

Export Performance of Indian Fisheries in the Context of Globalisation

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PROBLEM FOCUS

Internationally traded fisheries products are characterised by a high degree of heterogeneity, reflecting the wide range of species and of processing techniques. Indian sea food industry, by and large still remains as a supplier of raw materials to the pre processors in foreign countries and 90 per cent goes in bulk packs, which is the prime reason for the drastic reduction in the unit value realisation (Rao and Prakash, 1999). India's share in the overall trade of the world is 1.5 to 2 per cent. Though the marine exports in India had crossed the one billion dollar mark since 1994-95 and subsequently to 1.3 billion dollar during the year 1997-98 (MPEDA, 1999), India is still lagging behind Asian countries despite the existence of vast fisheries potential and therefore, India's role is not of much significance in the present global seafood trade in the present context (Unnithan *et al.*, 1998).

The policy constraints often take the form on non-tariff barriers and generally relate to quality specification of the traded goods and also packing materials. This could hamper the export earnings by 1.5 billion dollar annually. The export to the European Union still poses serious threats due to the quality aspects raised by the importers and the characteristics of a buyer market. Shrimp export from India is another instance posing serious concern (Datta and Chakrabarthy, 2001). The USA had placed restriction on the ground that these are not caught with turtle excluding devices (TED). An appeal was placed against this in the WTO Appellate Body. India has taken a position that arbitrary as well as restrictive sanitary and phyto-sanitary measures continue to represent a major obstacle to international trade of agricultural products. As a result of the recent WTO regime quality competitiveness has emerged as the prime mover of international food marketing. India has a large domestic market but output is unsteady.

In spite of all the developments, the shares of seafood in the overall exports of India are also not impressive in quantity. It showed a gradual increase from 1.8 per cent in 1961 to 3.1 per cent in 1981 and reached an all time high of 7.16 per cent during 1997. Hence, there exists an enormous scope to enhance the quantum and

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healthy shrimp and advice on possible crop rotations. While it is difficult to avoid diseases, proper insurance coverage should be provided in order to protect the interests of the producers, especially the small and marginal farmers. The industry should be made conscientious and responsible for the livelihoods of the local communities.

NOTES

1. Most common diseases are: Yellow Head Virus (YHV) and White Spot Disease Syndrome (WSS).
2. However, the industry people evaded our queries regarding revenue generation and net profits for obvious reasons.
3. Groundwater used to be available at the depth of 20-30 feet prior to the advent of shrimp farming.
4. However, production was commenced only during 1996-97.
5. Extensive systems apply monoculture with external supply of water through pumping. Locally prepared feeds are used. Usually two crops in a year are taken with an yield of 700 kgs per hectare per crop (Hein, 2000).
6. Prices vary substantially with the count (number) of shrimp per kilogram. While below 20 per Kg fetches the best price, above 30 count would get very poor price.
7. Assuming that the entire 72000 hectares of aqua farming in the state is under scampi cultivation.
8. Main crop season is February–June and second crop season is July–November. During December and January, there will be no crop.

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value of exports manifold in the next millennium (Cyriah, 2003). Much of the mainstream media in India have enthusiastically welcomed the removal of Quantitative Restrictions on imports with respect to 714 items. This sector has also attracted the attention of investors both domestic and foreign and an investment as high as Rs. 30,000 million has been approved in the last six years of which foreign investment was around Rs. 7,000 million (Maya *et al.*, 2001). The infrastructure facility has been considerably enhanced after the European Union ban on Indian seafood. But the economic viability of this industry is still in doldrums. The industry will mature only when value-added products are exported rather than semi-finished raw material for value addition in the import countries.

The overall objectives of the proposed investigation is to study the export performance and potential of Indian marine products under the trade liberalised economy and explore the possible impacts of WTO agreements on the Indian fisheries sector.

DATA AND METHODOLOGY

The study was conducted during the period from April 2002 to August 2003. The study was based on the secondary data collected from various published governmental and non-governmental sources and the growth, instability, structure and direction of export, potentials and opportunities competitiveness were examined in order to ascertain the problems and impediments faced by the exporters of the marine products, using a pre-tested interview schedule collected primary data from 30 seafood exporters. The primary data on the seafood exporters were obtained to draw meaningful conclusions on the important problems and impediments in the export of marine products.

Analytical Framework

Analysis of Growth

Growth rate was used to measure the past performance of economic variables. It was used to find out the trend in the export of major marine products during pre- and post-liberalisation periods. The growth in quantity exported, export value and unit value realised from exports, were analysed by using the exponential growth function (Raveendaran and Aiyasamy, 1982; Chatfield, 1984; Jeromi and Ramanathan, 1993).

Decomposition Model

In order to find out the source of growth and variability in Indian marine products exports, the Hazell's (1982) decomposition model was employed. The export quantity and export unit values were first detrended using the linear relations of the form

$$z_t = a + b + e_t$$

where z_t denoted the dependent variable (export quantity and export unit value),
 t = time variable and

e_t = random variable residual with zero mean and variance σ^2 .

After detrending the data, the residuals were centered on the export mean export quantity and export unit value resulting in the detrended time-series data of the form:

$$z_t^* = e_t + z$$

where z = mean of export quantity/unit value

z_t^* = detrended export quantity or unit value

The detrended values were subjected to the following analysis:

$$EV = EQ \cdot EUV$$

where EV = The export value of marine products,

EQ = The export quantity of marine products,

EUV = The export unit value of marine products.

The variance of the Export Value ($V(EV)$) will be expressed as :

$$V(EV) = EQ^2 V(EUV) + EUV^2 V(EQ) + 2EQEUV \text{Cov}(EQ, EUV) - \text{Cov}(EQ, EUV)^2 + R$$

where, EQ and EUV = the mean export quantity and mean export unit value.

R = The residual term which is expected to be small.

The description of the variable considered for calculating component of change in average export value and component of change in variance of export value are given in Tables 1 and 2.

TABLE 1. COMPONENTS OF CHANGE IN AVERAGE EXPORT VALUE

Sr. No. (1)	Source of change (2)	Symbol (3)	Components of change (4)
1.	Change in mean export value	ΔEUV	$EQ, \Delta EUV$
2.	Change in mean export quantity	ΔEQ	$EUV, \Delta EQ$
3.	Interaction between changes in (1) and (2)	$\Delta EUV \Delta EQ$	$\Delta EUV \Delta EQ$
4.	Change in EQ-EUV covariance	$\Delta \text{Cov}(EQ, EUV)$	$\Delta \text{Cov}(EQ, EUV)$

TABLE 2. COMPONENTS OF CHANGE IN THE VARIANCE OF EXPORT VALUE

Source of change		Components of change	
Description (1)	(2)	Symbol (3)	(4)
1.	Change in mean EUV	ΔEUV	$2 EQ, \Delta EUV \text{Cov}(EQ_1, EUV_1) + ([2EUV_1 \Delta \Delta EUV] + (\Delta EUV)^2) V(EQ)$
2.	Change in mean EQ	ΔEQ	$2 EUV_1 \Delta EQ \text{Cov}(EQ_1, EUV_1) + [2EQ_1 \Delta EQ + (\Delta EQ)^2] V(EUV_1)$
3.	Change in EUV variance	$\Delta V(EUV)$	$(EQ_1)^2 \Delta V(EUV)$
4.	Change in EQ variance	$\Delta V(EQ)$	$(EUV_1)^2 \Delta V(EQ)$
5.	Interaction between changes in mean EUV and EQ	$\Delta EUV \Delta EQ$	$2\Delta EUV \Delta EQ \text{Cov}(EQ_1, EUV_1)$
6.	Changes in EQ-EUV covariance	$\Delta \text{Cov}(EQ, EUV)$	$[2 EQ_1 EUV_1 - 2 \text{Cov}(EQ_1, EUV_1)] \Delta \text{Cov}(EQ, EUV) - [\text{Cov}(EQ, EUV)]^2$
7.	Interaction between changes in mean EQ and EUV covariance	$\Delta EQ \Delta V(EUV)$	$[2EQ \Delta EQ - (\Delta EQ)^2] \Delta V(EUV)$
8.	Interaction between changes in mean EUV and EQ covariance	$\Delta EUV \Delta V(EQ)$	$[2EUV \Delta EUV - (\Delta EUV)^2] \Delta V(EQ)$

(Contd.)

TABLE 2. (Concl.)

(1)	Source of change		Components of change
	Description (2)	Symbol (3)	(4)
9.	Interaction between changes in mean EQ and EUV and changes in EQ_EUV covariances	$\Delta EUV \Delta EQ$ $\Delta Cov(EQ, EUV)$	$[2 EUV_1 \Delta EQ + 2 (EQ_1 \Delta EUV) + 2 \Delta EQ \Delta EUV] \Delta Cov(EQ, EUV)$
10.	Change in residual	ΔR	$\Delta V(EQ, EUV) - \text{Sum of other components}$

Export Instability

Instability in export is expected to hamper the process of economic development (Pradhan, 1988). This analysis was used to find out the fluctuations in the export of major marine products during pre- and post-liberalisation periods. To study the export instability, Coppock's instability index was used to estimate the variation in the export of major marine products.

Revealed Comparative Advantage Ratios

The concept of Revealed Comparative Advantage (RCA) was first developed by Balassa (1964). In Balassa's framework, RCA indices can be measured by the relative export share of a country in the world export of the individual commodity. In other words, the relative export share of a particular country can be quantified in the form of an index, which indicates the pattern of RCA in the trade of a particular commodity. RCA is the measure by the item's share in the country's export relative to its share in the world.

$$RCA = (X_{ij} / X_j) / (X_{iw} / X_{tw})$$

where X_{ij} is the value of the country i 's export of j -th commodity,

X_j is the total country's export,

X_{iw} is the value of the country's total exports to the world,

X_{tw} is the total world exports.

If $RCA > 1$, then the country has a revealed comparative advantage in that commodity.

If $RCA < 1$, then the country has a revealed comparative disadvantage in that commodity and

$RCA = 1$, comparative neutrality.

EVALUATION OF THE PROBLEMS IN EXPORT

Garette Ranking Technique

The Garette Ranking Technique was employed to rank the problems in fisheries exports as expressed by the exporters. The order of merit given by the exporters was transmitted into scores.

Rejection of Exports - Probit Model

In order to evaluate and identify the factors that influence the rejection of seafood export, Probit model was employed. Here the dependent variable (acceptance or rejection of export) is a dichotomous response variable taking a value of '1' or '0'. In exports where the acceptance occurs, $Y=0$ and if rejection $Y=1$. It is explained on the basis of utility theory or rational choice perspective on behaviour as Mc-Fadden (1981).

In this study a Probit model of the following form was employed for the estimation of acceptance or rejection of export.

$I_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6$
is conceptualised and estimated where :

- I_i = The unobservable utility index which determines the acceptance or rejection of export
- X_1 = Commodities exported (Number),
- X_2 = Capacity Utilisation (per cent),
- X_3 = Experience in exports (Number of years),
- X_4 = Destinations (Number),
- X_5 = Frequency of exports (Ranks),
- X_6 = Incidence of Alert (Dummy) 0-no alert, 1-alert.

Predicted probabilities are computed as $I_t = P_t = F(X_t' \beta)$.

The impact of a unit increase in an explanatory variable on the choice probability is obtained by estimating the marginal effect as follows.

The probit model: $(\partial P_t / \partial X_{kt}) = f(X_t' \beta) \beta_k$

The elasticity gives the percentage change in the choice probability in response to a percentage change in the explanatory variable. For the i -th coefficient this is estimated as

$$E_{kt} = (\partial P_t / \partial X_{kt}) (X_{kt} / F(X_t' \beta))$$

Export Growth of Marine Products - Commoditywise

Almost 99 per cent of the export quantity from India is sent in frozen form to the different destinations. In Table 3, the commodity-wise export of marine products indicated that the post-liberalisation period performed better than the pre-liberalisation period. But it was again found that the unit value realisation registered a negative growth rate of 6.16 per cent during the post-liberalisation period, when compared with the pre-liberalisation period. The export basket during the post-liberalisation was characterised by the dominance of low value fresh and frozen fishes compared to the high-valued species (shrimps and lobster) which resulted in the decreased growth of the unit value realisation. The important reasons for significant growth in frozen shrimp can be attributed to increased landings, higher price realisation and widened markets. Frozen lobster also registered in increased growth during both the periods, nevertheless the export growth during post-

liberalisation period lagged behind the pre-liberalisation period mainly due to reduced lobster landings and high domestic prices. Cephalopods, namely frozen squid and frozen cuttlefish, performed better during the pre-liberalisation period when compared with the post-liberalisation period. The reasons for the reduced export growth during post-liberalisation periods could be attributed to the EU ban and subsequent rejections on quality grounds due to antibiotic contaminants, microbial and bacterial residues. Fresh and frozen fish export - the largest quantity component registered higher growth rates during the post-liberalisation period on account of the enormous demand by the South East Asian countries. But the decline in unit value poses a threat as the fresh and frozen fish export to the South East Asian countries, mainly comprise of low value fin fishes which are being reprocessed with value addition and re exported. The most striking feature during the post-liberalisation period is the emergence of minor marine products like chilled, dried and live items with the highest value addition, generating a commodity diversification and wider export basket.

TABLE 3. EXPORT GROWTH OF INDIAN MARINE PRODUCTS (COMMODITYWISE)

Year (1)	Pre-liberalisation (1979-1990) (2)	Post-liberalisation (1991-2002) (3)
Total		
Quantity (tonnes)	3.49** (1.53)	8.29** (2.763)
Value (Rs.)	3.33* (1.50)	8.23** (2.58)
Unit Value (Rs.)	-0.15 (-0.10)	-6.16 (-0.04)
Frozen Shrimp		
Quantity (tonnes)	0.83 (0.80)	5.35** (2.67)
Value (Rs.)	1.95 (0.89)	7.93** (2.36)
Unit Value (Rs.)	1.11 (0.68)	2.45** (1.40)
Frozen Lobster		
Quantity (tonnes)	12.88** (2.94)	2.54 (0.64)
Value (Rs.)	16.05** (2.64)	4.97* (0.83)
Unit Value (Rs.)	2.80 (0.83)	2.36* (0.89)
Frozen Squid		
Quantity (tonnes)	27.26** (2.24)	4.54* (1.02)
Value (Rs.)	26.64** (2.04)	7.37* (1.02)
Unit Value (Rs.)	-0.48 (-0.15)	2.69* (0.90)
Frozen Cuttlefish		
Quantity (tonnes)	26.03** (3.62)	7.62** (1.58)
Value (Rs.)	26.64** (2.04)	7.04* (1.05)
Unit Value (Rs.)	0.48 (0.06)	-0.53 (-0.24)
Fresh and Frozen Fish		
Quantity (tonnes)	3.49 (0.41)	11.62** (2.29)
Value (Rs.)	8.18** (1.35)	9.59** (1.98)
Unit Value (Rs.)	4.52* (1.14)	-1.81* (-1.66)
Others		
Quantity (tonnes)	-5.45* (-0.90)	13.59** (1.80)
Value (Rs.)	-6.23* (-1.03)	27.44** (1.13)
Unit Value (Rs.)	-0.83 (-0.11)	12.19** (0.77)

Figures in parentheses indicate the standard errors of the estimates.

** and * Significant at 1 and 5 per cent level, respectively.

In general, the growth as a result of increased volume of export can be ascribed to the manifold increase in the marine fish production consequent to the introduction of the mechanisation and deep sea fishing. Also the gradual shifts in the preservation systems from dried and salt fish stage to frozen items to value added stage. Structural changes in the product composition, growth in the number of exporters, ports and infrastructure as the focal points and continuous improvement in quality standard and manifold promotional measures by MPEDA and other agencies had resulted in the increased growth.

Export of Marine Products - Marketwise

The analysis of the export growth rate indicated that exports to the United States showed impressive growth rate in terms of quantity, value and unit value during the post-liberalisation period with 8.17, 14.79 and 14.73 per cent respectively (Table 4). Incidentally it was during the post-liberalisation period (during April - October, 2002) that the United States emerged as the top most buyers of Indian marine products relegating Japan to the second position after a gap of three decades.

TABLE 4. EXPORT GROWTH OF INDIAN MARINE PRODUCTS (MARKETWISE)

Year (1)	Pre-liberalisation (1979-1990) (2)	Post-liberalisation (1991-2002) (3)
Total		
Quantity (tonnes)	3.49** (1.53)	8.29** (2.763)
Value (Rs.)	3.33* (1.50)	8.23** (2.58)
Unit value (Rs.)	-0.15 (-0.10)	-6.16 (-0.04)
Japan		
Quantity (tonnes)	-0.06 (-0.06)	3.73** (1.00)
Value (Rs.)	0.91** (0.45)	5.03* (1.02)
Unit value (Rs.)	0.97 (0.52)	1.25 (0.59)
USA		
Quantity (tonnes)	2.62 (0.75)	8.17** (3.57)
Value (Rs.)	3.36* (0.77)	14.79** (3.49)
Unit value (Rs.)	0.72 (0.51)	14.73** (3.48)
European Union		
Quantity (tonnes)	13.66** (1.61)	-0.66 (-0.17)
Value (Rs.)	11.26** (1.53)	0.97 (0.23)
Unit value (Rs.)	-2.11* (-1.08)	7.35** (2.06)
South East Asia		
Quantity (tonnes)	2.14** (0.42)	13.86** (2.04)
Value (Rs.)	4.23 (1.46)	12.54** (1.38)
Unit value (Rs.)	0.48* (0.31)	-1.15 (-0.31)
Middle East		
Quantity (tonnes)	3.42* (1.36)	5.19 (0.85)
Value (Rs.)	2.13 (0.73)	7.84 (0.82)
Unit value (Rs.)	1.24* (1.19)	2.51 (0.45)
Others		
Quantity (tonnes)	2.84 (0.45)	18.18** (1.52)
Value (Rs.)	6.07* (1.13)	24.39** (1.58)
Unit value (Rs.)	3.14 (0.63)	5.26** (1.55)

Figures in parentheses are the standard errors of the estimates.

** and * Significant at 1 and 5 per cent level, respectively.

South East Asia also registered higher growth rates during the post-liberalisation period in quantity and value even though the growth in unit value realisation reduced by 1.15 per cent. South East Asia happens to be the largest importer in terms of quantity, particularly fresh and frozen fish like pomfret, ribbon fishes, seer, mackerel, tuna and others. The higher export value, unit value realisation even at a decline in quantity in European Union indicated the quality consciousness and higher value for the premium products. It is of utmost significance that the European Union ban and rejection of consignments on quality grounds need to be looked upon.

The post-liberalisation period scenario of marine products export is heartening in the context of geographic diversification as more number of export market were destined thereby checking the volatility of exports. In general, the analysis of the export growth reveals that there is considerable improvement on the number of commodities and markets for the Indian marine products exports.

Decomposition Analysis of the Components of Change in the Average Export Value and Variance of Indian Marine Products

Decomposition analysis was done for decomposing the sources of growth on the average export value and variance of export value of Indian marine products. Also the decomposition of the sources of growth in average export value and variance of the export value was analysed for the major marine products like frozen shrimp, frozen lobster, frozen squid, frozen cuttlefish and fresh and frozen fish and the estimated results are furnished below.

The results of the decomposition analysis of the components of change in the average export value and variance of Indian marine products are furnished in Table 5 and 6. The components of changes in the export value of Indian marine products in terms of change in mean export quantity and mean export unit value and their variability besides the interaction effect were set out in Table 5.

TABLE 5. DECOMPOSITION ANALYSIS OF THE COMPONENTS OF CHANGE IN AVERAGE EXPORT VALUE OF INDIAN MARINE PRODUCTS

Sr.No. (1)	Source of change (2)	Percentage share (3)
1.	Change in Mean Export Unit Value	1.18
2.	Change in Mean Export Quantity	95.93
3.	Interaction between changes in (1) and (2)	3.03
4.	Change in EQ-EUV covariance	-0.13

The results indicated that the contribution of change in mean export quantity was the highest among the other components of change, i.e., the increase in mean export quantity accounted for 95.93 per cent of the increase in average export value. This was as expected because the export quantity had recorded significant higher growth rates during both the periods whereas the export unit value recorded a negative growth rate during the post-liberalisation period. The changes in the covariance

between the mean export quantity and mean export unit value accounted for 0.13 per cent decrease in the mean export value. The changes in the covariances could arise through the changes in the variance of export quantity and export unit value. With regard to interaction effect, the export quantity was benefited to a small extent (3.03 per cent) from both mean export quantity and mean export unit value. Among the various components, the contribution of change in mean export quantity of Indian marine products was the dominant source for the change in average export value followed by the interaction between changes in the mean export quantity and mean export unit value. The components of change that affected the stability of export value are shown in Table 6.

TABLE 6. DECOMPOSITION ANALYSIS OF THE COMPONENTS OF CHANGE IN THE VARIANCE OF EXPORT VALUE OF INDIAN MARINE PRODUCTS

Sr. No. (1)	Description (2)	Source of change in variance	Percentage share (3)
1.	Change in mean EUV		-0.12
2.	Change in mean EQ		26.23
3.	Change in EUV variance		0.06
4.	Change in EQ variance		79.83
5.	Interaction between changes in mean EUV and EQ		-0.34
6.	Change in EQ-EUV covariance		-4.32
7.	Interaction between changes in mean EQ and EUV covariance		0.66
8.	Interaction between changes in mean EUV and EQ covariance		5.11
9.	Interaction between changes in mean EQ and EUV and changes in EQ-EUV covariance		-11.53
10.	Change in residual		4.43

The change in the variability of export quantity accounted for 26.23 per cent in the variance of export value. The coefficient of variation was worked out at 18.05 per cent and 26 per cent respectively during the pre-liberalisation and post-liberalisation periods. The change in the variance of export quantity was the important source in increasing the export value variance to the extent of 79.83 per cent.

The change in the covariance between mean export quantity and mean export unit value was -4.32 per cent showing the variability effect of both the mean export quantity and mean export unit value reduced the instability of export value variance to a small extent thus generating a stabilising effect among all other components of change.

The effect of interaction term was also important in determining the stability of the export value and when added together contributed six per cent of the increase in the variance of total export value. The interaction terms arose in part from the change in mean export unit value and export quantity covariance and had induced a change in the behaviour of the exporters, which affected the mean or variance of the export quantity and had led to the instability of the export value.

Export Instability of Indian Marine Products - Commoditywise

The export performance of a market during a period was also measured based on the extent of variability or fluctuations in addition to the point of view of the increase in quantity, value and unit value. The results in Table 7 indicated that the degree of instability was more pronounced during the post-liberalisation period with 23.40, 27.94 and 16.82, respectively, in terms of quantity, value and unit value even though more growth was associated.

TABLE 7. INSTABILITY INDICES OF INDIAN MARINE PRODUCTS EXPORT (COMMODITYWISE)

Year	Pre-liberalisation (1979-1990)	Post-liberalisation (1991-2002)
(1)	(2)	(3)
Total		
Quantity (tonnes)	12.57	23.40
Value (Rs.)	16.28	27.94
Unit value (Rs.)	10.23	16.29
Frozen shrimp		
Quantity (tonnes)	7.28	11.60
Value (Rs.)	17.51	23.67
Unit value (Rs.)	12.11	15.81
Frozen lobster		
Quantity (tonnes)	28.80	14.18
Value (Rs.)	39.90	40.15
Unit value (Rs.)	22.54	27.93
Frozen squid		
Quantity (tonnes)	63.24	19.30
Value (Rs.)	63.00	74.30
Unit value (Rs.)	27.80	69.64
Frozen cuttlefish		
Quantity (tonnes)	37.39	15.40
Value (Rs.)	62.96	33.56
Unit value (Rs.)	58.28	21.77
Fresh and frozen fish		
Quantity (tonnes)	61.19	31.64
Value (Rs.)	37.15	35.30
Unit value (Rs.)	27.57	16.91
Others		
Quantity (tonnes)	42.17	48.33
Value (Rs.)	57.09	235.57
Unit value (Rs.)	77.60	154.61

Frozen shrimp registered higher export quantity variation (11.60 per cent) during post-liberalisation period when compared with pre-liberalisation period (7.28 per cent) suggesting that there exist severe competition among the different exporters and the exports are very much responsive to the prices. In addition, the essentiality of a buyers market and lesser number of importers paved the way for higher instability. Contrary to the instability behaviour of frozen shrimp, there existed a lower degree of export quantity variation with respect to frozen squid, frozen cuttlefish and fresh and frozen fish. The widening of European Union domain and trading with South East Asian countries seemed to generate lesser instability. The category "Others", a new

constraint in the export basket posed the highest degree of instability cautioning the need for regularising the commodity for export. Thus, it could be noted that the post-liberalisation period generated a higher degree of instability for frozen shrimp, frozen lobster and others whereas a lesser degree of instability was noticed for frozen squid, frozen cuttlefish and fresh and frozen fish. The analysis suggested the need for diversification of commodities, which would reduce the degree of instability.

Export Instability of Indian Marine Products - Marketwise

The results in Table 8 indicated that the post-liberalisation period produced a higher degree of instability when compare to the pre-liberalisation period. Japan, a more stable market during the pre-liberalisation period increased its volatility in the post-liberalisation period as indicated by the instability index in quantity and value with a marginal decrease in the instability index of unit value. U.S.A. on the other hand, became lesser volatile during the post-liberalisation period for quantity, value except for the unit value. The major markets that have gained considerable reduction in the instability of Indian export were that of European Union which had a lesser

TABLE 8. INSTABILITY INDICES OF INDIAN MARINE PRODUCTS EXPORT (MARKETWISE)

Year (1)	Pre-liberalisation (1979-1990) (2)	Post-liberalisation (1991-2002) (3)
Total		
Quantity (tonnes)	12.57	23.40
Value (Rs.)	16.28	17.75
Unit value (Rs.)	10.23	16.29
Japan		
Quantity (tonnes)	7.43	18.04
Value (Rs.)	16.43	24.02
Unit value (Rs.)	13.73	11.06
USA		
Quantity (tonnes)	27.81	17.96
Value (Rs.)	36.84	29.73
Unit value (Rs.)	9.79	13.78
European Union		
Quantity (tonnes)	36.30	21.09
Value (Rs.)	34.84	22.22
Unit value (Rs.)	12.79	5.89
South East Asia		
Quantity (tonnes)	18.53	33.35
Value (Rs.)	28.21	46.71
Unit value (Rs.)	10.56	22.27
Middle East		
Quantity (tonnes)	24.32	36.93
Value (Rs.)	36.52	98.61
Unit value (Rs.)	17.52	58.59
Others		
Quantity (tonnes)	54.38	60.47
Value (Rs.)	51.02	75.51
Unit value (Rs.)	32.90	20.30

instability in all the export parameters. This had been possible due to the widening of the European Union and preferential export with respect to quantity and premium products. The South East Asia and Middle East markets even though had generated a significant growth in export, there existed an alarming rate of volatility.

Factors Affecting the Instability of Marine Products Export

In order to ascertain the factors affecting the export instability, Cobb-Douglas production function with export instability as the dependent variable and geographic concentration, commodity concentration, exchange rate, fish production and share of world import of Indian fisheries export as the independent variable was estimated. The results in Table 9 revealed that the commodity concentration, geographic concentration and share of world import were the major causal factors for the export instability during the pre-liberalisation period. The commodity concentration, geographic concentration and share of world import were negatively associated with the instability. The results indicated that one per cent increase in the commodity concentration, geographic concentration and share of world import would decrease the export instability by 26.7 per cent (one per cent level of significance), 6.91 per cent (five per cent level of significance) and 0.02 per cent (one per cent level of significance) respectively, thus, it was evident that the increase in the commodity concentration, geographic concentration and share of world import would reduce the export instability.

TABLE 9. FACTORS AFFECTING THE INSTABILITY IN EXPORTS

Parameters	Pre-liberalisation (1979-1990)		Post-liberalisation (1991-2002)	
	Coefficients (2)	Mean values (3)	Coefficients (4)	Mean values (5)
Intercept	60.032* (11.795)	-	15.542 (11.039)	-
GCON (per cent)	-6.917 (6.691)	55.01	-5.467** (13.851)	43.35
CCON (per cent)	-26.705* (13.757)	65.68	-3.852 (10.745)	57.46
EXRT (US \$)	-0.356 (0.226)	11.77	-0.480* (0.129)	35.91
SHIE (per cent)	0.640 (1.281)	1.89	-0.766 (1.555)	2.10
WOIM (million \$)	-0.020** (0.000)	22,869.28	0.024 (0.218)	50.39

N = 12, R² = 0.86; ** and * Significant at 1 and 5 per cent level, respectively.

where,

EINX = Export instability index,
CCON = Commodity concentration,
WOIM = World import,

GCON = Geographic concentration,
EXRT = Exchange rate,
SHIE = Share of Indian fish export.

During the post-liberalisation period, geographic concentration, commodity concentration and exchange rate were the important factors in determining the export instability. A one per cent increase in the geographic concentration and commodity concentration would reduce the export instability by 5.46 and 3.85 per cent respectively at five per cent level of significance. Increase in exchange rate leads to a depreciation of domestic currency, which will result in an increase in export earnings, and hence, it will have a positive influence in export instability. A one per cent increase in the exchange rate would increase the export instability by 0.48 per cent at one per cent level of significance. The above two regression analyses revealed the prime importance of geographic concentration and commodity concentration in reducing the export instability.

Revealed Comparative Advantage of Indian Fisheries Export

The Revealed Comparative Advantages of Indian Fisheries Export indicated the measure by which the Indian fisheries export share in the total Indian export relative to the share in the world. The results of the Revealed Comparative Advantage (RCA) of Indian fisheries export during the pre-liberalisation and post-liberalisation periods are given in Table 10. It was found that the RCA of Indian fisheries export was 2.31 during the post-liberalisation when compared with 1.85 during the pre-liberalisation period. The RCA suggested that the share of Indian fisheries to the total Indian export was more when compared with the share of world fish export to the world total exports the analysis also suggested the better performance of Indian fisheries export with respect to the world fisheries export.

TABLE 10. REVEALED COMPARATIVE ADVANTAGE OF INDIAN MARINE PRODUCTS

Sr. No.	Year	Share of fish export to total Indian exports	Share of Indian exports to world exports	RCA
(1)	(2)	(3)	(4)	(5)
1.	1979	4.19	0.85	1.99
2.	1985	3.20	0.54	1.72
3.	1990	2.96	0.55	1.63
4.	1996	3.74	1.04	2.33
5.	2002	3.25	1.09	2.12
6.	1979-1990 (Average)	3.61	1.03	1.85
7.	1991-2002 (Average)	3.85	1.11	2.31

It is also significant to note that the share of fish export to total Indian export was also on the increase from 3.61 per cent during pre-liberalisation when compared to 3.85 per cent in the post-liberalisation. Nevertheless, it is cautioning to note that the RCA during 2002 was 2.12 when compared with 2.33 in 1996 suggesting that the competition from world exporters especially South East Asia was on the rise and poses serious threats in the future.

PROBLEMS IN FISHERIES EXPORT - GARETTE RANKING TECHNIQUE

The important problems were ranked by the exporters, and on the basis of the ranks assigned. The results in Table 11 indicated that the high cost of investment, scarcity of raw material, dictatorship of the buyers and the low capacity utilisation were the major problems encountered in the fisheries export. The additional cost of investment required for the processing plant in view of the European Union guidelines and approval necessitated an exorbitant investment. Raw material shortage was acute with cut-throat competition among the exporters. Due to the non-availability of raw material there was low capacity utilisation with an average capacity utilisation of less than 20 per cent of the installed capacity. The absence of domestic demand coupled with the premium prices in the international market makes the products disposal at the whims and fancies of the buyers' market (the importers).

TABLE 11. ANALYSIS OF THE PROBLEMS IN MARINE PRODUCTS EXPORT - GARETTE RANKING TECHNIQUE

Sr. No. (1)	Reason (2)	Mean score (3)	Rank (4)
1.	High cost of investment	53.871	II
2.	Scarcity of raw material	55.905	I
3.	Dictatorship buyers	51.038	VII
4.	Low capacity utilisation	53.638	III
5.	Cut-throat competition among exporters	48.071	VIII
6.	Uncertainty in prices	52.755	IV
7.	Lack of market and product information	52.388	VI
8.	Higher cost of production and low margin of profit	52.487	V
9.	Lack of research and development	30.171	IX

Note: Garette ranking Present position =
$$\frac{100 (R_{ij} - 0.05)}{N_j}$$

The presence of such a buyers' market creates a dictatorship among the buyers in deciding the guidelines, quality criteria's and subsequent rejections. Uncertainty in prices with a global economic recession, drastic decline in price realisation, lack of market and product information, higher cost of production and low margin of profit were also found important in determining the export problems.

Factors Affecting the Rejection of Fish Export – Probit Analysis

There were considerable rejections of consignments from the different importing markets on account of the bacterial metabolites, antibiotic and microbial residues during the past years. These rejections occurred mostly from the countries in the European Union, with Spain, Norway, Italy, Greece and Netherlands leading the list. Even the incidence of antibiotics and growth inhibiting substances had been detected in consignments to United States and Japan. The species that were rejected mostly include frozen shrimps and cephalopods. The probit analysis on the factors affecting the rejection of fish exports is furnished in Table 12. The probit analysis estimates

indicated the negative association of the experience in years and the number of commodities with the rejection of exports at five per cent level of significance.

TABLE 12. FACTORS AFFECTING THE REJECTIONS OF FISH EXPORTS – PROBIT ANALYSIS

Sr. No. (1)	Parameter (2)	Coefficient (3)	Standard error (4)
1.	CONSTANT	-0.772	1.442
2.	Experience in exports (EXPR)	-0.045*	0.027
3.	Capacity utilisation (UTIL)	-0.049	0.069
4.	Commodities exported (COMN)	-0.088*	0.050
5.	Destinations (DEST)	0.166	0.286
6.	Frequency of exports (FREQ)	0.854	0.575
7.	Incidence of Alert (ALER)	1.338**	0.09

** and * indicates 1 and 5 per cent level of significance.

The positive association of the incidence of alert with the rejection indicated that 10 per cent increase in the incidence of alert would increase the probability of rejection by 13.4 per cent at one per cent level of significance, *ceteris paribus* from the mean level of elasticities. Also increase in the experience in years and increase in the number of commodities would decrease the probability of rejection.

The details on the prediction success of factors causing the rejection of exports through the Probit analysis are presented in Table 13. It could be observed from the table that the number of right predictions for the probability of export rejection was 24 out of 30 and the percentage of right prediction was worked out to be 80 per cent. This confirms the fact that the probit function was a good fit for this type of analysis and prediction.

TABLE 13. THE PROBABILITY OF REJECTION AND ACCEPTANCE PREDICTION - PROBIT ANALYSIS

Choice (1)	Actual		Total (4)	Right prediction	
	0 (2)	1 (3)		Number (5)	Percentage (6)
Predicted 0	19	1	20	19	63.3
Predicted 1	5	5	10	5	16.7
Total	24	6	30	24	80

CONCLUSIONS

Based on the findings of the study, the following conclusions have been drawn:

- The export growth estimates for the commodities indicated that there was significant growth in the export quantity, value and unit value for the major marine products with the emergence of new commodities for export, even though there exists concerns of decreasing unit value realisation.

- The decomposition analysis of the Indian marine products export earnings indicated that, the revenue had been generated primarily from the changes in the export quantities and interaction between the export quantity and export value with no sizeable contribution and realisation from the unit value.

- The post-liberalisation period generated a higher degree of instability for frozen shrimp, frozen lobster and others whereas a lesser degree of instability was noticed for frozen squid, frozen cuttlefish and fresh and frozen fish; and with regard to the markets, Japan, South East Asia and Middle East exhibited higher degree of instability when compared with the pre-liberalisation. In general, the results indicated that the post-liberalisation period produced a higher degree of instability when compared to the pre-liberalisation period.

- The revealed comparative advantage analysis suggested that the share of Indian fisheries to the total Indian export was more when compared with the share of world fish export to the world total exports. The analysis suggested the better performance of Indian fisheries export with respect to the world fisheries export.

- The competitiveness of the major marine products except for shrimp has decreased during the post-liberalisation period when compared with the pre-liberalisation period. The rejection from European Union on account of the microbial, antibiotic and bacterial residues, quality issues and higher domestic demand threatens the competitiveness of squid, cuttlefish and pomfrets.

- High cost of investment, scarcity of raw material, dictatorship of the buyers and the low capacity utilisation were the major problems encountered in the fisheries export.

- Even with rising export there are issues of rejection of consignments from the importing countries on account of quality concerns. The export market, essentially buyers market exercises control over the exporters which resulted in rejection of consignments during the past years.

- Experience, commodity diversification and incidence of alert were found to be the most pertinent factors in determining the incidence of rejection of export consignment. Experience, commodity diversification was found to be negatively associated whereas the incidence was found to have a positive association with rejection base upon the Probit analysis estimates.

POLICY GUIDELINES

Based on the results of the study, the following strategies are recommended for the major marine products:

- Indian fisheries export at aggregate level is highly responsive to international prices. There is a need for an export stabilisation fund to support the export. Resources for this can be mobilised by putting appropriate tariff on export when the international prices are high.

- External liberalisation may not produce good impact if domestic reforms by way of removal of excessive and unnecessary government controls, rationalisation of domestic policies, incentives to the exporters, etc. are not undertaken.

- Building infrastructure is also important to improve production efficiency. Existing infrastructure facilities for promoting seafood export need to be improved.

- Indian seafood, which is often been subjected to allegations of poor quality standards and rejection of consignments requires a well conceived export marketing plan. In order to curb these externalities, the acceptance of the Hazard Analysis and Critical Control Points (HACCP) guidelines may facilitate Indian seafood conforming to international quality standards.

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