

EXPORT PERFORMANCE OF GRAPES IN INDIA

A.D. SATHYENDRA KUMAR* and M. DEVARAJ

Institute of Development Studies, University of Mysore, Mysuru-570 006

Date of Receipt: 01.1.2020

Date of Acceptance: 24.2.2020

ABSTRACT

The study(2018-19) focused on the export performance of fresh grapes in India during pre-WTO and post-WTO period and destination- wise growth rate from 2001-02 to 2016-17. To analyse the export data and arrive at appropriate results, Growth Rate analysis, Instability analysis and Markov Chain analysis were used. The results indicated that the export of fresh grapes with the pre-WTO and post-WTO period when compared, the growth rate of post-WTO period decreased in terms of quantity, value and unit value of export. However, the overall growth rate was positive. The Netherlands, The United Kingdom, The United Arab Emirates, Bangladesh and Germany are major importers of fresh grapes from India, and these countries have a positive growth rate during the study period. The results of the Transitional Probability Matrix of fresh grapes export from India showed that The Netherlands was one of the stable markets of Indian fresh grapes as reflected by the probability of retention. It might be due to increasing demand for fresh grapes in that country and as a crop it was not cultivated extensively in the Netherlands. However, Germany did not continue as a loyal importer of India's fresh grapes. It might be due to rigid competition by other countries such as the Netherlands.

Keywords: Grapes, Export performance, Growth rate analysis, Instability analysis and Markov chain analysis

INTRODUCTION

Grape is one of the delicious refreshing and nutritious fruit. It is universally consumed as table fruit. More than 70 per cent of the world grape production is used for wine making and also to produce raisins and juice. Whereas, in India, it is primarily produced for table purpose and nowadays value-added products are also produced. Grape is produced in the world over an area of 7.94 mha with 105.56 million tons during 2016-17. The major producers are China, Italy, the USA, Spain, France, Turkey, Chile, Argentina, Iran and India. World trade for grapes is about 4.9 million tons and the contribution of India is about 2.98 percent (FAO, 2016). The

pattern of world trade in grapes reveals that Europe and Asia are largely importing regions, whereas, Europe and South America is the largest exporting region. Italy is the major exporter in Europe and Chile is the main exporter in South America. South Africa is another major exporters of grapes. India produces 2.59 million tons of grapes from 0.12 mha with the productivity of 21.23 tons per ha and accounts for 2.45 per cent of the world's production during 2016-17. India is also one of the major exporters of fresh grapes in the world. The country has exported 231.12 thousand MT of grapes to other countries in the world accounting for Rs.2065

*Corresponding Author E-mail: sathyendra.ccsniam@gmail.com; Ph.D thesis submitted to University of Mysore, Mysore

crores of value during the year 2016-17. Major importing countries of Indian fresh grapes were the Netherlands, the United Kingdom, the United Arab Emirates, Bangladesh and Germany. The main objective of the study conducted during 2001-02 to 2016-17 was to estimate the growth and instability in the export of Indian fresh grapes, extent of export potentiality and direction of export of fresh grapes from India and also to assess the policy imperatives to encourage export of fresh grapes from India.

MATERIAL AND METHODS

Growth Rate Analysis

Time series data on quantity and value of export of fresh grapes from India for the period from pre-WTO and post- WTO period and destination wise export of fresh from 2001-02 to 2016-17 were collected during 2018-19 from Food and Agriculture Organization (FAO), Agricultural and Processed Food Products Export Development Authority (APEDA), Directorate General of Commercial Intelligence and Statistics (DGCI&S), Government of India (GoI) and National Horticultural Board databases. The exponential function model is used to compute the annual compound growth rates in quantity and value of export.

$$y = ab^t e^u$$

y = Dependent variable for which growth is to be estimated

a = Intercept

b = Regression coefficient

t = Time variable

e = Exponent term (2.3018)

u = Disturbance term

The logarithmic form of equation is $\log y = \log a + t \log b + u$

The compound growth rate (g) in percentage is computed from the relationship.

$$g = (\text{anti log of log } b) - 1 \times 100 \text{ or } g = (b-1) \times 100$$

The standard error of the growth rate was estimated and tried for its significance with 't' test. If the compound growth rate is positive, the variable starts increasing, if the compound growth rate is negative, the variable starts decreasing year by year. The growth rates worked out with the above equation were converted into percentage for better understanding and effective comparisons. Growth rates were tested for their significance using the student 't' test.

Instability Analysis

In order to study the variability in quantity and value export of grapes, an index of instability is developed as a measure of variability. The coefficient of variation (CV) is calculated using the following formula:

$$\text{Co-efficient of variation (CV)} = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

The formula suggested by Cuddy and Della (1978) is used to compute the index of instability.

$$\text{Index of Instability} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100 \times \sqrt{1 - R^2}$$

Coefficient of variation is multiplied by the square root of the difference between the unity and coefficient of multiple determinations (R^2) in the cases, wherein, R^2 is significant.

Markov Chain Analysis

A Markov chain is a stochastic process which describes the finite number of possible outcomes $s_i = (i = 1, 2, \dots, r)$, which a discrete random variable at $t = 1, 2, \dots, T$ can take during a number of time periods. The assumptions that underlie a model are:

- The probability of an outcome on the trial depends only on outcome of the preceding trial, and
- The probability is constant for all time periods (Lee *et al.*, 1970).

In the current application, the share of export of fresh grapes from India (X_{it}) to a particular country (j^{th}) at time 't' is considered as a random variable, and this depends on only its past import with that country. Following the first order stationary Markovien property as discussed above, the model can be specified as follows:

$$X_{jt} = \sum_{i=0}^n X_{it-1} \cdot P_{ij} + e_{jt}$$

Wherein,

X_{jt} = is the export of fresh grapes from India to j^{th} country during the year 't'

X_{it-1} = is the export to i^{th} country during the year $t-1$

P_{ij} = is the probability that exports will shift

from i^{th} country to j^{th} country

e_{jt} = the error term independent of X_{it-1}

n = the number of importing countries

The transitional probability (P_{ij}) is the center of the Markov chain model analysis and will have the following properties.

$$0 < P_{ij} < 1$$

$$\sum_j P_{ij} = 1, \text{ for all 'i'}$$

The transitional probability P_{ij} indicates the possibility that exports will switch over from country 'i' to country 'j' with passage of time. The probabilities P_{ij} for $i = j$ indicates the gains or losses in exports of each of the importing country. The probability P_{ij} for $i \neq j$ (diagonal probabilities) indicate probability of retention of an importing country.

RESULTS AND DISCUSSION

Growth and Instability in the Export of Indian Grapes

Table 1 indicates explanation of growth, instability and average export in quantity, value and unit value of grapes during the pre-WTO period (1985-86 to 1995-96) and post-WTO period (1996-97 to 2016-17). During the pre-WTO period, the export value of fresh grapes registered a higher growth of 37.83 per cent which increased from 3.06 crores during 1985-86 to 54.76 crores during 1995-96 and export quantity increased from 3,462 tons to 22,151 tons at the rate of 23.98 percent over the years. A modest growth of 11.16 percent was observed

Table1. Compound growth rates and instability of export of fresh grapes from India during 1985-86 to 2016-17

Description (*)		Pre-WTO (1985-86 to 1995-96)	Post-WTO (1996-97 to 2016-17)	Overall Period (1985-86 to 2016-17)
Compound growth rate (%)	Quantity	23.98	15.83	14.61
	Value	37.83	22.57	22.33
	Unit value	11.16	05.83	06.09
Instability index (%)	Quantity	17.77	32.36	58.64
	Value	15.39	58.43	97.56
	Unit value	06.81	28.03	30.12
Average	Quantity	09.38	83.88	58.27
	Value	19.00	532.14	355.61
	Unit value	16.92	50.04	39.94

in unit value realised, with instability indices of 17.77 percent, 15.39 percent and 6.81 percent in export quantity, value and unit value realized respectively during the study period. The average quantity of export, value and unit value realized for this period was 9.38 thousand MT, Rs.19.00 crores and Rs.16.92 per kg.

During the post-WTO period, quantity of fresh grapes exported over the period witnessed a growth of 15.83 percent. The value and unit value of grapes increased at the rate of 22.57% and 5.83 % over the years, respectively. Similarly, 58.64%,97.56% and 30.12 per cent of instability were observed in the case of export quantity, value and unit value realized from export of grapes. The average of quantity export, value and unit value realized for this period were 83.88 thousand MT, Rs. 532.14 crores and Rs. 50.04 per kg. For the overall study period, the growth rate to the tune of 14.61 per cent was observed in the case of the export

quantity of grapes. On the other hand, export value and unit value were seen to be growing, at the rate of 22.33 per cent and 6.09 per cent, respectively. Instability indices were 58.64 %, 97.76 % and 30.12% of for export quantity, value and unit value respectively during the study period. The average of quantity export, value and unit value realised for this period were 58.27 thousand MT, Rs. 355.61crores and Rs. 39.94 per kg, respectively.

Compound annual growth rates of export quantity and value of Indian fresh grapes with the pre-WTO and post-WTO when compared, the pre-WTO period has higher than those during post-WTO though, the increase in actual quantity and value during the post-WTO were much higher than that of the pre-WTO period. The WTO agreements and trade liberalization might have given a greater boost to the export of Indian grapes and intervention of Central and State Government as well as Mahagrapes and

Table2. Destination wise growth rates and instability in export of fresh grapes from India during (2001-02 to 2016-17)

Description	Export Quantity		Export Value		Unit Value	
	Compound growth rate (%)	Instability index (%)	Compound growth rate (%)	Instability index (%)	Compound growth rate (%)	Instability index (%)
Netherlands	22.00	25.91	30.63	42.25	7.09	14.50
United Kingdom	05.90	26.32	13.53	36.27	7.20	16.81
United Arab Emirates	08.63	23.03	16.00	30.11	6.76	15.84
Bangladesh	21.59	67.35	33.42	63.42	9.47	34.40
Germany	12.13	80.17	21.58	107.86	8.46	28.38
Other Countries	25.55	42.77	36.58	60.12	8.79	17.74
Total	16.57	25.47	25.29	40.18	7.46	25.11

Source: Computed by researcher based on DGCI&S Data

NAFED, had helped to increase exports of high-quality grapes from India.

Export Potentiality of Indian Grapes

Table 2 explains destination wise growth rates and instability in the export of fresh grapes from India during 2001-02 to 2016-17. Export of fresh grapes is mainly concentrated to European countries (greater than 50 percent of the total export from India). Major markets for India's fresh grapes included in the study are The Netherlands, The United Kingdom, The United Arab Emirates, Bangladesh and Germany. These countries together accounted for 58 percent of India's total quantity of fresh grapes export and remaining countries were categorized as others.

Export trend analysis of fresh grapes during 2001-02 to 2016-17 showed that quantity of fresh grapes export grew at the rate of 16.57 percent, whereas, value increased at a much

higher rate of 25.29 percent and unit value realized (Rs/kg) increased at the rate of 25.11 percent. The stable markets for India's fresh grapes during the study period were the Netherlands and the United Arab Emirates as evidenced from lower instability index. Netherlands is the major export destination for India's fresh grapes, quantity exported to the Netherlands increased at the rate of 22 percent over the years, whereas, the value realised increased at the rate of 30.63 percent with instability indices of 25.91 per cent, 42.25 percent and 14.50 percent in quantity, value and unit value, respectively. Whereas, growth rate of quantity exported to the United Arab Emirates was 08.63 percent with the instability of 26.32 percent during the study period.

Quantity exported to the United Kingdom registered a lower compound growth rate of 5.90 percent compared to all other countries, but export value increased at the rate of 13.53

Table 3. Transitional Probability Matrix for Fresh Grapes Export from India (2001-02 to 2016-17)

Countries	Netherlands	United Kingdom	United Arab Emirates	Bangladesh	Germany	Other countries
Netherlands	0.6897	0.0000	0.0000	0.1143	0.0000	0.1960
United Kingdom	0.0323	0.4822	0.3537	0.0240	0.1078	0.0000
United Arab Emirates	0.0923	0.6069	0.2311	0.0383	0.0000	0.0314
Bangladesh	0.0000	0.0000	0.2900	0.4282	0.0000	0.2818
Germany	0.7784	0.0000	0.0000	0.2216	0.0000	0.0000
Other countries	0.2130	0.0000	0.0000	0.0000	0.0080	0.7791

Source: Computed based on Grapes Data from DGCIS GOI

percent, and 7.20 percent growth was observed in the value received per kg of grapes. Instability indices of 26.32 percent, 36.27 percent and 16.81 percent were observed for quantity exported, value and unit value, respectively.

Bangladesh emerged as another important market during the study period. Export to this country was impressive, as export quantity augmented at the rate of 21.59 percent. Export value also grew impressively at the almost same rate of 33.42 per cent but these are associated with high instability 67.35 percent and 63.42 percent, respectively. The quantity exported to Germany grew at the rate of 12.13 percent and 21.58 percent, 8.46 percent growth observed in the case of value and unit value realized from this country during the same period with the instability of 80.17% and 107.86 %, 28.38 %, respectively. This shows that Germany is the unstable market for the Indian grapes.

India's grapes export to other countries grew at the rate of 25.55 percent in terms of quantity and 36.58% and 8.79 % in value and unit value realized with moderate instability of 42.77 %, 60.12% and 17.74% in export quantity, value and unit value realized respectively during the study period.

Direction of Indian Fresh Grapes Exports

The dynamics export trend was important for drafting export oriented programs and improve or withstand current export trends. Therefore, understanding of changing in export trade across the export destinations was important. The dynamics of changes in degree and direction of export of Indian fresh grapes was analysed with the help of Markov Transitional Probability Matrix. The stochastic process and finite Markov Chain process, was used in the study for analysis of the changes in the direction of exports of Indian fresh grapes to capture the net effect of transferring pattern

of export trade over a period of time. This was provided by examining gains and losses in the export share of fresh grapes by major importing countries by deriving Transitional Probability Matrices (Table 3).

The results of the study revealed that except Germany all other countries had high retention in terms of export share over a period of time. Among the major importing countries, Netherlands was one of the most stable market of Indian fresh grapes as reflected by the probability of retention at 0.6897, with 69 percent of export share over the study period hence, The Netherlands, the most loyal and reliable market for importing the Indian fresh grapes. Export of fresh grapes to The Netherlands was retained to the tune of 69 per cent of its previous year's share in the current period; of the remaining 32 per cent of The Netherlands market share, 11 per cent was directed to Bangladesh, and 20 per cent to other countries. This high retention of the market share of Indian grapes by The Netherlands might be due to increasing demand for fresh grapes in that country and temperate crop such as grapes is not cultivated extensively in the Netherlands.

The United Kingdom had moderate probability retention of 0.4822, which retains its export share of 48.22 per cent. This implied that it had lost more than half of its share to other importing countries; of the remaining 52 per cent of The United Kingdom market share, 23.11 per cent was directed to United Arab Emirates,

10.78 per cent to Germany, 3.2 percent to The Netherlands and 2.4 percent to Bangladesh.

Bangladesh also had moderate probability retention of 0.4282, with retains its export share of 42.82 percent. This implies that it had lost most of its share to other importing countries and of the remaining 57.18 percent of Bangladesh market share, 29 percent was lost to United Arab Emirates, and 28.18 percent to other countries.

The countries United Arab Emirates had the retention of 23.11 percent of its original share. This implies that they were also the stable importers of Indian fresh grapes, whereas, countries with less quantity of fresh grapes imported from India, were pooled under the 'other countries' has showed high stability, which retained 77.91 per cent of its original share.

The entire share of fresh grapes market of Germany was directed to The Netherlands and Bangladesh with 77.84 percent and 22.16 percent, respectively. Total percent of Germany's share of grapes import from India was directed to The Netherlands and Bangladesh. However, Germany gained 10.78 per cent of United Kingdom market share and 0.8 percent of 'other countries' market share.

The Netherlands is the major gainer among importers of Indian fresh grapes over a period of time, which is having a transfer probability of 0.7784 from the Germany, 0.2130 from the 'other countries', 0.0923 from the United Arab

Emirates and 0.0323 from the United Kingdom. The probability that the Netherlands would gain in the export share of Indian fresh grapes over the study period at the cost of the Germany, the United Kingdom, the United Arab Emirates and other countries is 77.84 percent, 3.2 percent, 9.2 percent and 21.30 percent, respectively. Hence, The Netherlands loses about 31.03 per cent of its total imports.

The United Kingdom could retain its original share of 45.50 per cent and gained 60.69 per cent from The United Arab Emirates. Whereas, it lost its share to the refrain of 35.37 per cent to The United Arab Emirates, 10.78 percent to Germany, 3.2 percent to Netherlands and 2.4 percent to Bangladesh.

Bangladesh sustained its original share of 42.82 per cent and gained 22.16 percent from Germany, 11.43 percent from the Netherlands, 3.83 percent from the United Arab Emirates, and 2.40 percent from the United Kingdom. Whereas, it lost 29 percent to the United Arab Emirates and 28.18 percent to other countries. Therefore, Bangladesh lost about 57.18 percent and retained the rest.

The United Arab Emirates had retained its original share of 23.11 percent and gained 35.37 per cent from United Kingdom and 29 percent from Bangladesh. Whereas, it lost 60.69 percent to the United Kingdom, 9.23 percent to United Arab Emirates, 3.38 percent to Bangladesh, 3.14 per cent to other countries.

Other countries retained its original share of 77.91 percent and gained 28.18 percent from Bangladesh, 19.60 percent from Netherlands and 3.14 percent from United Arab Emirates. Whereas, it lost 21.30 percent to the Netherlands and 0.80 percent to Germany. Therefore, the total loss of other countries is 22.09 percent.

CONCLUSION

The results indicated that the export of fresh grapes of India when compared with the pre-WTO and post-WTO period, the growth rate of post-WTO period decreased in terms of quantity, value and unit value of export. However, the overall growth rate was positive. The Netherlands, The United Kingdom, The United Arab Emirates, Bangladesh and Germany are major importers of fresh grapes from India, and these countries have a positive growth rate during the study period. There is a necessity to encourage exports, and liberalise the government regulations and development of necessary infrastructure as well as improve upon the productivity in order to retain India's position in the world fresh grapes exports. There is a necessity to sensitize the farmers on export procedures and export quality standards. Farmers should be encouraged to create farmer producer organisations (FPOs) and bring value addition for increasing the returns. Government can also focus on export promotion in major importing countries to augment the import potential for Indian grapes.

REFERENCES

- Sathyendra Kumar, A.D and Devaraj, M. 2018. Production performance of grapes in Karnataka. *Agricultural Research Journal*. 55 (3): 606-608.
- Siddaya and Atteri, B. R. 2010. Export competitiveness of fresh fruits and vegetables under compliance. *Agricultural Economics Research Review*. 23 (3): 555 - 561.
- Sathyendra Kumar, A.D and Devaraj, M. 2016. Production performance of selected agricultural commodities in Karnataka. *International Journal of Agricultural Sciences and Veterinary Medicine*.(4): 13-20.
- Ashok Gulati, Anil Sharma, Kailash Sharma, Shipra Das and Vandana Chhabra. 1994. Export competitiveness of selected agricultural commodities. National Council of Applied Economics Research, New Delhi.
- Prakash K. Mokashi and Hosamani, S. B. 2012. An economic analysis of export potential of grapes from Northern Karnataka. M.Sc thesis submitted to University of Agricultural Sciences, Dharwad, Karnataka.