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HACCP Guidelines and the Economics of Seafood Processing : An Impact Analysis

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Fish and fishery products have been the focus of attention since the introduction of the New Economic Policy in July 1991 because of their export potential and high unit export value of the seafood items (Krishnan and BIRTHAL, 1997). The value of seafood exports from the country has crossed the \$1 billion mark for the fourth year in succession. The industry has registered a turnover of Rs.1,800 crore, in 1992-93, it rose to Rs. 3500 crore in 1994-95 and in 1996-97, it has touched Rs. 4,200 crore. The Indian seafood industry contributes 7 per cent to the net foreign exchange earnings. The industry is targeting at Rs.10,000 crore turnover in the next five years (Tharakan, 1998a).

The maintenance of quality is the responsibility of every individual in the fish marketing chain. The basic principles of quality organisation in the fish processing industry are little different from those applicable to other food commodities. Fish, however is more variable in intrinsic quality and subject to more variations, thus there is greater need for systematic and rational control measures (Santos, 1995).

The Hazard Analysis Critical Control Points (HACCP) concept can basically be described as a preventive system of control particularly with regard to microbiological hazards. It is a systems approach for estimating the risks in

producing a food product. Hazard Analysis is the identification of sensitive ingredients, critical process points and relevant human factors as they affect product safety. A Critical Control Point is a point in time or a physical location at which failure of control or preventive measures will expose the consumers to unacceptable health risks (ibid).

The question of quality stems from the possibility of improving it further. Despite the seafood export sector being given prime importance as a foreign exchange grosser, support to the sector in terms of infrastructure and credit is woefully inadequate. Tharakan, 1998, lists issues of hygiene and the need for the improvement of cleanliness in the sub segments of raw material supply as the root cause for the drop in confidence in Indian seafood products and the enforcement of the HACCP. The problems are in

1. Fishing harbours and landing centres
2. Peeling and pre-processing centres
3. Inadequate infrastructural utilities that include power, potable water, motorable roads
4. Administrative problems
5. Credit unavailability
6. Ban on aquaculture

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A Profile of Seafood Exporters in India:

The Indian seafood industry has accepted the Hazard Analysis Critical Control Points (HACCP) guidelines on quality of seafood that is exported from the country from December 18, 1997. There are 402 seafood processing plants registered with the Marine Products Development Authority (MPEDA) and over 625 active seafood exporters of whom 380 are integrated units while 240 are merchant exporters. About 85 per cent of the plants are in the small sector. The plants and their operations are located along the coastal states. The details of the locations of the plants is given in Table I.

This paper addresses first to the economic impact of installation of improved quality control equipment in the industry that would ensure HACCP compliance and then examines the macro economic implications of such a compliance and its inherent constraints and remedies.

Data and Methodology

Six major seafood exporting companies in Cochin were contacted and data on their operations were recorded in a pre-tested questionnaire¹. Details regarding their scale of operation (level of integration), species groups dealt in, export markets, product type, quantity, value and level/ type of processing

Table I : State-wise and Location-wise Break-up of Seafood Processing Plants in India

S. No.	State	Number of plants	Location
1.	Gujarat	56	Veraval
2.	Maharashtra	41	Porbandar
3.	Goa	07	Mumbai
4.	Karnataka	14	Ratnagiri
5.	Kerala	124	Goa
			Mangalore
			Calicut
			Cochin
			Quilon
6.	Tamil Nadu	48	Tuticorin
			Mandapam
			Chennai
7.	Andhra Pradesh	55	Nellore
			Kakinada
			Bhimavaram
			Vishakapatnam
8.	Orissa	21	Bhubaneshwar
			Paradip
			Puri
9.	West Bengal	36	Calcutta
Total		402	

The total installed freezing capacity is 7,500 metric tons a day. The industry is operating much below its installed capacity at 14 per cent plant utilisation since the total current production is 1,050 metric tons per day. On an annual basis, the installed capacity is 2,737,500 metric tons as against a current production of 3,78,200 metric tons.

involved were recorded. Status of their export standing, European Union and USFDA certification, estimated cost of modifying/ installing new quality control facilities, current and projected turnover as a spill over of the process up gradation were recorded.

Financial analysis was conducted to assess the impact of installation of improved

Table II : General Level of Integration Product Profile and Export Markets of Processed Seafood of Selected Companies

	Type of unit	Integration	Product Profile	Markets	Product type
M/S. Rubian Exports	BF / QF	Processing	shrimp	USA, UAE, Bahrain, China & UK	PD, PUD, HLW, Fish, FR, CF,
M/S. R.F.Exports	BF	Processing	Shrimp, Fish & Mollusc	Europe, USA, Japan, UAE, China, Far East	PD, PUD, HL, FR, Squid, CF, Fish
M/S. Lansea	BF/ IQF	Processing	Cephalopods	Spain, Italy, Portugal, Greece, France	Squid, Cuttlefish, Octopus
M/S. Integrated Rubian	BF / IQF	Processing/ Packaging Exports	Shrimp, Crabs, Squid Cuttlefish, Octopus	N.A	N.A
M/S. Aminson	BF/ IQF	Processing / Packaging	Shrimp / Crab	Hong Kong / Japan / USA I USAI Sri Lanka / UAE / China / Germany / Spain/ France / Greece/ Canada Thailand / UK	N.A
M/S. Abad Fisheries	BF / IQF / VA	Proc., Pack., Exp.	Shrimp, Fish, cuttlefish, squid, clams, octopus, clams squids and cocktail shrimps	Europe, Australia, Japan, USA, UAE, Africa	Squid, cuttlefish, prawn, fish, octopus clam meat, baigai

BF: Block frozen, IQF: Individually quick frozen, PD: Peeled and deveined, PUD: Peeled and undeveined, HL: Headless; FR: Frozen; VA: Value added

Table III : Current and Projected Costs and Returns of Export Turnover of Seafood Export Companies (in lakhs) and Projected Change in Returns (in Per Cent)

	1997 - 98		2002 - 2003		1997 -98	2002 - 2003	Per Cent Change in Projected Returns
	Op. Costs	Capital Costs	Op. Costs	Capital Costs	Returns	Projected Returns	
M/s Rubain Exports	-	-	-	-	481.00	2,405.00	500.00
M/s R.F. Exports	34.45	85.00	44.10	50.00	35.04	45.00	128.42
M/s Lansea	660.00	35.00	-	-	723.00	900.00	124.48
M/s Integrated Rubian	2,865.00 (1998-99)	205.00 (1998-99)	3,455.00 (2000-01)	185.00 (2000-01)	3,200.00 (1998-99)	3,800.00 (2000-01)	118.75
M/s Aminson	100.00	150.00	-	-	514.00	2,500.00	486.38
M/s Abad Fisheries	30.00	300.00	160.00	1,250.00	3,500.00	9,500.00	271.42

quality control equipments for compliance of the HACCP guidelines on overall turnover and profits.

Methodology as in Vandana *et al.*, (1996), Padmanabhan and Ramasamy, (1997), Mane *et al.*, (1996) for financial analysis were adopted.

Pay Back Period (PBP): $\sum_{t=0}^t C_t < \sum_{t=0}^t R_t$

Where R_t = Returns in period t

C_t = Costs in period t

t^* = Expected life of the project

Net Present Value

$$(NPV) = \sum_{t=1}^n R_t / (1+i)^t - \sum_{t=1}^n C_t / (1+i)^t$$

Benefit Cost Ratio (BCR)

$$= \frac{\sum_{t=1}^n R_t / (1+i)^t}{\sum_{t=1}^n C_t / (1+i)^t}$$

Where, i = discount rate or opportunity cost of capital

Table IV : Pay Back Period, Net Present Value, Benefit Cost Ratio and Internal Rate of Return of Seafood Processing Companies Invested in Quality Control Equipments for HACCP Compliance

	Pay Back Period	B/C Ratio	Net Present Value	Internal Rate of Return
M/S. Rubian Exports	NA	NA	NA	NA
M/S. R.F.Exports	2 years and 5 months	1.01	0	50%
M/S. Lansea	1 year and 2 months	1.07	Rs. 86 lakhs	> 50 %
M/S. Integrated Rubian	1 year and 3 months	3.26	Rs. 464 lakhs	> 50 %
M/S. Aminson	11 months	3.26	Rs. 619 lakhs	> 50 %
M/S. Abad Fisheries	1 month and 10 days	24.10	Rs. 58 crores	> 50 %

Internal Rate of Return (IRR) =

$$\left[\sum_{i=1}^n A_i (1+r)^{-i} - n + J (1+r)^{-n} \right] - I = 0$$

Where: A_i = Net cash flow in the year i

n = Number of years

r = discount rate

J = Junk value of investment

I = Capital Investment on the project

Results and Discussion

The seafood industry follows a *variant* of the Hotelling's model of non-collusive pricing. Firms in the industry follow basing-point pricing and they produce homogeneous product (the large proportion of the product that is exported is the block frozen shrimp) whose transportation costs are relatively high and whose production requires a large plant if the full economies of scale (minimum production costs) are to be realised (Koutsogiannis, 1979).

The seafood processing companies under study basically exported frozen shrimp in both block frozen and individually quick frozen (IQF) forms. The USA, Japan and the European Union countries were their main markets (Table II).

The current and projected costs and returns of export turnover of seafood exporting companies and percentage change in projected returns were examined. Projected returns as a multiplier effect of the changes that have been effected as a result of the installation of HACCP compliant quality control equipment ranged from over 100 per cent to 500 per cent (Table III). Operating costs as a percentage of total costs were expected to increase from 120 per cent to over 500 per cent.

Pay back period for recovery of costs for installation of HACCP compliance equipment

was as low as 11 months in one case and was 2 years and 5 months in case of another (Table IV). The internal rate of return² was more than 50 per cent and the net present value remained positive at that stage for four companies indicating that the project (of establishing the new quality control equipment) paid back all the costs and also earned an interest of more than 50 per cent on money invested which made it a very attractive technical change in the process of production. In all cases, the discounted benefit cost ratio was greater than one (at 50 % IRR) indicating that investment is indeed bankable.

The plague in Surat, disease in aquacultural farms, black listing of cooked shrimp by the USFDA in 1996, turtle extruder devices implementation and the requirement of HACCP compliance are some of the issues besetting the seafood industry (Tharakan, 1998b). Seafood exports contributed three per cent of the country's export volumes and eight per cent of its foreign exchange. There are 402 seafood exporting firms in the country. It is estimated that over US \$ 25 million will be required as additional investment to revamp and restructure its operations and fulfill the new international quality standards. Individual firms anticipate an investment of Rs. 2 crores for refurbishing their facilities. Some emerging requirements are a quick assessment of the requirements of the industry by the bankers, the availability of soft loans with a stipulation on repayment of loans in foreign currency through a fast track disbursement window, a 10 year repayment period with a moratorium of three years and an obligation to repay by way of deductions in each export bill. Additional working capital requirements, restructuring of working capital limits, revamping the norms for assessing working capital requirements, extension of packing credit overdue tenor from 360 days to 540 days, export refinance, letters of credit in foreign currency by value adding

exporters on domestic suppliers, facilities for offshore trading and representation for the seafood industry on All India Export Advisory Committee of the Reserve Bank of India are some of the very urgent requirements of the seafood industry. The Government of India,

the Reserve Bank of India and the Marine Products Export Development Authority are abreast of the needs of the seafood industry and are trying to give maximum assistance to the industry in infrastructural, financial and liaison arrangements respectively.

Notes

1. List of companies and their addresses:

1. M/s. Abad Fisheries, P.B.No.313, Kochangadi, Cochin - 682 002.
2. M/s. Aminson Foods Ltd., Aminson House, Rameswaram Lane, Kochi - 682 005.
3. M/s. Integrated Rubian Exports Ltd., Rubian Complex, Aroor- Alapuzha- 688 534.
4. M/s. Lansea Foods (P) Ltd., 10/434, Chriyakadavu, Kannamaly, Cochin - 682 008.
5. M/s. R.F.Exports, Eramallur, Alapuzha.
6. M/s. Rubian Exports, Aroor- 688 534, Alleppey Dist, Kerala, India.

The authors are thankful to the Chief Executive Officers of the above companies for providing the required data

2. The internal rate of return was calculated on the premise that the project would pay itself back in a maximum period of five years. The net returns were discounted at 20, 30, and 50 per cent discount rates using a standard computer spreadsheet software. NPV was not discounted more than 50 per cent. The NPV remained positive (0 and above) in four cases even at 50 per cent discount rate. In only one case the NPV was zero at exactly 50 per cent discount rate. High IRR's are normal in an export oriented industry. NABARD considers projects bankable if the return on investment is more than 50 per cent. (Please see references quoted).

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