Direction of Trade and Performance of Processed Food Products Export from India

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Abstract

Indian food processing sector is playing an important role in linking Indian farmers to ultimate consumers in the domestic and international markets. The import and export value of processed food was US$ 19.64 and US$ 32.73 billion and trade balance of US$ 13.09 billion during 2019-20. Paper tried to analyze the growth and direction of processed foods trade from India. The compound growth trend was used to estimate the growth trend of processed foods export from India and Markov chain analysis was used to assess the direction of trade. The results suggest that, processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparation and beverages (alcoholic and non-alcoholic) was growing with compound growth rate of 9.91, 5.61, 2.52, 18.62, 12.88 and 11.78 percent per annum respectively during 2000-01 to 2020-21. The Markov chain analysis suggests that most loyal importing countries were Indonesia, Russia, Kenya, UAE, UK and Haiti for processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparation and beverages (alcoholic and non-alcoholic) respectively.

Key words: Direction of trade, Markov chain, Compound growth rate, Trade balance, Processed foods

Indian agricultural sector is playing an important role in supplying food to fast growing non-farming community of the country, raw inputs for agro-based industry and export surplus. Beside this, it is the largest sector which provide employment opportunity to 42.60 percent population in the country during 2019. In 2020-21, gross value added by agriculture and allied sector was Rs 35879.86 billion at current price. The share of agriculture and allied sector to India's total gross value added (Rs 177811.20 billion) at current price was 20.18 percent in 2020-21 [7]. The gross capital formation in agriculture and allied sector was Rs 4460.44 billion at current price in 2019-20 [12].

The food processing sector in India is playing an important role in linking Indian farmers to ultimate consumers in the domestic and international markets. During 2019-20, import value of processed foods was US$ 19.64 billion, which accounts for 4.1 percent of India's total imports (US$ 474.71 billion), whereas export value of processed foods from India was US$ 32.73 billion accounting for about 10.45 percent of India's total exports (US$ 313.36 billion). After WTO formation, the tariff barriers have reduced and trade in value added and high-quality products have increased, but exports are facing risk in terms of meeting the required certifications and also compliance with national and international food safety standards [1], [3], [9]. The recent increase in regional/bilateral trade agreements has also brought additional challenges in terms of changes in the direction of trade of food products [11]. Looking the importance of food processing industries, present study was carried out to find the growth and direction of other

processed foods trade from India. The specific objectives of the present study are: [a] to estimate the growth trend of other processed foods (processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparation and beverages (alcoholic and non-alcoholic) export from the India; and [b] to analyze the direction of other processed foods trade.

MATERIALS AND METHODS

Data used

Many processed foods are exported from India to other member and non-member countries of WTO. Out of several processed foods, export oriented other processed foods considered for the present study. The other processed foods includes: (a) processed groundnut; (b) guar-gum; (c) jaggery and confectionary (cane jaggery, palmyra jaggery, raw cane jaggery, sugar confectionary, chocolates and chewing gum); (d) cocoa products; (e) cereal preparation (bakers wares, biscuits, corn flakes, couscous, crisp bread, ginger bread, malted milk food, other bakery products, other pasta, *papads*, stuffed paste cooked and uncooked paste); and (f) beverages-alcoholic and non-alcoholic (wine, other wine included grapes, whiskies, gin and other gin, coke, mineral water, white wine, brandy, rum, pepsi and soft drinks).

The study was based on the secondary data. The yearly data for export, both in quantity and value term was collected from the Agricultural and Processed Food Products and Export Development Authority (APEDA) website (https://apeda.gov.in/) for the period of 2000-01 to 2020-21.

Out of total export destinations, top ten major importers and others (rest of the countries was clubbed) were considered for the analysis.

Analytical procedure

Growth trend

The exponential function ($Y = a * b^t$) was used to study the temporal growth in other processed foods export from India. Where, Y is the dependent variable (it may be export data), t is the independent variable (it is rank given to the year concerned). Ranking of the year was done in ascending order, a is the functional coefficient used in exponential function and b is the compounding coefficient [13].

Analyzing trade directions

The pattern of direction of tread for selected other processed foods was analyzed by using a first order Markov chain approach. The Markov chain analysis is the estimation of transitional probability matrix P_{ij}. The element of P_{ij} of the matrix P indicates the probability that export will switch from i^{th} country to j^{th} country with the passage of time [4-6], [10]. The diagonal elements P_{ij} in the matrix measure the probability the export share of a country will retained [2], [14-15]. Hence, the assessment of the diagonal elements indicates the preference of an importing country for a particular country's exports. In the context of the present study, the structural changes were treated as a random process with selected importing countries. The average export to a particular country was considered to be a random variable which depended only on the past export to that country. The algebraically form of equation is given below:

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

Where, E_{jt} denotes exports from India to the ith country during the year t; E_{jt-1} denotes export from India to the ith country during the period $t-1$; P_{ij} denotes probability that exports will shift from the ith country to j^{th} country; e_{jt} is the error-term which is statistically independent of e_{jt-1}; t is the number of years considered for analysis and r is the number of importing countries.

The transitional probabilities P_{ij}, which can be arranged in a ($c \times r$) matrix, had following properties.

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

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

The minimum absolute deviations (MAD) estimation procedure was employed to estimate the transitional probability, which minimizes the sum of absolute deviations. The conventional Linear Programming (LP) technique was used, as this satisfies the properties of transitional probabilities of non-negativity restrictions and row sum constraints in estimation [8]. The Linear Programming formulation on analysis was stated as per expression given below:

$$Min \ O \ P^* + I_e$$

$$Subject \ to, \ XP^* + V = Y, \ GP^* = 1, \ P^* \geq 0$$

Where, P^* is a vector of the probabilities P_{ij} is arranged; 0 is vector of zeroes; I is an appropriately dimensional vector of area; e is the vector of absolute errors ($/U/$); Y is the vector of exports to each country; X is a block diagonal matrix of legged value of Y; V is the vector of errors; and G is a grouping matrix to add the row elements of P arranged in P^* to unity.

After calculating the transitional probability matrix, the expected share of export was calculated by using following equation:

$$Y_{jt} = \sum_{j-1}^{r} Y_{it-1} * P_{ij} \ (j = 1,2,3,\ldots r) \ \ldots\ldots\ldots\ldots [2]$$

Where, Y_{jt} is the predicted proportions of the jth country's share at time t, Y_{t-1} is the observed proportion of the ith country's share at time $t-1$, and P_{ij} is the estimated transitional probability matrix.

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. Multiple regression analysis was carried out, using ordinary least squire (OLS) estimation procedure in the statistical software E-views.

RESULTS AND DISCUSSION

Contribution of processed foods export to agricultural export

In 2009-10, total agricultural export from India was Rs 845.62 billion and it was increased to the level of Rs 3052.80 billion by the year 2020-21 (Fig 1).
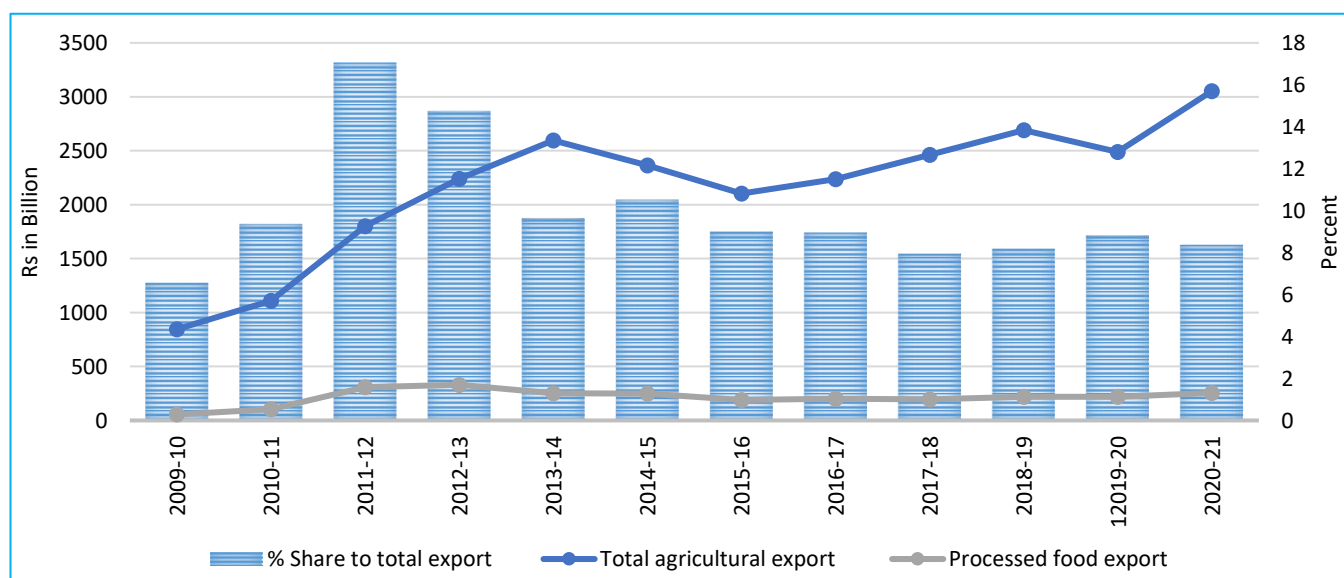

Fig 1 Share of processed foods to total agricultural export (Rs in Billion)

The other processed foods viz., processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparation, milled products, beverages (alcoholic and non-alcoholic) and miscellaneous products export from India was Rs 55.54 billion in 2009-10 and it was growing with a compound growth rate of 8.44 percent per annum and it reached to the level of Rs 255.71 billion by the year 2020-21. The contribution of other processed foods to India's total agricultural export was 6.57 percent in 2009-10 and it was increased to the level of 17.06 percent during 2011-12 and after that it was declined to level of 8.38 percent by the year 2020-21.

Growth trend of processed foods export

Total quantity of processed groundnut export from India was 137.07 thousand tonnes in 2000-01 and it was increased to the level of 638.58 thousand tonnes by the year 2020-21. The growth trend analysis suggests that it was growing with a compound growth rate of 9.91 percent per annum during same period of time. Total value of processed groundnut export from India was Rs 3.16 billion in 2000-01 and it was augmented to Rs 53.82 billion by the year 2020-21. The growth trend analysis for value of processed groundnut export from India was growing with a compound growth rate of 16.86 percent per annum during same period of time (Table 1).

Table 1 Growth performance of processed foods export from India

Name of the processed products	Export (Quantity)				Export (Value)			
	CGR (%)	R^2 value (%)	F-value	b_0	CGR (%)	R^2 value (%)	F-value	b_0
Processed groundnut	9.91*	78.10	67.63	113.359	16.86*	85.80	115.14	2476.38
Guar-gum	5.61*	59.70	28.11	119.453	13.23**	47.90	17.49	5071.05
Jaggery and confectionary	2.52	3.0	0.58	252.553	10.76**	46.80	16.72	2759.65
Cocoa products	18.62*	93.1	257.79	1.0143	28.35*	95.70	421.68	64.61
Cereal preparations	12.88*	87.00	126.72	39.8246	17.59*	95.50	406.30	1688.71
Beverages (alcoholic & non-alcoholic)	11.78*	66.70	38.04	28.4543	19.35*	84.30	102.39	733.24

CGR: Compound growth rate percent per year
*Significant at 1.0 percent level of significance; **Significant at 5.0 percent level of significance

In 2000-01, total quantity of guar-gum export from India was 129.53 thousand tonnes and it was growing with a compound growth rate of 5.61 percent per annum and total export was increased to 234.87 thousand tonnes by the year 2020-21. In 2000-01, total value of guar-gum export from India was Rs 6.03 billion and it was augmented to Rs 19.49 billion by the year 2020-21. The value of guar-gum export from India was growing with a compound growth rate of 13.23 percent per annum during same period of time (Table 1).

Total export quantity of jaggery and confectionary was 209.22 thousand tonnes in 2000-01 and it was reached to the level of 631.90 thousand tonnes by the year 2020-21. The growth trend analysis for jaggery and confectionary export from India was growing with a compound growth rate of 2.52 percent per annum during same period of time. In case of jaggery and confectionery, the value of export from India to different destinations was Rs 2.77 billion in 2000-01 and it was further augmented to Rs 26.60 billion by the year 2020-21. The export of jaggery and confectionary augmenting with a compound growth rate of 10.76 percent per annum during study period (Table 1).

Total quantity of cocoa products export from India was 1.30 thousand tonnes in 2000-01 and it was augmented to 25.77 thousand tonnes by the year 2020-21. The growth trend analysis for cocoa products export was augmenting with a compound growth rate of 18.62 percent per annum during the study period. The value of cocoa export from India was Rs 0.13 billion in 2000-01 and it was reached to the level of Rs 11.08 billion by the year 2020-21. The growth trend analysis for value of cocoa export from India was augmenting with a compound growth rate of 28.35 percent per annum during same period of time (Table 1).

In the year 2000-01, export of cereal preparations from India was 30.19 thousand tonnes and it was reached to the level of 403.27 thousand tonnes by the year 2020-21. The cereal preparations export from India was expanding with a compound growth rate of 12.88 percent per annum during same period of study. In the year 2000-01, value of export of cereal preparations was Rs 1.77 billion and it was reached to Rs 47.06 billion by the year 2020-21. The rate of expansion of value of

export for cereal preparations was growing with a compound growth rate of 17.59 percent per annum during study period (Table 1).

Total beverages (alcoholic & non-alcoholic) export from India was 86.99 thousand tonnes in 2000-01 and it was reached to the level of 247.46 thousand tonnes by the year 2020-21. The beverages (alcoholic & non-alcoholic) export from India was augmenting with a compound growth rate of 11.78 percent per annum during study period. The value of beverages (alcoholic & non-alcoholic) export from India was Rs 1.62 billion and it was reached to the level of Rs 23.87 billion by the year 2020-21. The growth trend analysis for value of export of beverages (alcoholic & non-alcoholic) was growing with a compound growth rate of 19.35 percent per annum during same period of time (Table 1).

Direction of processed foods trade

The transition probability matrix was estimated using Markov chain analysis for the export value of processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparation and beverages (alcoholic and non-alcoholic) from India. Transition probability matrix indicates about the changes in the direction of export from India. The row elements for a particular country indicate the probability of losing the market share by that country to competitive importers. The column elements for a country indicate the probability of gains to that country from other importers in terms of market share. The main diagonal elements show the retention of market share by the corresponding country and an indicator of loyalty of that country to Indian export of particular commodity.

Processed groundnut

India exports processed groundnut to 93 countries and export value was Rs 53816.13 million in 2020-21. Out of total value of export from India, the top nine importers were Indonesia, Vietnam Soc, Rep, Philippines, Malaysia, Thailand, UAE, Russia, Ukraine and Nepal contributes about 80.33 percent and share of remaining countries (84) were 19.67 percent. These all-remaining countries were clubbed into

'others' categories. The results indicate the Indonesia was the most reliable importer of processed groundnut from India which is indicated by retention probability of 72.21 percent of its market share from one period to next period followed by Nepal with a retention probability of 59.78 percent, Vietnam Soc. Rep. with 59.48 percent and Malaysia with retention of 59.09 percent (Table 2). The most unstable importers were Ukraine and Russia, which tend to loose their entire share to other countries in the subsequent period. The medium stable importers were Philippines with a retention probability of 23.50 percent followed by UAE (18.14 percent) and Thailand (16.94 percent). Interestingly 'others' group showed a good loyalty to Indian processed groundnut with a retention probability of 47.54 percent. Therefore, India can improve its exports of processed groundnut by strategically improving the trade with Indonesia and Nepal.

Table 2 Transition probability matrix for export of processed groundnut from India during 2000-01 to 2020-21

	Indonesia	Vietnam Soc Rep	Philippines	Malaysia	Thailand	UAE	Russia	Ukraine	Nepal	Other
Indonesia	0.722	0.000	0.118	0.012	0.000	0.024	0.000	0.014	0.000	0.110
Vietnam Soc Rep	0.026	0.595	0.147	0.017	0.051	0.000	0.035	0.028	0.007	0.095
Philippines	0.054	0.000	0.235	0.088	0.184	0.072	0.007	0.097	0.010	0.253
Malaysia	0.409	0.000	0.000	0.591	0.000	0.000	0.000	0.000	0.000	0.000
Thailand	0.000	0.619	0.000	0.000	0.169	0.000	0.209	0.000	0.003	0.000
UAE	0.000	0.000	0.819	0.000	0.000	0.181	0.000	0.000	0.000	0.000
Russia	0.000	0.175	0.000	0.000	0.768	0.000	0.025	0.000	0.032	0.000
Ukraine	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nepal	0.000	0.402	0.000	0.000	0.000	0.000	0.000	0.000	0.598	0.000
Others	0.242	0.000	0.000	0.242	0.000	0.001	0.004	0.030	0.007	0.475

Guar-gum

The value of guar-gum export from India was Rs 19490.71 billion and it was exported to 112 countries in the world during 2020-21. The top nine guar-gum importing countries were USA, Russia, Germany, China P Rp, UK, Canada, Italy, Australia, Brazil and these countries contributes about 67.57 percent to total guar-gum export from India and remaining 32.43 percent contribution was from remaining 103 countries. Rest of the countries (103) were clubbed into 'others' categories. Out of nine countries and 'other' countries group, Russia was the most reliable importer of Indian guar-gum indicated by retention probability of 98.10 percent of its market share from one period to next period followed by USA with a retention probability of 86.10 percent, 'other' country group with retention probability of 74.58 percent and UK with retention probability of 72.69 percent (Table 3).

Table 3 Transition probability matrix for export of guar-gum from India during 2000-01 to 2020-21

	USA	Russia	Germany	China P Rp	UK	Canada	Italy	Australia	Brazil	Other
USA	0.861	0.000	0.000	0.086	0.004	0.018	0.012	0.003	0.004	0.012
Russia	0.000	0.981	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019
Germany	0.000	0.000	0.495	0.477	0.000	0.000	0.026	0.002	0.000	0.000
China P Rp	0.423	0.000	0.000	0.073	0.000	0.000	0.000	0.043	0.054	0.407
UK	0.000	0.000	0.000	0.000	0.727	0.224	0.000	0.000	0.000	0.049
Canada	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000	0.800
Italy	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Australia	0.000	0.000	0.611	0.000	0.000	0.000	0.083	0.306	0.000	0.000
Brazil	0.590	0.410	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other	0.000	0.000	0.155	0.000	0.013	0.000	0.055	0.014	0.018	0.746

The most unstable importer of Indian guar-gum was Italy which tend to loose their entire share to other countries in the subsequent period. The medium stable importers were Germany with a retention probability of 49.50 percent followed by Australia (30.57 percent), Canada (20.01 percent) and China P Rp (7.29 percent). Therefore, India can improve its export of guar-gum by strategically improving the trade with Russia and USA.

Table 4 Transition probability matrix for export of jaggery and confectionary from India during 2000-01 to 2020-21

	Sri Lanka Dsr	Sudan	Nepal	Nigeria	USA	Indonesia	Tanzania Rep	Kenya	UAE	Others
Sri Lanka Dsr	0.101	0.000	0.250	0.011	0.000	0.000	0.062	0.120	0.344	0.112
Sudan	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.204	0.785
Nepal	0.000	0.000	0.454	0.000	0.247	0.000	0.058	0.000	0.000	0.240
Nigeria	0.000	0.193	0.057	0.471	0.000	0.000	0.208	0.070	0.000	0.000
USA	0.000	0.000	0.000	0.000	0.130	0.000	0.000	0.000	0.000	0.870
Indonesia	0.054	0.000	0.000	0.000	0.000	0.000	0.056	0.000	0.725	0.165
Tanzania Rep	0.000	0.077	0.000	0.526	0.112	0.000	0.285	0.000	0.000	0.000
Kenya	0.000	0.000	0.428	0.042	0.000	0.000	0.000	0.530	0.000	0.000
UAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.223	0.713
Others	0.125	0.037	0.000	0.000	0.025	0.055	0.000	0.000	0.018	0.740

Jaggery and confectionary

During 2020-21, India exports jaggery and confectionary to 161 countries and total value of export was Rs 26595.70 million. Top nine jaggery and confectionary importing countries were Sri Lanka Dsr, Sudan, Nepal, Nigeria, USA, Indonesia, Tanzania Rep, Kenya UAE and these countries were

contributing about 52.35 percent of total export value of jaggery and confectionary, whereas remaining 152 countries were contributing about 47.65 percent of total export value from India during 2020-21. Therefore, 152 countries were clubbed in one group i.e. 'other' countries. The Markov analysis suggests that, 'other' group of countries showed a most reliable importer to India's jaggery and confectionary with retention probability of 74.02 percent (Table 4). Kenya was the loyal importer of Indian jaggery and confectionary by retention probability of 52.99 percent.

Apart from this, there were moderately loyal importers like Nigeria with retention probability of 47.09 percent followed by Nepal (45.45 percent), Tanzania Rep (28.54 percent), UAE (22.32 percent), USA (13.02 percent) and Sri Lanka Dsr with retention probability of 10.13 percent. Sudan showed a very little retention probability of 1.14 percent. Indonesia was absolutely unstable market for Indian jaggery and confectionary inclining to loose their entire market share to other importing countries.

Cocoa products

During 2020-21, India exporting cocoa products to 114 countries and total value of export was Rs 11083.84 million.

Top ten cocoa products importing countries were USA, Turkey, Indonesia, Netherland, Nepal, Saudi Arab, UAE, Philippines, Germany and Malaysia and share of these countries to total cocoa products export value was 70 percent, whereas rest of the countries (104) were contributing 30 percent during 2020-21. Therefore, rest of the countries was clubbed into 'other' category. Results of Markov chain analysis suggests that, the 'others' group showed most loyal importer of India's cocoa products with a retention probability of 59.03 percent. UAE was the reliable importer of cocoa products from India with retention probability of 52.07 percent of its market share from one period to next period followed by Nepal with retention probability of 50.67 percent (Table 5).

The most unstable importers were Philippines and Malaysia which incline to loose their entire share to other countries in the subsequent period. The medium stable importers were USA with a retention probability of 49.87 percent followed by Turkey (48.14 percent), Indonesia (34.20 percent), Germany (24.96 percent), Saudi Arab (15.09 percent) and Netherland with a retention probability of 8.30 percent. Based on above discussion, India can improve its cocoa products export with UAE, Nepal and USA by strategically aggressive campaigning.

Table 5 Transition probability matrix for export of cocoa from India during 2007-08 to 2020-21

	USA	Turkey	Indonesia	Netherland	Nepal	Saudi Arab	UAE	Philippines	Germany	Malaysia	Others
USA	0.499	0.000	0.025	0.010	0.000	0.029	0.000	0.091	0.047	0.111	0.190
Turkey	0.351	0.481	0.021	0.000	0.000	0.048	0.000	0.097	0.001	0.000	0.000
Indonesia	0.000	0.000	0.342	0.000	0.000	0.000	0.074	0.000	0.000	0.000	0.584
Netherland	0.000	0.000	0.000	0.083	0.000	0.065	0.000	0.000	0.000	0.000	0.852
Nepal	0.000	0.000	0.000	0.417	0.507	0.000	0.000	0.000	0.000	0.076	0.000
Saudi Arab	0.000	0.140	0.567	0.000	0.000	0.151	0.000	0.000	0.119	0.000	0.023
UAE	0.105	0.000	0.000	0.000	0.000	0.301	0.521	0.073	0.000	0.000	0.000
Philippines	0.000	0.931	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.000	0.000
Germany	0.000	0.024	0.533	0.000	0.000	0.000	0.193	0.000	0.250	0.000	0.000
Malaysia	0.000	0.000	0.000	0.858	0.142	0.000	0.000	0.000	0.000	0.000	0.000
Others	0.230	0.000	0.000	0.000	0.086	0.038	0.055	0.000	0.002	0.000	0.590

Cereal preparations

India exports cereal preparations to 175 countries and value of total export was Rs 47058.09 million during 2020-21. Top ten cereal preparations importing countries were USA, Nepal, Bangladesh Pr, UAE, UK, Canada, Australia, Malaysia, Saudi Arab and Bhutan with the contribution of about 66 percent of total export value and contribution comes from the rest of the countries (165) were 34 percent during 2020-21. Remaining 165 countries were clubbed into 'others' categories. Out of ten countries and 'other' group, UK was the most reliable importer for cereal preparations from India with retention

probability of 91.20 percent followed by Malaysia (84.43 percent), 'other' countries (77.50%), Bangladesh Pr (61.07 percent), Bhutan (60.64 percent) and Canada with retention probability of 54.46 percent (Table 6). The most volatile cereal preparations importer was Australia which tend to loose their entire share to other countries in the subsequent period. The medium stable importers were USA with retention probability of 39.24 percent followed by Saudi Arab (23.58 percent), UAE (20.80 percent) and Nepal (20.20 percent). From the above discussion, India can improve cereal preparations export by intentionally improving the trade with UK and Malaysia.

Table 6 Transition probability matrix for export of cereal preparation from India during 2000-01 to 2020-21

	USA	Nepal	Bangladesh Pr	UAE	UK	Canada	Australia	Malaysia	Saudi Arab	Bhutan	Others
USA	0.392	0.058	0.000	0.130	0.000	0.000	0.000	0.000	0.041	0.000	0.378
Nepal	0.436	0.202	0.280	0.000	0.000	0.003	0.000	0.026	0.000	0.053	0.000
Bangladesh Pr	0.005	0.000	0.611	0.146	0.000	0.055	0.041	0.000	0.143	0.000	0.000
UAE	0.000	0.777	0.000	0.208	0.000	0.001	0.014	0.000	0.000	0.000	0.000
UK	0.077	0.000	0.000	0.000	0.912	0.000	0.000	0.000	0.011	0.000	0.000
Canada	0.000	0.000	0.000	0.000	0.000	0.545	0.455	0.000	0.000	0.000	0.000
Australia	0.000	0.000	0.000	0.000	0.000	0.226	0.000	0.000	0.000	0.000	0.774
Malaysia	0.082	0.000	0.000	0.000	0.000	0.074	0.000	0.844	0.000	0.000	0.000
Saudi Arab	0.107	0.104	0.000	0.000	0.207	0.041	0.223	0.040	0.236	0.043	0.000
Bhutan	0.044	0.000	0.148	0.009	0.000	0.186	0.000	0.006	0.000	0.606	0.000
Others	0.147	0.000	0.000	0.053	0.000	0.001	0.016	0.000	0.005	0.004	0.775

Beverages (alcoholic and non-alcoholic)

India exports beverages (alcoholic and non-alcoholic) to 102 countries and total value of export was Rs 23869.12 million during 2020-21. Top ten beverages (alcoholic and non-alcoholic) importing countries were UAE, Ghana, Singapore, Congo, Cameroon, Angola, Haiti, Netherland, Nigeria and UK and they were contributing about 68 percent of total export value from India. The contribution of remaining 92 countries to total beverages (alcoholic and non-alcoholic) export value from India was 32.00 percent during 2020-21. Therefore, 92 countries were clubbed in one group i.e. 'other' countries. The Markov analysis suggest that, Haiti was the most loyal importer of beverages (alcoholic and non-alcoholic) by retention probability of 100 percent followed by Angola (64.60 percent), Singapore (55.60 percent) and Congo with retention probability of 52.60 percent (Table 7).

Table 7 Transition probability matrix for export of beverages (alcoholic and non-alcoholic) from India during 2000-01 to 2020-21

	UAE	Ghana	Singapore	Congo	Cameroon	Angola	Haiti	Netherland	Nigeria	UK	Others
UAE	0.070	0.000	0.055	0.000	0.000	0.032	0.000	0.093	0.000	0.011	0.738
Ghana	0.000	0.451	0.000	0.000	0.169	0.000	0.000	0.000	0.320	0.000	0.061
Singapore	0.000	0.200	0.556	0.102	0.116	0.000	0.026	0.000	0.000	0.000	0.000
Congo	0.000	0.000	0.000	0.526	0.000	0.266	0.000	0.208	0.000	0.000	0.000
Cameroon	0.000	0.000	0.647	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.353
Angola	0.000	0.338	0.000	0.000	0.016	0.646	0.000	0.000	0.000	0.000	0.000
Haiti	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000
Netherland	0.651	0.000	0.000	0.000	0.000	0.000	0.000	0.349	0.000	0.000	0.000
Nigeria	0.510	0.017	0.000	0.000	0.000	0.000	0.009	0.143	0.321	0.000	0.000
UK	0.398	0.000	0.000	0.000	0.000	0.602	0.000	0.000	0.000	0.000	0.000
Others	0.476	0.000	0.009	0.010	0.000	0.011	0.000	0.000	0.006	0.007	0.481

The 'other' group of countries showed a medium dependability towards India's beverages (alcoholic and non-alcoholic) import with retention probability of 48.10 percent. The moderately reliable importers were Ghana with retention probability of 45.10 percent followed by Netherland (34.90 percent), Nigeria (32.1 percent) and UAE with retention probability of 7.00 percent. Cameroon and UK was completely volatile market for Indian beverages (alcoholic and non-alcoholic) tending to loose their entire share to other importing countries.

CONCLUSION

India's agricultural sector has gone an incredible conversion from food-deficit to food surplus country [12]. Processed foods export from country was Rs 55.54 billion in 2009-10 and it was reached to Rs 219.99 billion by the year 2020-21. In the year 2020-21, contribution of other processed foods to India's total agricultural export was 8.35 percent. During 2000-01 to 2020-21, the growth trend analysis for export value of processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparation and beverages (alcoholic and non-alcoholic) suggests that it was growing with compound growth rate of 16.86, 13.23, 10.76, 28.35, 17.59 and 19.35 percent per annum respectively. The Markov chain analysis suggests that most reliable importer of processed groundnut, guar-gum, jaggery and confectionary, cocoa products, cereal preparations and beverages (alcoholic and non-alcoholic) were Indonesia, Russia, Kenya, UAE, UK and Haiti respectively. Further augment the exports of other process products to Indonesia, Russia, Kenya, UAE, UK and Haiti through strategic agreements, aggressive campaigning, participating and organizing trade fares and exhibitions. Focus should be given to explore the trade opportunities in non-traditional importing countries as they have good signs of being loyal importers.

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