicate that Bangladesh shrimp industry takes strict measures and monitoring to comply with the EU food safety directives.

Conclusions

This study aims to verify whether the Bangladesh shrimp industry adheres to the prescribed codes. In response to the emerging food safety and other issues set by the import countries, the government and stakeholders of Bangladesh shrimp industry concertedly take necessary measures and programs. However, this study identifies that the Bangladesh shrimp industry grasps with some severe concerns like shortage of quality raw materials, illegal grabbing of government land, imposition of turn over tax, natural calamities, disorganized and nonsystematic production process, etc. The government also needs to take the lead role in introducing improved practices, technological and communication development. Processing plants should implement HACCP 100% in all stages of production, distribution, processing and export of fish. It is necessary to establish internal traceability first and then go for the chain traceability. Moreover, it is recommended to recover the illegally occupied government land and distribute those to the real shrimp farmers and processors to augment its production and export volume.

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