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

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The objective of this paper is to examine how India can utilize its unique strengths and competitive advantages to enhance its involvement in the regional value chains of SASEC nations. It entails analyzing 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, analyzed 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: SASEC Countries, Global Value Chains, Diversification, Trade Liberalization, Trade Margins.

JEL Codes: 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 liberalization has been beneficial for the region, although it's not as advanced as in other parts of Asia (Mishra and Kumar, 2008). Domestic

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producers are shielded by high tariffs and non-tariff barriers, limiting their motivation to innovate or explore new export markets abroad (OECD, 2015; Jain and 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 2017–19 (Salgado and 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.

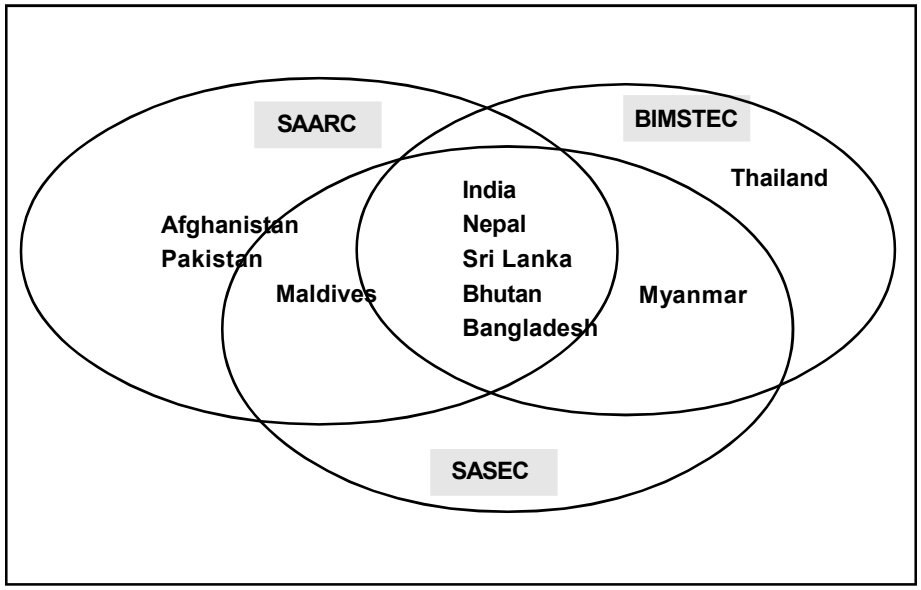
Despite the manifold advantages associated with increased participation in global value chains (GVCs), such as improved productivity and diversified exports (De Backer and Miroudot, 2013; OECD, 2015), successful examples of regional value chains within South Asia remain limited. However, amidst trade 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. 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"[3] (Wignaraja, 2023; Mikic, Nag, and Stephenson, 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 and 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 (OECD, 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 explored through various groupings. The inception of the South Asian Association for Regional Cooperation (SAARC), comprising eight countries — Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka — to foster regional cooperation in South Asia, initially sparked suspicion and mistrust among member countries. SAARC's failure to foster cooperation in the region led to the search for an alternative. BIMSTEC, a grouping of nations in the Bay of Bengal region, emerged as a favoured viable option. However, two decades since its establishment, BIMSTEC's successes have been limited. BIMSTEC provides India with an opportunity to continue regional cooperation in the absence of SAARC and serves as a bridge between SAARC and ASEAN. It was natural for India and others to gravitate towards BIMSTEC, which includes five South Asian countries and two ASEAN members, except Maldives, Afghanistan, and Pakistan (as depicted in Figure 1). The organization serves as a connection between South Asia and Southeast Asia, making it a suitable platform to test regional cooperation in the South Asian region. A significant milestone for BIMSTEC was the establishment of a permanent secretariat in Dhaka. However, the secretariat faces significant challenges in terms of funding and staffing, which has impacted its performance negatively. Additionally, the lack of leadership within BIMSTEC has led to increased interest from India in the grouping.

FIGURE 1

REPRESENTATION OF DIFFERENT GROUPINGS



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 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 liberalization, 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 to 10.6 per cent for South Asia and by 0.1 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].

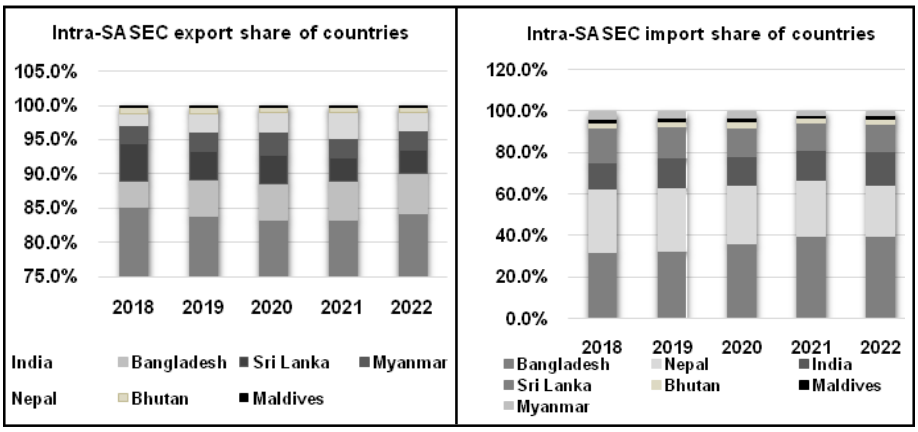
The objective of the paper is therefore to examine how India can utilize its strengths and competitive advantage to enhance its involvement in the regional value chains of SASEC countries. This includes identifying crucial sectors that can boost India's engagement with these countries through increased trade, emphasizing value addition and the technological sophistication of manufacturing industries. Additionally, the paper aims to analyze 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 background on India's trade with SASEC countries through descriptive statistics. Section 3 elucidates the methodology applied. Section 4 provides the results and findings and finally, Section 5 presents the conclusion and policy implications.

2. Background

The intra-SASEC trade amounts to US$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 is 2.2 per cent and its share in world imports is 3.4 per cent. The average exports within SASEC for the period 2018-2022 are US$29.5 billion. The annual growth in export value during 2018-2022 for the world is 7 per cent, but for SASEC countries it is 37 per cent. Intra-SASEC exports increased from US$26.8 billion in 2018 to US$36.8 billion in 2022. In terms of intra-SASEC exports and imports in 2022, India contributed 84.3 per cent & 16.4 per cent, Bangladesh 6 per cent & 39.8 per cent, Sri Lanka 3.2 per cent & 13.1 per cent, Myanmar 3 per cent & 1.7 per cent, Nepal 2.6 per cent & 24.5 per cent, Bhutan 1 per cent & 2.9 per cent, Maldives 0.03 per cent & 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-SASEC 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 & Steel, HS-84 Nuclear reactors, HS-87 Vehicles, HS-07 Edible vegetables, HS-85 Electrical machinery, HS-39 Plastics and HS-30 Pharmaceuticals).

FIGURE 2

INTRA-SASEC TRADE DURING 2018-2022 (%)

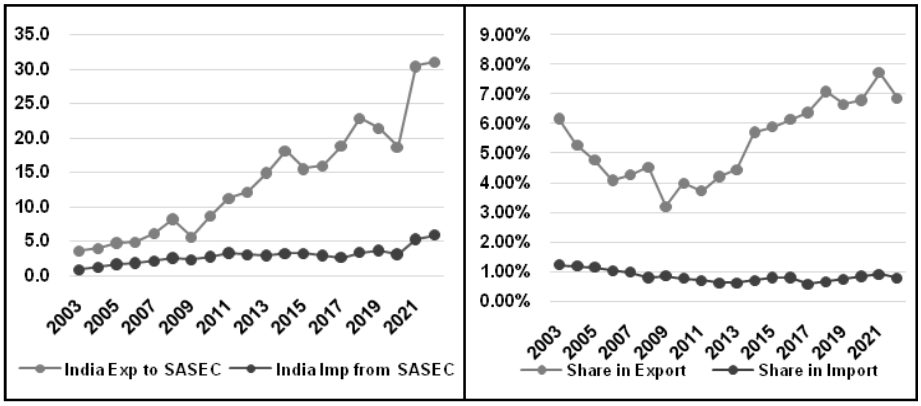


Source: ITC TradeMap.

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

FIGURE 3

INDIA'S TRADE WITH SASEC COUNTRIES (US$ BILLION) AND SHARE (%)



Source: ITC TradeMap.

India's top 10 exports to SASEC countries for the period 2013-2017 (Table 1) on average shows that for 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 country's 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 is a little different (Table 2). The top 10 India's exports to SASEC have excluded aircraft, and spacecraft (HS 88), but has included sugar & confectionary (HS 17). The SASEC country's 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 reduced from the world. Although, India has increased its exports to SASEC countries, but 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 & meslin, maize, electrical energy, raw cane sugar, parts and accessories of motorcycles, etc. For consumption goods, the exports have been rice, medicines, motorcycles, vaccines,

TABLE 1

INDIA'S TOP 10 EXPORTS TO SASEC COUNTRIES (AVERAGE EXPORT VALUE DURING 2013-2017 IN US$ BILLION)

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

Source: ITC TradeMap.

TABLE 2

INDIA'S TOP 10 EXPORTS TO SASEC COUNTRIES (AVERAGE EXPORT VALUE DURING 2018-2022 IN US$ BILLION)

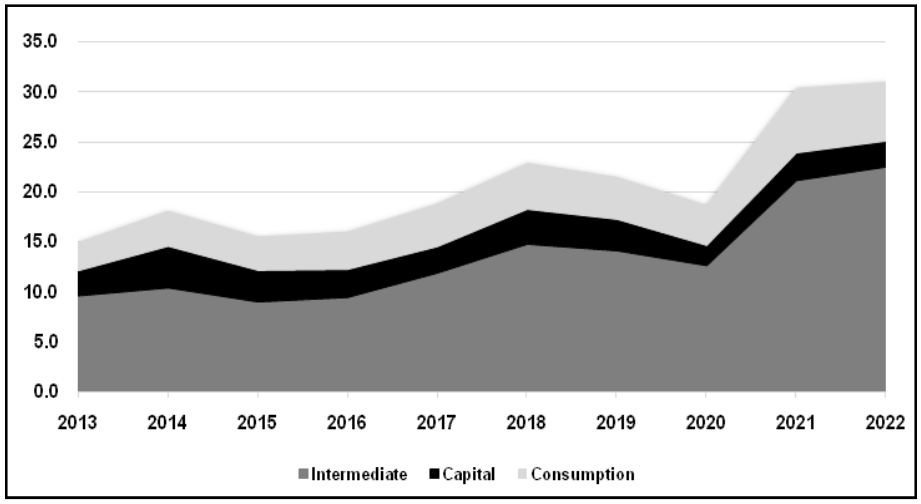
HS Code	Description	India's export to SASEC	SASEC import from world	India's export to World	Share of India's export to SASEC (%)	SASEC import dependence on India (%)
27	Mineral fuels, mineral oils and products of their distillation	4.51	194.98	55.15	8	2
52	Cotton	2.75	9.61	7.38	37	29
87	Vehicles other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

Source: ITC TradeMap.

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

FIGURE 4

INDIA'S EXPORT OF TYPE OF GOODS TO SASEC COUNTRIES (US$ BILLION)



Source: WITS Comtrade.

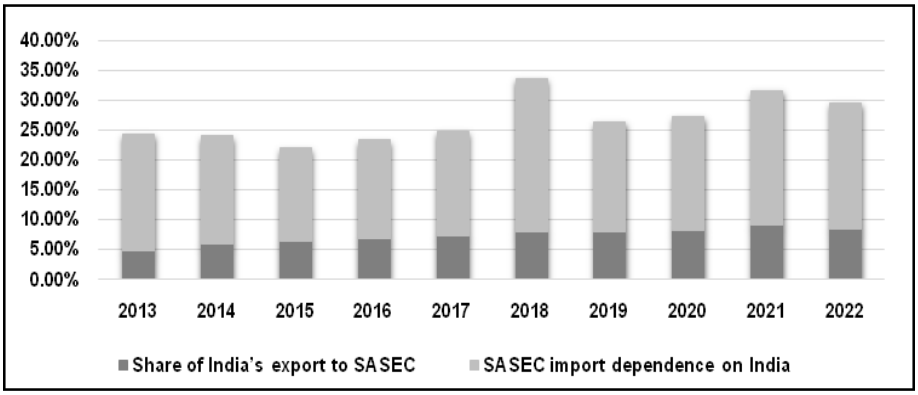
Further, the export trend of type of goods has been paired with a share of India's export to SASEC countries in India's total export to the world and SASEC countries import dependence on India which is the share of SASEC country's import from India in their total import from the world. As can be seen from Figures 5 & 6, the share of India's exports to SASEC country's has been maximum 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, for the share of import dependence of SASEC countries on India, it has been maximum 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 global value chains.

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

FIGURE 5

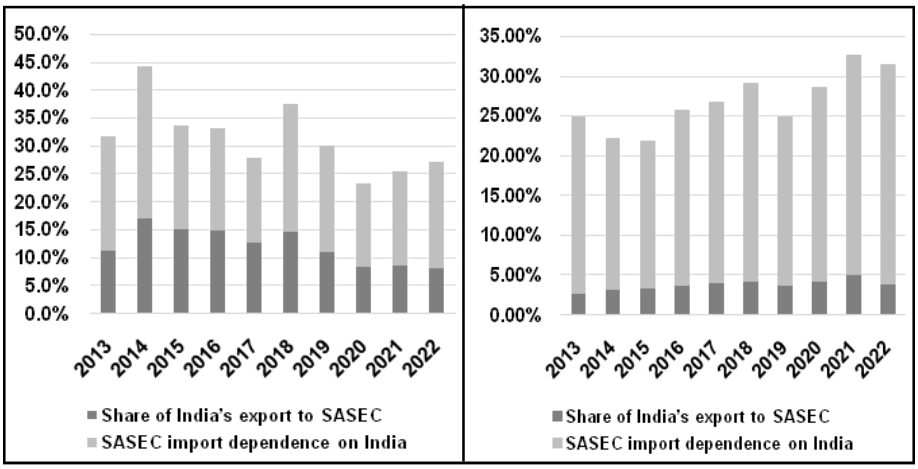
INDIA'S EXPORT OF INTERMEDIATE GOODS TO SASEC COUNTRIES



Source: WITS Comtrade.

FIGURE 6

INDIA'S EXPORT OF CAPITAL AND CONSUMPTION GOODS TO SASEC COUNTRIES



Source: WITS Comtrade.

It's been noted that companies establish foreign production and distribution units to capitalize on various benefits such as tariff relief, access to affordable inputs, lower labour costs, and reduced logistics expenses (Ferdows, 1997). In an increasingly globalized landscape, businesses have the chance to pursue dynamic product specialization, enabling them to build international reputations and tap into larger markets for goods, factors, and finance (Veerecke, 2007). Additionally, companies involved in value chains have witnessed enhancements in technical efficiency through gradual technology transfers (Pisano & Shih, 2009), (Bell & Albu, 1999; Lema, 2015; Morrison *et al.*, 2008; Pietrobelli & Rabellotti, 2011; Saliola & Zanfei, 2009). The globalization of supply

chains has reduced costs for companies to experiment with various inputs and finishing processes (Serieux, 2012). Countries now import significant quantities of intermediate goods to broaden the supply of inputs for exported items (Hummels, Ishii & Yi, 2001). Furthermore, participating in foreign production processes often leads to the adoption of new and improved technologies, enhancing front-end customer services (Pine & Davis, 1999). As customers from diverse cultural backgrounds provide feedback, supply chains are adjusted in terms of sequencing and timing to better meet their needs.

Utilizing 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 capitalize 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 underutilized. Enhanced access to trade gateways and improved connectivity to global markets could stimulate better resource utilization, 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.

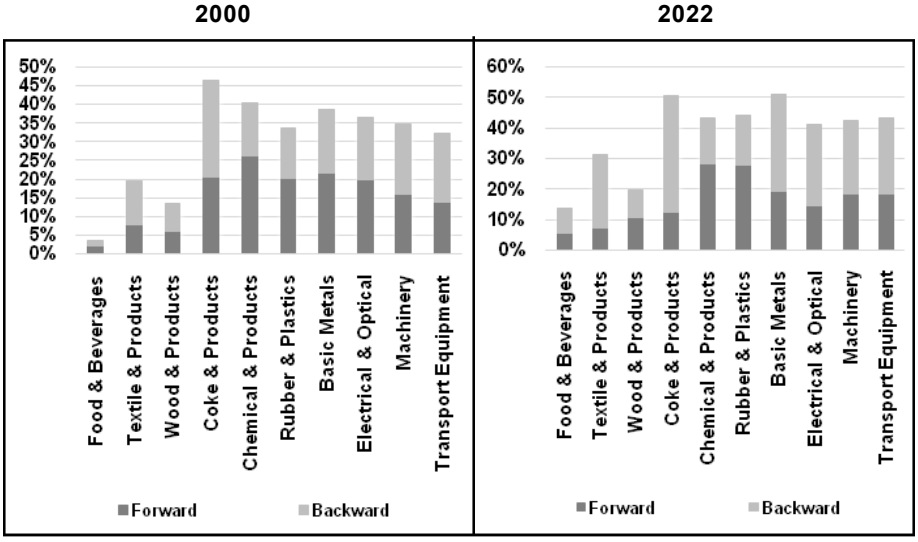
Moreover, the participation of the sub-region in regional value chains is currently limited. For instance, Southeast Asian economies derive over 30 per cent of their intermediate inputs from within the region, whereas South Asia has a significantly lower ratio, around 7 per cent (OECD, 2015). Strengthening 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 presents a comparison of GVC participation by the SASEC countries for the years 2000 and 2022. The expansion of a country's sector and its dominance over competitors are determined by the stage at which it performs and adds value (Gereffi & Fernandez-Stark, 2011). Integration into internationally fragmented production allows emerging countries, particularly, to join existing supply chains rather than establish new ones (Baldwin, 2011; Escaith & Inomata, 2013). GVCs play a pivotal role in enhancing the competitiveness of existing exports, leading to industrial and economic development in a country, while also serving as a conduit for technological knowledge and capabilities. GVC participation encompasses both forward participation and backward participation (Koopman, Wang, & Wei, 2014). The GVC participation index reflects the utilization of foreign inputs in exports (backward participation) and the utilization of domestic intermediates in exports to third countries (forward participation) (Timmer *et al.*, 2012; OECD, 2013; de Backer and 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 & 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, petroleum products, basic metals, and electrical & optical equipment show a stronger reliance on backward participation than forward participation. The SASEC region excels in resource-based sectors like chemicals and refined petroleum but adopts a more backward-

FIGURE 7

GVC INTEGRATION OF KEY SECTORS IN SASEC COUNTRIES



Source: WITS.

driven approach in food & beverages, textiles, electronics, and automotive industries. A more segmented GVC and increased division of labour enable more countries to engage in global trade and enhance competitiveness by specializing in specific parts of the supply chain where they excel (Cattaneo *et al*., 2013). Baldwin (2011) identifies this phenomenon as globalization's second unbundling.

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 can not 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 characterized 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 with existing potential for trade expansion and diversification through value chain linkages from India's perspective.

3. Methodology Application

3.1 Definition of Variables and Data Sources

With the above-stated objective, we consider 10 sectors belonging to different technological intensities[10]. The identification of these sectors pertains to the focus of traditional and emerging sectors in the region.

TABLE 3

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 chemicals 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, n.e.c.	28
10.	Motor vehicles, trailers and semi-trailers	29

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

TABLE 4

Variable	Description	Source Signs	Expected
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&D Expenditure/Industrial Sales= R&D Expenditure/ No. of Employees= (Availability of Skilled Labour (HTS))	CMIE Industry Outlook	(+)
7.	Weighted Tariffs	WITS TRAINS	(-)

3.2 Econometric Modelling and Results

The period taken is from 1995 to 2020 and for 10 sectors, therefore with both cross-sectional and time-series dimensions, a panel data formation has been used (Gujarati, 2003; Baltagi, 1995). The model can be written as follows, based on the foregoing theoretical discussion:

$$GE_{it} = \beta_0 + \beta_1 FL_{it} + \beta_2 EM_{it} + \beta_3 BL_{it} + \beta_4 Availability\_of\_Skilled\_Labour_{it} + \beta_5 IG\_FG_{it} + \beta_6 IM_{it} + \beta_7 TARIFFS_{it} + \varepsilon_{it} \quad \text{... (Eq 1)}$$

GE_{it} represents India's sector-wise exports to SASEC countries in year t. The estimated regression coefficients of GVC participation, trade margins as well as 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 presents the summary statistics focussing on average values for all the sectors and years. As can be seen, India's exports of coke & petroleum products, pharmaceutical products and textiles, wearing apparel, leather and related products have on average witnessed maximum export to SASEC countries. And it is for the motor vehicles and coke & petroleum products that India's intensive and extensive margins on average are the highest. Further, for food products, beverages & tobacco and textiles, wearing apparel India's forward linkage is the maximum.

The summary statistics indicate that the variables are normally distributed and there is no major deviation among the variables. However, to check for the linkage and impact of the variables on each other, a correlation matrix is required. Table 6 presents the correlation matrix. As can be seen, the correlation between GE & FL, GE & tariff is negative, but with other factors, the relationship is positive. From the literature it is expected that the relationship between tariffs and GE will be negative, however, India's exports to SASEC countries are negatively associated with forward linkages. This leads to the assumption that more final goods exports are suited to these countries. The export growth can take place at the intensive margin (selling existing products to existing markets) or at the extensive margin (selling existing products to new markets, new products to new markets, and new products to existing markets). The extensive margin which captures the diversification of products (Hummels & Klenow (2005), is highly positively correlated with gross exports. Similarly, backward linkage, intensive margin and the ratio of intermediate goods (IG) to final goods (FG) are positively correlated with gross exports.

4 Results and Findings

The panel data construction takes on the form of fixed effects after checking with the Hausman test. The results show that backward linkage is positively and significantly correlated (at a 5% 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 to further strengthen India's trade in existing sectors and well as to diversify in different products. An expected sign of tariff coefficient is witnessed. The availability of skilled labour which captures the

TABLE 5

SUMMARY STATISTICS

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 chemical and botanical products	1029.22	0.40	0.01	0.17	7.28	0.83	0.05	13.41
Rubber and plastics 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 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

skill for the production of the 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 (Table 7).

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, 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 as GVC is concerned, India has production of textile intermediates that get exported globally. Bangladesh and Sri Lanka are majorly into finished apparel manufacturing and their export of value-added intermediate is limited indicating lower forward GVC participation of these countries. The 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

TABLE 7

FIXED EFFECTS PANEL DATA

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 & 10 per cent level of significance.

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 the manufacturing of cotton and synthetic fibre-based products. Bangladesh is a

global hub of Ready-Made Garments (RMG) manufacturing (Barbar & Bilal, 2012; Ahmed *et al*., 2015; Arora & Siddiqui, 2022), and they contribute 41 per cent to the trade of finished goods in the region comprising 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 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 is that the region is primarily into the 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. Understanding the demand globally and the capability of SASEC countries to face global competition is the need of the hour. Shrimps are the product which has the highest exports from SASEC and shrimps from SASEC cater to 29 per cent of the global imports of Shrimp. The export destinations are the developed economies in the USA, EU and ASEAN countries.

India leads global exports of frozen shrimp by 23 per cent followed by Ecuador at 22 per cent and Vietnam at 11 per cent. Within SASEC, India, Bangladesh, Myanmar and Sri Lanka export-oriented shrimp production. The consumption of shrimp within SASEC is limited as evidenced by the shrimp exports to SASEC countries versus to other markets. SASEC can capture more share of the total export market which stands at US$16 billion out of which SASEC is catering to US$4 billion right now. Regional integration of resources in secondary processing will enable the region to reach new heights in frozen shrimp exports.

SASEC region has lower GVC participation in the auto sector and the industry is primarily backward-driven as exports from the region have a higher share of intermediate imports rather than domestically produced intermediates. However, India is the exception as the auto sector in the country has reached a stage of maturity due to the presence of established OEMs the likes of Maruti, Tata Motors, Mahindra, TVS, etc. and their suppliers which 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%) and forward linkages (13.6%). 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 SEA, 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.

5 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 with less value-addition. Also, India's exports are hindered by high tariffs. For GVCs to foster specialization, 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, recognizing 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 liberalization, 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.

Abbreviations

- SASEC : South Asia Sub-regional Economic Cooperation.
- GVC : Global Value Chains.
- EMDE : Emerging Market and Developing Economy.
- SAARC : South Asian Association of Regional Cooperation.
- BIMSTEC : Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation.
- ASEAN : Association of Southeast Asian Nations.

Conflict of Interest

The author declares that they have no conflict of interest.

NOTES

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APPENDIX

Hausman Test

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