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Abstract: This paper examines the emerging trends and patterns of merchandise trade in Southeast Asia and their implications for growth and structural changes in domestic manufacturing, with emphasis on the on-going process of global production sharing. The analysis reveals that participation in global production networks (GPNs) has strengthened economic interdependence among the Southeast Asian countries, and between these countries and China and the other major economies in East Asia, but this has not lessoned the dependence of growth dynamism of these countries on the global economy. The operation of the regional cross-border production networks depends inexorably on trade in final goods with North America and the European Union. Reflecting differences in policy regimes and the overall business climate, the degree of integration within GPNs and the resultant impact on industrial upgrading varies notably among the countries in the region.

Key words: global production sharing, global production networks, Southeast Asia, industrialization

JEL Codes: F14, L60, 019, 053,

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Global Production Sharing, Trade Patterns and Industrialization in Southeast Asia

Global production sharing ── the dispersion of separate stages (tasks) of an integrated production process across national boundaries ── has been a major factor in the economic dynamism of the Southeast Asian economies. Led by Singapore and Malaysia, the Southeast Asian economies have been major and successful participants in global production networks. 'Network products' (parts and components, and final assembly traded within production networks) constitute almost two thirds of the merchandise exports of Singapore, Malaysia, and the Philippines, while they have been a significant proportion in the case of Thailand and to a lesser extent Indonesia. From a small and recent base, they are growing quickly in Vietnam, while beginning in 2012 Cambodia has begun to participate in global production networks on a modest scale.

The purpose of this chapter is to document, analyze and explain Southeast Asia's engagement in global production sharing and to examine its implications for the process of industrially transformation in these countries. The chapter has two main objectives: to broadening our understanding of economic performance and structural changes in the Southeast Asian economies in the era of economic globalisation and to contribute to the wider literature on the role of global production sharing as a prime mover of global economic integration of developing countries.

The chapter is structured in five sections. It begins with a historical overview of Southeast Asia's engagement in global production sharing. The following section examines trends and patterns of trade based on global production sharing ('network' trade) in Southeast Asia from a comparative regional and global perspective. The next section probes the implications of global production sharing for growth and structural changes in domestic manufacturing, with a focus on the on-going debate on industrial

upgrading ('graduation from the middle'). The concluding section summarizes the key findings and draws some policy inferences.

A Brief History

Southeast Asia's engagement in global production sharing dates back to 1968 when two US companies, National Semiconductors and Texas Instruments, began assembling semiconductor devices in Singapore (Lee 2000). By the beginning of the 1970s Singapore had the lion's share of offshore assembly activities of the US and European semiconductor industries. As early as 1972 the MNEs with production facilities in Singapore began to relocate some low-end assembly activities in neighbouring countries, particularly Malaysia, Thailand and the Philippines, in response to the rapid growth of wages and rental costs. Many newcomer multinational enterprises (MNEs) to the region also set up production bases in these countries bypassing Singapore. By the late 1980s this process had created a new regional division of labour, based on differences in relative wage and skill requirements in different stages of the production process. At the time when production bases began to spread to the neighbouring countries, there was a widespread concern in policy circles in Singapore that the regional spread of MNE operations in the electronics industry could be at the expense of Singapore. However, the subsequent developments vividly demonstrated that 'the larger the scale and scope of electronic industry, which produces a wide range of heterogeneous end-products, each of which needs a large number of equally heterogeneous components in its manufacture…., the greater the economies of scale and more the opportunities for specialization for all participating countries' (Goh, 1990).

The US semiconductor producers set up assembly plants in Hong Kong, South Korea and Taiwan in the early 1960, well before their entry into Singapore (Gundwal and Flamm 1985).[1] Yet, by the early 1970s Singapore had become the largest source country

[1] The beginning of international of US-based semiconductor industry can be traced from 1961, when Fairchild set up a transistor assembly plant in Hong Kong (Gunwald and Flamm, 1985, p. 69).

of semiconductor devices imports to the US, accounting for nearly 25% of total imports. By the early 1980s, Southeast Asia accounted for over 70% of US total semiconductor devices imports; the combined share of Hong Kong, Taiwan and Korea had dropped to 17% (Table 1).

Table 1 about here

Southeast Asia's dominance in the global semiconductor industry within developing Asia is in sharp contrast to the three East Asian countries' far superior performance in manufactured exports in general during this period. What explains this difference? The 'guided' industrial development policy in Taiwan and Korea could have played a role. These countries (Korea in particular) followed the Japanese pattern by relying on non-equity arrangements rather than FDI to access technology and other MNE-controlled assets (Amsden and Chu 2003, Wade 1990). However, following Goh Keng Swee (1993), the architect of modern Singapore's spectacular economic development, one can argue that this difference largely emanated from the nature of the investment environment in the region. At this time, China's Cultural Revolution was reaching its height, and political stability was a key factor governing the location decisions of assembly operations by electronics MNEs. To quote Goh,:

> It is a matter for speculation whether in the absence of the upheaval caused by the Cultural Revolution in the mid- and late 1960s, the large American multinationals – among them National Semiconductors and Texas Instruments – would have sited their offshore factories in countries more familiar to them, such as South Korea, Taiwan and Hong Kong. These had resources and skills superior to Singapore. My own judgment remains that these three areas were too close to the scene of trouble, the nature of which could not but cause alarm to multinational investors. (Goh, 1993, p. 253).

This argument receives further support from the fact that US semiconductor firms favoured Singapore (and subsequently Malaysia, Thailand and the Philippines) over not only Korea and Taiwan, but also Hong Kong, a country that followed almost laissez-faire

economic policy throughout. By the early-1980s when political risk had waned and industrial policy had become receptive to FDI, wage levels in these countries had already increased to levels which made them less attractive as labor-intensive assembly locations compared to the Southeast Asian countries other than Singapore.

By the mid-1980s, the hard disk drive assemblers entered Singapore, further boosting the country's role as a global assembly centre. During the next five years there was a notable change in the composition of the island's electronics industry with computer peripherals, especially hard disk drives, becoming relatively more important compared to semiconductor assembly. By the late 1980s, most major global players in this industry, including Seagate, Maxtor, Hitachi Metals, Control Data, Applied Magnetic and Conner Peripherals, set up assembly plants in Penang, and Singapore had become the world's largest exporter of hard disk drives, accounting for almost half of world production (McKendrick *et al*., 2000). As in the case of semiconductor industry, a regional production network encompassing Malaysia, Thailand and the Philippines and centered in Singapore have developed by the early 1990s.

Until about the early 1990s, Southeast Asian countries' engagement in global production sharing was predominantly a two-way exchange with the home countries of MNEs: parts and components were brought to these countries for assembly, and the assembled parts and components were then re-exported to the home country to be incorporated in final products. As supply networks of parts and components became firmly established, producers in advanced countries began to move the final assembly of an increasing range of electronics and electrical goods such as computers, cameras, TV sets and motor cars) to Southeast Asian locations. This process intensified following the rapid appreciation of the yen following the Plaza Accord in 1985, which propelled Japanese MNEs in electronics and electrical goods industries to relocate assembly plants in Southeast Asia to maintain their international competitiveness.

Over the years Singapore's role in regional production networks has gradually shifted from low-skill component assembly and testing to component design and fabrication and providing headquarter services for production units located in the neighbouring countries. Singapore's attractiveness as the regional centre of cross-border

production networks has been continuously enhanced by the policy emphasis of the government on infrastructure development, expanding the human capital base, maintaining labour relations in a manner highly conducive for international production, and sound macroeconomic management (McKendrick *et al*., 2000).

In recent years, the East Asia production networks have begun to spread to Vietnam and Cambodia. Following the market-oriented policy reforms started in the late 1980s, a number of Korean, Taiwanese and Japanese firms set up assembly plants in Vietnam, but these ventures were predominantly of the conventional import-substitution variety with little links to the global production networks of the parent companies. From about the late 1990s parts and components assembly within regional production networks began to emerge, mostly with the involvement of small- and medium-scale investors from Taiwan and Korea, which only one major global player, Hitachi from Japan. A major breakthrough occurred with the decision made in February 2006 by Intel Corporation, the world's largest semiconductor producer, to set up a $300 million testing and assembly plant (subsequently revised to $1 billion) in Ho Chi Minh City. The Intel plant started commercial operation in early 2011 and is expected to eventually employ over 3,000 workers. The early experience in Singapore, Malaysia, Thailand and the Philippines indicates that there is something of a herd mentality in the site selection process of MNEs in the global electronics industry, particularly if the first entrant is a major player in the industry.

It seems that, following Intel's entry, this process has already begun to replay in Vietnam (Athukorala and Tran 2012). A number of other major players in the electronics industry have already come to Vietnam following in the footsteps of Intel. These include the Taiwanese-based Hon Hai Precision Industry and Compact Electronics (the world's largest and second-largest electronics contract manufacturers) and Nidec Corporation (a Japanese manufacturer of hard disk drive motors and electrical and optical components). In 2009, Samsung Electronics set up a large plant in Hanoi for assembling hand held products (HHPs) (smart phones and tablets). Over the past four years, Samsung has been gradually shifting HHP assembly from its plant in China to the Vietnam plant as part of a strategic production diversification strategy in response to increasing wages and rental

cost in China. In 2009, 65% of Samsung's global HHP supply came from China, with Vietnam contributing to a mere 3%; by the end of 2012 these figures had changed to 45% and 33%, respectively. In 2012, Samsung Vietnam's production capacity reached 150 million units, and its total exports (about US$11 billion) amounted to 11% of Vietnam's total merchandise export earnings.[2]

There are also early signs of regional production networks expanding to Cambodia. In 2011, Minebea, a large Japanese MNE which produces a wide range of parts and components for the automotive and electronics industries, set up a plant (Minebea Cambodia) in the Phnom Penh Special Economic Zone to assemble parts for cellular phones using components imported from its factories in Thailand, Malaysia and China. Minebea Cambodia currently employs 1,300 workers and it has plans to expand to a total workforce of 5,000 within two years. The other MNEs which have set up assembly plant in Cambodia include Sumitomo Corporation, Japan (wiring harnesses for cars); Denso, Japan (motorcycle ignition components); Pactics, Belgium (sleeves for sunglasses made by premier eyewear companies); and Tiffany & Company, USA (diamond polishing). There is anecdotal evidence that a number of other Japanese companies which have production based in China and Thailand are planning to relocate some segments of their production process in Cambodia. Rising wages and rental costs in China and the neighbouring Thailand, and production disruption caused by recent floods in Thailand, are considered the drivers working to Cambodia's advantage (*Business Day* 2013).

Despite obvious advantageous in terms of its location and relative wages, Indonesia has continued to remain a small player in regional production networks. Its engagement has so far been limited only to some low-end assembly activities undertaken mostly by Singaporean subcontracting companies in the Batam free trade zone (BFTZ).[3] In the early 1970s two major electronics MNEs, which had already established production bases in Singapore, did set up assembly plants in Indonesia (Fairchild and

[2] The discussion here on Samsung's operation in Vietnam is based on a conference presentation made by Seokmin Park, Vice President and Head, Corporate Supply Chain Management of Samsung (Park 2013).

[3] Batam, a 715 km^2 island (almost identical in size to Singapore) located in the Riau Islands Province of Indonesia, was declared a free trade zone in 1989 as part of the Singapore-Johor-Riau (SIJORI) growth triangle (Kumar 1994).

National Semiconductor, established in 1973 and 1974 respectively), but both plants firms were closed down in 1986. At that time there was a worldwide slump in semiconductor business. However, it is not clear whether external demand factors played an important role in their departure from Indonesia. Both MNEs continued their operation in both Singapore and Malaysia with some restructuring and labour shedding in response to demand contraction. The unfavorable business environment, in particular labour market rigidities, that hindered restructuring operations in line with global changes in the semiconductor industry, appears to be the major reason. According to press accounts at the time, in 1985 Fairchild announced a plan to introduce new technology that would have involved some reduction in their workforce, but the Ministry of Manpower opposed any retrenching resulting from automation (Thee and Pangestu 1998).

The issue of why Indonesia is left behind in global production networks was brought into sharp relief recently (in September 2011) when the Canadian firm, Research in Motion (RIM), the Blackberry producer, decided to set up an assembly plant in Penang, Malaysia bypassing Indonesia (Manning and Purnagunawan 2011). Indonesia is the major market for the Blackberry in Southeast Asia, accounting for some 75% of its total annual sales in the region, and almost ten times the annual sales of 400,000 in Malaysia. Therefore, when RIM announced its plan to set up a production base in Southeast Asia, there were high hopes in Indonesian policy circles that Indonesia would be its preferred location. Indonesian authorities were perplexed by RIMs decisions to go to Penang and the industry minister even announce the possible introduction of punitive import tariffs on luxury goods such as the BlackBerrys. However, it is not hard to understand the reason behind RIM's decisions in favour of Penang. Penang has been a world centre for electronics for nearly three decades (Athukorala 2011b), whereas, as discussed, Indonesia has had a chequered record in attracting multinational enterprises involved in global production sharing. There has not been any notable improvement in the investment climate in the country compared to the situation in the 1980s when Fairchild and National Semiconductor closed down their operations. While the proposed luxury tax was never implemented, it vividly reflected the ever-present tension in Indonesia between the declared official commitment to an open economy and the continuing protectionist leanings.

Trade patterns

The combined share of Southeast Asia in total world non-oil exports increased from 3.1% in the early 1970s to nearly 6% by 2009-10.[4] Rapid export growth has been underpinned by a profound shift in export structure away from primary commodities and toward manufactures. The share of manufacturing in total non-oil exports from South-east Asia stood at 72% by 2009-10, up from a mere 11% four decades ago. Among individual countries, the manufacturing share is still significantly lower than the regional average in Indonesia (54%), Vietnam (67%) and smaller Indochina economies (58%), reflecting both the nature of resource endowment and their later adoption of export-oriented industrialization strategies. But the rapid increase in the share of manufacturing is a common phenomenon observable across all countries in the region.

The past two decades have seen palpable shift in global production sharing away from mature industrial economies toward developing countries and in particular countries in East Asia (Table 2). The share of developing countries in total world network trade (parts and components, and final assembly) increased from 22.0% to 47.6% between 1992-03 and 2009-10, with the share of Developing East Asia (DEA)[5] increasing even faster, from 13.8% to 33.3%. Within East Asia, Southeast Asia's share in world network trade increased from 5.6% to 7.6% during this period. At the individual country level, all major Southeast Asian countries, with the exception of Singapore, have shown an increase in their export market shares. The mild decline in Singapore's share reflects a marked shift in its role in global production networks for high-tech industries away from the standard assembly and testing activities to oversight functions, product design, and capital and technology-intensive tasks in the production process. Some, if not most, of

[4] The data used in this section for all countries other than Taiwan are compiled from the United Nation's *Comtrade* Database, based on Revision 3 of the Standard International Trade Classification (SITC Rev. 3). Data for Taiwan are obtained from the trade database (based on the same classification system) of the Council for Economic Planning and Development, Taipei. For details on the classification system used in separating network trade (parts and components, and final assembly) from the trade data extracted from these sources, see Athukorala 2011a. In order to minimize the effect of possible random shocks and measurement errors, two-year averages are used in inter-temporal comparison throughout this section.

[5] As noted, DEA refers to East Asia excluding Japan.

these new activities are in the form of services and are, therefore, not captured in merchandise trade data (Wong 2007).

Table 2 about here

Table 3 about here

The share of network trade in total manufacturing trade is much higher in East Asia compared to the other major regions (Table 3). In East Asia Southeast Asian countries in particular stand out for their heavy dependence on global production sharing for their export expansion. In 2009-10, network exports accounted for nearly 70% of total manufacturing exports in Southeast Asia, up from 57% in the early 1990s. Malaysia, Singapore and the Philippines figure prominently for their heavy dependence on network trade compared to the other countries in the region. The patterns observed on the export and import sides are broadly similar, reflecting growing cross-border trade within production networks.

When total network trade is disaggregated into parts and components (henceforth referred to as components for brevity) and final assembly, countries in Southeast Asia stand out from the rest of East Asia for their heavy reliance on parts and component and the increase over time in the degree of component intensity of their trade flows within global production networks. Components accounted for 85% of total network exports of Southeast Asia in 2009-10, up from 40% in 1992-93. The comparable figures for DEA for 1992-93 and 2009-10 were 39% and 59% respectively. This comparison clearly points to the growing importance of Southeast Asian countries as suppliers of components to final assembly activities within China-dominated regional production networks. Disaggregated data (not reported here owing to space limitations) show that in 2009-10, over 20% of component exports to China originated in Southeast Asia, up from 12% in 1992-93. The share of components in total non-oil exports to China from Southeast Asia increased from 38% to 63% between 1992-93 and 2009-10.[6]

The commodity composition of network exports from Southeast Asia is compared with the global patterns in Table 4. The data clearly point to the heavy concentration of

[6] Data compiled from the United Nation's *Comtrade* Database. See Note 4.

network exports from Southeast Asia in electronics and electrical goods (SITC 75, 76 and 77), in particular, semiconductor devices compared to the total world network exports. Automobiles and other transport equipment accounts for only 9% of Southeast Asian exports compared to a global average of 30%. At the individual country level, the composition of network exports from Thailand is much more diversified compared to the other countries. Thailand's commodity composition is also much more in line with the overall global patterns, with automobiles accounting for a much larger share compared to electronics. The striking difference between Thailand and Malaysia relating to the relative importance of automobiles within global production networks is particularly noteworthy. It clearly reflects the contrasting policies of the two countries relating to the domestic automobile industry.

Table 4 about here

At the early stage of Southeast Asia's engagement in global production sharing, when it was a two-way exchange with the home countries of MNEs involved, there was a clear developed-country bias in the geographic profile of their manufacturing trade (Table 5). However, over the years the geographic profile has shifted towards East Asia as regional production networks have expanded to encompass an increasing number of countries, and, in particular, the emergence of China as the premier assembly centre within global production networks. Between 1996-97 and 2009-10 the share of Southeast Asian manufacturing exports destined for Asian markets (including Southeast Asia) increased from 51.2% to 63.5%, accompanied by a decline in the share accounted for by the tradition North American and European markets from 38.3% to 25.5%. The share of exports to China in total exports soared from 8.5% to 19.0%. However, we need to treat these figures cautiously as indicators of change over time in the relative importance of regional (East Asian) and extra-regional markets for the growth dynamism of Southeast Asian countries. As can be seen in Table 6, the increase in exports to China and the other East Asian countries has largely been the direct outcome of rapid integration of these countries as components suppliers within the rapidly expanding China-centered regional production networks. Components account for over two-thirds of Southeast Asia's intra

East Asian trade. The expansion of component trade depends inexorably on demand for final goods and extra-regional markets still accounts for the bulk of final goods exported from these countries. This was vividly illustrated by the behaviour of trade flows following the onset of the global financial crisis (GFC). All major economies in Southeast and East Asia, including China, experienced a precipitous trade contraction for over six quarters from about the last quarter of 2008 (Athukorala and Kohpaiboon 2012, Table 4).

Table 5 about here

Table 6 about here

Southeast Asia and China in Production Networks

When China began to emerge as a major trading nation in late 1980s, there was a growing concern in policy circles in Southeast Asia, and in other Asian countries, that competition from China could crowd-out their export opportunities. Initially, the 'China fear' in the region was mainly related to export competition in the standard light manufactured good (clothing, footwear, sport goods etc.), but soon it turned out to be pervasive as China began to rapidly integrate into global production networks in electrical and electronics products through an unprecedented increase in foreign direct investment in these industries. The rapid increase in China's share in world exports markets in these product lines, coupled with some anecdotal evidence of MNEs operating in Southeast Asian countries relocating to China, led to serious concern about possible erosion of the role of Southeast Asian countries in global production networks. These concerns gained added impetus from China's subsequent accession to the WTO, which not only provided China with most-favoured nation (MFN) status in major markets but also enhanced China's attractiveness to export-oriented investment by reducing the country risk of investment (Athukorala 2009).

As we have noted, there has been a significant contraction in final assembly of consumer electronics and electrical goods exported from Southeast Asia as an outcome of

competitive pressure from China for final assembly[7]. However, this structural shift has not resulted in a 'hollowing out' of production bases in Southeast Asia. On the contrary, the past two decades have seen a close complementarity between China and Southeast Asian countries within global production networks, for three reasons.

First, expansion in final assembly in China has created new demand for parts and components assembled in Southeast Asia. Benefitting from this, electronics firms involved in component design, assembly and testing restructured their operations by moving into high-value tasks in the value chain. This process has been greatly aided by the deep-rooted nature of their production bases and the pool of skilled workers developed over the past three decades.

Second, a number of large electronics MNEs have shifted regional/global headquarter functions to Singapore and Penang. Manufacturing is only part of their operations. Their activities now encompass corporate and financial planning, R&D, product design and tooling, sales and marketing. Some MNEs, which have shifted final assembly of consumer electronics and electrical goods to China, perform global headquarter functions relating to their operations in China from Singapore and Malaysia (Penang). Some of them now use their affiliated firms in Singapore and Malaysia as focal points of their global training and skill enhancement programs (Athukorala 2011b).

Third, while the electronics industry is still the main engine of growth in the region, in recent years the production base has begun to diversify into a number of electronics-related dynamic product lines, in particular in Singapore, Malaysia and Thailand. These include medical services and equipment, light emitting diodes (LED), and photovoltaic design and development. Over the past decade or so, Singapore has become a production hub of medical devices (MIT 2013).

Determinants

A number of factors seem to have underpinned the continued attraction of the Southeast Asia as a location of assembly activities within global production networks. First, despite rapid growth, manufacturing wages in all Southeast Asian countries except Singapore

[7]Final assembly is generally more labour intensive than component assembly, production and testing.

remain lower than or comparable to those in countries in the European periphery and Latin America. At the same time, there are significant differences in wages among the countries within the region, permitting rapid expansion of intra-regional product sharing systems (Table 7).

Table 7 about here

Second, the relative factor cost advantage of Southeast Asian countries has been supplemented by relatively more favorable trade and investment policy regimes, trade-related infrastructure and communication systems (Athukorala and Hill 2011). This would have facilitated cross-border production sharing among these countries by reducing the cost of maintaining 'services links' (*a la* Jones and Kierzkowski 2000) within production networks. Efficient and speedy services links are vital for the smooth functioning of production networks and as a key determinant of scale economies involved in global production sharing.

Third, as first comers in this area of international specialization, Southeast Asian countries, in particular Malaysia, Singapore and Thailand, seem to offer considerable agglomeration advantages for companies that are already located there. Site selection decisions of MNEs operating in assembly activities are strongly influenced by the presence of other key market players in a given country or neighbouring countries. Against the backdrop of a long period of successful operation in the region, many MNEs, particularly the US-based ones, have significantly upgraded the technical activities of their regional production networks in Southeast Asia and assigned global production responsibilities to affiliates located in Singapore and more recently also to those located in Malaysia and Thailand. All in all, the ASEAN experience seems to support the view that MNE affiliates have a tendency to become increasingly embedded in host countries the longer they are present there and the more conducive the overall investment climate of the host country becomes over time (Rangan and Lawrence, 1999). At the formative stage of MNE entry into setting up production bases in the region, there was a general perception that these firms would soon prove to be 'fly-by-night' operators. However, the data on firms in operation clearly indicate that most MNEs have become deep rooted

in the region. For instance, the expansion of the Penang export hub began during 1972-75 with the setting up of assembly plants by eight MNEs, National Semiconductors, Intel, Advanced Micro Devices, Osrum, Hewlett Packard, Bosch, Hitachi, and Clarion (the latter a Japanese auto part producer), which are known locally as the 'Eight Samurai. After almost half a century, Penang still remains a vital link in the global production networks of these companies. For some of these firms, the Penang facility is the focal point of their operations in the Asian region (Athukorala 2011b).

4. Global Production sharing and manufacturing performance

This section examines the role of global production sharing in manufacturing performance of Southeast Asia countries. The available production–side data (based on manufacturing surveys) do not permit directly linking network trade with manufacturing performance. The second-best approach followed here is to delineate the industries in which global production sharing is heavily concentrated as revealed by the analysis of trade patterns in the previous section (which we dub here 'global production sharing' (GPS) industries) and compare their performance with the other (non-GPS) industries. The data are compiled from the *INDSTAT* database of the United Nations Industrial Development Organization (UNIDO), which brings together data from the annual surveys of manufacturing conducted in individual countries under a uniform format at the four-digit level of the International Standard Industry Classification (ISIC). The list of GSP industries used in data compilation is given in the appendix. We examine the contribution of GSP to the process of industrialization in terms of five performance indicators: share in total manufacturing output (value added), employment, and value added share in gross output, real wages, and labour productivity. These indicators for the five major Southeast Asian countries are summarized in Table 8.[8]

Table 8 about here

[8] We have excluded petroleum refining (ISIC 2320) from total manufacturing in compiling these indicators in order to maintain inter-country comparability.

The relative importance of GPS industries in domestic manufacturing sector varies significantly among the five countries.[9] Among the five countries Singapore and Thailand stand out for the contiguous increase in the share of GSP industries in total manufacturing during the period 2000-2008: from 60.1% to 71.6% in Singapore and 41.2% to 46.8% in Thailand[10]. In both countries the increase was underpinned by a notable diversification of the GPS product mix. In Singapore, while the 'tradition' electronics industry recorded a modest increase (from 42.4 to 46.8%), the 'other GSP' category which encompasses new product lines such as medical, surgical and orthopedic equipment, and optical and photographic equipment jumped from 13.4% to 21.8%. In Thailand, there has been a notable shift in the product mix away from electronics and towards electrical goods and, more importantly, towards automobiles. The output shares of these industries increased from 8.8% to 12.0% and 8.4% to 14.5%, respectively.[11] The data clearly illustrate the 'outlier status' of Indonesia in terms of the degree to which domestic manufacturing is integrated within global production networks. The share of GSP products in total in Indonesian manufacturing in 2007-08 was 27.0%, down from 32.6% in 2000-01.[12]

An in-depth analysis of the underlying causes of inter-country differences in the performances of GSP industries is beyond the scope of this chapter. But there evidence to suggest that at least part of the explanation lies in the nature of investment climate within

[9] The data on the share of GPS products in total manufacturing reported here (which are based on nominal manufacturing value added) need to be interpreted with care because during this period the prices of these products, in particular electronics and electrical goods, grew at a slower rate compared to those of most other manufactured products. For instance, according to the data for Thailand, the only country in Southeast Asia for which manufacturing sector data at the 4-digit ISIC level are available both in current and constant prices), during 2001- 2008 the implicit price deflator of GPS products sector and other manufactured goods increased at annual rates of 2.8% and 5.8%), respectively (Calculated from the National Economics and Social Development Board (NESDB), Thailand database).

[10] In Table 8, we have reported data only for the two end points of the period under study for want of space, but the time patterns of the data for the interim years are consistent with inference made in this section.

[11] For details on the diversification of Thai GPS production base, in particular on the emergence of Thailand as the hub of automobile assembly ('Detroit of Asia') see Athukorala and Kohpaiboon 2010, Kohpaiboon and Jongwanich 2012 and Kohpaiboon et al 2010.

[12] A notable exception is the expansion of the share of automobiles. In recent years Indonesia has emerged as a regional hub for assembly of multipurpose vehicles by Toyota (Innova and Avanza models) and Honda (Stream and Freed models).

which GSP industries operates. Notwithstanding rapid increase in labour and rental cost, Singapore has continued to remain an attractive location within global production networks for high-value, more sophisticated tasks in the value chain because of the excellent overall investment climate which places the county at the top notch in various global business/investment climate rankings (eg Word Bank 2010 & 2012) . The quality of technical and higher education institutions in Singapore has notably improved over the year in line with the requirements of industrial upgrading within global production networks. Singapore has also been following a business-friendly immigration policy which employers to import skill manpower at high levels, to make up for absent indigenous skills (Athukorala 2006). In Malaysia impediments to further expansion of GSP industries with a diversification into other more sophisticated product lines are deeply rooted in Malaysia's long-standing ethnicity-based economic policy Of particular importance is the growing scarcity of skilled manpower resulting from deterioration in the quality of higher education and the ever expanding role of the public sector which provides 'easy and more secure jobs for local jobseekers (Gomas 2011, Henderson and Phillips 2007, NAEC 2010).. Political instability and poor infrastructure is often figure prominently in the evidence on the nature of investment climate in the Philippines (World Bank 2010 and 2012; Calimag 2008)

Both within and inter-country differences in the share of employment in GPS industries mirror patterns of production (Table 8, Column 3 and 4). However in all five countries employment shares of GSP industries are smaller compared to their output shares, suggesting that these industries are generally less labour intensive compared to the other industries in general. This pattern is consistent with the view that even though global production sharing essentially involves offshoring relatively low-skill-intensive segments of the production process from advanced countries, these tasks are relatively more capital and shill intensive compared to the he low-skill activities in the recipient (host) country (Feenstra and Hansen 2003).

Value added share in gross output in GSP industries (Table 8, Columns 5 and 6) does not seem to vary in line with these industries relative contribution to manufacturing output and employment. For instance, in Singapore the share of value added in gross output in these industries *declined* from 22.5% to 21.8% between 2000-01 and 2007-08

even through, as already noted, both their the contribution to output and employment recorded impressive increases. In Thailand the increase in employment and output shares of GPS industries has accompanied by a remarkable stability (at around 20%) of the value-added share in output. In Malaysia and the Philippines too this share has remained around 20% without showing any relationship with the employment and output shares.

These observed patterns cast doubt on the relevance of the conventional 'domestic value added' criterion in assessing the gains from industrialisation through global production sharing. The input structure of component and final assembly in a given country as part of the global value chain is determined as part of the overall process of international production. The expansion in output and employment resulting from the engagement in global sharing in a given country depend predominantly (if not solely) on 'the volume factor', the expansion of sales turnover (and hence gross output) facilitated by the access to a vast global market though production sharing. Interestingly, value added shares in gloss output is much higher in Indonesia compared to the other four countries (47%). This is understandable because these industries in Indonesia are predominantly domestic market oriented; in domestic market-oriented industries there is much more scope using locally source inputs in the production process. All in all, it seems that in an era of global production sharing, there forging domestic linkages (increasing domestic value addition) and achieving rapid growth and employment expansion through engaging in international production are not mutually consistent policy objectives (Athukorala and Santosa 1997).

The pessimistic school of thoughts on national gains from global production sharing holds that, while this form of international exchange may generate new jobs in host countries, MNEs, which are the main actor in this new form of international exchange, tends to restrain real wage growth in a given production location as part of their strategy to maximize profits in their wider global operations. They have the flexibility to transfer production facilities from one country to another in response to changing labour market conditions, in sharp contrast to the difficulties of such a move for the import-substitution MNEs which are essentially 'location bound'. Thus, under given labour supply conditions, workers employed in these ventures are likely to experience

slower real wage growth compared to their counterparts in domestic-market oriented MNE affiliates and indigenous firms.[13]

The data on real wages reported in Table 8 are, however, not consistent with this view. In Singapore real wages in GPS increased from US$21764 to US$32264 between 2000-01 and 2007-08, compared to an increase of wages in other industries from US$20,928 to US$26,672. Similar patterns can also be observed in trends and patterns of real wages in the Philippines, Malaysia and Thailand, although the gap between wages in GSP industries and the other industries in these countries is not as large as in Singapore.

The wage restraint critique is based on the popular characterization of export-oriented MNEs in general as 'footloose ventures' whose locational decisions are based largely on unit labour costs. This characterization is not consistent with the corporate behaviour of MNEs involved in global production sharing. New communication technologies and more competitive international markets are causing MNEs to distribute their activities more aggressively across countries through global assembly and marketing networks as part of their business strategy. In this endeavour, they have little room to take a short-term view of the host country labour market conditions. Moreover, alternative investment locations are available in abundance: low wage countries are *not* necessarily good locations for investment. While labour cost is important, other factors such as the presence of strong (or potentially strong) indigenous supply capabilities, good infrastructure, political stability, and the relevant government policies usually figure prominently in the international investor's locational decisions. This is the simple reason why, despite widespread attempts to entice MNE participation in export-oriented industries, so far only a handful of countries have been able to establish themselves as investment locations favoured by MNEs in international production. As we have already noted, there is a general tendency for MNE affiliates operating within global production network to become increasingly embedded in host countries the longer they are present

[13] For useful syntheses of the contending view on the employment implications of the involvement of MNEs in DC manufacturing see Caves (20012), pp 110-123.

there and the more conducive the overall investment climate of the host country becomes over time. They may, therefore, respond sluggishly to relative cost changes.[14]

5. Conclusion

Global production sharing has become an integral part of the economic landscape of Southeast Asia. Trade within global production networks has been expanding more rapidly than conventional final-good trade. The degree of dependence on this new form of international specialization is proportionately larger the main Southeast Asian economies compared to the other countries in East Asia. The rapid integration of China into global production networks as the premier assembly centre has not been a zero-sum proposition from the perspective of the Southeast Asian countries. Rather, it seems to have added further dynamism to East Asia's role within global production networks. China has opened up opportunities for producing original, equipment-manufactured goods and back-to-office service operations in these countries.

Global production sharing has certainly played a pivotal role in the continued dynamism of East Asia and its increasing intra-regional economic interdependence. This does not, however, mean that the process has contributed to lessening the region's dependence on the global economy. The region's growth based on vertical specialization depends inexorably on its extra-regional trade in final goods, and this dependence has increased over the years.

Global production sharing has significantly transformed the overall industrial landscape in Southeast Asia. However there are notable differences among these countries in terms of trends and patterns of trade and production relating to their engagement in global production networks and the resultants developmental gains. Probing these inter-country differences, while paying attention to differences in policy

[14] Relative labour cost is presumably an important determinant of export performance in the traditional labour intensive products such as clothing, footwear and toys. In these industries MNEs are rarely direly involved in the production process. International trade in these products largely takes places within 'buyer-driven' production networks within which the 'lead firms' (mostly retail chains and speciality store in developed countries) have ample room for changing procurement sources based on cost competitiveness (Gerefi 1999).

regimes and the overall business climate, is an important item on the future research agenda for broadening our understanding of the economies of Southeast Asian countries.

Appendix

Global Production Sharing (GPS) industries at the four-digit level of the International Standard Industry Classification (ISIC)

Electronics	
3000	Office, accounting and computing machinery
3110	Electric motors, generators and transformers
3120	Electricity distribution & control apparatus
3130	Insulated wire and cable
3140	Accumulators, primary cells and batteries
3210	Electronic valves, tubes, etc.
3313	Industrial process control equipment
Electrical appliances	
2930	Domestic appliances
3150	Lighting equipment and electric lamps
3190	Other electrical equipment
3220	TV/radio transmitters and line communication apparatus
3230	TV and radio receivers and associated goods
2925	Food/beverage/tobacco processing machinery
Automotive	
3410	Motor vehicles
3420	Automobile bodies, trailers & semi-trailers
3430	Parts/accessories for automobiles
3591	Motorcycles
3599	Other transport equipment.
Other GPS	
2813	Steam generators
2899	Other fabricated metal products
2911	Engines & turbines (not for transport equip)
2912	Pumps, compressors, taps and valves
2913	Bearings, gears, gearing & driving elements
2914	Ovens, furnaces and furnace burners
2915	Lifting and handling equipment
2919	Other general purpose machinery
2921	Agricultural and forestry machinery
2922	Machine tools
2923	Machinery for metallurgy
2924	Machinery for mining & construction
2926	Machinery for textile, apparel and leather
2929	Other special purpose machinery
3311	Medical, surgical and orthopedic equipment
3312	Measuring/testing/navigating appliances
3320	Optical instruments & photographic equipment
3530	Aircraft and spacecraft parts

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Table 1: Shares of principal Asian exporters in total US imports of Semiconductor Devices[1], 1969-83

	1969-70*	1974-75*	1979-80*	1982-83*
Asia[2]	56	73	88	87
East Asia	43	33	19	18
Hong Kong	28	11	4	2
Korea	9	15	11	12
Taiwan	7	8	4	4
South East Asia	8	40	67	69
Singapore	8	18	21	14
Malaysia	---	19	30	32
Thailand	---	---	3	4
Indonesia	---	---	2	2
Philippines	---	3	12	18

Notes:

1. Imports belonging to the US tariff items 806.30 and 807.00
2. Developing Asia (Asia excluding Japan)

* Two-year averages.

--- Less than 0.5 percent

Source: Compiled from Grunwald & Flamm (1985),Table 3.7

Table 2: Geographic profile of world manufacturing trade: Total trade and network trade (percent)
(a) Exports

	Total Manufacturing		Network Products					
			Parts and components		Final assembly		Total	
	1992-3	2009-10	1992-3	2009-10	1992-3	2009-10	1992-3	2009-10
East Asia	28.3	35.1	29.6	43.2	34.1	39.1	32.2	42.5.
Japan	12.3	7.2	15.2	8.3	20.8	8.2	18.4	9.2
Developing East Asia (DEA)	16.0	27.9	14.4	34.9	13.3	30.9	13.8	33.3
China	4.5	14.7	1.7	14.4	2.4	18.9	2.1	17.3
Hong Kong, China	1.8	0.6	1.5	0.6	1.2	0.5	1.3	0.7
Taiwan	2.9	2.6	3.7	4.1	2.0	2.2	2.7	3.2
South Korea	2.3	3.6	2.2	5.8	2.0	3.7	2.1	4.1
South East Asia	4.5	6.3	5.2	9.8	5.8	3.3	5.6	7.6
Indonesia	0.6	0.5	0.1	0.5	0.1	0.3	0.1	0.5
Malaysia	1.2	1.8	1.7	3.7	1.9	0.5	1.8	2.5
Philippines	0.3	0.5	0.5	1.6	0.2	0.3	0.4	1.2
Singapore	1.5	1.3	2.3	2.5	2.6	0.7	2.5	1.9
Thailand	0.8	1.4	0.6	1.6	0.9	1.5	0.8	1.6
Viet Nam	0.0	0.3	0.0	0.2	0.0	0.1	0.0	0.1
South Asia	0.9	1.4	0.1	0.5	0.1	0.2	0.1	0.3
Developed countries	72.4	55.5	76.7	51.9	78.6	56.1	77.8	52.4
Developing countries	27.6	44.5	20.8	48.1	22.9	44.4	22.0	47.6
World	100	100	100	100	100	100	100	100

(b) Imports

East Asia	21.7	25.7	30.1	38.9	14.3	18.4	21.0	29.8
Japan	4.1	3.5	4.0	3.9	3.0	3.3	3.4	3.5
Developing East Asia (DEA)	17.6	22.3	26.1	35.0	11.2	15.2	17.6	26.0
China	2.9	9.1	3.0	13.8	1.5	6.3	2.2	10.7
Hong Kong, China	4.4	3.6	5.4	6.3	2.8	2.1	3.9	4.4
Taiwan	2.1	1.6	3.1	2.3	1.4	1.2	2.1	1.8
South Korea	2.0	2.2	3.1	2.5	1.1	1.6	1.9	2.1
Southeast Asia	6.2	5.7	11.5	10.3	4.4	4.2	7.4	7.5
Indonesia	0.8	0.4	1.1	0.3	0.3	0.3	0.6	0.3
Malaysia	1.4	1.4	3.0	2.5	1.1	1.2	1.9	1.8
The Philippines	0.4	0.5	0.6	1.2	0.2	0.5	0.4	0.8
Singapore	2.3	2.0	4.8	4.3	2.0	1.5	3.2	3.3
Thailand	1.3	1.2	2.0	1.5	0.8	0.7	1.3	1.0
Viet Nam	0.0	0.4	0.0	0.3	0.0	0.2	0.0	0.2
South Asia	0.9	1.3	0.7	1.1	0.4	0.9	0.6	1.0
India	0.5	1.1	0.4	0.9	0.2	0.8	0.3	0.8
Developed countries	71.4	59.1	82.7	51.0	68.8	66.5	74.7	57.3
Developing countries	28.6	30.9	17.3	49.0	31.2	33.5	25.3	42.7
World	100	100	100	100	100	100	100	100

Source: data compiled from UN Comtrade database.

Table 3: Share of network products in manufacturing trade, 1992-93 and 2009-10 (percent)

	Parts and components		Final assembly		Total network products		Share of parts and components in network trade (%)	
	1992-93	2009-10	1992-93	2009-10	1992-93	2009-10	1992-93	2009-10
(a) Exports								
East Asia	20.2	36.4	31.6	25.3	51.8	61.7	39.0	59.0
Japan	23.9	36.2	44.5	29.1	68.4	65.3	34.9	55.4
Developing East Asia (DEA)	17.3	38.5	21.8	24.7	39.1	63.2	44.2	60.9
China	7.4	20.5	13.7	36.8	21.1	57.3	35.1	35.8
Taiwan	24.7	44.7	17.6	20.9	42.3	65.6	58.4	68.1
Republic of Korea	18.1	43.2	22.2	25.5	40.3	68.7	44.9	62.9
ASEAN	22.7	59.2	34.1	10.1	56.8	69.2	40.0	85.5
Indonesia	3.8	19.5	5.6	18.0	9.3	37.5	40.9	52.0
Malaysia	27.7	65.5	40.7	13.2	68.4	78.7	40.5	83.2
The Philippines	32.9	71.2	20.5	16.3	53.4	87.5	61.6	81.4
Singapore	29.0	49.5	45.9	18.0	74.9	67.5	38.7	73.3
Thailand	14.1	44.5	29.0	21.4	43.1	65.9	32.7	67.5
Viet Nam	---	12.03	---	7.5	---	19.5	---	61.7
South Asia	2.3	8.1	2.9	4.2	5.1	12.3	45.1	65.9
India	3.0	10.4	3.4	3.7	6.4	14.1	46.9	73.8
Developed countries	20.4	25.2	28.5	23.6	48.9	48.8	41.7	51.6
Developing countries	14.6	35.2	21.8	18.4	36.4	53.6	40.1	65.7
World	19.3	28.2	26.3	23.0	45.5	51.2	42.4	55.1
(b) Imports								
East Asia	27.2	42.0	17.2	19.8	44.4	61.8	61.3	68.0
Japan	19.3	22.2	19.3	39.9	38.6	62.1	50.0	35.7
Developing East Asia	29.0	44.4	16.7	17.3	45.8	61.7	63.3	72.0
China	20.4	42.0	14.0	21.7	34.4	63.7	59.3	65.9

Taiwan	29.5	36.7	18.0	19.0	47.5	55.7	62.1	65.9
Republic of Korea	30.1	35.3	14.6	14.0	44.7	49.3	67.3	71.6
ASEAN	36.0	47.8	18.4	16.2	54.4	64.0	66.2	74.7
Indonesia	27.0	22.8	9.2	34.8	36.1	57.6	74.8	39.6
Malaysia	40.5	55.0	20.2	17.0	60.7	72.0	66.7	76.4
The Philippines	32.6	62.3	15.0	16.3	47.6	78.6	68.5	79.3
Singapore	39.9	51.0	21.9	26.7	61.8	77.7	64.6	65.6
Thailand	30.6	41.0	15.6	7.2	46.2	48.2	66.2	85.1
Viet Nam	---	19.1	---	9.6	---	28.7		66.6
South Asia	16.6	23.8	12.9	16.5	29.5	40.3	56.3	59.1
India	17.5	22.9	10.6	17.0	28.1	39.9	62.3	57.4
Developed countries	22.6	23.4	25.2	27.8	47.8	51.2	47.3	45.7
Developing countries	11.9	33.6	28.6	19.8	40.4	53.4	29.5	62.9
World	19.6	27.3	26.2	24.4	45.7	51.7	42.9	52.8

Source: Compiled from UN Comtrade database.

Note: … = data not available

Table 4: Composition of network products exported from Southeast Asia, 2007-2008 (%)

Commodity group[1]	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam	Southeast Asia	World
Automatic data processing machines (75)	11.4	33.7	*27.5*	18.2	24.4	22.3	23.1	11.0
Telecommunication and sound recording equipment (76)	18.8	15.8	2.9	9.3	9.3	12.6	10.5	11.9
Electrical machinery excluding semiconductors (77 - 776)	24.2	11.6	10.9	8.4	14.5	28.5	11.4	12.8
Semiconductors (776)	5.2	25.1	47.5	40.0	12.4	3.4	30.5	8.0
Road vehicles (78)	15.8	1.9	5.7	2.1	20.8	8.6	6.5	23.3
Other transport equipment (79)	5.7	1.5	1.0	2.8	2.7	4.2	2.5	6.6
Professional and scientific equipment (87))	1.2	4.0	0.6	3.0	1.6	1.9	2.7	5.6
Photographic apparatus and optical goods, watches and clocks (88)	1.2	1.4	2.6	1.4	2.9	3.1	1.8	2.0
Other	16.5	5.1	1.3	14.7	11.4	15.4	11.0	18.9
Total	100	100	100.0	100.0	100.0	100.0	100.0	100.0
US$ billion	15.7	78.0	35.0	178.7	70.2	6.9	384.4	5054.5

Note: 1 Standard International Trade Classification (SITC) codes given in brackets.

Source: Compiled from Un Comtrade database.

Table 5: Direction of Southeast Asian Manufacturing Trade, 1996-2010[1](%)

	Asia						North America	Europe	Other
[1]	Total	Korea & Taiwan	Japan	China	Southern Asia	Southeast Asia			
(a) Exports									
1996-07	51.2	4.5	10.7	8.5	1.8	25.7	22.9	15.4	10.6
1999-00	49.0	5.4	10.6	8.3	2.0	22.8	23.4	17.6	10.0
2004-05	57.6	5.9	9.6	14.1	2.7	25.3	18.2	15.1	9.1
2009-10	63.5	7.2	8.3	19.0	3.9	25.1	12.8	12.7	11.1
(b) Imports									
1996-07	59.0	9.9	25.2	6.1	0.8	17.0	17.4	16.2	7.4
1999-00	64.0	11.3	22.9	7.8	0.9	21.1	17.1	13.0	5.8
2004-05	67.6	11.3	18.6	14.2	1.4	22.2	13.2	12.6	6.5
2009-10	70.4	12.9	15.8	18.3	1.7	21.7	11.6	12.6	5.4

Note: 1 Two-year averages.
Source: Compiled from UN Comtrade database

Table 6: South Asia: Share of Parts and Components in Manufacturing Trade Flows, 1996-2010[1](%)

	Asia						North America	Europe	Other
	Asia	Korea &Taiwan	Japan	China	Southern Asia	Southeast Asia			
(a) Exports									
1996-97	50.8	42.5	31.0	41.6	32.4	46.8	47.8	46.6	42.9
1999-00	62.8	56.4	50.2	55.2	36.9	63.1	56.5	53.7	55.1
2004-05	65.3	67.2	53.9	67.5	38.3	59.6	48.6	50.9	54.6
2009-10	66.1	67.4	48.5	68.1	37.6	60.8	42.8	47.4	49.8
(b) Imports									
1996-97	54.0	31.3	32.4	30.1	16.0	51.1	40.2	30.4	35.2
1999-00	65.1	44.8	49.9	45.6	20.5	63.7	57.4	44.8	51.3
2004-05	68.1	52.7	50.5	52.1	10.7	60.5	64.7	45.5	53.1
2009-10	41.3	45.8	45.9	44.2	21.0	51.6	57.3	41.4	47.2

Note: 1 Two-year averages.
Source: Compiled from UN Comtrade database.

Table 7: Average annual compensation per production worker (US$): 1988, 1995, 2000, 2005

	1988	1995	2000	2005
Portugal	10407	19572	16795	29948
Spain	25267	38742	32695	45766
Ireland	22578	30974	32391	52875
Poland	---	---	10487	12643
Czech Republic	---	---	7454	12371
Hungary	---	---	9342	15645
Turkey	8333	16606	21493	28854
Argentina	10050	29898	32700	18234
Brazil	11296	23116	19142	17278
Mexico	5400	8809	11527	13971
Costa Rica	---	---	11377	14178
China	---	---	7180	8356
Hong Kong	8009	10315	14282	9374
South Korea	8153	25484	28347	37585
Taiwan	9793	22908	25313	27027
Indonesia	6727	5876	3893	4166
Malaysia	4971	6677	7957	11685
Philippines	3955	6814	7716	6827
Singapore	10200	18647	24477	27516
Thailand	5000	6045	6081	7324
India	3762	4579	6813	8835

Notes:

1 The data relate to majority-owned manufacturing subsidiaries of US Multinational enterprises operating in each country.

2 Salary/wage plus other remuneration.

Source: Compiled from the US Bureau of Economic Analysis (BEA) online database of the *Survey of U.S. Direct Investment Abroad* (http://www.bea.gov/scb/account articles/international/iidguide.htm#link123b).

Table 8: Key indicators of manufacturing performance in Southeast Asian countries, 2000-01 and 2007-08

	Composition output (value added)[2] %		Composition of employment (%)		Share of value added in gross output[2] (%)		Real wage (US$)[4]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2000-01	2007-08	2000-01	2007-08	2000-01	2007-08	2000-01	2007-08
Indonesia								
GSP industries[1]	32.6	27.0	9.7	11.3	41.9	41.7	1339	1219
Electronics	6.7	3.3	1.1	1.4	41.3	35.1	1331	1212
Electrical Appliances	4.4	2.9	1.8	1.2	29.0	29.2	1296	1166
Automotive	10.5	13.1	1.8	3.0	51.8	41.9	1750	1498
Other	11	7.7	5.0	5.7	38.4	51.6	1231	1086
Other manufacturing	67.4	73	80.6	77.4	34.8	32.2	1198	932
Total	100	100	100	100	35.3	36.9	1226	1363
Malaysia								
GPS products	54.8	46.5	47.7	42	19.8	17.8	5606	6078
Electronics	36.1	30.2	29.6	25.1	19.8	16.9	5753	6033
Electrical Appliances	8.1	5.3	8.8	5.7	14.8	13.1	5613	5936
Automotive	4.2	3.9	2.8	3.7	23.7	18.2	6359	5719
Other	6.4	6.5	6.5	7.5	28.8	22..6	6617	6207
Other manufacturing	45.2	54.0	52.3	58	27.7	28.5	5412	5323
Total	100	100	100	100	23.2	22.2	8740	8464
Philippines								
GPS products	59.6	49.2	40.5	40.7	31.4	26.5	2960	3018
Electronics	44.2	32.6	35	31.7	24.3	21.9	2590	2638
Electrical Appliances	3.1	3.8	1.6	3.9	31.7	22.5	3097	2216

Automotive	4.5	4.6	1.6	2.6	29.2	26	4006	3555
Other	7.8	8.2	2.3	2.5	38.2	30.7	3035	3287
Other manufacturing	41.4	50.8	59.5	59.3	41.6	36.2	2616	3076
Total	100	100	100	100	31.9	22.8	4505	4425
Singapore								
GPS products	60.1	71.6	52.9	61.2	22.5	21.8	21764	32264
Electronics	42.8	46.8	30.7	30.3	20.1	20.2	19151	31700
Electrical Appliances	3.4	2.0	3.6	2.5	19.9	16.1	24646	36746
Automotive	0.5	0.9	0.7	1.5	16.2	13.8	25401	33555
Other	13.4	21.8	17.9	26.9	35.7	26.1	22367	32095
Other manufacturing	39.9	28.4	47.1	38.8	21.6	21.7	20928	26672
Total	100	100	100	100	25.7	23.9	33589	53545
Thailand								
GPS products	41.2	44.9	29.2	23.3	20.2	20.1	2418	2836
Electronics	16.0	9.6	13.0	10.3	13.7	15.1	2277	2901
Electrical Appliances	8.8	12.0	3.8	3.4	23.1	20.3	2657	2719
Automotive	8.4	14.3	5.0	5.1	25.1	24.8	3090	3429
Other	8.0	9.0	6.4	11.5	22.6	20.6	2167	2669
Other manufacturing	58.8	55.1	70.8	76.7	28.2	26.2	2106	2600
Total	100	100	100	100	42.6	47.5	3266	4041

Note: 1. The industry classification used in separating 'global production sharing (GSP) industries is listed in the appendix.
2. Calculated using data is current $.
3. Nominal average annual wage of production workers in local currency deflated by the consumer price index (2000= 100) and converted into US dollar using the exchange rate in 2000.
--- Data not available.

Source: Complied using data extracted from UNIDO INDSTAT database supplemented by World Bank, World development Indicator Database (for consumer price index and implicit manufacturing deflator), Thailand Manufacturing Census (data on manufacturing wages for Thailand) .

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