GLOBAL PRODUCTION NETWORKS AND ECONOMIC CORRIDORS: CAN THEY BE DRIVERS FOR SOUTH ASIA'S GROWTH AND REGIONAL INTEGRATION?

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ABSTRACT

Global production networks are a phenomenon of great significance in world trade and production, especially in Asia. While East Asia and Southeast Asia have rapidly established themselves as major players in global production network trade, South Asia has lagged behind. This paper examines the role of economic corridors in facilitating the access of South Asian countries to global production networks, in particular those based in East Asia and Southeast Asia. It does so by first reviewing the state of regional trade integration in South Asia. It then examines the nature of engagement of South Asia, and in particular, India, with the dynamic and high growth global production networks based in East and Southeast Asia, with a focus on disaggregated export data in the key network trade categories for India. Finally, the paper discusses the role of regional and national economic corridors that could potentially link South Asia to the rest of Asia, and identifies the key determinants of greater integration of South Asia with the global production networks based in East and Southeast Asia.

Key-words: Global Production Networks, Trade Integration, Economic Corridors, South Asia, India.

JEL Codes: R11, O53, P45

1. INTRODUCTION

1. South Asia is a more open region now than it was twenty years back. Almost all countries in South Asia have undergone significant trade reforms in the past two decades and are rapidly integrating with the rest of the world. However, much of the increase in South Asia's trade flows has been with Europe and North America, with trade linkages both within the region and with the rest of Asia still remaining at a relatively low level (though increasing in recent years). In particular, South Asia has so far not able to fit into the global production networks[1] in electronics and electrical goods, which are the most dynamic and growth oriented components of international trade (Athukorala and Yamashita 2006, Athukorala and Hill 2012). While there has been phenomenal increase in the engagement of East Asia and Southeast Asian countries in global production networks in the past few decades, this has not occurred for South Asian countries. Clearly, the fact that South Asian countries have not able to take advantage of the more dynamic components of manufacturing exports and have been left out the high growth production networks of 'Factory Asia' is a matter of significant policy concern. What can be done about increasing the engagement of South Asia in global production networks that are based in East and Southeast Asia? Can economic corridors that link South Asia to the rest of Asia be the way forward to facilitating greater regional integration? If so, what are the challenges and policy impediments? This paper addresses these questions, with a specific focus on India.

2. We first review the progress with regional integration in South Asia, and ask why South Asia has not been able to integrate better both with itself and with the rest of Asia. We discuss the role of global production networks in regional integration and suggest that South Asia's lack of access to these networks may have been the major constraint to its ability to integrate more with other parts of Asia. We examine in particular India's exports to key East Asian and Southeast Asian countries that are engaged in global production network trade, and take stock of what India has achieved to date. We then discuss the trade potential of national and regional economic corridors, and discuss how these corridors may boost regional trade between South Asia on one hand and Southeast and East Asia on the other. Finally, we identify the key factors that constrain the engagement of South Asian countries with East and Southeast Asia in global production network trade.

2. TRENDS IN INTRAREGIONAL TRADE IN ASIA

3. A remarkable feature of trade flows in the global economy in the past two decades has been the increasing flow goods and services between countries of the South. Between 1994 and 2008, the share of exports from low-income countries going to low- and middle-income markets rose from 24% in 1994 to 42% in 2008 (Table 1). The share of exports going from middle-income going from middle-income countries to low- and middle-income countries rose from 33% to 46% in the same period. The increase in trade shares for low- and middle-income countries greatly exceeded the increase in their relative economic size – between 1994 and 2008, the share of low- and middle-income countries in global GDP went up from 22 to 29%. Thus, in the past two decades, the rate of integration with the international economy for low and middle income countries was significantly higher than their rate of economic growth.

[1] We use global production network trade and network trade interchangeably.

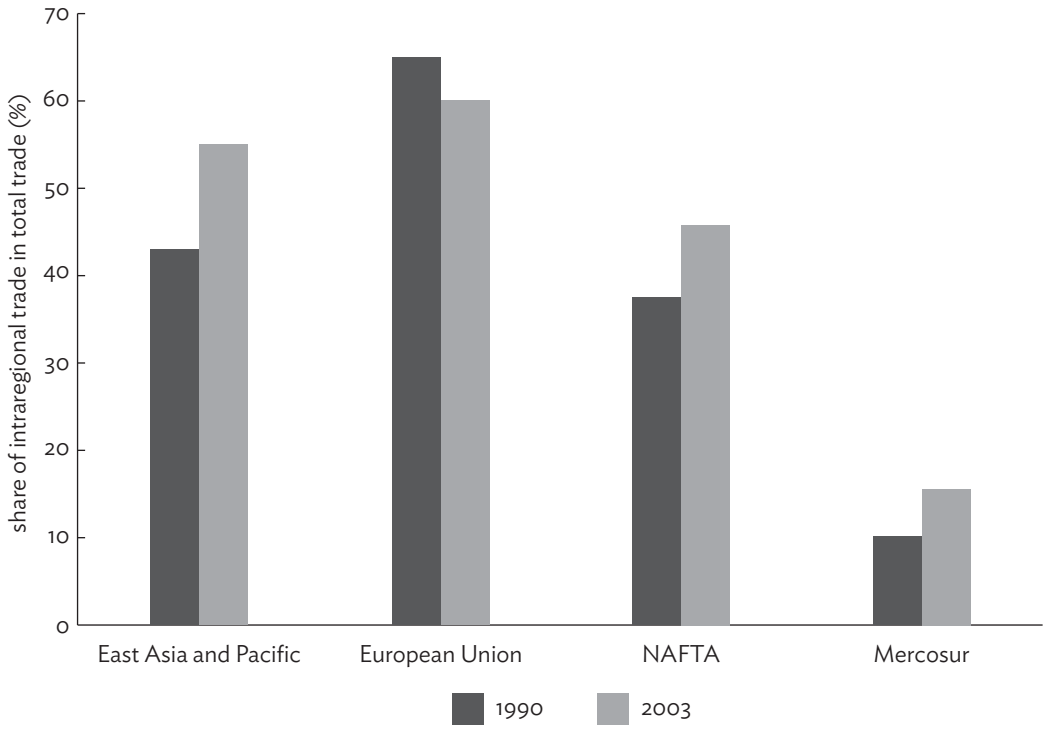
4. Much of the increase in trade flows in the South, and especially the increase in South-South trade was due to a rapidly integrating Asia (Gill and Kharas 2003). This in turn was due to the remarkable increase in intraregional trade in East Asia. This is clear from Figure 1, which shows that intraregional trade in East Asia and the Pacific increasing from 42% in 1990 to 54% in 2003. However, while countries in East Asia have become increasingly integrated with each other and the rest of the world, intraregional integration within Asia has lagged behind. Regional integration has been uneven in Asia, with the most intraregional trade occurring between in East and Southeast Asia. In contrast, the level of trade flows between South Asia and the rest of Asia remains low.

Table 1: Trade Flows between Regions of the World by Income Group

Exports and Imports Relative to GDP by Regional Trading Partner							
		Exports to partner relative to regional GDP			Imports from partner relative to regional GDP		
Region	Trade partner	1994 (%)	2008 (%)	Percentage point change	1994 (%)	2008 (%)	Percentage point change
Low-income countries	Low-income countries	0.8	3.2	2.4	0.8	3.2	2.4
	Middle-income countries	4.5	11.6	7.1	6.0	17.1	11.1
	People's Republic of China, India	1.1	8.3	7.2	1.8	10.7	8.9
	High-income countries	20.0	31.8	11.8	15.1	23.0	7.9
	World	26.3	55.0	28.6	23.7	54.0	30.4
Mid-income countries	Low-income countries	0.7	2.1	1.4	0.5	1.4	0.9
	Middle-income countries	5.3	15.6	10.3	5.3	15.6	10.3
	People's Republic of China, India	2.2	7.5	5.3	2.4	7.4	5.0
	High-income countries	16.9	29.6	12.7	18.6	26.0	7.4
	World	25.1	54.8	29.8	26.8	50.4	23.6
People's Republic of China and India	Low-income countries	0.8	2.7	1.9	0.5	2.1	1.6
	Middle-income countries	9.5	15.2	5.7	8.6	15.4	6.8
	People's Republic of China, India	0.1	1.2	1.1	0.1	1.2	1.1
	High-income countries	14.3	25.3	11.0	9.8	14.1	4.3
	World	24.8	44.4	19.6	19.0	32.7	13.7
High-income countries	Low-income countries	0.3	0.7	0.4	0.5	1.0	0.5
	Middle-income countries	3.7	6.6	2.9	3.4	7.5	4.1
	People's Republic of China, India	0.5	1.7	1.2	0.7	3.1	2.4
	High-income countries	12.8	16.9	4.1	12.8	16.9	4.1
	World	17.4	26.0	8.6	17.4	28.6	11.2

Source: Hanson (2012)

Figure 1: Intraregional Trade by Major Regions of the World



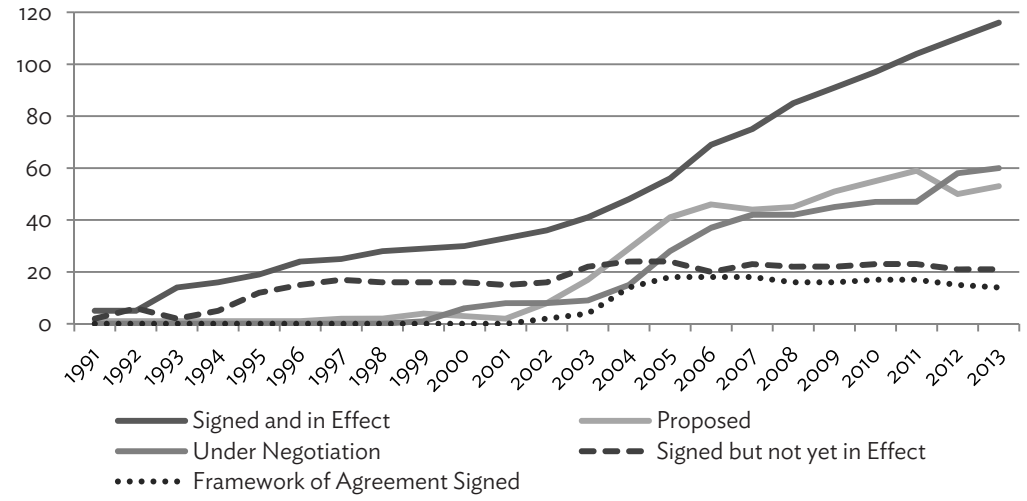
Note: NAFTA = North American Free Trade Agreement. Mercosur = Southern Cone Common Market in South America.

Source: Gill and Kharas (2007)

5. A major impetus to regional integration in East and Southeast Asia has been the increasing involvement of countries in these two regions in regional FTAs. While Asia has been a relative latecomer to free trade agreements, over the past decade or so, the number of FTAs has increased dramatically in the region. The number of FTAs involving at least one Asian country has more than tripled from 70 in 2002 to 257 as of January 2013 (Figure 1). The proliferation of FTAs in Asia has been referred to as the 'Asian noodle bowl'.

6. The surge in FTAs has been driven by a significant increase in the number of FTAs that have been proposed or under negotiation. In 2013, around 42% of FTAs were signed and in effect, and another 19% proposed. Another 29% were under negotiation while 9% were signed but not yet in effect. Much of the increase in FTAs in Asia involved the ASEAN+6 countries – the 10 ASEAN members plus Australia, PRC, India, Japan, the Republic of Korea and New Zealand, with these countries accounting for 70% of total FTAs. About 75% of FTAs were bilateral FTAs, and most involved partner countries outside Asia.

Figure 2: FTAs in Asia, 1991-2013



Source: Asia Regional Integration Centre (ARIC)

7. South Asian countries were also involved substantially in FTAs, with India leading the group with 34 FTAs in various stages of completion (Table 2). Pakistan followed with 27 FTAs. In constrast, Bangladesh was involved in 6 FTAs and Sri Lanka in 8. In all, 87 FTAs were various stages of completion in 2013 involving at least one South Asian country. Examples of FTAs involving more than one South Asian country are Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), notified to the WTO in 2004, and the South Asia Free Trade Area (SAFTA), notified to the WTO in 2008.

Table 2: Regional Trade Agreements in South Asia, 2013

Country	Proposed	Framework Agreement Signed	Negotiations Launched	Signed but not yet in effect	Signed and in effect	Total
Afghanistan	1	1	0	1	2	5
Bangladesh	0	2	1	1	2	6
India	7	4	10	0	13	34
Maldives	0	1	1	0	1	3
Nepal	1	1	0	0	2	4
Pakistan	11	4	3	3	6	27
Sri Lanka	2	1	0	1	4	8
Total	22	14	15	6	30	87

Source: ARIC

2.1 South Asia's Trade Integration with the Rest of Asia

8. In theory, the involvement of South Asian countries in a large number of FTAs, involving other Asian countries should have led to greater trade flows within South Asia, and from South Asia to the rest of Asia. In practice, while the second has happened, the first has not. While there is evidence of increasing trade flows between South Asia and other countries in developing Asia, the level of trade flows within South Asia has not increased substantially in recent years. For example, the share of exports and imports going from South Asia to other countries in Asia in South Asia's total trade has increased from 5.3% in 1990 to 16.6 in 2012. In contrast, the share of South Asia's total trade to itself has remained the same at around 4% in the 2000s, after going up marginally from 2.7% in 1990.

9. This is also clear from Table 4, which provides measures of intra- and inter-regional trade intensity for South Asia, along with East Asia and Southeast Asia for 1990, 2000 and 2012. South Asia's index of intraregional trade intensity shows an increase from 1990 to 2000 and then shows a decline from 2000 to 2012. Even though South Asia's measure of intraregional trade intensity is higher than that of East Asia in 2012, its measure is lower than that of Southeast Asia. Inter-regional trade intensity measures show a similar picture, with East Asia's trade intensity with South Asia, being less than 1, and declining over 1990-2012. Similarly, Southeast Asia's trade intensity index with South Asia also shows a decline over the same period. Overall, we see a negative trend for South Asian regional integration, both with respect to trade within the region, and also with other regions of Asia. In the next section, we focus on the role of global production networks in explaining South Asia's low level of integration with the rest of Asia. In this section, we conclude by speculating on what the low levels of trade integration in South Asia imply for economic welfare in the region?

Table 3: Direction of Trade, South Asia (% of exports and imports)

	1990	2000	2012
South Asia	2.7	4.4	4.2
Developing Asia, excluding South Asia	5.3	8.5	16.6
European Union	29.9	21.9	13.7
United States	12.8	13.9	7.8
Rest of the World	49.3	51.3	57.7

Source: IMF Direction of Trade Statistics, our calculations.

Table 4: Intra and Inter-Regional Trade Intensity, Asia

Region	1990	2000	2012
Intraregional Trade Intensity Index			
East Asia	1.61	1.76	1.6
Southeast Asia	4.34	3.44	3.7
South Asia	3.9	4.67	2.31
Trade Intensity Index			
East Asia with Southeast Asia	2.34	1.90	1.73
East Asia with Southesia	1.02	0.98	0.82
Southeast Asia with East Asia	2.27	1.88	1.71
Southeast Asia with South Asia	1.87	1.79	1.44
South Asia with East Asia	0.96	0.82	0.80
South Asia with Southeast Asia	1.66	1.34	1.43

Source: ARIC.
Notes: Intraregional trade intensity index is the ratio of intraregional trade share to the share of world trade with the region, calculated using exports data. An index of more than one indicates that trade flow within the region is larger than expected given the importance of the region in world trade.
Trade intensity index is the ratio of trade share of a country/region to the share of world trade with a partner. An index of more than one indicates that trade flow between countries/regions is larger than expected given their importance in world trade.

2.2 Greater Regional Integration – What are the Potential Benefits for South Asia?

10. Well-crafted trade blocs can raise efficiency and welfare in its member countries by expanding consumer choice and by increasing the competition that members face (Schiff, Barreira and Winters (2003), Ahmed et al. (2010)). The reduction of trade barriers that occurs through the creation of a trade bloc provides access to efficient producers in one country to the markets of other countries. But trade blocs can also end up adding, rather than reducing, distortions to trade and efficiency.

11. In the classical theory of international trade, gains from trade occur as countries specialise according to their comparative advantage, and free trade allows consumers and firms to purchase from the cheapest source of supply (Bhagwati and Panagariya 1996). In the classical model, trade barriers discriminate against foreign suppliers in favour of domestic firms. Domestic import competing firms can expand their supply, even though their production costs are higher than foreign firms. The expansion of the production of import-competing firms under trade protection leads to a re-allocation of resources from more efficient exporters to less efficient import-competing firms. This leads to reduction in real income. In this scenario, the creation of a regional FTA which lowers trade barriers within the FTA should unanimously increase economic welfare, and regional integration should be a powerful driver of economic growth and welfare (Srinivasan and Canonero 1995)

12. The gains from trade that accrue under free trade would hold in particular if there is a reduction in trade barriers across the board. However, in the FTA, it is not clear whether there would necessarily be gains from trade and increases in economic welfare. If more efficient partner country

firms displace inefficient domestic firms, trade creation will result and economic welfare will increase. If on the other hand, partner country firms displace more efficient non-partner country firms via the creation of a FTA, trade diversion will occur and economic welfare will decrease. Therefore, the welfare effects of a FTA on bloc members as a group would depend on the balance between trade creation and trade diversion. Real resources are saved if inefficient production is cut through trade creation but are lost if but are lost if imports are switched from low cost to high cost partner sources through trade diversion (Schiff, Barreira and Winters 2003).

13. What would be the possible welfare gains for countries in South Asia if they were deepen their integration with other countries in the region and the rest of Asia? A set of studies have used gravity models to predict trade flows between countries in South Asia with the tariff reductions that accompany the creation of trade blocs (e.g. CUTS (1996), Hassan (2001), Coulibaly (2004), Asian Development Bank (2008a), Bayson et al. (2006)). These studies find that in general, the increase in trade flows for individual countries in South Asia, would not be appreciable, with the exception of India. However, as Raihan (2012) points out, the use of gravity models cannot provide an adequate understanding of the welfare gains of increasing regional integration, as trade flow increases can also be due to trade diversion, and therefore, can be welfare reducing. Computable general equilibrium modelling provides a stronger analytical basis for calculating the welfare gains of regional integrating. Previous studies that have used CGE models to calculate welfare changes in South Asia in response to unilateral and preferential trade liberalisation find that much of the welfare gains occur under unilateral trade liberalisation, and that welfare gains under preferential trade liberalisation is quite limited (Bandara and Yu 2003). Under preferential trade liberalisation such as the creation of a South Asia FTA, the smaller South Asian countries will lose in terms of welfare, with India be the sole significant winner.

14. The finding that greater trade integration within South Asia may not lead to significant welfare gains suggest that most trade flows under preferential trade liberalisation would be mostly trade diverting, rather than trade creating. This is in great part due to the similar resource endowments among countries in South Asia, with labour intensive commodities dominating the export basket of countries in the region. In contrast, there is greater potential for welfare gains if South Asia was to trade at a higher level than is the case currently with East and Southeast Asia. This is for two reasons – firstly, the factor endowments for Southeast Asia and East Asia would not be similar to that of South Asia, with both Southeast and East Asia having a greater share of capital intensive commodities in their export baskets than South Asia. Secondly, a large part of the trade structure of Southeast and East Asian countries comprise of products that are characterised by large scale economies (Gill and Kharas 2007).

15. If greater integration with East and Southeast Asia has the potential for delivering larger welfare gains for South Asian countries, the question then is: what constraints greater inter-regional trade between South Asia on one hand and Southeast and East Asia on the other? In the next section, we look at the role of global production networks in fostering inter-regional trade in Asia, and discuss South Asia's relative lack of success in accessing these networks as being a key constraint to greater trade integration of South Asia with the rest of Asia.

3. GLOBAL PRODUCTION NETWORKS AND SOUTH ASIA

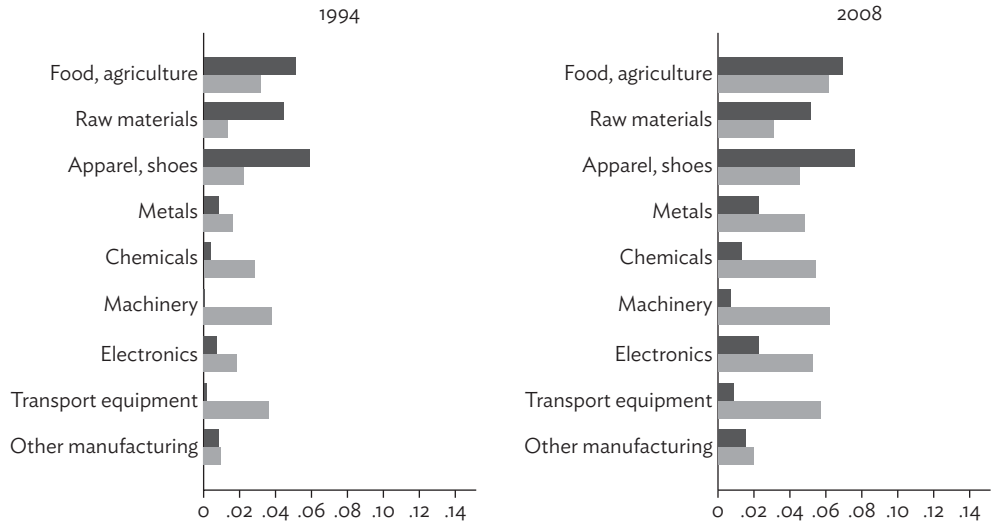
16. Perhaps the most distinctive feature of international trade in recent years is the rise of multistage global production networks in which firms fragment manufacturing production across borders by locating individual production stages in the countries where they can be performed at least cost (Jones 2000, Helpman 2011). Thus, "firms seem to be subcontracting an ever expanding set of activities from production design to assembly, from research and development to marketing, distribution and after-sales service" (Grossman and Helpman 2005, p. 135). Multinationals are at the forefront of global production networks. In a typical example of how production is organised across economies, Mattel who produce Barbie Dolls procure raw material (plastics and hair) from Taipei,China and Japan, conducts assembly in Indonesia and Malaysia, buys the moulds in the US, the doll clothing in the People's Republic of China and paints used in decorating the dolls in the US. The Intel Corporation produces seminconductors by first manufacturing silicon wafers in the US, Ireland and Israel, and then assembling integrated circuits made out of these wafers in plants in the People's Republic of China, Costa Rica, Malaysia and the Philippines. Dell subcontracts the production of parts and components to suppliers in many countries and has these parts shipped to final destination markets, where they are assembled into computers for final consumers. Intrafirm trade along tightly organised supplier chains therefore lead to trade betweenn countries as well.

17. In the case of Asia, production networks are vertically integrated and operate by separating a production chain into small steps and then assigning them each to the most cost location (ADB 2010). The rise of global production networks has been made possible by the rapid increase in information and communication technology, and more open markets. As ADB (2010, p. 62), notes: "Such fragmented production has proved a particularly beneficial strategy in Asia, thanks to the large range of development levels across the region, its strong intraregional and international links, and its adeptness at transferring and absorbing new production technologies. By enabling economies to specialize in narrower niches, production networks allow them to enter international markets with a more limited range of skills than previously. They thus facilitate the participation of outward-oriented least developed countries in the regional and global economy."

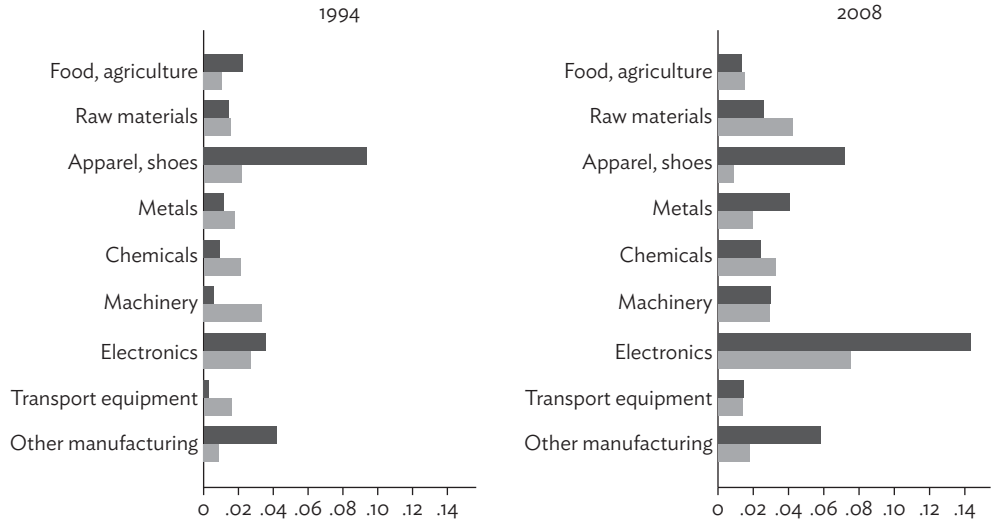
18. The rising importance of global production networks in world trade has also meant that patterns of trade has shifted quite dramatically in the past two decades, especially from low and middle income countries. As Figure 3 makes clear, while traditional commodities such as food and apparel remain important for low income countries, there has been a significant increase in the importance of electronics, especially for the People's Republic of China/India. This is also evident for middle income countries.

Figure 3: Trade Shares by GDP, by Income Group

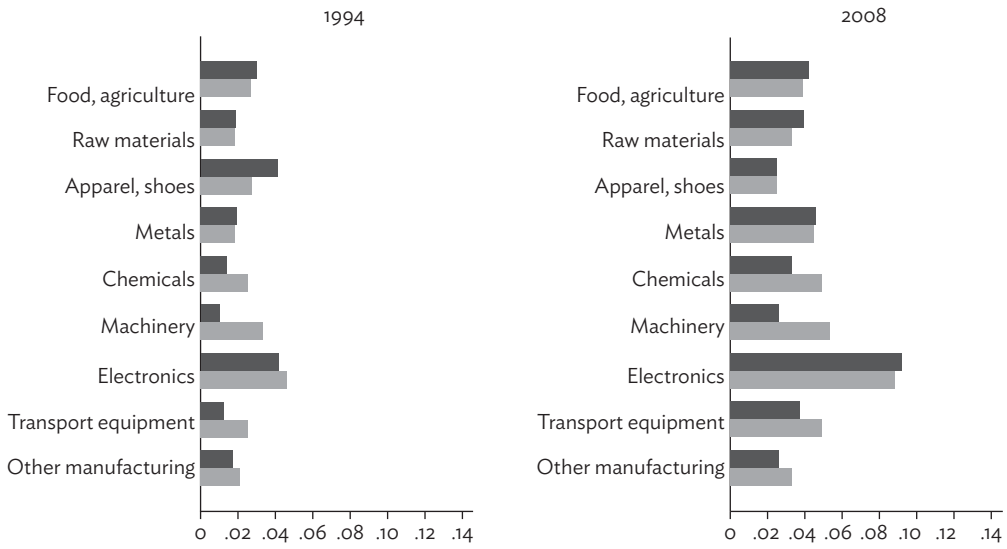
A. Low-income countries



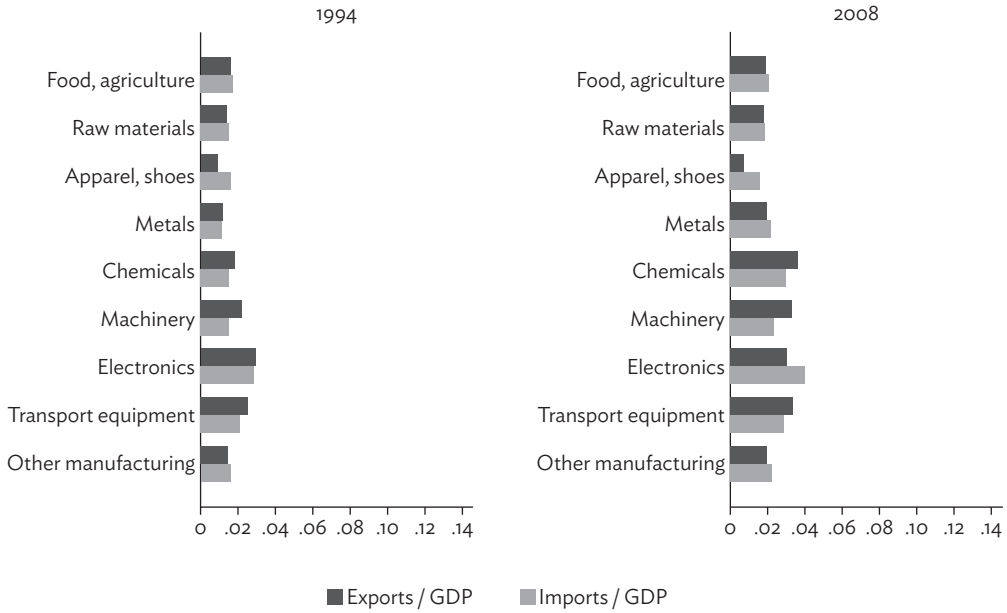
B. PRC and India



C. Middle-income countries



D. High-income countries



PRC = People's Republic of China.

Source: Hanson (2012)

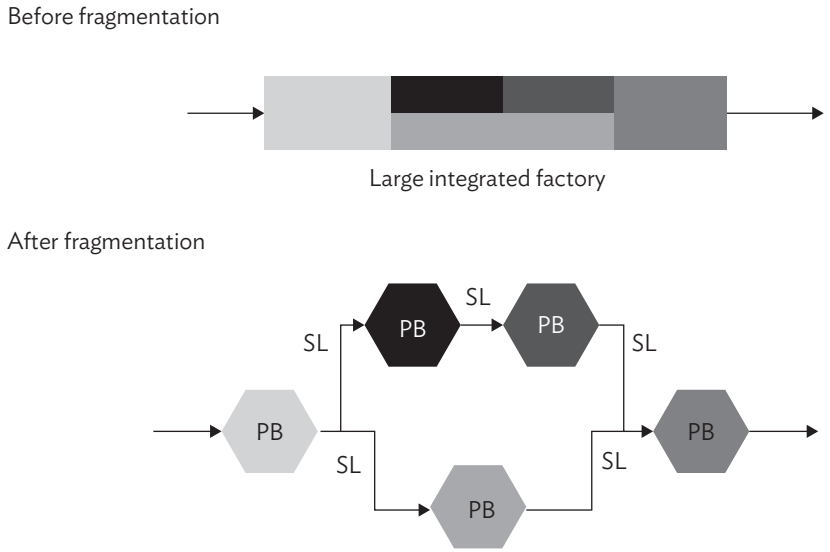
3.1 What explains the rise of global production networks?

19. The expansion of global production sharing has been driven by three mutually reinforcing developments (Helpman 2010). As Athukorala (2013) notes:

20. "First, rapid advancements in production technology have enabled the industry to slice up the value chain into finer, 'portable', components. As an outcome of advances in modular production (fixed-position automation) technology, some fragments of the production process in certain industries have become 'standard fragments' which can be effectively used in a number of products. Second, technological innovations in communication and transportation have shrunk the distance that once separated the world's nations, and improved speed, efficiency and economy of coordinating geographically dispersed production process. This has facilitated establishing 'service links' needed to combine various fragments of the production process across countries in a timely and cost efficient manner. There is an important two-way link between improvement in communication technology and the expansion of production sharing (fragmentation-based specialisation) within global industries. The latter results in lowering cost of production and rapid market penetration of the final products through enhanced price competitiveness. Scale economies resulting from market expansion in turn encourage new technological efforts, enabling further fragmentation of production processes. Third, liberalisation policy reforms across the world over the past four decades have considerably removed barriers to trade and foreign direct investment (FDI)".

21. The importance of information and communications technology in making it possible for large integrated production units to be split into smaller parts is evident from Figure 4, when large integrated factory is split into smaller units, and the production across the chain is coordinated by the means of service links which depend on high quality information and communication technology.

Figure 4: The Fragmentation of a Supply Chain



PB = production blocks, SL = services links.
South Asia in Global Production Networks

22. What has been South Asia's contribution to trade flows that occur through global production networks? We follow Athukorala (2013) in providing a summary of the main trends in trade occurring through global production networks (GPN). Table 5 presents data on world trade based on global production sharing (network trade) and East Asia's relative position in this new international exchange. World network trade increased from US$ 1,207 billion (about 23.8% of total manufacturing exports) in 1992-93 to US$ 4,850 billion (45.7%) in 2006-08, accounting for nearly two thirds of the total increment in world manufacturing exports during this period. This increase was due to a clear shift in global production sharing away from mature industrial economies toward developing countries and in particular toward East Asia. The share of East Asia in total network exports increased from 51.8% in 1992–93 to 60.7% in 2007–08. Much of this increase occurred in developing East Asia, and the major driving force was the People's Republic of China, where the share of total network products in total manufacturing trade increased sharply from 21.1 per in 1992093 to 52.1% in 2006–07.

23. There has also been a sharp increase in the share of parts and components in network trade across all countries in the region. In all countries except the PRC and Thailand components accounted for well over half of total network export (and imports) by 2007–08. In contrast to the growth in parts and component trade in East Asia, we see a stagnation in the share of trade in parts and component for South Asia. Total network trade as a share of total manufacturing trade increased from 5.1% in 1992–93 to 11.3% in 2007–08. Parts and components as a share of total manufacturing trade increased from 2.3% in 1992–93 to 8.2% in 2007–08, but the share of parts and component trade in total manufacturing trade for South Asia was significantly below the NIE-4 as well as the ASEAN countries. This suggests that South Asia has missed out so far in network trade. The lack of participation of South Asia in global production networks provide an explanation of why South Asia's integration with the rest of Asia has remained at a low level.

24. We examine the performance of selected South Asian countries in GPN trade in Table 6. over the period 1990-2011 We see that the share of parts and components in total network trade for Bangladesh and Pakistan is almost insignificant at less than 2%, while for India and Sri Lanka, it is greater than 5%. There is some increase in the share of parts and components in total network trade for these two countries over the 1990s and 2000s. With respect to share of GPN products in total manufacturing exports, we find that among the four South Asian countries, Bangladesh has the lowest share at 1.7% in 2006–2011, and India has the largest share at 14.3% in the same period. In the case of India, we see a fairly large increase in share of network products in total manufacturing exports, which doubled over the period 1990–2011. Overall, we find that among the four South Asian countries, India has engaged the most in GPN trade, followed by Sri Lanka, then Pakistan, with Bangladesh's engagement being the least.

Table 5: Share of network products in manufacturing trade, 1992–93 and 2006–08 *(%)*

	Parts and components		Final assembly		Total network products	
	1992–93	2007–08	1992–93	2007–08	1992–93	2007–08
(a) Exports						
East Asia	20.2	34.3	31.6	26.4	51.8	60.7
Japan	23.9	34.3	44.5	32.3	68.4	66.6
Developing East Asia (DEA)	17.3	34.0	21.8	25.2	39.1	59.2
People's Republic of China (PRC)	7.4	25.5	13.7	26.6	21.1	52.1
Hong Kong, China	15.8	33.3	18.0	17.8	33.8	51.1
Taipei,China	24.7	44.2	17.6	21.5	42.3	65.7
Republic of Korea	18.1	44.2	22.2	25.4	40.3	69.5
ASEAN	22.7	44.2	34.1	22.0	56.8	66.2
Indonesia	3.8	21.5	5.6	16.8	9.3	38.4
Malaysia	27.7	53.6	40.7	25.1	68.4	78.8
The Philippines	32.9	71.7	20.5	15.6	53.4	87.3
Singapore	29.0	49.3	45.9	17.2	74.9	66.5
Thailand	14.1	29.9	29.0	33.0	43.1	62.9
Viet Nam	---	11.0	---	7.6	---	18.5
South Asia	2.3	8.2	2.9	3.1	5.1	11.3
India	3.0	10.4	3.4	3.8	6.4	14.2
North American Free Trade Area (NAFTA)	28.4	31.2	31.4	28.1	59.7	59.3
Mexico	42.1	34.6	30.8	42.1	72.9	76.6
European Union (EU) 15	18.3	22.4	22.4	21.1	40.7	43.5
Developed countries	20.4	25.2	28.5	23.6	48.9	48.8
Developing countries	14.6	29.2	21.8	24.3	36.4	53.6
World	19.3	27.1	26.3	23.8	45.5	50.9
(b) Imports						
East Asia	27.2	42.0	17.2	17.8	44.4	59.8
Japan	19.3	29.2	19.3	21.9	38.6	61.1
Developing East Asia	29.0	44.4	16.7	17.3	45.8	61.7
PRC	20.4	44.0	14.0	19.8	34.4	63.7
Hong Kong, China	24.1	48.5	16.5	13.5	40.6	62.1
Taipei,China	29.5	38.9	18.0	16.8	47.5	55.7
Republic of Korea	30.1	31.9	14.6	17.4	44.7	49.3
ASEAN	36.0	47.8	18.4	16.2	54.4	64.0
Indonesia	27.0	21.8	9.2	15.8	36.1	37.7
Malaysia	40.5	50.0	20.2	22.0	60.7	72.0
The Philippines	32.6	61.3	15.0	17.4	47.6	78.6
Singapore	39.9	60.4	21.9	17.3	61.8	77.7
Thailand	30.6	36.1	15.6	12.4	46.2	48.5
Viet Nam	---	19.1	---	9.7	---	28.8
South Asia	16.6	23.8	12.9	16.5	29.5	40.3
India	17.5	22.9	10.6	17.0	28.1	39.9
NAFTA	37.4	28.8	13.4	22.4	50.7	51.2
Mexico	29.4	36.1	14.2	19.0	43.7	55.1
EU15	21.2	23.2	4.7	10.6	25.9	33.8
Developed countries	22.6	23.4	25.2	25.5	47.8	48.9
Developing countries	11.9	33.6	28.6	19.9	40.4	53.4
World	19.6	27.3	26.2	23.3	45.7	50.7

Note: ... = data not available
Source: Athukorala (2013)

Table 6: Parts and Component Trade in Total Network Exports, and Share of Network Exports in Total Manufacturing Exports, Selected South Asian Countries

	Parts and Components as percentage of Total Network Exports			
Countries	1990–1995	1996–2000	2000–2005	2006–2011
Bangladesh	0.7	0.8	0.8	n.a.
India	6.8	7.6	8.8	10.9
Sri Lanka	3.0	5.6	6.5	5.3
Pakistan	1.0	1.1	1.3	1.7
	Share of Network Products in Total Manufacturing Exports (%)			
Bangladesh	0.4	0.7	1.1	1.7
India	6.8	7.0	8.5	14.3
Sri Lanka	3.3	5.7	6.8	7.2
Pakistan	2.3	2.2	2.8	3.5

Note: Network Products are:
a)Office machines and automatic data processing machines;
b) Telecommunication and sound recording equipment
c) Electrical machinery excluding semiconductors (776)
d) Semiconductors
e) Road vehicles
f) Other transport equipment
g) Professional and scientific equipment
h) Photographic apparatus and optical goods, watches and clocks

Source: compiled by the author from UN Comrade database using the commodity classification from Athukorala (2014b).

25. While there are many factors that may explain South Asia's lack of access to global production networks, one set of factors highlighted in the literature is the role of logistics and physical connectivity With the fall in traditional barriers to trade such as tariffs and non-tariff barriers, logistics and physical connectivity have become important determinants of trade flows in parts and components across countries. Production networks depend upon imports of intermediate goods and exports of finished goods, and speed of delivery as well as low transaction costs are of the essence in minimising the time taken for intermediate goods leaving their points of origin and arriving at the next point in the global value chain, or for finished goods to reach the consuming points in other countries (Hoda and Rai 2013). Regional production networks establish themselves in locations that offer the possibility of lower logistic costs (Brooks and Menon 2008). Clearly, one important determinant of lower logistical costs is the available of high quality physical connectivity between the countries involved in the production network (Hummels 2007). In the next section, we examine the role of economic corridors in facilitating the shipment of goods and services across countries which are involved in various stages of the production network. Later in this paper, we ask whether a stronger emphasis on the establishment of regional economic corridors in South Asia may provide the basis for the region's greater integration with the high growth economies of East and Southeast Asia, and South Asia's ability to gain access to the dynamic segments in manufacturing trade, namely parts and component trade. Before we examine the role of regional economic corridors in GPN trade, we look in greater detail in

India's engagement in GPN trade with East and Southeast Asia, as a way of identifying the possible GPN products where India has a greater potential in exporting to East and Southeast Asia.

4. INDIA'S NETWORK TRADE WITH EAST AND SOUTHEAST ASIA

26. As we observed in the previous section, the only South Asian country which has engaged in network trade in some measure is India. This is not surprising, as India has a diversified manufacturing base, with considerable expertise in human capital and technology intensive goods that comprise the bulk of GPN trade, as compared to the other South Asian countries whose comparative advantage mostly lie in labour intensive products such as wearing apparel. In this section, we look more closely at India's performance in network trade, especially in relation to East and Southeast Asia. We first look at India's exports in GPN products to the rest of the world over the period 1990-2011, disaggregating these exports into the key commodity categories that comprise GPN trade (Table 7). We find that in some commodities, parts and components comprise most of India's exports in these commodity groups – these are office machines and data processing machines, electrical machinery and semi-conductors. In contrast, in professional equipment and photographic goods, final assembly comprise most of India's exports. On the whole, parts and component are becoming increasingly important in India's GPN trade, across most GPN commodity groups. However, network products still remain relatively unimportant in India's total manufacturing exports, though their share in India's total manufacturing exports is increasing over time. The most important GPN commodity in India's export basket is road vehicles, followed by other transport equipment, followed by electrical machinery.

27. We now analyse India's export performance in GPN products for seven selected East and Southeast Asian countries which are part of the global production networks in the Asian region and have significant trade in network products – these are the People's Republic of China, the Republic of Korea, Japan, Malaysia, Singapore, Thailand, and Viet Nam. We compile India's exports in parts and components and in final assembly in the six major SITC 2 digit commodity groups which form the bulk of network trade – these are SITC 75 (Office machines and data processing machines), SITC 76 (Telecommunications equipment), SITC 77 (Electrical goods), SITC 78 (Road vehicles), SITC 87 (Professional and scientific equipment) and SITC 88 (Photographic apparatus. To disentangle parts and component from final assembly trade, we first compute total parts and component trade in each of the SITC 2 digit commodity groups by adding all exports by India to the country in question in parts and components in that commodity group using the detailed SITC 5 digit list of parts and components provided in Athukorala (2010) and reproduced in Appendix 1 of our paper. We can then obtain final assembly exports by India to each of the seven countries in our sample by subtracting total parts and components trade in each SITC 2 digit category from total exports in that category (see Athukorala 2010 for further justification of this approach). We start our analysis in 1990 (the year prior to India's major economic reforms) and end our analysis in 2012, when the most recent data is available.

28. We begin the partner country level analysis of India's GPN exports by looking at India's GPN exports to the People's Republic of China (Table 8). By and large, India's GPN exports to the People's Republic of China has been dominated by final assembly, except in the case of office machines and road vehicles, where parts and components dominate in total network exports. Disappointingly, the share of network products in India's exports to the People's Republic of China remain at a very low level, though there has been a slight increase from 2.1% to 3.4% from 1990 to 2012. This has been the case in spite of a remarkable increase in India's exports to the People's Republic of China from 18 million US dollars in 1990 to 14729 US million dollars in 2012.

29. We now look at India's network exports to Japan in 1990-2012 (Table 9). India's exports to Japan in network products has been mostly in final assembly in office machines, telecommunication equipment and professional and scientific equipment, and in parts and components in electrical goods, road vehicles, and to some extent in photographic apparatus. Electrical goods and road vehicles form the bulk of India's GPN exports to Japan, and there has been an increase in the share of these products in India's exports to Japan from 0.07% in 1990 to 3.75% in 2012.

30. Examining India's network exports to the Republic of Korea in 1990-2012 (Table 10), these have been mostly in final assembly in office machines and professional and scientific equipment, and in parts and components in electrical goods, road vehicles, and to some extent in telecommunication equipment and photographic apparatus. Only electrical goods is important in India's GPN exports to the Republic of Korea, and disappointingly, there has been very little change in GPN goods in India's exports to the Republic of Korea over time.

31. India's network exports to Malaysia in 1990-2012 (Table 11) have been mostly in final assembly in road vehicles, professional and scientific equipment, and photographic apparatus and in parts and components in electrical goods and telecommunication equipment and to some extent in office machines There has been a surprising decline in India's GPN exports to Malaysia from 21.3% as a share of total exports to 8.9% in 2012. Among network products, only telecommunication equipment, electrical goods and road vehicles have shares more than 1% of India's total exports to Malaysia.

32. Looking at India's network exports to Singapore (Table 12), parts and components and final assembly are equally important in office machines, telecommunication equipment, and electrical goods, with road vehicles being mostly final assembly, and professional and scientific equipment, and photographic apparatus being mostly parts and components. As in the case of Malaysia, India's network exports to Singapore has been declining over time. Road vehicles remain the most important network export from India to Singapore.

33. With respect to India's network exports to Thailand (Table 13), final assembly is more important in office machines, telecommunication equipment, professional and scientific equipment, and photographic apparatus with electrical goods and road vehicles being mostly parts and components. Interestingly, the share of network exports in India's total exports to Thailand has increased significantly from 2% in 1990 to 10.4% in 2012. This has been mostly due to a rise in exports of road vehicles in India's total exports to Thailand from 1.3% in 1990 to 7.9% in 2012.

34. Finally, turning to India's network exports to Viet Nam (Table 14), final assembly is more important in office machines, road vehicles, professional and scientific equipment, and photographic apparatus with electrical goods being mostly parts and components, and both parts and components and final assembly important for telecommunication equipment. There has very little change in the share of network exports in India's total exports to Viet Nam over the period 1990-2012.

35. In Table 15, we provide a summary of the relative importance of parts and components and final assembly in India's network exports to the seven Asian countries we have looked at. It is clear that there is no clear pattern emerging – for some countries, parts and components may be important and in some other countries, final assembly for the *same* network trade product. The caveat here in that in many of the network trade categories, India's exports to individual countries is very low, so we are essentially discerning patterns from low volumes of trade. Among the six network trade categories, road vehicles dominate in India's exports to the East Asian region, followed by electrical goods. India's

exports to the seven Asian countries in professional and scientific equipment, telecommunication equipment, photographic apparatus and office machines has been low to date.

36. In terms of India's engagement with individual Asian countries in GPN exports, the only countries where there has been a large increase in the share of network exports in India's total exports has been Thailand, with some increase evident in the share of network exports in total exports to Japan as well. There has been a decline in the share of network exports in India's total exports to Malaysia and Singapore, with no clear pattern emerging for the People's Republic of China and Viet Nam. Overall, the analysis in this section indicates the very limited engagement of India in GPN trade with the more dynamic East and Southeast Asian countries. Clearly, there is a need for a role for the Indian government in association with the private sector to facilitate India's greater entry in GPN trade with East and Southeast Asia. In the next section, we analyse the role of economic corridors in providing a mechanism for India's greater trade engagement with the rest of Asia, as well as discuss the policy constraints to such a greater engagement.

Table 7: India, Network Trade by Commodity Group, Total Manufacturing Exports to the World

Parts and Components as percentage of Total Exports in Each Commodity Group				
	1990–1995	1996–2000	2000–2005	2006–2011
Office machines and automatic data processing machines	77.7	88.6	89.7	87.3
Telecommunication and sound recording equipment	31.7	35.7	39.2	45.2
Electrical machinery excluding semiconductors (776)	90.8	84.2	77.4	78.5
Semiconductors	100.0	100.1	100.0	100.0
Road vehicles	51.6	56.9	50.6	34.6
Other transport equipment	46.0	33.8	29.6	25.0
Professional and scientific equipment	10.8	14.8	18.8	25.3
Photographic apparatus and optical goods, watches and clocks	12.4	9.3	13.1	15.3
Total Exports in Each Commodity Group as percentage of Total Manufacturing Exports				
Office machines and automatic data processing machines	0.7	0.7	0.8	0.5
Telecommunication and sound recording equipment	0.3	0.4	0.4	1.6
Electrical machinery excluding semiconductors (776)	1.4	1.8	2.4	3.1
Semiconductors	0.3	0.3	0.3	0.4
Road vehicles	3.4	2.8	3.2	4.7
Other transport equipment	0.2	0.3	0.6	3.2
Professional and scientific equipment	0.3	0.3	0.4	0.6
Photographic apparatus and optical goods, watches and clocks	0.2	0.3	0.3	0.2
Total	6.8	7.0	8.5	14.3

Source: compiled by the author from UN Comrade database using the commodity classification from Athukorala (2014b).

Table 8: India's Parts and Component, and Final Assembly Exports, to the People's Republic of China, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS	0.0	6.9	48.1	37.0	80.3
SITC 75 FINAL ASSEMBLY EXPORTS	100.0	93.1	51.9	63.0	19.7
SITC 76 P&C EXPORTS	0.0	22.6	81.6	54.8	13.2
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	77.4	18.4	45.2	86.8
SITC 77 P&C EXPORTS	100.0	95.5	68.7	59.9	56.2
SITC 77 FINAL ASSEMBLY EXPORTS	0.0	4.5	31.3	40.1	43.8
SITC 78 P&C EXPORTS	100.0	85.2	97.5	91.5	72.5
SITC 78 FINAL ASSEMBLY EXPORTS	0.0	14.8	2.5	8.5	27.5
SITC 87 P&C EXPORTS		0.0	16.5	12.5	27.8
SITC 87 FINAL ASSEMBLY EXPORTS		100.0	83.5	87.5	72.2
SITC 88 P&C EXPORTS	72.4	86.0	9.0	0.8	0.6
SITC 88 FINAL ASSEMBLY EXPORTS	27.6	14.0	91.0	99.2	99.4
AS SHARE OF INDIA'S TOTAL EXPORTS TO THE PEOPLE'S REPUBLIC OF CHINA *(%)*	1990	1995	2000	2005	2012
SITC 75 TOTAL EXPORTS	0.15	0.08	0.21	0.14	0.41
SITC 76 TOTAL EXPORTS	0.00	0.00	0.43	0.06	0.68
SITC 77 TOTAL EXPORTS	1.38	0.64	2.26	0.79	1.18
SITC 78 TOTAL EXPORTS	0.38	0.10	0.28	0.20	0.60
SITC 87 TOTAL EXPORTS	0.00	0.05	0.08	0.11	0.18
SITC 88 TOTAL EXPORTS	0.20	0.02	0.10	0.09	0.35
Total	2.11	0.89	3.35	1.38	3.40
TOTAL EXPORTS TO THE PEOPLE'S REPUBLIC OF CHINA (million)	17.9	33.2	734.8	718.3	14729.3

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 9: India's Parts and Component, and Final Assembly Exports, to Japan, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS	32.7	29.1	52.7	36.3	17.2
SITC 75 FINAL ASSEMBLY EXPORTS	67.3	70.9	47.3	63.7	82.8
SITC 76 P&C EXPORTS	0.0	42.5	72.7	55.0	12.0
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	57.5	27.3	45.0	88.0
SITC 77 P&C EXPORTS	76.5	62.0	75.1	64.0	75.4
SITC 77 FINAL ASSEMBLY EXPORTS	23.5	38.0	24.9	36.0	24.6
SITC 78 P&C EXPORTS	93.7	69.0	79.8	92.1	92.6
SITC 78 FINAL ASSEMBLY EXPORTS	6.3	31.0	20.2	7.9	7.4
SITC 87 P&C EXPORTS	40.0	24.0	14.5	5.9	15.4
SITC 87 FINAL ASSEMBLY EXPORTS	60.0	76.0	85.5	94.1	84.6
SITC 88 P&C EXPORTS	12.0	48.6	20.5	13.3	43.2
SITC 88 FINAL ASSEMBLY EXPORTS	88.0	51.4	79.5	86.7	56.8
AS SHARE OF INDIA'S TOTAL EXPORTS TO JAPAN (%)	1990	1995	2000	2005	2012
SITC 75	0.004	0.080	0.140	0.120	0.128
SITC 76	0.004	0.022	0.035	0.036	0.073
SITC 77	0.029	0.244	1.916	2.061	1.510
SITC 78	0.017	0.119	0.210	0.607	1.686
SITC 87	0.014	0.040	0.067	0.184	0.314
SITC 88	0.003	0.012	0.022	0.033	0.043
Total	0.070	0.517	2.390	3.042	3.754
TOTAL EXPORTS TO JAPAN (USD Million)	1674.8	2208.9	1827.7	2455.2	6415.6

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 10: India's Parts and Component, and Final Assembly Exports, to the Republic of Korea, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS	8.9	100.0	14.6	31.2	29.7
SITC 75 FINAL ASSEMBLY EXPORTS	91.1	0.0	85.4	68.8	70.3
SITC 76 P&C EXPORTS	0.0	5.5	89.6	89.9	55.6
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	94.5	10.4	10.1	44.4
SITC 77 P&C EXPORTS	100.0	98.5	94.7	90.5	64.2
SITC 77 FINAL ASSEMBLY EXPORTS	0.0	1.5	5.3	9.5	35.8
SITC 78 P&C EXPORTS	100.0	85.1	97.5	86.8	93.2
SITC 78 FINAL ASSEMBLY EXPORTS	0.0	14.9	2.5	13.2	6.8
SITC 87 P&C EXPORTS	0.0	14.4	25.1	7.9	31.2
SITC 87 FINAL ASSEMBLY EXPORTS	100.0	85.6	74.9	92.1	68.8
SITC 88 P&C EXPORTS	0.0	5.6	2.9	0.1	50.5
SITC 88 FINAL ASSEMBLY EXPORTS	100.0	94.4	97.1	99.9	49.5
AS SHARE OF INDIA'S TOTAL EXPORTS TO THE REPUBLIC OF KOREA (%)	1990	1995	2000	2005	2012
SITC 75	0.091	0.014	0.218	0.048	0.072
SITC 76	0.000	0.059	0.073	0.077	0.286
SITC 77	1.760	1.302	2.163	1.371	1.270
SITC 78	0.282	0.117	0.793	3.106	0.655
SITC 87	0.001	0.023	0.067	0.105	0.169
SITC 88	0.008	0.008	0.197	0.051	0.012
Total	2.1	1.5	3.5	4.8	2.5
INDIA'S TOTAL EXPORTS TO THE REPUBLIC OF KOREA (USD Million)	180.6	446.9	439.1	1519.6	4076.4

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 11: India's Parts and Component, and Final Assembly Exports, to Malaysia, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS	13.6	99.7	98.2	32.2	57.0
SITC 75 FINAL ASSEMBLY EXPORTS	86.4	0.3	1.8	67.8	43.0
SITC 76 P&C EXPORTS	0.0	10.2	30.9	32.9	75.6
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	89.8	69.1	67.1	24.4
SITC 77 P&C EXPORTS	99.8	98.2	91.8	88.1	86.8
SITC 77 FINAL ASSEMBLY EXPORTS	0.2	1.8	8.2	11.9	13.2
SITC 78 P&C EXPORTS	28.4	50.7	48.0	81.1	34.9
SITC 78 FINAL ASSEMBLY EXPORTS	71.6	49.3	52.0	18.9	65.1
SITC 87 P&C EXPORTS	23.5	3.3	8.7	4.2	5.9
SITC 87 FINAL ASSEMBLY EXPORTS	76.5	96.7	91.3	95.8	94.1
SITC 88 P&C EXPORTS	2.2	3.0	2.1	1.9	5.6
SITC 88 FINAL ASSEMBLY EXPORTS	97.8	97.0	97.9	98.1	94.4
AS SHARE OF INDIA'S TOTAL EXPORTS TO MALAYSIA (%)	1990	1995	2000	2005	2012
SITC 75 TOTAL EXPORTS	0.102	9.379	16.592	0.511	0.735
SITC 76 TOTAL EXPORTS	0.002	0.428	0.140	0.316	1.743
SITC 77 TOTAL EXPORTS	9.541	4.706	2.906	2.167	1.724
SITC 78 TOTAL EXPORTS	10.994	2.080	1.816	6.301	2.202
SITC 87 TOTAL EXPORTS	0.354	0.345	0.590	0.817	2.225
SITC 88 TOTAL EXPORTS	0.279	0.241	0.461	0.351	0.273
Total	21.272	17.180	22.504	10.463	8.902
TOTAL EXPORTS TO MALAYSIA (USD Million)	149.3	392.0	531.0	1143.8	3791.2

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 12: India's Parts and Component, and Final Assembly Exports, to Singapore, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS	68.5	59.4	40.5	56.4	42.9
SITC 75 FINAL ASSEMBLY EXPORTS	31.5	40.6	59.5	43.6	57.1
SITC 76 P&C EXPORTS	0.0	91.9	37.9	45.4	52.5
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	8.1	62.1	54.6	47.5
SITC 77 P&C EXPORTS	97.1	81.9	85.3	80.2	45.4
SITC 77 FINAL ASSEMBLY EXPORTS	2.9	18.1	14.7	19.8	54.6
SITC 78 P&C EXPORTS	88.0	91.7	86.8	77.1	2.8
SITC 78 FINAL ASSEMBLY EXPORTS	12.0	8.3	13.2	22.9	97.2
SITC 87 P&C EXPORTS	3.9	19.3	6.6	12.2	10.7
SITC 87 FINAL ASSEMBLY EXPORTS	96.1	80.7	93.4	87.8	89.3
SITC 88 P&C EXPORTS	3.6	5.5	5.1	13.5	21.6
SITC 88 FINAL ASSEMBLY EXPORTS	96.4	94.5	94.9	86.5	78.4
AS SHARE OF INDIA'S TOTAL EXPORTS TO SINGAPORE *(%)*	1990	1995	2000	2005	2012
SITC 75 TOTAL EXPORTS	6.480	6.408	1.901	0.807	0.411
SITC 76 TOTAL EXPORTS	0.497	6.463	1.301	0.153	0.435
SITC 77 TOTAL EXPORTS	2.828	2.381	3.468	1.542	1.354
SITC 78 TOTAL EXPORTS	3.657	1.465	0.627	0.521	2.762
SITC 87 TOTAL EXPORTS	0.455	0.419	0.570	0.341	1.418
SITC 88 TOTAL EXPORTS	0.292	0.248	0.588	0.179	0.132
Total	14.209	17.384	8.454	3.543	6.511
TOTAL EXPORTS TO SINGAPORE (USD Million)	375.1	898.9	787.0	5427.6	13552.7

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 13: India's Parts and Component, and Final Assembly Exports, to Thailand, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS	1.5	60.8	57.5	54.6	37.9
SITC 75 FINAL ASSEMBLY EXPORTS	98.5	39.2	42.5	45.4	62.1
SITC 76 P&C EXPORTS	0.0	1.6	57.9	17.7	30.2
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	98.4	42.1	82.3	69.8
SITC 77 P&C EXPORTS	100.0	85.8	98.7	80.2	90.5
SITC 77 FINAL ASSEMBLY EXPORTS	0.0	14.2	1.3	19.8	9.5
SITC 78 P&C EXPORTS	98.6	98.0	98.5	98.2	78.6
SITC 78 FINAL ASSEMBLY EXPORTS	1.4	2.0	1.5	1.8	21.4
SITC 87 P&C EXPORTS	29.1	2.5	7.2	6.2	16.6
SITC 87 FINAL ASSEMBLY EXPORTS	70.9	97.5	92.8	93.8	83.4
SITC 88 P&C EXPORTS	29.6	0.0	7.6	0.5	6.4
SITC 88 FINAL ASSEMBLY EXPORTS	70.4	100.0	92.4	99.5	93.6
AS SHARE OF INDIA'S TOTAL EXPORTS TO THAILAND (%)	1990	1995	2000	2005	2012
SITC 75 TOTAL EXPORTS	0.061	0.460	0.227	0.148	0.162
SITC 76 TOTAL EXPORTS	0.019	0.278	0.073	0.142	0.149
SITC 77 TOTAL EXPORTS	0.612	0.706	1.245	1.227	1.433
SITC 78 TOTAL EXPORTS	1.269	0.525	0.730	3.833	7.893
SITC 87 TOTAL EXPORTS	0.091	0.114	0.102	0.263	0.655
SITC 88 TOTAL EXPORTS	0.010	0.009	0.061	0.191	0.069
Total	2.062	2.092	2.438	5.805	10.361
TOTAL EXPORTS TO THAILAND (USD Million)	244.3	471.5	525.2	1059.3	3454.1

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 14: India's Parts and Component, and Final Assembly Exports, to Viet Nam, 1990–2012

AS PERCENT OF TOTAL EXPORTS IN EACH SITC COMMODITY GROUP	1990	1995	2000	2005	2012
SITC 75 P&C EXPORTS		0.0	8.9	31.2	7.4
SITC 75 FINAL ASSEMBLY EXPORTS		100.0	91.1	68.8	92.6
SITC 76 P&C EXPORTS	0.0	97.8	54.2	88.1	49.0
SITC 76 FINAL ASSEMBLY EXPORTS	0.0	2.2	45.8	11.9	51.0
SITC 77 P&C EXPORTS	100.0	53.5	98.8	94.4	79.1
SITC 77 FINAL ASSEMBLY EXPORTS	0.0	46.5	1.2	5.6	20.9
SITC 78 P&C EXPORTS	28.7	6.3	99.9	28.2	5.8
SITC 78 FINAL ASSEMBLY EXPORTS	71.3	93.7	0.1	71.8	94.2
SITC 87 P&C EXPORTS	84.7	44.6	1.1	1.4	11.6
SITC 87 FINAL ASSEMBLY EXPORTS	15.3	55.4	98.9	98.6	88.4
SITC 88 P&C EXPORTS	100.0	0.2	40.4	15.6	8.2
SITC 88 FINAL ASSEMBLY EXPORTS	0.0	99.8	59.6	84.4	91.8
AS SHARE OF INDIA'S TOTAL EXPORTS TO THAILAND (%)	1990	1995	2000	2005	2012
SITC 75 TOTAL EXPORTS	0.000	0.043	0.010	0.063	0.030
SITC 76 TOTAL EXPORTS	0.524	0.468	0.007	0.786	0.209
SITC 77 TOTAL EXPORTS	0.058	1.124	0.795	0.997	0.893
SITC 78 TOTAL EXPORTS	1.087	1.192	0.327	0.723	1.225
SITC 87 TOTAL EXPORTS	0.094	0.056	0.312	0.186	0.214
SITC 88 TOTAL EXPORTS	0.008	0.712	0.123	0.080	0.029
Total	1.771	3.596	1.574	2.834	2.600
TOTAL EXPORTS TO VIET NAM (USD Million)	16.96	123.99	195.39	633.47	3658.16

Notes: P and C stands for Parts and Components; SITC Codes: SITC 75: Office machines and data processing machines), SITC 76: Telecommunications equipment), SITC 77: Electrical goods), SITC 78: Road vehicles), SITC 87: Professional and scientific equipment and SITC 88: Photographic apparatus.

Source: our calculations, from UN COMTRADE data-base.

Table 15: India's Network Exports to Selected Asian Countries, Parts and Component and Final Assembly, A Summary

Network Trade Commodity	PRC	Japan	Republic of Korea	Malaysia	Singapore	Thailand	Viet Nam
Office Machines (75)	P	F	F	P/F	P/F	F	F
Telecom equipment (76)	F	F	P/F	P	P/F	PF	P/F
Electrical goods (77)	P/F	P	P	P	P/F	P	P
Road vehicles (&*)	P	P	P	F	F	P	F
Professional and scientific equipment (87)	F	F	F	P	P	F	P
Photographic apparatus (88)	F	P/F	P/F	P	P	F	F

PRC = People's Republic of China.

Note: P: Mostly Parts and Components, F: Mostly Final Assembly; P/F: Both Parts and Components and Final Assembly.

Source: Obtained from Tables 8–14.

5. ECONOMIC CORRIDORS: HOW CAN THEY HELP IN FACILITATING ENGAGEMENT IN GLOBAL PRODUCTION NETWORKS FOR SOUTH ASIA?

37. It has been increasingly being realised that the creation of economic corridors within and across countries can be a powerful positive force for regional integration by facilitating the movement of goods and services across borders (De and Iyengar 2013). A Brunner (2013, p. 1) notes," large cumulative benefits not previously known by decision-makers can become apparent when potential growth-inducing investments that raise the production potential of integrated economic and geographic areas are modelled along economic corridors". Thus, economic corridors can be an important driver of inclusive growth by bringing in lagging regions into the growth process.

38. The corridor development approach builds on the insights of new economic geography, which show that there are powerful agglomeration effects by clustering economic activity along transport corridors, which are a set of routes that connect the economic centres in a geographic space, both within and across countries. Economic corridors provide a spatial focus for regional cooperation initiatives, clustering them along corridors or at nodal centers on the corridors. This is expected to help develop surrounding areas, including through catalyzing other investment from within and outside the region. The spatial focus can also facilitate prioritization of regional projects, and coordination of national projects among neighbouring countries (Srivastava 2011). The corridor development approach can act as a catalyst for regional integration, especially in contexts where existing regional trade initiatives have not gathered steam due to logistical difficulties or for political reasons.

39. While the large benefits of economic corridors have been understood by policy-makers in South Asia for some time, the role of economic corridors in allowing South Asian countries to link more closely with the production networks of East Asia has not been explored in a systematic manner. In this section, we will provide an exploratory framework which will sketch out the potential synergies between economic corridors and global production networks We will ask whether the prioritisation of the establishment of economic corridors in South Asia that links the region better with Southeast Asia can provide an enabling environment for South Asian countries to deepen their integration with Southeast and East Asia through greater access to the production networks of these two regions.

5.1 Economic Corridors and International Trade

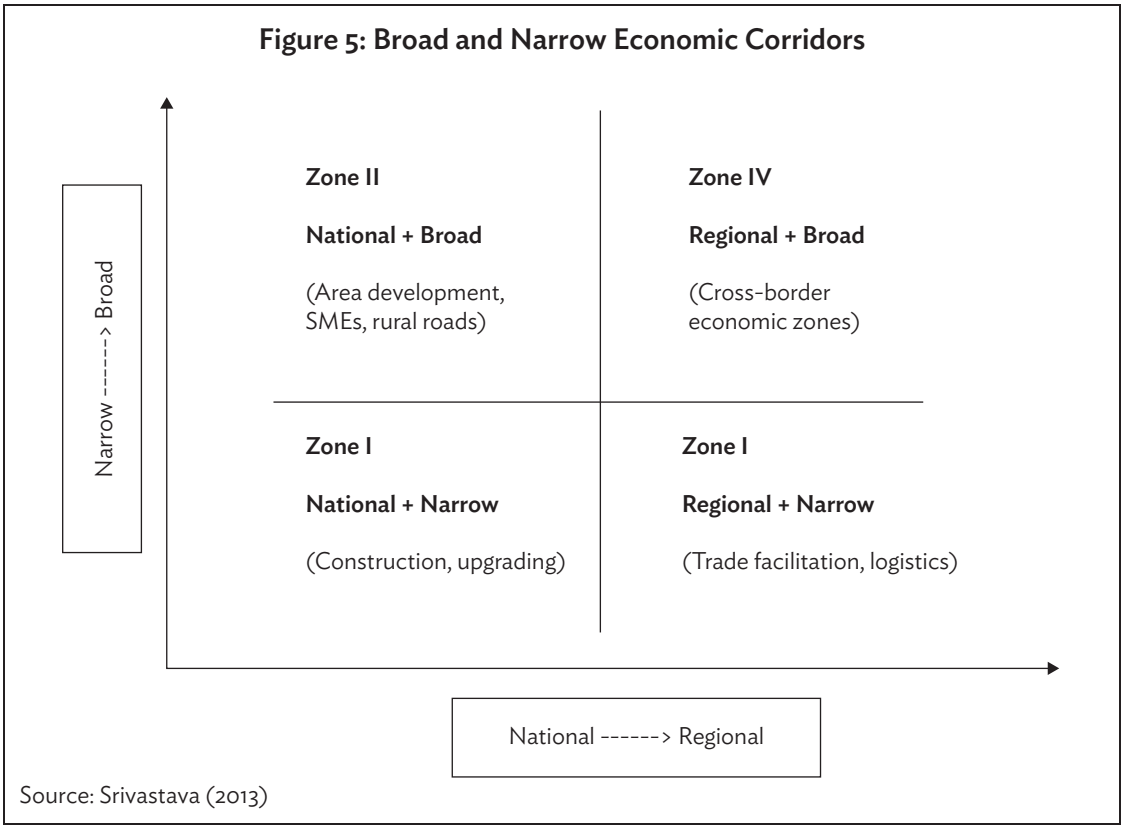
40. To what extent can economic corridors contribute to the facilitate of movement of goods and services? As Srivastava (2011) argues:

41. "The essential structural components of a regional corridor are its outer nodes or urban centers and the transport connectivity between them, along with other smaller nodes that may exist in between and the land surrounding the corridor in its vicinity. For corridors to be viable, they must make economic sense through encompassing actual or potential economic growth, which requires at the least that the nodes linked by the corridor are substantive centers of economic activity. Corridor development does not create economic strength so much as it channels, focuses, and amplifies the potential for economic growth. Thus, a corridor from "nowhere to nowhere through nowhere" would not be very meaningful. Similarly, a corridor linking two substantive nodes but with no potential for growth in between (because of adverse geography such as extremely rugged terrain or desert) is also of limited interest, as is a maritime "corridor" linking two ports.

42. Thus, the creation of regional and national economic corridors by themselves may not be a sufficient condition for greater regional trade integration if the nodes linked by the corridor are not viable centres of production that can produce low cost products where the country has a latent comparative advantage and where the products are in demand in other regions of Asia. Not all economic corridors can facilitate international trade in the same way – national economic corridors may facilitate movement of goods and services within countries but not across countries, while regional economic corridors have cross-border positive spillover effects and may need joint or coordinated action between countries in the same economic corridor. Srivastava differentiates between narrow and broad economic corridors – narrow corridors operate purely through the transportation route (a highway or railway line) while broad corridors involve a wider geographical area along the route.

43. Figure 5 captures the two dimensions of corridors – national/regional and broad/narrow. While most economic corridors start off from Zone 1, which involves construction or upgradation of a national transportation route, the question for policy-makers is whether to sequence Zone II or Zone III next. For the purpose of regional trade integration, Zone III should come next after Zone I, allowing for trade to occur through a transportation route across borders. However, for deeper regional integration and for maximising the inclusive growth potential of economic corridors, it is clear that it is important for countries involved in the regional economic corridor to push for broadening the corridor by investments in local infrastructure along the transportation route, and make a concerted attempt to move to Zone IV, which would be the ideal state where economic corridors can play a powerful role in facilitating international trade.

Figure 5: Broad and Narrow Economic Corridors



Source: Srivastava (2013)

5.2 Economic Corridors and Global Production Networks

44. While it is clear from the above discussion that economic corridors that are both regional and broad can contribute to regional trade integration and in linking South Asia with the rest of Asia, what role can they play in facilitating South Asia's access to the production networks of East and Southeast Asia? To address this question, we first need to understand how trade in global production networks occurs and the role of physical connectivity in these networks. Consider the production of hard disk drives, where the final assembly takes place in Thailand and where parts and components are sourced from all other Asian countries. Thailand in turn exports hard disks to Indonesia to be used in the manufacture of computers. As Figure 6 makes clear, trade in the global production networks occurs across large geographical space, and with very disparate countries in terms of per capita income linked together in the production network. This is also clear from Figure 7 which shows the location of the plants of a large electronics MNC – as is clear from the Figure, production networks in Asia are spread across many countries, at very disparate levels of development. Given the low presence of global production networks in South Asia, would the formation of a regional economic corridor that links South Asia to the rest of the region draw in one or more South Asian country into the network? This will depend on three factors:

5.2.1 The specific physical characteristic of the intermediate or final good:

45. Much of East Asia's engagement in global production sharing is the heavy concentration of production within the broader commodity group of machinery and transport equipment (SITC 7). Within this product group telecommunication and sound recording equipment, semiconductors and other electrical machinery and equipment account for the lion's share of total network exports. These goods are to a large extent high value low volume goods that mostly rely on air connectivity in the transportation of these products. For these products, the establishment of regional economic corridors cannot be expected to facilitate trade in these products. However, transport equipment is also a part of parts and component trade, and in this commodity basket, South Asia has not done too badly. As Athukorala (2013) notes, road vehicles and other transport equipment accounted for 28% of total Indian network exports in 2010-11, compared to an East Asian regional average of 13.2%, and the total volume of transport equipment exports from India is rapidly approaching the level of Thailand, which is the most successful second-tier automotive exporting country (after Japan and the Republic of Korea) in Asia. A number of leading automakers and auto part suppliers have established assembly plants in India and some of them have already begun to use India as an export platform within their global production networks (Humphrey 2003, Sen and Srivastava 2012). Transport equipment, unlike electronics, is high volume, and is mostly transported by road, rail and sea. For this set of commodities, regional economic corridors can play an important role in facilitating trade between South Asia (particularly India) and East and Southeast Asia. Here, the reduction of transportation costs along the economic corridor and the location of auto ancillary plants within the corridor, where auto components are transported to final assembly units for the production of automobiles that are located in East and Southeast Asia can can greatly facilitate the establishment of a successful production network in transport equipment linking South Asia to the rest of the region.

5.2.2 The Location Decisions of Multinationals

46. Multinationals (MNCs) play a key role in trade of parts and components. As ADB (2008b) notes, several MNCs have established extensive production networks in Asia, which are contributing not only to the development of economies that receive FDI, but also to the region's integration in production and trade. There are a number of factors that determine why MNCs locate part of their

production network in a particular country. These are: a) the degree of technological sophistication of the FDI-receiving country; b) the presence of a subcontracting industry for parts and components; c) the development of economic infrastructure; d) local regulations and the treatment of foreign firms; and e) the availability, cost, and quality of the labor force.

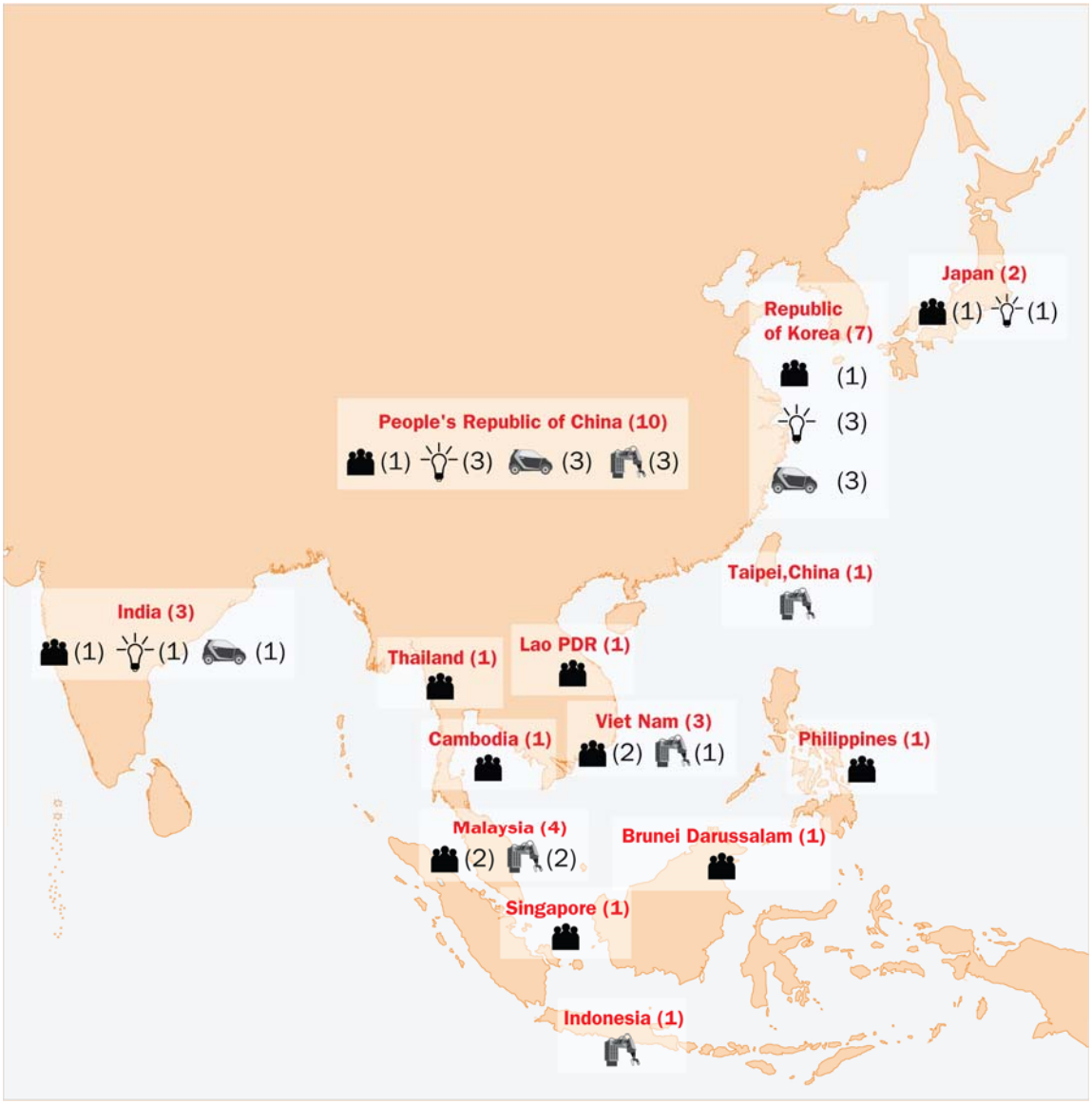
47. To bring in MNCs into South Asia to set up production facilities or enter into relationships with domestic country firms so that part of the production network can be located in South Asia would need a set of policies and supporting environment that provide an incentive for MNCs to source parts and components from South Asia (Carruthers et al. 2003). While the establishment of economic corridors would meet criteria c above, clearly there is a range of other factors that are important in the MNC's location decision. Therefore, a economic corridor approach needs to be nested within a broader approach that incentivises the decision of MNCs to set up production facilities in South Asia.

Figure 6: How Trade Occurs in the Production of Hard Disk Drives

Note: The production of hard disk drives requires several parts and components. The example shows the actual sourcing of parts and components of a hard disk drive assembly firm in Thailand. The largest majority of parts and components are sourced from other integrating Asian economies. Hard disk drives are used in several electronic products. The hard disk drive assembler in Thailand exports a large share of its production to electronic firms mostly in other integrating Asian economies.

Source: Asian Development Bank (2008b)

Figure 7: The Location of Different Units of a Large Asian Multinational Company (Hyundai)



Legend

Sales and administration | Research and development | Production plant | Assembly plant

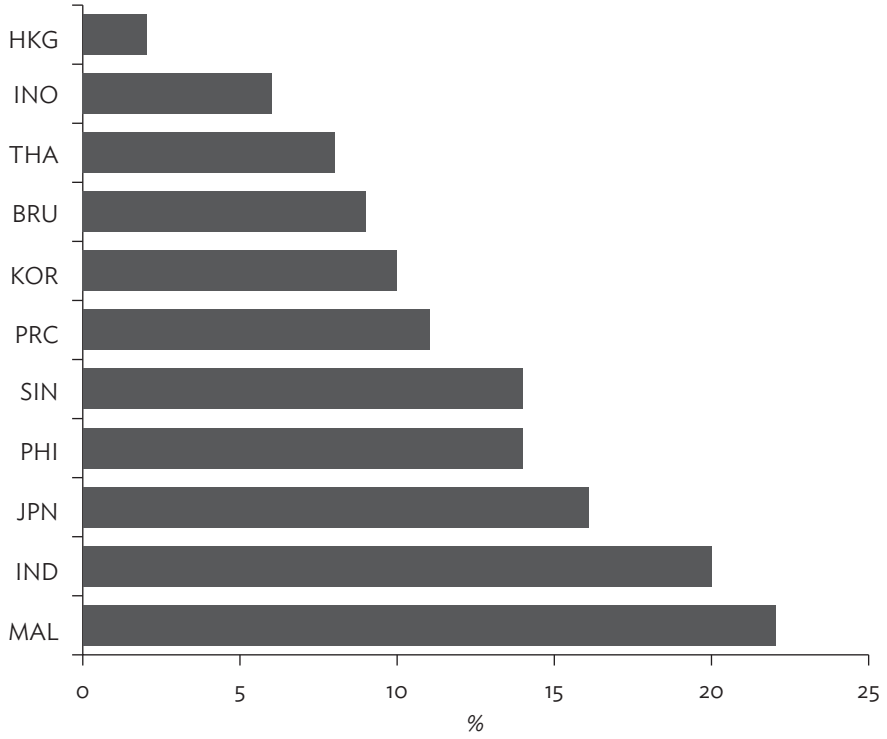
Lao PDR = Lao People's Democratic Republic.

Source: Asian Development Bank (2008b)

5.2.3 Trade Barriers

48. Trade within global production networks is more sensitive to tariff levels than trade in final goods because of multiple border crossings. Consequently, a one percentage point reduction in tariff can lead to a decline in cost of production of a vertically integrated good by a multiple equal to the number of times the parts and components of the good has travelled across borders (Menon 2013). This implies that the level of tariffs in a particular country will make a difference to the decision of the firm whether or not to source components from that country, and high levels of tariffs in a country may deter off-shoring to that country. However, under the Information Technology (IT) agreement of the WTO, most network trade already travels at zero duties or at very low tariffs in Asia. In addition, the wide prevalence of duty drawback schemes in Asia and the location of supplier firms in export processing zones would imply that off-shoring may not be very sensitive to the restrictiveness of the trade regime in the partner countries. In the case of South Asia, tariff levels still remain high relative to the Asian average (as observed in Figure 8 for India) for many products. This suggests that an economic corridor approach by itself would not be enough to facilitate trade in network products if the trade regimes in South Asia are not conducive to network trade, especially in products which do not attract low or zero duties such as those covered by the IT agreement of the WTO.

Figure 8: Trade Restrictiveness Index in Asia



BRU = Brunei Darussalam; HKG = Hong Kong, China; IND = India; INO = Indonesia; JPN = Japan; KOR = Republic of Korea; MAL = Malaysia; PHI = Philippines; PRC = Peoples Republic of China; SIN = Singapore; THA = Thailand.

Note: The restrictiveness indexes are estimated using 2005–2006 tariff schedules.

Source: Asian Development Bank (2008b)

5.2.4 The Role of Logistical and Institutional Factors

49. A key difference between trade in final goods and network trade is that unlike the former, where trade occurs mostly through arms-length transactions, trade in parts and component often occurs through bilateral repeated relationships between the sourcing firm (usually the MNC) and the supplier. Here, the quality of institutions prevailing in the country can play an important role for the sourcing firm based in one country to decide to use a supplier from another country. Institutional quality here would encompass a range of institutions all the way from contract enforcement mechanisms such as the nature of the legal system to transactions cost reducing institutions such as the ease of obtaining a licence to start a business and the ease of moving goods across borders through customs checkpoints. Figure 9 provides an illustration of how institutional constraints can impede the flow of goods in a regional economic corridor. For trade in parts and component, a set of institutional constraints such as complex customs regulations at the border crossing can have an amplifying effect, and can greatly reduce the attraction of regional economic corridors for suppliers and source firms in global production networks. In the South Asian case, goods in transit need to pass through several documentation clearances, ranging from port authority, customs, transport authority, veterinary and phytosanitary inspection section services depending on the type of goods traded (APEC 2013). Trade facilitation measures that simplify and rationalise customs and other administrative procedures that hinder, delay or increase the cost of moving goods across borders in South Asia, and between South and East Asia, can play a significant role in the success of regional economic corridors in facilitating network trade between South Asia and East/Southeast Asia (RIS 2006). A regional economic corridor that connects South Asia to Southeast Asia could stretch from Pakistan in the West to Myanmar in the East, and involve crossing of the India-Pakistan, Bangladesh-India, and Bangladesh-Myanmar borders.[2] However, there is no South Asia wide agreement on transit trade, and bureaucratic practices in shipment of goods across borders are cumbersome and costly. In addition, most of the Local Customs Stations that handle transit trade in South Asia have inadequate storage facility, as well as banking and foreign exchange services (D e 2011). With regional transit agreements that reduce the complex cross-border trading practices and without appropriate investment in Local Customs Stations, the use of regional economic corridors for network trade between South Asia and East/Southeast Asia is unlikely to occur.

50. Furthermore for off-shoring to be profitable, the firm out-sourcing the production of components for its final product needs low transport costs in terms of logistics in the countries where the suppliers are located in (Asian Development Bank 2009). This is all the more so with new business models of out-sourcing where lean production techniques, pioneered by Toyota, emphasise innovation and high quality among parts suppliers and combine this with sophisticated logistics to reduce inventory costs to a minimum (Gill and Kharas 2007). Athukorala (2013) finds that both logistical and institutional factors play an important role in explaining India's low volumes of network trade, using a gravity model of trade flows.

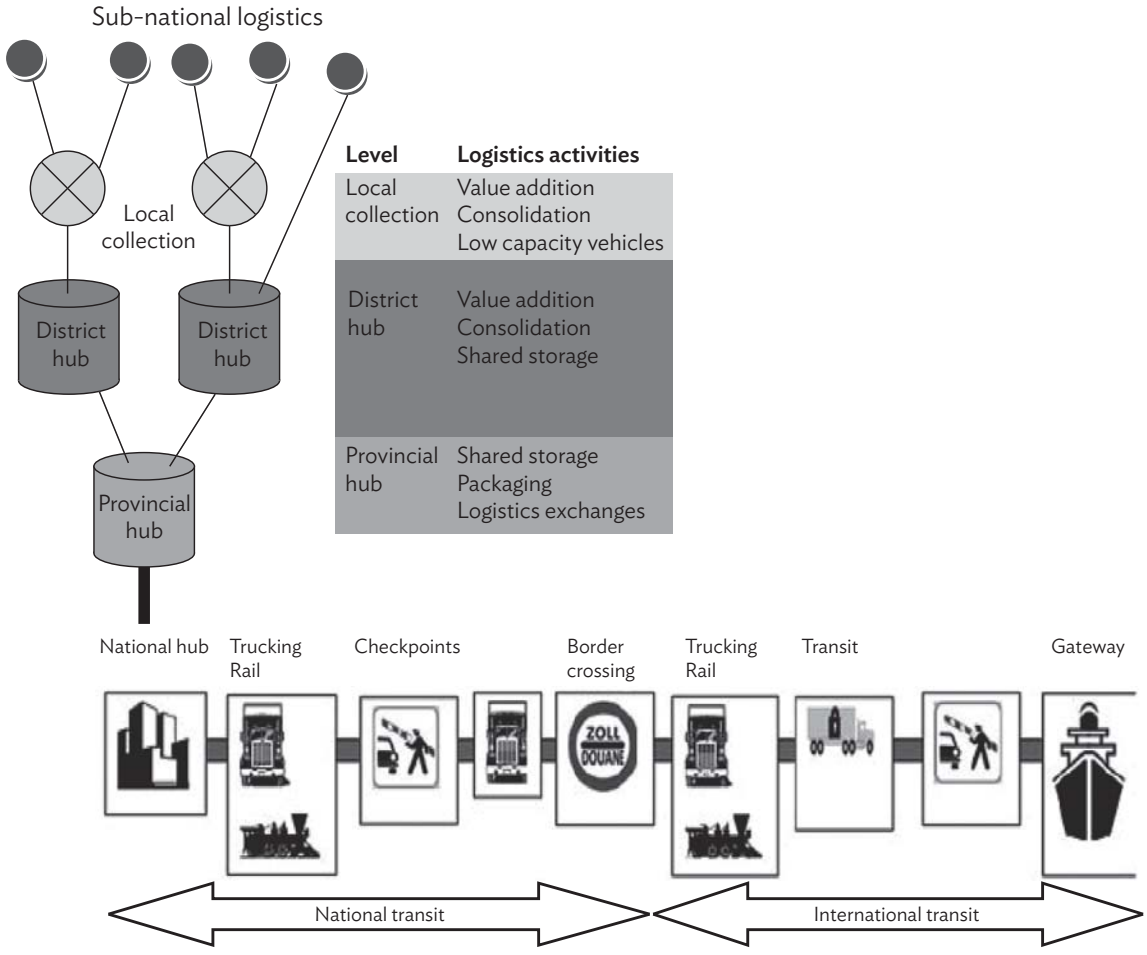
51. South Asia's weak performance in logistics is apparent from Table 16, which provides information on the quality of customs and logistics competence, as well as tracking and tracing and timeliness performance (the data is obtained from the World Bank's Logistics Performance Database). South Asia's performance in customs, logistics competence, tracking and tracing and timeliness is worse than all other regions of the world except Sub-Saharan Africa in 2011. Data on individual South

[2] Kimura and Umezaki. 2011. http://www.eria.org/CHAPTER%201%20%20ASEAN%20-%20India%20Connectivity%20A%20Regional%20Framework%20and%20Key%20Infrastructure%20Projects.pdf

Asian countries in comparison with selected Southeast Asian countries also show a similar pattern, with the exception of India, which does better than Indonesia, but has worse logistics indicators than Malaysia and Thailand (Table 17). However, India has low performance in the World Bank's ease of doing business indicator, suggesting significant transactions costs for MNCs to start production in the country (Figure 11). Therefore, for regional economic corridors to facilitate trade in network products, it would be essential for South Asian countries to develop sophisticated logistical systems along the corridor that are easily accessible to all firms located in the corridor, as well as reduce transactions costs in doing business in these countries.

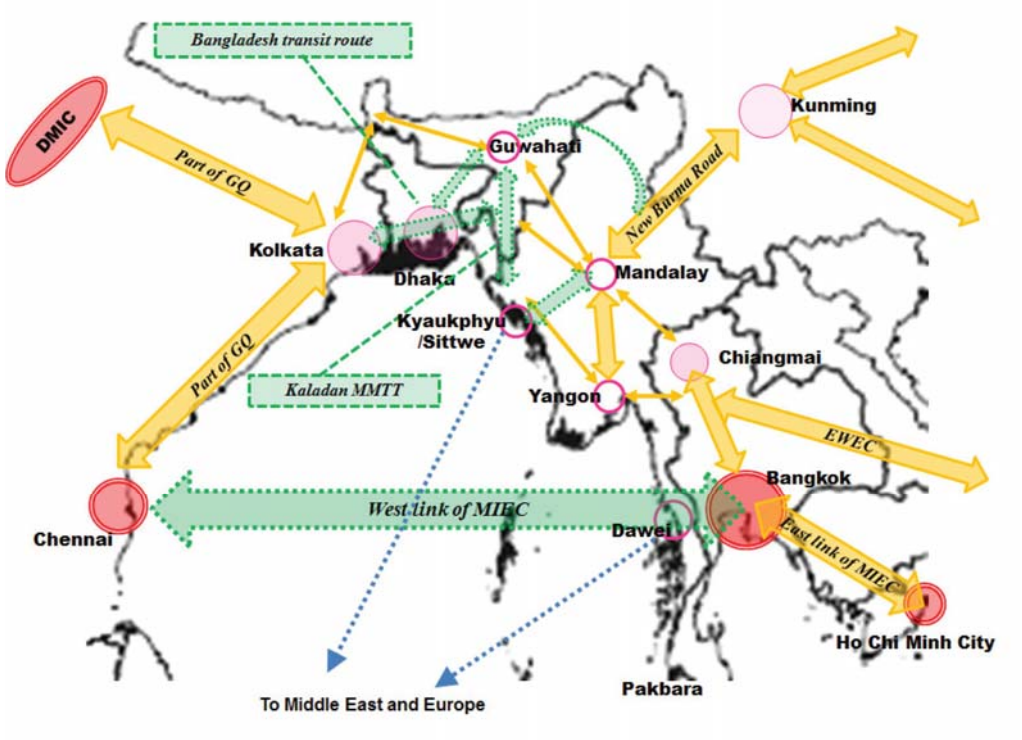
52. In Box 1, we provide a case-study of how a region in Southeast Asia became an important export hub in GPN trade – this is a case-study of Penang state in Malaysia. As is clear from the case-study, all the factors that we discussed above have been important in the success of this region as an export hub. This case-study highlights the importance of proactive and far-sighted government policy in providing the enabling environment for both multinationals and local firms to locate themselves in the region, and to engage in high value GPN trade over time.

Figure 9: Institutional Constraints to the Formation of a Successful Regional Economic Corridor



Source: Kunaka (2011)

Figure 10: Possible Regional Economic Corridors in South Asia



Source: Kimura and Umezaki (2011)

Table 16: Logistics Performance, South Asia and Other Regions, 2012

	Year	APEC Average	East Asia and the Pacific	Europe and Central Asia	Latin America and Carribean	Middle East and North America	South Asia	Sub-Saharan and Africa
Customs	2006	3.13	2.47	2.27	2.38	2.20	2.06	2.21
	2009	3.11	2.48	2.32	2.38	2.33	2.22	2.18
	2011	3.13	2.57	2.47	2.45	2.29	2.47	2.27
Logistics competence	2006	3.34	2.61	2.39	2.52	2.30	2.32	2.33
	2009	3.30	2.66	2.56	2.62	2.53	2.33	2.28
	2011	3.33	2.72	2.65	2.64	2.49	2.58	2.43
Tracking and tracing	2006	3.75	2.61	2.44	2.58	2.30	2.32	2.31
	2009	3.85	2.83	2.72	2.84	2.46	2.53	2.49
	2011	3.77	2.91	2.75	2.73	2.56	2.49	2.41
Timeliness	2006	3.37	3.09	2.90	3.02	2.77	2.73	2.77
	2009	3.49	3.37	3.28	3.41	3.22	3.04	2.94
	2011	3.47	3.32	3.14	3.12	3.02	2.93	2.85

Note: The score demonstrate comparative performance-the dimensions show on scale (lowest score to highest score) from 1 to 5

Source: World Bank Logistics Performance Index (http://lpisurvey.worldbank.org/) and PSU calculation.

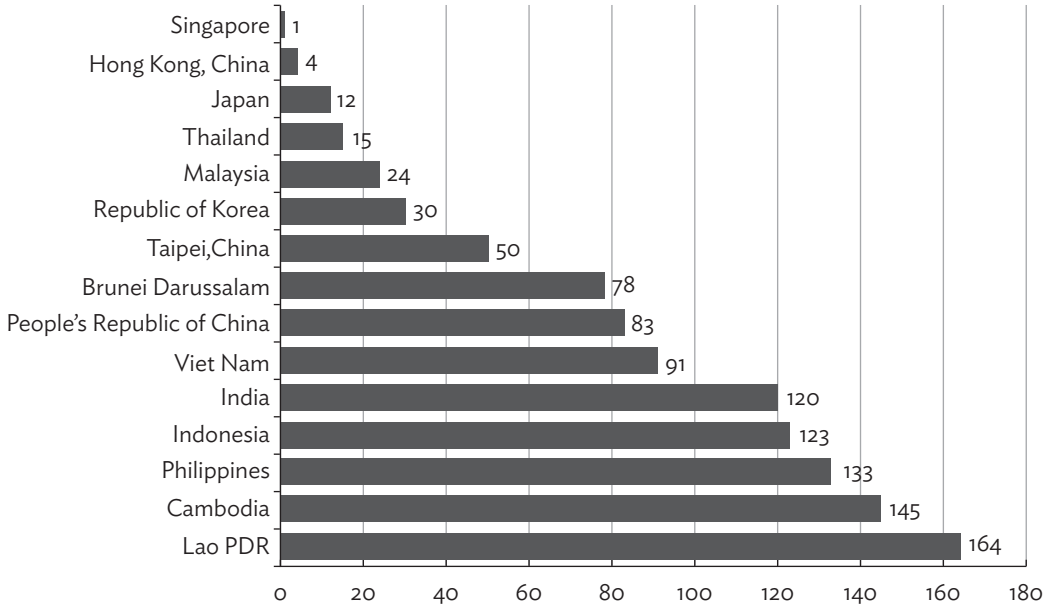
Table 17: Logistics Performance, Individual Countries in South and Southeast Asia. 2012

	LPI Rank	LPI Score	Customs	Infrastructure	International shipments	Logistics competence	Tracking and tracing	Timeliness
India	46	3.08	2.77	2.87	2.98	3.14	3.09	3.58
Pakistan	71	2.83	2.85	2.69	2.86	2.77	2.61	3.14
Nepal	151	2.04	2.2	1.87	1.86	2.12	1.95	2.21
Sri Lanka	81	2.75	2.58	2.5	3	2.8	2.65	2.9
Indonesia	59	2.94	2.53	2.54	2.97	2.85	3.12	3.61
Malaysia	29	3.49	3.28	3.43	3.4	3.45	3.54	3.86
Thailand	38	3.18	2.96	3.08	3.21	2.98	3.18	3.63

Note: LPI: Logistics Performance Index.

Source: World Bank's Logistics Performance Data-base (lpisurvey.wordlbank.org)

Figure 11: Ease of Doing Business in Asia



Lao PDR = Lao People's Democratic Republic.

Note: Economies are ranked on their ease of doing business, from 1 to 178, with first place being the best. A high ranking on the ease of doing business index means the regulatory environment is conducive to the operation of business. This index averages the country's percentile rankings on 10 topics, made up of a variety of indicators, giving equal weight to each topic.

Source: Asian Development Bank (2008)

How Did Penang Become a Major Export Hub For Network Trade?

Penang is a state of Malaysia in the northwest coast of the Malaysian peninsula. It is a major export hub in global production network trade. After consolidating its position in GPN trade by engaging in low end activities and final assembly within production networks, it has now moved into a number of electronics-related dynamic product lines that have high growth prospects. What explains Penang's emergence as an export hub and its ability to move into the more value added activities in GPN trade? What are the lessons for South Asian countries from Penang's example?

While Penang started the process of export-oriented industrialisation with some initial advantages such as high rates of literacy and well developed trade related infrastructure, good economic policies were key to Penang's development as an export hub. The most important of these was the creation of the Penang Development Corporation (PDC) as the principal development agency independent of the formal economic structure, its autonomy allowing it to be the key nodal agency for the formulation and implementation of an export-oriented industrialisation strategy, with a clear focus on electronics as the leading sector. A strong emphasis on cluster development along with the encouragement by on close links between MNEs and local firms were key components of industrial policy along with the effective use of Free Trade Zones and Industrial estates for infrastructure development. Along with this was an innovative land bank policy which allowed market acquisition of private land and a skill development policy through the Penang Skill Development Centre, so that skill shortages did not hamper the progress of industries up the value added ladder.

The important lesson for South Asian countries interested in creating export hubs which are part of GPN trade similar to Penang, is that export hubs like Penang do not develop on their own, and that governments need to enact far-sighted and coherent industrial policies that can provide enough incentives to MNE to base their affiliates in South Asia, along with proactive attempts to develop links between local firms and MNE affiliates, and to address emerging bottlenecks in skills development and infrastructure.

Source: Athukorala (2014a)

6. CONCLUSIONS

53. Global production networks is a phenomenon of great significance in world trade and production, especially in Asia. While East Asia and Southeast Asia have rapidly established themselves as major players in global production network trade, South Asia has lagged behind. What are the possible implications for greater integration of South Asia, both within the region, and with East and Southeast Asia? What have been the patterns so far in the engagement of South Asia in global production network trade? What has been the nature of the engagement of India, in particular, in global production network trade? How can national and regional economic corridors help in linking South Asia to the rest of Asia, and to the dynamic components of manufacturing trade?

54. In this paper, we review the secondary literature on regional cooperation in South Asia, and assess what we know about the impact of regional co-operation outcomes on welfare outcomes in South Asia. We note that in spite of recent policy initiatives on improving intraregional trade in South Asia, there still remain significant policy impediments to trade in the region. We documented the patterns and trends in intraregional and extra-regional trade for South Asia, arguing that the level of trade flows within South Asia and between South Asia and the rest of the world has been historically and though there has been increasing integration of the South Asian countries with the rest of the world, it still remains below the levels of East Asia. We discussed model-based assessments of trade integration that show large effects of increase regional trade on welfare, suggesting that greater welfare

gains may be obtained for South Asian countries if they trade more with East Asia and Southeast Asia than with themselves.

55. We then provide a brief introduction to key concepts in global production sharing as well as document the sharp increase in trade in product fragments, especially in East Asia. Trade in product fragments are among the most dynamic segments of trade flows in developing countries. We show that the South Asian region has not done as well as expected in this important and rapidly growing segment of international trade. We suggest that there has been limited research on South Asia's inability to exploit its locational advantage to East Asia in being integrated with global production networks.

56. Next we examine we look more closely at India's performance in network trade, especially in relation to East and Southeast Asia. In terms of India's engagement with individual Asian countries in GPN exports, the only countries where there has been a large increase in the share of network exports in India's total exports has been Thailand, with some increase evident in the share of network exports in total exports to Japan as well. There has been a decline in the share of network exports in India's total exports to Malaysia and Singapore, with no clear pattern emerging for the People's Republic of China, the Republic of Korea, and Viet Nam. Overall, the analysis in this section indicates the very limited engagement of India in GPN trade with the more dynamic East and Southeast Asian countries. Clearly, there is a need for a role for the Indian government in association with the private sector to facilitate India's greater entry in GPN trade with East and Southeast Asia.

57. We then describe the economic corridor approach, which emphasises the integration of infrastructure improvement with economic opportunities originating from trade and investment. We try to integrate the economic corridor approach with the key insights from our discussion of the global production network literature. We identify conditions under which regional economic corridors in South Asia can increase the region's linkages to the global production networks of East Asia, and how national and regional economic corridors can boost regional cooperation between South Asia, Southeast Asia and East Asia.

58. If South Asia wants to make a significant entry into the dynamic and growth oriented global production networks of East and Southeast Asia, regional and national economic corridors are important catalysts for such an entry to take place. However, for this to happen, several complementary policies need to be taken forward, such as cluster development and the easing of logistical constraints along the corridors, an enabling environment for multinationals to set up operations including land acquisition, skill and infrastructural development, along with a proactive and far-sighted government policy that can identify impending constraints to corridor development well in time and coordinate the complex institutional challenges that originate when economic corridors traverse different regions such as states in India, or different countries in South Asia. The success of late entrants to global production networks such as Cambodia and Viet Nam suggest that it is possible for South Asian countries to make this entry as well, which would have significant welfare gains for the citizens of the region.

Appendix 1: List of Parts and Components in Major Network Trade Categories
SITC-Rev 3 Code and Product Name

75230 Digital processing units, n.e.s.o.i.
75260 Adp input or output units, storage or not, nesoi
75270 Automatic data processing storage units, n.e.s.o.i
75290 Automatic data processing units, n.e.s.o.i.
75290 Adp mac&unts thereof;mag/opt rder,trnscrb,proc dat
75910 Parts and accessories of photocopying apparatus
75990 Pts suitble fr use w mac of 2/more head 8469-8472
75991 Typewriter & word process mach parts & accessories
75993 Parts and accessories of office machines, nesoi
75995 Parts of electronic calculating machines
75995 Parts for mach,nesoi, incorp calculating device
75997 Parts & accessories for adp machines & units
76211 Radiobroadcast receivers for motor vehicles w rcos
76212 Radiobroadcast receivers for motor vehicles nesoi
76281 Radiobroadcast receivers,nesoi,with sound recorder
76282 Radiobroadcast receivers,nesoi,with clock wo p & r
76289 Radiobroadcast receivers nesoi
76432 Transmission appr incorporating reception apparats
76481 Reception appr radio-telephon/telegraph etc nesoi
76491 Pt elect appr f line telephony or telegraphy etc.
76492 Pts micro-head-ear-phone,elect snd ampl sets etc
76493 Antennas and antenna reflectors and parts
76493 Pts,ex antenna,for trnsmssn,rdr,radio,tv,etc nesoi
76499 Pickup cartridgesfor sound recorders
76499 Pts & access f sound/video reproducing,record appr
77111 Liq Dielect Transformer Power Handl Cap Nov 650kva
77111 Liq Dielect Transfrm Pwr Hnd Cap >650 Nov 10t Kva
77111 Liq Dielect Transfrm Power Hand Cap > 10t Kva
77119 Transformers, nesoi,> 1 kva but =< 16 kva
77119 Transf nesoi, power handling cap >16 nov 500 kva
77119 Transformers, nesoi, > 500 kva
77125 Electrical inductors nesoi
77129 Pts for elect transformers static converters indct
77220 Printed circuits
77231 Fixed carbon resistors, composition or film type
77232 Fixed resistors, nesoi, pwr hand cap nov 20 w
77232 Fixed resistors nesoi > 20 w power hdlg cpcy
77233 Wirewound variable resistors, < 20 w
77233 Wirewnd var resist inc rheostats etc nesoi
77235 Variable resistors inc rheostat & potntiomtr nesoi
77238 Parts for resistors, rheostats, potetiometers
77241 Fuses for electrical apparatus, voltage > 1000 v
77242 Automatic circuit breakers > 1000 v but < 72.5 kv
77243 Auto circt breaker voltage 72.5 kv or more
77244 Isolating Switch & Make-&-Break Swtch Volt > 1000v
77245 Lightning arresters,voltage limiters,surge suppres
77249 Elect appr f prtct to elect circt >1000 v nesoi
77251 Fuses for voltage not exceeding 1000 v
77252 Auto circuit breakers voltage not exceeding 1000 v
77253 Other apparatus for protecting elc crts =< 1000 v
77254 Relays for a voltage not exceeding 60 v
77254 Relays For Voltage Over 60v More But Nt Over 1000v

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Appendix 1 continued

77255 Elect switches f voltage not over 1000 v, nesoi
77257 Lampholders For Voltage Not Over 1000v
77258 Elect plugs & sockets f voltage not over 1000 v
77259 Elect appr f prtct to elect circt nov 1000 v nesoi
77261 Controls etc w elect appr f elect cont nov 1000 v
77262 Controls etc w elect appr f elect cont over 1000 v
77281 Boards, panels, consoles etc of 8537 less apts
77282 Pt f elect appr f elect circt; f elct contrl nesoi
77311 Insulated winding wire of copper
77311 Insulated winding wire, nesoi
77312 Insulated coaxial cable & oth coaxial elect condct
77313 Insulated wiring sets for vehicles ships aircraft
283 854441 77314 Insulated electric conductors =< 80 v with cntrs
77314 Insulated electric conductors =< 80 v nesoi
77315 Electrical Conductors > 80 But =< 1000v W Cnctrs
77315 Elec Cond Ov 80v Nov 1000v Not Fitted W Connector
77317 Electric conductors for voltage exceeding 1000 v
77318 Insulated optical fiber cables with indvuly sh fbr
77322 Electrical insulators of glass
77323 Electrical insulators of ceramics
77324 Electrical insulators, nesoi
77326 Insulating fittings of ceramics for electrical mch
77328 Insulating fittings for machines made of plastic
77329 Inslt fit ex ceram/plas;elec cond tb/jnt,bmtl etc
77423 X-ray tubes
77429 X-ray/hi tnsn genr cntr pnl & dsk exm/trtmnt tb pt
77549 Parts of electric shavers and hair clippers
77579 Pts electromech domestc appl slf-cont elect motors
77589 Pts f heaters,hairdressing appr,flt iron,stove etc
77611 Cathode-ray tv picture tubes, color inc monitor
77612 Cathode-ray tv picture tubes, black and white etc
77621 Tv camera tbs; image cnvrtr & intnsfr; phtocthd tb
77623 Data/graphic display tubes,color, w/ pitch < 0.4 m
77623 Data/graphic display tubes, monochrome
77623 Cathode-ray tubes, n.e.s.o.i.
77625 Magnetron microwave tubes
77625 Klystron microwave tubes
77625 Microwave tubes, nesoi
77627 Receiver or amplifier tubes
77627 Thermionic and other cathode tubes nesoi
77629 Parts of cathode-bay tubes
77629 Parts of cathode tubes, nesoi
77631 Diodes ex photosensitive or light-emitting diodes
77632 Transistors ex photosenitive,disspation rate < 1 w
77633 Transistors, other than photosensitive, nesoi
77635 Thyristors, diac & triac, ex photosensitive device
77637 Photosnsitve semicndctr dvice inc phtvltc cell etc
77639 Semicndctr dvice ex photosensitive/photovoltaic cl
77641 Cards incorp. Elec. Integrated crct (smart cards)
77641 Metal oxide semiconductors(mos),mono digital inte
77641 Monolithic digital integ circuits,bipolar tchnolg
77641 Monolithic integrated circuits, digital, nesoi
77643 Electronic monolithic integrated circuit,n.e.s.o.
77645 Electronic hybrid integrated circuits
77649 Electronic microassemblies

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Appendix 1 continued

77681 Mounted piezoelectric crystals
77688 Parts for diodes, transistors & smlr semiconductrs
77689 Electronic integrated circuits and mcrssmbls parts
77812 Lead-acid batteries of a kind used for stg engines
77812 Lead-acid storage batteries nesoi
77812 Nickel-cadmium storage batteries
77812 Nickel-iron storage batteries
77812 Storage batteries nesoi
77817 Primary battery and cell parts
77819 Pts elect storage batteries inc separators thereof
77821 Filament lamps ex ultraviolet/infrared lamps nesoi
77821 Tungsten halogen electric filament lamps
77821 Filament lamp power nov 200 w & voltage over 100 v
77822 Discharge lamps, (ex ultraviolet), fluorescent
77822 Mercury or sodium vapor lamps; metal halide lamps
77822 Discharge lamps ex ultrvilt flurscnt ht cthde lamp
77823 Sealed beam electric lamp units
77824 Arc lamps
77824 Ultraviolet or infrared lamps
77829 Parts for elect filament, discharge or arc lamps
77831 Internal combustion engine spark plugs
77831 Internal combustion engine magnetos, magneto-dynam
77831 Distributors; ignition coils
77831 Internal combustion engine starter motors
77831 Internal combustion engine generators, nesoi
77831 Elect igntn/start eq f spark/comp eng; genrt nesoi
77833 Pts elect igntn/start equip; generators & cut-outs
77834 Lighting or visual signaling equipment for bicycle
77834 Elect lighting/visual signlng eq ex for bicycles
77834 Electrical sound signaling equipment for mtr vhl
77834 Wndshield wipr dfrstr & dmstr for cycle/mtr vehcle
77835 Pt elect lghtng/sgnlng eq wndshield wpr dfrstr etc
77848 Electromechanical hand tool parts
77861 Fixed capacitors, 50-60 hz, power, cpcty =>.5 kvar
77862 Tantalum electrolytic fixed capacitors
77863 Aluminum electrolytic fixed capacitors
77864 Ceramic dielectric,single layer fixed capacitors
77865 Ceramic dielectric, multilayer fixed capacitors
77866 Dielectric fixed capacitors of paper or plastics
77867 Fixed capacitors, nesoi
77868 Variable or adjustable (pre-set) capacitors
77869 Parts for electrical capacitors
77871 Particle accelerators,ion implanters for smcndctrs
77871 Particle accelerators, nesoi
77879 Pt elec mach & appr w individual functions, nesoi
77881 Permanent magnets made of metal
77881 Permanent magnets made of materials o/t metal
77881 Electromagnetic couplings, clutches and brakes
77881 Electromagnetic lifting heads
77881 Electromagnets,clamps, similr hldng devices & part
77882 Electrical signaling or traffic control eqpt rail
77882 Electrical signaling or traffic control eqpt,nesoi
77883 Parts for elc signaling, traffic, safety equipmnt
77885 Parts of electric sound or visual signaling aprts
77886 Carbon electrodes of a kind used for furnaces

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Appendix 1 continued

77886 Carbon electrodes nesoi
77886 Electrical carbon or graphite brushes
77886 Electrical carbon or graphite articles, nesoi
77889 Electrical parts of machinery nesoi in chapter 85
78410 Chas w eng f trac, mtr veh f pass/gd & special pur
78421 Bodies f mtr car/vehicles for transporting persons
78425 Bodies f road tractors and motor veh(pub tran,etc)
78431 Bumpers and parts, for motor vehicles
78432 Safety seat belts for motor vehicles
78432 Pts & access of bodies of motor vehicles, nesoi
78433 Mounted brake linings for motor vehicles
78433 Brakes and servo-brakes & pts for motor vehicles
78434 Gear boxes for motor vehicles
78435 Drive axles with differential for motor vehicles
78436 Non-driving axles & pts thereof for motor vehicles
78439 Road wheels & pts & accessories for motor vehicles
78439 Suspension shock absorbers for motor vehicles
78439 Radiators for motor vehicles
78439 Mufflers and exhaust pipes for motor vehicles
78439 Clutches and parts thereof for motor vehicles
78439 Steering wheels, columns & boxes f motor vehicles
78439 Parts and accessories of motor vehicles, nesoi
78535 Saddles and seats of motorcycles
78535 Parts of motorcycles, nesoi
78536 Parts & accsries of carriages for disables persons
78537 Frames and forks, and prts for bicycles etc.
78537 Wheel rims and spokes for bicycles etc.
78537 Hubs,other than coster brakn hubs,hb brks,spk,whls
78537 Brakes, incl coaster brkng hubs,hub brks,prts,nes
78537 Saddles for bicycles etc.
78537 Pedals and crank-gear, parts of bicycles etc.
78537 Parts and acessories nesoi of bicycles etc.
78689 Pts trailers, semi-trailer & ot veh n mech propeld
87119 Parts etc of binoculars, optical telescropes etc
87139 Pts for microscopes, exc optical; diffraction
87149 Pts & accessories for compound optical microscopes
87199 Pts of liq crystal device, laser&oth optical,nesoi
87319 Pt acces gas lqd elec supply mtr inc clbrating mtr
87325 Speedometers and tachometers; stroboscopes
87329 Pts for revolution counters, odometer, etc
87412 Pts, for direct find compasses, navigational inst
87414 Parts and accessories for surveying etc nesoi
87424 Pts, for drawing etc & inst for measuring lgth ins
87426 Pts, of mach nesoi in this chap,& profile projectr
87439 Pts, inst & apprts measure/check variables liq/gas
87454 Pts, machine & appln, test hardness/strength, etc
87456 Pts, hydrometers, therometers, pyrometers, etc
87461 Thermostats
87463 Manostats
87469 Pts, autom regulating/controlling inst & apprts
87479 Pts of inst f meas elect quat alpha beta inzng rdt
87490 Pts, nesoi for machines,appln,inst/appts of chap90
88112 Photo flashbulbs, flashcubes and the like
88113 Photo discharge lamp (electronic) flashlght apprts
88113 Photographic flashlight apparatus nesoi

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Appendix 1 continued

88114 Parts and accessories for still photo cameras
88115 Pts, photographic flashlight exc nesoi
88123 Parts and accessories for cinema cameras
88124 Parts and accessories for cinema projectors
88134 Pts, of image projector,enlarger&reducer exc cinem
88136 Pts & access of apprt & equip for photo/cinema lab
88422 Parts for frames and mountings, spectacles, etc
88431 Objctve lenses pts access for cameras projectr etc
88432 Objective lenses and parts, nesoi
88433 Filters & parts & accessories for instr & appratus
88439 Prism, mirrors, mounted & parts & accessorie, neso
88571 Inst panel clk & clk simlr,for vehicle,aircrft,etc
88591 Wtch cases,prcs metal or metal clad w prcs metal
88591 Watch cases of base metals, gold or silver plated
88591 Watch cases, nesoi
88591 Parts for watch cases of any material
88597 Clock cases of metal
88597 Clock cases of other than metal
88597 Parts for clock cases, nesoi
88598 Complete movements of watches,unassem/ptly assembl
88598 Incomplete movements of watches, assembled
88598 Rough movements of watches
88598 Compl clk movemnt, unassemble/ptly assem,rough etc
88599 Clock or watch springs, including hair springs
88599 Clock or watch jewels
88599 Clock or watch dials
88599 Clock or watch plates and bridges
88599 Parts for clocks or watches, nesoi

Source: Athokorala (2010)

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Global Production Networks and Economic Corridors

Can They Be Drivers for South Asia's Growth and Regional Integration?

This paper examines the role of economic corridors in facilitating the access of South Asian countries to global production networks, in particular those based in East Asia and Southeast Asia. It does so by first reviewing the state of regional trade integration in South Asia. It then examines the nature of engagement of South Asia, particularly India, with the global production networks based in East and Southeast Asia. Finally, the paper discusses the role of regional and national economic corridors that could potentially link South Asia to the rest of Asia, and identifies the key determinants of greater integration of South Asia with the global production networks based in East and Southeast Asia.

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