

Chapter 1

Conceptual Framework

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CHAPTER 1.

CONCEPTUAL FRAMEWORK

The Comprehensive Asia Development Plan (CADP) will provide a grand spatial design of economic infrastructure and industrial placement in ASEAN and East Asia and will claim to pursue both deepening economic integration and narrowing development gaps. This chapter presents our novel conceptual framework based on new waves of international trade theory: the extended fragmentation theory and new economic geography.

1-1. What is the Comprehensive Asia Development Plan?

East Asia¹ has been leading the world in sustained economic growth for the past three decades. The strength of the ASEAN and East Asian economies has resided in the unprecedented development of international production networks. After demonstrating strong recoveries from two massive economic crises and further upgrading of the economy, East Asia has now truly become the “Factory of the World.”

However, East Asia is now facing a big challenge. On the one hand, economic forces in the globalizing era require an even higher level of *de jure* and *de facto* economic integration than now. On the other hand, East Asia consists of countries and regions widely different in their development stages, with diversified historical, cultural, and political backgrounds. The reconciliation of two objectives, i.e., deepening economic integration and narrowing development gaps, is an urgent issue for policy discussion in East Asia.

The Comprehensive Asia Development Plan (CADP) will provide a grand spatial design of economic infrastructure and industrial placement, and will claim to pursue both deepening economic integration and narrowing development gaps at the same time. We apply a novel analytical approach based on new waves of international trade theory: the extended fragmentation theory and new economic geography.

The CADP is “comprehensive” in the sense that the whole plan is based on a rigorous conceptual framework, provides robust empirical evidence, and presents

¹ In the CADP, the geographical concept “East Asia” is defined in a flexible manner as “ASEAN and beyond,” depending on the context. It sometimes covers Southeast Asia and Northeast Asia or ASEAN+3 while it often includes India, Australia, and New Zealand corresponding to ASEAN+6.

concrete development strategies with more than 600 prospective projects on logistics and other economic infrastructure. It covers a wide range of policy modes that help to bridge infrastructure development and industrialization.

“Asia” here covers countries participating in the East Asia Summit, with emphasis on ASEAN and surrounding countries or regions in East Asia.

“Development” refers not only to macroeconomic growth but also to various aspects of overall economic development, focusing on economic integration and development gaps.

“Plan” means an indicative plan, which provides a framework for policy planners to formulate and implement infrastructure development and industrialization.

1-2. The emergence of international production networks

1-2-1. Novel pattern of industrial location and international trade

East Asia has developed unprecedented international production networks (Ando and Kimura, 2005).

The pattern of international division of labor and international trade in East Asia is no longer fully explained by the textbook version of international trade theories. The international division of labor is not industry-wise but production-process-wise, which differs from a standard setting of comparative advantage models such as the Ricardian model and the Heckscher-Ohlin model. Neither does intra-industry trade, based on the vertical division of labor, follow the formulation of the Helpman-Krugman intra-industry trade model with its horizontal production differentiation.

What we observe is fragmentation of production and the formation of industrial agglomerations. Such production networks have developed particularly in machinery industries in a salient manner but are observed in other industries to some extent. This unprecedented pattern of international division of labor and international trade requires a novel analytical framework.

1-2-2. New trade and investment regime

East Asia became a forerunner in developing international production networks because of its novel policy regime for trade and investment.

Aggressive attraction of foreign direct investment (FDI) by developing East Asian countries started in the latter half of the 1980s. International competition in attracting FDI became harsh in the early 1990s, and the accumulation of investment liberalization/facilitation and trouble-shooting helped create a new investment climate

in the 1990s. Unilateral “race-to-the-bottom” trade liberalization occurred, particularly in electronic parts and components under the umbrella of the Information Technology Agreement (ITA) (Baldwin, 2006).

After the Asian currency crisis (1997-), Asian regionalism was accelerated, and overall trade liberalization in ASEAN under the ASEAN Free Trade Area (AFTA) as well as ASEAN and beyond under the ASEAN+1 FTAs proceeded, together with various improvements in the trade and investment regime. As a result, favorable economic and policy environments for international production networks were created.

1-2-3. Evolving vibrant role of multinationals

Designers and coordinators of international production networks are primarily multinational enterprises (MNEs). These include MNEs with various firm nationalities; not just Japanese, Korean, Taiwanese, Hong Kong, and other East Asian MNEs but also American, European, and other MNEs; all are actively utilizing the mechanism of international production networks.²

East Asian MNEs have had strength in machinery industries. Machines typically consist of a large number of parts and components, each of which is produced by diversified technologies, which makes machinery industries particularly suitable for fragmentation of production. East Asian MNEs also had long-term experience in inter-firm production relationships; vertical subcontracting in Japan, horizontal subcontracting in Taiwan, and cross-border contract manufacturing between Hong Kong and Guangdong Province are examples. These became the prototypes of inter-firm fragmentation. We now observe local firms’ penetration into production networks run by MNEs, particularly in industrial agglomerations.

1-2-4. New development strategies

Developing East Asia is presenting novel development strategies. Its nations aggressively utilize MNEs in an open setting and accept almost all sorts of MNEs, which enables them to participate in international production networks and form industrial agglomerations. Then local firms/entrepreneurs/engineers can be helped to develop via their penetration into the production networks of MNEs. These strategies are fundamentally different from the traditional infant industry protection argument or strategies with import-substituting FDI. They are also different from a simple acceptance of exporting MNEs. Developing East Asia has much more effectively taken advantage of globalizing forces for its economic development than other

² See Ando, Arndt, and Kimura (2006) for a wide range of common elements between the US and Japanese MNEs in utilizing the mechanism of production networks.

developing regions in the world.

1-2-5. Logistics and economic infrastructure for industrialization

There is no doubt that the development of logistics and economic infrastructure is crucial to industrial development in general. However, the role of the infrastructure for economic development has not been thoroughly specified in a rigorous conceptual framework.

A number of significant development studies, initiatives, and plans for logistics and economic infrastructure have been conducted and implemented in ASEAN, East Asia, and the whole of Asia; examples include the Greater Mekong Sub-region (GMS), the Indonesia, Malaysia, Thailand Growth Triangle (IMT-GT), the Brunei, Indonesia, Malaysia, Philippines East ASEAN Growth Area (BIMP-EAGA), Infrastructure for a Seamless Asia (ADB and ADBI, 2009), and the Asian Highway³. These studies, initiatives, and plans have made great contributions to the development of infrastructure in ASEAN and East Asia. However, the link between logistics/economic infrastructure and industrialization is not necessarily well established. For example, road construction in rural areas certainly helps, but could be even more significant if we had a clearer idea of what sort of cargos would be transported and how it would accelerate specific industries.

Spatial design of logistics/economic infrastructure, together with industrialization strategies with convincing conceptual framework, is called for.

1-3. The augmented fragmentation theory and new economic geography

The mechanics of international production networks as well as the role of logistics/economic infrastructure in industrialization are lucidly analyzed by the augmented fragmentation theory with a flavor of new economic geography.

1-3-1. Fragmentation: location advantages and service links

Although international production/distribution networks began to be created from the end of the 1980s, Jones and Kierzkowski (1990) made a head start in developing the theory of fragmentation. The theory pointed out fundamental differences between

³ Up-to-date information on these initiatives can be found in the following websites; GMS (<http://www.adb.org/gms/>), IMT-GT (<http://www.adb.org/IMT-GT/>), BIMP-EAGA (<http://www.adb.org/BIMP/>), and the Asian Highway (<http://www.unescap.org/ttdw/index.asp? MenuName=AsianHighway/>).

intermediate goods trade and finished products trade, particularly in the flexibility of firm's decision making in cutting out production blocks and the existence of service link costs.

Figure 1-1. The fragmentation theory: Production blocks and service links

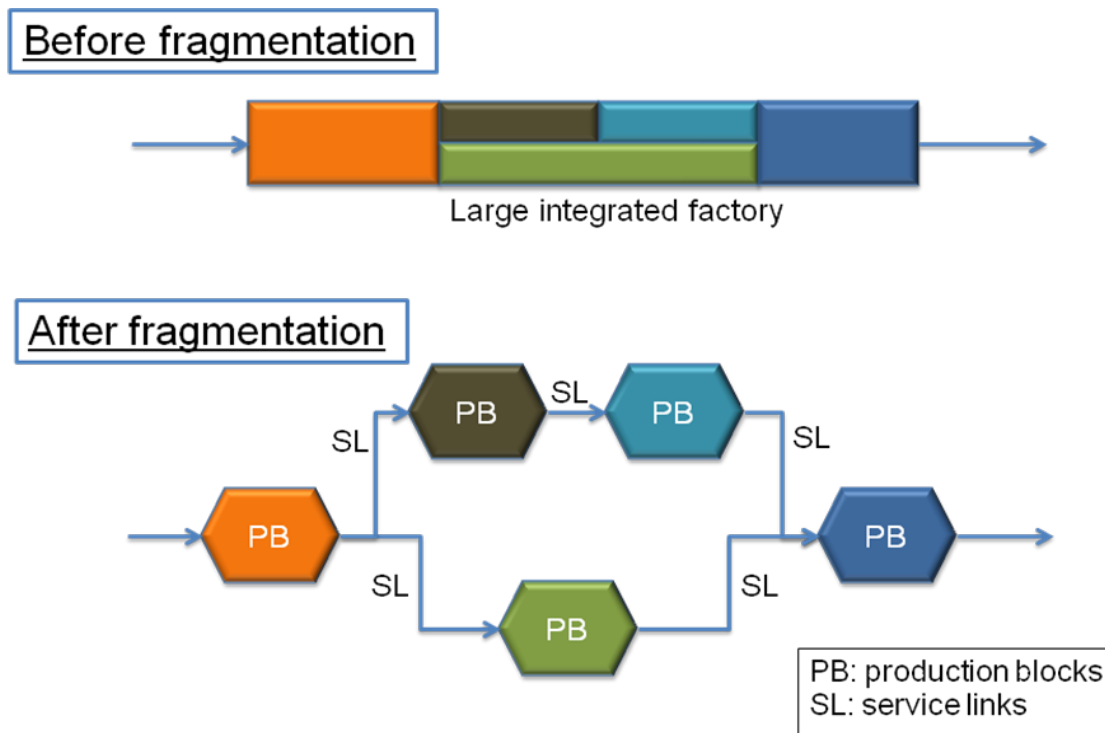


Figure 1-1 illustrates the original idea of fragmentation. Suppose that a firm originally produces a product from downstream to upstream in a big factory located in a developed country. The production processes in the factory, however, may have various characteristics; some would be capital or human-capital-intensive while others would be purely labor-intensive. Some would be capital-intensive, but needing 24-hour operation under the close supervision of engineers. Hence, if the firm can separate some of the production processes, design production blocks, and locate them in other places, the final total cost may be reduced. This is the so-called fragmentation of production.

Fragmentation of production is economically viable if (i) the saving of production costs *per se* in production blocks is large and (ii) incurred service link costs for connecting remotely located production blocks are small. Whether (i) is met depends on the technical separability of production processes and the availability of different location advantages. Firms have a certain degree of freedom on how to cut out production blocks so as to exploit differences in location advantages in remote areas,

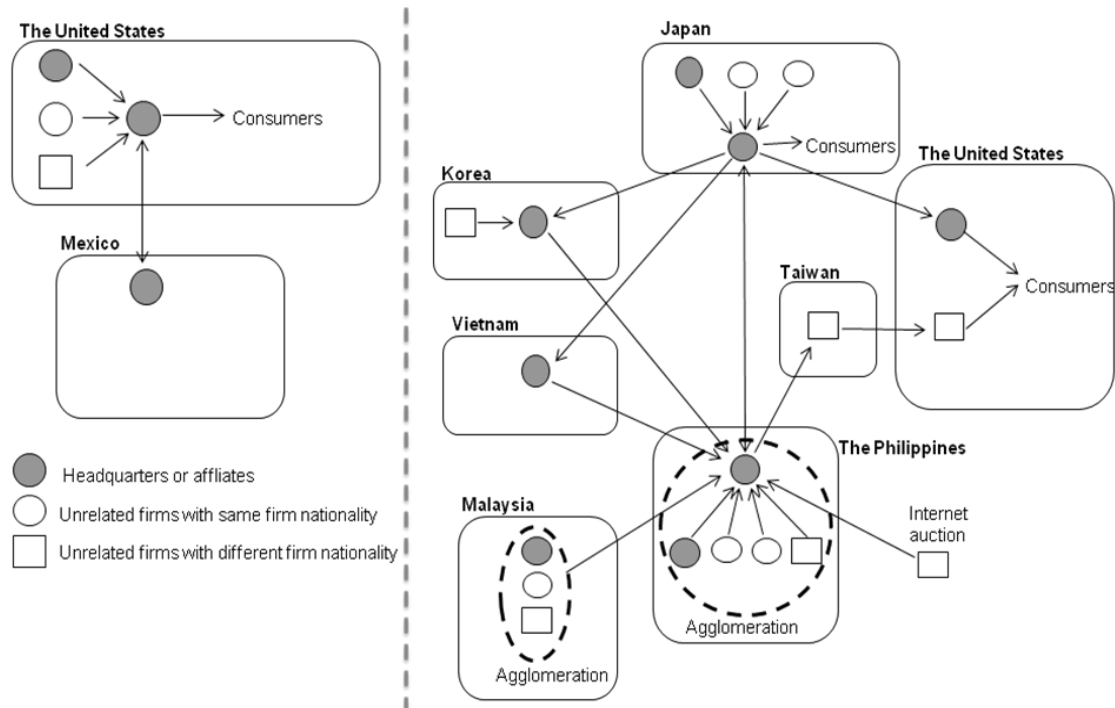
while host countries may seek niches of location advantages for each production block. On the other hand, (ii) depends not only on trade barriers and transport costs but also on various coordination costs, which make transactions in production networks relation-specific. In addition, service links often present economies of scale. These are the reasons why a simple disaggregation of industries in the framework of traditional trade theories cannot fully explain the division of labor at the level of production processes.

1-3-2. Intra-firm and arm's length fragmentation

Although cross-border production sharing exists between the US and Mexico, between the US and Costa Rica, and between Western Europe and Eastern Europe, these production-process-wise division of labor typically has a relatively simplistic structure with back-and-forth, closed-loop, and intra-firm transactions. For example, a US firm prepares a set of parts and components in the US, sends them to its own factory in Maquila in Mexico, and the factory sends finished products back to the US market (see the left-hand-side picture in Figure 1-2). In the case of East Asia, we observe open-ended “networks” of production-process-wise division of labor that cover a number of countries with a sophisticated combination of intra-firm and arm's length transactions (the right-hand-side picture in Figure 1-2). Transactions at long distance are likely to be intra-firm while those over short distances are predominantly arm's length. Particularly in some specific places, industrial agglomerations have begun to be created in which vertical, arm's length, and just-in-time transactions among multinationals and local firms are possible.

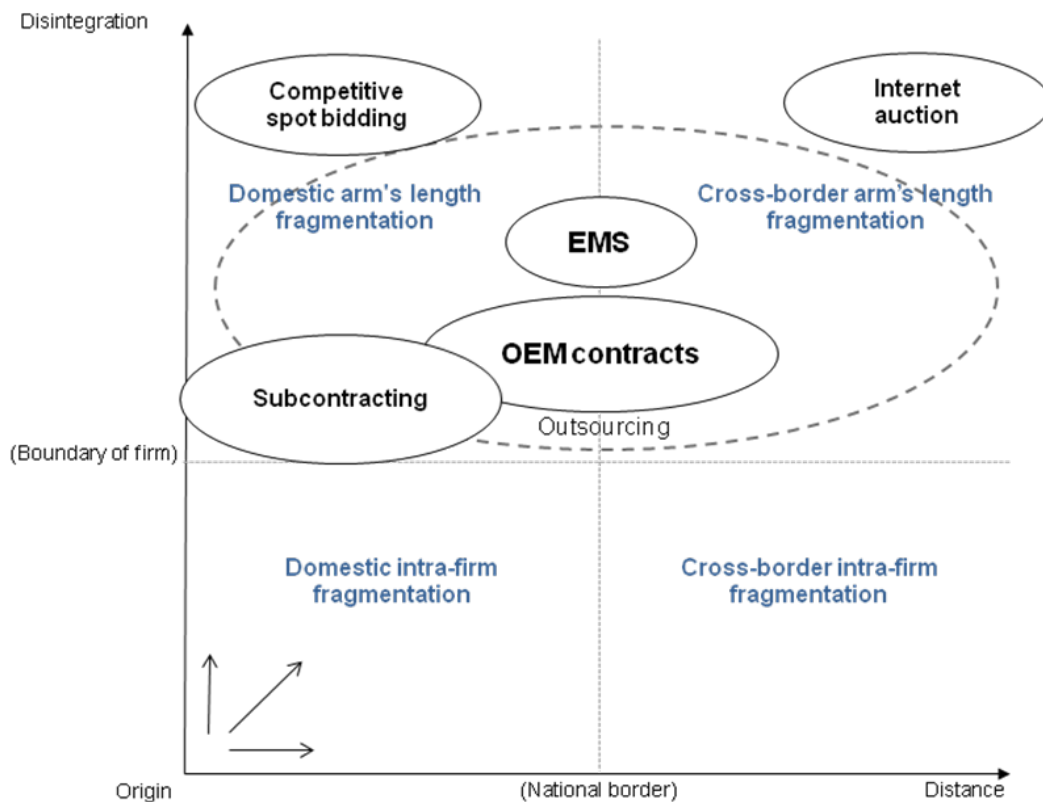
The concept of two-dimensional fragmentation proposed by Kimura and Ando (2005) expands the outset of fragmentation in order to analyze the sophistication of international production/distribution networks in East Asia. In addition to fragmentation in the dimension of geographical distance, the extended framework introduces fragmentation in the dimension of disintegration, where a firm decides whether to keep some economic activities inside the firm or to outsource them to unrelated firms (Figure 1-3). This framework well explains the sophisticated nature of fragmentation in East Asia, where both intra-firm and arm's-length (inter-firm) fragmentation of production processes flourish. By introducing the close relationship between geographical proximity and arm's-length transactions, the framework can also neatly describe the simultaneous development of the firm-level fragmentation of production processes and the industry-level formation of agglomeration.

Figure 1-2. Production networks: The US-Mexico nexus versus East Asia



Source: Ando and Kimura (2009).

Figure 1-3. Two-dimensional fragmentation: An illustration



Source: Kimura and Ando (2005).

By employing the framework of two-dimensional fragmentation, we can list a number of policies that make fragmentation viable in an organized manner. Table 1-1 presents a 2x3 matrix, which consists of two dimensions of fragmentation and three kinds of cost reduction sought, i.e., the reduction in network set-up costs, service link costs, and production costs in production blocks. The table indicates that trade and investment liberalization is certainly an essential precursor to the development of production networks, but other policies such as trade facilitation, the development of logistics infrastructure, and various domestic policies are also crucial.

It should also be noted that the relative importance of these policies changes according to the degree of participation in production networks. In the case of countries/regions that have not yet participated in production networks, set-up costs and service link costs for fragmentation in terms of the geographical distance are priorities. Production costs are also important, but some improvement of local niches, rather than the improvement of the whole economy, may suffice. At the stage of forming industrial agglomerations, the overall improvement of cost conditions for fragmentation over a geographical distance becomes important, and the development of disintegration-type fragmentation also comes into the scope.

Table 1-1. The 2x3 policy matrix fragmentation and agglomeration

	Reduction in fixed costs to develop production/distribution networks	Reduction in service link costs connecting production blocks	Further costs reduction in production cost per se in production blocks
Fragmentation along the distance axis	Policies to reduce investment costs	Policies to overcome geographical distance and border effects	Policies to strengthen location advantages
	<ul style="list-style-type: none"> (1) improvement in stability, transparency, and predictability of investment-related policies; (2) investment facilitation in FDI-hosting agencies and industrial estates; and (3) liberalization and development in financial services related to capital investment. 	<ul style="list-style-type: none"> (1) reduction/removal of trade barriers such as tariffs; (2) trade facilitation including simplification and improved efficiency in custom clearance/procedures; (3) development of transport infrastructure and improved efficiency in transport and distribution services; (4) development of telecommunication and ICT infrastructure; (5) improved efficiency in financial services related to operation and capital movements; and (6) reduction in costs of coordination between remote places by facilitation of the movement of natural persons. 	<ul style="list-style-type: none"> (1) establishment of educational/occupational institutions for personnel training to secure various types of human resources; (2) establishment of stable and elastic labor-related laws and institutions; (3) establishment of efficient international and domestic financial services; (4) reduction in costs of infrastructure services such as electricity and other energy, industrial estates services; (5) development of agglomeration to facilitate vertical production chains; (6) establishment of economic institutions such as investment rule and intellectual property rights; and (7) various trade and investment facilitation.
Fragmentation along the disintegration axis	Establishment of economic environment to reduce set-up costs of arm's length transactions	Development of institutional environment to reduce the cost of implementing arm's length transactions	Policies to strengthen competitiveness of potential business partners
	<ul style="list-style-type: none"> (1) establishment of economic system to allow co-existence of various business partners as well as making various types of contracts; (2) various policies to reduce costs of information gathering on potential business partners; (3) securing fairness, stability, and efficiency in contract; and (4) establishment of stable and effective institutions to secure intellectual property rights. 	<ul style="list-style-type: none"> (1) policies to reduce monitoring cost of business partners; (2) improvement in legal system and economic institutions to activate dispute settlement mechanism; and (3) policies to promote technical innovations in modulation to further facilitate outsourcing. 	<ul style="list-style-type: none"> (1) hosting and fostering various types of business partners including foreign and indigenous firms; (2) strengthening supporting industries; and (3) various policies to promote the formation of agglomeration.

1-3-3. Degree of freedom in fragmentation and investment climate

One important property of fragmentation along the geographical distance axis is that a firm can decide how to cut out production processes and design production blocks. Considering the most effective matching of location advantages with its own firm-specific assets such as production technology, managerial ability, and inter-firm connections, a firm can design and organize production networks with a certain degree of freedom. This provides ample flexibility for a firm to adjust for niches of location advantages.

On the other side of the coin, developing countries may try to provide proper niches in location advantages, rather than countrywide fundamental improvement of the investment climate, in order to attract production blocks. With the rise of fragmentation, it would be much easier for less developed countries (LDCs) to start industrialization than in the past by attracting some pieces of production blocks.

1-3-4. Technology transfers and spillovers

Fragmentation along the disintegration axis also provides flexibility in setting up inter-firm division of labor. Matching between business partners can be in any form, depending on their firm-specific assets. It means that even local firms may seek some niches to come into production networks.

The competitors of local firms are multinational SMEs; the former typically have price competitiveness while the latter are strong in non-price competitiveness, in terms of quality, delivery, and reliability. In order to gain non-price competitiveness, the activities of local firms must be carried out in industrial agglomerations. Once the relationship with MNEs is established, technology spillovers or even intentional technology transfers from MNEs to local firms may start.

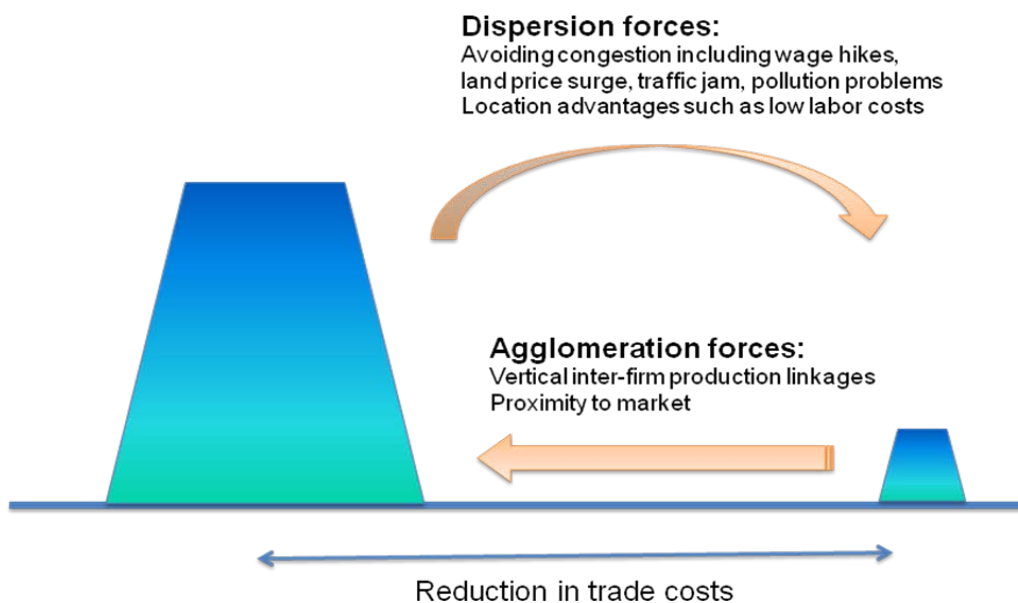
1-3-5. Knife-edge of agglomeration and dispersion forces

Lessons from new economic geography are important supplements in our conceptual framework.⁴

The fragmentation theory argues that a reduction in service link costs may be a trigger for developing countries/regions to attract FDI and participate in production networks. However, lower trade costs do not automatically result in the dispersion of economic activities. Rather, according to new economic geography, a reduction in trade cost generates two countervailing forces: agglomeration forces and dispersion forces (Figure 1-4).

⁴ For new economic geography, see Fujita, Krugman, and Venables (1999), Baldwin, Forslid, Martin, Ottaviano, and Robert-Nicoud (2003), and Combes, Mayer, and Thisse (2008).

Figure 1-4. Agglomeration and dispersion in new economic geography



Agglomeration forces make more and more economic activities be attracted to agglomerations. External economies of scale within a geographical boundary are generated in agglomerations due to vertical inter-firm production linkages for assemblers and parts and components producers, proximity to market for final goods producers, wholesalers, and retailers, and easy access to capital and human capital by firms. On the other hand, dispersion forces make some economic activities move from agglomerations to peripheries. As agglomerations become bigger, “congestion” occurs in the form of wage hikes, land price surges, traffic jams, and pollution problems so that certain kinds of economic activity start considering moving out of agglomerations. Differences in location advantages such as low labor costs in peripheral locations would provide more incentive for firms to relocate their production sites.

Controlling these two countervailing forces properly is the key for pursuing both rapid economic growth and narrowing development gaps. To achieve this goal, policies to enhance location advantages, which would work supplementary to a reduction in service link costs, are often required in order to attract economic activities to countries/regions at lower stages of development.

1-4. Fragmentation, agglomeration, and development stages

1-4-1. Evolution of fragmentation and agglomeration in development

The CADP applies a conceptual framework that is widely different from traditional

development theories and proposes a novel program based on new development strategies. To take advantage of the globalizing forces in corporate activities effectively, we should not depend on trade protection, but rather on free trade, proceed not only with tariff removal but also progressive trade liberalization and facilitation, and not limit ourselves to selective acceptance of FDI but engage in the aggressive attraction of all sorts of FDI.

The CADP provides a clear picture of an evolutionary process from simple, slow, and low frequency fragmentation to sophisticated, quick, and high frequency fragmentation; from thin slices of a value chain without tight local linkage to industrial agglomerations with active vertical links of production; and from industrialization heavily depending on MNEs to innovative industrial agglomerations consisting of both MNEs and local firms. East Asia is the most advanced region in the development of international production networks, and thus new development strategies should be established in order to pursue further economic integration with narrowing development gaps.

1-4-2. Three tiers with different degrees of participation in production networks

To fully utilize the mechanics of production networks, it is crucial to strategically classify stages of development in terms of the degree of participation in production networks.⁵

Tier 1 includes countries/regions that are already in production networks and where industrial agglomerations have started to form. Issues and challenges to take care of are upgrading industrial agglomerations, increasing innovation, and climbing up the ladder from middle-income to fully developed countries/regions.

Tier 2 corresponds to countries/regions that are not yet fully integrated into quick and high-frequency production networks. Issues and challenges are how to participate in quick and high-frequency production networks by reducing service link costs and improving location advantages for production.

Tier 3 comprises countries/regions that are not likely to come into quick and high-frequency production networks in the short run but would like to provide a new framework for industrial development with the development of logistics infrastructure as a trigger.

Our conceptual framework provides comprehensive strategies for spatial design of economic infrastructure and industrial placement.

⁵ Full discussion on the three-tier development strategies will be provided in Chapter 3.