

The dynamics of India – ASEAN trade with special reference to manufactured exports and their technological composition

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Abstract. *India's trade with Southeast Asia received a significant impetus in the early 1990s, with the launching of Look East Policy, after which the partners have been trading intensively and extensively. The study at hand examines the trend and composition of trade from 1992 to 2019, wherein the composition at both, aggregate and disaggregate level at 1, 2 and 3 digit SITC classification has been studied. The study further lays emphasis on technological composition and sophistication in bilateral trade, wherein trade has been studied in terms of the category of technology at the aggregate and disaggregated embodied technology level. The percentage growth in trade between India and ASEAN is found to be promising; with a two digit growth in export and import from 1992 to 2019. Results elucidate a statistically intense trade relationship between the partners, with export and import intensity indices persistently > 1 . India's exports to ASEAN are found to be highly concentrated in the resource based category, while ASEAN's exports to India are a lot more diversified, having significant exports from the resource-based, high-technology, and medium-technology categories.*

Keywords: ASEAN, Look East Policy, foreign trade, manufactured export.

JEL Classification: F1, F14, F15, F5.

1. Introduction

India's intense trade relations with Southeast Asia in the present era commenced after the end of Cold War, with the strategic rethinking in India's foreign policy. After the disintegration of Soviet Union in 1971, it became pertinent for India to look for alternate trade partners. The Southeast Asian Countries, had recently, in 1967 created a regional cooperation, with the aim of accelerating economic growth, social progress, and cultural development of Southeast Asian region, named ASEAN. The region was an emerging and promising trade bloc, with a high growth rate and immense trade potential. To enhance India's trade and economic partnership with the region, during the government of Prime Minister P.V. Narasimha Rao in 1991, the 'Look East Policy' was conceived. This was coupled with transition of Indian economy from a protectionist to a liberal economy. The policy continued to enjoy support from all the successive governments of India. ASEAN countries, in particular were at the helm of this policy. Trade and economic cooperation and engagement slowly and steadily started to thrive between India and ASEAN.

India and ASEAN countries intensively engage in trade, with manufactured exports forming the maximum chunk of their bilateral trade. Manufactured exports are seen as an important mechanism to identify a country's economic development process and structure of economy as described by Chenery (1980), Hausman et al. (2006), Palma (2005) and Bresser-Pereira (2012). The economic structure in turn spills over to the nature and sophistication of exports a country makes. The subsequent section discusses the production complexity and export structure, which forms as the basis for the nature, category and specialization of exports that are studied in the present study.

India and ASEAN countries: Complexity of production and export structure

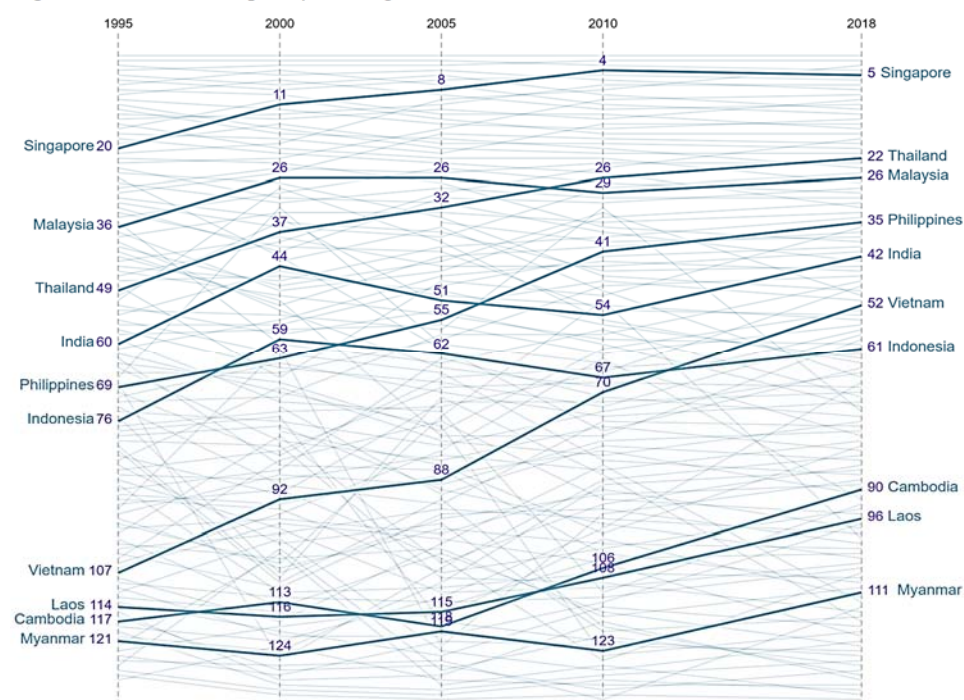
Structure of export directly mirrors the production structure of a country. For studying the economic complexity of India and each of the ASEAN countries, the Economic Complexity Index, calculated by Harvard's Growth Lab, based on the landmark work of Hidalgo and Hausmann (2009) has been collated. Typically, countries that are able to develop a diverse range of productive know-how, including sophisticated, unique know-how, are found to be able to produce a wide diversity of goods, including complex products that few other countries can make. The index is also used to explain trade patterns.

The Economic Complexity Index collated for the period 1995-2018 at Harvard's ATLAS database measures the complexity of export basket of a country. A higher ranking indicates the sophistication and specialized capability of the given country to produce goods. Countries having a high ranking in the index evidently export high technology manufactured commodities. It is observed in Figure 1 that among the cohort in 2018, India (ranked 42 globally) falls below Singapore (ranked 5), Thailand (ranked 22), Malaysia (ranked 26) and Philippines (ranked 35). The other ASEAN countries, Vietnam, Indonesia, Cambodia, Laos, Myanmar rank below India in the Index.

The study has been divided into various sections for a systematic analysis. After a brief introduction, Section 2 discusses the trend of bilateral trade and country-wise direction of India's trade with the ten ASEAN countries. Section 3 comprises of the review of literature,

after which the study proceeds to the database and methodology used in Section 4. Section 5 pertains to analysis and discussion, and finally, conclusions are presented in Section 6.

Figure 1. Economic complexity rankings – India and ASEAN countries



*Brunei in ASEAN has not been included due to non-availability of data.

Source: ATLAS of Economic Complexity, accessed at <https://atlas.cid.harvard.edu/rankings>

2. Trend and country-wise direction of trade

As observed from Table 1, India's bilateral trade with ASEAN has increased manifold since the beginning of the study's time period in 1992. India has been in trade deficit with ASEAN since 1995, which encompasses almost the entire period. Growth rates for export and import, calculated for the almost three decades time period show that India's exports to ASEAN have grown at an average growth rate of 15.04%, while India's imports from ASEAN have grown at an average growth rate of 18.5% up to 2018. The growth rates depict a steady and promising rise in bilateral trade between the partners. In 2019, the exports and imports are seen to slump and growth for the trade flows has been in negative, due to the beginning of Covid. As Southeast Asia borders China, it was one of the first regions to be affected by Covid when it began in China. In 1992, India's exports to ASEAN were at 1.39 billion US\$, which increased to 36.13 billion US\$, an almost 35 times increase in exports. In 1992, imports from ASEAN were at 1.15 billion US\$. In 2018, imports from ASEAN were 51 billion US\$, which signifies and almost 51 times rise in import during the 27 year time period. However, as evident in the table, 2019 marks the beginning of the Covid pandemic and a visible decline in export and import.

Table 1. India – ASEAN trade trend (in 1,000 USD)

Year	Export (in 1000 USD)	% Growth of export	Year	Import (in 1000 USD)	% Growth of import
1992	1394361.93		1992	1151348.75	
1993	1700152.81	21.93	1993	1009428.90	-12.33
1994	1922353.31	13.07	1994	1869284.02	85.18
1995	2720352.21	41.51	1995	2578780.39	37.96
1996	2898379.85	6.54	1996	2932450.78	13.71
1997	2461321.09	-15.08	1997	3391824.86	15.66
1998	1620794.86	-34.15	1998	4321220.02	27.40
1999	2228297.02	37.48	1999	5082339.64	17.61
2000	2660826.88	19.41	2000	4299391.156	-15.41
2001	3315111.18	24.59	2001	4345490.088	1.07
2002	4503302.06	35.84	2002	4807278.03	10.63
2003	5071800.12	12.62	2003	6686880.357	39.09
2004	7552217.14	48.90	2004	8549994.49	27.86
2005	10285768.51	36.19	2005	10632023.51	24.35
2006	12369340.02	20.26	2006	16300609.79	53.32
2007	13824080.35	11.76	2007	21031033.64	29.02
2008	19433466.44	40.57	2008	26698437.3	26.95
2009	17898834.99	-7.89	2009	23968099.23	-10.23
2010	22958453.36	28.27	2010	29640183.59	23.67
2011	34497614.32	50.26	2011	40331863.05	36.07
2012	32294998.38	-6.38	2012	42737955.69	5.97
2013	37885467.55	17.31	2013	42308783.22	-1.00
2014	31294244.59	-17.39	2014	44457578.26	5.08
2015	26428120.54	-15.55	2015	41516392.48	-6.66
2016	26381170.27	-0.18	2016	38222454.9	-7.93
2017	35411635.65	34.23	2017	45313297.08	18.55
2018	36133780.74	2.04	2018	51018950.51	53.15
2019	34249657.46	-5.21	2019	47364809.34	-7.16

Source: Collated by the authors based on UN Comtrade Data extracted via WITS.

Table 2 elucidates the significance of ASEAN in India's trade and country-wise direction of India's trade with ASEAN. Most recent data of 2018-19 has been used to understand which countries among the 10-member ASEAN group are India's largest trading partners in the group.

Table 2. India's trade with individual ASEAN countries: 2018-2019 (Values in US\$ Million)

No.	Country	Export	% share	Import	% share
1	BRUNEI	56.19	0.15	591.10	0.99
2	CAMBODIA	195.98	0.52	42.63	0.07
3	INDONESIA	5,275.60	14.08	15,849.67	26.72
4	Lao Pd. Rp.	39.38	0.11	1.04	0.001
5	Malaysia	6,436.30	17.18	10,818.60	18.24
6	Myanmar	1,205.60	3.21	521.49	0.88
7	Philippines	1,743.64	4.65	581.10	0.98
8	Singapore	11,572.27	30.88	16,281.64	27.45
9	Thailand	4,441.40	11.85	7,441.81	12.54
10	Vietnam Soc. Rep.	6,507.38	17.37	7,192.23	12.12
	Total	37,473.72		59,321.32	
	India's Total	330,078.09		514,078.41	
	% share	11.3530		11.5394	

Source: Collated by the authors based on Export Import Data Bank, Ministry of Commerce, Govt. of India accessed at <https://tradestat.commerce.gov.in/eidb/default.asp>

Trade flow with ASEAN countries constitutes 11.35% of India's total export and 11.54% of India's total import. It is observed that Singapore is India's largest trade partner in the group, making up for more than a quarter of both, export (30.88%) and import (27.45%). Indonesia is the second largest trade partner in the group. Other major trade partners in the group are Malaysia, Thailand and Vietnam. India's trade with ASEAN is mainly concentrated with these five ASEAN countries. India should focus on these five ASEAN countries, as they have immense trade potential. Smaller ASEAN countries such as Brunei, Cambodia, Laos and Myanmar and Philippines form a small and trivial percent of trade.

3. Review of literature

3.1. India's trade and foreign policy with South East Asia

Zhang (2006) explains that India is one of the two critical poles of ASEAN's external Asian policy, and also finds that economic and trade cooperation has deepened, gradually and new cooperation fields such as investment and tourism have been added to the list. Similarly, Mohanty (2007) explored India's launching of the 'Look East Policy' in early 1990s with a view to connect with South East Asian countries. As ASEAN was one of the major emerging trade bloc with a sound and stable trading environment and immense potential. This policy was one of India's major post-Cold War diplomatic reorientation and the policy acted as a catalyst in increasing economic interaction between India and ASEAN. On a similar note, Asher and Palit (2008) and Chanda and Sasidaran (2008) explored India's Look East Policy, initiated in 1992 and found that India's economic engagement with Southeast Asia has expanded rapidly since the early 1990s, suggesting that India's future regional initiatives with the region are crucial to assure the realization of its long term economic, strategic, and geo-political objectives. Pradnya (2009) highlighted on certain prospective areas of expanding economic cooperation between India and the ASEAN countries. The assessment found that economic relations between India and the ASEAN have tremendous scope for expanding trade and economic relations. Chandran (2011) empirically studied the trade complementarity and similarity between India and ASEAN countries. The analysis found that complementary sectors and products are available for enhancing trade cooperation between India and ASEAN, for instance, India could export food products, mining products, iron and steel and import machinery, transport equipment, electronic data processing products.

3.2. Composition of India and ASEAN's exports

Pillania (2008) suggests that India export composition is now dominated by manufactured goods in terms of direction. Nayak et al. (2013) found a transition in India's exports from low technology intensive exports to medium and high technology intensive exports. Desai (2011) suggests that with increased level of technological capability, a discernible change has taken place in India's technology-intensive exports. While for ASEAN, Ghani and Sofyan (2014) found that high-technology products account for more than 40 percent of their total merchandise exports, which is among the highest rate in the world. Chen and Intal (2011) state that capital and consumer goods form the major exported categories from ASEAN.

The study at hand attempts to fill the research lacuna of the previously conducted studies. While the previously conducted studies emphasize on overall trends in India-ASEAN trade, the present study investigates specifically into the technological composition and export sophistication of existing bilateral trade patterns, which is an area largely unexplored in India-ASEAN bilateral trade studies.

Objectives of the study

For the purpose of research, the following objectives have been formulated:

1. To analyze the overall trends in India-ASEAN trade during the period 1992 to 2019.
2. To examine the technological composition of manufactured commodities traded at the aggregate and disaggregate level as a measure of export sophistication.
3. To study the intensity of trade between India and ASEAN member countries.

4. Database and methodology

UN Comtrade database, which is United Nations (UN) repository of official international trade statistics, has largely been used for the study. The data is extracted through The World Integrated Trade Solution (WITS), a trade software provided by the World Bank. Export Import Data Bank of the Ministry of Commerce (Govt. of India) has also been used. ATLAS of economic complexity of Harvard University's Centre for International Development Growth Lab has been used to measure economic complexity rankings.

The classification of goods used is Standard International Trade Classification (SITC). The SITC Codes are used to classify the exports and imports of a country to enable comparing different countries and years. The SITC codes are used at 1, 2 and 3 digit level. The classification system is maintained by the United Nations.

4.1. Composition

For measuring the various nuances of composition included in the study, a percentage share approach has been used. Percentage shares have been used to calculate and study the composition. The formula used for measuring the composition is as follows:

$$\text{Composition} = \frac{\text{Trade value of particular commodity or commodity category}}{\text{Total value of trade}} \times 100$$

- **Overall Composition.** This has been studied by adopting trade codes of SITC 1 digit level, based on revision 3. With this, all tradable commodities have been classified into ten broad categories, SITC 0-10. Each code signifies a different class of goods. SITC Codes are widely adopted and used in trade related research.
- **Major Traded Commodities.** Major traded commodities have been studied at disaggregate SITC 2 digit level, and the focus years have been 1992 and 2019, i.e. the starting and the ending period of our study. This will help us ascertain the most significant commodities traded in 1992 and the present, which in turn lets us know the direction in which bilateral trade is going at the commodity level.

4.2. Technological composition of exports (export sophistication)

Using Lall (2000) classification of manufactured exports as the base, technological composition has been studied for manufactured goods at SITC 3 digit level. Commodities are classified by the kind of technology used in their production process, on the basis of which they are named as High Technology (HT), Medium Technology (MT), Low Technology (LT) and Resource Based (RB) manufactures.

The composition has been studied at the aggregate level, as well as the disaggregate embodied technology level, wherein the further classification is made as per the UNCTAD Lall (2000) classification. The technology wise composition is a pertinent measure of the level of sophistication, wherein higher specialized technology exports indicate a higher level of export sophistication.

4.3. Trade intensity index

This index indicates if a reporter country exports more, to a partner country vis-à-vis the world does on average. One of the most popular measures of Trade Intensity is the trade intensity index (Brown 1949; Kojima 1964). The index is classified into two, the export intensity index (XII) and import intensity index (MII). They are defined as follows:

$$\text{Export Intensity Index - } XIII_i = \frac{x_{ij}/X_{iw}}{M_{jw}/(M_w - M_{iw})}$$

$$\text{Import Intensity Index - } MIII_i = \frac{m_{ij}/M_{iw}}{X_{jw}/(X_w - X_{iw})}$$

Where $XIII_i$ is the country i 's export intensity index, $MIII_i$ the country i 's import intensity index, x_{ij} the country i 's exports to country j , X_{iw} the country i 's total exports to the world, M_{jw} the country j 's total imports from the world, M_w the world total imports, M_{iw} the country i 's total imports from the world, m_{ij} the country i 's imports from country j , X_{jw} the country j 's total exports to the world, X_w the world total exports.

An index value > 1 indicates larger than expected trade flow between the two parties and vice versa.

5. Results and discussion

5.1. The composition of trade

The overall composition at 1-digit aggregate level

To study the overall pattern of trade, SITC 1-digit data has been used, wherein all tradable commodities are classified into 10 broad categories, based on the class of goods. As observed in Table 3, as of 2019, Machinery and transport equipment (SITC 7) is the top exported commodity category, forming more than a quarter (26.16%) of India's exports to ASEAN. This is followed by Manufactured goods (SITC 6) forming 19.72% of exports. At the third place comes the Mineral Fuels category (SITC 3). Chemicals and related products (SITC 5) also form a significant portion of exports. Overall, As SITC 5 to 9 comprise of manufactured goods, it can be said that manufactured goods make up for largest section in exports to ASEAN, albeit the matter of concern can also be observed, as Manufactured goods (SITC 6) share has been going down constantly since 1992.

Table 3. *Composition of India's exports to ASEAN (1992-2019)*

SITC Code	Commodity description	Year								
		1992	1997	2002	2007	2012	2017	2018	2019	
0	Food and live animals	29.64	25.41	25.85	12.78	16.34	20.14	17.62	12.44	
1	Beverages and tobacco	0.21	0.87	0.32	0.52	0.48	0.40	0.47	0.50	
2	Crude materials, inedible, except fuels	6.09	7.75	2.72	4.23	4.40	4.14	4.17	3.74	
3	Mineral fuels, lubricants and related materials	1.14	0.05	9.84	28.40	31.70	24.90	26.38	18.98	
4	Animal and vegetable oils, fats and waxes	0.09	0.62	0.31	0.25	0.21	0.23	0.18	0.21	
5	Chemicals and related products, n.e.s.	10.00	11.58	12.66	12.82	12.20	10.39	13.89	13.94	
6	Manufactured goods classified chiefly by material	35.75	31.86	30.54	21.75	12.71	18.64	16.40	19.72	
7	Machinery and transport equipment	12.65	15.69	8.95	11.26	18.00	18.00	17.42	26.16	
8	Miscellaneous manufactured articles	3.72	5.05	6.26	4.19	3.49	3.01	3.45	4.22	
9	Commodities and transactions not classified elsewhere in the SITC	0.70	1.12	2.53	3.79	0.45	0.13	0.01	0.08	

Source: Authors' calculation based on UN Comtrade data extracted via WITS (SITC Rev 3).

Table 4 describes ASEAN's exports to India from 1992 to 2019. It is observed that Machinery and transport equipment (SITC 7) forms almost one-third of ASEAN's exports to India, with 29.39% share. This is followed by Mineral fuels (SITC 3) with 17.78% share. Manufactured goods (SITC 6) come at a close third with 17.78% share. Chemicals (SITC 5) and Animal and vegetable oils (SITC 4) also form a significant share of exports to India. Overall, it is evident that ASEAN's exports to India are a lot more diversified compared to India's exports to ASEAN.

Table 4. *Composition of ASEAN's exports to India (1992-2019)*

SITC Code	Commodity Description	Year								
		1992	1997	2002	2007	2012	2017	2018	2019	
0	Food and live animals	5.75	1.79	2.08	0.99	3.65	2.90	2.59	2.20	
1	Beverages and tobacco	1.53	0.99	0.24	0.06	0.21	0.26	0.25	0.28	
2	Crude materials, inedible, except fuels	12.66	7.33	5.97	5.67	8.99	6.49	6.34	5.45	
3	Mineral fuels, lubricants and related materials	37.69	13.23	12.66	20.74	20.28	16.63	17.52	17.78	
4	Animal and vegetable oils, fats and waxes	5.15	17.82	20.08	10.98	16.91	15.37	11.11	10.27	
5	Chemicals and related products, n.e.s.	8.22	10.18	10.31	10.55	11.02	13.49	13.61	13.45	
6	Manufactured goods classified chiefly by material	8.29	10.21	9.29	9.53	7.21	13.43	14.34	15.38	
7	Machinery and transport equipment	15.63	31.33	29.63	31.20	24.69	25.51	29.08	29.39	
8	Miscellaneous manufactured articles	3.83	4.44	7.06	4.04	4.09	3.78	3.73	4.59	
9	Commodities and transactions not classified elsewhere in the SITC	1.25	2.66	2.67	6.22	2.95	2.21	1.41	1.20	

Source: Authors' calculation based on UN Comtrade data extracted via WITS (SITC Rev. 3).

Major traded commodities at 2-digit disaggregate level

Major commodities exported by India to ASEAN have been described in Table 5. To study the transition in composition during the three decade time period, top exported commodities for 1992 and 2019 have been juxtaposed side by side. A visible change can be seen in the top exported commodities. In 1992, only two of the five top exports were from the manufacturing sector, while in 2019, four of the five top exports consist of manufactures. Only Iron and steel (SITC 67) is the commodity which has continued to remain among the top five exports, from 1992 to 2019.

Table 5. India's Top 5 exports to ASEAN – SITC 2 digit disaggregated (A comparison of 1992 and 2019)

1992			2019		
SITC Code	Description	% share	SITC Code	Description	% share
66	Non-metallic mineral manufactures, n.e.s.	15.64	33	Petroleum, petroleum products and related materials	21.68
68	Non-ferrous metals	10.36	79	Other transport equipment	11.84
65	Textile yarn and related products	9.44	67	Iron and steel	6.75
69	Manufactures of metal, n.e.s	6.20	51	Organic chemicals	6.09
67	Iron and steel	4.95	68	Non-ferrous metals	5.75

Source: Author's calculation based on UN Comtrade Database extracted through WITS (SITC Rev 3).

As elucidated in Table 6, ASEAN's export to India in 1992 was highly concentrated, with petroleum products (SITC 33) forming 42.78% of exports. In 2019, however, it was Coal, coke and briquettes (SITC 32) which was the top exported product with 10.69% share. Another noteworthy fact is that the composition of ASEAN's top exports to India has not changed as much. Four of the top exported products in 1992, remain among the top exports even in 2019, these include Electrical machinery (SITC 77), Petroleum, petroleum products (SITC 33), Fixed vegetable oils and fats (SITC 42) and Office machines (SITC 75).

Table 6. ASEAN's Top 5 exports to India – SITC 2 digit disaggregated (A comparison of 1992 and 2019)

1992			2019		
SITC Code	Description	% share	SITC Code	Description	% share
33	Petroleum, petroleum products and related materials	42.78	32	Coal, coke and briquettes	10.69
77	Electrical machinery, apparatus and appliances, n.e.s	5.87	42	Fixed vegetable oils and fats, crude, refined or fractionated	9.56
42	Fixed vegetable oils and fats, crude, refined or fractionated	4.30	77	Electrical machinery, apparatus and appliances, n.e.s	8.38
28	Metalliferous ores and metal scrap	4.05	75	Office machines and automatic data processing machines	7.55
75	Office machines and automatic data processing machines	3.85	33	Petroleum, petroleum products and related materials	7.46

Source: Author's calculation based on UN Comtrade Database extracted through WITS (SITC Rev 3).

5.2. Technology – Wise composition at the aggregate and disaggregate level

Table 7 emphasizes on the technological composition of technology-wise exports of India to ASEAN. It is evident that in 2019, resource based manufactures make up the maximum exports to ASEAN (34%), followed by medium-technology (18%) and high technology (12%). High technology manufactures form a miniscule percentage of exports, only 6%. If the present export figures are compared with the technology wise export structure in 1992, it is apparent that the share of resource based manufactures has increased the most, almost 15%, while the share of low tech-manufactures has declined and that of medium-tech manufactures has increased by 5%.

Table 8 indicates the broad technology wise composition of ASEAN's exports to India. The composition as of 2019 shows that ASEAN's exports are not concentrated in one technological category, but is rather pretty diversified. Resource based manufactures, medium technology manufactures and high technology manufactures, all three categories form significant chunk of export, with 29%, 28% and 24% shares respectively. On the other hand, low technology manufactures form a trivial 7% of total exports. The trend also shows that ASEAN's exports to India have diversified significantly over the decades, from 1992 to 2019.

Overall, through Tables 7 and 8, is highlighted that ASEAN's exports to India are significantly more sophisticated compared to India's exports to ASEAN.

Table 7. *Technological composition of manufactured exports from India to ASEAN (by percent)*

Technology category	Year							
	1992	1997	2002	2007	2012	2017	2018	2019
Resource based manufactures (RB)	21	16	33	45	45	37	42	34
Low technology manufactures (LT)	18	20	16	11	9	11	9	12
Medium technology manufactures (MT)	13	17	13	14	20	20	19	18
High technology manufactures (HT)	5	9	6	4	4	5	5	6

Source: Authors' calculation based on US Comtrade database, extracted through WITS.

Table 8. *Technological composition of manufactured exports from ASEAN to India (by percent)*

Technology category	Year							
	1992	1997	2002	2007	2012	2017	2018	2019
Resource based manufactures (RB)	24	34	32	27	33	31	35	29
Low technology manufactures (LT)	2	3	5	5	4	5	7	7
Medium technology manufactures (MT)	9	11	11	14	17	19	30	28
High technology manufactures (HT)	8	13	17	13	13	16	25	24

Source: Authors' calculation based on US Comtrade database, extracted through WITS.

Technological composition: Disaggregate level

Table 9 pertains to the technological composition at the disaggregate level for India's exports to ASEAN, wherein each of the four technology categories for manufactured commodities, i.e. resource based (RB), low technology (LT), medium technology (MT) and high technology (HT) manufactures have been further classified into embodied technology. From analysing the change in composition from 1992 to 2019, it is evident that Resource based other category continues to remain the top exported category from India to ASEAN, constituting 29.9% of total exports in 2019. Medium technology Engineering goods constitute the second largest exported product category from India to ASEAN in 2019, forming 18.63% of total exports. In low technology, textiles, garments and footwear category has witnessed a decline in its export share from 8.6% in 1992 to 3.29% in 2019. Other than these categories, the embodied technology wise composition remains largely similar over the decades.

Perusing through ASEAN's exports to India in terms of embodied technology in Table 10 signifies that high tech electronics are the single largest tech category exports from ASEAN to India, in 2019, making up 21.3% of total exports, followed by RB Agro (16.6%), medium tech engineering (18.6%) and process (12.03%).

Table 9. *Disaggregate level technological composition of India's exports to ASEAN (by percent)*

Technology category	Year							
	1992	1997	2002	2007	2012	2017	2018	2019
<i>Resource based</i>								
RB Agro	2.83	3.39	5.23	2.35	2.23	2.93	2.99	2.90
RB Others	18.17	12.68	25.64	39.17	41.42	32.80	37.03	29.87
<i>Low technology</i>								
LT Textile, Garments, Footwear	8.60	7.88	6.52	2.86	2.68	2.88	3.32	3.29
LT Others	8.67	10.67	8.34	5.85	4.69	7.16	5.19	7.64
<i>Medium technology</i>								
MT Automotive	2.90	2.06	1.30	1.28	3.60	3.37	4.06	4.09
MT Engineering	5.61	6.77	4.38	7.19	11.86	11.21	9.84	18.62
MT Process	5.02	8.31	8.19	7.00	5.87	6.018	6.34	6.21
<i>High technology</i>								
HT Electronic	3.85	6.75	3.27	2.53	2.21	2.62	2.68	2.83
HT Other	2.16	3.46	3.82	3.08	3.54	4.11	4.55	4.86

Source: Authors' calculation based on US Comtrade database, extracted through WITS.

Table 10. Disaggregate level technological composition of ASEAN's exports to India (by percent)

Technology category	Year							
	1992	1997	2002	2007	2012	2017	2018	2019
<i>Resource based</i>								
RB Agro	16.14	23.77	25.18	10.74	22.64	20.37	20.15	16.57
RB Others	8.05	9.95	7.10	16.19	10.08	10.83	15.14	12.01
<i>Low technology</i>								
LT Textile, Garments, Footwear	0.86	1.531	2.65	0.82	0.93	1.76	2.45	2.46
LT Others	1.18	1.77	2.75	4.03	2.82	2.66	4.54	4.58
<i>Medium technology</i>								
MT Automotive	0.10	0.25	0.25	0.36	1.00	1.47	1.96	1.58
MT Engineering	4.51	4.73	5.73	8.68	8.81	7.23	13.46	14.31
MT Process	3.92	5.48	5.03	5.16	6.98	10.12	14.46	12.03
<i>High technology</i>								
HT Electronic	6.83	10.91	15.83	12.06	11.29	14.43	23.14	21.33
HT Other	1.20	2.51	1.66	1.39	1.34	1.63	2.31	2.55

Source: Authors' calculation based on US Comtrade database, extracted through WITS.

5.3. Intensity of trade

As a rule of thumb, $TII > 1$ is indicative of an intense trade relationship between the partners in the study, while a TII value less than 1 indicates a non-intense trading relationship. Based on the index calculation, Table 9 makes it evident that trade relationship between India and ASEAN is intense throughout, with all the 4 bilateral trade intensities being > 1 during the period of study. This reflects upon the fact that the two are significant trading partners for each other, both in terms of export and import. It also signifies that both, India and ASEAN export more, to a partner country vis-à-vis the world does on average.

This also highlights that there is a high trade and economic integration between India and the ASEAN countries, and persistent efforts should be made from both the sides to continue this intense trading relationship.

Table 11. Trade intensity (Export and Import) – India and ASEAN

TII	1992	1997	2002	2007	2012	2017	2018	2019
<i>Export intensities</i>								
India to ASEAN	1.24	1.04	1.61	1.71	1.59	1.64	1.48	1.39
ASEAN to India	1.31	1.65	1.77	1.88	1.32	1.36	1.09	1.29
<i>Import intensities</i>								
India from ASEAN	0.88	1.18	1.27	1.45	1.17	1.29	1.43	1.47
ASEAN from India	1.24	1.29	1.28	1.51	1.24	1.19	1.13	1.02

Source: Authors' calculation based on UN Comtrade database extracted through WITS.

6. Conclusions and policy implications

The analysis presented in the study reveals that the two trading partners in question, India and ASEAN share a highly intense trade partnership, as elucidated by the Trade Intensity Index (TII) values which have persistently remained > 1 bilaterally. The study finds that India's composition in exports to ASEAN is not as diverse as ASEAN's exports to India, with India's exports mainly limited to resource-based manufactures and medium-technology engineering goods. Furthermore, with time, India has been exporting more and more resource based commodities to ASEAN, while ASEAN has expanded its exports into more diverse areas, such as high-tech, medium-tech and resource-based manufacture. This is a matter of concern for Indian policy makers. India is home to state of the art technologies

in certain areas such as pharmaceuticals, chemicals, engineering goods and other medium-technology manufactures. In addition, due to the formidable presence of MSME's in India's exports and high human resource, low-technology exports are also India's forte. However, the same is not converted into exports to ASEAN. As India lies somewhere in the middle in economic complexity, when compared to rankings of the other ten ASEAN countries, the scope to export commodities from each technology segment is much prevalent. India should therefore, concentrate, through policy measures to diversify and bank upon the considerable opportunities that are prevalent in this third-largest trading bloc in the world, called Association of Southeast Asian Nations (ASEAN).

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