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REVEALED COMPARATIVE ADVANTAGE AND TRADE INTENSITY: AN ANALYSIS OF INDIAN ECONOMY AND INDIA'S TRADE WITH BRICS NATIONS

ANAND SHANKAR PASWAN

Senior Research Fellow (SRF), Faculty of Commerce, Banaras Hindu University, Varanasi (U.P.), India.
Email: anandpaswanbhu@gmail.com, ORCID No: https://orcid.org/0000-0002-2123-0070

Dr. S.N. JHA

Professor, Faculty of Commerce, Banaras Hindu University, Varanasi (U.P.), India.
Email: snjhabhu@gmail.com

Abstract

Purpose: In the current global scenario, a balance and effective product composition play a decisive role in shaping a country's economy. Whereas, BRICS nations as the regional group, has been one of the fastest-developing regional groups in the world and one of India's reliable trading partners. **Methodology: Sampling**: For analysis India's composition of Products or investigating commodities structure India's commodities group volume was the sample country. While for assessing Trade Intensity India's Trade with BRICS nations was the sample countries. **Type of Data:** This paper basically deals with secondary data collected from various authentic international sources such as ITC Trade Map, World Development Indicators (WDI), World Trade Organisation (WTO) etc. for the period of 13 years i.e., from 2008-2020 for India's Compostion of Trade and from 2008-2021 for evaluating India's Trade Intensity with BRICS region. **Tools and Techniques:** This paper empirically examined India's structure of commodities group in which India has comparative advantages or disadvantages during the period 2008-2020 by employing Revealed Comparative Advantages (RCA). Further, this paper also investigated India's Trade performance with the BRICS nations both at individual and aggregate levels from 2008-2021 using Trade Intensity Index (TII). **Findings:** The empirical finding suggests that India has comparative advantage in manufacturing and agricultural sectors, which includes Gems & Jewellery, Textiles, Leather & Allied Products, and Vegetable Products while India has comparative disadvantages in commodities groups like Wood and Articles, Electronic Goods, Pulp and Paper Board and others. While India's trade intensity with the BRICS nations has improved decently. While at the individual level, India's strongest partner among the BRICS nations is China with the highest trade intensity level, while India enjoys a trade surplus with Brazil in maximum years. Whereas, Russia and South Africa are India's modest trade partners among the BRICS nations. **Suggestions:** This paper suggests that through lowering cost, reducing excessive tariff rates, proper management of exportable, potential, or unexploited market products exported by India to the world and to the BRICS nations can be effective for India in longer period.

Keywords: Revealed Comparative Advantages (RCA), Trade Intensity Index (TII), Economic, India, BRICS, Commodity composition, International Business

1. INTRODUCTION

Bilateral or multilateral trade refers to the exchange of goods and services between or among countries to gain the economic and financial relations ***(Miroudot, 2009)*** and reduce or eliminate tariffs and other trade barriers, making it easier and less expensive for goods and services ***(Hill, 2021)***. For every country, it becomes very essential to find a different combination of commodities groups ***(Lancaster, & Demand, 1971; Sagar, 2018)*** or enact a healthy balance the composition of the products being exported or

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imported by a particular country through bilateral trade or regional trade ***(Ortega & Osbat, 2020)***. For a smooth functioning of the trade composition of commodities, several factors are taken into consideration which includes export or import tariff rates, border cross taxes, shipping charges, customs duties, currency conversion, special additional duties charges, the quota on specific commodities group, WTO and other international instruction rules and regulation etc., all these activities play a prominent role in healthy international trading practices ***(Hill, 2021)***. In Indian context, India's product composition has undergone a phenomenal change and has successfully produced and offered a vast and versatile product range over the years. Perhaps before India's economic liberalisation, India's product composition portfolio was composed of simple and labour-intensive products ***(Sen, 2010)***. However, after that, a new trend was set up, and India's product composition has been diversified with more sophisticated, more complex, upgraded high-technology products has gained a place in India's export and import basket. Countries' export and import compositions indicate the country's plenty and scarcity of resources, provide a basic idea of the prevailing economic structure and help a country to facilitate the exchange of goods with a comparative advantage or disadvantage ***(Ravan, 2011)***. As a result, balanced commodity compositions play a significant role in influencing an economy's proportional demand and supply of commodities and help nations to identify important trading partners or regional blocs on which they can depend upon the availability of resources (Drysdale & Garnaut 2022). However, several factors also play an essential role in the healthy execution of balanced commodities composition, including demand and supply of a particular commodity, prevailing tariff rates, political relationships, shipping charges, customs duties and taxes and many more ***(Mayer, 1984; Hill, 2021)***. As a result, a country can't grow at a reasonable speed without a proper structure of commodities composition patterns. Thus, India's present scenario reveals that India is the 18th largest exporting nation in the world and represents 1.8 percent of the world's total export. While in terms of imports, India is the 10th highest importing nation in the world, controlling 2.6 percent of world imports as of 2021.

Further, BRICS nations has been one of India's favourite trading destinations. BRICS, as the regional group, has been one of the fastest-developing regional groups in the world. ***Jim O' Neill (2003)*** coined the term BRICs acronym for Brazil, Russia, India and China and predicted that BRICs as a group could play a decisive role in shaping the world economy, and by 2050, among the current G7 members, only the USA and Japan would be among the top seven GDP countries of the world. At the same time, while the G7 countries (United States, Canada, United Kingdom, France, Germany, Italy, and Japan) have historically been the dominant economic powers, the BRICS nations are projected to play an increasingly large role in shaping the world economy in the future. As such, understanding the economic policies and dynamics of these countries is becoming increasingly important for businesses and policymakers ***(Carayannis, et al., 2020).***

In 2020, the BRICS nations had a combined GDP (US$ nominal value) worth US$ 20.65 trillion, representing nearly 25 percent of global GDP (US$ nominal value). Further, in terms of GDP (Purchasing Power Parity), these five nations account for nearly 31 percent of worldwide GDP (PPP). Together BRICS nations control more than 3.20 billion of the

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population representing more than 41 percent of the world's population. Whereas BRICS nations acquire nearly 30 percent of the world land area, BRICS, as a group, account for over 40 percent of the worldwide workforce ***(BRICS, 2021)***. Whereas, from India's perspective, its trade relationship with the BRICS nations has witnessed healthy growth since its establishment. An intensive export and import trend have been recorded over the years. While, India's export to the BRICS nations represents 9.8 percent of India's total export, while India's imports from the BRICS nations command 19.7 percent of India's total import volume in 2021 ***(ITC, Trade Map, 2021)***.

In order to determine which commodity category India has a considerable advantage over or deficit over, the current study evaluated the Revealed Comparative Advantage (RCA) and tried to identify it. Based on the two-digit Indian Trade Categorization of the Directorate General of Foreign Trade (DGFT), Ministry of Commerce and Industry, India, the classification of commodities has been subdivided into 21 main commodity groups, totaling 99 commodities. Additionally, the study looked into India's trade intensity (TI) both individually and collectively with the BRICS countries. In order to measure the effectiveness of trade in terms of growth rates and to determine the trajectory of trade over time and the direction, one can assess the level of commerce between two nations or regional groups.

2. REVIEW OF LITERATURE

In this section, a brief review of the recently selected studies on intra-BRICS trade, RCA and trade Intensity and other trading blocs.

Maryam Javeria et al. (2018) assessed the intra- BRICS trade by applying trade intensity and RCA findings suggest that Russia has emerged as the major trading partner for EU among the BRICS countries. RCA also suggest that Russia and Brazil have comparative advantages in natural resource-based product, while India and China have comparative advantages in manufactured and processed products. Whereas, during the time period of 1985–2012, RCA and Bilateral RCA were performed by ***Ahmad et al. (2017)*** for both China and India. The study found that both countries had a total of 12 different goods that had RCA index values greater than 1. On the other hand, both nations are competitors in the international trade of goods. 4135 goods were identified at SITC as having RCA values greater than 1 for India and China. Moreover, ***Kalpana Singh (2016)*** examined the intra-BRICS trade intensities pattern using export intensity index, import intensity index, trade intensity index and the result suggests that in spite the CAGR of intra-BRICS trade of have been around 20 percent but the intensity of intra-BRICS trade has declined during 2001-2015, another finding suggests that although the BRICS nations trade around 17 percent of the world trade but the intra-BRICS trade only account for 12.12 percent of total BRICS trade with the world. While, ***Radha Raghuramapatruni (2014)*** examined the pattern of India- China trade relationship with special attention to service sector of both the nations by employing Trade Intensity Index (TII), Modified Trade Intensity Index (T'II) and Revealed Comparative Advantage Index (RCA) finding suggest that India registered greater TII and T'II which represent India's higher dependent on China as a major export and import partner but for China, the values are comparatively

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low which mean China depend more on other countries than India. While the RCA index for service sectors suggests that 12 items are assessed for the purpose, 5 services categories are feasible for trade between both the countries. Further, ***Chatterjee et al. (2014)*** employed a series of analytical tools to highlight the trends in trade and competitiveness between the BRICS as well as its implications for India. It indicated that India competes with other BRICS nations in many product categories and had comparative advantages. The study focused on the Finger-Kreinin Index and Relative Export Competitive Pressure Index of BRICS pairings. Further, India is ready to become a major trade open country, according to BRICS. While the BRICS group was predicted to account for approximately 50 percent of global GDP growth by the end of the next decade, and the global economy's center of gravity was expected to be between India and China. Whereas, ***Wani and Dhami (2013)*** in their paper "Indo-China Trade: Intensity and Potential for Future Trade" attempts to identify how the bilateral trade between India and China helps in growing their partnership for their mutual benefit in the coming time. The trends in the growth rate of China–India trade show a huge potential focused on their political achievements. Further, the relative advantages of China and ASEAN was done by ***Shohibul (2013)***. The study that was used produced both a symmetric comparative advantage index and a trade balance index. Overall findings suggested that China's trading patterns were more established and stable than those of ASEAN. Additionally, ***Tian and Yu (2012)*** have observed China and India's trading patterns since 2000. In order to understand the trade pattern, the study looked at the proportion of trade openness and the trade balance. The study found that both nations have a high ratio of trade openness. The survey found that although China has a larger share of tech-related exports than India does, the proportion is lower in India. On the other hand, the Chinese exports were dominated by the trade activities. ***Wignaraja G (2011)*** provided compelling evidence for a different pattern of comparative advantage for the year 2009 between China and India in the global market. The correlation was observed to be varied between the two countries. ***Pant (2011)*** identified the issues of trade and technology between India and the BRICS countries for the years 1995-2007. This evidence examined the factors affecting the long-term viability of intra-BRICS trade, including the substitutability and complementarity of merchandise trade and the primary challenges of technology cooperation among BRICS nations. As a measure of the long-term viability of trade, the ratio of net trade among the BRICS to net trade with the rest of the world at four-digit levels revealed an upward trend. The RCA demonstrated the limited potential for complementarity and substitution in BRICS trade. According to the study's conclusions, the BRICS member states should form PTA. ***Singh et al. (2011)*** used many criteria, such as market share, regional orientation, and competitiveness, among others, to develop the concept of the BRICS union under the PTA. The report supported the introduction of a PTA among BRICS member states based on its findings. ***Yuan and Zhao (2011)*** analysed BRICS trade data to determine the make-up and intended destination of BRICS trade. The study found that BRICS countries, especially China, are highly reliant on international trade. In contrast to India and Brazil, China, South Africa, and Russia all direct their exports to the developed countries. ***Havlik et al. (2009)***. The research showed that the Triad's share of international trade and of trade with the BRICS countries has

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been declining. In spite of this, a significant part for the EU was discovered to function in BRICS trade, especially with RussiaIn the framework of the RTA, ***Shinoj and Mathur (2008)*** analysed India's competitive advantage in important agricultural products exports to Asia between 1991 to 2004. The outcomes of the study revealed that India's comparative advantage in agriculture and related sectors has lost over time, and it is losing influence to other Asian countries. ***Serin and Civan (2008)*** analysed RCA and competitive intensity in selected commodities with tomato, olive oil, and fruit juice industries in Turkey and the EU from 1995 to 2005. The empirical finding suggest that the EU and Turkey only have prominent comparative advantages in the fruit juice and olive oil markets. Beside this, ***Batra and Khan (2005)*** investigated the RCA index within the manufacturing sector in India and China from 2000–2003 at both the HS-two and HS-six digit levels. The analysis showed distinct variations in the structure of comparative advantages at each of the several levels of segmentation. The findings suggest that Organic compounds, cotton, and salt were all among the top 100 commodities at one point or another. Among the top 100 commodities in terms of RCA value, organic and inorganic chemicals and nuclear reactors were manufactured in China. China had the greatest edge in manufacturing, whereas India had the greatest advantage in agriculture and related industries. The People's Republic of China and India were the subjects of yet another research comparing the two countries. While, ***Utkulu and Seymen (2004)*** evaluated Turkey's RCA and competitiveness in relation to the EU/15 over the years 1990–2003. The study divided the commodities into 63 categories and the study indicates 7 commodities to have high RCA. Further, the finding also reveals that the Economic crises in 1994, 1999, and 2001 had no severe impact on the structure of comparative advantages.

3. OBJECTIVE OF THE STUDY

- Analysing the major commodity groups on which India has comparative advantages or disadvantages
- To evaluate the trade intensity India and the BRICS nations to assess the effectiveness of trade from India’s perspective.

4. RESEARCH METHODOLOGY

A fundamentally important responsibility for regional integration is evaluating comparative advantages ***(Costinot et al., 2015)***. Typically, comparative advantages are determined by deriving a Revealed Comparative Advantage (RCA) index from trade flows. ***Balassa (1965)*** Revealed Comparative Advantage (RCA) indices had been used in a wide variety of applications as a measurement of the relative ability of a country to produce a good or service for its trading partners. Balassa's indexes have been used in numerous applications and has remained the standard RCA index in the literature for more than fifty years. The concept is straightforward but has significant ramifications because it is based on the Ricardian Trade Theory. The differences in relative productivity ascertain the pattern of international trade flow, which is evident and can be used to infer differences in relative production efficiency, which are not observable (Sheng el al., 2022). According

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to ***Balassa (1965)***, whenever a nation or region has a revealed comparative advantage for a given product (RCA >1), it is assumed to be a leading competitive exporter of that product in comparison to a country producing and exporting at or below the international average level ***(Ferto and Hubbard 2003, Batra and Khan 2005, Kannan 2015)***. A country with a demonstrated comparative advantage in the product is considered to have a strong export position in that product. The higher a country's RCA for product *i,* the stronger its export position in that product *i*. Thus, the subsequent RCA index is determined as the ratio of the former share to the latter share. As a result, when its value exceeds one, it indicates comparative benefits; when it is less than one, it represents comparative disadvantages. Although such disparities in productivity are difficult to see, an RCA metric may be easily derived using trade data to "expose" them. At the same time, the statistic can provide a general indication and first estimation of a country's competitive outsourcing areas of strength. It should be noted that the RCA unit of measurement does not consider any applied national measures that affect competitiveness, such as tariff rates, non-tariff policies, tax incentives, grants and others.

In the present study, RCA Indices computed between India and the world have been measured.

$$RCA = \frac{\frac{Xij}{Xit}}{\frac{Wj}{Wt}}$$

Where, Xij = Country *i* India Export of commodity *j* to world**;** Xit = Country *i* India Total Export to world**;** Wj = World Export of Commodity *j***;** Wt = World Total Export

The RCA Indices range from 0 to ∞. It is argued that a country has a comparative advantage when the RCA value is more than 1. In contrast, a country's comparative disadvantage is disclosed when the RCA value is lower than 1, as in the case of a country having a comparative disadvantage in a specific commodity or industry worldwide.

Trade Intensity Index (TII)

The trade intensity between two countries was firstly used by ***Brown*** in the year of 1949 and later applied by ***Kojima (1962). Lapadre (2004, 2006)*** further developed the measurement to intra and extra trade calculations, as well as to the introversion index, and expanded its use to regions and/or integration groups of countries in relation to the rest of the world *(**Tereza De Castro, 2010)***. Trade Intensity Index (TII) measures whether a country's trade with a particular country or region exceeds or falls short of what would be expected given that country or region's importance in the global economy. A value greater than 1 indicates that a country trades more from that country or region than would be expected given its share in the global economy, while a value less than 1 indicates the opposite.

$$TIIij = \frac{\frac{Tij}{Tiw}}{\frac{Twj}{Tww}}$$

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Where, TIIij = Trade Intensity Index of country *i* (India) from *j* country/ BRICS region; Tij = country *i* (India) trade with *j* country/ BRICS region; Tiw = country *i* (India) trade with the world (*w*); Twj = *j* country/ (BRICS) trade the world (*w*); Tww = total world trade

5. MAJOR FINDINGS

5.1 India's revealed Comparative Advantage (RCA) Indices

Table 1 illustrates the status of Revealed Comparative Advantage Indices (RCA) of India's exports to the world based on two-digit HS codes (further classified into 21 commodities groups). India's RCA indicators have been examined in two different timeframes, 2008 and 2019, in order to provide a more comprehensive prediction. As 2020 has been excluded for comparison as due to COVID-19 this year was considered as an uncertain event year.

The RCA output reveals that India had relative advantages in 2008 across 10 distinct commodity groups, with Gems & Jewellery holding the most significant advantage of 4.85 percent. Textiles stand second with a 3.13 percent market share, followed by Leather & Allied Products (2.57%), Vegetable Products (2.25%), Footwear and Headgear (1.54%), Engineering Goods (1.32%), Prepared Food & Tobacco (1.30%), Chemical Products (1.25%), Minerals (1.21%), Live Animal & Animal Products (1.0%), and Textiles (3.13 %). Besides that, India had a comparative disadvantage in certain commodities groups in 2008, including Miscellaneous Manufactured items 0.12 %; Wood and Articles Thereof 0.14%; optical, photographic, surgical and Musical Instruments 0.21%; Pulp and Paper Board 0.26%; Electronic Goods 0.33%; Machinery 0.37%; Other Commodities 0.45%; Transport Equipment 0.56%; Plastics and Rubber 0.64%; Mica, Ceramic, Glass and Glassware 0.96%.

Furthermore, in 2019 India has comparative advantages in 11 different commodities groups, which include Gems & Jewellery with the highest RCA value of 3.38%; followed by Textiles at 2.59%; Vegetable Products at 1.88%; Chemical products at 1.64; Live Animal & Animal Products 1.64%; plastics and Rubber 1.64 %; Leather & Allied Items 1.58%; Mica, Ceramic, Glass and Glassware 1.38%; Engineering Goods 1.27%; Minerals 1.26; Footwear and Headgear 1.08% as the indices value was greater than the unitary value. In contrast, there are a few commodities groups where India has a comparative disadvantage in 2019, including other Commodities 0.04; Miscellaneous Manufactured items 0.17%; Wood and Articles Thereof 0.23%; optical, photographic, surgical and Musical Instruments 0.31%; Electronic Goods 0.33%; Pulp and Paper Board 0.57%; Machinery 0.57%; Plastics and Rubber 0.74%; Transport Equipment 0.75%; vegetable oil 0.79%. Thus, it can be concluded from table 1 that India had the most comparative advantage in Gems & Jewellery, with RCA values lying between 3 and above in full years during the period under study. However, the highest RCA value of Gems & Jewellery was registered in 2009 with RCA indices of 7.12, while the lowest was recorded at 2.20 in 2020. Additionally, in the second commodities group, in which India had a greater comparative advantage in textile articles, the RCA value was 2.45 to 3.13 during the study period. Furthermore, other commodities groups in which India has a comparative advantage were Vegetable products in which the RCA range was between 2.70 to 1.67;

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Leather and allied items from 2.57 to 1.58; Footwear and Headgear highest with 1.54 to lowest 0.98 only in 2020; Minerals range between 1.26 to 1.08; Chemical products 1.64 to 1.02; Engineering Goods 1.48 highest in 2020 to lowest 0.97 in 2011 and Live Animal and Animal products with highest value 1.92 in 2017 to 0.84 in 2009. Thus, it can be concluded from the finding that the commodities group on which India has comparative advantages has good potential to expertise more on these commodities groups so more cost-effective and lower product prices can be achieved in future.

Table 1: India's Revealed Comparative Advantage (RCA) Indices

Product label	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Live animals and Animal Products	1.00	0.84	1.08	1.17	1.36	1.72	1.78	1.86	1.84	1.92	1.74	1.61	1.52
Vegetable Products	2.25	1.67	1.73	2.07	3.10	2.70	2.51	2.19	1.93	2.07	2.00	1.88	2.13
Vegetable Oil	0.58	0.57	0.61	0.58	0.58	0.57	0.56	0.68	0.60	0.74	0.73	0.79	0.89
Prepared Foods and Tobacco	1.30	0.67	0.84	0.85	0.90	0.81	0.68	0.68	0.68	0.65	0.66	0.71	0.86
Minerals	1.21	1.15	1.24	1.08	1.04	1.19	1.21	1.06	1.14	1.10	1.16	1.26	1.14
Chemicals Products	1.25	1.02	1.12	1.04	1.28	1.26	1.25	1.42	1.45	1.43	1.53	1.64	1.73
plastics and Rubber	0.64	0.49	0.57	0.62	0.63	0.66	0.61	0.66	0.68	0.68	0.79	0.78	0.79
Leather and Allied items	2.57	2.03	1.73	1.71	1.78	1.77	1.90	1.94	1.91	1.78	1.73	1.58	1.59
Wood and Articles Thereof	0.14	0.11	0.11	0.11	0.14	0.15	0.15	0.22	0.20	0.19	0.19	0.23	0.22
Pulp and Paper Board	0.26	0.24	0.27	0.26	0.32	0.33	0.33	0.38	0.40	0.38	0.50	0.57	0.56
Textiles	3.13	2.79	2.94	2.70	2.85	2.89	2.82	3.09	2.96	2.88	2.72	2.59	2.45
Footwear and Head Gear	1.54	1.28	1.18	1.09	1.09	1.17	1.23	1.28	1.26	1.17	1.13	1.08	0.98
Mica, Ceramic, Glass and Glassware	0.96	0.81	0.83	0.74	0.84	0.86	0.96	1.06	1.13	1.13	1.24	1.38	1.56
Gems and Jewellery	4.85	7.12	5.16	4.76	3.55	2.83	3.44	3.89	4.11	3.94	3.78	3.38	2.20
Engineering Goods	1.32	1.03	1.38	0.97	1.14	1.19	1.22	1.24	1.19	1.45	1.24	1.27	1.48
Machinery	0.37	0.34	0.32	0.32	0.35	0.36	0.39	0.44	0.45	0.49	0.55	0.57	0.55
Electronic Goods	0.33	0.43	0.31	0.34	0.32	0.28	0.23	0.22	0.23	0.21	0.26	0.33	0.31
Transport Equipment	0.56	0.61	0.70	0.69	0.66	0.68	0.83	0.76	0.73	0.73	0.73	0.75	0.74
Optical, Photographic, Surgical and Musical Instruments	0.21	0.22	0.20	0.20	0.23	0.22	0.23	0.26	0.29	0.28	0.30	0.31	0.32
Miscellaneous Manufactured items	0.12	0.13	0.14	0.14	0.16	0.15	0.15	0.17	0.17	0.17	0.19	0.17	0.23
Other Commodities	0.45	1.98	0.91	2.46	0.50	0.48	0.17	0.35	0.16	0.06	0.06	0.04	0.07

Author's Calculation

In addition, India had a comparative disadvantage in these commodities groups in maximum years, which includes Miscellaneous Manufactured items; Wood and Articles Thereof; optical, photographic, surgical and Musical Instruments; Electronic Goods; Pulp and Paper Board; Machinery; Plastics and Rubber; Transport Equipment; vegetable oil and other Commodities. Thus, by employing upgraded technology and cost control methods, the production cost of the products can be reduced, so improvement in RCA value can be witnessed, ultimately leading from a comparative disadvantage product to a comparative advantage product.

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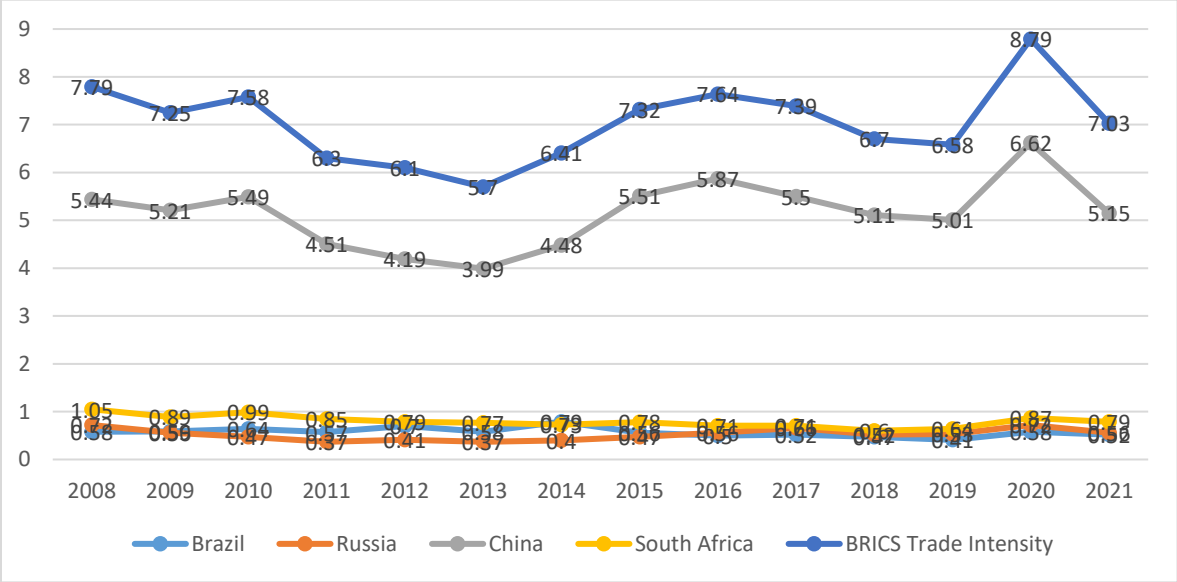
Table 2: India's Trade Intensity with BRICS Nations

Year	Brazil	Russia	China	South Africa	BRICS
2008	0.58	0.72	5.44	1.05	7.79
2009	0.59	0.56	5.21	0.89	7.25
2010	0.64	0.47	5.49	0.99	7.58
2011	0.57	0.37	4.51	0.85	6.30
2012	0.70	0.41	4.19	0.79	6.10
2013	0.58	0.37	3.99	0.77	5.70
2014	0.79	0.40	4.48	0.73	6.41
2015	0.56	0.47	5.51	0.78	7.32
2016	0.50	0.56	5.87	0.71	7.64
2017	0.52	0.66	5.50	0.71	7.39
2018	0.47	0.52	5.11	0.60	6.70
2019	0.41	0.53	5.01	0.64	6.58
2020	0.58	0.72	6.62	0.87	8.79
2021	0.52	0.56	5.15	0.79	7.03

Author's calculation

Figure: 1 India's Trade Intensity with BRICS Nations



Author's calculation

5.2 India's Trade Intensity with Brazil

Table 2 and Figure 1 reveal the trade intensity ratio between India and the BRICS nations individually and aggregately. India's Trade intensity with Brazil was recorded at its highest TII in 2014 at 0.79 points. However, the trade intensity over the study period has been a bit flatter or uneventful; and in range between 0.58 index to 0.64 index during the initial phase from 2008 to 2010. Additionally, during the timeframe from 2010 to 2014, a mixed trade intensity trend was observed; it uplifted from 0.64 index in 2010 to 0.79 index in

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2014, which was recorded as the highest TII during the study period, which exhibits India's and Brazil's trade pattern has contributed about 0.79 index in world trade which still cannot be considered as significant at world trade level but ultimately recorded at 0.56 points in 2015. However, from 2015 onwards, the trade intensity dripped and overall trade followed a downward trend from 0.56 index in 2015 to 0.41 index in 2019, which represents the poor performance of India's and Brazil's trade at the international level.

Additionally, the COVID-19 initial phase had a positive impact on India's trade intensity with Brazil as the TII value was uplifted by 0.17 points from 0.41 index in 2019 to 0.58 index in 2020. However, in 2021 a marginal drop was witnessed, and the TII value was recorded at 0.52 index. Thus, the overall Trade Intensity Index (TII) has declined insignificantly from 0.58 in 2008 percentage to 0.52 percentage in 2021, which reveals a major concern for both India and Brazil as the bilateral trade pattern is not performing up to their potential level as the TII has slowed down over the study period in a nutshell. While the possible suggestion for the policymaker would be to revisit the loophole. Another possible reason is that the Brazilian economy has also remained one of the most closed economies of the BRICS nations with slight trade liberalisation since significant tariff reductions at the turnover of the 1980s and 1990s **(Freemantle and Stevens 2010)**

5.3 India's Trade Intensity with Russia

India and Russia have been considered as one among the fastest growing countries in the world, followed by the fact that India is regarded as a cheap labour country with specialisation and diversity in Information Technology (I.T), Manufacturing Industry, Service sector, Fuel and Mining Products, agricultural products etc., which add fuels in shaping India's economy. Similarly, Russia is world famous for its natural gas, and the Russian market is considered as the world energy market, while it also has a favourable oil supply, followed by a high level of dependency on Hydrocarbon and other primary products etc., which are considered as the core specialisation and diversified area. Even though India and Russia have been a dominator in their specified areas, it does not find enough evidence to have a dominating role in world trade at the bilateral trade level. India and Russia's TII didn't perform according to their potential during the study period; TII has been below the unitary level and not even in a single year was it recorded nearly one index, which is considered a sign of concern part between India and Russia trade. The TII in its initial four years since the establishment of BRICS nations shows a negative trend, and a downward slope was observed from 2008-2011; TII dropped significantly from 0.72 index in 2008 to 0.37 index in 2011, which was recorded as the lowest during the study period. Moreover, this was largely because, during this period, overall trade performance between India and Russia declined, followed by their share contribution in the international market also reducing simultaneously. However, from 2012 to 2015, a stagnant mixed trend in both countries' TII index was observed, in 2012 TII was registered with a 0.41 index, followed by a narrow decrease of 0.04 index to 0.37 in the immediate next year, whereas in the next two consecutive years it marginally rose to 0.40 index in 2014 and 0.47 index in 2015. In the latter half from 2016 to 2019 TII started to recover to its initial position, but it failed to maintain the earlier index; for two consecutive years, TII witnessed positive growth; it rose to 0.56 index in 2016 and 0.66 index in 2017 and again

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in later half TII started to fall, in 2018 TII dropped by 0.14 points from its previous year and recorded at 0.52 index while in 2019 a negligible 0.01 index growth was witnessed and TII was recorded at 0.53 index. In contrast, during the COVID-19 early stages, the TII value substantially improved by 0.19 points from 0.53 index in 2019 to 0.72 index in 2020; however, in the post-COVID19 preliminary phase again, a reduction of 0.16 index was observed and the TII value was recorded at 0.56 index. Thus, in the concluding remark on India-Russia trading practices from 2008-2021, it can be illustrated in a nutshell that even after considering both emerging nations as a giant in their respective filed but both nations didn't perform according to their potential level rather India's Trade Intensity Index (TII) with Russia is second lower as compared to India's TII with the remaining BRICS nations which need to be strictly monitored if India wants to overcome from the unintended trading with Russia.

5.4 India's Trade Intensity with China

India and China are among the world's leading exporters and imports. China holds the number one place as the world's exporter representing 14.1 percent of world exports. As a global importer, it is placed in the second position, representing 11.1 percent of world imports of merchandise products. Similarly, India holds the eighteenth place as a world exporter and represents 1.8 percent of world exports, followed by placed at the tenth position as a world importer and representing around 2.6 percent of world imports (ITC, Trade Map, 2021) which establishes the importance of these two economic giants from Asia as well as them dominance at the world level. Trade Intensity Index (TII) during the study period has been more than 5 index in maximum years; during the period from 2008 to 2011 TII followed a mixed trend; in 2008 it was recorded with 5.44 index, in the next year it slipped by 0.23 points to 5.21 index in 2009, followed by a recovery of 0.28 point to 5.49 index in 2010 and again it fell sharply with 0.98 points to 4.51 index in 2011 and this falling pattern further continues for next two years when TII was recorded with 4.19 in 2012 and to its lowest of 3.99 index in 2013. While two quick recoveries in immediate years were witnessed in 2014 and 2015, with TII values recorded with 4.48 and 5.51 index respectively. While 2016 is considered the landmark year when TII reached its all-time high with 5.87 index (before COVID-19 first phase) and for the next three consecutive years, a downward trend was observed when in 2017, 2018 and 2019, TII value was recorded at 5.50, 5.11 and 5.01 index respectively. However, during the COVID-19 preliminary phase, the TII value increased sharply by 1.61 points from 5.01 index in 2019 to 6.62 index in 2020, which was registered as the highest TII index during the study period, whereas in 2021a drop of 1.47 index in TII value was recorded and the TII value was recorded at 5.15 index. While comparing overall TII performance from 2008-2021 a sideway slowdown trend was observed; it reduced from 5.44 index in 2008 to 5.15 index in 2021. Thus, the finding suggests that India and China's economies support each other economy through healthy competition with good productivity followed by aggressive trade patterns by India for products like pharmaceutical goods, high-tech production, textile, chemicals, software etc., while China has the upper hand by the trading of telecom equipment, automotive, consumer goods, chemicals etc. Therefore, in both nations' bilateral trade, China has the upper hand and India needs to take productive steps to reduce the increasing unfavourable trade balance.

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5.5 India's Trade Intensity with South Africa

During the timeframe from 2008-2011 TII observed a mixed trend, 2008 was the only year when TII was recorded above one index and in 2008 TII was recorded as the highest level with 1.05 index followed by a decline in the immediate year by 0.16 points to 0.89 index and again a recovery was witnessed in next year and the TII was recorded at 0.99 index in 2010 which was recorded as the second highest, while in 2011 again it slipped down by 0.14 index and TII stood at 0.85 index. However, during the timeframe from 2012 to 2015 basically, a nominal downward trend was observed except in 2015 when some sort of positive recovery was noticeable, during this period 2012, 2013 and 2014 TII was recorded with 0.79, 0.77 and 0.73 index respectively which exhibits marginal negative slowdown in TII performance and the core reason behind this TII slowdown was decease in share contribution of India and South Africa at world trade level which reduced the impact of these two nations in the international market, noticeably a negligible recovery in TII was observed in 2015 when it was recorded at 0.78 index. However, from 2016 to 2019 impact of these two emerging nations at the world market even get worse, in 2016 TII was recorded as the lowest with 0.71 index, however in 2017 it retained its lower TII with 0.71 index, while in 2018 its broke its own other previous year record and created a new low of 0.60 index and remained the lowest during the study period. While in 2019 TII improved marginally by 0.4 points and TII stood at 0.64 index.

Furthermore, during the first phase of COVID-19 TII value increased by 0.23 points from 0.64 index in 2019 to 0.87 index in 2021; further in 2021 TII value dropped slightly to 0.79 index. Thus, the finding suggests that overall, India's trade intensity with South Africa has declined and TII reduced from 1.05 index in 2008 to 0.79 index in 2021, while policy framers and foreign trade authorities of both nations need to take a proper productive step so that importance of these two nations at world level should be more appraised and appreciated like India are promising exporters of the product like pharmaceutical goods, high-tech production, textile, chemicals, software etc., while South Africa are promising exporters of various ores, jewels, gold etc., so both nations need to monitors efficiently what they have the upper hand or has resource advantage as compare to other nations.

5.6 India's Trade Intensity with BRICS Nations

As BRICS is one of the flourishing trade blocs in the present scenario, BRICS as a bloc has performed better than the existing trade bloc like G6, NAFTA and another developed trade blocs. In the initial four years of BRICS establishment, India's trade intensity with the BRICS region has been on top, and it has performed significantly well; in 2008 TII was recorded at its level high with 7.79 index during the study period, followed by a drop of 0.54 points in TII value to 7.25 index in 2009, however in 2010 TII index again jumped by 0.33 points. TII reached to 7.58 index but in 2011 a drastic fall in TII index was observed. A drop of more than 1.20 index was noticeable in 2011 TII was registered at 6.30 index this sudden fall in TII index was result of high degree gap between India's export and India's import patterns with the BRICS nations which increased the gap of India's trade deficit with remaining BRICS nations which leads to lower TII index for India during this year. Meanwhile, this fall in TII index does not stop and this falling pattern further continued for the next two years in 2012 TII was recorded at 6.10 index followed

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by sharp decline of 0.40 point in the immediate next year to 5.70 index in 2013 which was recorded as the lowest during the study period. However, a sharp recovery in the next two years was noticed when in 2014 TII was recorded at 6.41 index followed by an increase of almost 0.90 points was witnessed in 2015 when TII stood at 7.32 index. This fluctuating trend continued for next four years when in 2016 TII was recorded at 7.64 index, afterwards a downward trend pattern was witnessed for the next three years when in 2017 it was recorded at 7.39 index, followed by 6.70 index in 2018 and 6.58 index in 2019 respectively. Moreover, during the first phase of COVID-19, India registered its all-time high trade intensity with the BRICS nations as TII value was recorded at 8.79 index, followed by a declining value in 2021 when TII value was recorded at 7.03 index. Thus, it can be inferred that India's trade intensity with the BRICS nations though witnessed a downward trend but BRICS as a regional group has performed significantly well over the years and India among the BRICS nations has been playing an important and prominent role in shaping BRICS as one of the strongest regional blocs.

6. DISCUSSION AND CONCLUSION

In this paper, the finding reveals that India has comparative advantage on various commodities which includes Gems & Jewellery with the highest RCA value between 2.20 percent to 7.12 percent; followed by Textiles between 2.45 percent to 3.13 percent ; Vegetable Products between 1.67 percent to 3.10 percent; Chemical products between 1.02 percent to 1.73 percent; Live Animal & Animal Products apart from 2009 its RCA value was in between 1.00 percent to 1.92 percent; Leather & Allied Items RCA value between 1.58 percent to 2.57 percent; Engineering Goods except 2011 RCA value was recorded between 1.03 percent to 1.48 percent; Minerals products RCA value between 1.04 percent to 1.26 percent; Footwear and Headgear with RCA value between 1.09 percent to 1.58 percent apart from 2020 RCA value when it was registered at 0.98 percent. Whereas, there were some commodities groups on which India has comparative disadvantages which includes other Commodities; Miscellaneous Manufactured items; Wood and wood products 0.23%; optical, photographic, surgical and Musical Instruments; Electronic Goods; Pulp and Paper Board; Mica, Ceramic, Glass and Glassware; Machinery; Plastics and Rubber; Transport Equipment; vegetable oil; Prepared foods and tobacco. All these commodities group have less than 1 value in maximum year during the course study, which express India have comparative disadvantages in the commodities. Further the finding also reveals that India's Trade Intensity with the BRICS nations aggregately represents a healthy trade engagement with the BRICS nations. During the study period it was recorded in range between 5.70 indices to 8.79 indices which exhibits BRICS nations are one of the significant groups on which India's trade dependent upon. But, from India's perspective the biggest concern is that India's trade with the BRICS nations is dominated by India's import from it as compared to India's export which leads the gap of India's trade deficit with the BRICS nations. While, in regard to India's individual trade potential with the BRICS nations. India's Trade Intensity with China was recorded as the highest among the BRICS nations. As the finding suggest that India's trade intensity with China was recorded in range between 3.99 indices to 6.62 indices which reveals China is among the top trading destination for India, on which India largely

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depends upon. While, India's Trade Intensity with Brazil are recorded below the unitary level which reflects both countries are not a major trading partner for each other as it was recorded in range between 0.41 indices to 0.79 indices. Whereas, India's Trade Intensity with South Africa was recorded below the unitary level in maximum years which determine low concentration of both countries at the world level. While, India's Trade Intensity with Russia reveals similar result as it was recorded in range between 0.37 indices to 0.72 indices. This also define a low trade concentration of both countries on one another as compared to their trade to the world. Thus, this paper also suggests that through proper management of exportable, potential, or unexploited market products exported by India to the world and to the BRICS nations can be effectively utilised by lowest possible cost, reducing excessive tariff rates on comparative advantages products, effective management of essential and determines products planning and control, developing new products through strategic planning by adaptations and innovations to impart greater acceptability to the products. Furthermore, the established and existing commodities group must be critically examined against the objectives that they were expected to achieve in the market and their past performance. Thus, it is essential that the composition of the commodities group planning and evaluation must be a continuous process so the growing demand of the commodities group must be further uplifted and the less demand products can be promoted effectively as this will leads to more versatile trade option to the global market. Further India's Trade Intensity especially in export dimensions with the individual BRICS nations and as a regional group need to be accelerate so the prevailing increasing trade deficit with BRICS nations except Brazil can be taken control. Thus, the Export performance can be improved with the BRICS nations in years to follow.

7. LIMITATION AND FUTURE SUGGESTION

The study conducted research to find the comparative advantages among five countries. India may have much more comparative advantages over other countries except these BRICS countries. The methodology of data collection could have been extended. Due to time, resources, and data availability, the findings might be biased. Future studies are suggested to consider these issues. All commodities were not counted in this studies, which may offer a scope for the future studies.

References

1) Ahmad, I., Kunroo, M. H., & Sofi, I. A. (2018). An RCA analysis of India–China trade integration: Present, potential and prospects. *Foreign Trade Review*, *53*(1), 49-58.

2) Balassa, B. (1965). Trade liberalisation and "revealed" comparative advantage 1. *The manchester school*, *33*(2), 99-123.

3) Batra, A., & Khan, Z. (2005). *Revealed comparative advantage: An analysis for India and China* (No. 168). Working paper.

4) Bergstrand, J. H. (1990). The Heckscher-Ohlin-Samuelson model, the Linder hypothesis and the determinants of bilateral intra-industry trade. *The Economic Journal*, *100*(403), 1216-1229.

5) Brown, A. J. (1949). Applied economics: Aspects of the world economy in war and peace. *London:*

ISSN: 1671-5497
E-Publication: Online Open Access
Vol: 41 Issue: 11-2022
DOI 10.17605/OSF.IO/Y4827

6) Burange, L. G., & Chaddha, S. J. (2008). India's revealed comparative advantage in merchandise trade. *Artha Vijnana*, *50*(4), 332-363.

7) Carayannis, E. G., Acikdilli, G., & Ziemnowicz, C. (2020). Creative destruction in international trade: insights from the quadruple and quintuple innovation Helix models. *Journal of the Knowledge Economy*, *11*, 1489-1508.

8) Chandran, D. (2011). Trade Complementarity and Similarity between India and ASEAN Countries in the Context of the RTA. *Available at SSRN 1763299*.

9) Chatterjee, B., Jena, P., & Singh, S. (2014). Intra-BRICS trade & its implications for India. *Available at SSRN 2474078*.

10) De Castro, T. (2013). Trade among BRICS countries: Changes towards closer cooperation?

11) Drysdale, P., & Garnaut, R. (2022). The Pacific: an application of a general theory of economic integration. In *Regional Institutional Arrangements*. The Australian National University.

12) Golub, S. S., & Hsieh, C. T. (2000). Classical Ricardian theory of comparative advantage revisited. *Review of international economics*, *8*(2), 221-234.

13) Hill, C (2021), an International Business Competing in the Global Marketplace, McGraw Hill, 14th Edition.

14) Kojima, K. (1964). The pattern of international trade among advanced countries. *Hitotsubashi Journal of Economics*, *5*(1), 16-36.

15) Lancaster, K., & Demand, C. S. (1971). A New Approach. *New York-London*.

16) Maryam, J., Banday, U. J., & Mittal, A. (2018). Trade intensity and revealed comparative advantage: an analysis of Intra-BRICS trade. *International Journal of Emerging Markets*.

17) Maryam, J., Banday, U. J., & Mittal, A. (2018). Trade intensity and revealed comparative advantage: an analysis of Intra-BRICS trade. *International Journal of Emerging Markets*.

18) Miroudot, S., Lanz, R., & Ragoussis, A. (2009). Trade in intermediate goods and services.

19) O'Neill, J., Leme, P., Lawson, S., & Pearson, W. (2003). Dreaming with BRICs: the path to 2050. *Goldman Sachs Global Economics Paper*, *99*.

20) O'neill, J. (2011). *The growth map: Economic opportunity in the BRICs and beyond*. Penguin UK.

21) Ortega, E., & Osbat, C. (2020). Exchange rate pass-through in the euro area and EU countries. *Banco de Espana Occasional Paper*, (2016).

22) Raghuramapatruni, R. (2015). Revealed comparative advantage and competitiveness: A study on BRICS. *Arabian journal of business and management review*, *5*(5), 1-7.

23) Sagar, N. A., Pareek, S., Sharma, S., Yahia, E. M., & Lobo, M. G. (2018). Fruit and vegetable waste: Bioactive compounds, their extraction, and possible utilization. *Comprehensive reviews in food science and food safety*, *17*(3), 512-531.

24) Sheng, Y., Ball, V. E., Erickson, K., & Mesonada, C. S. J. (2022). Cross-country agricultural TFP convergence and capital deepening: Evidence for induced innovation from 17 OECD countries. *Journal of Productivity Analysis*, *58*(2-3), 185-202.

25) Singh, K. (2016). A comparative analysis of foreign trade of BRICS countries. *Prabandhan: Indian Journal of Management*, *9*(2), 29-40.