International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 24s, 2025
https://theaspd.com/index.php/ijes/index

A Constant Market Share Analysis of India's Export Competitiveness of Fruits, Nuts and Vegetables

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Abstract
Horticultural exports in developing countries are a tool for enhancement of livelihoods, and employment creation. This study assessed the pattern of India's horticultural export competitiveness vis-a-viz the rest of the world, focusing on high value horticultural products of fruits, nuts, and vegetables. It assumed the Constant Market Share method for same products for the period 2002 -2021. Results of the study came out a mixed bag. In the vegetable category, products like mushroom, tomatoes, onions, and cabbages revealed a positive competitive effect. The result showed growth in India's global share for the same products in markets like the United Arab Emirates, a situation that could be attributed to large Indian diaspora population in same country. On the other hand, commodities like green beans, cucumbers and fresh vegetables recorded negative competitive effects. Under fruits and nuts, the products showed a strong structural competitive effect suggesting a global demand driven by global demographic appetite for healthy and nutritional dietary requirements. The results have a trade policy ramification that India needs to strengthen product specific and market specific strategies to enhance competitiveness of all horticultural products as well as strengthen value chain linkages, from farm to fork.
Keywords: *Export competitiveness, constant market share analysis, world exports*

INTRODUCTION
Nations have adopted export-led growth as a key strategy for economic development and enhancement of export competitiveness is fundamental to their development trajectory (Kumar, K.N.R., Mishra, 2023). Agriculture has emerged as one of the fastest export-led growth domains with potential to generate export earnings and impact positively on nations development (Jha, G.K., Punera, 2019). In that context, India is one such country whose horticultural sector has grown phenomenally (Mitra, A. and Panda, 2020). The country's horticultural production as maintained an upward trend, increasing from USD3,35 billion to USD41,56 billion during the period 1990-91 – 2021/22 (Kumar. K, 2022). Riding on high value products like fruits, nuts and vegetables, horticulture in India has emerged as a sunrise industry (Janbandhu. M.H., 2024). This development comes against growth in world population with high demand for dietary and healthy foods like fruits and vegetables. Incidentally, India is the global second largest producer of fruits and vegetables after China (Priyadarshini., M Kundu, K.K and Bishnoi, 2020). Horticulture in India contributes immensely to the country's Gross Domestic Product (Ismaiel, M, I.A., 2023).

Though the World Trade Organisation (WTO) has enabled significant tariff reductions, exports of high value products like fruits, nuts and vegetables face huge risks from non-tariff barriers, which exist in the form of compliance and certification protocols (Mouzam, 2020). Despite India registering remarkable growth in agricultural output, the share of agricultural exports as a percentage of the nation's basket of exports fell from 18.47% to 14.20%. (Kumar, K.N.R., Mishra, 2023). With the increasing global importance of fruits and vegetables for both diet and health security as well as revenue potential, against stringent sanitary and phytosanitary standards, it is important to examine how well India is performing in the international market. It is therefore appropriate to delineate India's position and competitiveness in world market for horticultural products of FV. International competitiveness is a common concept used to address such concerns. Attending to such issues enables crafting of development strategies by exports as well as policy markers (Suresh, D., and Varalakshmi, 2017).

Against this background, the study rides on the objective to determine changes in patterns of global competitiveness of FV exports, using econometric method of Constant Market Share analysis. The timeframe covered is from 2002 to 2021.

MATERIALS AND METHODS

India's export performance of its high value horticultural products of fruits, and vegetables and nuts have been examined by using the CMSA. The selected time period of 2002 to 2021 was convenient for the study due to data availability. Data on Indian fruits, nuts and vegetables covering exports to major destinations as well as on FV of importing countries were obtained from the United Nations Commodity Trade Statistics (UN COMTRADE) database.

Econometric Tool

To determine competitiveness, the CMS analysis was employed. Specifically, it was used to examine the changing patterns of competitiveness of India's FV in the global market for the period 2002 and 2021. The model, introduced by Tysznskin and Richardson and later modified by Ahmadi-Esfahani and adapted by Jepma's version was used to analyse the competitiveness of horticultural commodities of fruits, nuts and vegetables in the global market. The model is employed to assess the structural changes in international trade both in terms of exports and imports, in the process ascertaining export performance of India across major geographical destinations globally. The model decomposes the world exports into four categories/ effects that is WDE, Commodity Composition Effect (CCE), MDE and the Residual Competitiveness Effect (RCE). The model is shown as:

RESULTS AND ANALYSIS

The results of the CMS analysis for India's fruits, nuts and vegetable exports over the period 2001–2022 provide insights into the contribution of global demand trends (structural effect) and India's export performance (competitive effect) across major products and markets. By decomposing the total change in exports into these components, the analysis identifies products where growth was driven by favourable market conditions and those where competitiveness played a key role. The results highlight variations across commodities, with some products strengthening their market position while others experienced a decline in market share despite global demand growth.

Table 1 Vegetable Data (Value in 1000 USD)

Product	Market	*Country Export (Base Year)2003 (Value in 1000 USD)*	*Country Export (Comparison Year)2022 (Value in 1000 USD)*	*World Export (Base Year)2003 (Value in 1000 USD)*	*World Export (Comparison Year)2022 (Value in 1000 USD)*	World Growth Rate	Expected Export	Structural Effect	Actual Change	Competitive Effect
Onion	United Arab Emirates	13,033.24	68,965.77	1,17,701.12	5,24,591.41	3.46	58088.88	45055.64	55932.53	10876.89
Tomato	United Arab Emirates	5.97	1,449.16	1,194.65	21,137.43	16.69	105.63	99.66	1443.19	1343.53
Green beans	United Arab Emirates	71.8	77.07	164.07	191.21	0.17	83.68	11.88	5.27	-6.61
Garlic	United Ara	69.28	486.90	480.63	8,793.87	17.30	1267.58	1198.30	417.62	-780.68

	b Emirates									
Mushrooms	United Arab Emirates	72.50	100.79	6,725.60	1,755.07	-0.74	18.92	-53.58	28.29	81.87
Cucumber	United Arab Emirates	0.00	408.55	9,907.91	879.17	-0.91	0.00	0.00	408.55	408.55
Cabbage lettuce, fresh or chilled	United Arab Emirates	0.00	61.48	41.12	189.82	3.62	0.00	0.00	61.48	61.48
Other vegetables, fresh or chilled, nes	United Arab Emirates	3,858.41	15,437.77	16,057.28	93,080.89	4.80	22366.44	18508.03	11579.36	-6928.67
Carrots and turnips, fresh or chilled	United Arab Emirates	1.12	350.71	19.41	547.37	27.20	31.58	30.46	349.59	319.13
Fruits of genus Capiscum or Pimenta, fresh or c	Bangladesh	33.43	917.99	2,183.07	47,082.20	20.57	720.98	687.55	884.56	197.01
Peas, fresh or chilled	Australia	4.42	1.78	1,885.23	740.11	-0.61	1.74	-2.68	-2.64	0.04
Spinach, fresh or chilled	Qatar	0	49.04	3.42	98.17	27.70	0.00	0.00	49.04	49.04
Beetroot... radishes and other similar edible ro	Japan	0	4.78	119.09	454.94	2.82	0.00	0.00	4.78	4.78
Aubergines, fresh or chilled	Bhutan	0	238.65	161.7	313.28	0.94	0.00	0.00	238.65	238.65
White and red cabbages, kohlrabi, kale...etc, f	Maldives	10.1	1,700.22	69	2,194.18	30.80	321.18	311.08	1690.12	1379.04
Seed potatoes	Saudi Arabia	0	465.54	662.78	725.2	0.09	0.00	0.00	465.54	465.54

Leguminous vegetables, fresh or chilled, nes	Germany	0.34	0.06	34.66	395.92	10.42	3.88	3.54	-0.28	-3.82
Potatoes, frozen	Sri Lanka	264.01	99.59	671.66	4,654.86	5.93	1829.69	1565.68	-164.42	-1730.10
Mixtures of vegetables, frozen	Canada	133.37	425.87	9,411.21	5,739.97	-0.39	81.34	-52.03	292.50	344.53
Manioc, fresh or dried	United States	30.29	63.16	31.12	2,837.86	90.19	2762.17	2731.88	32.87	-2699.01
Cauliflowers and headed broccoli, fresh or chil	Nepal	1.89	11.65	19.21	245.91	11.801145 2	24.194164 5	22.3041645	9.76	-12.5441645
Leeks and other alliaceous vegetables, nes	Bangladesh	71.83	0	135.13	22.12	-0.8363057 8	11.758155 8	-60.0718441	-71.83	-11.7581558
Brussels sprouts, fresh or chilled	Nepal	15.63	0	15.63	19.8	0.2667946 2	19.8	4.17	-15.63	-19.8
Spinach, frozen	United States	0.4	64.56	0.56	303.27	540.55357 1	216.621428	216.221428	64.16	-152.061428
Sweet corn, frozen	United States	91.92	1,305.55	198.41	20,929.67	104.48697 1	9696.36241	9604.44241	1213.63	-8390.81241
Other vegetables and mixture of vegetables pro	Germany	1,049.68	655.48	7,248.51	9,493.17	0.3096719 1	1374.73642	325.056419	-394.2	-719.256419
Roots and tubers with high starch content, fres	Nepal	43.77	7.83	588.56	603.43	0.0252650 5	44.875851 4	1.1058514	-35.94	-37.0458514

International Journal of Environmental Sciences
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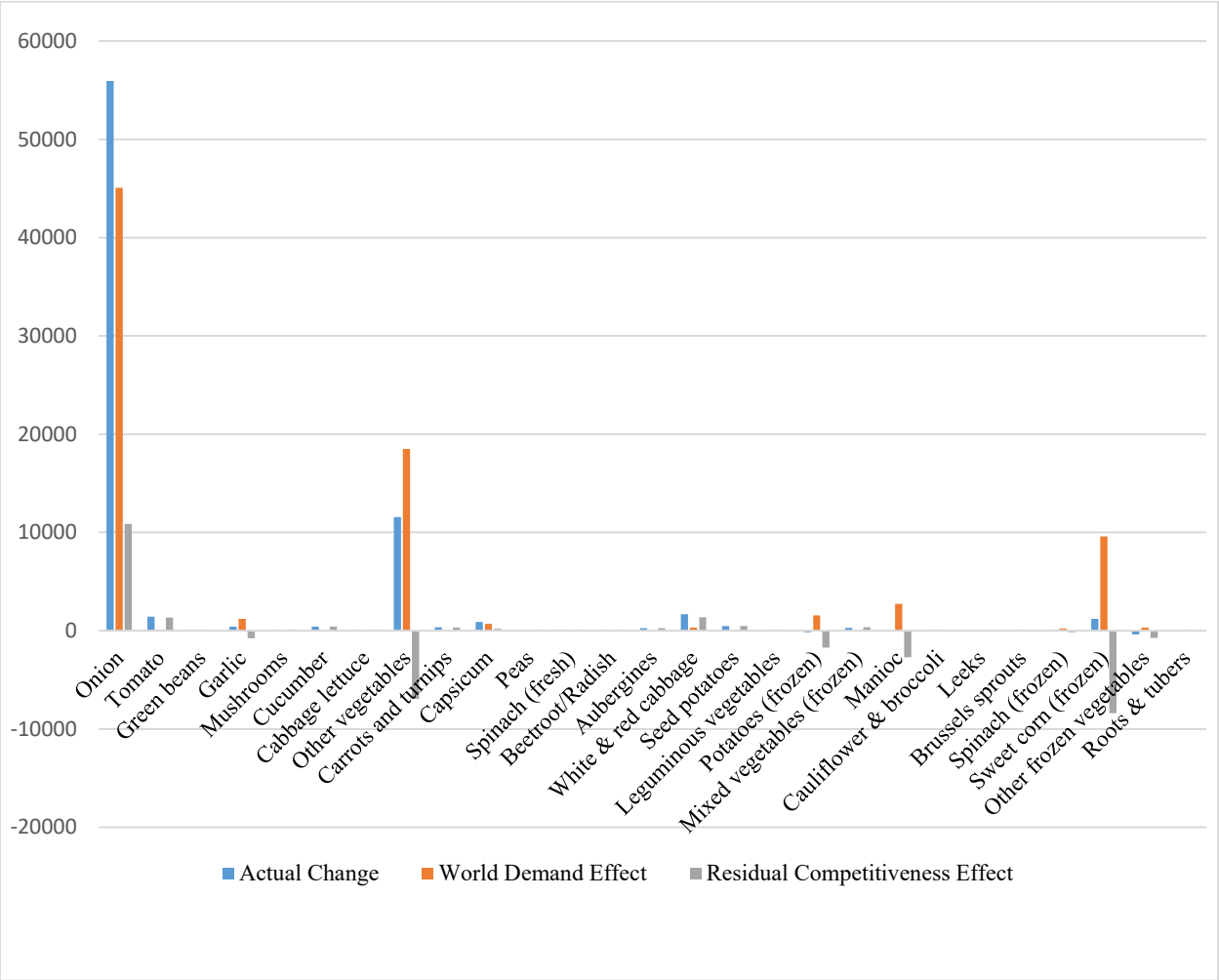


Fig.1

According to the graph illustrations, exports increased from $13,033.24 in 2003 to $68,965.77 in 2022, resulting in an actual change of $55,932.53. The structural effect contributed $45,055.64, and the competitive effect was $10,876.89, indicating a strong gain in India's market competitiveness. Exports grew from $5.97 to $1,449.16, marking an actual increase of $1,443.19. The structural effect was only $99.66, while the competitive effect accounted for $1,343.53, showing high competitiveness-driven growth. Exports rose from $71.80 to $77.07, with an actual change of $5.27. The structural effect added $11.88, but the competitive effect was negative at $-6.61, suggesting a marginal decline in competitiveness. Exports jumped from $69.28 to $486.90, a change of $417.62. However, a strong structural effect of $1,198.30 was partially offset by a negative competitive effect of $-780.68, reflecting competitive disadvantage.

Exports moved up from $72.50 to $100.79 ($28.29 change), despite a negative structural effect of $-53.58. The positive competitive effect of $81.87 suggests improved export performance due to competitiveness. There were no exports in 2003, but in 2022 exports rose to $408.55, fully driven by competitiveness (competitive effect: $408.55). Exports began at zero and reached $61.48 in 2022, completely attributed to competitive gains (competitive effect: $61.48). Exports increased from $3,858.41 to $15,437.77, a rise of $11,579.36. However, the competitive effect was negative at $-6,928.67, despite a structural gain of $18,508.03, suggesting India lost competitiveness. Exports surged from $1.12 to $350.71, a $349.59 rise. The structural effect contributed $30.46, and the competitive effect was a strong $319.13. Exports expanded from $33.43 to $917.99, a gain of $884.56, with $687.55 from structural effect and $197.01 from competitiveness. Exports declined from $4.42 to $1.78, a drop of $-2.64, due to a structural loss of $-2.68, while competitiveness remained almost neutral ($0.04). No exports in 2003, but exports reached $49.04 in 2022 fully due to competitive growth. Also starting from zero, exports rose to $4.78 attributed entirely to competitiveness. Exports began at zero and grew to $238.65, with competitive effect accounting for the entire

increase. Exports rose from $10.10 to $1,700.22, an increase of $1,690.12, out of which $311.08 came from structural change and $1,379.04 from competitiveness. No exports in 2003, but in 2022 exports reached $465.54, fully explained by competitive advantage. Exports declined slightly from $0.34 to $0.06, a change of $-0.28, despite a structural boost of $3.54, suggesting a competitive decline of $-3.82. Exports dropped from $264.01 to $99.59, a loss of $-164.42. Even though the structural effect was $1,565.68, competitiveness fell sharply by $-1,730.10.

Exports increased from $133.37 to $425.87, with an actual gain of $292.50, despite a structural decline of $-52.03, due to strong competitive gain of $344.53. Exports rose from $30.29 to $63.16, an increase of $32.87, but most of the structural growth of $2,731.88 was lost due to $-2,699.01 competitiveness drop. Exports increased from $1.89 to $11.65, a rise of $9.76. Structural gains were $22.30, but competitiveness eroded by $-12.54.

Exports dropped from $71.83 to $0.00, a total loss of $-71.83, despite a small competitive gain of $11.76 after a major structural fall of $-60.07. Exports were $15.63 in 2003 but dropped to zero by 2022. The competitive effect of $-19.80 reversed the minor structural gain of $4.17. Exports grew from $0.40 to $64.56, a change of $64.16, primarily driven by a structural gain of $216.22 with competitive losses of $-152.06. Exports rose from $91.92 to $1,305.55, increasing by $1,213.63. However, a large structural gain of $9,604.44 was negated by $-8,390.81 in competitiveness. Exports declined from $1,049.68 to $655.48, a drop of $-394.20, despite a structural boost of $325.06, due to a competitive fall of $-719.26. Exports dropped from $43.77 to $7.83, a fall of $-35.94, despite a minor structural gain of $1.11, pointing to competitive loss of $-37.05.

Table 2 Decomposition of India's Vegetable Exports Using Constant Market Share Analysis (2003–2022)

Product	Actual Change ($1000 USD)	World Demand Effect ($ 1000 USD, %)	Commodity Composition Effect ($1000 USD, %)	Market Distribution Effect ($1000 USD, %)	Residual Competitiveness Effect ($ 1000 USD, %)
Onion	55932.53	45055.64 (80.6%)	0 (0%)	0 (0%)	10876.89 (19.4%)
Tomato	1443.19	99.66 (6.9%)	0 (0%)	0 (0%)	1343.53 (93.1%)
Green beans	5.27	11.88 (225.4%)	0 (0%)	0 (0%)	-6.61 (-125.4%)
Garlic	417.62	1198.30 (286.9%)	0 (0%)	0 (0%)	-780.68 (-186.9%)
Mushrooms	28.29	-53.58 (-189.4%)	0 (0%)	0 (0%)	81.87 (289.4%)
Cucumber	408.55	0.00 (0.0%)	0 (0%)	0 (0%)	408.55 (100.0%)
Cabbage lettuce	61.48	0.00 (0.0%)	0 (0%)	0 (0%)	61.48 (100.0%)
Other vegetables	11579.36	18508.03 (159.8%)	0 (0%)	0 (0%)	-6928.67 (-59.8%)
Carrots and turnips	349.59	30.46 (8.7%)	0 (0%)	0 (0%)	319.13 (91.3%)
Capsicum	884.56	687.55 (77.7%)	0 (0%)	0 (0%)	197.01 (22.3%)
Peas	-2.64	-2.68 (101.5%)	0 (0%)	0 (0%)	0.04 (-1.5%)
Spinach (fresh)	49.04	0.00 (0.0%)	0 (0%)	0 (0%)	49.04 (100.0%)
Beetroot/Radish	4.78	0.00 (0.0%)	0 (0%)	0 (0%)	4.78 (100.0%)
Aubergines	238.65	0.00 (0.0%)	0 (0%)	0 (0%)	238.65 (100.0%)
White & red cabbage	1690.12	311.08 (18.4%)	0 (0%)	0 (0%)	1379.04 (81.6%)
Seed potatoes	465.54	0.00 (0.0%)	0 (0%)	0 (0%)	465.54 (100.0%)

Leguminous vegetables	-0.28	3.54 (-1264.3%)	0 (0%)	0 (0%)	-3.82 (1364.3%)
Potatoes (frozen)	-164.42	1565.68 (-952.2%)	0 (0%)	0 (0%)	-1730.10 (1052.2%)
Mixed vegetables (frozen)	292.5	-52.03 (-17.8%)	0 (0%)	0 (0%)	344.53 (117.8%)
Manioc	32.87	2731.88 (8311.2%)	0 (0%)	0 (0%)	-2699.01 (-8211.2%)
Cauliflower & broccoli	9.76	22.30 (228.5%)	0 (0%)	0 (0%)	-12.54 (-128.5%)
Leeks	-71.83	-60.07 (83.6%)	0 (0%)	0 (0%)	-11.76 (16.4%)
Brussels sprouts	-15.63	4.17 (-26.7%)	0 (0%)	0 (0%)	-19.80 (126.7%)
Spinach (frozen)	64.16	216.22 (337.0%)	0 (0%)	0 (0%)	-152.06 (-237.0%)
Sweet corn (frozen)	1213.63	9604.44 (791.4%)	0 (0%)	0 (0%)	-8390.81 (-691.4%)
Other frozen vegetables	-394.2	325.06 (-82.5%)	0 (0%)	0 (0%)	-719.26 (182.5%)
Roots & tubers	-35.94	1.10 (-3.1%)	0 (0%)	0 (0%)	-37.05 (103.1%)

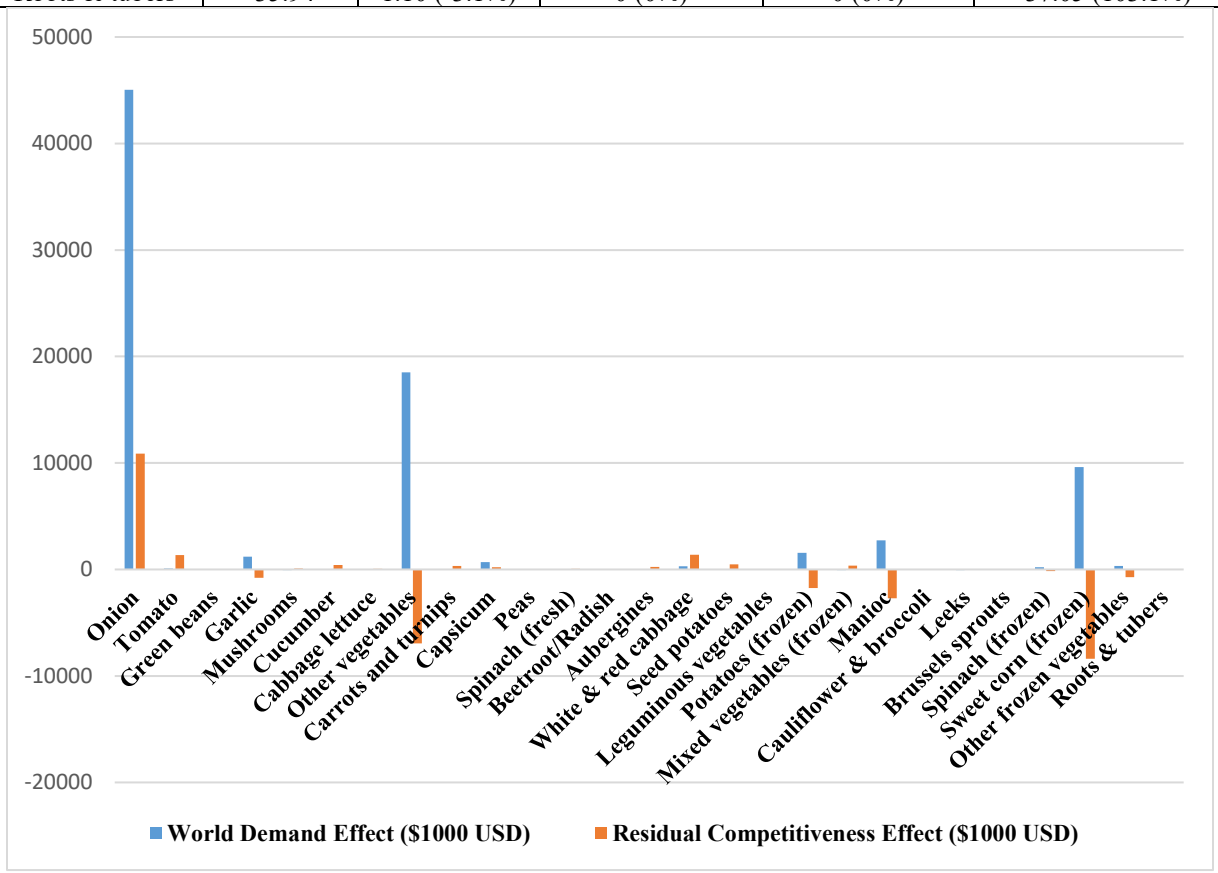


Fig.2

India's onion exports increased by $55,932.53k, with $45,055.64k (80.6%) attributed to global demand growth. The remaining $10,876.89k (19.4%) gain was due to India's residual competitiveness, indicating a strong position in the global onion market. Exports rose by $1,443.19k, where only $99.66k (6.9%) came from rising global demand. A large part—$1,343.53k (93.1%) was due to India's competitive edge, showing

India's improving capability in tomato exports. The total export increase was $5.27k. While world demand effect was $11.88k (225.4%), the residual competitiveness effect was negative ($-6.61k), implying a decline in India's performance despite favourable market conditions. India's garlic exports grew by $417.62k, with $1,198.30k coming from world demand. However, competitiveness dropped by $780.68k, suggesting India did not fully capitalize on global opportunities.

A modest growth of $28.29k was recorded, despite a negative world demand effect ($-53.58k). The gain came from a positive competitive effect ($81.87k), showing improved competitiveness in a declining global market. India recorded $408.55k in cucumber exports, entirely due to competitive effect (100%), with no contribution from world demand. All the $61.48k growth was driven by India's competitiveness, as global demand had no effect. The increase was $11,579.36k, though $18,508.03k (159.8%) was attributed to global demand. A negative competitiveness effect ($-6,928.67k) indicates that India underperformed compared to global market expansion. India's exports rose by $349.59k, primarily due to residual competitiveness ($319.13k, 91.3%), and $30.46k from world demand. The total rise of $884.56k was supported by $687.55k (77.7%) from world demand and $197.01k due to competitiveness. A small decline of $2.64k occurred. Though world demand fell by $2.68k, India's competitiveness slightly improved by $0.04k. With no impact from global demand, the entire $49.04k growth came from India's competitive performance. Exports increased by $4.78k, entirely due to India's competitiveness, with 0% from demand effect. A $238.65k export rise was fully due to India's improved competitiveness in the absence of global demand contribution. India achieved $1,690.12k in growth. Global demand explained $311.08k (18.4%), and $1,379.04k (81.6%) came from improved competitiveness. The entire $465.54k growth in seed potato exports came from residual competitiveness, not global demand. Although world demand increased by $3.54k, India's competitiveness fell sharply by $-3.82k, resulting in a marginal decline of $-0.28k. A significant fall of $-164.42k, despite high world demand ($1,565.68k). India's competitiveness declined steeply by $-1,730.10k, indicating a major competitive setback.

Despite a negative demand effect ($-52.03k), India's competitiveness drove an overall $292.5k gain, with a positive competitive effect of $344.53k. India saw a small gain of $32.87k, but world demand effect was extremely high ($2,731.88k), and competitiveness dropped sharply by $-2,699.01k, indicating a failure to capture global market opportunities. Of the $9.76k increase, world demand contributed $22.30k (228.5%), but a negative competitive effect ($-12.54k) suggests India lost share despite favourable conditions. Exports declined by $71.83k, largely due to negative demand ($-60.07k), but India also lost competitiveness by $-11.76k. A small export fall of $15.63k was primarily driven by a competitive disadvantage ($-19.80k) despite a modest increase in global demand. Although demand grew by $216.22k, the net export increase was only $64.16k, with a competitive loss of $-152.06k, showing underperformance. A large $1,213.63k gain was outweighed by an enormous demand surge ($9,604.44k). India's competitiveness dropped by $-8,390.81k, indicating it failed to maintain its share. Exports dropped by $394.2k, despite a positive demand effect ($325.06k). India experienced a competitive loss of $-719.26k. A small decline of $35.94k occurred even with slight world demand growth. The entire drop was due to competitiveness loss ($-37.05k).

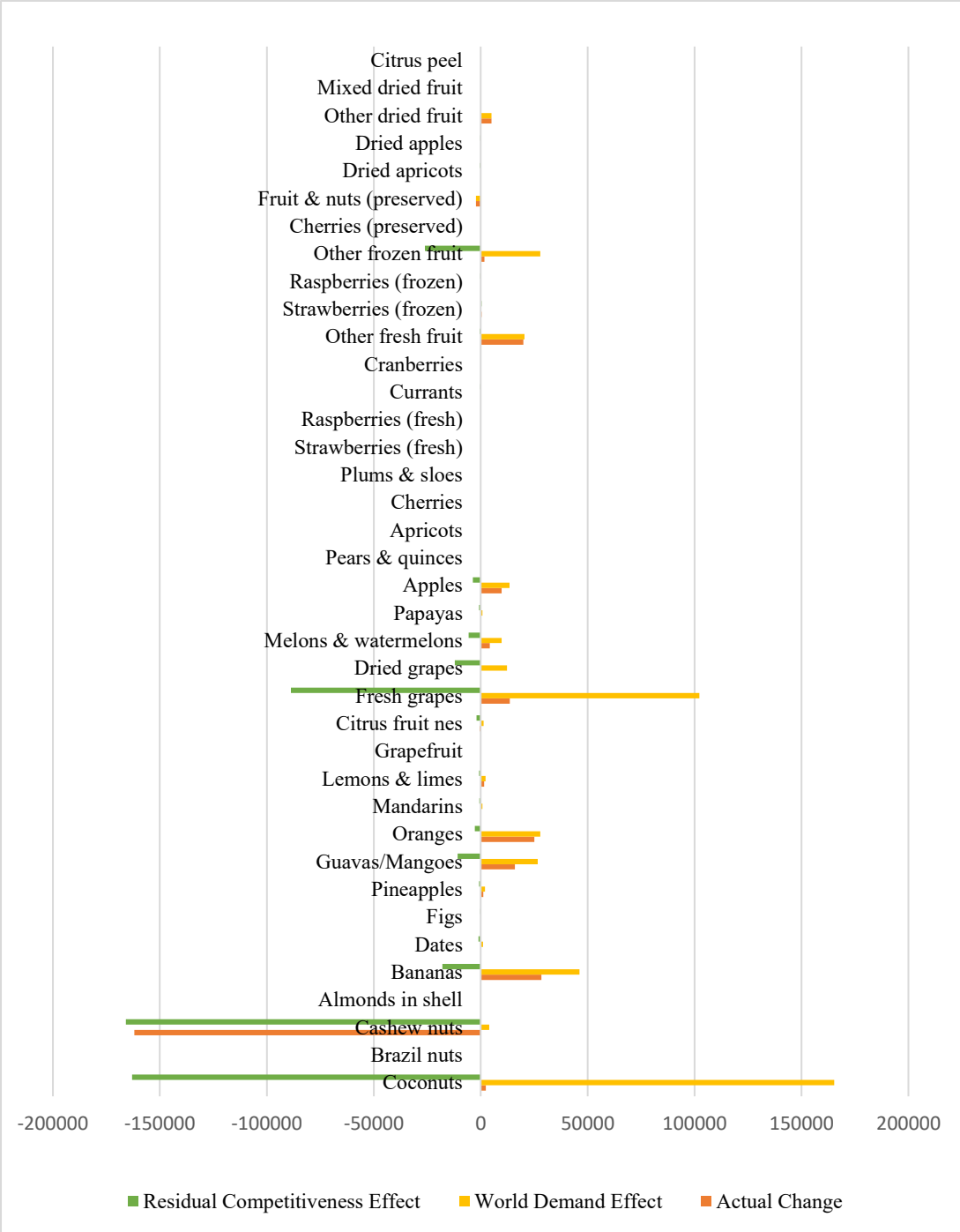
Table 3 Fruits and nuts data

Product	Market	Country Export (Base Year)2003(Value in 1000 USD)	Country Export (Comparison Year)2022(Value in 1000 USD)	World Export (Base Year)2003(Value in 1000 USD)	World Export (Comparison Year)2022(Value in 1000 USD)	World Growth Rate	Expected Export	Structural Effect	Actual Change	Competitive Effect
Coconuts, fresh or dried	Nepal	512.56	2,938.15	176.6	57,147.45	322.60	165863.5163	165350.9563	2,425.59	-1,62,925.37
Brazil nuts, fresh or dried	United Kingdom	13.76	0.78	101.5	13.82	-0.86	1.873529064	-11.88647094	-12.98	-1.09

Cashew nuts, fresh or dried	United States	1,70,382.87	8,494.44	3,51,494.53	3,59,785.59	0.02	174401.8645	4018.994544	-1,61,888.43	-1,65,907.42
Almonds in shell, fresh or dried	United States	0.38	89.86	36.05	1,609.67	43.65	16.96739528	16.58739528	89.48	72.89
Bananas, including plantains, fresh or dried	United Arab Emirates	719.17	29,080.38	2,494.29	1,62,800.44	64.27	46939.68722	46220.51722	28,361.21	-17,859.31
Dates, fresh or dried	United States	27.43	39.66	55.1	2,223.12	39.35	1106.718359	1079.288359	12.23	-1,067.06
Figs, fresh or dried	Bangladesh	32.21	0.76	63.43	441.43	5.96	224.159866	191.949866	-31.45	-223.40
Pineapples, fresh or dried	United Arab Emirates	175.61	1,462.34	349.72	4,354.40	11.45	2186.538328	2010.928328	1,286.73	-724.20
Guavas, mangoes and mangosteens, fresh or dried	United Arab Emirates	13,212.35	29,196.19	72,873.83	2,20,198.44	2.02	39922.95806	26710.60806	15,983.84	-10,726.77
Oranges, fresh or dried	Bangladesh	8,875.87	33,986.02	9,168.40	37,954.22	3.14	36743.24012	27867.37012	25,110.15	-2,757.22
Mandarins, clementines, wilkings...etc, fresh o	Nepal	3.98	174.08	3.98	826.21	206.59	826.21	822.23	170.10	-652.13
Lemons and limes, fresh or dried	United Arab Emirates	958.14	2,582.03	1,812.59	6,202.46	2.42	3278.637212	2320.497212	1,623.89	-696.61
Grapefruit, fresh or dried	United Kingdom	35.75	0.00	90.13	130.15	0.44	51.62390436	15.87390436	-35.75	-51.62
Citrus fruit, fresh or dried, nes	United Arab Emirates	544.22	31.21	739.64	2,667.26	2.61	1962.544261	1418.324261	-513.01	-1,931.33
Fresh grapes	United Kingdom	8,828.14	22,395.59	24,313.19	3,06,064.30	11.59	111132.208	102304.068	13,567.45	-88,736.62
Dried grapes	United Arab Emirates	30.86	272.61	82.29	32,904.29	398.86	12339.60857	12308.74857	241.75	-12,067.00
Melons and watermelons, fresh	United Arab Emirates	383.87	4,581.54	487.85	12,917.22	25.48	10164.05297	9780.18297	4,197.67	-5,582.51
Papaws (papayas), fresh	United Arab Emirates	369.35	478.78	1,062.18	3,507.50	2.30	1219.656861	850.3068614	109.43	-740.88
Apples, fresh	Bangladesh	1,244.46	11,096.79	1,802.10	21,346.15	10.85	14740.81895	13496.35895	9,852.33	-3,644.03

Pears and quinces, fresh	Qatar	0.78	0.28	21.47	295.86	12.78	10.74852352	9.968523521	-0.50	-10.47
Apricots, fresh	United Arab Emirates	5.15	1.54	82.12	3.29	-0.96	0.206326108	-4.943673892	-3.61	1.33
Cherries, fresh	Nepal	11	3.56	28.14	5.91	-0.79	2.310234542	-8.689765458	-7.44	1.25
Plums and sloes, fresh	Bangladesh	92.12	0.48	106.96	67.84	-0.37	58.42764398	-33.69235602	-91.64	-57.95
Strawberries, fresh	Nepal	23.44	1.35	30.74	14.19	-0.54	10.82022121	-12.61977879	-22.09	-9.47
Raspberries, blackberries, mulberries and logan	United Kingdom	3.55	10.54	4.41	207.09	45.96	166.705102	163.155102	6.99	-156.17
Black, white or red currants and gooseberries,	Germany	15.56	0.20	15.56	206.84	12.29	206.84	191.28	-15.36	-206.64
Cranberries, milberries...etc, fresh	Brunei	2.75	0.00	5.81	6.45	0.11	3.05292599	0.30292599	-2.75	-3.05
Other fruit, fresh, nes	United Arab Emirates	2,852.68	22,744.79	9,596.09	78,275.45	7.16	23269.35353	20416.67353	19,892.11	-524.56
Strawberries, frozen	United Arab Emirates	41.46	462.94	1,466.31	323.37	-0.78	9.14330544	-32.31669456	421.48	453.80
Raspberries, blackberries...etc, frozen	Germany	15.13	0.31	28.37	523.49	17.45	279.1823652	264.0523652	-14.82	-278.87
Other fruit and nuts, frozen, nes	Germany	80.07	1,784.91	113.93	39,683.63	347.32	27889.65377	27809.58377	1,704.84	-26,104.74
Cherries, provisionally preserved, not for imme	United Kingdom	45.06	0.16	53.19	15.31	-0.71	12.96989284	-32.09010716	-44.90	-12.81
Fruit and nuts, provisionally preserved, not fo	Netherlands	2,249.54	24.55	21,053.58	382.12	-0.98	40.82888634	-2208.711114	-2,224.99	-16.28
Dried apricots	United Kingdom	76.79	1.49	86.77	331.43	2.82	293.3100115	216.5200115	-75.30	-291.82
Dried apples	Nepal	6.53	0.88	6.53	194.68	28.81	194.68	188.15	-5.65	-193.80

Other dried fruit, nes	United Arab Emirates	527.4	5,560.78	3,009.97	31,654.81	9.52	5546.482787	5019.082787	5,033.38	14.30
Mixtures of dried fruit and nuts, nes	United Arab Emirates	105.72	47.72	187.26	288.31	0.54	162.7690548	57.04905479	-58.00	-115.05
Peel of citrus fruit or melons, fresh, frozen,	Canada	0	21.20	0.23	69.97	303.22	0	0	21.20	21.20



Results of the study show that in terms of exports of nuts to the United Kingdom, exports fell from $13.76k to $0.78k. The world market declined slightly by -0.86%, with expected exports at $1.87k. The structural effect was -$11.89k, and the actual loss was -$12.98k, with a competitive effect of $-1.09k, showing both market shrinkage and lost competitiveness. Cashew Nuts exports to the United States dropped sharply from $170,382.87k to $8,494.44k despite a stable global market (0.02% growth). Expected exports were $174,401.86k with a structural effect of $4,019.00k, but the actual change was $-161,888.43k, and the competitive effect was $-165,907.42k, showing significant loss in market position. Almonds (In Shell) to the U.S. jumped from $0.38k to $89.86k, while the world market grew 43.65%. Expected exports were $16.97k, with a structural effect of $16.59k. The competitive effect was $72.89k, showing India's growth was driven mainly by improved competitiveness. Bananas (Including Plantains) exports to the UAE surged from $719.17k to $29,080.38k. With a world growth rate of 64.27%, expected exports were $46,939.69k, and the structural effect was $46,220.52k. The competitive effect was negative at $-17,859.31k, showing gains were below market potential.

Regarding dates (Fresh or Dried) exports to the U.S. these rose slightly from $27.43k to $39.66k, while the global market grew 39.35%. The expected export value was $1,106.72k, with a structural effect of $1,079.29k. The competitive effect was $-1,067.06k, indicating missed opportunities. Figs (Fresh or Dried) to Bangladesh fell from $32.21k to $0.76k despite 5.96% world growth. The expected export was $224.16k, with a structural effect of $191.95k. The competitive effect of $-223.40k shows severe underperformance. Pineapples, both fresh and dried) exports to the UAE Exports increased from $175.61k to $1,462.34k. The world market grew 11.45%, with expected exports at $2,186.54k. The competitive effect was $-724.20k, meaning gains were below potential. Guavas, Mangoes & Mangosteens exports to the UAE grew from $13,212.35k to $29,196.19k. World growth was 2.02%, with expected exports at $39,922.96k. The competitive effect was $-10,726.77k, suggesting India's growth lagged the market.

During the same period, oranges exports to Bangladesh rose from $8,875.87k to $33,986.02k, with world growth of 3.14%. Expected exports were $36,743.24k, but the competitive effect of $-2,757.22k shows performance slightly below potential. Mandarins, Clementines exports to Nepal increased from $3.98k to $174.08k. The global market grew sharply (206.59%), with expected exports at $826.21k. However, the competitive effect of $-652.13k shows missed market capture. Lemons and Limes exports to the UAE grew from $958.14k to $2,582.03k. World growth was 2.42%, with expected exports at $3,278.64k. The competitive effect was $-696.61k, indicating below-market growth. Grapefruit exports to the United Kingdom fell from $35.75k to zero. The world market grew slightly (0.44%), but the competitive effect of $-51.62k reflects complete loss of market share. Citrus Fruit exports to the same market fell from $544.22k to $31.21k despite world growth of 2.61%. Expected exports were $1,962.54k, but the competitive effect of $-1,931.33k shows severe decline. Fresh grapes to the U.K grew from $8,828.14k to $22,395.59k, with 11.59% world growth. Expected exports were $111,132.21k, but the competitive effect of $-88,736.62k shows underutilized potential. Papayas exports to the UAE rose from $369.35k to $478.78k, while the world market grew 2.30%. Expected exports were $1,219.66k, with a structural effect of $850.31k. The competitive effect was $-740.88k, showing slower export growth than the market. Apples exports to Bangladesh increased from $1,244.46k to $11,096.79k. The global market grew 10.85%, with expected exports of $14,740.82k. The competitive effect of $-3,644.03k indicates growth was positive but still below potential. In the category of pears and quinces exports to Qatar exports fell from $0.78k to $0.28k despite 12.78% world growth. Expected exports were $10.75k, and the competitive effect of $-10.47k reflects a major loss in export performance.

Apricots exports to the UAE declined from $5.15k to $1.54k as the world market shrank (-0.96%). Expected exports were $0.21k, and the competitive effect of $1.33k indicates that despite reduced demand, India retained some competitiveness. Fresh cherries to Nepal fell from $11.00k to $3.56k, with world market contraction (-0.79%). Expected exports were $2.31k, but the competitive effect of $1.25k indicates performance was better than the declining trend. Plums and Sloes exports to Bangladesh Exports dropped sharply from $92.12k to $0.48k amid -0.37% global decline. Expected exports were $58.43k, and the competitive effect of $-57.95k reflects a steep market loss. Strawberries (Fresh) – Nepal Exports decreased from $23.44k to $1.35k, with the world market shrinking (-0.54%). Expected exports were $10.82k, but the competitive effect of $-9.47k shows a large drop in competitiveness. Raspberries, Blackberries, Mulberries &

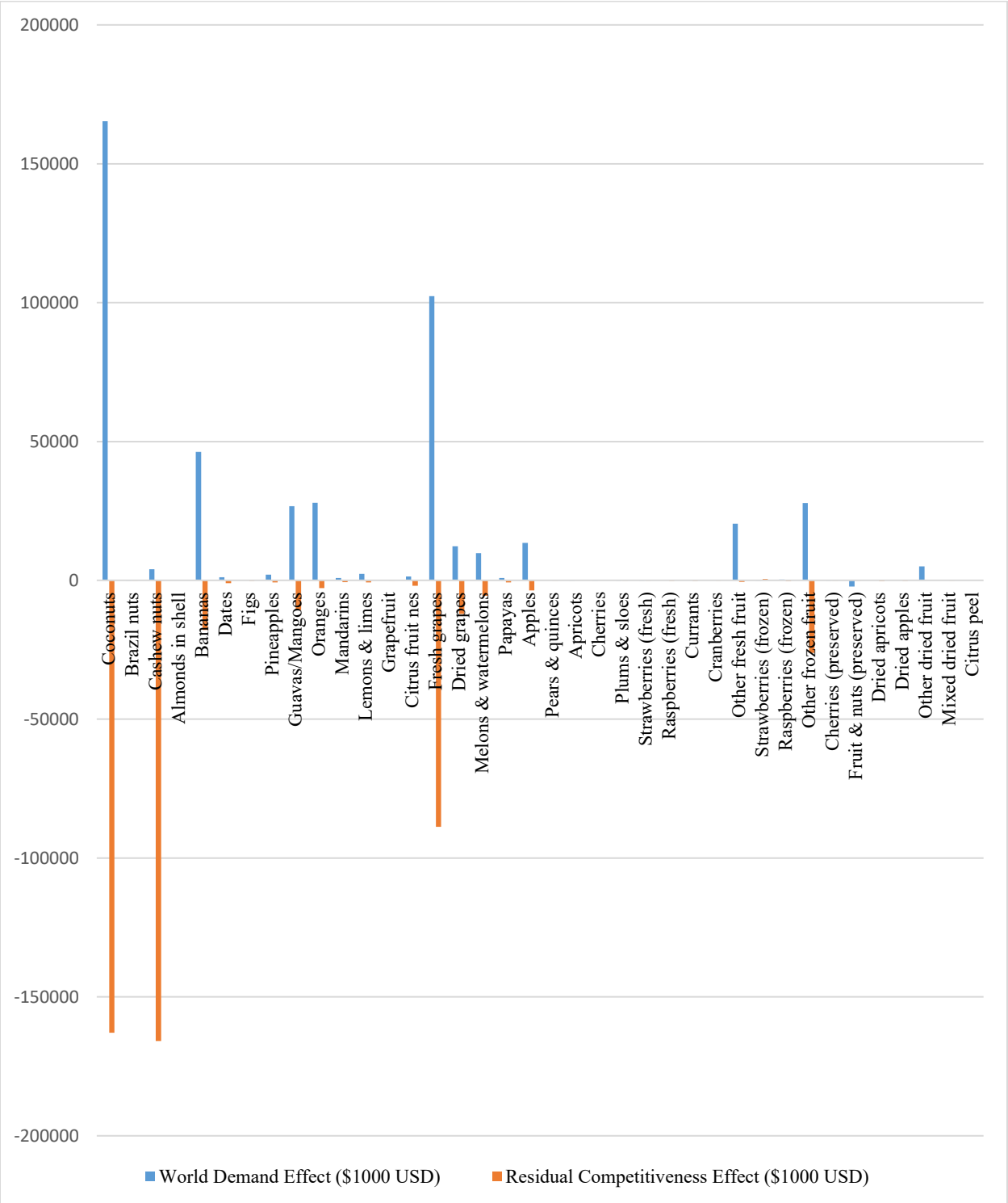
Loganberries (Fresh) – UK Exports rose from $3.55k to $10.54k amid strong world growth (45.96%). Expected exports were $166.71k, but the competitive effect of $-156.17k shows India gained little share despite market expansion. Currants & Gooseberries – Germany Exports fell from $15.56k to $0.20k with 12.29% world growth. Expected exports were $206.84k, but the competitive effect of $-206.64k indicates near-complete loss of market share. Cranberries & Other Berries – Brunei Exports dropped from $2.75k to zero, with the world market nearly flat (0.11% growth). Expected exports were $3.05k, and the competitive effect of $-3.05k shows a total market exit.

For the rest of fruits to the UAE exports surged from $2,852.68k to $22,744.79k, with world growth of 7.16%. Expected exports were $23,269.35k, but the competitive effect of $-524.56k shows performance just under market expectations. Citrus/Melon Peel exports to Canada rose from zero to $21.20k amid strong world growth (303.22%). Expected exports were negligible, so the entire $21.20k gain is attributed to improved competitiveness.

Table 4 Decomposition of India's Fruit and Nut Exports Using Constant Market Share Analysis (2003–2022)

Product	Actual Change ($ 1000 USD,)	World Demand Effect ($ 1000 USD, %)	Commodity Composition Effect ($ 1000 USD, %)	Market Distribution Effect ($ 1000 USD, %)	Residual Competitiveness Effect ($ 1000 USD, %)
Coconuts	2425.59	165350.95 (6816.9%)	0 (0%)	0 (0%)	-162925.37 (-6716.9%)
Brazil nuts	-12.98	-11.89 (91.6%)	0 (0%)	0 (0%)	-1.09 (8.4%)
Cashew nuts	-161888.43	4018.99 (-2.5%)	0 (0%)	0 (0%)	-165907.42 (102.5%)
Almonds in shell	89.48	16.59 (18.5%)	0 (0%)	0 (0%)	72.89 (81.5%)
Bananas	28361.21	46220.51 (163.0%)	0 (0%)	0 (0%)	-17859.31 (-63.0%)
Dates	12.23	1079.29 (8824.9%)	0 (0%)	0 (0%)	-1067.06 (-8724.9%)
Figs	-31.45	191.95 (-610.3%)	0 (0%)	0 (0%)	-223.40 (710.3%)
Pineapples	1286.73	2010.93 (156.3%)	0 (0%)	0 (0%)	-724.20 (-56.3%)
Guavas/Mangoes	15983.84	26710.61 (167.1%)	0 (0%)	0 (0%)	-10726.77 (-67.1%)
Oranges	25110.15	27867.37 (111.0%)	0 (0%)	0 (0%)	-2757.22 (-11.0%)
Mandarins	170.1	822.23 (483.4%)	0 (0%)	0 (0%)	-652.13 (-383.4%)
Lemons & limes	1623.89	2320.50 (142.9%)	0 (0%)	0 (0%)	-696.61 (-42.9%)
Grapefruit	-35.75	15.87 (-44.4%)	0 (0%)	0 (0%)	-51.62 (144.4%)
Citrus fruit nes	-513.01	1418.32 (-276.5%)	0 (0%)	0 (0%)	-1931.33 (376.5%)
Fresh grapes	13567.45	102304.07 (754.0%)	0 (0%)	0 (0%)	-88736.62 (-654.0%)
Dried grapes	241.75	12308.75 (5091.5%)	0 (0%)	0 (0%)	-12067.00 (-4991.5%)

Melons & watermelons	4197.67	9780.18 (233.0%)	0 (0%)	0 (0%)	-5582.51 (-133.0%)
Papayas	109.43	850.31 (777.0%)	0 (0%)	0 (0%)	-740.88 (-677.0%)
Apples	9852.33	13496.36 (137.0%)	0 (0%)	0 (0%)	-3644.03 (-37.0%)
Pears & quinces	-0.5	9.97 (-1994.0%)	0 (0%)	0 (0%)	-10.47 (2094.0%)
Apricots	-3.61	-4.94 (136.8%)	0 (0%)	0 (0%)	1.33 (-36.8%)
Cherries	-7.44	-8.69 (116.8%)	0 (0%)	0 (0%)	1.25 (-16.8%)
Plums & sloes	-91.64	-33.69 (36.8%)	0 (0%)	0 (0%)	-57.95 (63.2%)
Strawberries (fresh)	-22.09	-12.62 (57.1%)	0 (0%)	0 (0%)	-9.47 (42.9%)
Raspberries (fresh)	6.99	163.16 (2334.2%)	0 (0%)	0 (0%)	-156.17 (-2234.2%)
Currants	-15.36	191.28 (-1245.3%)	0 (0%)	0 (0%)	-206.64 (1345.3%)
Cranberries	-2.75	0.30 (-10.9%)	0 (0%)	0 (0%)	-3.05 (110.9%)
Other fresh fruit	19892.11	20416.67 (102.6%)	0 (0%)	0 (0%)	-524.56 (-2.6%)
Strawberries (frozen)	421.48	-32.32 (-7.7%)	0 (0%)	0 (0%)	453.80 (107.7%)
Raspberries (frozen)	-14.82	264.05 (-1781.7%)	0 (0%)	0 (0%)	-278.87 (1881.7%)
Other frozen fruit	1704.84	27809.58 (1631.2%)	0 (0%)	0 (0%)	-26104.74 (-1531.2%)
Cherries (preserved)	-44.9	-32.09 (71.5%)	0 (0%)	0 (0%)	-12.81 (28.5%)
Fruit & nuts (preserved)	-2224.99	-2208.71 (99.3%)	0 (0%)	0 (0%)	-16.28 (0.7%)
Dried apricots	-75.3	216.52 (-287.5%)	0 (0%)	0 (0%)	-291.82 (387.5%)
Dried apples	-5.65	188.15 (-3330.1%)	0 (0%)	0 (0%)	-193.80 (3430.1%)
Other dried fruit	5033.38	5019.08 (99.7%)	0 (0%)	0 (0%)	14.30 (0.3%)
Mixed dried fruit	-58	57.05 (-98.4%)	0 (0%)	0 (0%)	-115.05 (198.4%)
Citrus peel	21.2	0.00 (0.0%)	0 (0%)	0 (0%)	21.20 (100.0%)



Brazil nuts exports dropped by $-12.98k, with the world demand effect at $-11.89k (91.6%), indicating that most of the loss followed global demand trends. The remaining $-1.09k (8.4%) decline came from reduced competitiveness. Cashew nuts plunged by $-161,888.43k, even though the world demand effect was positive ($4,018.99k, -2.5%). The residual competitiveness loss of $-165,907.42k (102.5%) shows a major erosion in India's market position. Almonds (in shell) exports increased by $89.48k, supported by a world demand effect of $16.59k (18.5%). The bulk of the gain ($72.89k, 81.5%) came from India's improved competitiveness. India's banana exports rose by $28,361.21k, aided by a strong world demand effect of $46,220.51k (163.0%). However, a $-17,859.31k (-63.0%) residual competitiveness effect indicates missed opportunities in capturing the expanding market. Pineapples Exports increased by $1,286.73k, with a world demand effect of $2,010.93k

(156.3%). The $-724.20k (-56.3%) competitiveness effect shows India's gains were below potential. Guavas/Mangoes Exports rose by $15,983.84k, aided by a world demand effect of $26,710.61k (167.1%). The $-10,726.77k (-67.1%) competitiveness effect indicates underperformance relative to global growth. Oranges India's orange exports increased by $25,110.15k, matching well with the world demand effect of $27,867.37k (111.0%). However, the $-2,757.22k (-11.0%) competitiveness effect shows minor shortfall. For grapefruit exports fell by $-35.75k, even as the world demand effect was $15.87k (-44.4%). The $-51.62k (144.4%) competitiveness loss underscores declining market standing. Meanwhile, citrus fruit (nes) exports dropped $-513.01k despite a strong world demand effect of $1,418.32k (-276.5%), showing a $-1,931.33k (376.5%) competitiveness gap. Fresh grapes exports increased $13,567.45k, supported by a $102,304.07k (754.0%) world demand effect. The large $-88,736.62k (-654.0%) competitiveness loss shows severe underperformance in a booming market.

Papayas exports rose $109.43k, supported by $850.31k (777.0%) in world demand effect, but offset by $-740.88k (-677.0%) competitiveness loss. Apples exports increased $9,852.33k, with $13,496.36k (137.0%) from world demand. The $-3,644.03k (-37.0%) competitiveness effect shows moderate underperformance. Pears & Quinces exports fell $-0.50k, despite $9.97k (-1,994.0%) in world demand. The $-10.47k (2,094.0%) competitiveness loss is notable for such a small market. Apricots exports dropped $-3.61k, with the world demand effect at $-4.94k (136.8%), but a positive $1.33k (-36.8%) competitiveness effect shows slight resilience. Cherries exports fell $-7.44k, with $-8.69k (116.8%) world demand effect and a $1.25k (-16.8%) competitiveness gain. Plums & Sloes exports dropped $-91.64k, with $-33.69k (36.8%) from world demand decline and a $-57.95k (63.2%) competitiveness loss. Meanwhile, fresh strawberries exports fell $-22.09k, partly due to $-12.62k (57.1%) from global demand decline and $-9.47k (42.9%) competitiveness loss. Last but not least, fresh raspberries exports grew $6.99k, but world demand growth was $163.16k (2,334.2%), leaving a $-156.17k (-2,234.2%) competitiveness gap.

CONCLUSION

The Constant Market Share (CMS) analysis of India's exports for vegetables and fruits/nuts between 2003 and 2022 reveals a mixed performance pattern across products and markets. In vegetables, products such as onions, tomatoes, mushrooms, and cabbage lettuce recorded positive competitive effects, showing that India's share in these markets grew beyond what would be expected from global demand trends. This reflects strong positioning in specific categories, especially onions and mushrooms in the UAE market. However, products like garlic, green beans, cucumbers, and other fresh vegetables recorded negative competitive effects, indicating a loss of market share despite in some cases benefiting from favourable market demand. In fruits and nuts, certain products such as bananas, mandarins, lemons/limes, guavas/mangoes, and apples show a combination of strong structural and competitive effects, suggesting both global demand and India's export performance contributed to growth. Conversely, items like cashew nuts, coconuts, dried grapes, fresh grapes, and pineapples show negative competitive effects, indicating declining market share despite large markets or favourable demand. Many dried or preserved fruits (e.g., dried apricots, other dried fruit, and provisionally preserved cherries) also showed weak competitive positioning. Overall, CMS results suggest that India's export growth in vegetables and fruits/nuts is not uniform across all products. Growth is concentrated in a few strong categories where both market demand and competitiveness are favourable, while several other products rely mainly on structural demand or are losing market share. This highlights the need for targeted product- and market-specific strategies to strengthen competitiveness, diversify product baskets, and improve value chain efficiency.

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