

Economics of cost of compliance with HACCP in seafood export units and its limitations for applicability in domestic markets

FEMEENA HASSAN, CHARLES JEEVA AND SANGEETHA K. PRATHAP

Central Institute of Fisheries Technology, Cochin - 682 029, Kerala, India

e-mail: femeenahassan@rediffmail.com

ABSTRACT

Implementation of quality control measures like HACCP is highly capital intensive, which cannot be borne by small seafood processing units. The cost of implementation of HACCP should be realized from the market price of products, which usually happens in the case of export oriented units. Domestic fish marketing in India is constrained by inadequate infrastructure limiting consumption to areas in the vicinity of landing centres. Even though the consumer is quality conscious, the low per capita income restricts access to high quality food items. This paper looks into the essential elements of implementation of HACCP plan and its cost applicability in the seafood industry. Domestic quality control in seafood can be achieved by economic measures, rather than by adopting high cost international quality infrastructure. To achieve quality, measures should be adopted right from capture of fish to consumption stage.

Keywords: Domestic fish markets, Economics of compliance, HACCP, Quality

Introduction

Unyielding quality compliance in international trade has been viewed with significant importance since the WTO regime. Undoubtedly, 'export quality' products are not traded in domestic markets and fish and fish products are no exception. Physical facilities and infrastructure in all types of fish markets are far from satisfactory (FAO, 2001). Some of the problems in domestic fish marketing include high perishability, heterogeneity in species, high cost of storage as well as transportation and more players in the channels of distribution.

Fishery products are an important source of foreign exchange earnings for developing countries including India. However, major output generated by the fisheries sector in the country is not exported. In fact, seafood exports accounted for only 29.33% of the total value of output generated from marine and inland fishery in 2008-09, which implies that almost 70.67%, is used for domestic consumption and other non-consumptive uses. The average per capita consumption of fish in India is estimated to be 9 kg (NFDB, 2009). At this level, domestic marketing plays an important role and can act as a shock absorber in the context of vagaries in the export marketing system (Sathiadhas *et al.*, 2003). About 70% of the fish catch is marketed fresh and the remaining is utilized in the form of processed, dried, smoked, reduced to fishmeal *etc.* However, the harvested fish is not evenly distributed to interior areas due to lack of transportation and non-availability of proper storage facilities. Therefore, there

is a need for balanced system of distribution to make fish available in the interior areas at reasonable rates.

The domestic fish marketing scenario in India is restrained by infrastructural lacunae annihilating smooth trade. Lack of exclusive fish markets except in urban centres limits the movement of fish. Further, more players in the marketing channels consume time and decreases marketing efficiency. Marketing channels involved in domestic fish marketing in India are mostly producer-consumer direct channel or producer - middlemen (trader) - consumer channel or producer-wholesaler-retailer-consumer channel (Sathiadhas, 2005). The consumer at the end of a longer marketing channel gets more degraded fish than a person directly purchasing it from the landing centre. This happens because of inadequate storage and transporting facilities at retail level. A wholesaler of fish can afford to have a cold storage wagon to supply fish at retail markets. The retail suppliers are small traders, cycle/rickshaw or head-load vendors who use ice for storage and cannot afford capital intensive storage facilities. The quality of water used in ice preparation can also cause degradation of fish. What restrict the domestic trade in complying with quality are the price conscious middle and low income consumers who form majority of fish eaters. Hence, capital intensive quality compliance technologies cannot be adopted by the retail vendors as they are unable to transfer such costs to the consumer. The improvement in fish marketing system and distribution would not only reduce the demand-supply gap of fishes across country, but would also contribute to food

and nutritional security of a vast majority of resurgent middle income population (Ganesh Kumar *et al.*, 2008).

The inability to respond to changing safety and quality standards is a major concern in developing countries. The high cost of compliance is a major blockade for achieving this objective. In this backdrop, the paper analyses the challenges, particularly the economic aspects before implementing quality standards for fish and fish products in domestic markets in the country.

Materials and methods

Case study evaluation method was adopted to assess the cost and benefits of HACCP implementation in seafood units. Primary and secondary data were used for analysis. Secondary data were collected from the publications of Government agencies *viz.*, Marine Products Export Development Agency (MPEDA), Central Marine Fisheries Research Institute (CMFRI) and other sources (Personal communications).

At present, quality is considered relevant only in the field of exports, ensuing stringent international quality regulations governing trade. Out of the 230 EU approved seafood export units in India, 65 are in Kerala. Five seafood export units approved by EU were selected for detailed study. Field level observations were made by visiting five seafood export units located in Aroor (Alappuzha District) and Sakthikulanganara (Kollam District). Focused group discussions and interviews were conducted with the help of open ended interview schedule to collect relevant information. The data pertaining to costs of implementation was collected from the units surveyed. Data under the following heads were subjected to analyses, *viz.*, initial investment in fixed assets like land, building, plant as well as machinery and operating expenditure (manpower, input costs for HACCP compliance, training expenses and other operating expenses) for conforming to HACCP.

The expenses incurred were aggregated on accounting terms to work out the total operating expense, which includes interest on capital expenditure and depreciation. The Average Operating Cost (AOC) of HACCP compliance per kg of fish was calculated using the formula:

$$\text{AOC per kg of output} = \frac{\text{Total operating expenses of the seafood plant (Rs.)}}{(\text{Plant Capacity in tonnes} \times 1000)}$$

Similarly Total Cost (TC) of HACCP compliance per kg of fish was calculated using the formula :

$$\text{TC per kg of output} = \frac{\text{Total expenses of the seafood plant (Rs.)}}{(\text{Plant Capacity in tonnes} \times 1000)}$$

Results and discussion

Seafood export units located in Aroor (Alappuzha District) and Sakthikulanganara (Kollam District) in Kerala operate very well in compliance with the requirements following the Good Manufacturing Practices (GMP) specified in the pre-requisites of HACCP. The units undertake export of block frozen shrimp and cephalopods. The units maintain HACCP manual duly certified by EIC (Export Inspection Council) and the destination countries' authorities which is taken as the base document needed for compliance. Being large units, the exports are destined to USA, Japan, Gulf countries and the major market is the EU. EU and USA have been instrumental in implementing HACCP system (for EU it is known as the on check system) for ensuring food safety.

HACCP system intends to control the physical, biological and chemical hazards that are present in the specified fish product/ species of fish. On this basis, the firm has to adopt strategies to check the presence of the specified hazards in the process/ product and set Critical Control Points (CCPs) to monitor and control the same. HACCP plan may be designed and implemented towards achieving this objective. The HACCP plan provides a guide to design a comprehensive plan, which focuses on control of significant hazards at identified CCP in the process in order to prevent or minimize food safety risk to the consumer. The HACCP plan requires in depth evaluation of product and process to determine the location where specific control is required. Generally there are twelve steps involved in designing and implementing an HACCP plan; that a product/ process difference might cause reduction of or addition to the same. The units need to adhere to control measures specified in the system such as supplying the additional infrastructure to support GMP. HACCP implementation in seafood plants tends to be effective with proper facilities for cleaning and sanitation (hygiene of facilities and equipment, including both pre-operational and operational), hygiene of personnel (training, health, personal habits and protective clothing), reception of fish and other incoming materials, *Listeria* management, product recall, repairs and maintenance, storage and transport including temperature controls, training, vermin control, potability of water and ice and waste management (inedible product management and dropped product) (FIICC, 1997).

For conforming to HACCP standards, the units surveyed had to invest in the following additional requirements. The units in Aroor region were set up in 2003, strictly conforming to the EU legislations regarding HACCP. The units in Sakthikulanganara, established well before HACCP implementation had to service additional requirements. In export units at Sakthikulanganara, the

preprocessing facilities were not attached to the main factory which needed to be established as part of HACCP implementation. Other requirements that needed to be established included own ice plant, water and effluent treatment plants, thermographs, pest control devices and facilities for the employees (Table 1).

products. It was also observed that the cost burden tends to be higher for smaller firms compared to the larger ones when measured in terms of turnover. As these requirements are stringent, the small firms cannot compete and they direct the exports to Gulf countries that do not follow stringent quality checks.

Table 1. Additional facilities required in the units surveyed while implementing HACCP system

Unit Code Particulars	Aroor region			Sakhikulangara region	
	A	B	C	D	E
Preprocessing facility	√	√	√	√	√
Ice plant	√	√	√	√	√
Chill room	√	√	√		
Laboratory facilities	√	√	√		
Water treatment plant	√	√	√	√	√
Effluent treatment plants	√	√	√	√	√
Tables	√	√	√		
Air conditioning	√	√	√	√	
Thermographs	√	√	√	√	√
Foot dips	√	√	√		
Pest control devices	√	√	√	√	√
Employee uniform and accessories	√	√	√		√
Washrooms	√	√	√	√	

Business units tend to evaluate each unit of investment in terms of revenue generation potential. For example, if we take the case of implementation of HACCP standards, it involves certain amount of initial capital investment and operational expenses. Following the specifications, it is necessary for each factory to invest in requirements for facilitating potable water system, continuous power supply, effluent treatment plants, flake ice machines, chill rooms and laboratories. The recurring expenses also tend to be high on account of increase in number of records, operations performed, additional expenses incurred while attaching preprocessing unit, water and electricity expenses and staff expenditure on training, uniforms and miscellaneous items. The cost of operating HACCP compliant units among the selected units were worked out and the average cost of operation per kilogram of seafood products was arrived at Rs. 10.19, while operational expenditure alone costs Rs. 3.93 per kg (Table 2). The additional cost per unit of output can be very well realized from the comparative advantage of export price of HACCP compliant seafood

Dey *et al.* (2005) observed that compliance to quality specifications in India costs around 3,09,300 US \$ with a yearly operating cost of around US\$41.2, which ultimately costs 0.21 to 0.28 US\$ per kg of fish. The cost of implementing HACCP in seafood companies tends to vary; even a company dealing with multiple species of fish might experience a differential cost, as each product warrants individual specifications. Implementation costs per unit size of turnover is the frequently used methodology to compare firms and across industries without consideration to product/species variations. A study which assessed the cost of establishing HACCP compliance standards in food industry found that seafood sector recorded the highest operational expenditure of HACCP compliance (Rs. 6.37 lakhs) followed by dairy (Rs. 2.36 lakhs), spices (Rs. 1.27 lakhs) and fruits and vegetables processing sector (0.85 lakhs) (Deodhar, 2003).

“Will an average Indian middle class consumer pick a quality compliant product at a higher price?” It is relevant to analyse the above question in light of the following facts. The average per capita income of an Indian is Rs. 33,283 per annum (2007-08) (CSO, 2009). The estimated MPCE (Monthly Per Capita Consumption Expenditure) shows that the spending pattern of an average Indian rural household is Rs. 695 per month while that of urban areas is Rs. 1312 per month. It was also reported that a rural household spends an average of Rs. 24 per month on egg, meat and fish items,

Table 2. Cost of compliance in selected seafood units

Indicators	Amount
Average operating expenditure	Rs. 2.84 crore
Average annual turnover (seafood products)	7200 t
Average operating expenditure per unit of output	Rs. 3.93 per kg
Total expenditure per unit of output	Rs. 10.19 per kg

while an urban household spends Rs. 34 per month. Given this scenario, it is quite clear that the quality conscious consumer may have to bear a price differential compared to the price conscious average consumer who may not have the capacity to bear such margins.

In view of developments in international markets and through awareness, domestic consumers, particularly at the premium end are oriented towards quality. Modern trade in India operating as supply chain outlets and supermarkets provide infrastructure facilities such as cold storage to preserve fish and fish products. However, the price savvy Indian consumer expects quality product at reasonable prices. High quality compliance in seafood industry is out of the reach of the petty traders in domestic marketing system. Some simple points can be reiterated to ensure quality, right from the point of catch till the consumer.

Fishermen, traders and those who handle fish at different stages should be made aware of the following aspects for achieving better quality without added costs:

- Fish and shellfish should be preserved properly immediately after catch.
- Ice should be prepared in good quality water and used in appropriate proportion.
- Handling area and containers should be properly disinfected.
- Proper drainage and storage should be provided in markets and landing centres.
- Fish should be protected from rodents, flies, insects, birds and animals.
- Immediately after catch, fish should be sorted by species, shrimps should be graded, beheaded, peeled and de-veined as soon as possible.
- Quality standards like fixing limits for heavy metals and microbial limits should be imposed.
- Bivalves as far as possible should be depurated before shucking.
- Sun drying in sandy beach should be stopped and while salting good quality salt should be used.
- Quality of fish sold in domestic market should be assured.
- Proper cost effective preservation facilities should be provided at all retail outlets - cold storage units can be established on cooperative basis or by local bodies extending the facilities on nominal charges.
- The public, including the fisher folk, should be educated about the need for seafood safety norms through proper extension strategies

Trade in fish and fishery products plays an important role in improving food security and nutritional needs, with its availability at low cost in addition to its contribution to economic activity, employment and forex earnings. However, the quality of fish traded in domestic markets is still at stake as the tradeoff between price and quality is always outweighed by price consciousness of the low/middle income consumer.

Domestic quality can be ensured by Government intervention by improving the domestic market infrastructure and organizing awareness campaigns to bring about a change in the consumer's perception on hygiene and food safety. The establishment of modern domestic markets plays a very crucial role in the development of fisheries sector in the country. Apart from ensuring nutritional and food security, it also helps in minimizing post-harvest losses, increasing revenue, enhancing employment opportunities and offers high standards of hygiene and sanitation leading to food safety. In this context, National Fisheries Development Board (NFDB) has identified areas for the development of domestic fish marketing system in terms of modernisation of wholesale markets, to develop cold chains of hygienic retail outlets of varying levels and to offer schemes under rural development for promoting women and weaker sections in domestic fish marketing. In addition, institutional framework at the national level including National Cooperative Development Corporation (NCDC) and National Federation of Fishermen's Cooperatives Ltd. (FISHCOPFED) are involved in creation of infrastructural facilities for fish marketing, ice plants, cold storages, retail outlets, *etc.* FISHCOPFED promotes fishery cooperatives and assists fishermen to market their produce efficiently through hygienic retail fish centres in metropolitan cities thereby providing remunerative prices to fish farmers.

Urbanization offers an interesting revelation in terms of quality consciousness which offers formidable solutions for ensuring food safety through products traded in the 'modern trade' channel. In this direction, it is required to have greater emphasis on brand architecture, brand roles and relationships (Ayyappan and Krishnan, 2005). The most recent ASEAN charter has been debated weighing the consequences of import of fish varieties in the country. The fact that it might instigate domestic trade distortions is debatable and the quality of such imports can be regulated, which might result in better quality compliance for domestic trade and re-exports. Such a scenario would force domestic players in the market to take steps towards such compliance, if not to face competition but for survival.

Acknowledgements

The authors express their deep sense of gratitude to the Director, CIFT for giving permission to publish the

paper and for the encouragement given during the work. The financial assistance from the Department of Science and Technology, New Delhi is gratefully acknowledged.

References

- Ayyappan, S. and Krishnan, M. 2005. Offbeat attempts needed. *The Hindu-Survey of Indian Agriculture*, p. 134-136 .
- CSO 2009. Central Statistical Organization. *The Economic Times Daily*. 30th January, 2009.
- Deodhar, S. Y. 2003. Motivation for and cost of HACCP in Indian food processing industry. *Indian J. Econ. Bus.*, 2(2). http://www.ijeb.com/Issues/data/Dec03_5_mfchifpi.pdf
- Dey, M. M., Rab, A., Jahan, K. M., Nisapa, A., Kumar, A. and Ahmed, M. 2005. Food safety standards and regulatory measures: implications for selected fish exporting Asian countries. *Aquacult. Econ. Manage.*, 9 (1& 2): 217-236.
- FAO, 2001. *Production, accessibility, marketing and consumption patterns of freshwater aquaculture products in Asia: A cross-country comparison*, FAO, Rome, Italy. Circular No. 973 : 275 pp.
- FIICC, 1997. *A guide to hazard analysis critical control point systems in the seafood industry*, MAF Regulatory Authority (Meat and Seafood), Guidelines for the management of SQAPDCs, Fishing Industry Inspection Certification Council, p 1-143.
- Ganesh Kumar, B., Datta, K. K., Joshi, P. K., Katiha, P. K., Suresh, R., Ravisankar, T., Ravindranath, K. and Muktha, M. 2008. Domestic fish marketing in India – changing structure, conduct, performance and policies, *Agr. Econ. Res. Rev.*, 21: 345-354.
- NFDB 2009. *Guidelines for domestic marketing*. NFDB, India. <http://ahd.bih.nic.in/Docs/NFDB-Guidelines-for-Domestic-Marketing.pdf>
- Sathiadhas, R. 2005. Policy Issues in Marine Fisheries Management in India. In: Vasudevappa, C., Basavaraju, Y., Seenappa, D., Ayyappan, S. and Ravichandrareddy, S. (Eds.), *Proceedings of the seventh Indian Fisheries Forum, Bangalore*, Asian Fisheries Society, Indian Branch, Mangalore, India, p. 348-366.
- Sathiadhas, R., Ashaletha, S. and Femeena, H. 2003. Seafood safety norms and marketing management of marine fisheries sector in India, In: Surendran, P. K., Mathew, P. T., Thampuran, N., Nambiar, V. N., Joseph, J., Bhoopendranath, M. R., Lakshmanan, P. T. and Nair, P. G. V. (Eds.), *Seafood Safety*, Society of Fisheries Technologists (India), Cochin, p. 566-579.

Date of Receipt : 15.10.2011

Date of Acceptance : 03.02.2012