Performance of Pomegranate Export from India

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Abstract

In the present study efforts have been made to explore the current status and performance or direction of trade and changes in the export of pomegranate from India. The secondary data on value of Pomegranate exported to various countries were collected for the period 2006-07 to 2014-15. The collected data were analysed using Markov Chain analysis. The study reveals that the production of pomegranate in India during 2006-07 was to a tune of 839650 tons and the quantity exported was 21670.43 tons accounting for 2.6 per cent of production, which increased during the year 2012-13 with production of 744950 tons and correspondingly the export as 35970.60 tons (4.8%). The dynamic nature of trade pattern was analyzed by applying first order Markov process. Examining the gains and losses in export share of major pomegranate importing countries showed UAE as one of the stable importer of Indian pomegranate as reflected by high probability of retention at 0.83811. Netherland and Other-countries were found able to retain their market share by probability of 0.55988 and 0.48860 respectively.

Keywords: Pomegranate Export, Markov Chain Analysis, transitional probability, trade pattern

The pomegranate fruit has very good potential for export due to its large use of decoration, use of fresh kernels (arils) for garnishing and for consumption as fresh fruit because of its nutritive value. There is tremendous potential for export of pomegranate from India and it is fact that India is largest producer of pomegranates in the world. Moreover, India produces finest edible quality of pomegranates which are available almost throughout the year. The major Markets of India's pomegranate during the year 2014-15 were UAE, Bangladesh, Netherlands, UK, Saudi Arabia and Russia. To increase exports, it is necessary to improve the quality at various stages from production, post-harvest, processing and handling, storage and till it reaches the customers.

It is exported mainly to Gulf and SAARC (South Asian Association for Regional Cooperation) countries. Its export to European countries has just started. India is the largest producer of pomegranates in the world, but accounts only 7% share of total world exports. At present as excellent cultivars with good quality fruits are available India can supply almost throughout the year and can become a good player in its export. Spain exports pomegranates from September to December months which decrease from January onwards. Major exports from Spain are to European Union. Iran exports are mainly to Gulf countries and supplies are at peak during October-December and it decreases from January onwards. In India, its peak production is during December-March and continues up to April-June. Thus, India can export pomegranates from February to June months when there will be no competition from Spain. In this context, the present study is undertaken with the aim to study performance of Pomegranate export from India.

Methodology

The study is based on time series data on area, production and exports of pomegranate from India obtained from various published issues of

APEDA (Agricultural & Processed Food Export Development Authority). The structural change and direction of change in export value of pomegranate have been analyzed using Markov Chain analysis. Annual export data for a period of 2006-07 to 2014-2015 have been used to analyze the direction of trade and changing pattern of pomegranate export from India. The major Pomegranate importing countries considered on average basis are United Arab Emirates (UAE), Netherland, United Kingdom (UK), Saudi Arabia, Bangladesh, Russia and the rest under Other-countries category.

Markov Chain Analysis

Markov Chain Analysis has been employed to analyze the dynamic nature of trade pattern specially the structural change in any system whose progress through time can be measured in terms of single outcome variable. The gains and losses in market share of pomegranate by major importing countries have been examined by first order Markov process. The basic assumption of first order Markov process is that the average export of a commodity from a country to its importing countries in any period depends only on export in the previous period and this dependence is the same among all periods.

It is expressed as:

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

Where,

E_{jt} = Exports from India during the year t to j[th] country,

E_{it-1} = Exports to i[th] country during the year t-1,

P_{ij} = The probability that exports will shift from i'th country to j'th country,

e_{jt} = The error term which is statistically independent of e_{ij-1} and,

r = Number of importing countries

The transitional probability matrix, which can be arranged in a (c × r) matrix, has some properties. The diagonal elements of matrix P indicate the probability that the export share of a particular country will remain the same from one period to another. The off-diagonal or transfer probabilities indicate the probability that the export share of a

particular country will shift to another country over time. Thus, the export share of a country during the period 't' will be obtained by multiplying the actual exports in the previous period (t-1) with transitional probability matrix. The transitional probability matrix has been estimated in the linear programming (LP) framework by a method referred to as minimization of mean absolute deviation (MAD) which is stated as:

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

Subject to

$$\begin{aligned} XP* + V &= Y \\ GP* &= 1 \\ P &\geq 0 \end{aligned}$$

Where,

P* is a vector in which probability P are arranged,

0 is a vector of zeros,

I is an appropriately dimensioned vector of area,

e is the vector of absolute errors (IUI),

Y is the vector of export to each country,

X is a block diagonal matrix of lagged values of Y and

V is a vector of errors,

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

Results and Discussion

India is one of the leading countries in pomegranate production and at present, it is being cultivated in more than one lakh hectare area. The major pomegranate growing states in India are Maharashtra, Karnataka, Gujarat and Andhra Pradesh etc.

The present status of pomegranate production in India during the year 2012-13 to 2014-15 is described in Table 1. It is observed from the table that pomegranate is being cultivated in India in an area of 143.14 thousand hectares with a production of 1789.31 thousand tons in 2014-15. It is mainly cultivated in Maharashtra followed by Karnataka, Andhra Pradesh and Gujarat states. Maharashtra is the leading state in the cultivation of pomegranate (99.14 hectares) with a production of 1197.71 thousand tones and contributing 66.94 percent to the country's production in the year 2014-15.

Table 1: Area and Production of Major Pomegranate Growing States in India during 2012-13 to 2014-15

(Area in '000 ha, Production in '000 Tons)

Sl. No.	States	2012-13				2013-14				2014-15			
		Area	Share %	Production	Share %	Area	Share %	Production	Share %	Area	Share %	Production	Share %
1	Maharashtra	78.00	68.87	408.00	54.77	90.00	68.82	945.00	70.22	99.14	69.26	1197.71	66.94
2	Karnataka	15.10	13.33	150.30	20.18	16.62	12.71	134.18	9.97	19.04	13.30	261.82	14.63
3	Gujarat	7.40	6.53	79.02	10.61	9.38	7.17	99.33	7.38	9.38	6.55	171.66	9.59
4	Andhra Pradesh	6.20	5.47	62.01	8.32	6.00	4.59	90.01	6.69	5.85	4.09	76.69	4.29
5	Telangana	0.00	0.00	0.00	0.00	1.73	1.32	25.97	1.93	2.06	1.44	33.52	1.87
6	Madhya Pradesh	2.16	1.91	23.00	3.09	2.38	1.82	25.29	1.88	2.62	1.83	28.00	1.56
7	Tamil Nadu	0.38	0.34	11.90	1.60	0.40	0.31	13.09	0.97	0.42	0.29	12.19	0.68
8	Others	4.02	3.55	10.72	1.44	4.26	3.26	12.85	0.95	4.65	3.25	7.72	0.43
	Total	113.25	100.00	744.96	100.00	130.77	100.00	1345.72	100.00	143.14	100.00	1789.31	100.00

Source: Horticulture Statistics Division, DAC&FW.

Considering its production potential there is a need to understand its export prospects. It is also observed that Maharashtra state contributes highest part in respect to area and production of major pomegranate growing states in India during 2012-13 to 2014-15 followed by Karnataka and Gujarat.

Production and export details of pomegranate from India during 2006-07 to 2013-14 are presented in Table 2.

Table 2: Export of Pomegranate from India (2006-07 to 2013-14)

Year	Production (tons)	Export (tons)	Export as % of Production
2006-07	839650	21670.43	2.6
2007-08	884129	35175.17	4.0
2008-09	807173	34811.21	4.3
2009-10	820970	33415.08	4.1
2010-11	743090	18181.30	2.4
2011-12	772450	30023.29	3.8
2012-13	744950	35970.60	4.8
2013-14	1345710	31328.29	2.3
2014-15	1789310	20997.02	1.2

Source: http://www.apeda.com

Table 2 reveals that the production of pomegranate in India during 2006-07 was about 839650 tons and quantity exported was about 21670.43 tons accounting for 2.6 per cent of production. During the year 2010-11 the production was about 743090 tons and the quantity exported was 18181.30 tons accounting for 2.4 per cent of production which was increased during the year 2011-12 with production of 772450 tons and correspondingly the export was 30023.29 tons (3.8 %). It is also observed from the table that in the recent years up to 2012-13 in tune with the increase in production there was an increase in the quantity exported, but in the year 2013-14 production was increased 1345710 tons but per cent export was declined up to 2.3 percent. A similar finding has been observed in the year 2014-15 also.

The trade direction has been explored by Markov chain analysis using export value data from the period of 2006 to 2015. The transitional probability matrix has worked out by using the triennium average which provides a broad indication of change in the direction of pomegranate export from India to six major countries importing pomegranate namely, United Arab Emirates (UAE), Netherland, United Kingdom (UK), Saudi Arab, Bangladesh and Russia has been presented in Table 3. The exports to remaining countries are aggregated under 'others' category. The row elements in the transitional probability matrix provide the information on the extent of loss in market share on account of competing countries. The columns element indicates

Table 3: Transitional Probability Matrix of Pomegranate Export from India during 2006 to 2015

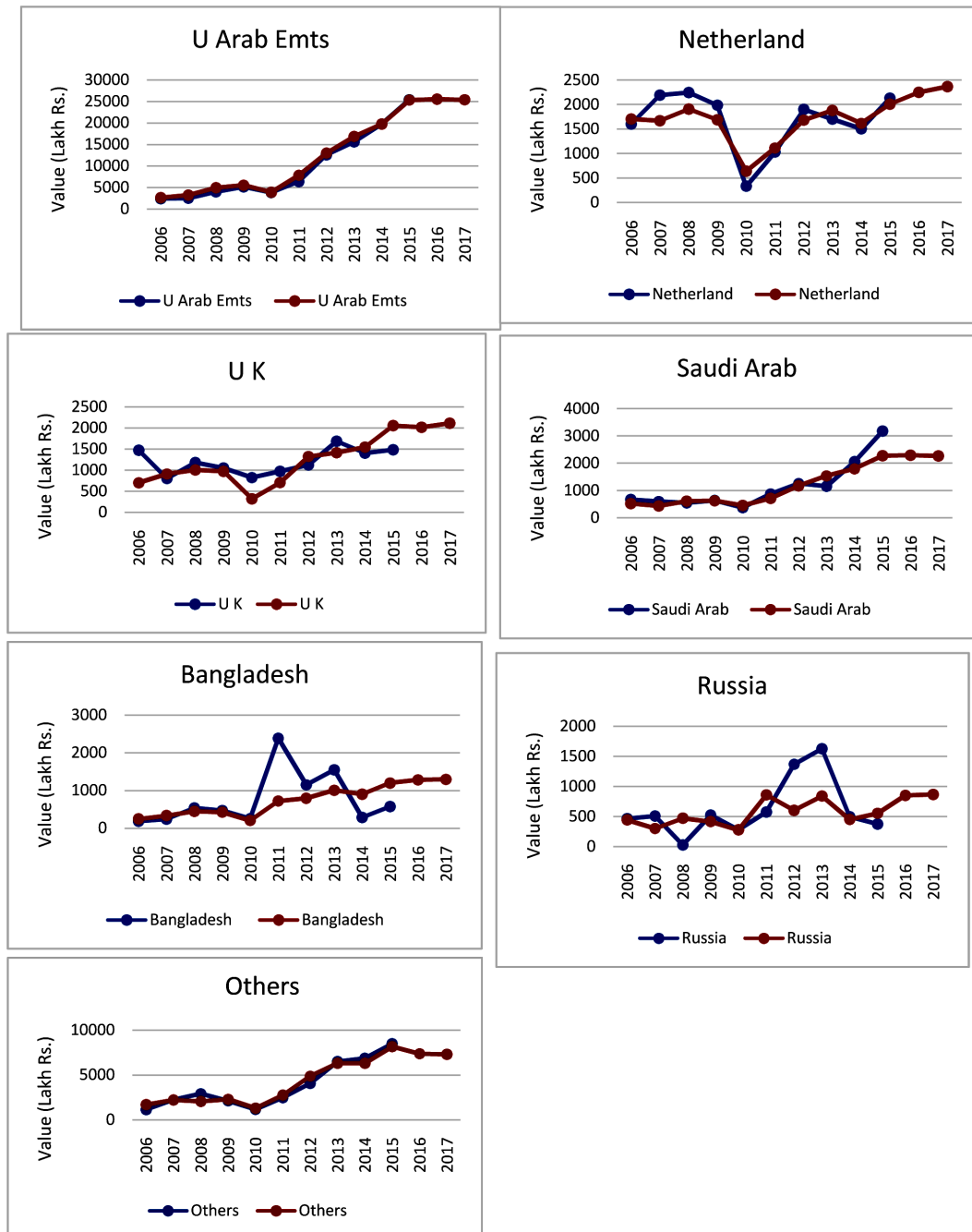| Countries	UAE	Netherland	U K	Saudi Arab	Bangladesh	Russia	Others
UAE	**0.83811**	0.00000	0.05085	0.05451	0.02692	0.00000	0.02961
Netherland	0.00000	**0.55988**	0.35251	0.00000	0.07080	0.01681	0.00000
U K	0.00000	0.54767	**0.00876**	0.19243	0.00000	0.25113	0.00000
Saudi Arab	0.00000	0.00000	0.00000	**0.08364**	0.00000	0.00000	0.91636
Bangladesh	0.57892	0.00000	0.00408	0.00000	**0.16669**	0.25032	0.00000
Russia	0.00000	0.00000	0.00000	0.00000	0.00000	**0.00000**	1.00000
Others	0.44030	0.00000	0.00000	0.03927	0.03182	0.00000	**0.48860**

Fig. 1: Actual and Predicted Trends of Value of Pomegranate Export to Major Countries from India

Table 4: Actual and Predicted values pomegranate export to different countries from India (in Lakh Rupees)

Year	UAE		Netherland		U K		Saudi Arab		Bangladesh Pr		Russia		Others	
	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted
2006	2434.67	2647.78	1601.06	1703.26	1473.26	701.84	663.26	516.44	182.50	245.57	463.30	442.59	1139.26	1699.82
2007	2558.82	3264.35	2189.84	1666.59	804.40	910.07	591.47	431.34	238.12	334.58	506.71	298.44	2230.13	2214.12
2008	4023.36	4961.88	2244.81	1904.92	1183.36	1008.46	542.68	606.48	537.73	449.28	25.82	469.53	2903.86	2061.06
2009	5170.01	5536.90	1985.31	1687.40	1051.47	973.85	627.77	619.89	468.16	425.19	521.48	414.63	2118.63	2284.98
2010	3884.42	3910.01	330.17	636.93	825.45	322.17	368.44	446.75	252.55	206.77	279.87	276.07	1154.31	1296.50
2011	6416.44	7849.81	1028.17	1109.80	975.31	706.98	870.39	707.69	2383.70	721.80	573.32	858.90	2480.51	2772.86
2012	12601.29	13012.49	1898.86	1679.16	1124.82	1324.67	1251.97	1167.47	1148.32	794.19	1367.04	601.85	4057.32	4869.80
2013	15639.00	16865.24	1698.60	1875.35	1687.76	1415.11	1152.27	1529.00	1547.71	1006.10	1626.07	839.83	6500.22	6321.00
2014	19759.71	19742.29	1503.12	1612.68	1407.99	1548.12	2058.78	1789.48	283.31	903.66	495.34	449.79	6853.20	6315.43
2015	25380.48	25337.21	2130.43	2006.14	1485.12	2056.92	3175.81	2268.12	572.04	1199.33	374.36	551.98	8481.53	8180.07
2016		25531.36		2249.71		2018.48		2288.03		1284.33		850.51		7377.34
2017		25389.85		2365.03		2114.22		2261.36		1295.43		866.22		7307.66

the probability of gains in market share from other competing countries and the diagonal element indicates probability of retention of the previous year's trade volume by the respective country. It is observed from the table that United Arab Emirates and Netherland are the stable importers of Indian pomegranate as reflected by high probability of retention at 0.83811 and 0.55988 respectively.

Similarly others countries and Bangladesh are also able to retain their probability of retention at 0.48860 and 0.16669 respectively. On the contrary, United Kingdom, Saudi Arab and Russia are having a probability of retention near about zero, indicating that they are unstable importers of Indian pomegranate.

UAE has shown the stability in the import of Indian pomegranate during 2006 to 2015 by gaining its share from other countries (0.44030) and Bangladesh (0.57892). Similarly, Netherland has gained from UK with transfer probability of (0.54767) *i.e.*, the probability that others country has gained in the export share of Indian pomegranate during 2006 to 2015 is at the cost of that of UK. On the other hand Russia which has zero probability of retention will likely to gain from some major countries *i.e.* from U.K (0.25113). Hence, it is necessary to give more stress on these countries and also explore possibility for tapping other markets through proper planning and policy formulation.

The export shares of Indian pomegranate to different countries have been estimated for the triennium averages of the period 2006 to 2015 by using transitional probability matrix and the same are compared with the observed export shares.

A close look at the observed and estimated shares of pomegranate (Table 4 and Fig. 1) reveals that the difference is by and large small. That means the observed proportions of export shares are inconsistent with the predicted shares of exports, which are derived from the Markov process validating the use of the Markov chain model for estimating the share of different countries by using transitional probability matrix. The difference in export of shares between observed and expected values are by and large found to be small. If there are some instances of differences in few years, these are mainly due to limitations of the model that the present estimates depend only on the previous year's observation.

Conclusion

UAE is one of the stable importers of Indian pomegranate as reflected by high probability of retention at 0.83811. Netherland and other countries are able to retain their probability of retention at 0.55988 and 0.48860 respectively. There is a potential to increase its export as currently India is exporting less than 5.00% of its production. Though sales channels of the pomegranate are currently directed all over the world, due to their origin, they are mostly consumed in the Middle and Far East as well as in Mediterranean countries and the United Kingdom. Consumption is dispersed and slow to take off, as western consumers consider it as exotic and difficult to eat. The Markov-Chain Analysis for pomegranate indicates high dependence on a few export markets viz., Middle-east which will increase the trade risk in the long run. Therefore, appropriate export promotion policies need to be evolved to diversify the trade concentration to other countries and also to find new markets besides expanding the existing markets in major importing countries. This crop has good commercial potential and the area under this crop is significantly increasing in the study area.

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