

## **ANALYSING TECHNOLOGY-INTENSIVE AND GVC EXPORTS: A STUDY OF INDIA, ASEAN, AND GLOBAL TRENDS**

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### **ABSTRACT**

Recognizing the growing importance of technology-intensive and Global Value Chain (GVC) products in global trade, this paper delves into the trends and pattern of trade in these sectors between India and ASEAN *vis-à-vis* world over the past two decades (2003–2022). The analysis utilizes a product classification of technology-intensive goods in the trade sector based on HS nomenclature, along with GVC products represented by the parts and components sector, to explore the bilateral trade dynamics between India and ASEAN. The findings indicate that technology exports constitute a substantial portion of ASEAN's total exports, accounting for 52.3 percent, compared to India's 29.7 percent in 2022. Interestingly we also find that ASEAN's technology exports to India exhibited a higher growth rate than its technology exports to the global market during the period 2003–2022. This observation indicates a deepening trade relationship between ASEAN and India in the technology sector, highlighting India's increasing importance as a destination for ASEAN's technology-intensive goods. The analysis further revealed that although India's share in ASEAN's global exports of technology-intensive GVC products is relatively small, the export growth over the last two decades has been promising. This growth trend reflects significant trading opportunities in this emerging sector between the two regions. These insights hold significant implications for Indian policymakers, particularly in the context of the impending review of the existing India–ASEAN Free Trade Agreement (FTA) in goods.

**Keywords:** India, ASEAN, Technology-intensive Exports, GVC Products, Trade

**JEL Code:** F10, F14, F15

## **1. Introduction**

The Association of Southeast Asian Nations (ASEAN) is a prominent and dynamic trade bloc, demonstrating impressive growth and immense trade potential. In 2022, the ASEAN economy expanded by 5.7 per cent maintaining an average annual growth rate of 4.4 per cent during 2010 – 2022. This growth outpaced the global economy which grew by 3.5 per cent in 2022. ASEAN now ranks as the fifth-largest economy globally, following the U.S., China, Japan, and Germany, with a nominal GDP estimated at US\$3.6 trillion (The ASEAN Secretariat, 2023). Additionally, ASEAN's global merchandise trade experienced a significant surge, increasing by 14.4 per cent to reach US\$3.8 trillion in 2022. In contrast, global trade expanded by 8.7 percent, reaching a total of \$47.3 trillion in the same year.

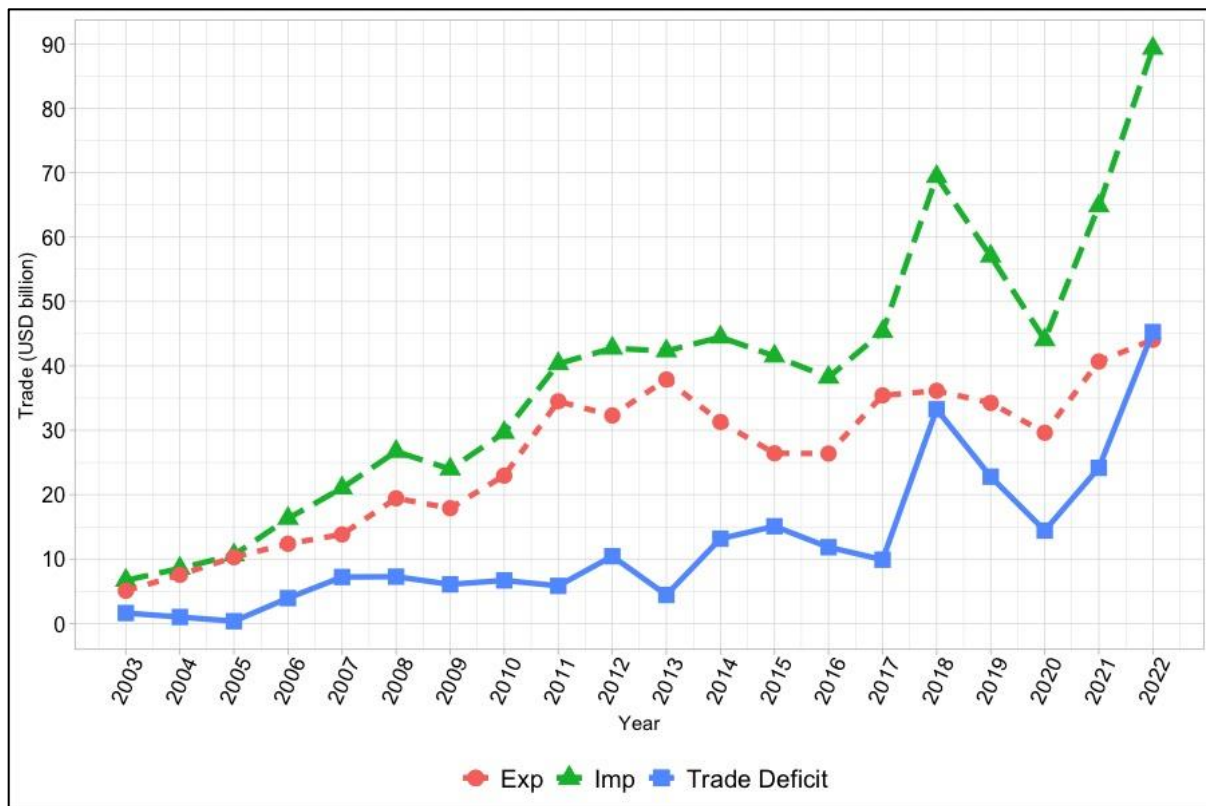
Recent studies have indicated that the integration of South Asia and Southeast Asia could yield substantial economic benefits for both the regions (World Bank 2022, Chandra & Kumar 2010). Scholars such as Das and Guha (2022) and Mohanty (2007) underscore the pivotal role of India's 'Look East Policy', initiated in the early 1990s, in developing extensive economic and strategic ties with Southeast Asian countries. This policy has acted as a catalyst in increasing economic interaction between India and ASEAN. Over the last three decades, the India-ASEAN relationship has evolved into a strong economic co-dependence, starting with a sectoral partnership in 1992 that culminated into signing of the ASEAN-India Free Trade Agreement (FTA) in goods in 2009. This integration further deepened as the India-ASEAN Comprehensive Economic Cooperation Agreement (CECA) became fully operational in July 2015, after the agreement on trade in services and investment entered into force.

The increasing economic and diplomatic engagements between India-ASEAN have spurred a remarkable growth in trade relations, as depicted in Figure 1. In 2003, India's exports to ASEAN stood at US\$ 5.1 billion, which increased nearly nine-fold to US\$ 44 billion by 2022. Similarly, India's imports from ASEAN increased more than thirteen-fold from US\$ 6.7 billion in 2003 to US\$ 89.3 billion in 2022. Therefore, we observe that India has consistently maintained a trade deficit with ASEAN throughout the entire study period (2003-2022), which has expanded dramatically from US\$ 1.6 billion in 2003 to US\$ 45.3 billion in 2022.

In the Indian context, several studies (ADB, 2005; Mohanty and Arockiasamy, 2008) underscore the significance of export volumes not only in fostering stable domestic growth but also emphasize the pivotal role of exports lies in the level of margin generated from the business (UNCTAD, 2002). To enhance the returns on exports, it's imperative that exportable products become more technology-intensive and adapt to the evolving global trade landscape. Typically, countries witness an improvement in the technology intensity of their export basket as they progress economically and technologically. In this regard, Newly Industrialized Countries

(NICs) have made significant advancements in managing production and engaging in technology-intensive trade, thereby playing a pivotal role in reshaping global trade dynamics (Widodo2010). Samen (2010) provides evidence suggesting that the adoption of technology-intensive trade in developing nations often results from structural transformations within their economies. India's remarkable growth in information technology (IT) exports and the emergence of high-tech industries have positioned the country as a knowledge powerhouse, elevating it to the ranks of high-technology producers among developing nations (Mani2008). Leromain & Orefice (2014) indicate that countries with a higher degree of technological intensity in their trade, especially those with a significant proportion of high-technology goods in their export structure, have enhanced their prominence in global exports. Moreover, a technological-intensive export structure contributes more significantly to long-term growth compared to one dominated by low-technology products. This is because technological-intensive goods typically exhibit high income elasticity, stimulate new demands, replace older products, and experience faster growth in trade(Desai, 2013;Montobbio& Rampa, 2005).

**Figure1: India’s Trade with ASEAN: 2003 – 2022**



Source: UNComTrade, WITS.

Recognizing the pivotal role of technological capabilities in enhancing production efficiency and bolstering product competitiveness, numerous emerging countries have embraced this strategy to enhance their trade relations with various regions worldwide. Improved access to Southeast Asian markets for South Asian exporters not only opens up new trading prospects but also encourages greater participation in global value chains (GVCs). This is particularly significant for countries like India, which, despite not being a major player in GVCs thus far (Tewari & Veeramani, 2016; Nag *et al.*, 2015), are now focusing on enhancing manufacturing capacity and incentivizing foreign direct investment (FDI). These developments present India with new opportunities to integrate more deeply into regional and global value chains and enhance its trading prospects with the dynamic regional bloc ASEAN.

Against this backdrop, this paper aims to investigate the bilateral trade dynamics between India and ASEAN member countries at an aggregate level and further analyses the technology-intensive trade between India and ASEAN *vis-à-vis* world, employing a classification system devised by Mohanty (2003) based on the Harmonized System (HS) Nomenclature. Furthermore, the paper delves into the analysis of technology-intensive exports in value chains for both India and ASEAN over the past two decades (2003–2022). These trends are explored in the context of the increasing significance of technology-intensive and Global Value Chain (GVC) products in global trade, aiming to provide insights into the evolving trade pattern between the two regions.

The rest of the paper is organised as follows: a brief literature review in the second section, followed by the methodological framework in the third section. The fourth section presents the results and discussion, and finally, the fifth section concludes the article.

## **2. Literature Review**

The existing body of literature extensively examines the evolving economic relations between India and the South East Asian markets, notably ASEAN, since the inception of the Look East Policy (LEP) in 1992. Scholars, such as Das *et al.* (2016), have noted a discernible shift in India's foreign trade orientation over the past two decades, transitioning from a Western-centric focus to a pronounced emphasis on the East. Sharma (2020) offers a comprehensive analysis of the India-ASEAN bilateral relationship, noting its transformation into a robust economic partnership, with India's policy approach evolving into the Act East Policy since 2014. Asher and Palit (2008), along with Chanda and Gopalan (2009), highlights the critical importance of India's regional initiatives in ensuring the fulfilment of its long-term economic, strategic, and geopolitical objectives.

Recognizing India's proactive endeavours towards fostering deeper economic integration with ASEAN through its Act East Policy, Banik and Kim (2020) conduct an in-depth exploration of

trade patterns between India and ASEAN. Their findings revealed that there are sectors in which India has the potential to become competitive but is hindered by distortionary domestic policies. Similarly, Das and Guha (2022) assess the impact of the LEP/AEP on India's trade with ASEAN nations, revealing higher trade intensity compared to the rest of the world (RoW). Chandran (2011) identifies sectors and product groups showcasing complementarities between India and ASEAN, suggesting potential areas for collaboration and trade expansion. Notably, India demonstrates a comparative advantage in sectors such as food grains, minerals, chemicals, gems and jewellery, and manufactured products, while ASEAN nations excel in electrical goods, electronic products, vegetable oils, rubber products, and agricultural goods.

The analysis by Ohlan (2012) reveals that India's comparative advantage in terms of trade specialization is relatively weaker compared to ASEAN countries, emphasizing the imperative for India to bolster competitiveness through comprehensive measures. Such measures include investments in infrastructure, research and development, skill enhancement, and innovation. By enhancing competitiveness, India can mitigate potential import surges and foster a more balanced, mutually beneficial trade relationship with ASEAN countries.

Fayaz and Bhatia (2018) highlight that trade in the technology-intensive sector is the fastest-growing segment in global trade, with emerging economies playing an increasingly active role. Developing countries are leveraging their surplus labour to export high-tech goods, capitalizing on the advancements in information technology, transportation, and communication. These developments have catalysed a significant fragmentation of production processes, spanning borders and shifting from high-wage to low-wage countries (Oldenski2012). Nayak *et al.* (2013) and Desai (2013) notes a notable transition in India's global exports, shifting from low-technology-intensive products to medium and high-technology-intensive exports. These findings suggest a discernible shift in India's technology-intensive export profile, potentially indicative of increased technological capabilities within the country.

India has been actively restructuring its export basket to include more technology-intensive products, especially globally dynamic products (Mohanty2010), a trend that initiated with the advent of its second generation of reforms. However, India continues to lag significantly behind many other emerging countries like China in the restructuring of its export basket. Research by Khalid and Ismail (2022) highlights that India's exports to ASEAN predominantly fall within the resource-based category. Traditionally, India has enjoyed a competitive edge in resource-based goods and low-skill-intensive manufacturing, owing to its abundant natural resources and a workforce comprising unskilled and semi-skilled laborers. However, in today's global landscape, the mere abundance of natural resources no longer serves as a distinctive factor of competitiveness. Instead, the unrestricted and swift flow of capital and technology signifies a profound reorganization of comparative advantage (Braunerhjelm& Thulin, 2008).

To the best of our knowledge, there have not been any studies that have examined the changing dynamics of trade trends between India and ASEAN *vis-à-vis* world in the technology-intensive sector, using Mohanty (2003) revised product classification. This paper fills this gap by providing a comprehensive analysis of India and ASEAN trade in the technology-intensive goods and GVC sector over the past two decades (2003–2022). The aim is to understand the roles of these dynamic economies in the emerging high-technology and GVC sectors, shedding light on their evolving trade patterns and the potential for further growth and collaboration in these key areas.

### **3. Database and Methodology**

The analysis encompasses the period from 2003 to 2022, focusing on two dynamic economies/regions: India and ASEAN. Data on exports and imports are sourced from the United Nations COMTRADE database, employing the Harmonized System (HS) classification for merchandise trade at the 6-digit level.

#### **3.1 Technology-Intensive Trade**

This paper examines the trends and pattern of technology-intensive trade between India and ASEAN, utilizing Mohanty's (2003) revised product classification. The level of technology content varies significantly across different commodities. Mohanty (2003) categorized products at the HS 6-digit level into different technology intensity groups. This classification is based on Lall's (2000) product classification, which divides tradable products into primary, resource-intensive, low-tech, medium-tech, and high-tech products, depending on the types of technologies used in their production processes. The last two categories are generally considered technologically more advanced. Therefore, in this paper, products categorized as medium and high-tech intensive have been combined to analyse the emerging trends in technology-intensive trade between India and ASEAN. Examining the technological composition of exports provides insights into export sophistication, where higher levels of specialized technology exports indicate a higher degree of export sophistication. By analysing these trends, the paper aims to shed light on the evolving nature of technology-intensive trade between India and ASEAN.

Mohanty's (2003) classification maintains consistency with Lall's (2000) classification, comprising five broad product groups. However, two modifications are introduced: firstly, Lall's classification, based on SITC Revision-3, is now adapted to the HS trade classification. Secondly, additional products not originally classified by Lall are included in the existing classification. For a concise summary of the technology intensity of international trade, based on the HS trade classification utilized in this study, please refer to Appendix I.

### **3.2 Technology-Intensive Exports in Value Chains**

We analyse technology-intensive exports in value chains for India and ASEAN *vis-à-vis* world over the past two decades (2003-2022) to highlight the increasing significance of technology-intensive trade in value chains. Global Value Chain (GVC) analysis can be undertaken using disaggregated data for the Parts and Components (P&C) sector. The UN Broad Economic Category (BEC) product classification offers a structured framework for identifying intermediate products at a highly disaggregated level. Intermediate products are categorized into two sets, including semi-finished goods and parts & components, based on the principal use of the products, as detailed in Appendix II. These products are concorded with the Harmonized System (HS) of trade classification to identify the intermediate products used in the trade sector. Within this framework, nearly 384 products at the 6-digit HS classification level, primarily from capital goods, transport equipment, and the automotive sectors, are integral components of GVCs. These products are spread across nine HS sections and fifteen HS chapters, with significant trade activities occurring in sectors such as machinery and mechanical appliances, the automotive sector, and plastic products. This specific product classification serves as a comprehensive framework for analysing trade flows within the GVC sector.

It is crucial to understand that while over 50 percent of global trade is encompassed by Global Value Chains (GVCs) and technology-intensive trade separately, these categories are not mutually exclusive. There is overlap, with certain products being common to both GVCs and technology-intensive trade. This means that several products in GVCs are also technology-intensive in nature. This provides us a framework for analysing and comparing the trade patterns in this specific sector for both India and the ASEAN region *vis-à-vis* world.

## **4. Results and Discussion**

### **4.1 Changing Dynamics of Trade Trends between India and ASEAN**

Table 1 provides a comprehensive analysis of bilateral trade flows between India and the ASEAN countries, offering valuable insights into the evolving trade dynamics from 2003 to 2022. Among the ASEAN nations, Singapore emerges as India's most significant trading partner throughout the period from 2003 to 2022, boasting an average trade value of approximately US\$8.97 billion. However, it is noteworthy that Indonesia was India's largest trading partner during the years 2014 to 2022, although the trade balance is tilted against India. This trend could be attributed to the active participation of Indian state-owned trading companies, such as STC and MMTC, in Indonesia's trading landscape, engaging in commodities like tin, crude palm oil, as well as various agricultural products like oil meals, groundnut, and agro-chemicals. Furthermore, Singapore has grown as a hub for Indian IT companies, with more than 300 of

them establishing software development operations in the country. Singapore also hosts approximately 1,500 Indian companies, and every year, around 150 new companies set up their base there. Indian firms currently constitute the fourth-largest business community in Singapore.

Regarding the country-wise trade balance, India holds a positive trade balance with only two ASEAN member countries in 2022 (Cambodia and the Philippines) while experiencing a negative trade balance with the remaining eight regional economies (Indonesia, Malaysia, Thailand, Vietnam, Singapore, Brunei Darussalam, Lao People's Democratic Republic, and Myanmar). In contrast, in 2012, India's trade balance was positive with Singapore, Vietnam, Cambodia, and the Philippines but negative with the other six regional economies. It is worth noting that in both 2012 and 2022, India's largest trade deficit was with Indonesia. The primary reason behind this trend could be attributed to Indonesia's relatively limited tariff reduction under the Free Trade Agreement (FTA) and its reluctance to sign the Services Trade pact. This has resulted in trade imbalances and deficits between India and Indonesia.

In terms of India's exports to ASEAN, there are notable trends to observe. The contribution of Indonesia, Malaysia, and Singapore to India's total exports to ASEAN declined from 72.3 percent in 2012 to 65.6 percent in 2022. While these countries remained vital trading partners, their relative significance decreased over the decade. This shift may be attributed to various factors constraining the performance of Indian exports in the ASEAN market. One significant challenge is the heightened competition from China, coupled with the imposition of stringent non-tariff barriers. According to data from the World Trade Organization, the number of non-tariff measures in ASEAN surged from 1,634 in 2000 to 5,975 in 2015, particularly impacting developing nations (PHD Chamber, 2018). Additionally, the influx of various Chinese products into the ASEAN market has made it increasingly challenging for Indian products to compete effectively.

Brunei, on the other hand, saw a remarkable increase in India's exports between 2012 and 2017, with a nearly 17.5-fold surge, although this figure dropped to USD 68.8 million in 2022. Therefore, Brunei's share remained relatively consistent between 2012 and 2022. Malaysia and Indonesia witnessed moderate growth in their shares of India's exports to ASEAN, with increases of 4.6 and 3.8 percentage points, respectively, during the decade. This suggests that India's exports to these countries expanded steadily but not dramatically. Thailand and Vietnam also belonged to this club with moderately increasing shares. Thailand's share in India's exports rose from 10.7 percent to 13.7 percent, while Vietnam's share increased from 11.3 percent to 13.4 percent during the same period. In contrast, India's exports to Singapore displayed an interesting trajectory. There was a substantial surge from 2003 to 2012, but this trend reversed afterward. Singapore's share in India's exports declined significantly, falling from 42 percent in 2012 to 26.9 percent in 2022. Furthermore, Cambodia and Lao PDR, while contributing less in absolute



terms, displayed substantial export growth, reflecting their increasing participation in the Indian market.

**Table 1: Changing Trends of India’s Bilateral Trade Engagement with ASEAN Regional Economies: 2003 – 2022**

Flow	Country	Value (USD Million)						Share (%)	
		2003	2007	2008	2012	2017	2022	2012	2022
EXPORTS	Brunei	4.9	8.8	17.2	33.4	595.3	68.8	0.1	0.2
	Indonesia	1039.6	1878.2	2659.3	6021.9	16235.4	9866.6	18.6	22.4
	Cambodia	20.3	44.8	53.9	110.1	47.9	227.4	0.3	0.5
	Lao PDR	0.5	2.9	4.6	27.3	249.9	16.9	0.1	0
	Myanmar	76.6	162.8	237.3	526.8	738	765.2	1.6	1.7
	Malaysia	793.1	1850.3	3034.4	3791.2	8901.9	7190.5	11.7	16.3
	Philippines	324.3	571.4	755	1119.2	711.1	2160.8	3.5	4.9
	Singapore	1701.9	6390.1	8853.9	13552.7	7235.4	11830.8	42	26.9
	Thailand	731.8	1673.3	2005.3	3454.1	6456.4	6039.4	10.7	13.7
Vietnam	378.8	1241.5	1812.6	3658.2	4142	5880.8	11.3	13.4	
IMPORTS	Brunei	0.3	234.1	325.9	939.3	48	317.3	2.2	0.4
	Indonesia	1879.8	4840.3	6431.3	14068.3	3762.7	28665.3	32.9	32.1
	Cambodia	0.3	1.2	4.3	10.1	120.3	120.4	0	0.1
	Lao PDR	0.2	0.1	0.5	143.7	23.6	57.5	0.3	0.1
	Myanmar	360.2	809.1	906.3	1346.2	1063	1032.3	3.1	1.2
	Malaysia	1894.3	5725.6	7461.4	10494.1	5546.2	13542.4	24.6	15.2
	Philippines	111.9	173.5	227.6	494.2	1584.6	896.4	1.2	1
	Singapore	1867	6901.6	8304.8	7797.3	11559.9	24418.7	18.2	27.3

Thailand	539.2	2192.4	2664.8	5499.3	3588.6	11250.5	12.9	12.6
Vietnam	33.6	153.1	371.6	1945.5	8114.7	9004.7	4.6	10.1

**Source:** UNComTrade, WITS

On the import front, India's imports from ASEAN nations exhibited a different set of dynamics. Indonesia dominated as a key source of imports for India, with imports surging from USD 1879.8 million in 2003 to a staggering USD 28665.3 million in 2022, indicating a nearly 15-fold increase. Singapore, while remaining a substantial contributor, exhibited more conservative growth in Indian imports. In contrast, Vietnam experienced rapid growth, with imports to India increasing from USD 33.6 million in 2003 to USD 9004.7 million in 2022, marking an impressive 267-fold rise. This highlights Vietnam's emerging role as a major trade partner for India. Singapore and Vietnam, in particular, have played increasingly influential roles in shaping India's import landscape in the context of India-ASEAN trade. Singapore's share in India's imports witnessed a substantial leap, surging from 18.2 percent to 27.3 percent over the study period. This denotes Singapore's growing importance as a source of imports for India, reflecting the deepening economic ties between the two nations. The sharp rise in Vietnam's share, climbing from 4.6 percent to 10.1 percent, emphasizes its evolving role as a key contributor to India's import market. Conversely, Malaysia, which held a substantial 24.6 percent share in 2012, experienced a marked decline, dwindling to just 15.2 percent by 2022. These shifts in import sources signify changing patterns in India's economic engagement with ASEAN, reflecting evolving trade relationships over the years.

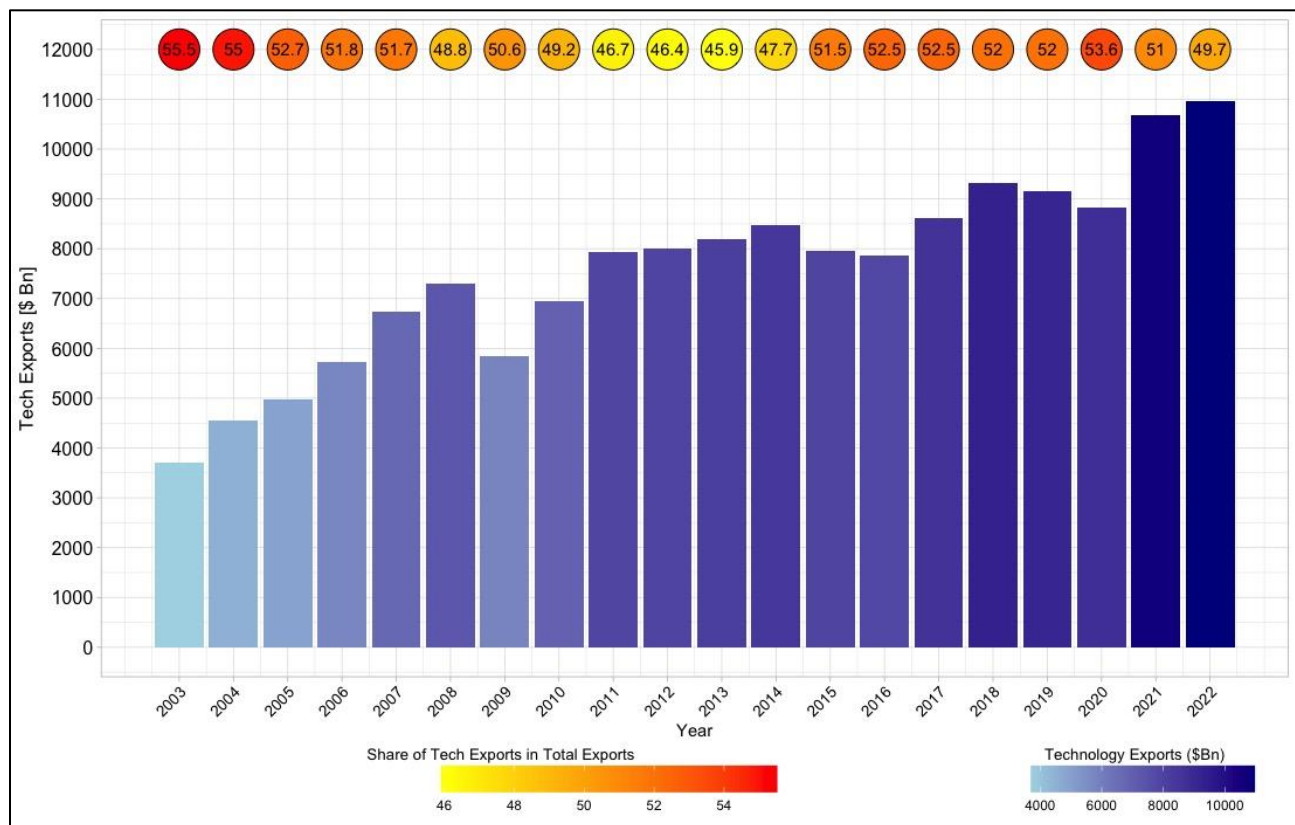
The surge in India's imports from ASEAN can be attributed to India's liberal trade policies initiated in the early 1990s as part of its economic reforms. The successful implementation of economic reforms and the Act East Policy have allowed India to capitalize on trade with ASEAN over the last two decades. Among ASEAN nations, Malaysia, Singapore, Thailand, and Indonesia are emerging as strong trading partners of India.

#### **4.2 Emerging Trends in Technology-Intensive Trade: India, ASEAN and the World**

Emerging literature on the expanding technology-intensive trade in global and regional economies suggests that this sector's trade growth will likely continue to surge for several decades. In 2003, total technology-intensive exports of the world amounted to USD 3.7 trillion. By 2022, this figure had soared to USD 11.0 trillion, underscoring the sector's critical importance in the global economy, especially in the merchandise trade sector. This robust growth trajectory is indicative of the increasing reliance on technology-intensive goods in global trade. As countries seek to enhance their competitiveness and tap into new markets, the role of technology-intensive trade is expected to become even more pronounced in the coming years.

Figure 2 shows that technology-intensive trade accounted for over half of global trade from 2003 to 2022. While the sector experienced persistent trade growth overall, it did face a decline during the initial phase of the 2008-09 recession. However, it quickly regained momentum in the subsequent years. The share of technology-intensive exports in global exports remained relatively stable at around 52 percent from 2015 to 2020, before dipping to 49.7 percent in 2022. Despite fluctuations in overall trade, the technology-intensive sector encompassed several high-tech industries that remained resilient to global trade disruptions, including those triggered by the COVID-19 pandemic. It is widely believed that the technology-intensive sector will be a major driver of growth for both industrialized and developing economies. The participation of emerging, transitional, and other developing countries in this sector is crucial for global trade. These countries have increasingly engaged in technology-intensive sectors such as semiconductors, information and communication technology (ICT), and environmentally sensitive technologies, among others.

**Figure2: Trend in Global Technology Exports: 2003 - 2022**

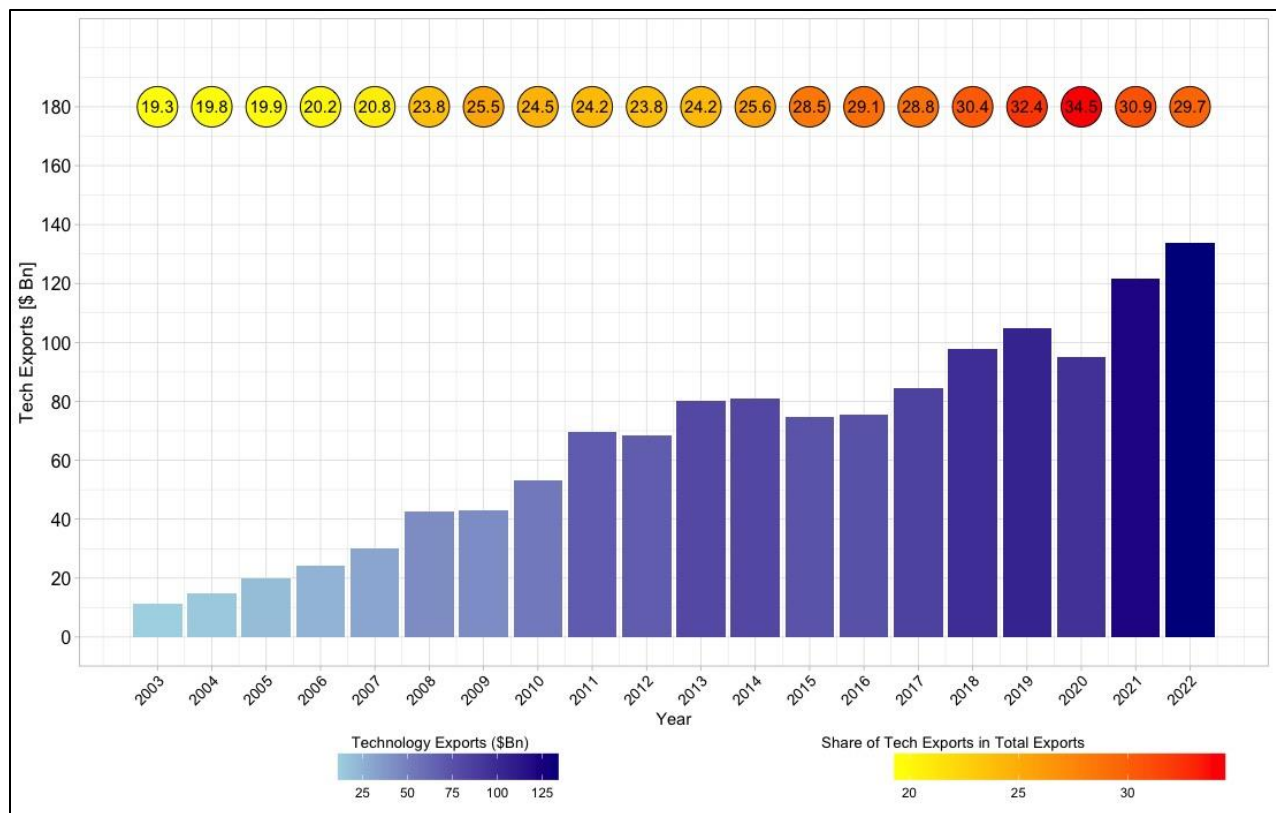


**Source:** Authors' estimates based on UN COMTRADE, WITS

In the technology-intensive trade sector, India's exports to the world have shown a consistent increase in their share, rising from 19.3 percent in 2003 to a peak of 34.5 percent in 2020, before declining to 29.7 percent in 2022, as depicted in Figure 3. Despite this recent decrease, India's tech-exports to the world have experienced a remarkable compound annual growth rate (CAGR) of around 13.9 per cent over the past two decades (2003-2022). In 2022, India exported nearly USD 134 billion worth of technology products to the world, a significant increase from USD 11.3 billion in 2003.

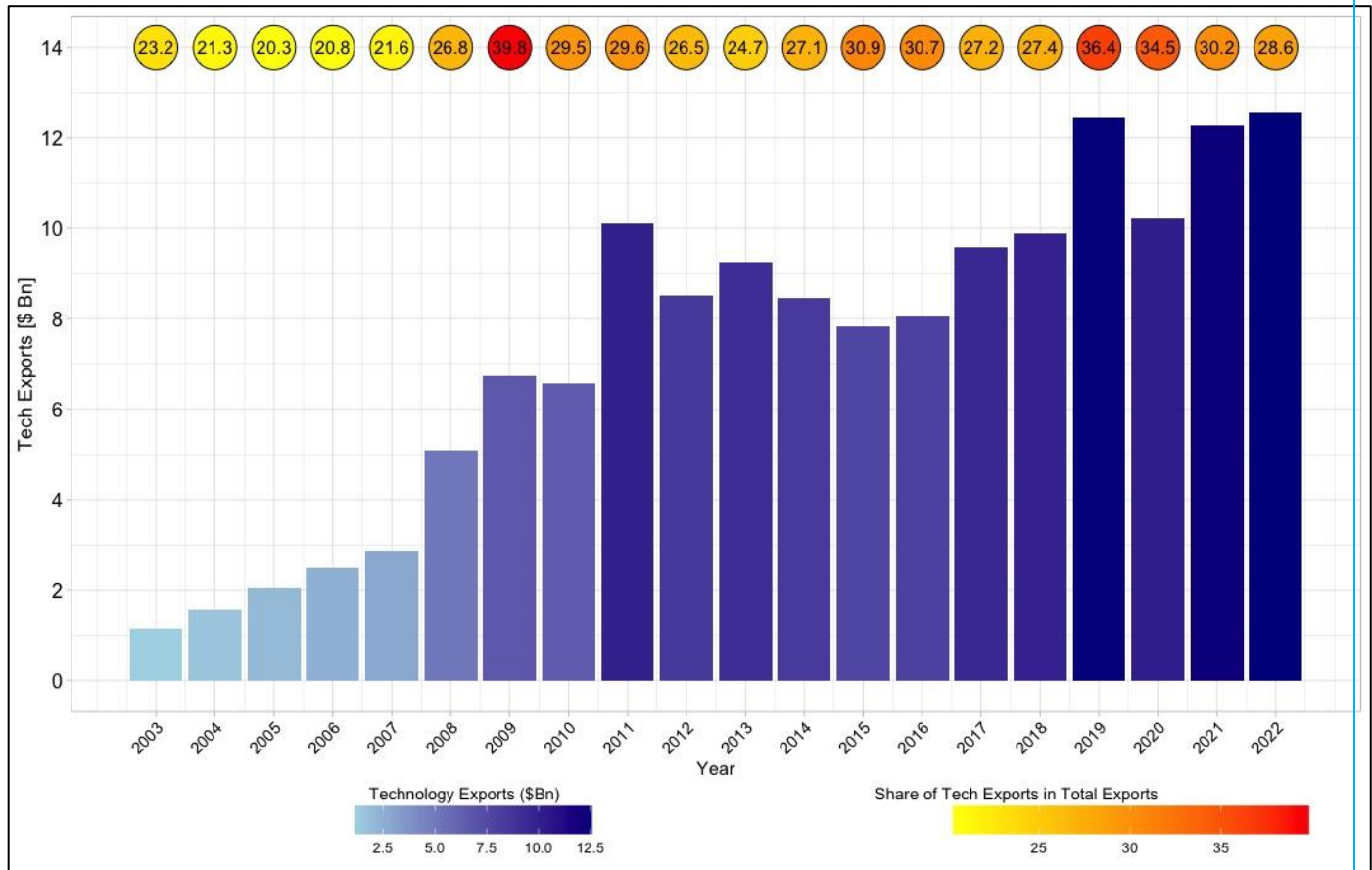
India's trade pattern with ASEAN mirrors its global trade trends. In 2022, India exported USD 12.6 billion worth of technology products to ASEAN, accounting for 28.6 percent of its total exports to the region, as illustrated in Figure 4. This share has fluctuated between 21 and 39 percent over the past two decades. India's tech exports to ASEAN have registered a robust CAGR of 13.4 per cent over the period 2003-2022, mirroring the growth trajectory of its global technology exports.

**Figure3: India Technology Exports to World: 2003 – 2022**



**Source:** Authors' estimates based on UN COMTRADE, WITS

**Figure4: India Technology Exports to ASEAN: 2003 – 2022**



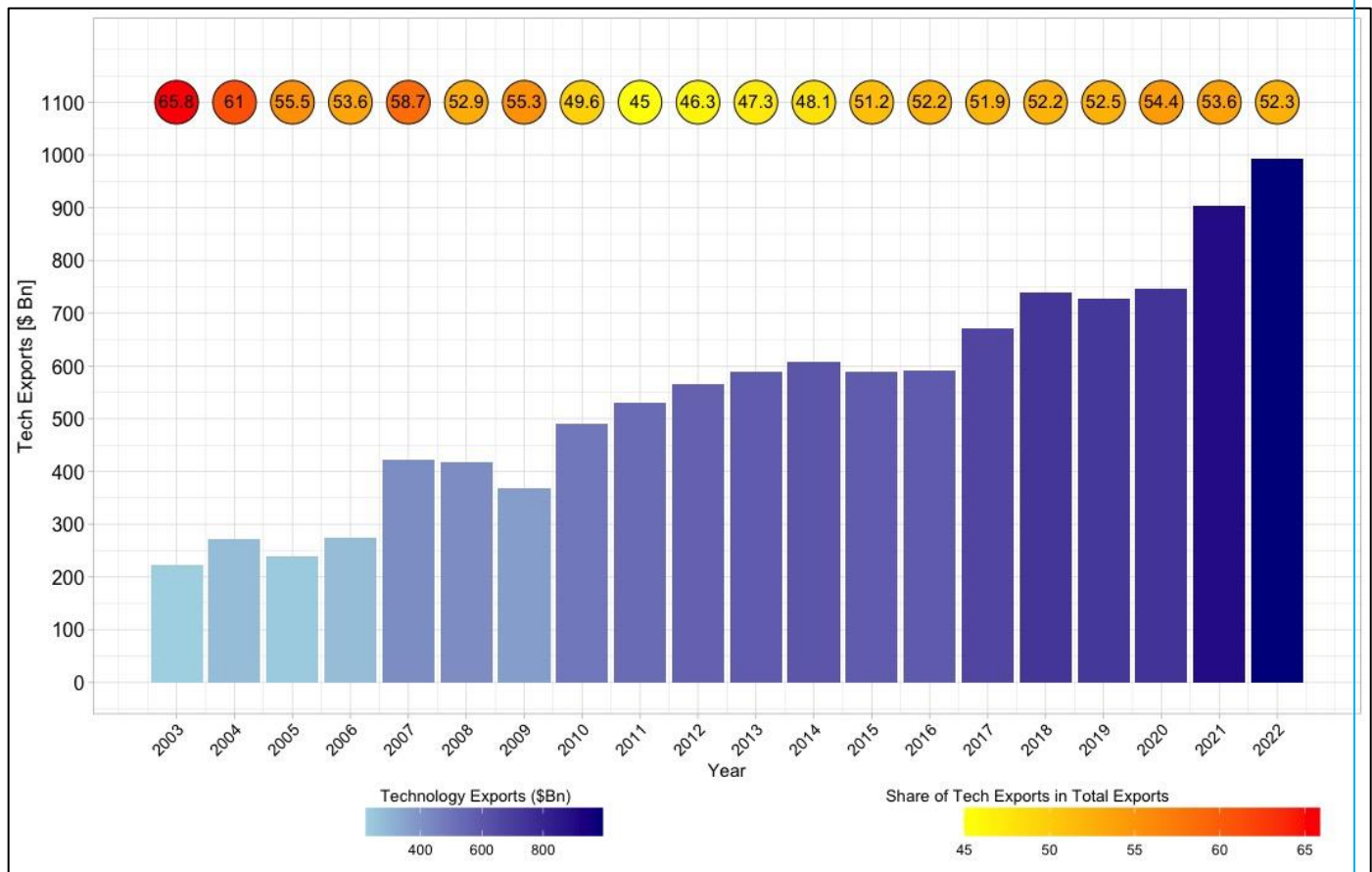
**Source:** Authors' estimates based on UN COMTRADE, WITS

Technology exports play a crucial role in ASEAN's total exports, constituting more than half of its overall export value. However, the share of ASEAN's technology exports in its total exports has experienced significant fluctuations during different global economic regimes. During the buoyant period from 2003 to 2007, the share of tech exports in ASEAN's global exports averaged around 59 percent, despite the relatively low value of tech exports during this period, as shown in Figure 5. The global financial crisis of 2008 led to a substantial downturn in global economic activities, causing ASEAN's share of tech exports to drop from 58.7 percent in 2007 to 52.9 percent in 2008. Over the past decade, the region's share of technology exports in its total exports has surged from 45 percent in 2011 to 52.3 percent in 2022.

Figure 6 illustrates the bilateral exports of ASEAN to India in the technology-intensive sector, which have experienced significant fluctuations from 2003 to 2022. The share of ASEAN's technology exports to India reached its highest point at 53.7 percent in 2009 before sharply

declining to 41.5 percent in 2010. From 2011 to 2017, the share averaged around 37 percent before returning to normal levels in 2018. Interestingly, ASEAN's tech exports to India grew at a CAGR of 12.1 per cent, moderately higher than the growth of ASEAN's tech exports to the world (8.2%) over the period 2003 to 2022, reflecting ASEAN's growing trade engagement with India.

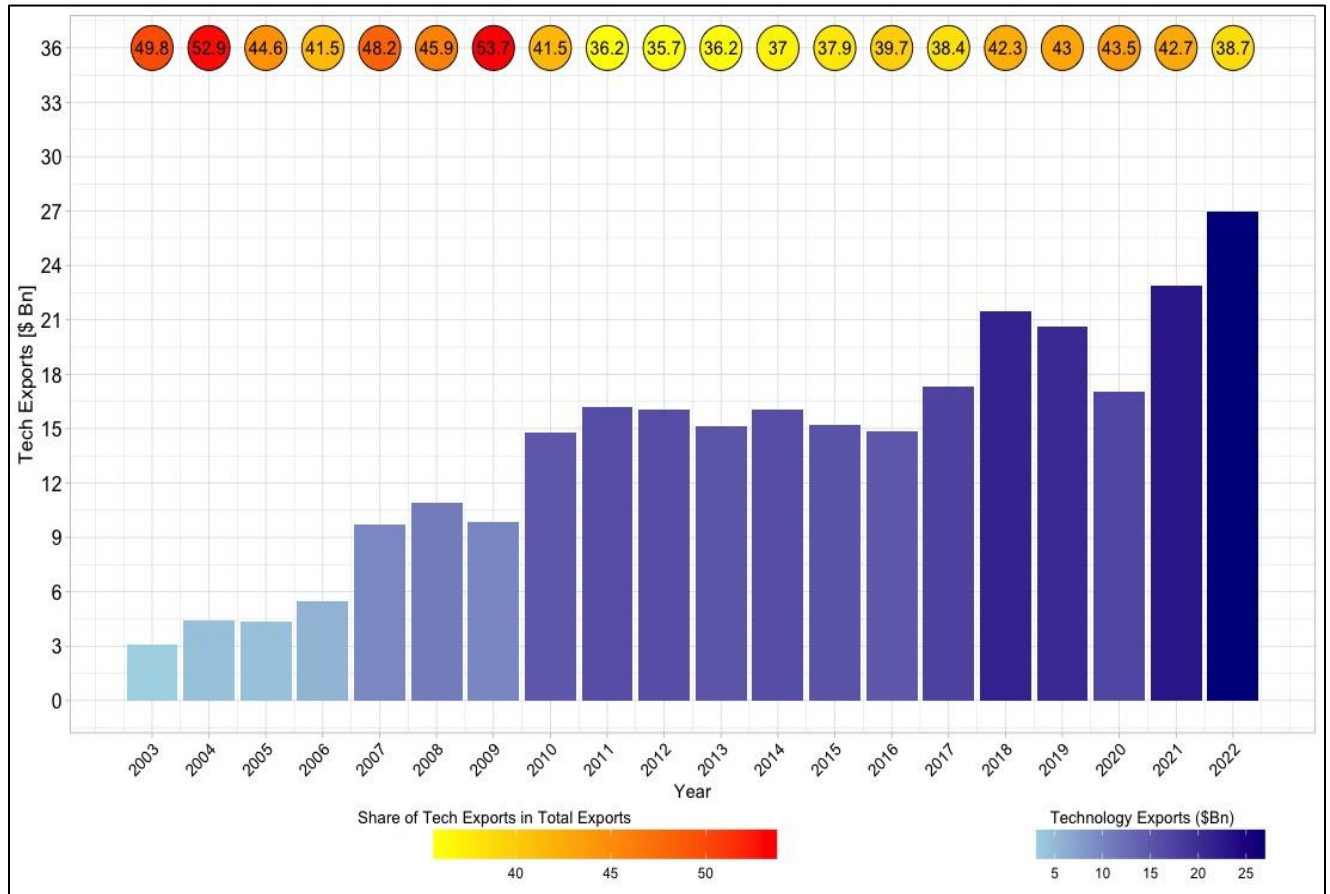
**Figure5: ASEAN Technology Exports to World: 2003 – 2022**



**Source:** Authors' estimates based on UN COMTRADE, WITS

It is important to highlight the contrasting trends in bilateral trade between India and ASEAN. In 2022, India's share in the total ASEAN exports of technology-intensive products was 2.7%, which is notably low compared to ASEAN's share in India's global tech exports, standing at 9.4%. In 2003, the corresponding figures were 1.4% and 10.2%, respectively. This trend indicates that India's share in ASEAN's total exports of technology-intensive products has shown a modest increase between 2003 and 2022. Conversely, ASEAN's share in India's global technology exports experienced a slight decline during the same period.

**Figure 6: ASEAN Technology Exports to India: 2003 - 2022**



**Source:** Authors' estimates based on UN COMTRADE, WITS

### 4.3 Technology-Intensive Exports in Value Chains: India and ASEAN

The experiences of countries in the global economy underscore the significance of GVC trade, indicating that these products serve as inputs for critical sectors such as base metals, electric machinery and appliances, automobiles, precision instruments, and more. These GVC products encompass various categories of technology-intensive products, highlighting their essential role in the production processes of regions worldwide. While several technology-intensive GVC products have experienced rapid growth since the onset of global economic buoyancy, the trade patterns in this sector differ between India and the ASEAN region. In 2003, India exported USD 2.8 billion worth of technology-intensive GVC products to the world, with approximately 9.1 percent of these exports going to ASEAN. By 2022, India's exports in this sector to the world had surged to USD 35.6 billion, and the share of ASEAN had moderately increased to around

10.5 percent, indicating the growing importance of tech-intensive GVC exports in India's trade basket over the past two decades.

In contrast, ASEAN's exports of technology-intensive GVC products to the world amounted to USD 120.4 billion in 2003, with only a small fraction (1.2%) exported to India. By 2022, ASEAN's exports in this sector to the world had soared to USD 499.1 billion, and India's share in these exports had slightly increased to 1.9 percent of ASEAN's total global technology-intensive GVC products. This suggests that while India is not a major destination for ASEAN's exports of technology-intensive GVC products, the growth of ASEAN's exports to India in this sector has been impressive. ASEAN's exports to India in the technology-intensive GVC sector experienced a compound annual growth rate (CAGR) of 10.4 percent over the period 2003–2022, which is higher than ASEAN's exports to the world in this sector (7.8%) during the same period. India's exports to the world in this sector have also shown significant growth, with an impressive CAGR of 14.3 percent. However, India's exports to ASEAN in this sector have demonstrated even higher growth, registering a 15.1 percent CAGR over the past two decades (2003–2022). This trend highlights the increasing importance of ASEAN as a trading partner for India in the technology-intensive GVC sector and underscores the potential for further growth in this dynamic trade relationship.

**Table 2: Tech-Intensive Exports of India and ASEAN in Value Chains: Bilateral and World (USD Million)**

Year	India's Exports		ASEAN Exports	
	World	ASEAN	World	India
2003	2826.0	256.2	120418.3	1418.7
2004	3755.9	368.7	149215.7	2099.0
2005	5241.4	483.0	103932.1	1529.1
2006	6446.9	526.6	119140.6	1833.4
2007	8074.4	607.7	238096.3	4690.4
2008	11227.2	1024.6	225228.4	5372.5
2009	9320.7	1098.8	205176.7	4731.7
2010	12841.2	1322.8	263636.9	6640.2



2011	16768.7	1681.1	270578.2	7229.5
2012	16836.5	1772.8	278843.7	6570.4
2013	19250.9	2153.2	292319.6	5762.7
2014	19405.8	2052.5	297988.0	5495.6
2015	18295.1	1798.3	289464.7	5450.0
2016	19731.3	2107.0	289537.3	5399.2
2017	23128.3	2402.3	330760.8	5800.9
2018	27878.4	3086.5	364853.8	6931.9
2019	28124.6	3240.5	361469.9	7311.4
2020	23766.8	2580.3	380937.8	6099.5
2021	32226.0	3201.7	449920.3	7718.2
2022	35656.3	3729.9	499052.4	9336.3

**Source:** Authors' estimates based on UN COMTRADE, WITS

**Note:** Estimation based on aggregation of products at HS 6-digit with bilateral time series data.

## 5. Conclusion

As India and ASEAN prepare to review their existing Free Trade Agreement (FTA) in goods, there is growing interest in the potential for India to expand its market access in the ASEAN regional economies. This paper attempts to explore the trends and pattern of trade between India and ASEAN in high-technology goods and the Global Value Chain (GVC) sector *vis-à-vis* world over the past two decades (2003 – 2022). Trade in high-technology goods and GVC constitutes a significant component of world trade, accounting for half of its total trade. Global experiences demonstrate that technology and technological capabilities play a major role in enhancing the competitiveness of countries' trade sectors and contribute to the overall growth of their trade performance.

The export structures of both India and ASEAN reveal a significant proportion of high-technology goods in their total exports to the world and to each other. The analysis shows distinct trends for India and ASEAN. Despite the relatively small share of technology exports in

India's total exports compared to ASEAN, India experienced more rapid export growth in this sector than ASEAN's tech exports to the world during the period 2003–2022, indicating India's shift towards medium and high-tech goods in its export structure. At the bilateral level, interestingly, India follows the similar trend with ASEAN as with the world. India's technology exports to ASEAN grew faster than ASEAN's tech exports to India during the same period. ASEAN is a major destination for India's technology exports, accounting for 9.4 percent of its total exports in this sector in 2022. However, this share has slightly declined from 10.2 percent in 2003. Conversely, India is a relatively small market for ASEAN's tech exports, accounting for only a 2.7 percent share of its total exports of technology-intensive goods in 2022. Nonetheless, the prospects are promising as this share has shown steady growth from 1.4 percent in 2003 to 2.7 percent in 2022.

The analysis further examined the performance of technology-intensive Global Value Chain (GVC) products for both India and ASEAN over the period 2003-2022, considering that several products in GVCs are also technology-intensive in nature. India's exports of tech-intensive GVC products to ASEAN grew at 15.1 percent, while India's exports to the world grew at 14.3 percent during the same period, highlighting ASEAN as an important trading partner for India. Similarly, ASEAN's figures also indicate a promising trend: ASEAN's tech-intensive GVC exports to India grew at 10.4 percent, while ASEAN's exports to the world grew at 7.8 percent.

These trends suggest the positive impact of India's Look East Policy (LEP)/Act East Policy (AEP) on deeper economic integration between India and ASEAN. They also indicate a strengthening trade relationship between India and ASEAN in the technology-intensive and GVC sector. This reflects India's commitment to boosting domestic manufacturing of medium and high-tech goods, such as electronics, solar PV modules, pharmaceuticals, automobiles, drones, medical devices, and telecom products, under the production-linked incentive (PLI) scheme announced in 2020.

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