Export of Onion from India and its Destination Pattern: An Empirical Analysis

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ABSTRACT

The purpose of this paper is to provide an overview of export of onion from India and its destination patters. Horticulture has emerged as a core sector in agriculture passing through various phases with coverage of nearly 22.25 million hectares encompassing a wide variety of crops, vegetables, root and tuber crops, mushroom, ornamental, medicinal and aromatic plants, nuts, plantation crops including coconut and oil palm. The study was based on secondary data. The data pertaining to the objectives of the study was collected from the National Horticulture Board (NHB), Agricultural & Processed Food Products Export Development Authority (APEDA), Food and Agriculture Organization (www.fao.org), Department of commerce, Govt. of India (www.commerce. nic.in) and Codex Alimentarius (www.codexalimentarius.org). Onion is an important vegetable crop in India. India is second largest onion producer in world after China. Pakistan is the fourth largest Onion producer in the world and also it is competitor to India in the International Market. Onion accounts for 25 per cent share in total horticultural products exports from India. Onion export has increased over the period of study.

Keywords: Export of onion, Destination of onions, Horticulture crops, vegetable crops

Although the share of the agriculture and allied sector in the country's GDP is declining, a trend that is expected in the development process of any economy, agriculture yet forms the backbone of development. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. There has been a phenomenal increase in area, production and productivity during 2001-02 to 2011-12 amounting to 34 per cent, 70 per cent and 26 per cent, respectively. With the growth trend, horticulture is expected to play a dominant role in the overall development of agriculture in the country in the coming years. The cultivation of horticultural crops, especially fruits and vegetables, plays a vital role in the prosperity of the nation and is directly linked with the health and happiness of its people and constitute about 92 per cent of the total horticultural production in the country (***Source:*** State of Indian agriculture 2011-12). Within horticulture, vegetable is a very important produce, which occupies 8.49 million hectare with a total production of 149.61 million tonnes having a productivity of 17.42 tonnes per hectare (2011-12). India is the second largest producer of vegetable after china having a share of 14 per cent in world vegetable production and is a leader in the production of peas and okra.

Besides, India occupies the second position in the production of brinjal, cabbage, cauliflower, onion, potato and is third in tomato production in the world. The vast production base offers India tremendous opportunities for export. During 2011-12, India exported fruits and vegetables worth ₹ 4801.29 crores which comprised of fruits worth ₹ 1779.49 crores and vegetables worth ₹ 3021.74 crores. The emphasis on horticulture is recognition of the need for attaining nutritional security and also for a sustainable income. There has been significant improvement in the export of horticultural produce. Onion, Okra, Bitter Gourd, Green Chilles, Mushrooms and Potatoes contribute largely to the vegetable export basket. The increased globalization and liberalization of international markets, facilitated by both bilateral trade agreements and the WTO, are opening new export markets for Indian agricultural products, both fresh and processed. Rapid technological advances in real time communication and transport domestically and internationally further facilitate these international linkages. Despite being one of the major horticultural producers in the world, India is the small player in the global horticultural export trade. Keeping the above view, the following objectives were the study:—

1. To analyze the growth in export of onion.
2. To examine the pattern of export destination of onion.

Onion (*Allium cepa* L) is extremely important vegetable crop not only for internal consumption but also as highest foreign exchange earner among the fruits and vegetables. It occupies an area of 1064 thousand ha, with production of 15118 thousand tons. India is the 2nd largest producer of onion, in the world next only to China but the productivity of onion in India is very low i.e., 14.21 tons/ ha as compared to China and other countries like, Egypt, Netherlands, & Iran etc. Maximum onion production takes place in Maharashtra (4905.0 thousand tons) state followed by Karnataka (2592.2 thousand tons), Gujarat (1514.1 thousand tons.), Bihar (1082.0 thousand tons.), Madhya Pradesh (1021.5 thousand tons.) and Andhra Pradesh (812.6 thousand tons). In Rajasthan, Haryana and Uttar Pradesh it is grown to some extent i.e. 494.2, 453.9 and 368.6 thousand tons respectively. The export of onion during 2011 -12 was 13, 09,863.26 thousand tons with a value of ₹ 1,722.85 crore.

Research Methodology

The study is confined to the Republic of India. Vegetable crops onions were selected for the study. The database includes the secondary data for the period from 1991-92 to 2011-12. The data were collected from National Horticulture Board (NHB), Agricultural & Processed Food Products Export Development Authority (APEDA), Food and Agriculture Organization (www.fao.org), Department of commerce, Govt. of India (www. commerce.nic.in), Codex Alimentarius (www. codexalimentarius.org).

Exponential growth function was used to study the growth in volume, value and price of export of major fruits and vegetables. Markov chain analysis was employed to examine the direction of exports. MRLs in selected fruits and vegetables across the countries were compared to examine the different SPS specifications in different countries.

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To analyse the growth in exports of onions in India, national level data will be collected for the period from 1990-91 to 2011-12 and to examine the pattern of export destination of onions, country wise data will be collected for the period from 2006-07 to 2011-12.

To fulfil the first objective i.e., to analyse the growth in export of onion, compound growth rate was calculated. Compound growth rate is worked out to examine the tendency of variable to increase, decrease or stagnant over a period of time. Growth rate of exports of onions were computed for a period of 22 years from 1990-91 to 2011-12.

In the present study, compound growth rates of exports of onions from the country will be estimated

by using the exponential growth function (Angles, 2001) of the form,

$$Yt = a\, b^t\, U^t \qquad \dots(1)$$

Where,

Yt = Dependent variable for which growth rate was estimated (quantity, value and unit value of spices exported in year 't').

a = Intercept

b = Regression coefficient

t = Year which takes values 1, 2, …, n.

U_t = Disturbance term in year 't'.

The equation (1) will be transformed into log-linear and written as—

$$log\, Y_t = log\, a + t\, log\, b + log\, U_t \qquad \dots(2)$$

Equation (2) will be estimated by using Ordinary Least Square (OLS) technique.

The compound growth rate (g) will be then estimated by the identity given in equation (3)—

$$g = (b{-}1) \times 100 \qquad \dots(3)$$

Where,

g = Estimated compound growth rate per annum in percentage.

b = Antilog of log b

Markov chain analysis

For fulfilment of second objective i.e., to examine the pattern of export destination of selected vegetable, markov chain analysis were done. Annual export data for the period 2006-07 to 2011-12 were used to analyse the direction of trade and changing pattern of exports of selected vegetable crop.

The trade directions of commodities exports were analysed 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 eight 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—

$$E_{jt} = \sum_{i=1}^{r} E_{it-1} * P_{ij} + e_{jt} \qquad \dots(4)$$

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—

$$O \le P_{ij} \le$$

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

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 unweighted 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—

$Min\ OP^* + Ie$

Subject to,

$XP^* + V = Y$

$z\ GP^* = 1$

$P^* \geq 0$

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 (1 U 1).

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.

RESULTS AND DISCUSSION

Export growth performance of onions from India

It is evident from table 1 that onions registered a significant and positive growth rate of 8.89 per cent per annum in terms of volume of exports. In terms of export value onions showed significant growth rate of 14.18 per cent per annum. It showed growth rate of 5.29 per cent per annum in export price.

Onion is an important vegetable crop in India. India is second largest onion producer in world after China. Pakistan is the fourth largest Onion producer in the world and also it is competitor to India in the International Market. Onion accounts for 25 per cent share in total horticultural products exports from India. Onion export has increased over the period of study.

Table 1: Growth rate in the export of Onions

| Items	Particulars	Study periods 1991-92 to 2011-12
Export quantity	f- value	50.85
	R^2	0.728
	Growth rate	08.89
Export value	f- value	160.88
	R^2	0.8944
	Growth rate	14.18
Export price	f- value	102.69
	R^2	0.8441
	Growth rate	05.29

The direction of trade of vegetables to different importing countries for the period 2006-07 to 2011-12 was studied by estimating the transitional probability matrix using the Markov chain framework.

The diagonal elements in a transitional probability matrix provide the information on the probability of retention of the trade. The row elements indicate the probability of loss in trade on account of competing countries and the column elements indicate the probability of gain in trade from other competing countries.

It is evident from the table 2 that Bangladesh was the one of the most stable market among the major importers of onion from India as reflected by high probability of retention of 0.2791, i.e. the probability that Bangladesh retains its share over the study period was 27.91 per cent. Thus, Bangladesh was most stable and loyal market for onions from India. Similar results were observed by Vaishali (2010) while studying export among SAARC countries for the period of 2001-02 to 2008-09.Malaysia retains a share of 14.41 per cent while Pakistan, Sri Lanka and UAE lost its share completely to other countries.

Table 2: Transitional probability matrix of onion export, 2006-07 to 2011-12

Major country	Bangladesh	Malaysia	Others	Pakistan	Sri Lanka	UAE
Bangladesh	**0.2791**	0	0.0465	0	0.6744	0
Malaysia	0	**0.1441**	0	0	0.4746	0.3813
Others	0.0294	0.6405	**0**	0.0784	0.0752	0.1765
Pakistan	0	0.2329	0	**0**	0.7671	0
Sri Lanka	0.4261	0	0.2435	0.3304	**0**	0
UAE	0.8725	0	0	0	0.1275	**0**
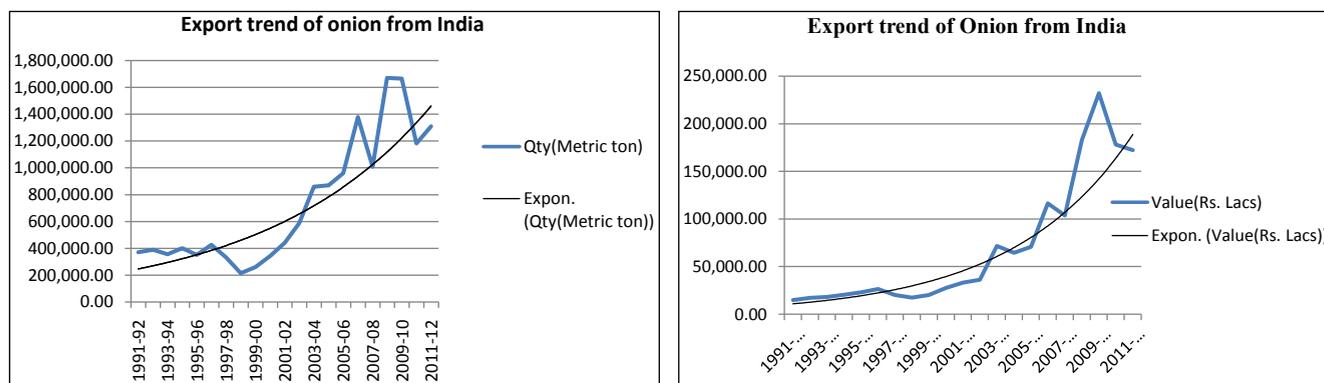
Fig. 1: Change in direction of trade of major fruits and vegetables

Bangladesh lost its share of 67.44 per cent to Sri Lanka and 4.65 per cent to other countries and gained a share of 87.25 per cent from UAE, 42.61 per cent from Sri Lanka and 2.94 per cent from other countries. Malaysia lost its share to Sri Lanka (47.46%) and UAE (38.13%) while gained from Pakistan (23.29%) and other countries (64.05%).

A loss of share of 76.71 per cent and 23.29 per cent Pakistan lost to Sri Lanka and Malaysia respectively while it gained share from Sri Lanka (33.04%) and other countries (7.84%). Sri Lanka lost its complete share to Bangladesh (42.61%), Pakistan (33.04%) and other countries (24.35%) and gained share from Pakistan, Bangladesh, Malaysia, UAE and other countries. UAE also lost its share completely to Bangladesh (87.25%) and Sri Lanka (12.75%) and gained from Malaysia and other countries.

Hugar (2002) found that Malaysia and UAE were the most loyal market for onion export from India. But in current study UAE lost its share major share of 87.25 per cent to Bangladesh and the results of this study shows that Bangladesh is the most loyal market for the period of 2006-07 to 2011-12.

Onion crop has registered a positive growth of 8.89 per cent, 14.18 per cent and 5.29 per cent in trade volume, value and price respectively. Bangladesh is the most loyal market for export of onion from India. Other major importers of onion from India are Malaysia, Pakistan, Sri Lanka and UAE.

SUGGESTIONS

1. Keeping in view the opportunity in global market, to increase the production and export onion good agronomic practices and high yield plant varieties are recommended for meeting growing domestic demand and to be the global leader in the export of fruits and vegetables.

2. The Markov chain analysis has revealed that the export shares to major destinations are on the decline. Consequently, appropriate steps should be initiated to increase India's share in these countries by offering quality vegetables at competitive prices than producing countries.

3. Since different countries are adopting different standards therefore, it is suggested

that an awareness capacity building program should be initiate among farmers cultivating onion crop with high marketable surplus and wish to export in global market.

4. In depth analysis of the new destination should be conducted to know the consumer perception, various SPS measures. So that the producer and exporter may be made aware in order to get the maximum benefit of the global market.

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