

RESEARCH PAPER

Market composition and direction of trade of marine products exports from India

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ABSTRACT

India is a major supplier of marine products in the world. Marine products are major contributor in the Indian agricultural exports as a whole. In the financial year 2014-15 the marine products exports accounted for 14.54 % (Rs. 33441.61 crore) of the total agricultural exports (Rs. 2,29,996 crore) which shows the increasing importance of marine products exports in the total Indian agricultural exports portfolio. The present study aims to explore the market composition and direction of trade of marine products exports from India. The yearly data on export quantity, value and US \$ terms have been compiled from Marine Products Export Development Authority (MPEDA) website for a period of 14 years (2001-02 to 2014-15) and being analysed with appropriate tools. The results showed that Japan, USA, European Union, China, South East Asia and Middle East are the major destinations for Indian marine products South East Asia was the largest market for Indian marine products. Whereas, USA claimed the largest share in terms of the value of exported commodities because of high valued marine products. Japan has reported to be the most unstable destination as far as Indian marine product exports are concerned whereas it used to be a major exports destination for Indian marine products in recent past. The decrease in exports to countries like Japan and China may be related to the inadequate infrastructure, processing, packaging and grading facilities and lack of proper attention towards hygienic practices. Therefore, an increasing need for compliance to SPS measures has been realised for which conscious efforts and investment in raising our compliance standards are inevitable.

KEY WORDS : Market composition, Direction of trade, Marine products, Major supplier

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Fishing in India is a major industry employing over 14 million people. India has 8,118 kilometers of marine coastline, 3,827 fishing villages, and 1,914

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traditional fish landing centers. Fish production in India has increased more than tenfold since its independence. The marine fish harvested in India consist of about 65 commercially important species/groups. India is a major supplier of fish in the world. Marine products are major contributor in the Indian agricultural exports as a whole. In the financial year 2014-15 the marine products exports accounted for 14.54 % (Rs. 33441.61 crore) of the total agricultural exports (Rs. 2,29,996 crore) which shows the increasing importance of marine

products exports in the total Indian agricultural exports portfolio Whereas the share of agricultural exports in total exports of the country decreased from 13.46 % in 2012-13 to 12.16% in 2014-15. The exports of marine products reached an all time high of \$5511.12 million.

METHODOLOGY

The study has been undertaken on a macro framework based on secondary data regarding marine products exports from India. The yearly data on export quantity, value and US \$ terms have been compiled from Marine Products Export Development Authority (MPEDA) website for a period of 14 years (2001-02 to 2014-15). To fulfill the specific objective of the study based on the nature and extent of availability of data, the following analytical tools and techniques were adopted.

Analysis of growth rate :

Growth rates for export of selected commodities in terms of value were computed for a period of 14 years from 2001-02 to 2014-15. Exponential growth model was selected for the analysis and the model is of the following form.

$$Y = a b^t e_t \quad (1)$$

where,

Y = Dependent variable for which growth rate is estimated

a = Intercept

b = Regression co-efficient

t = Time variable

e = Error term

The compound growth rate was obtained for the logarithmic form of the eq. (1) as below:

$$\ln Y = \ln a + t \ln b \quad (2)$$

where $\ln Y$ is natural logarithm of Y, $\ln a$ and $\ln b$ are similarly defined.

The compound growth rate 'r' was computed by using the relationship

$$r = (\text{Antilog of } \ln b) \times 100$$

$$\text{where } \ln b = \frac{\sum(t \ln Y) - (\sum t \sum \ln Y) / n}{\sum t^2 - (\sum t)^2 / n}$$

and n is number of times points

The significance of $\ln b$ was tested by t-ratio.

$$t = \frac{|\ln b|}{SE(\ln b)}$$

where $SE(\ln b) = (SS_{\ln Y} (\ln Y)^2 SS_t) / ((n-2) SS_t)$

where, $SS_{\ln Y} = \sum (\ln Y)^2 - (\sum \ln Y)^2 / n$

The critical value is t- table value for n-2 degrees of freedom.

Markov chain analysis :

Annual export data for the period 2001-2015 were used to analyze the direction of trade and changing pattern of exports of selected Indian commodities. Top destinations were considered for the analysis.

The trade directions of commodities exports were analyzed using the first order Markov chain approach. Central to Markov chain analysis is the estimation of the transitional probability matrix P. The elements P_{ij} of the matrix P indicates the probability that export will switch from country i to country j with the passage of time. The diagonal elements of the matrix measure the probability that the export share of a country will be retained. Hence, an examination of the diagonal elements indicates the loyalty of an importing country to a particular country's exports.

In the context of the current application, structural changes were treated as a random process with selected importing countries. The average exports to a particular country was considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically as

$$E_{jt} = \sum_{i=1}^r P_{ij} E_{it-1} + e_{jt}$$

where,

E_{jt} = Exports from India to jth country during the year t.

E_{it-1} = Exports to ith country during the period t-1.

P_{ij} = Probability that the exports will shift from ith country to jth country.

e_{jt} = The error term which is statistically independent of E_{it-1} .

t = Number of years considered for the analysis

r = Number of importing countries

The transitional probabilities P_{ij} which can be arranged in a (c * r) matrix have the following properties.

$$0 \leq P_{ij} \leq 1$$

$$\sum_{i=1}^r P_{ij} = 1 \text{ for all } i$$

Thus, the expected export shares of each country during period 't' were obtained by multiplying the export to these countries in the previous period (t-1) with the transitional probability matrix.

There are several approaches to estimate the

transitional probabilities of the Markov chain model such as un weighted restricted least squares, weighted restricted least squares, Bayesian maximum likelihood, unrestricted least squares, etc. In the present study, Minimum Absolute Deviations (MAD) estimation procedure was employed to estimate the transitional probability, which minimizes the sum of absolute deviations. The conventional linear programming technique was used, as this satisfies the properties of transitional probabilities of non-negativity restrictions and row sum constraints in estimation.

The linear programming formulation is stated as

$$\text{Min } OP^* + Ie$$

Subject to,

$$XP^* + V = Y$$

$$z \quad GP^* = 1$$

$$P^* \geq 0$$

where,

0 - is the vector of zeroes.

P* - is the vector in which probability P_{ij} are arranged.

I - is an apparently dimensioned vector of area.

E - is a vector of absolute error.

Y - is the vector of export to each country.

X - is the block diagonal matrix of lagged values of Y

V - is the vector of errors

G - is the grouping matrix to add the row elements of P arranged in P* To unity

Using the estimated transitional probabilities, the exports of commodities to various destinations were predicted by multiplying the same with the respective shares of base year. The values in the transitional probabilities matrix will have different interpretations. The value of diagonal elements indicates the probability of retention of the previous year values, while values in columns reveals probability of gain of a particular country

from other countries, values in rows reveals probability that a country might lose to their countries in respect of a specific commodity exports.

ANALYSIS AND DISCUSSION

Marine products crossed all previous records in quantity (10,51,243MT), Rupee value (Rs. 33441.61) and USD terms (\$5511.12 million). Compared to the previous year, seafood exports recorded a growth of 6.86% in quantity, 10.69% in rupee and 10.05% growth in US dollar earnings.

South East Asia was the largest market for Indian marine products during 2014-15. Around 39 per cent of the total exported quantity of marine products from India found market in various South East Asian countries (Table 1). However, it is interesting to note that, USA claimed the largest share in terms of the value of exported commodities. This clearly indicates that, even though a huge bulk of exports is directed towards South East Asia, they are mostly low value products. Most of the high value products are exported to USA followed by EU mainly because of higher purchasing power of the consumers in these developed economies.

An overall increasing trend was noticed in marine products exports from India for the study period. South East Asia was the major growth centre in Quantity (21.57 %) and Value terms (26.04 %) registering nearly one fourth times increase in exports. A negative growth rate in quantity was observed in exports destined to China. Growth trends of exports towards USA and EU was also notable as there is high growth rate in value terms compared to growth in quantity terms. Exports to South East Asian countries registered the maximum growth (23.85%) followed by Middle East (18.23%) and European Union (11.32%) in US \$ terms (Table 2).

South East Asia was the most stable market for Indian marine products whereas Japan was reported to

Table 1 : Marine exports the major destinations in the financial year 2014-15

Market	Quantity in Ton	Value in Rs. crore	US million dollar	Share (%)		
				Quantity	Value in crore	US million dollar
Japan	78772	3040.3	502.3	7.5	9.1	9.1
USA	129667	8830.1	1458.2	12.3	26.4	26.5
European Union	188031	6715.6	1106.7	17.9	20.1	20.1
China	59519	1349.0	221.4	5.7	4.0	4.0
South East Asia	409931	8620.9	1416.8	39.0	25.8	25.7
Middle East	64608	2020.9	333.1	6.1	6.0	6.0
Others	120716	2864.9	472.6	11.5	8.6	8.6
Total	1051243	33441.6	5511.1	100.0	100.0	100.0

Table 2 : Market wise growth in India's marine products exports for the period 2001-02 to 2014-15 (CAGR %)

Market	Quantity in ton	Value in Rs. crore	US million dollar
Japan	2.78	5.07	3.36
USA	5.63	11.83	9.97
European Union	5.70	13.24	11.32
China	-5.47	8.38	6.46
South East Asia	21.57	26.04	23.85
Middle East	11.00	20.20	18.23
Others	16.39	19.15	17.15
Total	7.85	13.80	11.87

Table 3 : Transitional probability matrix of marine products exports (Quantity in Tons) from India for the period 2001-2015

Country	Japan	USA	EU	China	SE ASIA	Others
Japan	0.57	0.11	0.00	0.32	0.00	0.00
USA	0.04	0.69	0.27	0.00	0.00	0.00
EU	0.03	0.00	0.77	0.00	0.00	0.20
China	0.11	0.00	0.11	0.77	0.00	0.00
SE ASIA	0.01	0.08	0.00	0.00	0.82	0.08
Others	0.00	0.00	0.00	0.00	0.41	0.59

be highly unstable as reflected by its lowest transitional probability value. South East Asia retained 82 per cent of its previous market share. It gained 41 per cent share from other destinations. European Union retained 77 per cent of its previous market share losing 20 per cent of its market share to other countries and gaining 27 per cent and 11 per cent of market share from USA and China, respectively. Japan was reported to be the most unstable destination as it retained merely 57 per cent of its previous market share losing major market share to China (32%) and USA (11%) (Table 3).

Conclusion :

Various aspects regarding India's exports of marine products have been investigated in this paper. Among the various agricultural commodities marine products hold a prime status. The primary destinations are South East Asia, USA and European Union. Japan has reported to be the most unstable destination as far as Indian marine product exports are concerned whereas it used to be a major exports destination for Indian marine products in recent past. The decrease in exports to countries like Japan and China may be related to the inadequate infrastructure, processing, packaging and grading facilities and lack of proper attention towards hygienic practices. Therefore, an increasing need for compliance to SPS measures has been realised for which conscious

efforts and investment in raising our compliance standards are inevitable. In addition, as the marine products contribute a major share in total Indian agri exports, there is an immediate need to take up awareness generation campaigns among the fishermen and exporters on GMP, GHP and Code of Conduct on Responsible Fisheries in order to produce the exportable quality of marine products and thereby increasing the exports.

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