Journal of Business Thought, *DOI: 10.18311/jbt/2024/44034, Vol. 15, 2024*

Analysis of Trade and Technology Linkages through Value-Added Content in India's Exports to SASEC Countries

Kashika Arora[1*], Sugandha Huria[2] and Amogh Desai[3]

[1]Senior Research Fellow, Centre for WTO Studies, New Delhi - 110014, India; kashika_cws@iift.edu
[2]Assistant Professor, Indian Institute of Foreign Trade, New Delhi - 110014, India; sugandha@iift.edu
[3]Indian Institute of Foreign Trade, New Delhi - 110014, India; amoghdesai2893@gmail.com

Received: 14 May 2024 **Accepted:** 24 November 2024 **Published:** 18 December 2024

Abstract

This paper's objective is to examine how India can utilise its unique strengths and competitive advantages to enhance its involvement in the regional value chains of SASEC nations. It entails analysing crucial sectors that can bolster India's interaction with these countries, focusing on trade that adds value and the manufacturing sectors' technological intensity. The study also delves into the trends and potential growth in trade, as well as diversification through value chain integration in the SASEC area, analysed using panel data spanning from 1995 to 2020. The findings detail the determinants of India's exports to SASEC countries, including factors like backward and forward linkages, tariff rates, trade margins, the availability of skilled labour, and the ratio of intermediate versus final goods. The paper additionally outlines various scenarios for both high-tech and low-tech industries, thereby shedding light on India's strengths and constraints in participating in specific sectoral value chains.

Keywords: Diversification, Global Value Chains, SASEC Countries, Trade Liberalisation, Trade Margins
JEL Classification: O19, F14, F60

1. Introduction

South Asia is emerging as a promising region in the global economy, with several countries showing robust growth while others recover from instability. Despite challenges like high inflation and interest rates affecting emerging markets, South Asia appears to be moving forward positively (ADB, 2023[1]). Trade liberalisation has been beneficial for the region, although it's not as advanced as in other parts of Asia (Kumar & Mishra, 2008). Domestic producers are shielded by high tariffs and non-tariff barriers, limiting their motivation to innovate or explore new export markets abroad (Kowalski *et al.*, 2015; Jain & Singh, 2009; Kathuria, 2018). Competition in traditional export destinations has intensified, resulting in South Asian countries contributing less than 2.5 per cent to global trade in 2017–2019 (Salgado & Anand, 2022). However, IMF estimates from 2019 for South Asia, particularly India, have the potential to achieve balanced growth across all sectors, including agriculture, manufacturing, and high-skill services.

[1]https://www.adb.org/publications/asian-development-outlook-december-2023

*Author for correspondence

Despite the manifold advantages associated with increased participation in Global Value Chains (GVCs), such as improved productivity and diversified exports (De Backer & Miroudot, 2013; OECD, 2015), successful examples of regional value chains within South Asia remain limited. However, amidst trade tensions, the COVID-19 pandemic, and a global economic downturn, GVCs face unprecedented challenges[2]. Several key factors are poised to reshape GVCs in Asia in the years ahead. Firstly, production activities are relocating away from China due to escalating US-China competition (Zhang, 2021). Tariffs and economic sanctions imposed by the United States are prompting numerous firms, including Chinese enterprises, to move their production from China to other Asian nations (Rapoza, 2020; Deshmukh, 2021), resulting in a phenomenon dubbed "*friend-shoring*" (Wignaraja, 2023;[3] Mikic *et al.*, 2023). Secondly, the COVID-19 pandemic has intensified the imperative for countries to diversify their economies and export structures to enhance resilience against shocks. Simultaneously, as the lasting impacts on various sectors become apparent, there is a pressing need to facilitate the reallocation of resources from less viable to more sustainable sectors, particularly to mitigate vulnerability to production and supply-side disruptions, including those stemming from widespread value chain disturbances caused by the pandemic (Salgado *et al*., 2019; Salgado & Anand, 2022).

Nevertheless, East Asia and China continue to hold significant positions in supply chains due to the high costs associated with industrial relocation and the difficulty for latecomers to replicate conditions conducive to sophisticated manufacturing. Historically, South Asia has played a limited role in global supply chains (Kowalski *et al*., 2015). However, notable manufacturing investments by prominent companies such as Apple and Mercedes in India indicate a potential shift in perceptions about South Asia's role in supply chains, with India emerging as a complementary hub in the Asian supply chain landscape (Singh, 2022; Wignaraja, 2023). This trend is driven by multinational corporations' strategies to mitigate risks, escalating trade tensions between the United States and China, and India's rapid economic growth. Furthermore, recent projections from the World Bank for 2023 anticipate a robust 6 per cent growth for the South Asian region, surpassing the growth rates of many other emerging markets and developing economies (World Bank, 2023[4]).

Regional cooperation and integration in South Asia have been pursued through various initiatives. One such effort was the establishment of the South Asian Association for Regional Cooperation (SAARC), comprising Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Despite its aim to enhance regional collaboration, SAARC faced initial mistrust and suspicion among its members and ultimately struggled to achieve its objectives. This led to the exploration of alternative frameworks, with Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) — a coalition of countries in the Bay of Bengal region — emerging as a promising option. Over two decades, however, BIMSTEC's achievements have remained modest. For India, BIMSTEC represents an avenue to advance regional cooperation in the absence of SAARC and serves as a link between SAARC and Association of Southeast Asian Nations (ASEAN). Including five South Asian and two ASEAN nations, it excludes Maldives, Afghanistan, and Pakistan (Figure 1). As a platform connecting South Asia and Southeast Asia, BIMSTEC offers a potential testing ground for regional collaboration. A notable development was the establishment of its permanent secretariat in Dhaka, but challenges such as insufficient funding and staffing have hindered its effectiveness. Additionally, the absence of strong leadership within BIMSTEC has amplified India's interest in the grouping.

Besides, these two major groupings, in 1996, four members of SAARC — Bangladesh, Bhutan, India, and Nepal (BBIN) — formed the South Asian Growth Quadrangle. At the request of BBIN, the Asian Development Bank (ADB) provided technical assistance for the implementation of sub-regional cooperation projects under the South Asia Sub-Regional Economic Cooperation (SASEC) Programme[5]. This programme was further joined by Maldives, Sri Lanka in 2014 and Myanmar in 2017, spurring economic cooperation further along strategic sea routes. SASEC is a project-based partnership, where ADB serves as the SASEC

[2] https://eastasiaforum.org/2020/07/28/what-lies-ahead-for-global-value-chains-in-asia/
[3] https://www.gatewayhouse.in/wp-content/uploads/2023/07/Gateway-House-Paper_The-Great-Supply-Chain-Shift_2023.pdf
[4] https://www.worldbank.org/en/region/sar/publication/south-asia-development-update
[5] https://www.sasec.asia/index.php?page=what-is-sasec

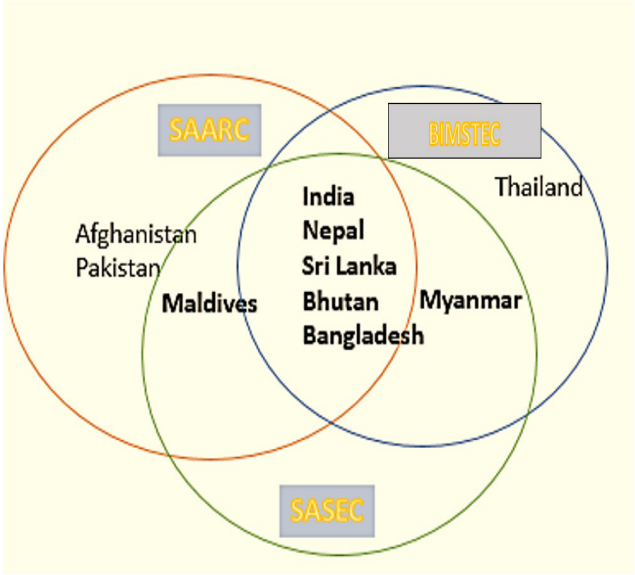


Figure 1. Authors' representation of different groupings.

Secretariat, working with member governments to help implement SASEC projects and initiatives and to provide technical support. The SASEC Vision document outlines the broad framework to transform the SASEC sub-region into Asia's growth driver by leveraging synergies across industries, expanding regional value chains, and strengthening connectivity and access to trade among the member countries[6]. The SASEC region being strategically located at the crossroads of Central Asia, East Asia, and South Asia, becomes a crucial area for trade routes, energy pipelines, and maritime traffic, impacting global trade and logistics.

The region's untapped trade potential can be unlocked through strengthened connections with Southeast Asia. According to projections from the World Bank in 2022[7], tariff liberalisation, along with the removal of non-tariff barriers, ease of Foreign Direct Investment (FDI), and enhanced trade facilitation, could increase Gross Domestic Product (GDP) by 0.4 per cent to 10.6 per cent for South Asia and by 0.1 per cent to 0.4 per cent for Southeast Asia. Thus, the strategic position of SASEC countries offers opportunities for trade linkages that can lead to economic integration. From India's standpoint, fostering economic and connectivity ties between South and Southeast Asia represents a natural and forward-thinking step toward fostering growth and prosperity[8].

The objective of the paper is therefore to examine how India can utilise its strengths and competitive advantage to enhance its involvement in the regional value chains of SASEC countries. This includes identifying crucial sectors that can boost India's engagement with these countries through increased trade, emphasising value addition and the technological sophistication of manufacturing industries. Additionally, the paper aims to analyse existing and prospective trends in trade growth and diversification, focusing on how value chain connections within the SASEC region can be strengthened and expanded. Consequently, to set the background of the analysis, Section 2 provides the literature review while Section 3 provides the background on India's trade with SASEC countries through descriptive statistics. Section 4 elucidates the materials and methods Section 5 provides the results and discussions and finally, Section 6 presents the conclusion and policy implications.

2. Literature Review

Over the past four decades, international trade has undergone a significant transformation, reshaping the global economy (Antràs & Chor, 2022; Pansera & Owen, 2018; Howson *et al.*, 2022). Inspired by the success of export-driven strategies in nations like Japan and South Korea, many developing countries adopted similar export-oriented models in the late 1970s and early 1980s (Bernard & Jensen, 1999; Emery, 1967; Feder, 1983; Grossman & Helpman, 1991a, 1991b; Hausmann *et al.*, 2007). This shift is based on the premise that exports stimulate economic growth and productivity by leveraging economies of scale, technological advancements, and enhanced competitiveness (Kalaitzi & Chamberlain, 2020). A nation's export composition often mirrors its technological sophistication, with a larger share of high-technology exports signalling advanced capabilities (Can, *et al.*, 2022; Hausmann *et al.*, 2007). However, countries like the Philippines and Malaysia demonstrate that significant high-tech exports are possible even with limited technological infrastructure (Srholec, 2007). The primary drivers of high-tech exports include domestic

[6] https://www.sasec.asia/index.php?page=publications-list&pid=305&url=sasec-vision
[7] https://www.worldbank.org/en/region/sar/publication/deepening-linkages-between-south-asia-and-southeast-asia
[8] https://www.orfonline.org/research/india-the-bridge-linking-south-and-southeast-asia

factors such as income levels, human capital, and R and D investments, all of which are associated with higher high-tech output (Tebaldi, 2011; Güneş *et al.*, 2020; Braunerhjelm & Thulin, 2008). External factors like FDI and access to global technology also significantly impact high-tech exports (Abedini, 2013; Cadestin *et al.*, 2018; Kutan and Vukšić, 2007). The advent of GVCs has further reshaped international trade, allowing countries to plug into existing production networks rather than create new ones, thus supporting industrial growth (Baldwin & Yan, 2014; Taglioni & Winkler, 2016). Despite the advantages of GVC involvement, such as improved productivity and export diversification, regions like South Asia face challenges including trade tensions, the COVID-19 pandemic, and economic downturns, which affect GVC dynamics (De Backer & Miroudot, 2013; Kowalski *et al.*, 2015; Salgado & Anand, 2022). Notably, factors such as the relocation of production from China due to US-China tensions and the need for economic diversification to mitigate shocks are reshaping GVCs in Asia (Rapoza, 2020; Deshmukh, 2021; Wignaraja, 2023; Mikic *et al.*, 2023; Salgado & Anand, 2022). Despite the challenges, including high tariffs and non-tariff barriers that limit domestic innovation (Kumar & Mishra, 2008; Kowalski *et al.*, 2015), and the historically limited role of South Asia in global value chains (Salgado & Anand, 2022), recent trends and investments indicate a growing potential for South Asia, particularly India, to enhance its role in regional and global trade networks.

The decreasing costs of transportation and communication have given firms the chance to engage in GVCs (Grossman and Rossi-Hansberg, 2008; Draper, 2013). For this trend to persist, it's crucial to avoid succumbing to the temptation of reintroducing protectionist policies (Ahmed *et al.*, 2015). Following the global financial crisis, there was an increase in protectionist measures. Developing countries, though somewhat shielded, experienced a drop in exports to advanced economies, which in turn reduced their foreign exchange earnings during the crisis period. At the same time, South Asian countries were grappling with food and fuel price crises, leading to export bans, especially on agricultural products. The lesson learned over the years is that while implementing protectionist measures may be relatively straightforward, removing them is significantly challenging.

The SASEC programme's efforts in regional integration and trade facilitation are outlined in an ADB report, emphasising the strategic importance of regional cooperation (ADB, 2023[1]). Despite the challenges, including high tariffs and non-tariff barriers that limit domestic innovation (Kumar & Mishra, 2008; Kowalski *et al.*, 2015), and the historically limited role of South Asia in global value chains (Salgado & Anand, 2022), recent trends and investments indicate a growing potential for South Asia, particularly India, to enhance its role in regional and global trade networks. Existing literature has extensively analysed India's trade potential with various regions and countries (*e.g.*, Ahuja, 2001; Banik & Kim, 2020; Batra, 2006; Kumar & Prabhakar, 2017; Sharma & Kumar, 2021). For instance, Sharma and Kumar (2021) evaluated India's trade potential with SAARC nations under SAFTA from 2004 to 2019, identifying significant potential with Bangladesh and Sri Lanka. Researchers have also explored India's export potential across specific sectors and products (Bhutia *et al.*, 2022; Kaur *et al.*, 2021; Kumar *et al.*, 2021). Kelkar and Kalirajan (2021) analysed India's merchandise export efficiency between 2001 and 2019, estimating it at around 80 per cent and suggesting regulatory improvements to enhance export performance. Similarly, Kaushal (2022) examined how regional trade agreements influenced India's export efficiency from 2008 to 2018, concluding that India had not fully exploited its potential and advocated for increased FDI in export-driven manufacturing. Using the gravity model of trade, Kaur and Nanda (2010) assessed India's export potential within SAARC, highlighting low trade levels and recommending reduced barriers and greater trade investment. Khati and Kim (2022) studied the ASEAN-India Free Trade Agreement's (FTA) impact on India's merchandise exports from 2000 to 2019, observing trade growth but limited export gains due to non-tariff barriers. Similarly, Seker (2022) applied the gravity model to evaluate India's export potential with Southeast Asia from 1996 to 2018, identifying significant opportunities with Brunei, Cambodia, and Thailand. Against this backdrop, the present study focuses on assessing India's export potential within South Asia from 2004 to 2021.

While the existing studies mention South Asia's integration into global value chains and its growing role, there is limited research on how GVC participation specifically enhances or constrains the export potential of individual countries, particularly in the context of recent geopolitical shifts (*e.g.*, the relocation of production due to US-China tensions). A focused analysis of how South Asian countries, especially India, can optimise their

position within GVCs to enhance high-tech exports, mitigate the risks of protectionism, and improve export efficiency could offer valuable insights. A recurring theme in the literature is the role of technology and innovation in driving export performance. However, there is a gap in research that investigates how South Asian countries, particularly those with limited technological capabilities (*e.g.*, the Philippines or Malaysia), can break the technological barriers to increase their share in high-tech exports. Exploring strategies for overcoming technological constraints and attracting FDI in high-tech sectors, as well as the role of human capital and regional innovation ecosystems, could be fruitful areas for further investigation.

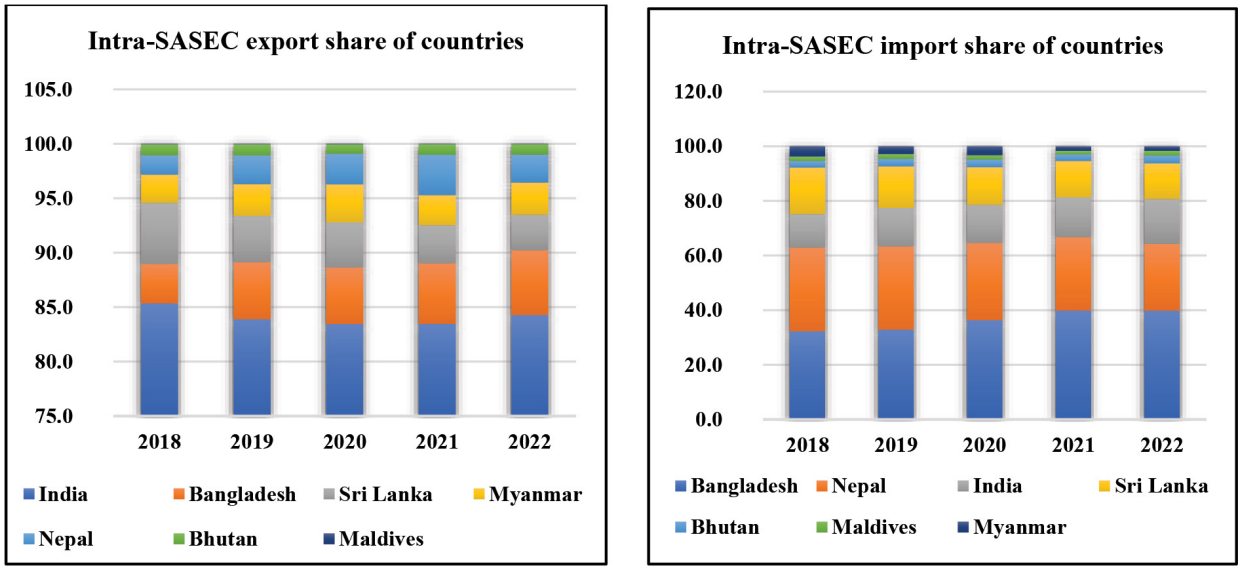
Therefore, this paper tries to ascertain the sectors with existing and potential for trade expansion and diversification through value chain linkages from India's perspective.

3. Background

The intra-SASEC trade amounted to USD 73 Billion or 0.15 per cent of the total global trade for the year 2022. In the same year, SASEC's share in world exports was 2.2 per cent and its share in world imports, 3.4 per cent. The average exports within SASEC for the period 2018-2022 were USD 29.5 Billion. The annual growth in export value during 2018-2022 for the world was 7 per cent, but for SASEC countries it was 37 per cent. Intra-SASEC exports increased from USD 26.8 Billion in 2018 to USD 36.8 Billion in 2022. In terms of intra-SASEC exports and imports in 2022, India contributed 84.3 per cent and 16.4 per cent, Bangladesh 6 per cent and 39.8 per cent, Sri Lanka 3.2 per cent and 13.1 per cent, Myanmar 3 per cent and 1.7 per cent, Nepal 2.6 per cent and 24.5 per cent, Bhutan 1 per cent and 2.9 per cent, Maldives 0.03 per cent and 1.7 per cent (Figure 2). Nepal, Bhutan, Myanmar, and Maldives have low shares of exports in intra-SASEC trade. Myanmar, Maldives, Bhutan and India have a low share of imports in intra-SASE trade. The top 10 intra-SASEC exports and imports over the years have been the same at broad-level (HS-27 Mineral Fuels and oils, HS-52 Cotton, HS-10 Cereals, HS-72 Iron and Steel, HS-84 Nuclear reactors, HS-87 Vehicles, HS-07 Edible vegetables, HS-85 Electrical machinery, HS-39 Plastics and HS-30 Pharmaceuticals).

India drives the intra-SASEC trade. India's exports and imports from SASEC countries in 2003 were USD 3.7 Billion and USD 0.9 Billion and in 2022, the values were USD 31 Billion and USD 5.8 Billion (Figure 3). In this period, the share of India's exports going to SASEC countries witnessed fluctuations, but since 2009, the trend has been increasing. Such fluctuations are in tandem with India's exports to the world.

India's top 10 exports to SASEC countries for the period 2013-2017 (Table 1) on an average show that for

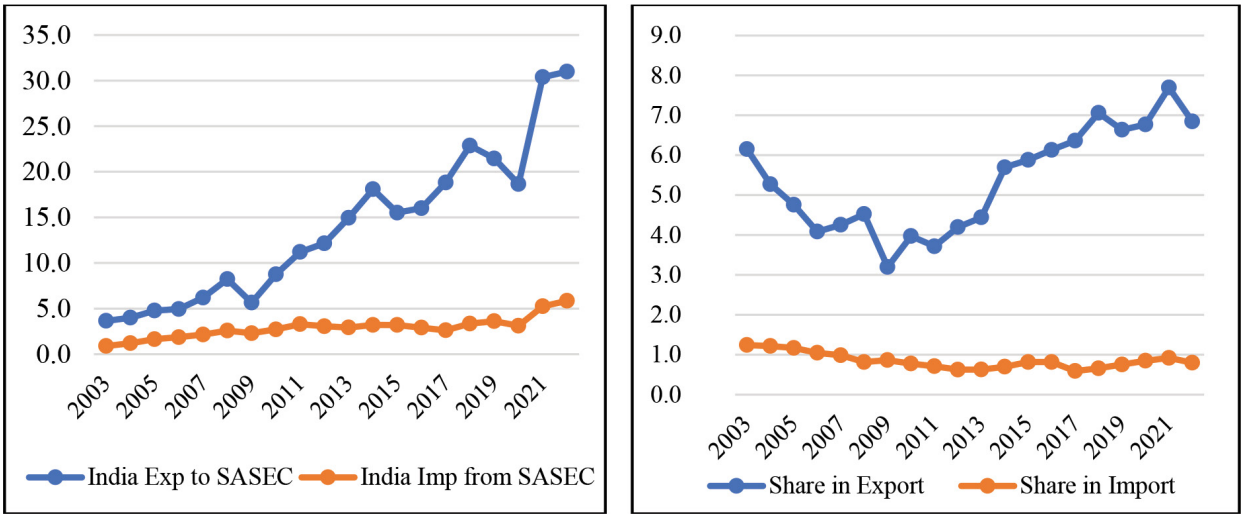


Source: ITC TradeMap

Figure 2. Intra-SASEC trade during 2018-2022 (per cent).

cotton (HS 52), cereals (HS 10), and aircraft, spacecraft, and parts (HS 88), both India's share of exports going to SASEC countries and SASEC countries dependence on India have been the highest. However, for products like mineral fuels, oils (HS 27), nuclear reactors (HS 84), electric machinery (HS 85) and plastics (HS 39), the SASEC countries dependence on India is quite low. India's exports of these products to SASEC have great potential to increase as India is already exporting these products to the world with high average values.

From 2018-2022, the scenario has been a little different (Table 2). The top 10 India's exports to SASEC have excluded aircraft, and spacecraft (HS 88), but have included sugar and confectionary (HS 17). The SASEC countries dependence on cotton (HS 52) and cereals (HS 10) has increased tremendously in comparison to the 2013-2017 period. For vehicles other than railways (HS 87), India's exports to the world have increased significantly and so has SASEC country's dependence. However, an observation is that SASEC countries import demand has



Source: ITC TradeMap

Figure 3. India's trade with SASEC countries (USD Billion) and share (per cent).

Table 1. India's Top 10 exports to SASEC countries (average export value during 2013-2017 in USD Billion).

HS Code	Description	India's export to SASEC	SASEC imports from the world	India's export to the World	Share of India's export to SASEC	SASEC import dependence on India
52	Cotton	1.93	7.88	8.17	23.7 per cent	24.5 per cent
27	Mineral fuels, mineral oils and products of their distillation	1.92	135.62	45.28	4.2 per cent	1.4 per cent
87	Vehicles other than railway or tramway rolling stock	1.82	10.85	14.71	12.4 per cent	16.8 per cent
84	Nuclear reactors, boilers, machinery and mechanical appliances	0.99	42.10	14.03	7.0 per cent	2.3 per cent
72	Iron and steel	0.99	14.51	8.75	11.3 per cent	6.8 per cent
88	Aircraft, spacecraft, and parts thereof	0.87	3.78	4.00	21.9 per cent	23.1 per cent
10	Cereals	0.87	2.74	8.27	10.5 per cent	31.7 per cent
30	Pharmaceutical products	0.55	2.91	12.37	4.4 per cent	18.7 per cent
85	Electrical machinery and equipment and parts thereof	0.54	43.18	9.05	6.0 per cent	1.2 per cent
39	Plastics and articles thereof	0.43	14.87	5.55	7.8 per cent	2.9 per cent

Source: ITC TradeMap

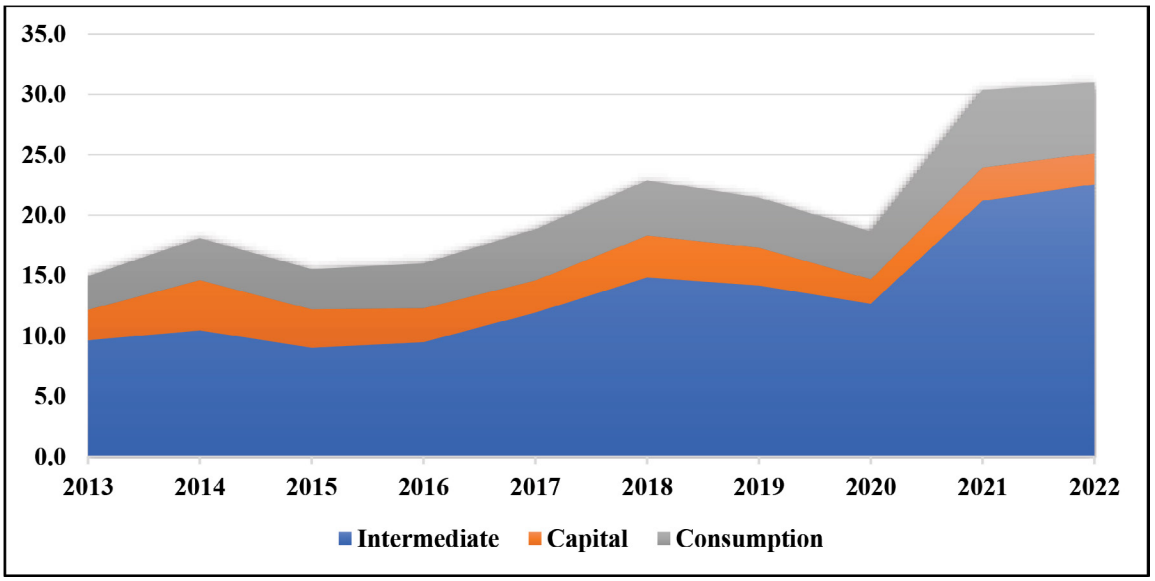
reduced from the world. Although India has increased its exports to SASEC countries, a commensurate dependence of SASEC countries for imports on India is yet to be seen. This presents an opportunity for India to increase exports and further diversify into different products, as has been done for sugars and sugar confectionery (HS 17).

Along with this, the trend of India's export to SASEC countries in terms of the type of goods shows that the export of intermediate and consumption goods has been the maximum (Figure 4). In terms of intermediate goods, the exports have largely been of medium oils, raw cotton, wheat and meslin, maize, electrical energy, raw cane sugar, parts and accessories of motorcycles, etc. For consumption goods, the exports have been rice, medicines, motorcycles, vaccines, fresh fruits, *etc.* The

Table 2. India's Top 10 export to SASEC countries (average export value during 2018-2022 in USD Billion).

HS Code	Description	India's export to SASEC	SASEC imports from the world	India's export to the World	Share of India's export to SASEC	SASEC import dependence on India
27	Mineral fuels, mineral oils and products of their distillation	4.51	194.98	55.15	8 per cent	2 per cent
52	Cotton	2.75	9.61	7.38	37 per cent	29 per cent
87	Vehicles other than railway or tramway rolling stock	1.88	9.73	17.77	11 per cent	19 per cent
72	Iron and steel	1.72	18.10	13.35	13 per cent	9 per cent
10	Cereals	1.60	3.69	9.98	16 per cent	43 per cent
84	Nuclear reactors, boilers, machinery and mechanical appliances	1.56	56.11	22.27	7 per cent	3 per cent
85	Electrical machinery and equipment and parts thereof	0.83	62.87	17.14	5 per cent	1 per cent
30	Pharmaceutical products	0.77	5.08	17.65	4 per cent	15 per cent
39	Plastics and articles thereof	0.69	22.15	7.72	9 per cent	3 per cent
17	Sugars and sugar confectionery	0.48	1.70	3.31	9 per cent	3 per cent

Source: ITC TradeMap



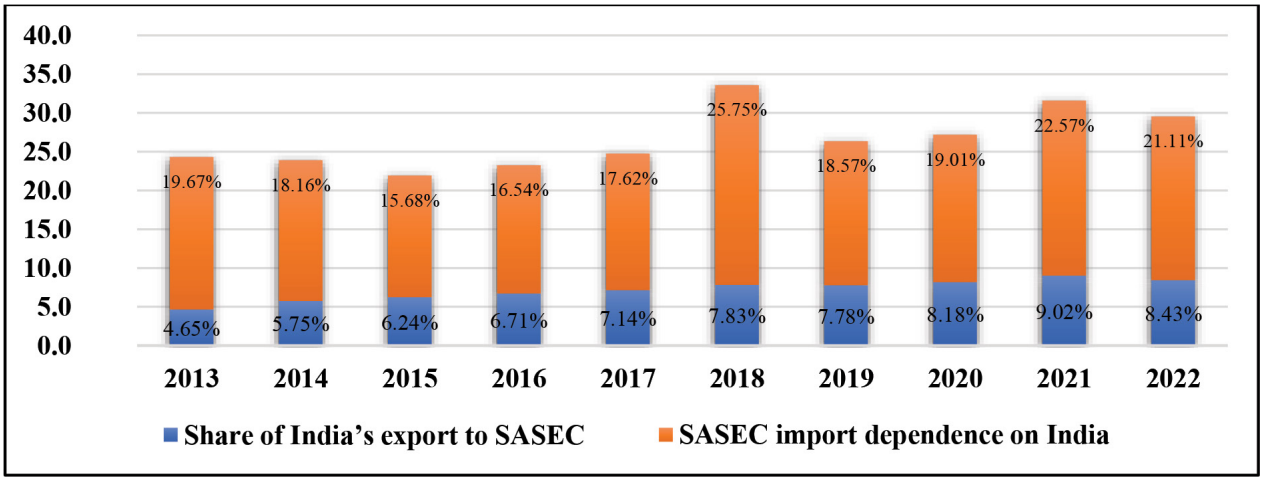
Source: WITS Comtrade

Figure 4. India's export of type of goods to SASEC countries (USD Billion).

capital goods on the other hand have been cranes, textile machinery, motor vehicles, *etc*.

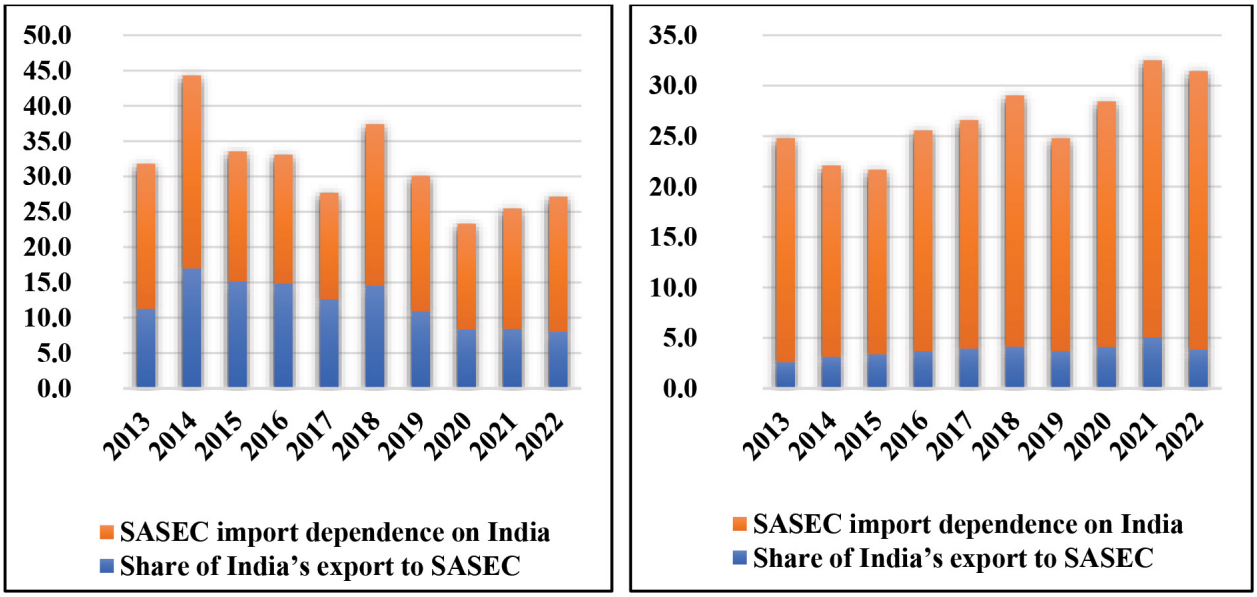
Further, the export trend of type of goods has been paired with a share of India's export to SASEC countries in India's total export to the world and SASEC countries import dependence on India which is the share of SASEC countries import from India in their total imports from the world. As can be seen from Figures 5 and 6, the share of India's exports to SASEC countries has been the highest for capital goods throughout the period. Since 2020, for both intermediate and capital goods, the share of India's exports to SASEC countries has been in a similar range. However, regarding the share of import dependence of SASEC countries on India, it has been the largest for consumption goods.

In general, SASEC countries are dependent on India for their increasing import demand, but this share can be significantly expanded as India has definitive export potential to further increase its exports to SASEC Countries. Also, the aspect of increasing trade of intermediate goods between India and other SASEC countries points out the formation of GVCs.



Source: WITS Comtrade

Figure 5. India's export of intermediate goods to SASEC countries (per cent).



Source: WITS Comtrade

Figure 6. India's export of capital and consumption goods to SASEC countries (per cent).

Value chains encompass the integration of various production and distribution stages, with the goal of augmenting the value of the product at each phase through specialised processes and improved quality. This integration fosters heightened efficiency, leveraging the factors of production involved, while also considering external influences. Optimising value chains is vital to uphold the future competitiveness of the product (Galar, 2012).

It's been noted that companies establish foreign production and distribution units to capitalise on various benefits such as tariff relief, access to affordable inputs, lower labour costs, and reduced logistics expenses (Ferdows, 1997). In an increasingly globalised landscape, businesses have the chance to pursue dynamic product specialisation, enabling them to build international reputations and tap into larger markets for goods, factors, and finance (Vereecke, 2007). Companies engaged in value chains have experienced improvements in technical efficiency, largely driven by gradual technology transfers (Pisano & Shih, 2009; Bell & Albu, 1999; Lema, 2015; Morrison *et al.*, 2008; Pietrobelli & Rabellotti, 2011; Saliola & Zanfei, 2009). The globalisation of supply chains has further enabled cost reductions, allowing firms to experiment with various inputs and production processes (Serieux, 2012). This has led to a significant increase in the imports of intermediate goods, expanding the input base for exported products (Kummritz *et al.*, 2007; Hummels *et al.*, 2001). Moreover, involvement in foreign production processes often facilitates the adoption of advanced technologies, enhancing customer-facing services (Pine & Davis, 1999). Feedback from customers across diverse cultural contexts also plays a crucial role, prompting adjustments in supply chain sequencing and timing to better align with consumer needs.

Utilising India's trade relations with SASEC countries could serve as a gateway to further exports to Southeast Asia. In the textile sector, India plays a pivotal role in intra-SASEC trade, where the majority comprises input and intermediate goods, while final goods are geared towards export. Nations like Bangladesh, Sri Lanka, and Myanmar heavily rely on India for essential textile materials such as cotton yarn, cotton fabrics, and made-ups. India's increasing exports of fundamental food products like wheat, rice, sugar, spices, vegetable oils, fresh vegetables, and fruits to SASEC countries leave limited space for the export of food processing products that offer greater value addition in production. The SASEC region looks to India for exports of automobiles and auto components. Moreover, according to ADB (2017[9]), there is potential to enhance the electronics value chain between India and Southeast Asian countries. Strengthening the chemical and pharmaceutical value chain is also viable, along with considering metallurgy, including basic iron and steel, basic precious metals, and other non-ferrous metals casting of metals.

While individual SASEC countries can address certain constraints on their own, a strategic collaborative approach could enable them to harness their strengths and capitalise on regional opportunities more effectively. Notably, countries in the SASEC sub-region, such as Bhutan, Nepal, and India's northeast region, boast abundant natural and mineral resources that are currently underutilised. Enhanced access to trade gateways and improved connectivity to global markets could stimulate better resource utilisation, fostering additional industrial growth. To achieve this, it is essential to develop and enhance multimodal transport infrastructure (including air, sea, road, river, and rail) within the sub-region.

Moreover, the participation of the sub-region in regional value chains is currently limited. For instance, Southeast Asian economies derive over 30 per cent of their intermediate inputs from within the region, whereas South Asia has a significantly lower ratio, around 7 per cent (OECD, 2015). Strengthening collaboration in areas such as trade facilitation and infrastructure development holds the potential to help SASEC sub-region countries establish intra-sub-regional value chains and mutually benefit from each other's comparative advantages.

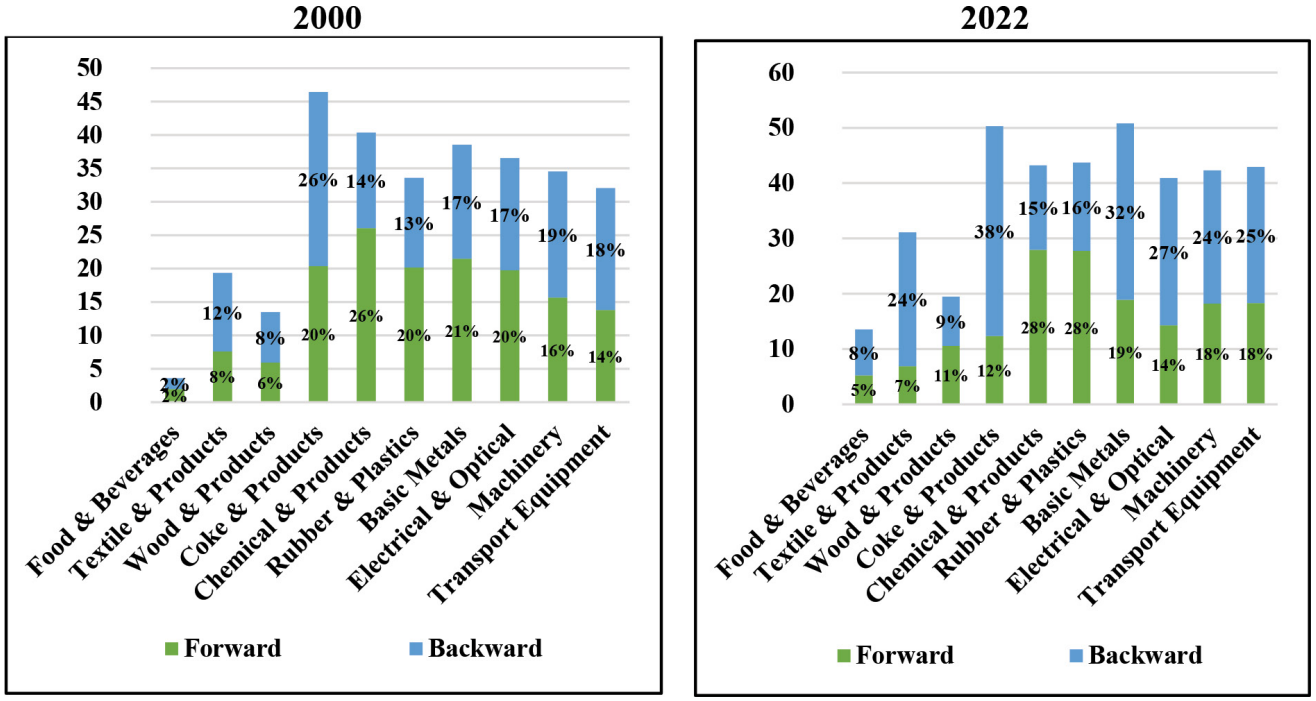
Figure 7 compares the GVC participation of SASEC countries between 2000 and 2022. A country's sectoral growth and competitive edge are influenced by the stages at which it engages in value addition (Gereffi & Fernandez-Stark, 2011). Integration into globally fragmented production networks enables emerging economies to join existing supply chains instead of creating new ones from scratch (Baldwin, 2011; Escaith & Inomata, 2013). GVCs are instrumental in boosting the competitiveness of current exports, fostering industrial and economic growth, and serving as a channel for acquiring technological knowledge and expertise.

[9] https://sasec.asia/uploads/publications/sasec-vision.pdf

Participation in GVCs includes two key dimensions: forward participation and backward participation (Koopman *et al.*, 2014). The GVC participation index measures both the extent to which foreign inputs are used in a country's exports (backward participation) and the use of domestic intermediates in exports to other countries (forward participation) (Timmer *et al.*, 2012; De Backer & Miroudot, 2013; UNCTAD, 2013b). In 2022, there's been a notable increase in GVC involvement across all main sectors, as illustrated in Figure 7. However, sectors like wood and wood products, chemical products, rubber, and plastics exhibit a greater emphasis on forward participation compared to backward participation. Conversely, sectors such as textiles, machinery, transportation equipment, coke, and petroleum products, basic metals, and electrical and optical equipment show a stronger reliance on backward participation than forward participation. The SASEC region demonstrates strength in resource-based sectors such as chemicals and refined petroleum, while its participation in industries like food and beverages, textiles, electronics, and automotive is characterised by a more backward-driven approach. The segmentation of GVCs and an increased division of labour allow more countries to participate in international trade by focusing on specific areas of the supply chain where they have a comparative advantage, thereby enhancing their competitiveness (Cattaneo *et al.*, 2013). Baldwin (2011) refers to this trend as globalisation's "*second unbundling*," emphasising the disintegration of production processes across borders.

With this background, two key observations emerge. Firstly, the growing significance of SASEC countries is underscored by their collective pursuit of project-based partnerships aimed at fostering robust growth and regional integration. This approach is increasingly vital in reinforcing the economic interconnectivity and collective progress within the region. Secondly, India's substantial economic influence within the SASEC grouping is pivotal. India cannot only enhance intra-regional connectivity but also bridge these nations with the global economy more effectively. This strategic integration acquires added importance in the current context, where the focus on supply chain resilience is intensifying. This resilience is characterised by a concerted effort to diversify both in terms of introducing new products and exploring fresh markets, further underscoring the significance of these collaborative efforts.

Therefore, to act as the regional coordinating mechanism for promoting regional value/supply chain development, this paper ascertains the sectors



Source: WITS

Figure 7. GVC integration of key sectors in SASEC countries (per cent).

Table 3. **Industry codes.**

S. No	Industry	ISIC Rev 4 Code
1	Food products, beverages and tobacco	10, 11, 12
2	Textiles, textile products, leather and footwear	13, 14, 15
3	Wood and products of wood and cork	16
4	Coke and refined petroleum products	19
5	Pharmaceuticals, medicinal chemical and botanical products	21
6	Rubber and plastics products	22
7	Basic metals	24
8	Computer, electronic and optical equipment	26
9	Machinery and equipment, nec	28
10	Motor vehicles, trailers and semi-trailers	29

with existing and potential for trade expansion and diversification through value chain linkages from India's perspective.

4. Materials and Methods

4.1 Definition of Variables and Data Sources

With the said stated objective, we consider 10 sectors belonging to different technological intensities[10]. Table 3 enlists these sectors, along with their ISIC codes. The identification of these sectors pertains to the focus of traditional and emerging sectors in the region.

The question raised is to analyse and determine India's trade with SASEC countries to build on the GVC participation. Therefore, the variables selected for the time period 1995-2020 are presented in Table 4.

4.2 Econometric Modelling and Results

The time period taken is from 1995 to 2020 and for 10 sectors, therefore with both cross-sectional and time-

Table 4. **Description of variables.**

Variable	Description	Source	Expected Signs
Dependent variable	India's Gross Exports sector-wise to SASEC Countries (GE)	WITS-UNcomtrade	
Explanatory variables			
1	Ratio of India's export of intermediate goods to final goods (IG_FG)	TIVA (Trade in Value Added) OECD Database	(+)
2	India's Intensive Margin going to SASEC (IM)	WITS-UNcomtrade	(+)
3	India's Extensive Margin going to SASEC (EM)	WITS-UNcomtrade	(+)
4	India's Foreign Value Addition (Backward Linkages) (BL) as a proportion of gross exports	TIVA (Trade in Value Added) OECD Database	(+)
5	India's Indirect Value Addition (Forward Linkages) (FL) as a proportion of gross exports	TIVA (Trade in Value Added) OECD Database	(+)
6	Availability of Skilled labour (India specific) 1. For Low-tech Sectors and for all-Sectors= Industrial Sales/No. of Employees 2. For High-tech Sectors (HTS)= Industrial Sales/No. of Employees * R and D Expenditure/Industrial Sales= R and D Expenditure/ No. of Employees= (Availability of Skilled Labour (HTS))	CMIE Industry Outlook	(+)
7	Weighted tariffs	WITS TRAINS	(-)

[10] https://www.oecd-ilibrary.org/docserver/5jlv73sqqp8r-en.pdf?expires=1700987772&id=id&accname=guest&checksum=D551121340B73D6300C14A7C886551B4

series dimension, a panel data formation has been used (Gujarati, 2003; Baltagi, 1995). The model can be written as follows, based on the foregoing theoretical discussion:

$GE_{it} = \beta_0 + \beta_1 FL_{it} + \beta_2 EM_{it} + \beta_3 BL_{it} + \beta_4 Availability_of_Skilled_Labour_{it} + \beta_5 IG_FG_{it} + \beta_6 IM_{it} + \beta_7 TARIFFS_{it} + \varepsilon_{it}$

GE_{it} represents India's sector-wise exports to SASEC countries in year t. The estimated regression coefficients of GVC participation, trade margins, labour, and tariffs range from β_0 to β_7, and it is the error component of the regression equation ε_{it}, which includes sector-specific fixed effects and time-specific effects.

Table 5. Summary statistics of variables used in analysis.

Variables	Gross Export (GE)	Forward Linkages (FL)	Extensive Margin (EM)	Backward Linkage (BL)	Availability of skilled worker	IG/FG	Intensive Margin (IM)	Tariffs
Mean	615	0.48	0.015	0.2	53.19	1.62	0.05	15.4
Median	318	0.45	0.009	0.188	9.54	0.83	0.05	10
Maximum	3468	0.82	0.07	0.698	1783.8	7.12	0.19	90.7
Minimum	0.46	0.16	0	0.03	0	0.46	0	0
Std. Dev.	721	0.12	0.15	0.122	180	1.42	0.03	15.6
Skewness	-0.98	-0.20	-0.35	-0.43	0.92	0.75	-1.74	-1.12
Kurtosis	3.53	4.36	2.51	2.9	4	1.89	7.6	3.95
Sector-wise Mean values								
Food products, beverages and tobacco	838.48	0.77	0.02	0.06	377.40	0.60	0.06	24.04
Textiles, wearing apparel, leather and related products	1100.25	0.53	0.05	0.12	5.71	0.68	0.03	16.41
Wood and products of wood and cork	10.01	0.45	0.00	0.09	3.51	0.57	0.05	14.74
Coke and refined petroleum products	1127.14	0.37	0.03	0.46	70.20	2.99	0.04	7.36
Pharmaceuticals, medicinal chemicals and botanical products	1029.22	0.40	0.01	0.17	7.28	0.83	0.05	13.41
Rubber and plastic products	182.41	0.47	0.01	0.19	18.34	3.81	0.05	16.17
Basic metals	714.32	0.42	0.01	0.22	10.47	4.28	0.07	13.42
Computer, electronic and optical products	67.43	0.46	0.01	0.25	10.85	1.01	0.01	12.17
Machinery and equipment n.e.c.	545.07	0.46	0.01	0.22	16.00	0.82	0.08	13.94
Motor vehicles, trailers and semi-trailers	536.82	0.49	0.00	0.25	12.22	0.61	0.11	22.84

Table 5 presents the summary statistics focussing on average values for all the sectors and years. As can be seen, India's exports of coke and petroleum products, pharmaceutical products and textiles, wearing apparel, leather and related products have on average witnessed maximum export to SASEC countries. And India's intensive and extensive margins on average are the highest for motor vehicles and coke and petroleum products. Further, wearing apparel in India's forward linkage is the maximum for food products, beverages, tobacco, and textiles.

The summary statistics reveal that the variables are normally distributed with no significant deviations. However, a correlation matrix is necessary to understand their relationships and mutual impacts. Table 6 presents this matrix, highlighting that the correlations between GE (Gross Exports) and FL (Forward Linkages), and GE and tariffs are negative, while the relationships with other factors are positive. Literature suggests that tariffs generally have a negative correlation with GE, as expected. Interestingly, India's exports to SASEC countries show a negative association with forward linkages, implying a preference for final goods exports to these nations.

Export growth can occur at the intensive margin (increased sales of existing products in existing markets) or the extensive margin (expanding to new markets, introducing new products to existing or new markets). The extensive margin, reflecting product diversification as outlined by Hummels and Klenow (2005), shows a strong positive correlation with gross exports. Similarly, backward linkages, the intensive margin, and the ratio of Intermediate Goods (IG) to Final Goods (FG) are also positively associated with gross exports, emphasising the role of value-added processes and market expansion in driving export performance.

5. Results and Discussions

The panel data construction takes on the form of fixed effects after checking with the Hausman test (Appendix). The regression results are tabulated below (Table 7). Our findings show that backward linkage is positively and significantly correlated (at a 5 per cent level of significance) with gross exports. For all the cross-sectional units combined, this shows that India is doing less value-addition while exporting to SASEC countries. The trade margins both intensive and extensive explain that it is pertinent to further strengthen India's trade in existing sectors as well as to diversify in different products. An expected sign of tariff coefficient is witnessed. The availability of skilled labour which captures the skill required for the production sectors, a positive and significant correlation is seen. However, the ratio of intermediate to final goods represents the unbundling of the value chain. This being positively correlated with gross exports, exemplifies the nature of trade of India with SASEC countries and the need to increase regional integration.

The point of comparison between high and low technology sectors is the relationship between the ratio of intermediate goods and final goods with the gross exports. For high-tech sectors, the relationship is negative whereas for low-tech it is positive with gross exports. The importance of final goods is more in comparison to intermediate goods in India's export of high-tech sectors to SASEC countries. And these products require less value addition. These sectors are mainly automobiles,

Table 6. Correlation matrix.

Variables	GE	BL	FL	EM	IM	Tariff	Availability of skilled labour	IG_FG
GE	1	0.3	-0.28	0.68	0.2	-0.43	0.12	0.029
BL	0.3	1	-0.74	0.28	-0.016	-0.21	-0.05	0.54
FL	-0.28	-0.67	1	-0.09	0.32	0.23	0.23	-0.4
EM	0.68	0.28	-0.09	1	0.29	-0.14	0.73	0.16
IM	0.2	-0.016	0.32	0.29	1	0.2	0.39	-0.2
Tariff	-0.43	-0.21	0.23	-0.14	0.2	1	0.01	-0.13
Availability of skilled labour	0.12	-0.05	0.23	0.73	0.39	0.01	1	-0.1
IG_FG	0.029	0.54	-0.4	0.16	-0.2	-0.13	-0.1	1

Table 7. Fixed effects panel data regression results.

Variables	All Sectors	High-Tech sectors	Low-Tech sectors
BL	0.564*** (0.00) [0.069]	0.648*** (0.00) [0.148]	0.56*** (0.00) [0.08]
FL	-1.14*** (0.00) [0.15]	-1.27*** (0.00) [0.24]	-1.12*** (0.00) [0.18]
IM	1.14*** (0.00) [0.02]	1.18*** (0.00) [0.08]	1.11*** (0.00) [0.02]
EM	1.28*** (0.00) [0.04]	1.26*** (0.00) [0.06]	1.34*** (0.00) [0.06]
Tariffs	-0.015 (0.11) [0.00]	-0.02** (0.04) [0.01]	-0.00 (0.57) [0.01]
Availability of Skilled Labour (HTS)		-0.052* (0.06) [0.02]	
Availability of Skilled Labour	0.06** (0.01) [0.02]		0.08*** (0.00) [0.03]
IG/FG	0.268** (0.048) [0.13]	-0.266 (0.18) [0.19]	0.268 (0.14) [0.17]
C	6.5 (0.00) [0.15]	6.7 (0.00) [0.32]	6.3 (0.00) [0.18]
Adj R squared	0.98	0.98	0.99
F-statistic	0	0	0
Obs	229	92	137

Note: The table indicates coefficients, p values in () and standard errors in [ ]. ***, **, * indicate 1 per cent, 5 per cent and 10 per cent level of significance

pharmaceuticals, basic metals and machinery. However, for low-tech sectors, the export of intermediate goods is important and even the value-added requirement of these sectors is higher. These sectors are mainly textiles, food products, coke and petroleum products, rubber products and wood and wood products.

SASEC countries fare well in backward GVC participation in the textiles sector owing to dependence on intermediate imports for domestic manufacturing. As regards to forward GVC is concerned, India has production of textile intermediates which get exported globally. Bangladesh and Sri Lanka are majorly into finished apparels manufacturing and their export of value-added intermediates is limited indicating lower forward GVC participation of these countries. Rest of the countries are import dependent and have limited manufacturing. India is a major supplier of raw materials and intermediate goods such as raw cotton fibres, manmade fibres and cotton yarn and fabrics to the other SASEC nations with over 93 per cent of the raw materials and 84.5 per cent of the intermediate goods traded within the region going out of India. SASEC countries like Bangladesh, Nepal and Sri Lanka import both raw as well as intermediate goods from India to support their forward linkage industries in manufacturing of cotton and synthetic fibre-based products. Bangladesh is a global hub of Ready-Made Garments (RMG) manufacturing (Babar & Bilal, 2012; Ahmed *et al.*, 2015; Arora & Siddiqui, 2022), and they contribute about 41 per cent to the trade of finished goods in the region comprising of knitted and woven garments. India contributes to 46 per cent of the trade of finished goods in the region indicating its strength across the textile value chain from sourcing of raw materials to processing of the yarn and fabric and manufacturing of the final good.

The GVC participation in the food processing industry within SASEC countries is low. The reason being that the region is primarily into production of primary food products and exports of primary products rather than value addition through secondary or tertiary processing While Nepal, Sri Lanka and India show some extent of forward GVC participation, the other countries do not. To understand the demand globally and the capability of SASEC countries to face global competition is the need of the hour. Shrimp is the product which has the highest exports from SASEC and shrimps from SASEC cater to 29 per cent of the global imports of Shrimps. The export destinations are the developed economies in USA, EU and ASEAN countries.

India dominates global frozen shrimp exports with a 23 per cent share, followed by Ecuador at 22 per cent and Vietnam at 11 per cent. Within the SASEC region, countries like India, Bangladesh, Myanmar, and Sri Lanka are key players in shrimp production, primarily for export purposes. Domestic consumption of shrimps in SASEC remains relatively low, as evidenced by the significantly higher volume of shrimp exports to non-SASEC markets compared to intra-regional trade. Currently, SASEC accounts for USD 4 billion of the global frozen shrimp export market, which totals USD 16 billion, leaving

substantial room for growth. By fostering regional integration and collaboration in secondary processing — such as cleaning, packaging, and value addition — SASEC countries can enhance their competitiveness and potentially capture a larger share of the global market, driving the region to new heights in frozen shrimp exports.

SASEC region has lower GVC participation in auto sector and the industry is primarily backward driven as exports from the region have higher share of intermediate imports rather than domestically produced intermediates. However, India is an exception as the auto sector in the country has reached a stage of maturity due to presence of established original equipment manufacturers (OEMs) like Maruti, Tata Motors, Mahindra, TVS, *etc*. and their suppliers who have not only been able to meet the huge domestic demand but also have been able to set up manufacturing footprints across the world. India's GVC participation is driven by both backward (19.2 per cent) and forward linkages (13.6 per cent). Other SASEC economies have limited auto manufacturing and exports and this is indicative of their lower forward GVC participation values.

Among SASEC countries, only India and Bangladesh are engaged in trade in intermediate goods for electrical and optical equipment with Vietnam (taken as an example among Southeast Asian countries). In addition, even for India and Bangladesh, the share of intermediary goods trade is far lower in South East Asia, in comparison with their performance globally. Further, analysis of the extent of backward and forward linkages of India and Bangladesh with Vietnam in this sector reveals that, SASEC economies are more engaged in backward GVC participation with South East Asia in comparison to forward GVC participation. This implies that SASEC economies are dependent on imports from Southeast Asian economies for further manufacturing and exporting electronic products.

6. Conclusion and Policy Implications

Over the past decade, there has been a noticeable increase in India's export of intermediate goods and the reliance of SASEC countries on final goods, particularly in terms of consumer products, as evidenced by trade data. Econometric analysis reveals that India's exports to these countries are linked to backward linkages. In the low-tech sector, the significance of intermediate goods underscores the presence of intra-industry trade. India's role in sectoral value chains with SASEC countries indicates a trend of exporting more final products which corroborates to less value-addition. Also, India's exports are hindered by high tariffs. For GVCs to foster specialisation, spread technology, and boost productivity and income growth, reducing tariffs is crucial. The type and framework of protection in international markets are key in shaping the potential for diversifying exports. Enhancing the variety and quality of imported inputs can aid in improving the quality and productivity of current sectors and facilitate the development of new product varieties. Input producers should consider expanding the applications of their products (diversification towards new uses) to tap into new markets and lessen the impact of shocks specific to certain products (OECD, WTO 2019).

India should expand its economic benefits regionally by increasing outward foreign direct investment in countries like Bangladesh and Sri Lanka, alongside implementing initiatives such as a Make in South Asia Programme and bilateral FTAs. Adopting outward-oriented development strategies, employing intelligent business tactics, and fostering close collaboration between businesses and governments are crucial for the region's advancement. Asia has been a key driver of global trade, with sub-regional trade among China, Korea, and Japan, as well as interregional trade between Southeast Asia and East Asia (ASEAN+3 regional supply chains), playing significant roles, alongside trade with the rest of the world. India can facilitate the development of regional supply chains within South Asia, potentially linking with Southeast Asia and beyond, through infrastructure development and trade facilitation along economic corridors, a component of the SASEC project.

In terms of trade composition within SASEC, the bulk of intra-regional trade revolves around intermediate manufacturing goods, while trade levels in consumption and capital goods remain relatively low. Research indicates that achieving rapid trade integration necessitates a multifaceted approach, recognising that no single reform can achieve this goal in isolation. The primary focus should be on deepening integration into GVCs while simultaneously implementing complementary structural reforms aimed at enhancing productivity and bolstering exports. This strategic combination aims to kickstart a positive cycle, where productivity growth and strong

export performance mutually reinforce each other. Therefore, the interaction of trade liberalisation, regional integration, and supportive policies is deemed crucial to unlocking the potential for sustained economic growth through increased productivity and enhanced export capabilities. SASEC, through a project-based programme, aims to complement GVC integration by establishing multimodal cross-border transport networks that enhance intra-regional trade and create trade opportunities with East and Southeast Asia.

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8. Appendix

Table A1. Hausman test.

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.41	7	0.613