Original Article

India's Incipient Comparative Advantage and Trade Specialization in Pharmaceutical Sector in Comparison to ASEAN

Sumit Oberoi[1,*], Pooja Kansra[2]

[1]Symbiosis School of Economics, Symbiosis International University, Pune, INDIA.
[2]Mittal School of Business, Lovely Professional University, Jalandhar, Punjab, INDIA.

ABSTRACT

Introduction: Today the whole world is looking towards the rising role of Asian nations in the world trade. Amid 48 Asian nations, India's pharmaceutical segment observed a crucial restructuring in mounting income and occupational opportunities. **Aim/ Objectives:** Therefore, the present study aims at measuring comparative advantage and trade specialization between India and selected ASEAN economies at harmonized standard 4-digit level of product categorization. **Materials and Methods:** Statistical indexes meticulously assess the secondary data by performing revealed comparative advantage (RCA) index and Lafay index. **Results:** Outcomes lucidly elucidate that India embraces comparative advantage and trade-specialization for pharmaceutical sectors *viz.* '*Bulk Medicines*', '*Inputs Specific to Pharmaceutical Industry*' and '*Medical technology equipment*". **Conclusion:** Thus, the results advocates that industrial progressions, technical innovation, product sophistication and commodity diversification in pharmaceutical sector is a pre-requisite for India to clinch trade superiority.

Key words: Pharmaceutical Sector, India, ASEAN, Trade Specialization, Comparative Advantage.

INTRODUCTION

Asia has emerged to be a new-fangled engine for economic growth globally. According to Oberoi (2018),[1] "*With the phenomenal growth and development of Asian continent in the recent years, owes much to the extension of its international trade and policies that derived it towards the growth and development*". Asia has appreciably increased its regional portion or quota of world GDP over the past couple of decade in comparison with other world regions. As the economic potency of Asian economies is anticipated to continue, the Asian portion of worlds GDP is forecasted to reach 29.4 percent in 2030. Trade, in turn, has much facilitated and encouraged the Asian economies to develop infrastructure, rapid technological change, foreign investment, employment and structural reforms.[2]

With the advent of economic integration between the various nations, today the whole world is looking towards the rising role of Asian nations in the world trade. According to Firend (2016),[3] Asia being the diverse and allied region, it represents the significant importance to the trade. In terms of revenue and sales, Asia acts to be the biggest market player globally. The 21st century is projected as the century of Asian dominance. The concept of Asian Century counterpart the characterization of the 20th century as Century of America, and 19th century as Britain's Imperial Century. The Asian economy constitutes of more than 4.3 billion people (59% of the world population) residing in 49 different nations, but the significance Asia doesn't lie only in demographic dividend, but the growing middle-class in Asia is creating an unparalleled demand for products and services which act as a catalyst for trade in Asia.

Submission Date: 12-06-2021;
Revision Date: 19-11-2021;
Accepted Date: 02-04-2022.

DOI: 10.5530/ijper.56.3.143

Correspondence:
Sumit Oberoi
Research Associate,
Symbiosis School of Economics, Symbiosis International University, Pune (411003), Maharashtra, INDIA.
E-mail: profsumitoberoi@gmail.com

www.ijper.org

India-ASEAN economies are dynamic and vibrant regional grouping in the Asian continent. The relationship between, India and South East-Asian nations have a profound deep historical root.[4] For many centuries, trade and human migration have stretched across the Bay of Bengal and the Indian Ocean maritime to the South-East Asian economies. India and Southeast Asian sub continents being diverse in nature holds the sustained integration through trade, culture, and community. The pharmaceutical sector has also experienced a momentous and instantaneous modification with the beginning of ASEAN-India Free Trade Agreement (AIFTA) in the Asian economy. Spread of pharmaceutical commodities and services has amplified enormously in the recent years.[1] changing epidemiological status and demand for pharmaceutical goods is the primary cause of rising trade between India and ASEAN members. Thus, with the rising significance of trade between India and ASEAN members. The present study aims at measuring comparative advantage and trade specialization between India and selected ASEAN members at (HS) 4-digit level of product classification.

Literature Review

An all-inclusive review of literature majorly focusses upon research gaps, thereby providing better understanding to the scholar for future research. "*The present manuscript predominantly emphases upon the Ricardo's comparative advantage theory and Heckscher-Ohlin (H-O) factor comparison theory*".[5] Both theories emphasize upon productivity and endowment of factor as indispensable source of attractiveness and advantage.[6] According to Worz[7] "*the choice between export diversification or export specialization for economic growth of developing economies has been a debatable issue. H-O theory emphasized that every economy should specialize in product manufacturing and trade of particular product line regarding which it holds both comparative and competitive advantage*". Large number of studies and academic literature certifies that it's the trade which induce the occurrence of specialization and distribution of technical know-how. The pattern of specialization in trade has been the subject matter for numerous studies. As per the findings derived from the studies conducted by,[1,8,9] exhibits that diversity in goods and commodities which country produces and trades is unswervingly proportionate to ever-increasing specialization, which successively influences the pecuniary growth process. India's pharmaceutical segment manifests as foremost player of generic medicines in international market. Additionally, trade movement and guidelines on pharmaceutical products, disclosed trade intensification was witnessed in pharmaceutical sector starting from 1996-2009.[10] Study steered by Mahmood and Nishat,[11] elucidated India's profound dependence for raw material on Republic of China for mass production and potential trade of pharmaceutical product line. Nevertheless, strategies implemented by India such as brimming service gaps, cost effectiveness, research and development of new product line strengthened the existence of new global leader and pharmaceutical avenue. A similar study manifested India's potential as emerging front-runner and billion-dollar economy successively after Singapore and Thailand in pharmaceutical segment.[12] According to Pal and DasGupta,[13] India originally holds strong competitive advantage in trading service assistances such as informational expertise, generic pharmaceutical product range, therapeutic tourism and cheap tele-connectivity. Whereas, ASEAN economies are whopping buyer of service retail. In recent literature Oberoi *et al.*[14] "*India ought to work on formulating innovative export preferment strategies to achieve sustainable comparative advantage at industry and sector level as whole. Thus, export elevation blueprint is the need of an hour to survive in such a competitive international market for both old-school and new-fangled exporters*".

MATERIALS AND METHODS

This study is by and large grounded upon the secondary set of data to comprehend India's incipient advantage and specialization regarding selected ASEAN members. Time frame of this study is right from 2001 till 2020 in order to understand the shift in trade before and after AIFTA.

Rational of the Study

Amid 48 Asian nations, India's pharmaceutical segment perceived an essential restructuring in mounting income and occupational opportunities.[14] India's holds competitiveness and comparative advantage in its large pool of highly qualified medical specialists in comparison to its peer Asian. Quite the reverse, ASEAN partners such as Malaysia, Singapore and Thailand are giving India a stiff competition in healthcare sector. For certain medical procedure viz. Vedic-medication, Angioplasty, Spinal Fusion, Cosmetic Surgery, etc. Malaysia and Thailand holds more of cost competitive advantage in comparison to India.[15]

Revealed Comparative Advantage (RCA)

This particular concept has been utilized immensely to examine competitiveness and comparative advantage in majority of research articles. RCA index helps in measuring product lines trade potential and degree of

trade advantage; RCA also highlights the contending competence of product. RCA index is majorly employed to compete the ratio of the share of industry in nation's total export, to the ratio of the share of industry in world's total export.

The statistical formula for RCA:

$$(RCA^{i}) = (X^{i}_{z}/X^{i}_{t})(X^{w}_{z}/X^{w}_{t}) \quad (1)$$

Where, (a) Xiz = product 'z' export in country 'i'. (b) Xit = nation 'i' entire export (c) Xwa = export of product 'z' from world (d) Xwt = World's entire export. Value of RCA highlight greater degree of trade advantage and specialization in export of product z, if (RCA >1) value is bigger than unity or opposite.[11] According to Oberoi (2018, pp. 24),[1] The revealed comparative advantage (RCA) index could be efficacious to manifest that several produces might hold comparative shortcomings but holds potential to accomplish effectiveness. To measure the degree of advantageous country's export were catalogued into competitively positioned (CP), promising (Tier-1 and Tier-2) commodities, vulnerable commodity (VP) and feebly positioned (Tier-1 and Tier-2).

Measuring Country's Export Advantage in Pharmaceutical Product Line

Competitively Positioned	**Vulnerable Commodities**
Competitive product line holds RCA index value > 1 and display enhancement gradually because of productive external and internal settings. (a). RCA >1 for 2014-20 (b). And, $RCA_{2014-20} - RCA_{2010-14} > 0$	These commodities hold RCA>1, Still indices deteriorate to opposing domestic setting or international competitive stresses. The principle decision to choice commodities under this section are: (a) RCA >1 for 2014-20 (b) And, $RCA_{2014-19} - RCA_{2010-14} < 0$.
Promising Product Line	**Feebly Positioned**
These commodities reveal RCA values <1, expressing comparative disadvantage, but comparative international position in export market is enhancing. **Tier-1** (a) $RCA_{2014-20} < 1$, but equals to 0.5 (b) Variance for RCA means of 2014-20 and 2010-14 is positive **Tier-2** (a) $RCA_{2014-20} < 0.5$. (b) RCA mean for 2014-20 and 2010-14 is to be positive $RCA_{2014-19} - RCA_{2010-14} > 0$.	RCA index values are >1 and deteriorating because of unfavorable international and domestic aspects. **Tier-1** (a) $RCA_{2014-20} < 1$, is equivalent to 0.5 or > 0.5 (b) RCA difference between 2014-20 and 2010-14 holds negative $RCA_{2014-20} - RCA_{2010-14} < 0$. **Tier-2** (a) $RCA_{2014-20} < 0.5$. (b) RCA mean for 2014-20 and 2010-14 is to be negative $RCA_{2014-19} - RCA_{2010-14} < 0$.

Source: Authors Compilation

Lafay Index

The present article examines trade specialization using Lafay Index (LFI). According to Lafay,[16] index measures and analyze the altering sequence of trade specialization. According to Oberoi,[5] "*Lafay index is defined as nation's specialization with regards to a specific good as the difference between the trade balance of that good and the country's overall trade balance weighted by the goods share of the total trade*".

$$LFI_{j} = 100\left(\frac{x_{j} - m_{j}}{x_{j} + m_{j}} - \frac{\sum_{j=1}^{N}(x_{j} - m_{j})}{\sum_{j=1}^{N}(x_{j} + m_{j})}\right)\frac{x_{j} + m_{j}}{\sum_{j=1}^{N}(x_{j} + m_{j})} \quad (2)$$

Where (a) Xj = article " j " export to world (b) Mj= article " j " import from world (c) N = Total traded merchandise.

A positive estimate of Lafay index designates comparative advantage and greater degree of trade specialization, under the sector manufacturing advanced diversification in product range.

Fors and Againsts of Lafay Index

- Lafay indices ponders on export-import ratios in contrast to RCA, which solely depends upon exports.
- Lafay index contemplates on each product's involvement and prominence in trade.
- This index restraint all contortions and distortion caused due to macroeconomic unrest.
- Possible limitation of Lafay (LFI) index is that it takes estimates near to "*zero*" for a sector, in which a "country" import and export equivalent quantity, in distinctive sub segments of a sector.

Competitive Positioning of Pharmaceutical Products: A Sectorial Investigation in Context of India-Asean

The particular section of the study examines the competitive positioning of pharmaceutical products at various grouping levels between India and selected ASEAN members.

Bulk Medicines

Bulk medicine (HS 28–38) commodities have been acknowledged as the foremost patron in product export. Number of pharmaceutical products of India was 52 having a greater degree of comparative advantage (RCA>1). Quite the reverse, ASEAN members such as Indonesia, Malaysia and Vietnam holds less of competitive advantage with low number of products with RCA>1. Nations such as Singapore and Thailand holds more of competitive advantage over its other

ASEAN partners with 47 and 38 products having RCA>1.

Inputs-Specific to the Pharmaceutical Industry

India's pharmaceutical industry positively and strongly contributes to the exports, but the results of RCA index clearly highlight both competitive advantage and budding threats. ASEAN members such as Malaysia, Singapore and Thailand though have less number of product line with RCA>1, but they also possess few number of products with RCA<1 which clearly signifies there rising threat of competitive advantage in comparison with India.

Chemical Inputs of General Purpose

Under chemical inputs of general-purpose sector though India holds few products with RCA>1 (26 products), but it also has advantage over other economies with mere 18 products with RCA<1. Malaysia and Singapore holds comparative advantage with greater number of commodities having RCA>1 (31 and 28 products). Other ASEAN members like Indonesia, Thailand and Vietnam also underline the rising competitive advantage.

Hospital and Laboratory Inputs

From Table 1 it could be easily understood that ASEAN members possess large number of products with RCA>1. Singapore stands to be most competitive nation with 58 products having RCA>1, followed by Malaysia (44), Thailand (33) and Indonesia (27). India holds less of comparative advantage with mere 20 products having RCA>1. Therefore, India should work more rigorously in the particular healthcare sector.

Medical Technology Equipment

The overall position of India for medical technology equipment is balanced and does not exhibit a huge comparative advantage under product line with RCA>1. On the other hand, comparatively more developed ASEAN members such as Malaysia, Singapore and Thailand holds higher competitive and comparative advantage over India, Indonesia and Vietnam with greater number of products having RCA>1.

Degree of Country's Advantage in Export of Pharmaceutical Product Line (2001-2020)

Table 2 elucidates the degree of country's export advantage in pharmaceutical product line, which is measured using the scale adapted from Erokhin *et al.* (2021).[17] Any nations degree of comparative advantage

Table 1: RCA Profile of India and ASEAN Members for Pharmaceutical Product Line.

Bulk Medicines		**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Chemicals Organic (HS 28) Aluminides, modified starches, glues, enzymes (HS 35) Miscellaneous chemical products (HS 38)	RCA>1	52 (43)	21 (35)	29 (44)	47 (45)	38 (48)	33 (34)
	RCA<1	68 (57)	39 (65)	36 (56)	56 (55)	41 (52)	62 (66)
	Total	**120**	**60**	**65**	**103**	**79**	**95**
Inputs specific to the pharmaceutical industry		**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Pharmaceutical products: HS 30 Furniture, lighting, signs, prefabricated buildings: HS 94	RCA>1	27 (42)	10 (27)	21 (52)	17 (43)	13 (41)	07 (17)
	RCA<1	36 (58)	27 (73)	19 (48)	22 (57)	18 (59)	32 (83)
	Total	**63**	**37**	**40**	**39**	**31**	**39**
Chemical inputs of general purpose		**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Chemicals Organic (HS 29) Miscellaneous chemical product (HS 38)	RCA>1	26 (59)	24 (29)	31 (42)	28 (41)	17 (43)	21 (42)
	RCA<1	18 (41)	57 (71)	42 (58)	39 (59)	24 (57)	30 (58)
	Total	**44**	**81**	**73**	**67**	**41**	**51**
Hospital and laboratory inputs		**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Glass and glassware (HS 70) Vehicles other than railway tramway (HS 87)	RCA>1	20 (25)	27 (30)	44 (61)	58 (75)	33 (47)	17 (28)
	RCA<1	59 (75)	62 (70)	28 (39)	19 (25)	37 (53)	42 (72)
	Total	**79**	**89**	**72**	**77**	**70**	**59**
Medical technology equipment		**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Machinery, boilers, nuclear reactors, etc. (HS 84) Optical, photo, technical, medical, etc. apparatus (HS 90)	RCA>1	29 (38)	23 (31)	32 (64)	41 (53)	37 (47)	13 (16)
	RCA<1	47 (62)	51 (69)	18 (34)	36 (47)	43 (53)	67 (84)
	Total	**76**	**74**	**50**	**77**	**80**	**80**

Source: Authors calculation based on data from trademap.org (http://trademap.org)

Table 2: Profile of Country's Advantage in Export of Pharmaceutical Product Line (2001-2020).						
Bulk Medicines	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Chemicals Organic: HS 28	**CP**	**FP (Tier-1)**	**PP (Tier-2)**	**CP**	**CP**	**PP (Tier-1)**
Aluminides, modified starches, glues, enzymes: HS 35	**PP (Tier-1)**	**FP (Tier-1)**	**PP (Tier-1)**	**PP (Tier-2)**	**PP (Tier-2)**	**CP**
Miscellaneous chemical products: HS 38	**CP**	**VC**	**CP**	**PP (Tier-1)**	**PP (Tier-1)**	**PP (Tier-1)**
Inputs Specific to the Pharmaceutical Industry	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Pharmaceutical products: HS 30	**CP**	**PP (Tier-1)**	**CP**	**PP (Tier-1)**	**FP (Tier-1)**	**PP (Tier-1)**
Furniture, lighting, signs, prefabricated buildings: HS 94	**CP**	**PP (Tier-1)**	**PP (Tier-1)**	**PP (Tier-1)**	**PP (Tier-1)**	**CP**
Chemical inputs of general purpose	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Chemicals Organic HS 29	**VC**	**CP**	**PP (Tier-1)**	**PP (Tier-2)**	**FP (Tier-2)**	**PP (Tier-2)**
Miscellaneous chemical products: HS 38	**FP (Tier-1)**	**CP**	**CP**	**CP**	**VC**	**PP (Tier-2)**
Hospital and laboratory inputs	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Glass and glassware: HS 70	**PP (Tier-2)**	**CP**	**PP (Tier-2)**	**PP (Tier-1)**	**CP**	**FP (Tier-2)**
Vehicles other than railway tramway: HS 87	**CP**	**CP**	**PP (Tier-1)**	**FP (Tier-1)**	**PP (Tier-2)**	**PP (Tier-1)**
Medical technology equipment	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Machinery, boilers, nuclear reactors, etc.: HS 84	**PP (Tier-2)**	**PP (Tier-2)**	**VC**	**CP**	**CP**	**CP**
Optical, photo, technical, medical, etc. apparatus: HS 90	**PP (Tier-1)**	**FP (Tier-2)**	**FP (Tier-2)**	**PP (Tier-1)**	**CP**	**PP (Tier-1)**

Source: Authors Calculation.

or trade potential is assessed on diverse sets of RCA values. The result of Table 2 clearly manifest that India holds competitive position for (HS 28 and 38) and promising product (tier-1) for (HS 35) under bulk Medicines. Similarly, Singapore, Thailand and Vietnam also holds better competitive position by displaying large proportion of their product line under promising (PP) and competitively positioned (CP) sections in comparison to Malaysia and Indonesia under vulnerable (VC) and feebly positioned (FP) product line under bulk medicines.

Inputs specific to the pharmaceutical industry product line evidently reveals that India and all major ASEAN members have higher degree of comparative advantage or trade potential in comparison to each other. But, India exclusively holds advantage over others as both product line (HS 30 and 94) are positioned under competitively positioned (CP) section. Malaysia is the immediate competition of India for (HS 30) commodities and Vietnam for (HS 94). Rest, ASEAN members have to develop their competitive advantage under "*Inputs specific to the pharmaceutical industry*".

India and Thailand comparative advantage and trade potential are vilest for commodities (HS 29 and 39) under chemical inputs of general purpose. Both products exhibit vulnerable and feebly position with low RCA values. On the contrary, Indonesia highlights competitive position under both products. ASEAN countries *viz.* Malaysia and Singapore are emerging threat for Indonesia's comparative advantage. Lastly, Vietnam has to endeavor its efforts to restore higher advantage and grow its trade potential. Similarly, for hospital and laboratory inputs again Indonesia holds utmost degree of advantage in both commodities (HS 70 and 87), but, quite the reverse India and Thailand also reports eminent trade potential over Malaysia and Singapore with higher RCA values. Lastly, under hospital and laboratory inputs all economies promises good potential overall.

An unprecedented result is witnessed under medical technology equipment. Thailand reveals a superior advantage over various developing and big economic establishments *viz.* India, Singapore, Malaysia and Indonesia, by highlighting both products (HS 84 and 90) under competitively positioned (CP) section. Whereas, Indonesia and Malaysia need to put a stern effort to move out of vulnerable and feebly positioned category by increasing their potential trade and creating specialisation. Lastly, India holds promising position

for product line (HS 84 and 90), therefore, meticulous effort should be made to rise product line category from promising position (PP) to competitive position (CP).

Trade Specialization of India and Asean Members in Pharmaceutical Sector

The particular section of the study focuses upon trade specialization of India in comparison with selected ASEAN members for different pharmaceutical sectors.

Bulk Medicines

A significant change in trade specialization was witnessed for bulk medicines sector from 2001-20. A consistent rise in India trade specialization was observed throughout, but a decline in trade specialization was witnessed in 2015-16 with Lafay Index value to be 0.59. ASEAN members also exhibited rise in trade specialization for bulk medicines sector, but an erratic pattern was observed from Table 3. Indonesia and Vietnam highlighted a significant rise in their trade specialization with Lafay index values to be positive from negative. Malaysia, Singapore and Thailand exhibits somewhat similar specialization or comparative advantage over others.

Inputs Specific to Pharmaceutical Industry

Under inputs specific to pharmaceutical industry though India holds comparative advantage and more of trade specialization still ASEAN member such as Malaysia, Singapore and Thailand are also giving stiff competition to Indian pharmaceutical sector. The Lafay index value of India for 2019-20 was 0.42 in comparison to 0.37 of Singapore and 0.19 of Malaysia. Nations such as Indonesia and Vietnam need to work more rigorously to achieve more of specialization (Table 4).

Chemical Inputs of General Purpose

Table 5 explains that ASEAN members such Malaysia, Singapore and Vietnam holds better competitive advantage over India with higher Lafay index values to be 0.61, 0.66 and 0.48 for year 2017-18. Indonesia and Thailand also exhibits rising trend in their trade specialization index values, but an erratic pattern is also quite visible throughout. Lastly, India clearly showcase that it's trade specialization is increasing but it is getting tough competition from ASEAN members. Therefore, India should work more meticulously for the chemical inputs of general purpose healthcare sector.

Hospital and Laboratory Inputs

Under hospital and laboratory inputs sector, majority of ASEAN members such as Indonesia, Malaysia, Singapore and Thailand holds greater competitive advantage and trade specialization in comparison to India as exhibited in Table 6 with positive Lafay index values (0.02, 0.12, 0.23 and 0.09) majorly from 2017-2020. Lafay index value of India clearly reveals a decline in its negative values from -0.35 in 2001-02 to -0.32 in 2017-18. Lastly, nation

Table 3: India and ASEAN Trade Specialization for Bulk Medicine Sector.

	Years	India	Indonesia	Malaysia	Singapore	Thailand	Vietnam
Bulk Medicines: (a) Chemicals Organic: HS 28 (b) Aluminides, modified starches, glues, enzymes: HS 35 (c)Miscellaneous chemical products: HS 38	2001-02	0.12	–0.10	0.08	–0.05	0.26	–0.32
	2004-05	0.19	–0.06	0.09	–0.01	0.18	–0.29
	2008-09	0.32	0.03	–0.11	0.12	0.09	–0.18
	2012-13	0.63	0.17	0.21	0.06	0.15	–0.13
	2015-16	0.59	0.11	0.32	0.19	0.19	0.02
	2017-18	0.66	0.15	0.27	0.25	0.21	0.05
	2019-20	0.72	0.12	0.34	0.23	0.16	0.04

Table 4: India and ASEAN Trade Specialization for pharmaceutical industry.

	Years	India	Indonesia	Malaysia	Singapore	Thailand	Vietnam
Inputs specific to pharmaceutical industry: (a) Pharmaceutical products: HS 30 (b) Furniture, lighting, signs, prefabricated buildings: HS 94	2001-02	-0.08	–0.26	–0.18	0.07	–0.22	–0.23
	2004-05	-0.02	–0.23	–0.19	0.05	–0.11	–0.1
	2008-09	0.14	–0.15	0.01	0.12	0.02	–0.13
	2012-13	0.20	–0.07	0.11	0.08	0.06	–0.02
	2015-16	0.27	0.09	0.16	0.17	0.12	0.03
	2017-18	0.28	0.11	0.21	0.24	0.16	0.07
	2019-20	0.42	0.17	0.19	0.37	0.13	–0.03

Table 5: India and ASEAN Trade Specialization for Chemical inputs.						
	Years	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Chemical inputs of general purpose: **(a) Chemicals Organic HS 29** **(b) Miscellaneous chemical products: HS 38**	2001-02	0.24	0.14	0.43	0.37	0.16	0.26
	2004-05	0.32	0.21	0.41	0.44	0.25	0.24
	2008-09	0.34	0.35	0.39	0.42	0.22	0.33
	2012-13	0.46	0.27	0.47	0.59	0.19	0.38
	2015-16	0.44	0.33	0.54	0.63	0.28	0.47
	2017-18	0.52	0.36	0.61	0.66	0.29	0.48
	2019-20	0.67	0.23	0.46	0.34	0.21	0.12

Table 6: India and ASEAN Trade Specialization for Hospital and Laboratory Inputs.						
	Years	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Hospital and laboratory inputs: **(a) Glass and glassware: HS 70** **(b) Vehicles other than railway tramway: HS 87**	2001-02	–0.35	–0.14	0.21	0.38	–0.15	–0.16
	2004-05	–0.28	–0.18	0.25	0.37	–0.05	–0.23
	2008-09	–0.29	–0.08	0.14	0.49	0.02	–0.35
	2012-13	–0.33	0.02	0.31	0.50	0.15	–0.18
	2015-16	–0.25	–0.03	0.43	0.44	0.22	–0.10
	2017-18	–0.17	0.16	0.38	0.52	0.28	–0.08
	2019-20	–0.32	0.02	0.12	0.23	0.09	–0.14

Table 7: India and ASEAN Trade Specialization for Medical Technology Equipment.						
	Years	**India**	**Indonesia**	**Malaysia**	**Singapore**	**Thailand**	**Vietnam**
Medical Technology Equipment: **(a) Machinery, boilers, nuclear reactors, etc.: HS 84** **(b) Optical, photo, technical, medical, etc. apparatus: HS 90**	2001-02	0.34	0.11	0.44	0.48	0.14	0.24
	2004-05	0.37	0.14	0.46	0.47	0.23	0.22
	2008-09	0.45	0.21	0.51	0.55	0.21	0.19
	2012-13	0.39	0.18	0.49	0.53	0.36	0.25
	2015-16	0.52	0.26	0.57	0.61	0.33	0.30
	2017-18	0.55	0.33	0.58	0.64	0.37	0.29
	2019-20	0.43	0.27	0.39	0.58	0.21	0.17

like Vietnam also highlights its rising trade specialization but the number of commodities with RCA>1 is low in comparison with India.

Medical Technology Equipment

For medical technology equipment sector, India highlights its rising trade specialization with Lafay index values to be 0.34 in 2001-02 to 0.45 in 2008-09 and lastly to be 0.55 in 2017-18, but a steep decline was observed for 2019-20 because of trade restrictions (Table 7). Similarly, Singapore and Malaysia also showcase there escalating trade specialization and comparative advantage with greater product line under RCA>1 and lafay index values to be 0.64 and 0.58 in year 2017-18. Vietnam though exhibits an increase in its trade specialization, but the lafay index values highlights an erratic trend throughout from 2001 to 2020. The results of Thailand's rising trade specialization is directly in accordance with the study published by (Oberoi and Kansra, 2019).[14]

CONCLUSION

The proposition from the prevailing academic literature on India-ASEAN healthcare trade lucidly allude that emerging economies are strategically trusting upon knowledge creation, research, technology building and dissemination of know-how. According to Oberoi *et al.* "*Healthcare sector in India has gained momentum due to increase in the number of diseases and changing lifestyle pattern of the people. The volume and composition of India's export for healthcare merchandise has also witnessed a noteworthy change in Covid-19 period*". This has facilitated India to shift from labor intensive technology based nation to a manufacturing hub driving for self-reliance and export dominance. The present study lucidly explains that due

to heterogeneity and product diversification the exports are directly affected. The results of this study evidently evince that India is stirring from insignificantly less specified nation to highly specialized and self-sufficient economy with greater degree of comparative advantage. The pharmaceutical sectors *viz.* "*Bulk Medicines*", "*Inputs Specific to Pharmaceutical Industry*" and "*Chemical Inputs of General Purpose*" evidently demonstrates India's both comparative advantage and specialization over ASEAN members with larger number of products under RCA>1 index and escalating Lafay values from 2001-2020. On the other hand, ASEAN members majorly showcased their comparative advantage and specialization under '*Hospital and Laboratory Inputs*' and '*Medical Technology Equipment*' healthcare sector. Malaysia, Singapore and Thailand are the emerging threat to Indian economy. As they hold more of cost comparative advantage for treating diseases *viz.* angioplasty and spinal fusion. Hence by attracting more of medical tourists. Therefore, the present study suggests that India should work more meticulously on those sectors were it is lacking behind ASEAN members and must develop technical progression and scientific modernization in pharmaceutical sector to attract more economies for trade.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ASEAN: Association of Southeast Asian Nations; **LFI:** Lafay Index; **RCA:** Revealed Comparative Advantage; **AIFTA:** ASEAN-India Free Trade Agreement; **HS:** Harmonized Standard; **GDP:** Gross Domestic Product.

REFERENCES

1. Oberoi S. India's rising import dependency and comparative disadvantage at different industry level in context of AIFTA. Anvesha. 2018;11(1):23-40.
2. Brooks DH, Menon J, editors. Infrastructure and trade in Asia. Edward Elgar Publishing; 2008.
3. Firend RA. Asian case studies: Lessons from Malaysian industries. IJBMR Publisher; 2016.
4. Yong TT, Mun SC. The evolution of India–ASEAN relations. India Rev. 2009 Feb 10;8(1):20-42. doi: 10.1080/14736480802665170.
5. Oberoi S. Dynamics of trade specialization and trade performance of ASEAN–India free trade agreement. J Intl Econ Comm Policy. 2019 Feb 4;10(1). doi: 10.1142/S1793993319500030, PMID 1950003.
6. Lederman D, Olarreaga M, Rubiano E. Trade specialization in Latin America: The impact of China and India. Rev World Econ. 2008 Jul;144(2):248-71. doi: 10.1007/s10290-008-0146-z.
7. Wörz J. Dynamics of trade specialization in developed and less developed Countries. Emerg Markets Fin Trade. 2005 Jun;41(3):92-111. doi: 10.1080/1540496X.2005.11052607.
8. Hausmann R, Hwang J, Rodrik D. What you export matters. J Econ Growth. 2007 Mar 1;12(1):1-25. doi: 10.1007/s10887-006-9009-4.
9. Santos-Paulino AU. Trade specialization, export productivity and growth in Brazil, China, India, South Africa, and a cross section of countries. Econ Change Restruct. 2011 Apr;44(1-2):75-97. doi: 10.1007/s10644-010-9087-3.
10. Helble MC. More Trade for Better Health? - International Trade and Tariffs on Health Products. SSRN Journal. Oct 2012;Oct 1. doi: 10.2139/ssrn.2165734.
11. Mahmood A. Export Competitiveness and Comparative Advantage of Pakistan's Non-agricultural Production Sectors: Trends and Analysis. Pak Dev Rev;43(4II):541-61. doi: 10.30541/v43i4IIpp.541-561.
12. Pattharapinyophong W. The opportunities and challenges for Thailand in becoming the medical tourism hub of the ASEAN region. 2019 Jul 19;6(1):1-6.
13. Pal P, Dasgupta M. Does a free trade agreement with ASEAN make Sense? Econ Pol Wkly. 2008 Nov;15:8-12.
14. Oberoi S, Kansra P, Yadav R. Export performance and comparative advantage of India in healthcare merchandise export. Advances in Intelligent Systems and Computing. 2020:(1349-61). doi: 10.1007/978-981-15-0751-9_123.
15. Oberoi S, Kansra P. Factors influencing medical tourism in India: A critical review. SAMVAD. 2019 Jun 10;17:9-16.
16. Lafay G. The measurement of revealed comparative advantages. In: International trade modelling. US: Springer; 1992 Jan 1. p. 209-34.
17. Erokhin V, Tianming G, Ivolga A. Cross-country potentials and advantages in trade in fish and seafood products in the RCEP Member States. Sustainability. 2021 Jan;13(7):3668. doi: 10.3390/su13073668.

Cite this article: Oberoi S, Kansra P. India's Incipient Comparative Advantage and Trade Specialization in Pharmaceutical Sector in Comparison to ASEAN. Indian J of Pharmaceutical Education and Research. 2022;56(3):899-906.