

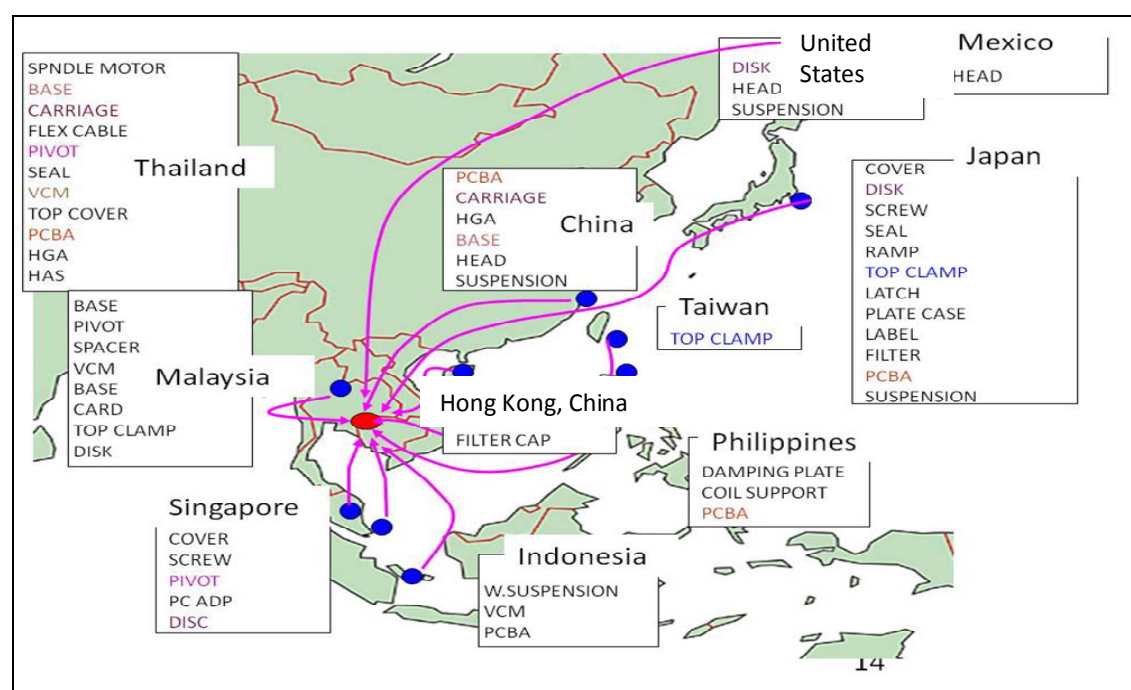
Chapter I

Driving forces of Asian international production networks: A brief history and theoretical perspectives

Witada Anukoonwattaka

During the past three decades, the process of global production sharing has created a new form of division of labour between Asian economies, especially in East and Southeast Asia. The rapid growth of production networks has dramatically transformed patterns of production and international trade in the region, with a notable expansion of intra-regional trade “through multiple border crossings of parts and components” (figure 3).

Figure 3. International production network of a hard disk drive made in Thailand



Source: Baldwin, 2010.

This chapter provides a brief review of the development process of the IPN phenomenon in Asia, followed by a literature survey, with the objective of providing an analytical framework for discussing the necessary conditions for the successful integration of a country into IPNs. It conveys important policy implications for setting trade and investment climates that encourage IPNs.

1. Brief overview of the development of Asian IPNs

International product fragmentation has been an important feature of the international division of labour since about the mid-1960s (Athukorala, 2008). Electronics MNCs based in the United States started the process in response to increasing pressure created by domestic real-wage increases and rising import competition from low-cost sources. The Government of the United States facilitated the process by introducing an outward processing tariff scheme under which companies were allowed to export material for processing overseas and to re-import the finished products, paying tariffs only on the value-added abroad (not the exported intermediates).

The growth of IPNs led to international division of labour between countries along the value chain, in which the term “vertical specialization” is used interchangeably to describe the same phenomenon as documented by Hummels, Ishii and Yi (2001). Consequently, intra-industry trade in parts and components has been growing rapidly between countries participating in IPNs as intermediate inputs are imported and used in goods that are subsequently exported (so called outward processing trade).

Using the Asian input-output table maintained by Japan’s JETRO, Baldwin (2008) concludes that international production sharing in Asia has developed from a simple North-South outward processing trade to a much broader phenomenon, for which the term “Factory Asia” is widely used. The process of linking Asia to global supply chains began in the 1960s in the electronics industry with the arrival of two United States companies, National Semiconductors and Texas Instruments, which set up plants in Singapore to assemble semiconductor devices (Athukorala, 2008 and Goh, 1993). From around the late 1970s, MNCs with production facilities in Singapore began to relocate some low-end assembly activities to neighbouring countries (particularly Malaysia, the Philippines and Thailand). Many MNCs that were newcomers to the region also set up production bases in those countries. Singapore has since become a regional centre for component design and fabrication as well as providing headquarter services for production units located in neighbouring countries.

Although the United States electronics MNCs started their IPNs in Asia in the 1960s, the vertical specialization form of trade was more important in North-North trade among European and North American nations up until the early to mid-1980s (Amador and Cabral, 2008). Initially, the United States MNCs explored opportunities for North-South offshoring in neighbouring countries in Latin America, but the unfavourable investment climate in those countries – macroeconomic instability, political tensions, trade union upheavals and uncertainty – led American producers to switch to sub-suppliers located in Asia (Feenstra, 1998; Grunwald and Flamm, 1985;

and Helleiner, 1973). Consequently, a rapid increase in North-South intra-industry trade occurred, especially in Asia, after the mid-1980s.

By the 2000s, rapid development of IPNs led to countries in East and South-East Asia becoming important players in the global supply chain system. Amador and Cabral (2008) found that the group of first-tier newly industrialized economies (Republic of Korea, Singapore, Taiwan Province of China and Hong Kong, China) accounted for 24.5 per cent of global vertical intra-industry trade between 2001 and 2005. The most impressive increase took place in China; while China's share of global vertical intra-industry trade between 1986 and 1990 was 2 per cent on average, this share increased to an average of 15 per cent between 2001 and 2005.

Corresponding to the growth of IPNs in the region, South-South trade in parts and components became more significant. In the mid-1980s, developing nations in East and South-East Asia had little trade among themselves.⁷ They either supplied their own intermediates or imported intermediates from technologically advanced nations, mostly Japan, the United States and members of the European Union. In the 1990s, the importance of local sourcing declined, while imports of intermediates from Japan, the United States and Asia's newly industrialized economies (NIEs) increased. More recently, the emergence of China as the "global assembly centre" has strengthened the linkages between countries in IPNs, as the success of China's manufacturing exports appear to rely significantly on parts and component imported from other countries in the region particularly those in East and South-East Asia.⁸

The evolution of Asian IPNs during the past two decades appears to correspond to dynamic decisions of MNCs in responding to changes in trade and business environments. Prior to the 1990s, operations of MNCs could be divided into two categories: "vertical" and "horizontal" FDI (Markusen, 1995). Vertical FDI corresponds to international fragmentation of production on a factor-cost saving basis (such as labour), while horizontal FDI occurs when MNCs follow a "build-where-you-sell" strategy for seeking markets. In the context of Asia, vertical FDI by the United States electronics MNCs in the 1970s was documented as the beginning of IPNs in Asia. Meanwhile, investment by Japanese MNCs in the South-East Asian automotive sector during the same period is an example of horizontal FDI responding to high tariff protection in the host countries.

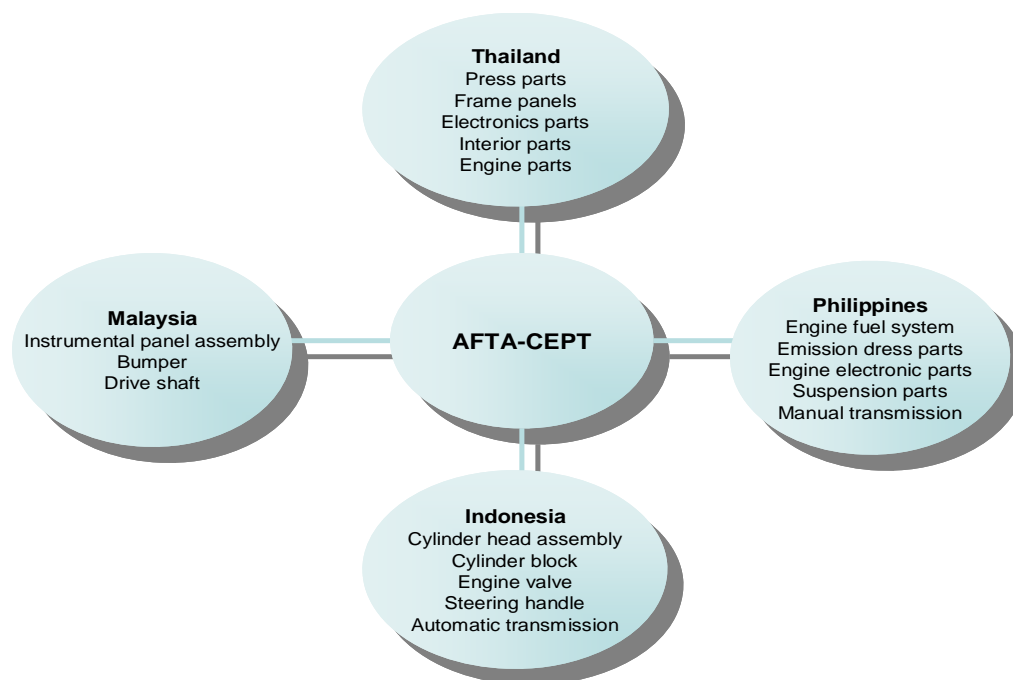
Since the late 1990s, MNC operations in Asia have progressively adopted an international product fragmentation strategy; as a result, the division between the two types of investment has become unclear. Both horizontal and vertical operations of

⁷ Parts and components are intermediate products. The list of parts and components is given in Appendix I.

⁸ This is discussed in more detail in chapter II.

MNCs are increasingly able to coexist as declining tariffs and transportation costs allow for more flexibility in sourcing components from various countries. For example, Japanese automobile assemblers are taking advantage of regional trade liberalization programmes to consolidate duplicated production facilities in ASEAN countries and facilitate the division of labour within the region, in order to achieve a regional scale of production (figure 4).⁹ In addition, during the past two decades, many MNCs have significantly upgraded technical activities of their regional production networks in ASEAN, and assigned global production responsibilities to affiliates located in Singapore and, more recently, to those located in Malaysia and Thailand (Athukorala, 2008, Borrus, Ernst and Haggard, 2000; and McKendrick, Doner and Haggard, 2000). Overall, the ASEAN experience appears to support the view that MNC affiliates have a tendency to become increasingly embedded in host countries the longer they are present there (Rangan and Lawrence, 1999; and Athukorala and Yamashita, 2006).

Figure 4. Production network of automotive components in ASEAN



Source: Hiratsuka, 2010.

⁹ For details see, for example, Legewie, 1999a and 1999b, and Hiratsuka, 2010.

2. Theoretical perspectives of international production network

This section reviews the literature that is relevant to this area of research with the objective of identifying the key determinants in the successful integration of a country into IPNs. This will be built into an analytical framework for providing guidelines for policy reform aimed at enhancing IPN-friendly trade and business environments.

IPNs are driven by firm-level decisions regarding the organization and locations of their production system. When factor-cost savings are large relative to the costs of fragmenting business activities across countries, a multinational firm will decide whether or not to fragment the production into stages as well as where to locate those fragmented units. The firm will optimize these decisions, given a set of exogenous factors.

Two elements of the relevant literature are of particular relevance: (a) offshoring literature that models the process of international fragmentation of production; and (b) new economic geography (NEG) literature that discusses how industrial locations are shaped in general equilibrium.¹⁰ The focus of the offshoring literature is on factors driving a firm to split its production process into stages and locate them between countries, while the focus of the NEG literature is on discussing simultaneously the centripetal forces that cause economic activities to cluster together in particular locations and the centrifugal forces that push it apart. In the context of Asian IPNs, these two elements of literature coexist. The offshoring literature helps us to understand important factors driving rapid growth of IPNs in Asia. Meanwhile, the NEG literature completes the picture by helping to clarify the reasons for the concentration of a particular industry in a certain country (for example, why assembly activities are concentrating in China whereas manufacturing parts and components are clustering in South-East Asia).

Offshoring literature contains comparative-advantage elements of international trade theory. This is a large area of research that could be divided into groups. One is the literature on international fragmentation of production, such as Jones (2000), Jones and Kierzkowski (2001), and Feenstra and Hanson (1996a and 1996b). The literature directly discusses the vertical specialization in the international supply chain. A general conclusion is that the division of labour between countries in an IPN is

¹⁰ Another branch of literature looks at a firm's organization issues arising from the fact that production networks can be organized within the boundary of a single firm or take place between different firms. However, such organization decisions of MNCs are not a focus of this study. Literature in this area looks at microeconomic decisions of MNCs regarding organizations governing IPNs, i.e., the literature on outsourcing versus vertical integration. Antràs and Rossi-Hansberg (2009) provide a comprehensive review of this intersection of organizational economics and international trade.

determined by factor intensity of production stages and differences in factor prices between countries. An implication of this proposition is that relative abundance of labour was an important factor driving China to become a major assembly centre in the past decade.

A comparative advantage element is that studies of international fragmentation of production share a common feature with a branch of the FDI literature that models vertical investment of MNCs. In general, vertical FDI models assume that activities of a multinational firm differ in factor intensities, while host countries differ in factor proportions. Early general equilibrium trade models of vertical firms include Helpman (1984) and Helpman and Krugman (1985). Recently, attempts to integrate vertical and horizontal FDI models have led to a modern view of multinational firms. In recent models, parent firms are exporters of services that are produced using knowledge-based assets to foreign subsidiaries (Markusen, 1995, 1998, 2002 and 2005). These models are referred to as “knowledge-capital” models. They assume that firm-specific knowledge assets are geographically mobile and are a joint input to multiple production facilities. An important implication of these FDI models is that reducing trade barriers will enable location advantages to be more easily realized and will allow MNCs more greater flexibility in sourcing components across countries. Consequently, trade liberalization is expected to increase intra-firm trade within the production network of MNCs.

A recent attempt to discuss the growing phenomenon of trade in tasks and components in the literature led to development of modelling the production process as combining a continuum of components or tasks (Baldwin and Robert-Nicoud, 2010; Deardorff, 2001; Dixit and Grossman, 1982; Feenstra and Hanson 1996a; Grossman and Rossi-Hansberg, 2008; and Yi, 2003). The literature discusses trade in tasks or components between that stand at different levels of development, i.e., countries that differ in factor endowments or disparate technological capabilities. Motivated by the fact that trade in intermediate goods largely take places between advanced industrial countries, more recent literature in this area started to discuss trade in tasks between countries with similar characteristics by sharing the “new trade theory” features of (external) economies-of-scale at the task level (Grossman and Rossi-Hansberg, forthcoming).

The NEG literature covers several levels of agglomeration. At one extreme, the literature discusses a core-periphery structure of production where factor mobility in some areas results in a great deal of economic activity while in other areas there is almost no such activity.¹¹ Another form of agglomeration is industrial concentration,

¹¹ An example of this type of agglomeration is the fear about crowding-out effects resulting from the rise of China.

where different sectors cluster in different countries. This form of agglomeration is particularly related to internationalization and trade in IPNs. Of the large number of studies that deal with this area, Fujita, Krugman and Venables (1999) provided a comprehensive framework for the agglomeration mechanisms. As shown by Venables (1996) and Krugman and Venables (1995), there are backward and forward linkages that tend to draw the upstream and downstream producers of an industry to concentrate in a single location.

The forward linkages, which depend on market size issues, form an important force for agglomeration of firms in a country with a relatively large domestic market. Firms want to locate where they will have good access to a large demand, thus enabling them to reduce trade costs. When a large firm or many firms doing so, their suppliers then move to nearby areas in order to serve their customers and minimize trade costs. As a result of this circular mechanism of forward linkages, agglomeration may begin.

The second driver of industry agglomeration is through the backward linkages.¹² Firms buy inputs such as raw materials, intermediate goods, machinery and equipment as well as services (e.g., financial and logistic services) from service providers. The cost linkages work by encouraging firms to locate near their suppliers to save transport costs and trade-related costs. When many firms move to a low-cost location for intermediates, the cost of intermediates in that location reduce even further because suppliers of intermediates can enjoy economies-of-scale. As final products of some firms are also intermediates for other firms, an additional benefit for these upper-stream producers comes from increases in demand for their final goods.

Key messages from the NEG literature are that:

- (a) The input-output linkages form a key driving force for industries to choose particular regions within which to become concentrated;
- (b) Economies-of-scale, transportation costs, and mobility of factors can cause spatial structure of industrial sectors to emerge and changes;
- (c) The landscape of industrial concentration may change in response to trade cost reductions in a non-linear manner. Trade cost reductions from high to intermediate levels will lead to a concentration of manufacturing activities in a country already having many firms located there because firms want to be located near their major markets to save trade costs while reductions in trade costs allow them to export their goods to peripheral markets. If trade costs are reduced further to a very low level, production cost savings start to dominate trade-cost saving. Consequently, firms will disperse their

¹² See, for example, Grossman and Helpman, 2002, 2003 and 2005.

manufacturing activities out of the core location to peripheral countries in order to exploit benefits arising from differences in factor prices and other advantages in those latter countries.

3. Key factors driving integration of a country into IPNs

On the basis of the literature reviewed above, this section summarizes important factors for countries to successfully integrate into the IPNs, which are:

(a) Factor-cost advantages

Theory suggests that international fragmentation of production allows firms to reduce production costs as some intermediate inputs are cheaper to produce in some countries. Therefore, given that trade costs are relatively small, interactions between factor-intensity of fragmenting tasks and factor-price differences between potential host countries will determine the division of labour between countries participating in IPNs. The emergence of China as a major assembly centre during the past decade, and the division of labour in IPNs between countries in East and South-East Asia, appear to support this view. Empirically, MNCs tend to spread production stages over different countries due to production-cost savings. For example, Kimura (2006) reveals a fact about IPNs in East Asia that wage differential plays a crucial role for multinational firms when taking location decisions. Meanwhile, Athukorala (2008) indicates that significant differences in wages among the countries within the East and South-East Asian regions have provided the basis for rapid expansion of intraregional product-sharing systems, giving rise to increased cross-border trade in parts and components.

China's emergence as a major assembly centre in Asian IPNs appears to support this supposition. However an ongoing transition of industrialization in China that has led to rapid increases in real wages could change the location advantages of China. In this context, relative abundance of labour of an emerging economy such as India appears to be a supportive factor for participation by such a country in labour-intensive activities in IPNs, including assembly activities.

(b) Economies-of-scale

Certain stages of production that involve high fixed costs require scale economies from specialized providers (Abraham and Taylor, 1996). According to the new trade theory, a country will export goods for which it has a large home market, which is called "the home market effect". Large domestic industries serve as a base for exports because the operation of increasing returns-to-scale makes manufactured products cheaper in a country that has a large domestic market. In addition, the NEG literature points out that for firms clustering in a single location positive externality

emerges from knowledge spillovers and backward- and forward-linkages, called “the agglomeration effect”.

In the context of domestic market size, China appears to have the location advantage for scale-intensive activities such as automotive manufacturing due to its large and rapidly growing home market. The apparent consolidation of Japanese operations in the ASEAN automotive sector in order to use benefits of regional trade liberalization programmes to overcome the limitations on domestic market sizes of ASEAN countries also appears to be consistent with the literature. In the case of India, the country offers the advantage of a huge and fast-growing economy even though the level of per capita income is still relatively low. Therefore, the country appears to offer a supportive environment in this regard, especially in the medium to long term.

(c) *Thickness of markets*

One implication of the NEG literature is that for an industry having a vertical production structure, the input-output relationships create forward and backward linkages between firms, and lead to industry concentration in a particular country or region. Such linkages rest on issues concerning thickness of markets, which implies ability to access to downstream customers and upstream suppliers.

In this context, early establishment appears to be an important factor determining location decisions of firms. Based on experiences of ASEAN and China, Athukorala (2008) indicated that site selection decisions by MNCs operating in assembly activities were strongly influenced by the presence of other key market players in a given country or in neighboring countries. In this context, late establishment of manufacturing industries as well as poor development of supporting industries and supply-chain networks appears to put late entry into global production networks by countries such as India and other South Asian nations at a serious disadvantage.

(d) *Low international trade costs*

International fragmentation of production requires intermediate inputs to be manufactured in one or more countries and then shipped to another destination for final assembly. In addition, operating international supply chain requires sophisticated management and the use of infrastructure services, such as telecoms, the Internet, air freight and trade-related finance, in order to coordinate the production process and flows between production units in different locations. Costs related to those operations are commonly termed as “international trade costs”. A broad definition of trade costs includes: policy barriers from tariffs; non-tariff barriers; transportation, communications

and information costs; exchange rate costs; legal, regulatory and enforcement costs, and local distribution costs (WTO, 2008).¹³

Trade in IPNs involves multiple cross-borders trading of a good-in-process during different stages of production. As international trade costs are incurred each time a good-in-process crosses a border, even a minor reduction in trade costs can result in the cost of a vertically-integrated good being reduced considerably below the initial trade cost reduction.

An obvious precondition for the international unbundling production process is that such international trade costs must be low enough to enable firms to utilize location advantages of countries arising from factor-price differences and economies-of-scale. A trade cost reduction may make it profitable for firms that previously concentrated all of their production stages in one country to move some stages of the production overseas. Firms that have already been internationally fragmenting their production are also likely to increase their flows of component trade when trade costs decline.

Several factors can result in reductions in trade costs, including: eliminating trade and investment barriers; trade facilitation; deregulation; infrastructure improvements; technological advances in communications; transportation and logistics services; increased automation; and standardization of production technology.¹⁴ Except for technology factors, all of these factors can be influenced by policy and its implementation. The next section considers policy implications for countries that have been missed out on taking advantage of the IPN phenomenon in order to create a more IPN-attracting environment.

4. The way forward: Creation of IPN-attracting environments

To benefit from the opportunities for trade and employment expansion through the international fragmentation of production in IPNs, policymakers need to create IPN-attracting environments, which will require major reforms. The implications drawn from theoretical debates on policy reforms are discussed below.

¹³ Kimura and Ando (2005) termed the costs of coordinating production units over different locations as “service link costs”. Therefore, service link costs are a subcategory of trade cost in broad terms.

¹⁴ The rapid development in automation of production technology has allowed an increasing number of tasks to be standardized. These tasks can easily be offshored. An implication is that the development of automation and specialized software that allows workers to follow a set of routine procedures has been a driving force in IPN development (for example, in the automotive industry). Evidence supporting this argument is found in the changes in distribution of tasks performed in the United States. Since the 1970s, the share of routine tasks has been falling, while that of non-routine tasks has been rising (WTO, 2008).

(a) *Promote comprehensive trade liberalization*

Trade barriers – not only tariffs but also non-tariff barriers – are an important element of international trade costs.¹⁵ Trade within IPNs is postulated as being relatively more sensitive to changes in trade barriers because it involves multiple cross-borders trading in parts and components. Tariffs have been progressively reduced globally, especially in most Asian countries, because of unilateral liberalization, multilateral commitments, and preferential trade agreements (PTAs). However, most trade barriers are in forms of non-tariff barriers (NTBs) that include quantitative restrictions, subsidies, anti-dumping and countervailing duties, customs valuations, standard and technical regulations.

The comprehensiveness of liberalization is highly important, because trade in IPNs involves international trading in extensive areas, not only manufacturing (such as final and intermediate goods) but also agricultures (such as primary and intermediate inputs), and services (communications, finances and logistics, and other related services). In addition, tariff escalation in favour of domestic production in final goods should be avoided because it creates a bias against domestic manufacturers of parts and components.

At the national level, several approaches to trade liberalization are available: (a) a regional approach to liberalization through PTAs; (b) multilateral liberalization through WTO; and (c) unilateral liberalization. In theory, the trade-stimulating effects of preferential trade liberalization would be high for trade of participants in IPNs, which require multiple border crossings in the trading of parts and components. However, in practice, the actual benefits of PTAs with regard to increasing the trade of participants in IPNs depends much on the nature of the rules of origin built into PTAs. Trade-distorting effects of rules of origin can be more detrimental to trade in IPNs than the conventional style of trade in which firms only trade in final goods because trade costs arising from the bureaucratic process of utilizing tariff preferences will be accumulated over multiple cross-border trading in parts and components at different stages of production. Moreover, maintaining trade barriers against non-members may distort the natural expansion of fragmentation trade across countries. In the policymaking context, it is difficult to define products giving tariff preferences because vertical specialization in IPNs may need a very fine level of product categorization.

Under multilateral liberalization, trade diversion is supposed to be insignificant since the liberalization tends to cover almost all important trading

¹⁵ For more details on trade cost calculation, see the comprehensive ARTNeT trade cost database available at www.unescap.org/tid/artnet/trade-costs.asp.

partners in IPNs. Furthermore, transaction costs associated with multilateral liberalization are expected to be lower than those under preferential trade liberalization. However, the complexity of the nature of trade within IPNs has already gone beyond the current scope of multilateral trading rules designed under GATT/WTO. Doing business abroad and connecting international production facilities means that IPN-type trade barriers are now not only tariffs and other border measures, but also threaten tangible and intangible property rights, discriminatory treatment of foreign investment, restricted movement of capital, and anticompetitive practices. Currently, the multilateral system still lacks deeper disciplines in these regulatory measures.

Unilateral liberalization with comprehensive and deep coverage appears to cause fewer distortions than other approaches to liberalization, *ceteris paribus*. The non-reciprocal approach of unilateral liberalization also makes the process associated with low transaction costs. Under this approach, a country also has full control over the pace and sequence of liberalization measures. On the other hand, because of the absence of reciprocity in the opening of market access, in reality it is the least favoured road to take.

(b) Combine trade and investment liberalization

Based on experience of East and South-East Asian countries, direct investment by global producers is a necessary starting condition for developing countries to become integrated into the global value chain. Vertical (efficiency-seeking) FDI has been a major driver of the growth of IPNs. The type of FDI attracted by a country is mainly governed by the characteristics and policy environment of that country; for example, trade barriers and protection given to domestic producers will create incentives for market-seeking FDI rather than efficiency-seeking FDI. An open investment climate is more necessary for efficiency-seeking operations than for market-seeking operations, because efficiency-seeking MNCs rely not on economic rents created by protection but on profit margins, which are determined by the cost competitiveness of a vertically-integrated good. To establish an investment-friendly environment, restrictions on investment have to be relaxed in an effort to simplify investment procedures, remove investment bottlenecks on a national treatment basis, and capital and financial market openness to inward and outward investment flows.

(c) Spend on infrastructure improvement

Coordinating international production requires assurances of world-class telecommunications and goods transportation as well as efficient financial services and customs clearance. These “infrastructure” services are necessary in order to facilitate international business transactions that are highly intensive in the IPN operations. In much the same way as trade barriers, the costs of those infrastructure services penalize goods produced in multiple stages across different countries,

because producers need to pay for moving goods at each stage of the production process. A reduction in costs and the time required for those services will therefore be beneficial to trade in IPNs.

Although investment in infrastructure and technological advancement has played an important role in reducing costs and the time required for shipping and communications, infrastructure services are still state-monopolized in many developing countries. However, state monopolization results in distortions in trade and investment, and the often inefficient operation of the services providers.

Therefore, comprehensive policy reforms to promote trade and investment in services are needed in order to minimize trade costs arising from inefficiency of service sectors. As pointed out by ESCAP (2011), FDI can play a key role in improving the efficiency of service sectors, especially infrastructure services which are characterized as capital- and technology-intensive. International service providers are a major source of capital, technology transfer and improved managerial skills for host developing economies.

References

- Abraham, K. G. and S. K. Taylor (1996). "Firms' use of outside contractors: Theory and evidence", *Journal of Labor Economics*, vol. 14, No. 3; pp. 394-424.
- Amador, J. and S. Cabral (2008). "Vertical specialization across the world: A relative measure", Bank of Portugal Working Paper No. 10-2008.
- Ando, M. and F. Kimura (2010). "The special patterns of production and distribution networks in East Asia", in P. Athukorala (ed.), *The Rise of Asia: Trade and Investment in Global Perspective*; pp. 61-88. Routledge, London.
- Antràs, P. and E. Rossi-Hansberg (2009) "Organizations and trade", *Annual Review of Economics*, vol. 1; pp. 43-64.
- Athukorala, P. (2008). "China's integration into global production networks and its implications for export-led growth strategy in other countries in the region", ANU working paper on trade and development, No. 2008/04. Australian National University, Canberra.
- Athukorala, P. and N. Yamashita (2006). "Production fragmentation and trade integration: East Asia in a global context", *North American Journal of Economics and Finance*, vol. 17, No. 4; pp. 233-256.
- Baldwin, R. E. (2010). "21st century regionalism: Filling the gap between 21st century trade and 20th century trade rule", presentation at WTO Workshop on New Era Preferential Trade Agreements, 3 November 2010, World Trade Organization, Geneva. Available from http://www.wto.org/english/res_e/reser_e/ersd201108_e.pdf
- (2008). "Managing the Noodle Bowl: The fragility of East Asian Regionalism", *Singapore Economic Review*, vol. 53, No. 3; pp. 449-478.
- Baldwin, R. E. and F. Robert-Nicoud (2010). "Trade-in-goods and trade-in-tasks: An integrating framework, NBER Working Paper No. 15882. National Bureau of Economic Research, Cambridge, MA, United States.
- Borras, M., D. Ernst and S. Haggard (2000). *International Production Networks in Asia: Rivalry or Riches?* Routledge, London and New York.
- Deardorff, A. (2001). "Fragmentation in simple trade models", *North American Journal of Economics and Finance*, vol. 12; pp. 121-137.
- Dixit, A. and G. M. Grossman (1982). "Trade and protection with multi-stage production", *Review of Economic Studies*, vol. 49; pp. 583-594.
- ESCAP (2011). *Asia-Pacific Trade and Investment Report 2011*. Economic and Social Commission for Asia and the Pacific, Bangkok.
- Feenstra, R. C. (1998). "Integration of trade and disintegration of production in the global economy", *Journal of Economic Perspectives*, vol. 14, No. 4; pp. 31-50.
- Feenstra, R. C. and G. H. Hanson (1996a). 'Globalization, outsourcing and wage inequality', *American Economic Review*, vol. 86; pp. 240-245.
- (1996b). "Foreign investment, outsourcing, and relative wages", in R. C. Feenstra, G. M. Grossman and D. A. Irwin (eds.), *The Political Economy of Trade Policy: Papers in Honor of Jagdish Bhagwati*; pp. 89-127. London, and Cambridge, MA, United States.

- Fujita, M., P. Krugman and A. J. Venables (1999). *The Spatial Economy: Cities, Regions and International Trade*. MIT Press, Cambridge, MA, United States.
- Goh, K. S. (1993). "What causes fast economic growth?" Fourth K.T. Li Lecture, Harvard University, reproduced in L. Low (ed.), *Wealth of East Asian Nations, Speeches and Writings by Goh Keng Swee*; pp. 243-258 (1995). Federation Publications, Singapore.
- Grossman, G. M. and E. H. Helpman (2005). "Outsourcing in global economy", *Review of Economic Studies*, vol. 72; pp.135-160.
- (2003). "Outsourcing versus FDI in industry equilibrium", *Journal of European Economic Association*, vol. 1; pp.317-327.
- (2002). "Integration versus outsourcing in industry equilibrium", *Quarterly Journal of Economics*, vol. 117; pp. 85-119.
- Grossman, G. M. and E. Rossi-Hansberg (2008). "Trading tasks: A simple theory of offshoring", *American Economic Review*, vol. 98; pp. 1978-1997.
- (forthcoming). "Task trade between similar countries", *Econometrica*.
- Grunwald, J. and K. Flamm (1985). *The Global Factory: Foreign Assembly in International Trade*. Brookings Institution, Washington, D.C.
- Helleiner, G. K. (1973). "Manufactured exports from less-developed countries and multinational firms", *Economic Journal*, vol. 83, No. 329; pp. 21-47.
- Helpman, E. H. (1984). "A simple theory of trade with multinational corporations", *Journal of Political Economy*, vol. 92; pp. 451-471.
- Helpman, E. H. and P. Krugman (1985). *Market Structure and Foreign Trade*. MIT Press, Cambridge, MA, United States.
- Hiratsuka, D. (2010). "Characteristics and determinants of East Asia's trade patterns", in D. Hiratsuka and Y. Uchida (eds.) (2010). *Input Trade and Production Networks in East Asia*, Institute of Developing Economies, Japan External Trade Organization, Chiba, Japan, and Edward Elgar Publishing, Cheltenham, United Kingdom and Northampton, MA, United States.
- Hummels, D., J. Ishii and K-M Yi (2001). "The nature and growth of vertical specialization in world trade", *Journal of International Economics*, vol. 54, No. 1; pp. 75-96.
- Ishii, J. and K-M Yi (1997). "The growth of world trade", Research Paper No. 9718, Federal Reserve Bank of New York.
- Jones, R. W. (2000). *Globalization and the Theory of Input Trade*. MIT Press, London, and Cambridge, MA, United States.
- Jones, R. W. and H. Kierzkowski (2001). "Globalization and the consequences of international fragmentation", in R. Dornbusch, G. Calvo and M. Obstfeld (eds.), *Money, Factor Mobility and Trade: The Festschrift in Honor of Robert A. Mundell*. MIT Press, Cambridge, MA, United States.
- Kimura, F. (2006). "International production and distribution networks in East Asia: 18 facts, mechanics, and policy implications", vol. 1, No.1; pp. 346-347.

- Kimura, F. and M. Ando (2005). "Two-dimensional fragmentation in East Asia: Conceptual framework and empirics", *International Review of Economics & Finance*, vol. 14, No. 3; pp. 317-348.
- Krugman, P. and A. J. Venables (1995). "Globalization and the inequality of nations", *Quarterly Journal of Economics*, vol. 110, No. 4; pp. 857-880.
- Legewie, J. (1999a). "Manufacturing strategies for Southeast Asia after the crisis: European, US and Japanese firms", *Business Strategy Review*, vol. 10; pp. 55-64.
- (1999b). "Driving regional integration: Japanese firms and the development of the ASEAN automobile industry", Working Paper No. 99/1, Philipp Franz von Siebold Stiftung, German Institute for Japanese Studies, Tokyo.
- Markusen, J. R. (2005). "Modelling the offshoring of white-collar services: From comparative advantage to the new theories of trade and FDI", NBER Working Paper No. 11827. National Bureau of Economic Research, Cambridge, MA, United States.
- (2002). *Multinational Firms and the Theory of International Trade*. MIT Press, London.
- (1998). "Multinational firms, location and trade", *The World Economy*, vol. 21, No. 6; pp. 733-756.
- (1995). "The boundaries of multinational firms and the theory of international trade", *Journal of Economic Perspectives*, vol. 9; pp. 169-189.
- McKendrick, D. G., R. F. Doner and S. Haggard (2000). *From Silicon Valley to Singapore: Location and Competitive Advantage in the Hard Disk Drive industry*. Stanford University Press, Stanford, California.
- Rangan, S. and R. Z. Lawrence (1999). *A Prism on Globalization*. Brookings Institution, Washington, D.C.
- Venables, A. J. (1996). "Equilibrium locations of vertically linked industries", *International Economic Review*, vol. 37; pp. 341-335.
- WTO (2008). "Trade, the location of production and the industrial organization of firms", *World Trade Report 2008 – Trade in a Globalizing World*. Geneva.
- Yi, K-M (2003). "Can vertical specialization explain the growth of world trade?" *Journal of Political Economy*, vol. 111; pp. 52-102.