



RESEARCH ARTICLE

Competitiveness of Indian Agricultural Exports: A Constant Market Share Analysis

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Abstract: The 1991 Indian reforms aimed at economic liberalization, as a part of its economic structural adjustment, and transformed the nation's economy into a more global market-based and service-oriented system, which revolutionized its agricultural trade facet. The new regime paved the way for the self-reliant Indian agriculture to expand its roots into the spheres of global competitiveness and export orientation. India enjoys competitive advantage in the international market and considering the growth in India's exports of major agricultural commodities. This study employed Constant Market Share model to analyze the export performance of its various facets such as diversification, instability, elasticity, competitiveness, etc. The findings revealed that India's growth performance of major agricultural commodities' exports both in terms of quantity and value was found satisfactory (except wheat and cashew nuts, shelled (quantity)) during 1991-2020. During the recent past decade, i.e., 2011-2020, World Demand Effect (WDE) is the main sources of India's agricultural export performance (due to general rise/fall in world demand given a constant market share of the India, unlike Market Distribution Effect (MDE), Commodity Composition Effect (CCE) and the Residual Competitiveness Effect (RCE) due to high inconsistency arising out of changes in external environment). Both MDE and RCE with respect to commodity-wise exports and CCE and RCE with respect to country-wise exports are found negative for majority of commodities and countries (markets) respectively. Consistently negative CCE for exports of agricultural products, total and across major export destinations were found more disheartening and this should deserve special attention. So, it is imperative to boost the export competitiveness of agricultural commodities from India and the future prospects of exports depend on how much the latest surge in COVID-19 infections in India affects its agricultural production and global demand conditions.

Keywords: Indian exports; World exports; Export performance; Export competitiveness; World demand

1. Introduction

Economic reforms and trade liberalization policies have been widely adopted by developing countries to im-

prove their position in world trade. Since 1991, India entered the Liberalization-Privatization-Globalization (LPG) phase to overcome its debt crisis, food shortage and at the

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same time to gain from net agricultural exports, as it enjoys comparative advantage for majority of the agricultural commodities. With the advent of this LPG phase, more focus is now given towards export promotion through enhancing both domestic and export competitiveness of agricultural commodities. Emphasis on cost-effective and quality production of agriculture gained more significance. With the emergence of World Trade Organization (WTO) in 1995, it was expected that India would be benefited through multilateral trade, as it enjoys comparative advantage with reference to majority of the agricultural commodities and also fulfill the import requirements like pulses, edible oils, technology etc. In this context, a number of studies investigated the effects of trade liberalization on export performance of agricultural commodities in India. Many studies have identified positive effects of trade liberalization on export performance of majority of the agricultural commodities. In the post-WTO regime, Indian agricultural commodities exports performance has undergone paradigm shift through the tremendous structural and qualitative changes ^[1]. India is the second most populous country with the fifth largest economy occupying only 13th position in world trade and earning US\$ 623 billion of merchandise trade and US\$ 294 billion of services trade. In India, agriculture exports have significantly increased by multiple folds from US\$ 3.35 billion to US\$ 41.56 billion and registered impressive growth rates during 1990-1991 to 2020-2021. India imports an immense catalogue of 6000 agri-products from 140 nations, bested only by its exports comprising about 7500 types of products to 190 countries globally. As of 2020-2021, India's agri-exports amount to US\$ 41.56 billion, which constitutes 14.20 per cent of its total exports. On the contrary, the nation's agri-imports were valued at US\$ 21.47 billion, the 5.42 per cent piece of the total national import pie (Table 1). This shows that India's agricultural economy enjoys a whopping US\$ 20.09 billion global trade surplus. Yet, on more narrow spectra, the nation enjoys trade surplus with Bangladesh, Belgium, Germany, Hongkong, Italy, Malaysia, Nepal, Netherlands, Singapore, Sri Lanka, UAE, UK, USA, Vietnam, etc., but looks to a trade deficit with nations such as Australia, China, Nigeria, South Korea, Switzerland, Saudi Arabia, Iran, Iraq, Qatar, etc., which could be cited as some of the nations serving as epicenters of shifts in the global economic power. The nation recorded an increase in its share of global exports from 0.53 per cent in 1994 before the commencement of WTO to 1.71 per cent in 2019. In the same time-frame, India's share in

global imports hiked from 0.7 per cent to 2.5 per cent ^[2].

India has consistently maintained a trade surplus in agricultural commodities over the years. The agricultural exports from India registered an increase of nearly 50 times in the span of 30 years per cent till 2020-2021. However, in 2019-2020, there was a slight drop in agri-exports by around 8 per cent. In the next year during 2020-2021, India's agri-exports reached the highest. So, with the increased international trade opportunities, the agricultural exports from India gained the rapid surge. However, besides absolute growth in agri-exports, the competitiveness of the agricultural commodities is an important dimension. The tendency of a nation to produce and distribute products that can withstand the competitiveness of global markets and sustain its producers by ensuring a continuous improvement in their real incomes and living standards is a measure of the nation's export competitiveness. It gained more prominence in modern times, owing to the increasing foreign exchange to the exporting country. A nation, on realization of export competitiveness, embodies several advantages such as strengthening of ports' export infrastructure, quality enhancement of commodities, capture of monopoly gains in the international market, earning significant amounts of foreign exchange, ease in regulation of procedural formalities at ports, increase in the pace of making exports, planning towards need-based exports on client specifications, quality enhancement of commodities, strengthening of international trade relationships, analysis of the tariff levels of market players and fixation of export prices in accordance, etc. These advantages may move the Government of a nation with a liberalized economy to formulate appropriate trade policies aimed towards its significant exports. Keeping in view of the importance of export competitiveness and increase in exports value of agricultural commodities from India, it demands analysis of its various facets such as diversification, instability, elasticity, competitiveness, etc. So, this article investigates the major sources of India's exports performance during the recent past decade of post-WTO regime period (2011-2020) by using Constant Market Share Analysis (CMSA). The article is organized into five sections. Beginning with an introduction in the first section, brief review of literature is presented in the section, followed by the methodology, data used in the analysis and brief description about CMSA model in the third section, the fourth section presents the results and discussions. Summary and conclusions are presented in the last section.

Table 1. India's Imports and Exports of Principal Agricultural Commodities (US\$ Billion)

Year	Agricultural Imports	Total National Imports	% of Agricultural Imports to Total National Imports	Agricultural Exports	Total National Exports	% of Agricultural Exports to Total National Exports	Net agricultural export
1990-1991	0.67	24.08	2.79	3.35	18.14	18.47	2.68
1991-1992	0.60	19.55	3.09	3.20	18.00	17.80	2.60
1992-1993	0.94	20.68	4.54	2.95	17.52	16.84	2.01
1993-1994	0.74	23.31	3.18	4.01	22.24	18.05	3.27
1994-1995	1.89	28.65	6.60	4.21	26.33	15.99	2.32
1995-1996	1.76	36.68	4.80	6.10	31.79	19.18	4.34
1996-1997	1.86	39.13	4.76	6.81	33.47	20.33	4.94
1997-1998	2.36	41.48	5.70	6.68	35.01	19.09	4.32
1998-1999	3.46	42.39	8.17	6.06	33.22	18.25	2.60
1999-2000	3.71	49.74	7.45	5.84	36.71	15.91	2.13
2000-2001	2.65	50.54	5.24	6.27	44.56	14.08	3.63
2001-2002	3.41	51.41	6.63	6.23	43.83	14.22	2.82
2002-2003	3.64	61.41	5.92	7.16	52.72	13.58	3.52
2003-2004	4.78	78.15	6.12	7.92	63.84	12.41	3.14
2004-2005	5.08	107.13	4.74	9.26	83.54	11.08	4.18
2005-2006	3.61	129.69	2.78	10.32	103.09	10.02	6.72
2006-2007	5.08	185.60	2.74	12.76	126.26	10.10	7.68
2007-2008	5.60	251.56	2.23	18.56	162.98	11.39	12.95
2008-2009	6.25	299.33	2.09	17.65	183.10	9.64	11.40
2009-2010	11.47	287.61	3.99	17.81	178.32	9.99	6.34
2010-2011	11.21	369.37	3.03	24.80	249.46	9.94	13.60
2011-2012	14.64	489.42	2.99	38.14	305.90	12.47	23.50
2012-2013	17.99	501.62	3.59	42.70	307.14	13.90	24.71
2013-2014	14.17	448.82	3.16	43.43	314.87	13.79	29.26
2014-2015	19.84	447.58	4.43	39.20	310.15	12.64	19.36
2015-2016	21.43	380.38	5.63	32.90	262.17	12.55	11.47
2016-2017	24.56	384.31	6.39	33.79	275.74	12.26	9.23
2017-2018	23.60	465.60	5.07	39.03	303.55	12.86	15.43
2018-2019	19.60	514.09	3.81	39.27	330.04	11.90	19.67
2019-2020	20.94	477.41	4.39	35.93	315.32	11.40	14.99
2020-2021	21.47	395.90	5.42	41.56	292.76	14.20	20.09

Source: DGCI & S, 2020-2021

2. Review of Literature

Though there are several definitions for export competitiveness, no definition or measurement was found universally accepted. According to Cook and Bredahl^[3], competitiveness can be seen from the perspective of geographical market or product. However, they opined that this definition is even not clear regarding at what level i.e., either at national level or industry level or firm level, the competitiveness should be measured. Pursell and Gupta^[4] opined that market distortion by price policy for agricultural commodities is one of the major causes for regional dispersion of competitiveness of Indian wheat. Singh^[5] employed CMSA model to analyze the India's exports performance of major commodity groups during the post-liberalization period (1991-2011). The findings revealed that the increased world demand is the major contributing factor for export growth from India. However, the exports from India are highly prone to changing external environment and trading policies of importing countries. Alberto's^[6] study revealed that Spain has experienced stiff competition from China and other emerging economies and this led to decline in export share of commodities. However, the former enjoyed more export competitiveness compared to other European advanced economies. Mamta^[7] employed CMSA model to analyze and compare export competitiveness of cotton between India and China. It is found interesting that both the countries improved their export competitiveness post Multi Fiber Agreement (MFA) and the comparative picture revealed that China outpaced India. Though India is the second largest producer of cotton in the world, it could not keep a cotton buffer, unlike China. So, maintenance of buffer stocks is essential to regulate cotton prices and for streamlining cotton supply to the domestic industry at competitive rates. Varalakshmi and Suresh^[8] employed CMSA model and found that bovine meat exports were more competitive in new markets compared to traditional export destinations. So, the policy should focus on penetrating into new markets at the same to promote competitiveness in the traditional markets to enhance bovine meat trade. Sonu and Rajni^[9] employed CMSA model and found that export growth of wheat in India is attributed only to World Demand Effect (WDE) and Market Distribution Effect (MDE) and concluded that there is competitive disadvantage in the wheat exports as compared to rest of world.

Though CMSA model is popular and has wider adoptability in quantifying the export performance and in determining the factors underlying the export potential of commodities etc., there are certain limitations and associated criticisms with respect to its potential. The results

of CMSA are sensitive to the extent of market consolidation^[10,11]. For example, market consolidation as in European Union has varied results over the individual component markets with respect to analysis using CMSA model. Moreover, the selection of destination markets also can have impact on the results. The selected regions should ideally have true competitors only for obtaining optimum results using CMSA model and however, this situation of availability of true competitors is not realistic^[10,12]. However, considering its broad consistent framework, this model still serves as a popular tool to explore the export potential of commodities over a period of time for a given country.

3. Materials and Methods

The India's export performance with reference to major agricultural commodities viz., apples; cashew nuts, shelled; chillies and peppers, dry; cotton lint; maize; mangoes, mangosteens, guavas; rice; sorghum; wheat and agricultural products, total has been examined by using the CMSA model^[5,13]. The period from 1991 to 2020 was considered for the study in view of data availability for all the selected commodities and their major importers in the world. The relevant data on India's exports both commodity-wise and country-wise, imports of selected commodities across major importing countries and world agricultural products exports are collected from www.fao.org.

3.1 CMSA Model

Introduced by Tysznskin^[14] and Richardson^[10] and later, Ahmadi-Esfahani^[15] adapted Jepma's^[16] version to analyze the competitiveness of agricultural commodities in the international market. This model is often employed to analyze the structural changes in international trade both in terms of exports and imports^[17] and thus, ascertain the export performance of a country across major geographical destinations in the world^[18]. This model helps to decompose the world exports into four categories or effects viz., WDE, the Commodity Composition Effect (CCE), the MDE and the Residual Competitiveness Effect (RCE). It is interesting that this model explains the divergence between actual export growth and export growth computed on the assumption the focus country's export share of each commodity in each market remains constant. Following is the main equation of the CMSA model in terms of actual export change:

$$\Delta X = \sum_{i=1}^n r_i X_i + \sum_{i=1}^n r_i X_i - \sum_{i=1}^n r_i X_i + \sum_{i=1}^n \sum_{j=1}^m r_{ij} X_{ij} - \sum_{i=1}^n r_i X_i + \Delta X - \sum_{i=1}^n \sum_{j=1}^m r_{ij} X_{ij} \quad (1)$$

where, ΔX = actual change in India's agricultural exports

(difference between 2020 and 2011);

r = percentage increase in total world (excluding India) exports from period 2011 to period 2020;

r_i = percentage increase in world (excluding India) exports of commodity “i” from period 2011 to period 2020;

r_{ij} = percentage increase in world (excluding India) exports of commodity “i” to country “j” from period 2011 to period 2020;

X_i = India’s exports of commodity “i” to the rest of the world in period 2011, and

X_{ij} = India’s exports of commodity “i” to country “j” in period 2011.

In the above Equation (1), $\sum_{i=1}^n r X_i$ represent MDE; $\sum_{i=1}^n r_i X_i - \sum_{i=1}^n r X_i$ represent CCE; $\sum_{i=1}^n \sum_{j=1}^m r_{ij} X_{ij} - \sum_{i=1}^n r_i X_i$ represent to MDE and $\Delta X - \sum_{i=1}^n \sum_{j=1}^m r_{ij} X_{ij}$ represent RCE. The analysis is done in MS Excel.

WDE: This effect analyzes the increase/decrease in focus (India) country’s exports due to general increase/decrease in world exports. So, a positive/negative value of WDE indicates an increase/decrease in focus country’s exports due to general rise/fall in world demand given a constant market share of the focus (India) country.

CCE: This effect measures the magnitude of concentrations of country’s export composition in products/commodities, where import demands are high. It is the weighted sum of export values of selected commodities. The weights are calculated by subtracting the individual commodity’s growth rate from the world’s total export growth rate in aggregate (represented by “r” in previous formula). A positive CCE indicates that the focus country’s exports are concentrated for those commodities whose demand is increasing at a higher rate than aggregate growth rate (r) of the total world exports. A negative CCE value indicates the inverse situation.

MDE: This is a measure of the magnitude of country’s export concentrations to those markets (importing countries), where the demand is growing relatively higher or slower rate as compared to total growth of world exports of particular commodity in those markets (presented by r_i in previous formula). It is the weighted sum of export values for individual commodities directed to a particular importing country. A positive value of MDE indicates that a focus country’s exports are directed to relatively growing markets. A negative value indicates that the exports of the focus country are concentrated in markets where demand is growing slowly than the rest of the world.

RCE: This will assess the difference between actual change in focus country’s exports and changes that would have taken place if the constant market share has been sustained in those markets by the focus country. This is a residual term, as from the actual change in the exports

of the focused country, the earlier three effects i.e., WTE, CCE and MDE have been deducted. If this residual term is positive, it means there is improvement in the focus country’s competitiveness and *vice versa*.

3.2 Actual Increase in Exports

This is the difference between agricultural exports of focus country (India) between 2020 and 2011. This is given by:

$$X_A = X_1 - X_0 \tag{2}$$

where, X_A = Actual increase in exports of the focus country (India);

X_1 = Actual value of exports of focus country in the period 2020;

X_0 = Actual value of exports of focus country in the period 2011.

3.3 Potential Increase in Exports

This is derived from the following formulae:

$$X_{PV} = (X_W * S_{Xfo})/100 \tag{3}$$

where, X_{PV} = Potential value of focus country’s exports in period 2020;

X_W = Value of world exports in period 2020;

S_{Xfo} = Share of focus country in world exports in period 2011.

So, $X_{PI} = X_{PV} - X_0$, X_{PI} = Potential increase in focus country’s exports

Practical utility: This analysis shed light on the on the export performance of major agricultural commodities from India through splitting it across various effects viz., WDE, CCE, MDE and RDE. This helps the policy makers to reveal the underlying reasons for export performance of selected agricultural commodities and overall exports. It also enables the researchers to compare the export performance from India with other competing countries and thereby, help to figure out the competitiveness of focus country in global trade. Accordingly, relevant policy suggestions can be figured out to enhance the export competitiveness of India.

4. Results and Discussion

4.1 Growth in Exports of Selected Commodities from India

Table 2 shows the growth in exports (both in terms of quantity and value) of selected commodities and agricultural products, total from India during 1991 to 2020. The findings revealed that India registered noticeably positive and significant export growth rates both in terms of quantity and value for all the selected commodities, ex-

cept wheat and cashew nuts, shelled (quantity) during the overall reference period, 1991-2020. Across the selected commodities, chillies and peppers, dry showed promising performance during all the selected sub-periods, except in terms of value during 1991-2000. Sub-period, 2001-2010 was found favourable to register positive and significant export growth rates of apples, cotton lint, maize, mangoes, mangosteens, guavas and sorghum. Though total market size in importing countries is dwarfed by increased production volumes, the above commodities are well-suited to value-added processing. On the contrary, majority of the commodities viz., apples, cashew nuts, shelled, cotton lint, maize and mangoes, mangosteens, guavas registered declining growth performance during sub-period 3, i.e., 2011-2020. Though these commodities enjoyed increased exports in the past decade, their exports in the recent decade found more challenging in the context of increasing demand for Sanitary and Phyto-Sanitary (SPS) requirements, increased competition from foreign producers (cashew), high rates of import duties, declining incentives (for cotton), higher transaction costs (mangoes, mangosteens,

guavas) etc. It is important to note that though Pakistan and Bangladesh enjoyed duty free or concessional duty access in India, in turn, they imposed higher higher rates of duty on Indian yarn. Further, countries like Bangladesh and Vietnam enjoy duty-free access in world's largest cotton yarn markets such as China, unlike India. The positive and significant growth rates both in terms of quantity and value for apples and sorghum during sub-period 2, i.e., 2001 to 2010 has compensated their respective poor performances during other two sub-periods viz., 1991-2000 and 2011-2020 and thus, these commodities registered impressive (significant) growth rates during overall reference period, 1991-2020. It is quite disheartening to note that wheat, one of the major cereal crops cultivated in the country had shown dismal (negative) performance both in terms of quantity and value during all the selected sub-periods and hence, the export performance is not significant during the overall reference period. This is because, export ban significantly influenced export volume of wheat. The ratio of domestic market price and international price has a strong adverse significant impact on wheat exports^[19].

Table 2. Export growth (%) of selected commodities from India during 1991 to 2020

Commodity	1991-2000		2001-2010		2011-2020		1991-2020	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Apples	-6.927	-7.188	13.381**	17.317**	-3.878	-3.950	4.060**	5.695**
Cashew nuts, shelled	4.670**	5.193*	0.696	5.987**	-9.010**	-6.305*	1.055	3.372**
Chillies and peppers, dry	11.336*	7.281	16.023**	26.100**	6.220**	8.586**	12.004**	15.289**
Cotton lint	-20.410	-18.478	82.631**	95.665**	-11.085**	-12.339**	16.060**	18.240**
Maize	64.522	50.833	47.547**	9.247**	-20.587*	-20.195*	33.167**	34.457**
Mangoes, mangosteens, guavas	7.915**	2.397	21.888**	32.057**	-6.501**	-3.262*	9.130**	12.370**
Rice	98.802*	104.933**	-3.806	15.192	13.134	10.195	40.601**	45.398**
Sorghum	-3.225	-3.152	64.096**	75.969**	-9.349	-7.263	34.575**	37.640**
Wheat	-42.029	-36.082	-75.734**	-71.540**	-23.874	-24.618	12.178	15.165
Agricultural products, total		3.029*		12.037**		1.103		6.254**

Note: ** & * - Significant at 1 and 5 percent levels respectively

Raw Data Source: www.fao.org

4.2 Percent Share of India's Exports in the World

Table 3 highlights the share of India's exports in terms of selected commodities and agricultural exports, total in world agricultural exports and their respective growth (both actual and potential) in value terms (US\$ millions) between 2011 and 2020. The findings revealed that India's exports of agricultural products, total rose from US\$ 30291.63 million to US\$ 32083.77 million, i.e., by US\$ 1792.14 million (5.92%) and accordingly, the actual increase in exports is higher than the potential (of US\$ 1412.08 million) offered by the growth of world trade. However, the share of India's agricultural products, total in world's agricultural exports declined from 2.29 per cent to 2.15 per cent during 2011 to 2020. Regarding commodity-wise exports, India's share in world trade during 2020 compared to 2011 showed impressive performance with reference to chillies and peppers, dry; rice and wheat, unlike other commodities during the above reference period. Only chillies and peppers, dry registered rapid (actual) increase in exports (US\$ 603.53 million) over and above the potential increase (US\$ 245.26 million) during the selected period. However, for other commodities, their respective actual increase in exports is far lower than their potential exports. It is interesting that the actual increase in exports is positive for chillies and peppers, dry (US\$ 603.53 million) followed by rice (US\$ 112.47 million), wheat (US\$ 97.62 million) and sorghum (US\$ 0.48 million).

Regarding country-wise performance (Table 4), India's share in world's total imports showed increasing trend for Bangladesh (from 8.28% to 10.12%), Iran (from 0.13% to 0.60%) and Thailand (from 0.92% to 1.03%). Accordingly, the actual increase in exports is higher than potential increase in these three countries. However, for other selected countries, it is disappointing that the share of India's exports showed a declining trend during the reference period and further, their actual increase in exports is considerably less than respective potential increase in exports. It is interesting that the actual increase in exports is highest for Bangladesh (US\$ 546.17 million) followed by Thailand (US\$ 43.90 million), Iran (US\$ 36.88 million) and Saudi Arabia (US\$ 4.23 million). On the whole, though India's exports of agricultural products, total showed considerable increase in absolute (value) terms, its share in world agricultural exports showed a declining trend during 2011 to 2020. The impressive total export performance in terms of absolute value over and above the potential increase can be attributed to lower trade barriers in developed countries followed more recently by developing countries and India's structural reforms (especially

external sector reforms) at domestic level. Further, reduction in tariffs/non-tariffs barriers across the importing countries, depreciation of Indian rupee (historical low of 76.91 on 1.1.2020) and development of Export Promotion Zones (EPZs) has laid favourable environment for boosting overall agricultural exports from the country. Further, buoyed by rising global food prices since June 2020 with countries coming out of lockdowns and lifting the curbs imposed on trade, Indian agricultural exports have benefited from favourable prices and according there is actual increase in exports during the reference period. However, the worry-some aspect is regarding the declining trend in share of India's exports (agricultural products, total and for majority of selected agricultural commodities) in world agricultural exports in the liberalized regime. On the supply side, the main focus of the Government's policies is to ensure the nation's self sufficiency of staple commodities, distributing the production among the urban and rural poor on subsidy and maintaining sufficient stocks by procurement largely from rural areas. The rising food prices resulting from the widening demand-supply gap consequent to the population increase have resulted in a major political issue forcing the Government to hasten many unsuccessful measures to counter price hikes of essentials such as pulses, rice, sugar and wheat. The Government utilized input subsidies and MSPs as key domestic policy tools to promote agricultural interests by encouraging domestic production for food self-sufficiency. This hiked the farm subsidy and domestic support bill at about \$51.2 billion during 2016-2017, which included certain farm input subsidies, price supports, storage and public food distribution. Further, in this direction, India directed its focus towards export control and highly restricted the import regime. India's trading potential is also hurdled by trade barriers, market-distorting policies and Government's excessive involvement in the marketing and procurement aspects of agricultural goods. India's capacity to export has been hampered by some factors on the importers' side such as high agricultural tariffs, SPS and non-tariff barriers like quality standards, import bans, labeling and packaging rules. As the recent COVID-19 outbreak shocked the world's economies since 2020, there are apprehensions that agricultural businesses may suffer decline. However, notwithstanding the COVID-19 pandemic, India's agricultural exports have shown remarkable growth aided by favourable domestic weather conditions and export curbs implemented by many countries. However, future prospects of these exports depend on how much the latest surge in COVID-19 infections in India affects its agricultural production and global demand conditions. During 2021, the pandemic induced curbs and lockdowns

have not adversely impacted the production and export of agricultural products. There is spectacular growth of a few products that have led the overall growth in exports. The five products in this regard are wheat, vegetable oils, other cereals, molasses and non-basmati rice^[20]. The exceptionally robust growth in exports of these products has led to their total share increasing by 140 per cent in agricultural exports during 2021. The bumper harvest of these commodities is the key factor behind higher agricultural exports from India. The increasing agricultural exports from India during the past one decade and the satisfactory performance even during the COVID-19 pandemic has prompted the researchers to analyze the India's export performance across selected commodities and countries and decompose the same into WDE, CCE, MDE and RCE through fitting CMSA model.

4.3 Decomposition of India's Exports across Selected Commodities

It is interesting to note from the Table 5 and Figure 1 that between 2011 to 2020, India's agricultural products, total exports in absolute terms increased by US\$ 1792.15 million. This was largely attributed to the highly positive MDE (US\$ 1761.51 million) followed by the WDE (US\$ 821.28 million). However, both CCE (US\$ -216.41 million) and RCE (US\$ -574.22 million) are found to be negative. The higher value of actual increase in India's exports compared to its potential increase implies higher competitiveness of Indian agricultural products during the reference period. So, it can be inferred that WDE and MDE are the main sources of India's agricultural export performance, unlike CCE and RCE due to changes in external environment (trading policies of importing countries and COVID-19 pandemic).

Regarding decomposition of export performance of selected commodities, the CCE is equal to zero as percentage increase in total world exports (r) and percentage increase in total world exports of commodity i (r_i) would be equal, that is, ($r = r_i$). The findings revealed that chillies and peppers, dry realized highest actual increase of US\$ 603.53 million in its value, followed by rice (US\$ 112.47 million), wheat (US\$ 97.62 million) and sorghum (US\$ 0.482 million). On the other hand, the export values for cotton lint (US\$ -1947.17 million), maize (US\$ -696.90 million), cashew nuts, shelled (US\$ -490.92 million) and mangoes, mangosteens, guavas (US\$ -63.90 million) showed declining trend. In case of all nine commodities analyzed, the WDE was found to be positive for six commodities viz., apples; cashew nuts, shelled; chillies and peppers, dry; maize; mangoes, mangosteens, guavas and rice ranging from US\$ 0.86 million (apples) to US\$

779.13 million (cashewnuts, shelled), unlike for remaining three commodities viz., cotton lint; sorghum and wheat. On the contrary, the MDE was negative in case of five commodities namely, cashewnuts, shelled (US\$ -680.64 million); chillies and peppers, dry (US\$ -440.97 million); cotton lint (US\$ -131.65 million); rice (US\$ -115.46 million) and sorghum (US\$ -2.76 million) and positive in case of the remaining four commodities. Similarly, the RCE was also found to be negative in case of five commodities and was found to be the lowest in case of maize (US\$ -5373.83 million) and highest in case of chillies and peppers, dry (US\$ 721.80 million). On the whole, the commodity-wise analysis asserts that positive net export performance of chillies and peppers, dry and rice could be attributed to higher WDE and RCE. In case of sorghum, positive value of RCE and in case of wheat, positive values of both MDE and RCE contributed for their positive net export performance during the reference period.

4.4 Decomposition of India's Exports across Selected Countries (Markets)

It is interesting from Table 6 and Figure 2 that in case of country-wise analysis, the MDE is equal to 0 as $r_i = r_{ij}$. During this period, actual increase in India's exports was the highest in case of Iran (US\$ 1035.83 million), followed by Saudi Arabia (US\$ 702.43 million), Bangladesh (US\$ 585.11 million) and Thailand (US\$ 29.07 million). The WDE is found to be highest with China mainland (US\$ 1568.95 million), followed by Vietnam (US\$ 1240.37 million) and Bangladesh (US\$ 1076.66 million). On the other hand, it is lowest with UAE (US\$ -384.02 million) followed by USA (US\$ -34.62 million) and Iran (US\$ -10.95 million). Positive CCE was recorded in case of China, mainland, Iran, UAE and USA. It was highest with UAE (US\$ 1157.14 million), followed by USA (US\$ 187.50 million), China, mainland (US\$ 102.90 million) and Iran (US\$ 7.27 million) and lowest with Vietnam (US\$ -1035.08 million), followed by Bangladesh (US\$ -726.11 million) and Thailand (US\$ -45.94 million). As India could not diversify their exports across above three export destinations, the CCE recorded negative values. Again, the RCE was recorded to be negative in five markets. Highest negative value was recorded in case of China, mainland (US\$ -2904.50 million) and the lowest in case of Thailand (US\$ -1.61 million). It is interesting that the negative values of RCE contributed to decline in India's exports across the selected markets, except Thailand. Positive values of WDE contributed to actual increase in India's exports for Bangladesh (also RCE), Saudi Arabia (also RCE) and Thailand. Highly negative CCE was compensated by positive WDE in case of Bangladesh and Thailand. How-

Table 3. Percentage Share of India in the world exports of selected commodities (Value in US\$ Million) during 2011 and 2020

Commodities	2011				2020				Actual Δ in India's exports	Potential Δ in India's exports	(AΔ/PΔ)*100
	World exports (Rs)	India's exports (Rs)	World exports excl India (Rs)	Share of India's exports in World exports (%)	World exports (Rs)	India's exports (Rs)	World exports excl India (Rs)	Share of India's exports in World exports (%)			
Apples	7149.60	14.80	7134.80	0.21	7565.68	14.07	7551.62	0.19	-0.73	14.71	679.45
Cashew nuts, shelled	3037.17	895.14	2142.03	29.47	4410.67	404.23	4006.44	9.16	-490.91	128.64	77.74
Chillies and peppers, dry	1317.22	497.05	820.17	37.73	2453.24	1100.58	1352.66	44.86	603.53	245.26	108.33
Cotton lint	20841.55	3395.69	17445.86	16.29	14032.70	1448.52	12584.18	10.32	-1947.17	316.51	3.15
Maize	33786.74	1086.18	32700.57	3.21	36750.36	389.28	36361.08	1.06	-696.90	170.08	58.80
Mangoes, man-gosteens, guavas	1371.52	201.36	1170.17	14.68	3195.84	137.46	3058.38	4.30	-63.90	187.61	53.30
Rice	795.51	23.85	771.67	3.00	1187.82	136.32	1051.50	11.48	112.47	142.32	723.12
Sorghum	1717.32	15.99	1701.34	0.93	1709.42	16.47	1692.96	0.96	0.48	18.05	554.17
Wheat	46863.89	145.45	46718.45	0.31	44834.11	243.07	44591.04	0.54	97.62	99.02	309.98
Other products	1204564.65	24016.14	1180548.51	1.99	1376071.26	28193.79	1347877.47	2.05	4177.65	89.88	4.74
Agricultural products, total	1321445.18	30291.63	1291153.56	2.29	1492211.09	32083.77	1460127.32	2.15	1792.14	1412.08	7.08

Raw Data Source: www.fao.org

Table 4. Percentage share of India in the overall imports of selected countries (Value in US\$ Million) during 2011 and 2020

Countries	2011				2020				Potential Δ in India's exports	$(\Delta\Delta/P\Delta)*100$	
	Overall imports	India's exports	World imports excl India	Share of India's exports in World imports excl India (%)	Overall imports	India's exports	World imports excl India	Share of India's exports in World imports excl India (%)			
Bangladesh	7380.21	610.74	6769.47	8.28	11426.66	1156.91	10269.75	10.12	546.17	372.32	30.94
China mainland	95517.54	2426.66	93090.89	2.54	157693.90	852.71	156841.16	0.54	-1573.95	171.79	65.61
Iran	10171.70	13.07	10158.64	0.13	8331.38	49.95	8281.43	0.60	36.88	17.05	586.66
Malaysia	18674.35	411.05	18263.30	2.20	17610.11	73.30	17536.81	0.42	-337.75	12.5	800.00
Saudi Arabia	19553.53	88.95	19464.58	0.45	20472.96	93.18	20379.79	0.46	4.23	17.77	562.65
Thailand	9794.80	89.91	9704.89	0.92	13035.97	133.81	12902.15	1.03	43.90	34.71	288.18
UAE	14021.19	239.70	13781.49	1.71	16366.14	196.23	16169.91	1.20	-43.47	47.68	209.73
USA	107141.10	402.08	106739.00	0.38	146494.70	115.68	146379.03	0.08	-286.40	41.05	243.60
Vietnam	12444.25	237.97	12206.28	1.91	21765.68	179.49	21586.20	0.82	-58.48	22.23	-449.85
Others	1026747.00	25771.53	1000975.01	2.51	1079014.00	29232.52	1049781.10	2.71	3460.99	303.26	32.97
Total agricultural imports	1321445.00	30291.63	1291153.56	2.29	1492211.00	32083.77	1460127.32	2.15	1792.14	1046.36	9.56

Raw Data Source: www.fao.org

Table 5. Decomposition of India’s total agricultural products exports across selected commodities during 2011-2020 (Value in US\$ Million)

Commodities	Actual Δ in India’s exports	WDE	CCE	MDE	RCE
Apples	-0.73 (100.00)	0.86 (-118.57)	0.00	16.62 (-2279.68)	-18.21 (2498.25)
Cashew nuts, shelled	-490.92 (100.00)	779.13 (-158.71)	0.00	-680.64 (138.65)	-589.41 (120.06)
Chillies and peppers, dry	603.53 (100.00)	322.70 (53.47)	0.00	-440.97 (-73.07)	721.80 (119.60)
Cotton lint	-1947.17 (100.00)	-946.29 (48.60)	0.00	-131.65 (6.76)	-869.24 (44.64)
Maize	-696.90 (100.00)	121.59 (-17.45)	0.00	4555.35 (-653.66)	-5373.83 (771.11)
Mangoes, mangoosteens, guavas	-63.90 (100.00)	324.91 (-508.50)	0.00	-9.80 (15.34)	-379.01 (593.16)
Rice	112.47 (100.00)	8.65 (7.69)	0.00	-115.46 (-102.65)	219.28 (194.97)
Sorghum	0.48 (100.00)	-0.08 (-16.34)	0.00	-2.76 (-572.17)	3.32 (688.50)
Wheat	97.62 (100.00)	-6.62 (-6.78)	0.00	34.92 (35.77)	69.32 (71.01)
Agricultural products, total	1792.15 (100.00)	821.28 (45.83)	-216.41 (-12.08)	1761.51 (98.29)	-574.22 (-32.04)

Note: Figures in parentheses indicate percent to respective total

Raw Data Source: www.fao.org

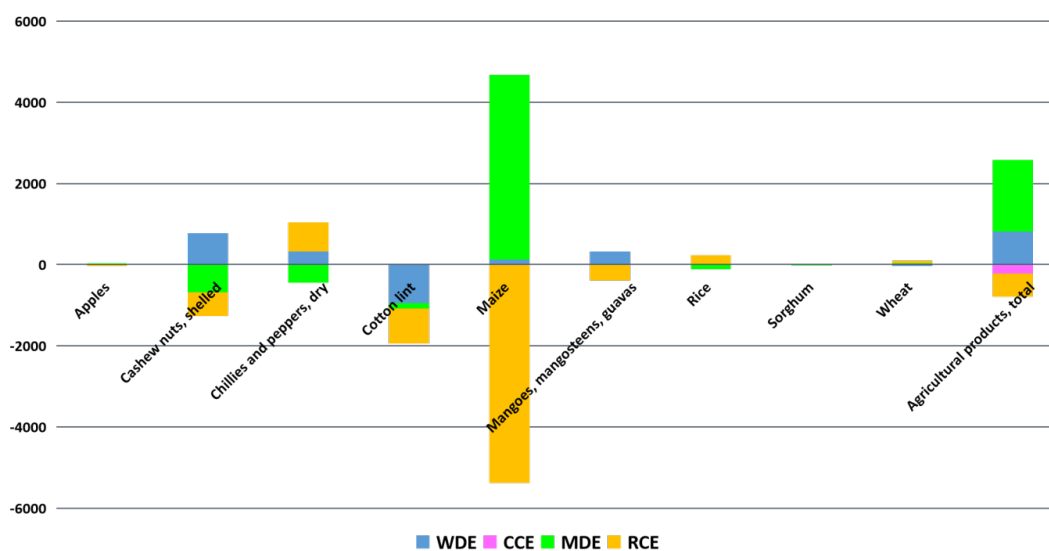


Figure 1. Decomposition of India’s total agricultural products exports (US\$ Million) across selected commodities (2011-2020)

ever, negative CCE in case of majority of the selected markets indicates India’s specialization in exporting the commodities having slow growing world demand during the study period. It is important that since December, 2019, the export curbs imposed by the majority countries

in view of COVID-19 pandemic have affected the CCE and RCE of majority of the selected commodities. That is, though domestic food security was not threatened during COVID-19 pandemic, the export curbs across the major importing countries led to lower actual increase in exports

of selected commodities compared to their respective potential exports. However, in countries like Bangladesh, Iran and Thailand, the actual increase in exports is greater than their respective potential exports in view of their importing policies and Government contracts to import and stock under present circumstances of COVID-19.

So, this pandemic also helped India to augment exports to these countries. While unrelated to COVID-19, the ongoing political disturbances in Myanmar have diverted grain demand of Southeast Asia towards India and their exports increased to Vietnam, Thailand and Malaysia ^[21].

Table 6. Decomposition of India’s total agricultural products exports across selected countries during 2011-2020 (Value in US\$ Million)

Commodities	Actual Δ in India’s exports	WDE	CCE	MDE	RCE
Bangladesh	585.11 (100.00)	1076.66 (184.01)	-726.11 (-124.10)	0.00	234.55 (40.09)
China mainland	-1232.66 (100.00)	1568.95 (-127.28)	102.90 (-8.35)	0.00	-2904.50 (235.63)
Iran	1035.83 (100.00)	-10.95 (-1.06)	7.27 (0.70)	0.00	1039.52 (100.36)
Malaysia	-102.44 (100.00)	7.57 (-7.39)	-29.88 (29.17)	0.00	-80.12 (78.22)
Saudi Arabia	702.43 (100.00)	11.47 (1669.74)	-10.41 (-990.54)	0.00	701.37 (-579.20)
Thailand	29.07 (100.00)	76.62 (160.79)	-45.94 (297.47)	0.00	-1.61 (-358.26)
UAE	-828.91 (100.00)	-384.02 (-162.40)	1157.14 (-81.09)	0.00	-1602.02 (343.49)
USA	-204.81 (100.00)	-34.62 (-24.65)	187.50 (-54.55)	0.00	-357.68 (179.20)
Vietnam	-477.09 (100.00)	1240.37 (-120.72)	-1035.08 (-681.82)	0.00	-682.38 (902.53)

Note: Figures in parentheses indicate percent to respective total

Raw Data Source: www.fao.org



Figure 2. Decomposition of India’s total agricultural products exports (US\$ Million) across selected countries (2011-2020)

5. Conclusions

Findings of the CMSA revealed that though Indian exports of agricultural products, total showed increasing trend (absolute terms), the shares of selected commodities' exports and agricultural products, total in total world agricultural exports showed declining trends during the past decade, 2011 to 2020. All the selected commodities except wheat registered significant and positive growth rates in terms of value of exports during 1991-2020. It is heartening that even with the advent of COVID-19 pandemic and the imposition of export curbs by the importing countries, the India's export performance in Bangladesh, Iran and Thailand markets showed impressive performance. This was mainly attributed to WDE compared to CCE, MDE and RCE. That is, the competitiveness of India's exports remained prone to high inconsistency arising out of changing external environment and import restrictions in view of COVID-19 pandemic. Both MDE and RCE with respect to commodity-wise exports and CCE and RCE with respect to country-wise exports are found negative for majority of commodities and countries (markets) respectively. These findings are in tune with the Indonesian cinnamon exports, as the MDE was found negative implying the difficulty of its exports to the US market^[22]. However, the findings are contrast to China's performance of high technology, medium technology and low technology exports, as it is mainly attributed to its competitive strength in the global market, though decreasing trend has been observed in the competitiveness of all three categories^[23]. In view of these findings, sustaining India's agricultural export performance deserves special attention through boosting CCE, MDE and RCE. This will certainly depend on India's internal situation and global demand conditions. Further, it would also depend on whether importing countries continue to maintain export restrictions and trade curbs. Since, India's overall agricultural export performance seem satisfactory during the past decade, it is essential to promote export competitiveness through withstanding export curbs imposed by the importing nations in the context of pandemic, foreign exchange rate fluctuations (not only absolute but relative also) and able to respond quickly to changes in external trade environment should deserve special attention. Accordingly, boosting the export competitiveness in traditional markets and exploring new markets to increase the export share is of immediate concern to make India as major player in the world trade. So, in the future, India should focus on countries where it enjoys competitive advantage to increase foreign exchange in the years to come. So, India should harness its agricultural export potential, through

suitable policy instruments, to make India global power in agriculture and raise farmers income. Public and private stakeholders across the value chain of each agricultural commodity should be updated with innovative solutions to address the challenges of upgrading the products, technologies, business models, policy environments etc., to realize competitive trade in the global market^[24].

One of the important limitations of CMSA is that it considers demand as an exogenous component and further the exporters help generate demand by activating innovation and product differentiation processes^[25]. So, price competitiveness alone cannot explain about the market penetration, as the demand evolution is influenced by a number of policies being implemented by the exporter countries.

Conflict of Interest

There is no conflict of interest.

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