Joining pre-existing Production Networks

: An Implication for India's Economic Integration to East Asian Production Networks

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Table of Contents

1. Introduction

1.1 Motivation

The Indian economy was left out of the global division of labor in the 1980s, particularly with regard to parts and components production. Though the gap gets narrower but still far behind, compared to East Asian countries. The increasing share of trade in parts and components of East Asian countries was fuelled by an export-led, outward-oriented growth strategy in the 1980's. During the same period, India followed an entirely different growth strategy from East Asian countries (Rajan and Sen, 2002). Especially in contrast with China, India has not become a manufacturing powerhouse in labor-intensive goods. Processing trade accounts for half of China's overall trade, while it is negligible in India. Foreign direct investments in India mostly serve the local market rather than for export production. In contrast, in China and other East Asian countries, much of FDI is linked to processing trade to serve global markets. These patterns show that India is not exploiting its labor abundance and concomitant comparative advantage in labor-intensive exports, particularly in manufacturing.

The main question of this research is why India has not been actively participating in East Asia International Production Networks (hereafter, IPNs), and if it is beneficial, how India can participate in them effectively. The presumption this article is on is that participating in East Asia IPNs can be meaningful to South Asian economies. In general, labor abundance allows a country to break into labor-intensive manufacturing exports, which induces fast economic growth at a certain stage of development. Labor-intensive exports can attract FDI and hence improve employment, infrastructure, and institutions. IPNs in East Asia are known to be most developed in the world in their significance in each economy in the region, their extensiveness covering a number of countries in the region (Ando and Kimura 2009). During the Global financial crisis, East Asia's trade showed V-shaped recovery within the regional production networks. And it is often argued that the existence of dense industrial clusters and IPNs helps East Asian economy to remain stable (Ando 2010). From this respect, plugging into East Asian IPNs for manufacturing can be helpful for South-Asia countries to get on to sustainable growth paths. Though the importance of understating IPNs gets substantial attentions, there are still lots of questions which are yet fully answered due to its sophistication in subtle combinations of intra-firm and arm's length (inter-firm) transactions, especially for East Asian IPNs.

1.2 Literature Review

In theoretical explanations on IPNs, there have been several approaches. Kimura and Ando (2005) suggest a conceptual framework of two-dimensional fragmentation; *distance* and *uncontrollability*. In their categorization, they emphasize the tension between the cost of a service link that connects remotely located production blocks and the benefit of outsourcing that enables a MNC(Multi-National Corporation) to save its production costs. The source of such benefits may come from not only wage level or resource availability, but also the existence and quality of infrastructure and its services, and the policies of the host country's government. A more analytical model is provided by Grossman and Rossi-Hansberg (2008) which describes production in terms of a continuum of tasks and draw out the general equilibrium implications for trade and for wages. Helpman(1984) explains how the trade pattern and the

share of intra-industry trade in the context of IPN, with concentrating on the emergence of MNC as a result of the tendency of factor rewards to differ across countries. The common feature of the literature, however, is that it is less stressed that IPNs typically experience a sequence of production activities consisting of upstream(s) and downstream(s). Baldwin and Venables(2010) is exceptional. They pay attention that offshoring may occur in two different configurations, *spider* and *snake*. Spider type, which most previous studies have focused on, describes production activities with multiple parts coming together to form a body, which may be the final product itself or a component. Snake type focuses on a 'sequence' of IPN-related production activities, the good moving in a linear manner from upstream to downstream with value added at each stage. Moving from a location of part production (upstream) to its assembly location (downstream) in spider (snake) type incurs its corresponding offshoring cost. [empirics literatures?]

1.3 Contributions of this article

The aim of this study is to provide a unified theoretical framework to more systematically analyze off-shoring which is the basis of participating in an IPN. Components that may drive India's participation in East Asian IPNs difficult are suggested and reviewed with detailed data. Our model is close to Baldwin and Venables (2010) with focusing on the fact most production processes are complex mixtures of the two configurations. In our model, we combine two types of production activities into a single framework. First, we identify the cost components a MNC faces through a production process and explain the interactions among them. From this clarification of IPN-related costs, we draw out what structured disadvantages late-follower countries to get involved with a pre-existing IPN have to bear and provide several policy implications to overcome the disadvantages with more targeted efforts. Furthermore, we have tried to put India's case in the theoretical framework of the IPN and then look at the possible problems that make India's participation into the East Asian production network hard and slow. Whenever possible, relevant data are provided in order to support the theoretical explanations.

2. Some Backgrounds for India's involvement in East Asia IPNs

2.1. Characteristics of East Asia IPNs

It is well recognized that production networks in East Asian region has shown remarkable growth in many ways. However, the extensive and sophisticated production network expansions through MNCs in East Asian countries are not fully understood yet. One distinguishing feature of East Asian IPNs is that exports in machinery parts and components in intraregional trade are much larger than exports in final products in East Asian IPNs. While intraregional exports in machinery parts and components in European Union (EU27) or America (NAFTA and UNASUR) are similar in volume with those in final products, intraregional exports in machinery parts in East Asia (ASEAN+ 6) are almost two times larger than those in final products in 2007. Also, the intraregional exports in East Asia have grown very fast in last decade. The volume of intraregional exports in East Asia in 2007 is three times larger than that in the same East Asia in 1994, while in other regions the volume has grown about two times (Kimura and

Obashi, 2011).

Nevertheless, the India's involvement in IPNs is very low, while other neighbors in East Asia have become a hot melting pot of production networks. Shares of machinery in total exports and imports of manufactured goods (parts and components) in Singapore and Philippines have reached over 70%, while the share is less than 20% in India.

2.2. India's unilateral and bilateral trade policy

For understanding the policy environment of India for IPN involvement, we briefly investigate how government of India has been changed its trend of trade and investment policy. The FDI regime in India has been liberalized in the 1990s. It is known that India's trade and FDI liberalization has come about almost totally through unilateral measures – outside trade negotiations, whether in the WTO or FTAs. This happened mostly in two reform bursts, first in 1991-93 and then in 1998-2004, with "reform pauses" in 1993-96 and after 2004. Unilateral liberalization swept across southeast Asia, and then China, in the 1980s and '90s. However, unilateral liberalization has stalled in east and south Asia. It stalled in China from about 2006, corresponding with greater industrial-policy interventions. India's challenge is to stimulate further unilateral trade and FDI liberalization related to domestic structural reforms (Sally, 2011).

India has recently become very active with FTAs. India has already made free trade agreement with ASEAN, Japan, and South Korea. But India's approach to FTAs outside South Asia is mostly about foreign policy and is "trade light": not much trade is actually liberalized. At best tariffs are eliminated on close to 90 per cent of products – though with often long transition periods and restrictive ROOs (Rules of Origins). India's recently concluded FTA with South Korea fits the pattern: only 66 per cent of Indian tariff lines are subject to duty elimination over an 8-year transition period; and agreements on services and investment are weak.

3. An Economic model of International Production Networks

3.1 An introduction to our approach

Our modeling strategy is to describe a production network as a sequence of production stages and each stage is a sum of several parts production and their assembly activity. Once a group of parts are assembled, it subsequently becomes either a component for the next stage or a final good. A possible example is illustrated in <Figure 1>. Each cell is a stage at which value is added to a good that ends up as final consumption. Specifically, a small letter represents a production activity for a part or component (but call it a part, briefly), and a capital letter does the assembly activity of all the parts in its current stage. Each arrow is a physical movement of a part or an assembled component or the good itself. In production processes like those illustrated in the diagram the location of any one element depends on the location of others. In this respect, it seems we do not need to distinguish capital letter (assembly activity) from small letter (a part production). For instance, a parallel stage of Y, Y' in <Figure 1> may be treated as another part for stage Z. However, there is an essential difference, espeically for a MNC's point of view when it decides locations of each production activities. Because an assembly activity by nature requires several parts, a choice for assembly location affects several decisions on part production locations. The location of part production

also affects (i) the choice of assembly location but only in a collective manner and (ii) other parts production location choices only indirectly through the assembly location.

We suppose that costs are incurred if an arrow on the figure crosses an international boundary, and we will refer to these as 'offshoring costs'. They are likely to be made up of costs of coordination and management as well as direct shipping costs. These offshoring costs create centripetal forces binding related stages together. Firms seek to be close to other firms with which they transact, but the form of this depends on how the production process looks like. It is more important especially when the activities are linked to an upstream and a downstream stage. But there are also centrifugal forces that encourage dispersed production of different stages; for example, different stages have different factor intensities which create international cost differences and incentives to disperse. There is a tension between comparative costs creating the incentive to unbundle, and co-location or agglomeration forces binding parts of the process together (Baldwin and Venables, 2010). Moving forward, we clarify the cost minimization problem a MNC considers by itemizing types of cost in a context of IPNs. And then, we analyze how each type affects the interaction of centripetal and centrifugal forces and show how they determine the location for different production activities parts.

3.2 Basic elements

The production cost of part $i \in I$ is denoted by b_{ir} when it is produced in region $r \in R = \{\mathbf{E}ast, \mathbf{S}outh\}$. $\bar{r}$ and $\underline{r}$ represent the immediate upstream or downstream location of r, respectively. a_r denotes the assembly cost for the stage in question. When the location of part production i and that of assembly are different, it occurs a unit offshoring cost $\tau_i(r_o, r_d)$ where r_o is for the origin and r_d for the destination of offshoring. Obviously, there is no offshoring cost if $r_o = r_d = r$; $\tau_i(r, r) = 0$. To distinguish the offshoring cost of the assemled for the next stage from that of a part in a stage, we omit a subscript *i*; $\tau(r_o, r_d)$

The objective of a MNC is to minimize its total production cost over the whole chains of production by choosing locations of part production and assembly for every stage. That is, we look at the efficient location of production stages when decisions are taken by a single cost-minimizing agent, rather than when each stage is controlled by independent decision makers.

3.3 Costs related to parts-production location choice

For a part production location choice, first fix the assembly location. Suppose the assembly occurs in region r̂. Then, a MNC will choose region r to produce part i as long as

$$b_{ir} + \tau_i(r, \hat{r}) < b_{ir'} + \tau_i(r', \hat{r})$$

where $r' \neq r$. When the assembly location is different from r, it is simplified into

$$\tau_i(r,r') < b_{ir'} - b_{ir} \quad (1)$$

A region will be chosen for a part production location as long as the region can provide high enough production cost saving compared to when the part is produced in the same location as the assembly location. In other word, if part i requires a high offshoring cost, it is not necessary for region r to host the FDI for part i even when the region has production cost advantage for the part. From this relationship between offshoring cost and production cost, we can see why abundant labor force may be neither a sufficient nor a necessary condition for involvement into an IPN.

In each stage of production, a group of parts are usually involved. When related parts are produced in (physically or institutionally) the same location, there can be some positive co-location effects. Once industrial agglomeration starts working, it becomes an important element of location advantages, and subsequently induces more part productions in the location. Ando and Kimura (2009) showed that agglomeration effect is more important for parts and components than for machinery final products or other products in intra-East Asian trade patterns. The agglomeration effect acts as disavantage to a late-follower which is willing to get involved with pre-established IPN. To capture this feature, we extend part production cost b_{ir} into $B_{I_r}(\hat{r})$ which represents total production costs of the set I_r (all the parts produced in region r) when the assembly occurs in region $\hat{r}$. Note that the subset I_r of I may be different in equilibrium depending on where the assembly place for the stage, that is, it can be $B_{I_r}(r) \neq B_{I_r}(r')$. When there is the agglomeration effect, $B_{I_r}(r)$ should satisfy a condition that average cost gets smaller as more parts are produced in the same place. That is, for any part i and any given I_r,

$$\frac{B_{I_r \cup \{i\}}(r)}{\#(I_r \cup \{i\})} \leq \frac{B_{I_r}(r)}{\#(I_r)}$$

where $\#(J)$ is the number of elements in set J. Define the marginal contribution of part i on agglomeration effect in region *r*

$$\Delta B_{I_r \cup \{i\}} \equiv B_{I_r \cup \{i\}}(r) - B_{I_r}(r).$$

Note that the marignal contribution of each part can be different for given I_r. Thus, there can be $\Delta B_{I_r \cup \{i\}} \neq \Delta B_{I_r \cup \{j\}}$ for each pair of parts (i, j). Also, the marginal contribution may depend on which parts will be proudced in a region together with part i, that is, I_r matters. Considering the agglomeration effect, we can replace (1) with (2). That is, a MNC chooses region r for the production location of part i as long as

$$\tau_i(r,r') < \Delta B_{I_{r'} \cup \{i\}} - \Delta B_{I_r \cup \{i\}} \quad (2)$$

Basic implication is similar to (1) except one thing. Rather than the simple difference in production costs

$b_{ir'} - b_{ir}$, it is important whether the difference in the marginal contribution of part i on total cost saving is big enough to overcome the additional offshoring cost if it is produced in region r. In sum, for a part requiring low offshoring cost, the marginal contribution of the part on the agglomeration effect determines its production location. On the contrary, for a part requring high offshoring cost, the place assembly occurs is a critical factor which affects its production location.

3.4 Costs related to assembly location choice

Suppose a MNC chooses region r for its assembly location for a a stage. The total production cost for the stage is given by

$$C(r) = a_r + B_{I_r}(r) + B_{I_{r'}}(r) + \sum_{i \in I_{r'}} \tau_i(r', r) \tag{3}$$

As we discussed in the above, a choice for assembly location both affects and is affected by decisions on part production locations. However, the choice of r is directly influential on not only assembly cost itself a_r but also all the costs related with parts production, $B_{I_r}(r) + B_{I_{r'}}(r)$, and offshoring costs for parts $\sum_{i \in I_{r'}} \tau_i(r', r)$. For the choice of assembly location, there is another distinctive characteristic which should be considered in context of production chians. The assembly location is the end point of a stage. At the same time, it is also the bridging point for its subsequent stage. In this respect, the location of immediate upstream or downstream should be considered into a choice for current assembly location. For each stage, the total cost the MNC concerns will be

$$TC(r; \bar{r}, \underline{r}) = C(r) + \tau(\bar{r}, r) + \tau(r, \underline{r}) \tag{4}$$

And the MNC chooses a location r (rather than r') for its assembly activity when

$$TC(r; \bar{r}, \underline{r}) < TC(r'; \bar{r}, \underline{r}) \tag{5}$$

Combining (3) and (4), we can rewrite (5) in a detail manner. For given $(\bar{r}, \underline{r})$, MNC chooses region r for assembly activity when

$$a_r + \sum_{\tilde{r} \in R} B_{I_{\tilde{r}}}(r) + \sum_{i \in I_{r'}} \tau_i + \tau(\bar{r}, r) + \tau(r, \underline{r}) < a_{r'} + \sum_{\tilde{r} \in R} B_{I_{\tilde{r}}}(r') + \sum_{j \in I_r} \tau_j + \tau(\bar{r}, r') + \tau(r', \underline{r}) \tag{6}$$

With (2) and (6), now we are ready to analyze the location choice problems.

4. Analysis

In this section, we examine how a bundle of cost components in (6) affect a MNC's production location choice decision and how a region can attract the MNC's investment with introducing proper policies. Based on characteriscs of IPN-related costs, we categorize policy implications into four. The first two are generally applicable to any offshoring problem in that it focuses on the tension between cost saving motive and offshoring cost in an offshoring decision. The last two focus on what the disadvantages are for a region which is not in an IPN but willing to join a pre-established one and how to overcome them with late-participant's strategies.

4.1.Utilizing production cost advantages

A prompt conclusion from cost comparision may be the factor price advantage argument. A region which can provide a lower cost to use a factor than other regions hosts MNC's investment and can be a part of the IPN. It may include all the relevant incurred costs when a firm uses the factor, besides the market price of the factor itself. Policy recommendations from this perspective focus on how to make $a_{r'} - a_r$ greater. Making a flexible labor law may be a typical example of them. Because this point is one of the most fundamental reasons for offshoring, it has several other aspects related to other cost components. We will discuss them in each related other component in below.

4.2. Lowering offshoring costs

Now let's focus on offshoring costs which are another main concern of offshoring. The costs can be decomposed into two parts, $\tau_i = \alpha\boldsymbol{\tau}_i$ and $\tau = \alpha\boldsymbol{\tau}$ where α captures the overall level of offshoring costs and bold letter does a part-specific element costs. Then, (6) can be rewritten into

$$\alpha\left[\sum_{i\in I_{r'}}\boldsymbol{\tau}_i + \boldsymbol{\tau}(\bar{r}, r) + \boldsymbol{\tau}(r, \underline{r})\right] - \left[\sum_{j\in I_r}\boldsymbol{\tau}_j + \boldsymbol{\tau}(\bar{r}, r') + \boldsymbol{\tau}(r', \underline{r})\right] < \left(a_{r'} - a_r\right) + \sum_{\tilde{r}\in R}\left[B_{I_{\tilde{r}}}(r') - B_{I_{\tilde{r}}}(r)\right]$$

From this decomposition, we can observe that production cost determines the location as $\alpha \to 0$ and offshoring costs are decisive as $\alpha \to \infty$, at intermediate values of α there is tension between these forces (Baldwin and Venables, 2010). A decrease in α can be achieved when the region *r* improves its customs procedure or relaxes regulations about foreign investment. A typical way to lower part/component specific offshoring costs $\sum_{i\in I_{r'}}\boldsymbol{\tau}_i$ is a tariff cut on the part/component through FTA or unilateral measures. The other way to reduce the cost is to lessen the number of parts imported from r', which is more closely influenced by the agglomeration effect and related with assembly location choice.

4.3. Overcoming disadvantage from the agglomeration effect

Even when $a_{r'} > a_r$ and $\alpha\sum_{i\in I_{r'}}\boldsymbol{\tau}_i < \sum_{j\in I_r}\boldsymbol{\tau}_j$, region *r* may not be competitive against *r'*. One possibility is due to the agglomeration effect which acts as a disavantage against the late-participant into the IPN. To focus on the effect, we

consider an extreme case where all the parts but part *i* have been produced in E. In this case, it is clear that

$$\sum_{\tilde{r}\in R} B_{I_{\tilde{r}}}(S) = B_{I_E}(S) > B_{I_E}(E) = \sum_{\tilde{r}\in R} B_{I_{\tilde{r}}}(E).$$

The policy for region *S* to weaken this inequality is enlarging the set of parts produced in region *S*, I_S. To do this, a policy needs to be targeted. As we saw in 4.2, giving a favor on a part industry is helpful to attract the part production in home region. Examples of such favorable policies may be tariff-cut on the part or tax-cut on factors used for the part. When such a policy is costly to host region, however, which part should have priority and enjoy a greater favor? A possible answer might be a part having a greater marginal contribution of cost reduction. Once such a part is produced in region *S*, it becomes easier to attract other parts. At the same time, it helps region *S* to mitigate the disavantage from the agglomeration effect region *E* had. Another strategy which can be considered as a long-term policy is to give a favor to a part which the MNC is indifferent between two regions because the part has a small externality. This strategy has a merit in that it is a feasible start-up for a region in an early stage of involving an IPN. Among such 'indifferent' parts, a part having a greater externality on parts with a large marginal contribution must be the one in priority. The first strategy can be more effective when the collection followed by the second strategy reaches a critical mass.

For example, auto parts have been identified as a thrust sector as part of India's trade policy, and have been granted several fiscal incentives in order to be competitive globally. However, the focus needs to be not just on the specific products that have a current low-cost advantage in production, but also on the specific areas that can provide a more sustainable advantage. A policy suggestion by Srinivasan and Sen (2011) is in the same line with our analysis. That is, there is a need to adopt an industrial cluster approach to this sector and provide export incentives for the same, with adequate infrastructural supports.

4.4. Aligning with immediate upstream and downstream locations

When above three cost components are equal between two regions, the remaining cost a MNC considers is the difference in offshoring costs of assembly activity which incurs by the locational coordination with its upstream and downstream, that is, whether $\tau(\bar{r}, r) + \tau(r, \underline{r}) < \tau(\bar{r}, r') + \tau(r', \underline{r})$ or not. Note that for a country which newly joins an IPN, it is typically $r \neq \bar{r}$ and $r \neq \underline{r}$. For exmaple, in South/East Asia context, (6) is given by

$$a_S + b_S + \sum_{j\in I_E} \tau_j + \tau(E,S) + \tau(S,E) < a_E + B_I(E) + \tau_i$$

As discussed in 4.2, lowering α can be a way to overcome the disadvantage. Another quick answer is to have more and deeper FTA with countries in immediate upstreams and downstreams of a production stage region *S* gets interested in. When we consider offshoring cost structure over production process, we can draw out more specific policy

implications. When other cost components are neglible, a stage requring more offshoring cost becomes decisive its immediate upstream and downstream locations and subsequently all the production activities. From this respect, protection over an industy on the stage negatively affects FDI hosting not only for the stage but also for all activities in the line of production process. An example can be a case where a product gets significantly heavier over production process so requires a more transportation cost. Suppose offshoring cost keep increasing for a later stage convexly. That is, the marginal offshoring cost gets increased over stages. If it is the case, imposing on higher tariff on final goods has a greater impact on FDI in all the related upstream industries.

5. Economic Interpretations on India's Weak Participation in East Asia IPNs

5.1 Matching Theoretical Variables with Actual Data

In the previous theoretical development, we have seen that the high opportunity costs of including India in East Asian production networks may be the reason why India is not well-involved in the networks. In other words, there are so many better opportunities in other East Asian countries that including India in the East Asian production networks may be relatively costly. In the conceptual model suggested in this paper, the total costs of MNCs' building IPN can be summarized with three main costs; assembly-related cost, the costs of parts production, and offshoring costs. The firm's objective of building a production network is to minimize the overall production costs. Minimizing assembly-related costs and the costs of parts production is about finding locations that have the best cost-competitiveness in each stage of production or the locations that have high agglomeration effects. On the other hand, offshoring cost is about minimizing the cost of linking each production stage in each location with other production stages (or assembly) in other locations.

In section 5.2, first we see the trade flows of intermediate goods and FDI flows in India using world input-output table provided by World Input-Output Database. From these data, we can briefly gauge the economic integration of India to East Asian economies. Revealed Comparative Advantage (RCA) indices of China and India are also provided to see the capacity and readiness of two countries to the production networks. In addition, volumes of trade with major trading partners from 2001 to 2009 are provided to show the overall involvement of India in Asian region. The degree of horizontal integration between India and other East Asian countries may be a good indicator that can predict the vertical integration between them. In section 5.3, we look up wage statistics compared with education attainment to find cost advantages in India. Agglomeration effects are discussed using the world input-output data. And then in section 5.4, we consider networking costs among assembly and parts productions at different locations, which is typically known as offshoring costs. Offshoring costs are closely related with trade costs. In terms of data, protectionism through tariffs is provided as a measure for trade costs.

5.2 India's Participation in Intermediate Goods Trade

Tables 1 and 2 provide how much China, India and Indonesia (a member of ASEAN) participate in inter-country intermediate goods trade in 2009 using data from the world input-output database (WIOD). In Table 1, countries in the first column are the exporters of intermediate goods and countries in the first row are the importers of intermediate goods. In the second row, manufacturing indicates the consumption of manufacturing goods in the importing country and intermediate consumption indicates the overall consumption of intermediate goods in the importing country. The measurement unit is millions of US dollar. We can take an example to see how to interpret the table. The third row provides Australian (AUS) intermediate exports to China, Indonesia and India. In the third row (AUS), the second column provides the Australian intermediate exports to the Chinese manufacturing sector; the third column provides the share of Chinese manufacturing intermediate goods consumption to overall intermediate consumption shown in the fourth column of the bottom lines; and the fourth column indicates the overall Chinese imports from Australia.

The input-out table offers some ideas about the trade flows of intermediate goods. The most emphasized feature in this paper is the India's relatively low participation in intermediate trade. Compared to China, India is about 5.9 times smaller economy in terms of GDP. However, India is 8.3 times smaller in overall intermediate consumption, especially 9.2 times smaller in manufacturing intermediate consumption. Tables 3 and 4 provide the shares of foreign supply of intermediate goods and the shares of intermediate exports in China, Indonesia and India. These two tables show India's relatively low participation in intermediate trade compared to China and Indonesia. Foreign supply of intermediates in India relative to total output is 6.9 %, which is lower than 7.8 % of China or 7.4 % of Indonesia. In the case of manufacturing intermediate, the share of foreign supply to total output is 4.5 %, which is higher than that of Indonesia (3.4 %), but still lower than that of China (5.7 %). Intermediate exports of India in Table 4 give a much clear look about the low participation of intermediate trade. Overall intermediate export relative to total output is about 4.3%, which is the lowest among three countries. Similarly, manufacturing intermediate export relative to total output is about 6.9 %, which is lower than 9.2% of China and especially lower than 16.6 % of Indonesia.

There are features that the world input-output database provides. First of all, all three countries supply about 90% of their demand for intermediate goods by themselves. Second, among three countries India has the lowest intermediate demand relative to total output, which is about 47.3%. However, India has a larger share of intermediate manufacturing compared to Indonesia. China has even larger intermediate demand relative to total output and also has a larger share of intermediate manufacturing. Total intermediate goods consumption of China is almost ten times larger than that of India. This size of intermediate demand and the high intensity of manufacturing sector lead us to a clue that China can have a larger agglomeration effect than India. Third, maybe the most interesting thing from the table in terms of East Asian production networks is the share of Japan and Korea in the India's intermediate goods consumption. In manufacturing sector, two countries explain only 0.1% of India's intermediate consumption. In contrast, Japan has the largest share in Chinese manufacturing intermediate consumption from abroad, 0.9% and also has the second largest share in Indonesian manufacturing intermediate consumption, 0.5%. Korea has the third largest share in Chinese intermediate consumption next to Japan and the U.S., 0.7% and plays an important role in Indonesian intermediate consumption. In India, Australia, Germany and the U.S. have larger shares in intermediate consumption. The intermediate supply of China, Indonesia and India show the similar results with the intermediate consumption: the

role of Japan and Korea is relatively small in India. Germany and the U.S. have a larger share in India's intermediate demand and supply.

Table 5 shows the investment inflows to China, Indonesia, and India. We can see the similar patterns in investment inflows with intermediate consumption and supply. All three countries account for most of their investment and the size of investment in China is much larger than that in India. Also, as in foreign investment, Japan and Korea are less connected with India compared to Germany or the U.S. In contrast, Japan plays an important role as an investor in China and Indonesia.

5.3 Costs Related to Assembly and Parts Production

As mentioned earlier, even though assembly and parts production are different processes and so treated differently in the theoretical framework, the distinction is not very definitive in terms of data. Once we understand that in East Asian production networks offshoring is mostly happening in sectors that do not require high technology or highly skilled workers, the cost saving is coming from the low wages of unskilled labor. Thus, assembly and low-tech parts production related costs are linked with wages in India. One of the reasons that many people in economic policy and business expect the India's active role in production chain is the relatively low wages.

However, in this subsection, what we are trying to show is that low wage is not India's strength in East Asian production networks compared with China and other competitors, but the low-wage advantage in these competitors is declining and hence India should take some actions to be the location replacing and filling the competitors' empty spots as they lose their ground in low-wage advantages.

Figure 2 provides the labor cost index (United States=100) in 2007. It says that the average hourly compensation cost for all employees in manufacturing was about 3.1 in India when that in the U.S. was normalized to 100. This index shows that the labor cost in India was fairly low compared with Mexico, East European countries, or Philippines. However, as a competitor in East Asian production networks, China is formidable in terms of wage rates. Hourly compensation cost in China in recent years has been the lowest among most East Asian countries. But, these gaps are declining. Figure 3 compares hourly wage rates among China, India and Philippines from 2003 to 2008. In 2003, the hourly compensation cost of manufacturing employees in China was only 76% of India's. The wage gap between China and India has decreased and so hourly compensation cost in China was about 90% of India's in 2008. At the same time, compared with hourly compensation for manufacturing employees in Philippines (a member of ASEAN), in 2003 hourly compensation of Philippine was 1.02, which is about 26% higher than that of India. The gap has widened and in 2007 hourly compensation of Philippines was about 36% higher than that of India. For the same tasks, India has become more attractive location than before as a participant in production networks.

In addition to wages, we link the cost of parts production with benefits of disintegration in parts production. We argue that the proper level of industrialization is a key to the participation in the production networks. However cheap the labor cost is, too low level of industrialization in manufacturing sectors may hinder the participation in the production networks. There are several ways to quantify the level of industrialization of a country. One way to do that is to see the levels of (revealed) comparative advantage in overall sectors. If we can see that a country has comparative

advantage in many high-tech industries that require high capital-intensity, then we may say that a country is well-industrialized. Table 6 provides top 15 industries that India has comparative advantage in 2003. We use revealed comparative advantage indices reported by Batra and Khan (2005). Interestingly, none of 15 industries that show high comparative advantage are manufacturing-related. Most of industries are agricultural or processing raw materials that barely require advanced technologies. These industries do not require many processes from start to the final assembly and hence may not gain much from production disintegration through production networks.

As a comparison, China's top 15 industries with high revealed comparative advantage are also provided in Table 7. China also has high comparative advantages in primary industries. However, unlike India, there are some manufacturing industries showing high comparative advantage.

Another way to evaluate the level of industrialization is to see the commodity composition of imports. Figure 4 shows that the large share of imports are explained by the energy-related consumption and capital goods. Large share of energy consumption may be coming from the abrupt rise in the price of crude oil in the late 2000's. Export-related imports have been relatively small. Furthermore, most items in export-related imports are not manufacturing goods. More detailed data in imports composition are reported in Table 8. This phenomenon can be evidence that India has imported substantial amount of capital goods, which are mostly intermediate goods, but they are not well led to exports. This economy seems to have focused more on domestic investment rather than participating in production networks.

From these observations, we can conclude that the industrial structure of Indian economy seems to suffer disadvantages by agglomeration effects as we have seen in 4.3. One or two industries related to parts production can bring multinational corporations to India and accelerate industrialization and globalization of production networks in India. To do so, the focus needs to be not just on specific products with cost advantage, but on specific industries as a whole that can provide more sustainable advantage. Then, the agglomeration effect can attract more international firms and foster the participation in international production networks.

5.4 Offshoring Costs

High offshoring costs are related to increased trade costs caused by the production disintegration and relocation of production facilities such as shipping costs, a wider set of communication, coordination as well as protectionism. The concept of offshoring is broad and not definitive yet. This paper suggests three different costs that may contribute to make India's participation to East Asian production networks hard: existing protectionism, historically longer linkage with Western countries, trade openness with countries closely involved in East Asian production networks and business environment in India.

We provide (import) tariff rates in India as a measure for offshoring costs. High import tariff rates hinder multinational firms to separate their production facilities in different locations in order to save some costs. The protectionism seems to still exist in India and tariff rates give us a chance to glimpse at the trade policy. Table 9 provides effective tariff rates on commodities from China, Japan and South Korea in 2005 and 2010 at ISIC3 2-digit level. What is detected in tariff data is that there has been a selective and strategic trade policy; average tariff rates reduced from 2005 to 2010 while the standard deviation of tariff rates across commodities has widened up in the same

period. Average tariff rates on commodities imported from China has decreased from 16% to 11.51%. Likewise, the average tariff rates on commodities from Japan and South Korea have also dropped from 15.66% to 12.15% and from 15.37% to 12.82%, respectively. However, the standard deviation of tariff rates on commodities imported from China has risen from 5.19 to 6.3. The similar increases in standard deviation can be observed from Japan and South Korea. We interpret decreasing average tariff rates with increasing standard deviations as part of strategic trade policy in India. It is natural that the government tries to protect some industries such as infant industries or industries that are thought to be essential to India's development and economic growth. Many economies at the developing stage have tried to attract foreign investment and to suppress final consumption and that is what exactly we can observe from tariff rates in India. Tariff rates on intermediate goods are in the middle.

Tables 10 through 12 provide tariff rates based on those categories using BE code. Importing goods are categorized based on their product types: intermediate goods, consumption goods and capital goods. The countries imported from are China, Japan and South Korea and data are provided from 2001 to 2009 whenever possible. Table 10 shows tariff rates on intermediate goods, Table 11 on consumption goods, and Table 12 on capital goods. Tariff rates imposed on consumption goods have decreased and still remained high compared to other types of products. Especially, within consumption goods, tariffs imposed on 'mainly for household consumption' stay very high or have increased, while tariffs imposed on durable goods, which are close to capital goods in nature, have dropped fast and significantly. In contrast, the tariff rates on capital goods seem to have dropped fast and significantly. Tariff rates on intermediate goods have dropped modest. Standard deviations of tariff rates get larger in consumption goods and intermediate goods. We interpret larger standard deviations across products over time as an indirect indicator that shows the Indian government has been strategic in trade policy. Especially, high tariff rates on consumption goods can be interpreted that *import substitution trade policy is prevailing* in India. Furthermore, there is a room for policy intervention to get more involved in East Asian production networks; lowering tariff rates on intermediate goods.

Tariffs are relatively clear and obvious obstacles for regional economic integration. There are other obstacles for further economic integration or building closer production networks. We review these obstacles for India to participate in East Asian IPNs. Tables 13 to 16 provide measures for business environment and easiness of doing business in India. These measures are educational attainments, trade facilitation indicators, logistics performances, and business environment indicators. Table 13 shows that in terms of tertiary education enrollment rates, India is lower than China and other ASEAN members. If the level of education can represent the productivity of workers, then India may have relatively lower productivity. Especially, considering labor compensation shown in Figure 3, on average employers in India pay more for less educated workers than in China. Compared to other ASEAN countries, it is not very clear. Table 14 shows whether international trade is easy in India compared to China and other ASEAN countries. India requires more documents than other countries in the table. Lead times to import and export are relatively longer than other countries in the table (except for Philippines). Costs to export and import are relatively very high in India. In 2010, cost to export in India is $1,055, which is more than two times higher than in China, Malaysia or Vietnam. As to multinational firms that require high volumes of import and export, India may not be very attractive. In terms of logistic performances, India did not get the highest scores. Consistently, India performs worse than China, Malaysia, Thailand and Singapore. Logistics can be one of the considerations multinationals keep in their mind when they choose the location for production facilities. However, logistic performance is not one of India's attractions as shown

in Table 15. Table 16 provides overall domestic business environments in India. These indicators are also not very favorable to India. Column 1 introduces `ease of doing business` index and index for India reveals that doing business in India is overall mot very easy. Compared to Malaysia, Thailand and Singapore, business-related regulations are complicated and restricted. Especially, contract-enforcement-related regulations are not business-friendly. Compared to China, India has less favorable business environment except tax-related regulations shown in columns 12 and 13.

In addition, longer historical economic linkage with Western countries than other Asian countries might be the reason that delays India to enjoy full participation in East Asian production networks. Even though India started "Look East" policy in 1992, the sizable improvement in economic and commercial integration has made only in recent years. As shown in Table 17, East Asian countries are not India's major trading partners. This seems another factor that India cannot easily break the agglomeration effects built-in East Asian region and get involved in the East Asian production networks. India used to trade more with advanced economies, especially European countries before around 2005. Since then, the volume of trade with emerging markets and developing Asian countries has risen up fast. Thus, India's slow but steady involvement in East Asian production networks is expected in the long-run.

Another variable we can use as a measure for the offshoring costs is the level of FTAs India has made a deal with. What is interesting is that both India and China made free trade agreements with ASEAN, Japan and South Korea but these two did not each other. Table 18 provides information about the FTAs made by ASEAN, China and India. As mentioned in the previous sections, ASEAN and China are geographically close and interlinked with FTAs. Here we expect ready-built agglomeration effects in East Asian countries.

6. Concluding Remarks

To get involved further into an IPN, suggested solutions in the literature can be summarized into two types of cost reduction. First is to strenghen the competitiveness in factor prices. If home country can provide a cheaper labor force than countries which already participated in a IPN, for instance, it may induce FDI by MNCs and it leads to more IPN-involvement chances. Having a more flexible labor law is an example along this line. From the wage rate data, we have found that the wage rate in India is a bit higher than in China and lower than in Philippines. And the wage gap between China and India has been narrowing down. Yet, India's participation in IPNs is not gaining speed. So, it seems that the wage rate itself is not the major driving force that slows India's participation to global production networks.

Second is to lower offshoring costs. A policy recommendation from this approach is to increase trade with IPN-in countries through further trade liberalization agreements such as FTAs or to develop customs facilitation. ASEAN countries have deeper and more thorough FTAs with Japan and China. As discussed in section 4.4, India has disadvantage in this alignment. In East Asian IPNs, Japan (and South Korea) have been played key roles as main investors. Large trade volumes with Japan help China and other ASEAN countries build more tied and cohesive East Asian production networks with each other. Yet, India imposes relatively high tariffs on imports from Japan and South Korea and hence India's trade with Japan and South Korea has not been very active. There is no better way for India to participate in East Asian production networks than further economic engagement with Japan and South Korea. In

addition to improving economic relationship with downstream investors, India also needs to increase trade with countries in the similar production stages. India has kept high tariff rates on imported goods from China which is largest trader in intermediate goods and there has been no tightly bound trade agreement between China and India by far. Considering that China is the one of the most actively involved country in East Asian production networks, lowering trade barriers and creating more cooperative economic relationship between China and India will be a critical point for Inida to further participate in the production networks.

Our theoretical model enables us to see through an aspect of production costs to improve the environment for participating in an IPN with targeted policies, especially in a *pre-existing* IPN. First, we focus on the fact that a whole process of IPN is a chain-type sequence of upstreams and downstreams. For a given stage of production, if the production location of immediate upstream or downstream is different from the current assembly location, it incurs offshoring cost. For example, in a MNC's view including a new region for a certain stage of production causes additional offshoring costs when every other stage of production has already been operated in one region. In this respect, the late follower bears disadvantage to get in the middle of already-established IPNs. When other things are equal, upstream location has a predetermined power for its immediate downstream location choice, again its immediate downstream, and so on. Thus, protection on upstream industry may affect involvment of downstreams negatively. If other things are equal, giving a more favor to upstream industy can be the most effective unilateral open policy. Recently, Indian government allows companies to get round sectoral caps on foreign equity, which enables an Indian holding company with up to 49 percent of foreign equity to invest in “downstream” companies without counting the holding company’s foreign equity. If the policy priority is on IPN involvement, it will be worthy to consider allowing the similar measures on upstream companies as well. Second, even after the alining with upstream and downstreams, a disadvantage to a late-follower may still remain due to the pre-existing co-location effect. For a part having a greater marginal contribution on total cost reduction, the government may provide a more targeted favor. Such a part production location can be an axis to attract other parts production subsequently mitigate the disadvantage from the agglomeration effect.

At last, many indicators showing the easiness of trading or doing business in India tell that India has less favorable business environments for MNCs to expand their networks compared with East Asian competitors. Also, some East Asian countries may have reached scale economies in several industries highly involved in production networks. Multinationals would like to utilize relatively better business environment and existing concentration (or agglomeration) benefits in those East Asian countries. Then, in order to break into pre-existing production networks and to overcome the handicaps as a late participant, India needs to offer more attractive deals to investors than existing deals in the industries that India would like to have further participation. We have suggested some ideas about the possible policies but yet how to implement them is still an open question.

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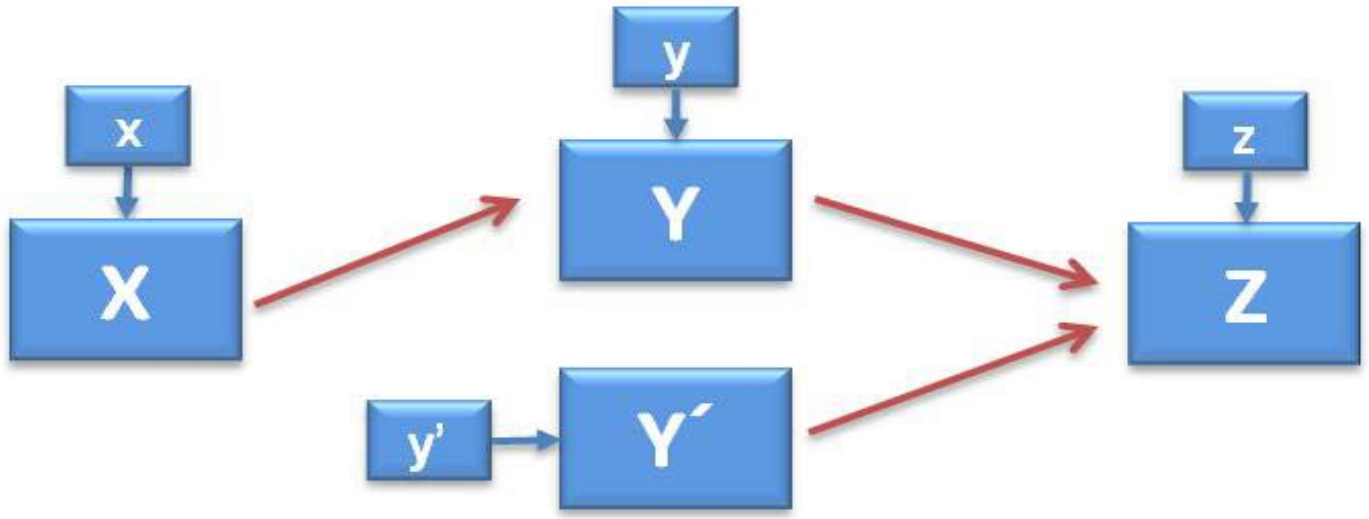
Figure 1. An illustrative example of IPNs



Each cell is a stage at which value is added to a good that ends up as final consumption. Specifically, a small letter represents a production activity for a part or component (but call it a part, briefly), and a capital letter does the assembly activity of all the parts in its current stage. Each arrow is a physical movement of a part or an assembled component or the good itself.

Table 1. Inter-country Intermediate Input-Output in 2009 (Imported by China, Indonesia and India)

Importer		CHN			IDN			IND		
Exporter		Manufacturing	Contribution (%)	Intermediate consumption by origin	Manufacturing	Contribution (%)	Intermediate consumption by origin	Manufacturing	Contribution (%)	Intermediate consumption by origin
AUS		44,563	0.4	57,584	1,513	0.3	3,245	4,544	0.4	7,417
AUT		4,064	0.0	8,165	156	0.0	288	240	0.0	456
BEL		4,749	0.0	7,801	295	0.1	984	2,001	0.2	4,028
BGR		109	0.0	160	15	0.0	43	13	0.0	18
BRA		20,745	0.2	25,041	389	0.1	765	1,025	0.1	1,339
CAN		17,167	0.2	24,079	462	0.1	887	1,417	0.1	3,311
CHN	C1	431,611	4.3	606,728	257	0.0	352	11	0.0	19
	C2	327,770	3.3	451,192	221	0.0	328	238	0.0	414
	D	3,618,512	35.9	5,340,170	7,797	1.4	13,561	18,108	1.5	29,879
	total	5,338,742	52.9	8,895,354	8,773	1.6	16,200	18,624	1.5	31,708
CYP		25	0.0	79	1	0.0	7	4	0.0	6
CZE		922	0.0	1,694	36	0.0	87	201	0.0	392
DEU		44,783	0.4	71,391	1,155	0.2	2,927	2,812	0.2	4,878
DNK		2,263	0.0	4,073	106	0.0	415	303	0.0	401
ESP		3,131	0.0	5,081	78	0.0	159	365	0.0	601
EST		68	0.0	105	4	0.0	6	18	0.0	23
FIN		3,052	0.0	4,916	71	0.0	126	637	0.1	1,578
FRA		11,846	0.1	21,758	437	0.1	972	854	0.1	1,529
GBR		9,592	0.1	19,073	253	0.0	910	1,447	0.1	3,232
GRC		131	0.0	338	25	0.0	104	15	0.0	29
HUN		1,170	0.0	1,914	23	0.0	84	41	0.0	73
IDN	C1	527	0.0	663	45,778	8.4	67,928	31	0.0	46
	C2	5,677	0.1	7,554	27,293	5.0	51,559	644	0.1	840
	D	5,187	0.1	7,281	75,810	14.0	161,232	2,401	0.2	3,460
	total	11,783	0.1	16,846	195,941	36.1	460,560	3,077	0.3	4,346
IND	C1	597	0.0	840	173	0.0	238	56,755	4.7	98,875
	C2	1,528	0.0	1,785	1	0.0	24	22,632	1.9	26,053
	D	4,741	0.0	6,940	419	0.1	888	245,506	20.3	434,944
	total	7,301	0.1	11,178	593	0.1	1,151	558,001	46.1	1,034,932
IRL		2,872	0.0	4,778	20	0.0	161	143	0.0	302
ITA		11,125	0.1	17,884	424	0.1	1,413	1,205	0.1	2,025
JPN		88,852	0.9	126,225	2,879	0.5	7,280	1,437	0.1	2,491
KOR		70,936	0.7	99,635	1,641	0.3	3,921	1,643	0.1	2,744
LTU		83	0.0	219	2	0.0	4	37	0.0	49
LUX		951	0.0	2,698	4	0.0	22	12	0.0	21
LVA		151	0.0	163	5	0.0	15	59	0.0	78
MEX		5,264	0.1	6,042	34	0.0	60	315	0.0	369
MLT		552	0.0	879	1	0.0	1	1	0.0	1
NLD		6,742	0.1	15,613	242	0.0	677	672	0.1	1,118
POL		1,619	0.0	2,856	98	0.0	435	89	0.0	173
PRT		1,300	0.0	3,209	3	0.0	5	22	0.0	31
ROM		269	0.0	414	30	0.0	146	100	0.0	153
RUS		17,244	0.2	21,367	129	0.0	278	968	0.1	1,327
SVK		224	0.0	334	6	0.0	12	10	0.0	19
SVN		94	0.0	169	9	0.0	16	43	0.0	94
SWE		5,695	0.1	9,864	328	0.1	590	421	0.0	754
TUR		1,767	0.0	2,174	179	0.0	353	344	0.0	574
TWN		76,882	0.8	90,242	813	0.1	1,609	561	0.0	874
USA		79,605	0.8	113,176	2,052	0.4	4,576	7,506	0.6	12,501
RoW		301,387	3.0	389,734	14,495	2.7	31,655	62,342	5.1	85,008
Total Intermediate Consumption (A)		6,199,820	61.5	10,084,306	233,720	43.0	543,148	673,564	55.6	1,211,002

Source: The World Input-Output Database (40 countries, in current prices (millions of US$))
Note : C1 indicates Agriculture, Hunting, Forestry and Fishing, C2 Mining and Quarrying and D all manufacturing

Most of intermediate goods are supplied domestically in all three countries. As foreign suppliers, the U.S. and Germany as well as China play an active role in all three countries. South Korea and Japan have high share of intermediate supply in China and Indonesia, while their roles in India are relatively small.

Table 2. Intercountry Intermediate Input-Output in 2009 (exported by China, Indonesia and India)

		CHN				DEU	FRA	GBR	IDN				IND				JPN	KOR	TWN	USA	RoW	
		c1	c2	D	total	total	total	total	c1	c2	D	total	c1	c2	D	total	total	total	total	total	total	total sum (A)
CHN	c1	120,471	1,018	431,611	606,728	410	80	146	29	0	257	352	4	0	11	19	1,078	725	175	1,188	2,132	614,347
	Share (%)	1.2	0.0	4.3	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2
	c2	812	29,713	327,770	451,192	145	52	27	1	66	221	328	1	1	238	414	1,445	1,464	511	354	701	458,622
	Share (%)	0.0	0.3	3.3	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6
	D	152,191	96,851	3,618,512	5,340,170	37,028	16,348	16,431	371	114	7,797	13,561	325	138	18,108	29,879	47,403	42,554	21,906	114,494	236,475	6,051,147
	Share (%)	1.5	1.0	36.4	53.8	0.4	0.2	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.3	0.5	0.4	0.2	1.2	2.4	60.9
	total	338,170	218,629	5,338,742	8,895,354	47,386	24,508	24,186	454	209	8,773	16,200	337	145	18,624	31,708	59,172	56,847	22,612	161,374	375,037	9,933,807
IDN	c1	77	10	527	663	97	51	42	6,910	8	45,778	67,928	6	0	31	46	304	55	23	354	555	2,560
	Share (%)	0.0	0.0	0.1	0.1	0.0	0.0	0.0	1.2	0.0	8.1	12.0	0.0	0.	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.5
	c2	10	561	5,677	7,554	73	0	96	0	8,670	27,293	51,559	0	1	644	840	10,390	5,562	2,494	311	828	31,062
	Share (%)	0.0	0.1	1.0	1.3	0.0	0.0	0.0	0.0	1.5	4.8	9.1	0.0	0.0	0.1	0.1	1.8	1.0	0.4	0.1	0.1	5.5
	D	457	100	5,187	7,281	1,615	514	517	9,244	722	75,810	161,232	131	5	2,401	3,460	5,385	1,806	1,021	2,954	31,059	62,363
	Share (%)	0.1	0.0	0.9	1.3	0.3	0.1	0.1	1.6	0.1	13.4	28.4	0.0	0.0	0.4	0.6	0.9	0.3	0.2	0.5	5.5	11.0
	total	573	711	11,783	16,846	3,867	1,106	1,553	22,510	12,446	195,941	460,560	137	6	3,077	4,346	16,232	8,512	3,538	3,649	34,155	567,672
IND	c1	185	0	597	840	112	25	59	20	0	173	238	22,779	1	56,755	98,875	48	98	89	1,310	2,585	104,774
	Share (%)	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	5.0	8.6	0.0	0.0	0.0	0.1	0.2	9.2
	c2	1	105	1,528	1,785	150	52	19	0	0	1	24	0	38	22,632	26,053	702	93	108	11	418	33,409
	Share (%)	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.3	0.1	0.0	0.0	0.0	0.0	2.9
	D	133	164	4,741	6,940	3,442	1,064	1,654	60	10	419	888	9,991	3,658	245,506	434,944	1,248	1,357	736	12,076	23,260	497,168
	Share (%)	0.	0.0	0.4	0.6	0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.9	0.3	21.4	38.0	0.1	0.1	0.1	1.1	2.0	43.4
	total	362	325	7,301	11,178	6,390	1,509	6,140	80	10	593	1,151	51,326	8,323	558,001	1,034,932	3,116	1,595	933	19,748	35,972	1,144,996
Total intermediate consumption		363,137	247,447	6,199,820	10,084,306	2,746,151	2,230,827	1,890,650	25,625	14,738	233,720	543,148	53,523	9,075	673,564	1,211,002	4,448,473	1,275,610	439,502	10,628,438	8,012,985	57,183,665

Source: The World Input-Output Database (40 countries, in current prices (millions of US$))
Note : C1 indicates Agriculture, Hunting, Forestry and Fishing, C2 Mining and Quarrying, D manufacturing

Focus of this table is to find the share of China, Indonesia and India as intermediate good suppliers. India has relatively fairly small share in intermediate good supply to South Korea and Japan, which own most of downstream companies in the East Asian production networks.

Table 3. Intermediate Supply from Abroad in 2009

Importer	CHN			IDN			IND		
	Manufacturing (1)	Share of Intermediate Manufacturing (%)	Intermediate consumption (2)	Manufacturing (3)	Share of Intermediate Manufacturing (%)	Intermediate consumption (4)	Manufacturing (5)	Share of Intermediate Manufacturing (%)	Intermediate consumption (6)
Total Intermediate Supply (A)	6,199,820	61.5	10,084,306	233,720	43.0	543,148	673,564	55.6	1,211,002
Self-supply (B)	5,338,742		8,895,354	195,941		460,560	558,001		1,034,932
Foreign Supply (A-B)	861,078		1,188,952	37,779		82,588	115,563		176,060
Total Output (C)	15,149,655		15,149,655	1,109,661		1,109,661	2,562,658		2,562,658
(A-B) / C	5.7 %		7.8 %	3.4 %		7.4 %	4.5 %		6.9 %

Source: The World Input-Output Database (40 countries, in current prices (millions of US$))
Note : C1 indicates Agriculture, Hunting, Forestry and Fishing, C2 Mining and Quarrying

Table 3 shows India's relatively low participation in intermediate trade compared to China and Indonesia. Foreign supply of intermediates in India relative to total output is 6.9 %, which is lower than 7.8 % of China or 7.4 % of Indonesia. In the case of manufacturing intermediate, the share of foreign supply to total output is 4.5 %, which is higher than that of Indonesia (3.4 %), but still lower than that of China (5.7 %).

Table 4. Domestic Intermediate Production for Exports in 2009

		Intermediate total sum (A)	Self-consumption (B)	A-B	Total output (C)	(A-B) / C
CHINA	c1	614,699			880,420	
	Share (%)	6.2				
	c2	458,949			466,024	
	Share (%)	4.6				
	manufacturing	6,064,708	5,340,170	724,538	7,888,823	9.2%
	Share (%)	60.9				
	total	9,933,807	8,895,354	1,038,453	15,149,655	6.9%
IDONESIA	c1	70,488			111,652	
	Share (%)	0.5				
	c2	82,621			82,182	
	Share (%)	5.5				
	manufacturing	223,595	161,232	62,363	376,315	16.6%
	Share (%)	11.0				
	total	567,672	460,560	107,112	1,109,661	9.7%
INDIA	c1	105,012			271,749	
	Share (%)	9.2				
	c2	33,409			40,535	
	Share (%)	2.9				
	manufacturing	498,057	434,944	63,113	913,529	6.9%
	Share (%)	43.4				
	total	1,144,996	1,034,932	110,064	2,562,658	4.3%
Overall World		57,183,665			114,023,957	0.502

Source: The World Input-Output Database (40 countries, in current prices (millions of US$))
Note : C1 indicates Agriculture, Hunting, Forestry and Fishing, C2 Mining and Quarrying

Table 4 also shows India's relatively low participation in intermediate trade compared to China and Indonesia. Intermediate exports of India give a much clear look about the low participation of intermediate trade. Overall intermediate export relative to total output is about 4.3%, which is the lowest among three countries. Similarly, manufacturing intermediate export relative to total output is about 6.9 %, which is lower than 9.2% of China and especially lower than 16.6 % of Indonesia.

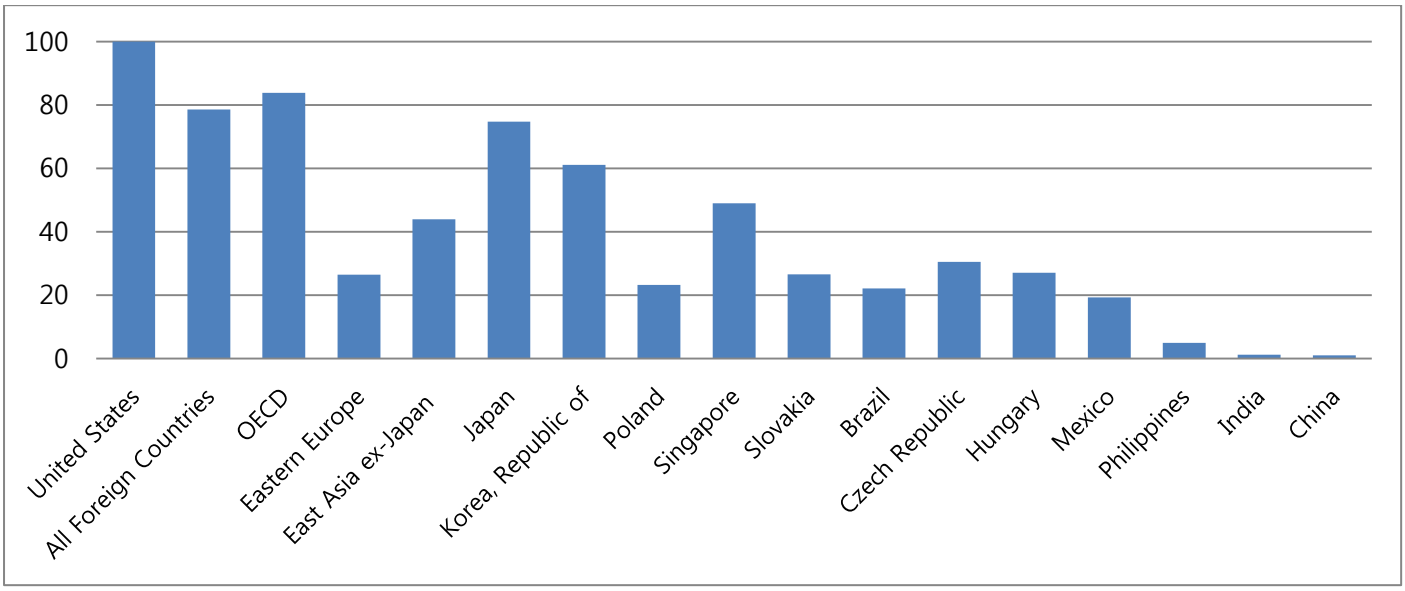
Table 5. Inter-country Investment Flows in 2009

		Host Country					
		CHN		IDN		IND	
		Gross fixed capital formation	Share (%)	Gross fixed capital formation	Share (%)	Gross fixed capital formation	Share (%)
AUS	Total	689	0.0	159	0.1	87	0.0
AUT	total	1,608	0.1	45	0.0	116	0.0
BEL	total	742	0.0	30	0.0	1,044	0.3
BGR	total	13	0.0	1	0.0	5	0.0
BRA	total	657	0.0	26	0.0	35	0.0
CAN	total	1,207	0.1	172	0.1	290	0.1
CHN	total	2,039,292	93.9	3,397	2.0	16,149	3.9
CYP	total	3	0.0	0	0.0	45	0.0
CZE	total	621	0.0	7	0.0	101	0.0
DEU	total	25,295	1.2	525	0.3	2,872	0.7
DNK	total	823	0.0	23	0.0	59	0.0
ESP	total	551	0.0	41	0.0	217	0.1
EST	total	17	0.0	0	0.0	1	0.0
FIN	total	1,555	0.1	89	0.1	192	0.0
FRA	total	3,857	0.2	199	0.1	754	0.2
GBR	total	2,842	0.1	137	0.1	482	0.1
GRC	total	4	0.0	1	0.0	6	0.0
HUN	total	757	0.0	67	0.0	34	0.0
IDN	total	980	0.0	160,494	92.7	86	0.0
IND	total	2,341	0.1	1,922	1.1	362,886	88.2
IRL	total	755	0.0	17	0.0	35	0.0
ITA	total	4,469	0.2	189	0.1	1,013	0.2
JPN	total	26,927	1.2	1,683	1.0	830	0.2
KOR	total	14,179	0.7	419	0.2	1,459	0.4
LTU	total	3	0.0	0	0.0	1	0.0
LUX	total	43	0.0	1	0.0	3	0.0
LVA	total	2	0.0	0	0.0	0	0.0
MEX	total	849	0.0	24	0.0	24	0.0
MLT	total	2	0.0	0	0.0	0	0.0
NLD	total	1,152	0.1	47	0.0	265	0.1
POL	total	278	0.0	22	0.0	37	0.0
PRT	total	113	0.0	0	0.0	7	0.0
ROM	total	77	0.0	2	0.0	15	0.0
RUS	total	311	0.0	7	0.0	65	0.0
SVK	total	524	0.0	2	0.0	10	0.0
SVN	total	67	0.0	2	0.0	8	0.0
SWE	total	1,740	0.1	316	0.2	194	0.0
TUR	total	80	0.0	13	0.0	80	0.0
TWN	total	5,599	0.3	154	0.1	353	0.1
USA	total	16,735	0.8	682	0.4	5,870	1.4
RoW	total	14,676	0.7	2,262	1.3	15,679	3.8
Total Sum		2,172,437	2,172,437	173,177	173,177	411,412	411,412

Source: The World Input-Output Database (40 countries, in current prices (millions of US$))

Table 5 shows the investment inflows to China, Indonesia, and India. We can see the similar patterns in investment inflows with intermediate consumption and supply. All three countries account for most of their investment and the size of investment in China is much larger than that in India. Also, as in foreign investment, Japan and Korea are less connected with India compared to Germany or the U.S. In contrast, Japan plays an important role as an investor in China and Indonesia.

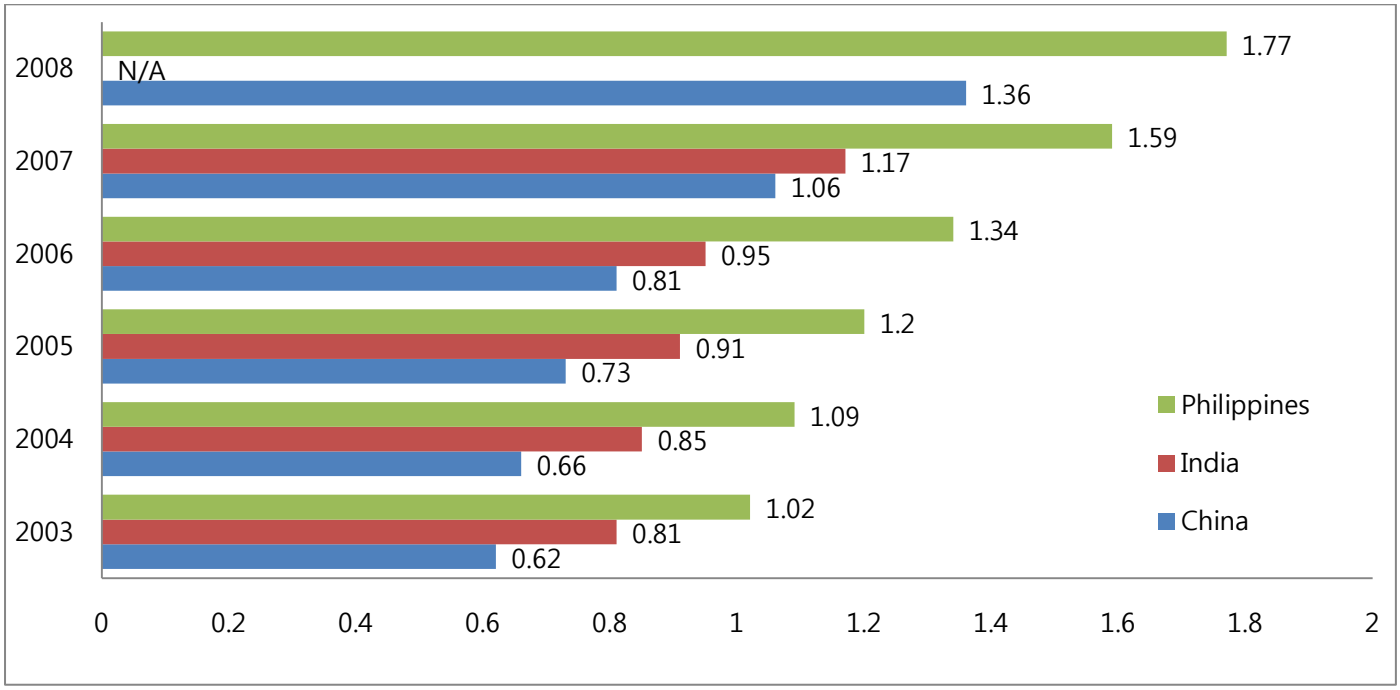
Figure 2. Index of Hourly Compensation Costs in Manufacturing Employees, 2007



Source: U.S. Bureau of Labor Statistics, December 2011
Note: Compensation costs include direct pay, social insurance expenditures, and labor-related taxes.
Index, U$ 32.07 = 100 in 2007

This graph shows the relative wages among some regions and countries in terms of US wage (US=100).
Low wages are a good attraction to multinational firms seeking the production cost saving.
India is the one of the countries that has lowest wage rates and so then some other factors than wages have hindered India's active involvement in Asian production networks.

Figure 3. Mean Hourly Compensation Costs in the Manufacturing for Philippines, India and China as a Percent of Corresponding Costs in the US$, 2003 - 2008



Source: News Release, Bureau of Labor Statistics, the U.S. Department of Labor (2011).

This graph provides the changes in relative wages among Philippines (a member of ASEAN), India and China. The wages in all three areas have grown rapidly. An interesting fact is that even though the wage rate in Philippines is higher than India, Philippines' involvement in Asian production networks is much higher India's. (See OECD, 2012) There may be other factors that slow India's integration to East Asian production networks as a late participant. Possible conjecture is that the wage gap between Philippines and India is not wide enough for India to overcome the agglomeration effect existing in East Asian production networks.

Table 6. India's top 15 sectors based on RCA index in 2010

Rank	HS code	Sector	RCA index
1	13	Lac, gums, resins, vegetable saps and extracts nes.	8.66
2	52	Cotton	8.23
3	53	Vegetable textile fibers nes, paper yarn, woven fabric	7.80
4	50	Silk	6.85
5	57	Carpets and other textile floor coverings	6.37
6	71	Pearls, precious stones, metals, coins, etc.	5.17
7	14	Vegetable plaiting materials, vegetable products nes	5.14
8	63	Other made textile articles, sets, worn clothing etc.	4.09
9	09	Coffee, tea, mate and spices	3.76
10	54	Man-made filaments	3.55
11	55	Man-made staple fibres	3.36
12	79	Zinc and articles of thereof	3.33
13	67	Bird skin, feather, artificial flowers, human hair	2.91
14	26	Ores, slag and ash	2.51
15	62	Articles of apparel and clothing accessories, not knitted and crocheted	2.51

Source: WITS

Note: Revealed Comparative Advantage: RCA=(Xij/Xwj)/(Xi/Xw). Xij: i country's export of commodity j, Xwj: world export of commodity j, Xi : total export of country i, and Xw : total world exports.

This table provides the industrial comparative advantage reported in World Integrated Trade Solution (WITS).
The measure used is the index of revealed comparative advantage. All industries India has comparative advantage are non-manufacturing, implying that the industrial structure in India is not mature enough to participate in manufacturing networks.

Table 7. China's top 15 sectors based on RCA index in 2010

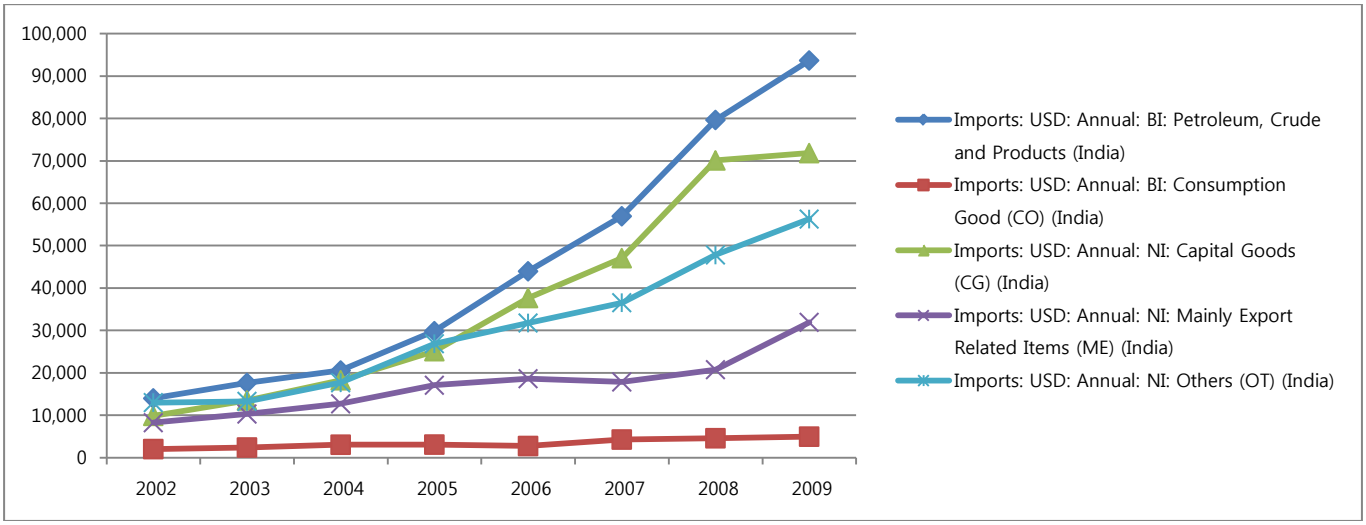
Rank	HS code	Sector	RCA index
1	66	Umbrellas, walking-sticks, seat-sticks, whips, etc	7.09
2	46	Manufactures of plaiting material, basketwork, etc.	6.51
3	67	Bird skin, feathers, artificial flowers, human hair	6.10
4	50	Silk	4.69
5	65	Headgear and parts thereof	4.33
6	63	Other made textile articles, sets, worn clothing etc	3.88
7	42	Articles of leather, animal gut, harness, travel goods	3.75
8	61	Articles of apparel, accessories, knit or crochet	3.65
9	64	Footwear, gaiters and the like, parts thereof	3.46
10	95	Toys, games, sports requisites	3.26
11	62	Articles of apparel, accessories, not knit or crochet	3.15
12	58	Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery	3.10
13	60	Knitted or crocheted fabrics	3.08
14	96	Miscellaneous manufactured articles	3.03
15	94	Furniture; bedding; mattress supports; cushions and similar stuffed furnishings; lamps and lighting fittings, n.e.s.; illuminated signs, illuminated name-plates and the like; prefabricated buildings	2.85

Source: WITS

Note: Revealed Comparative Advantage: RCA=(Xij/Xwj)/(Xi/Xw). Xij: i country's export of commodity j, Xwj: world export of commodity j, Xi : total export of country i, and Xw : total world exports.

China also shows strong comparative advantage in primary industries as India. However, there are some manufacturing industries that produce low-tech final goods or intermediate goods.

Figure 4. India's Import Composition Change



Source: CEIC

Figure 4 shows the import composition in India since 2002. It seems that trade policy implemented is reflected in import composition. First, imports of capital goods have grown fast, while imports of consumption goods have grown much slower. Mainly export related imports have grown consistently.

Table 8. Composition of imports in India from 2002 to 2009

	2002	2003	2004	2005	2006	2007	2008	2009
Bulk Imports: USD: Annual (BI)	20,263.1	24,299.5	29,461.5	42,400.7	61,086.1	84,235.8	112,744.7	138,791.1
Petroleum, Crude and Products	14,000.3	17,639.5	20,569.5	29,844.1	43,963.1	56,945.3	79,644.5	93,671.7
Consumption Good (CO)	2,043.2	2,411.0	3,072.8	3,104.6	2,766.6	4,294.1	4,600.3	4,975.3
Cereal and Cereal Preparation	18.2	24.5	19.4	26.4	36.1	32.1	705.2	47.0
Edible Oils	1,355.6	1,814.2	2,542.5	2,465.3	2,024.0	2,108.3	2,558.6	3,443.4
Pulses	662.6	565.6	497.2	395.6	559.3	860.1	1,335.0	1,358.1
Sugar	6.8	6.8	13.6	217.3	147.2	0.8	1.5	126.8
Other Items (OI)	4,219.6	4,249.0	5,819.2	9,452.0	14,356.5	22,996.4	28,499.9	40,144.0
Fertilizers	679.0	625.8	720.8	1,377.1	2,127.0	3,144.1	5,406.0	13,626.5
Fertilizers: Crude	166.8	184.8	133.8	289.5	317.8	361.1	467.3	1,062.6
Fertilizers: Sulphur & Unroasted Iron	57.4	83.3	86.2	128.1	136.0	109.3	362.0	651.2
Fertilizers: Manufactured	454.8	357.6	500.8	959.5	1,673.3	2,673.6	4,576.6	11,912.7
Non Ferrous Metals	647.3	666.5	948.8	1,310.3	1,844.4	2,604.9	3,505.2	5,699.3
Paper,Paperboards,Mgfs incl News Print	446.9	449.4	657.7	727.7	944.1	1,206.8	1,424.8	1,770.3
Crude Rubber, incl Synthetic,Reclaimed	174.3	182.5	280.8	409.2	414.1	630.8	785.7	860.8
Pulp and Waste Paper	294.7	343.4	409.1	489.5	572.9	639.3	778.0	805.6
Metalliferous Ores, Metal Scrap etc	1,143.7	1,037.8	1,295.9	2,468.5	3,881.8	8,345.8	7,911.7	7,906.3
Iron and Steel	833.7	943.7	1,506.1	2,669.7	4,572.2	6,424.7	8,688.6	9,475.3
Non Bulk Imports: USD: Annual (NI)	31,150.2	37,112.6	48,687.6	69,116.7	88,079.6	101,499.4	138,694.4	160,042.8
Capital Goods (CG)	9,882.2	13,498.2	18,278.9	25,135.0	37,666.2	47,069.1	70,110.5	71,833.1
Manufactures of Metals	407.0	488.3	689.7	918.7	1,211.1	1,603.6	2,662.7	3,254.9
Machine Tools	193.0	246.9	460.1	620.4	1,076.2	1,481.3	2,208.0	2,259.8
Machinery excluding Electrical	2,970.8	3,565.6	4,743.6	6,817.8	10,009.8	13,850.4	19,860.4	21,601.0
Electrical Machinery excl. Electronic	594.4	664.1	872.2	1,195.0	1,504.3	1,959.8	2,870.5	3,685.5
Electronic Goods	3,782.0	5,599.4	7,506.1	9,993.2	13,241.7	15,972.5	20,209.9	23,333.8
Computer Goods	216.5	493.8	383.2	666.3	901.9	967.0	893.8	1,274.6
Transport Equipment	1,149.4	1,897.4	3,227.9	4,327.4	8,838.5	9,438.6	20,111.6	13,230.3
Project Goods	569.0	542.7	396.0	596.2	882.7	1,795.9	1,293.6	3,193.1
Mainly Export Related Items (ME)	8,260.0	10,313.7	12,716.8	17,095.5	18,641.0	17,871.7	20,768.3	31,930.8
Pearls, Precious and Semi-Precious	4,622.6	6,062.8	7,128.7	9,422.7	9,134.4	7,487.5	7,971.6	16,581.3
Organic and Inorganic Chemicals	2,799.6	3,025.2	4,031.9	5,699.9	6,984.1	7,830.6	9,896.6	12,203.0
Textile Yarn, Fabrics, Made-ups, etc	747.5	970.4	1,257.8	1,571.2	2,050.5	2,151.2	2,474.1	2,565.4
Cashew Nuts	90.4	255.4	298.5	401.7	471.9	402.4	425.9	581.1
Others (OT)	13,008.0	13,300.7	17,691.9	26,886.2	31,772.4	36,558.5	47,815.7	56,278.9
Gold and Silver	4,582.3	4,288.3	6,856.4	11,150.0	11,317.7	14,646.0	17,867.0	22,783.0
Gold and Silver: Gold	4,170.4	3,844.9	6,516.9	10,537.7	10,830.5	14,461.9	16,723.6	20,725.6
Gold and Silver: Silver	411.9	443.3	339.5	612.3	487.2	184.1	1,143.3	2,057.4
Artificial Resins and Plastic Material	674.1	781.8	1,082.0	1,456.9	2,267.7	2,584.8	3,685.2	3,939.1
Professional, Scientific Controlling	1,041.1	1,133.2	1,230.3	1,530.4	1,972.7	2,341.0	3,899.6	4,420.3
Coal, Coke and Briquettes	1,143.3	1,239.6	1,410.8	3,198.4	3,868.7	4,576.8	6,423.7	9,990.2
Medicinal & Pharmaceutical Products	424.9	592.0	643.7	705.4	1,027.9	1,296.4	1,671.7	1,886.1
Chemical Materials and Product	444.4	452.0	631.6	819.4	1,052.5	1,321.6	1,625.3	2,092.8
Non Metallic Mineral Manufactures	219.9	234.7	327.4	471.9	621.9	780.0	1,046.6	1,171.4
Miscellaneous	4,478.0	4,579.1	5,509.8	7,553.9	9,643.2	9,011.9	11,596.7	9,996.0

Note: Imports: USD: Annual:
Source: CEIC

Table 9. Simple Average Tariff Rates imposed by India

Simple Average Tariffs		China			Japan			South Korea		
ISIC3	Product Name	2005	2010	change, %	2005	2010	change, %	2005	2010	change, %
1	AGRICULTURE, HUNTING AND RELATED SERVICE ACTIVITIES	20.73	17.25	-16.79	20.15	14.47	-28.19	19.97	20	0.15
2	FORESTRY, LOGGING AND RELATED SERVICE ACTIVITIES	17.49	4.27	-75.59	16.31	7.5	-54.02	18.38	10	-45.59
5	FISHING, OPERATION OF FISH HATCHERIES AND FISH FAR	15.95	10	-37.30	19.65	0	-100	14.9	15	0.67
10	MINING OF COAL AND LIGNITE; EXTRACTION OF PEAT	12.5	0	-100	8.88		-100	5		
11	EXTRACTION OF CRUDE PETROLEUM AND NATURAL GAS; SER		15		0			15		
13	MINING OF METAL ORES	3.89	0	-100	4.38			4.17		
14	OTHER MINING AND QUARRYING	12.01	10.69	-10.99	11.44	6.36	-44.41	11.43	11.67	2.10
15	MANUFACTURE OF FOOD PRODUCTS AND BEVERAGES	25.43	20.13	-20.84	31.82	20.7	-34.95	26.97	22.65	-16.02
17	MANUFACTURE OF TEXTILES	14.81	7.85	-47.00	13.25	7	-47.17	14.07	3.99	-71.64
18	MANUFACTURE OF WEARING APPAREL; DRESSING AND DYEIN	20.03	17.92	-10.53	18.51	18.14	-2.00	19.58	17.89	-8.63
19	TANNING AND DRESSING OF LEATHER; MANUFACTURE OF LU	20.19	21.43	6.14	18.97	22.8	20.19	17.72	19.5	10.05
20	MANUFACTURE OF WOOD AND OF PRODUCTS OF WOOD AND CO	16.34	16.21	-0.80	17.97	24.91	38.62	16.01	17.5	9.31
21	MANUFACTURE OF PAPER AND PAPER PRODUCTS	18.15	15.86	-12.62	17.77	16.26	-8.50	18.15	15.12	-16.69
22	PUBLISHING, PRINTING AND REPRODUCTION OF RECORDED	13.7	13.81	0.80	13.26	13.33	0.53	13.31	13.16	-1.13
23	MANUFACTURE OF COKE, REFINED PETROLEUM PRODUCTS AN	12.22	13.6	11.29	14.85	11.6	-21.89	13.7	10.86	-20.73
24	MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS	11.12	5.87	-47.21	12.16	5.51	-54.69	11.59	4.87	-57.98
25	MANUFACTURE OF RUBBER AND PLASTICS PRODUCTS	20.1	18.77	-6.62	19.55	19.54	-0.05	18.74	19.53	4.22
26	MANUFACTURE OF OTHER NON-METALLIC MINERAL PRODUCTS	19.92	17.72	-11.04	18.17	19.28	6.11	19.2	17.64	-8.12
27	MANUFACTURE OF BASIC METALS	14.1	8.72	-38.16	14.01	7.88	-43.75	14.44	6.88	-52.35
28	MANUFACTURE OF FABRICATED METAL PRODUCTS, EXCEPT M	17.48	13.92	-20.37	16.79	14.27	-15.01	16.73	13.64	-18.47
29	MANUFACTURE OF MACHINERY AND EQUIPMENT N.E.C.	10.81	5.33	-50.69	10.62	4.47	-57.91	10.87	4.84	-55.47
30	MANUFACTURE OF OFFICE, ACCOUNTING AND COMPUTING MA	6.88	1.68	-75.58	6.43	1.05	-83.67	5.31	1.46	-72.50
31	MANUFACTURE OF ELECTRICAL MACHINERY AND APPARATUS	16.08	11.77	-26.80	15.89	11.66	-26.62	15.06	12.28	-18.46
32	MANUFACTURE OF RADIO, TELEVISION AND COMMUNICATION	13.54	4.56	-66.32	13.47	5.32	-60.50	12.76	6.34	-50.31
33	MANUFACTURE OF MEDICAL, PRECISION AND OPTICAL INST	11.2	6.47	-42.23	10.5	3.41	-67.52	10.87	3.94	-63.75
34	MANUFACTURE OF MOTOR VEHICLES, TRAILERS AND SEMI-T	26.2	19.45	-25.76	30.64	22.79	-25.62	30.19	22.49	-25.51
35	MANUFACTURE OF OTHER TRANSPORT EQUIPMENT	22.19	8.67	-60.93	24.57	9.44	-61.58	17.42	12.88	-26.06
36	MANUFACTURE OF FURNITURE; MANUFACTURING N.E.C.	18.97	15.2	-19.87	18.52	16.07	-13.23	18.91	16.38	-13.38
	avg	**16**	**11.51**	**-28.06**	**15.66**	**12.15**	**-22.41**	**15.37**	**12.82**	**-16.59**
	s.d.	**5.19**	**6.3**		**6.85**	**7.22**		**5.71**	**6.22**	

Source: WITS

Low wages attract multinational firms to build production facilities in developing countries. On the other hand, trade costs are one of the biggest concerns in multinational trade networks. There are many indices measuring trade costs.

This study uses tariff rates as an indicator that allows us to glance at the trade policy. This table shows the overall (effective) tariff rates imposed on goods imported from China, Japan and South Korea in 2005 and 2010. Two facts are provided. First, the average tariff rates are declining. Second, the standard deviation across products is increasing. We argue that trade liberalization has been pursued in India with development-related strategies. However, some industries are still protected and some are not. Identifying the exact reasons for the directions and sizes of tariff changes requires further study.

Table 10. Tariff rates on *intermediate* goods in India (summary)

Partner		Simple Average 2001	2004	2005	2007	2008	2009	% change bet. 2001 &2009†	Weighted Average 2001	2004	2005	2007	2008	2009	% change bet. 2001 & 2009†
China	avg	31.30	26.67	20.58	18.19	16.36	16.56	**0.471**	25.85	24.27	17.68	21.51	11.35	12.14	**0.530**
	s.d.	8.22	6.65	12.12	11.22	17.32	17.21		9.35	7.48	8.36	21.37	8.92	8.50	
Japan	avg	33.10	28.80	19.89	17.79	14.46	14.76	**0.554**	32.29	30.92	19.00	17.12	13.76	14.21	**0.560**
	s.d.	5.73	4.20	9.74	10.20	11.14	10.94		9.66	13.89	7.95	8.10	11.54	11.24	
Korea	avg	31.48	34.24	23.60	15.83		14.18	**0.550**	31.85	30.93	27.56	14.44		13.52	**0.575**
	s.d.	5.72	12.20	16.18	10.58		10.50		8.21	9.34	29.10	7.28		10.40	

Source: WITS
Note: Classification follows BEC.
† : the formula is (2001-2009)/2001

Tariffs on intermediate goods have dropped almost up to 60%, which is not as high as those on capital goods but higher than those on consumption goods. We expect that tariff rates on intermediate goods will drop further as the economy grows.

Tariff rates on *intermediate* goods in India (full data)

BEC	Product	Product type	partner	Simple Average 2001	2004	2005	2007	2008	2009	Weighted Average 2001	2004	2005	2007	2008	2009
21	Primary	interm.	China	24.22	22.58	15.65	14.14	10.62	10.63	14.38	12.38	11.37	10.76	7.66	7.11
22	Processed			32.77	29.03	15.86	13.48	8.54	8.93	33.46	29.09	15.92	13.58	7.61	8.24
31	Primary			25	16	12.5	10.63	5	5	25	25	15	12.5	5	5
42	Parts and accessories			25.87	24.67	12.95	11.18	7.03	7.69	21.57	20.69	8.03	8.35	6.05	7.1
53	Parts and accessories			33.22	29.27	14.71	12.16	9.03	9.33	34.56	29.31	14.99	12.49	9.77	9.82
111	Mainly for industry				30	43.75	40	55	55		30	30.14	71.8	30	30
121	Mainly for industry			48	38.5	35.91	31.88	28.75	28.78	36.94	32.66	30.97	30.07	19.72	19.86
322	Other			30	23.33	13.33	12.08	6.88	7.13	15.01	15.02	15	12.5	5.02	9.96
			avg	**31.30**	**26.67**	**20.58**	**18.19**	**16.36**	**16.56**	**25.85**	**24.27**	**17.68**	**21.51**	**11.35**	**12.14**
			stdev	**8.22**	**6.65**	**12.12**	**11.22**	**17.32**	**17.21**	**9.35**	**7.48**	**8.36**	**21.37**	**8.92**	**8.50**
21	Primary	interm.	Japan	29	24.68	15.53	13.55	8.36	8.68	30.34	25.89	15.95	14.32	5.36	5.75
22	Processed			32.9	29.36	16.01	13.79	8.2	8.48	31.23	30.12	16.21	14.49	7.11	7.41
31	Primary					15	11.25					15	12.35		
42	Parts and accessories			26.09	24.71	12.91	11.18	6.96	7.67	25.04	23.87	12.09	11.14	6.55	7.5
53	Parts and accessories			32.77	28.83	14.7	12.26	8.76	9.17	34.16	28.23	14.48	11.9	9.11	9.29
111	Mainly for industry			35	30	30	30	30	30	35	30	30	30	30	30
121	Mainly for industry			44.29	37	40	37.78	31.46	31.5	50.55	60.82	33.3	30.23	31.12	31.16
322	Other			31.67	27	15	12.5	7.5	7.83	19.73	17.5	15	12.5	7.06	8.35
			avg	**33.10**	**28.80**	**19.89**	**17.79**	**14.46**	**14.76**	**32.29**	**30.92**	**19.00**	**17.12**	**13.76**	**14.21**
			stdev	**5.73**	**4.20**	**9.74**	**10.20**	**11.14**	**10.94**	**9.66**	**13.89**	**7.95**	**8.10**	**11.54**	**11.24**
21	Primary	interm.	Korea	23	23.4	13.36	12.87		7.32	23.11	22.39	12.6	12.46		4.68
22	Processed			32.63	29.24	15.71	13.59		8.64	31.73	30.05	16.36	15.12		7.13
31	Primary														
42	Parts and accessories			25.96	24.62	12.98	10.98		7.49	22.21	21.82	11.8	11.11		8.04
53	Parts and accessories			34.81	29.07	14.67	12.34		9.54	35	29.62	15	12.5		9.89
111	Mainly for industry				50	47.5	20		30		49.94	92.05	16.49		30
121	Mainly for industry			37.5	53.33	47	40		29	44.02	32.66	30.2	30.4		27.05
322	Other			35	30	14	11.88		7.25	35	30	14.92	12.47		7.85
			avg	**31.48**	**34.24**	**23.60**	**15.83**		**14.18**	**31.85**	**30.93**	**27.56**	**14.44**		**13.52**
			stdev	**5.72**	**12.20**	**16.18**	**10.58**		**10.50**	**8.21**	**9.34**	**29.10**	**7.28**		**10.40**

Source: WITS

Table 11. Tariff rates on *consumption* goods (summary)

Partner		Simple Average							Weighted Average						
		2001	2004	2005	2007	2008	2009	% change bet. 2001 & 2009†	2001	2004	2005	2007	2008	2009	% change bet. 2001 & 2009†
China	avg	44.31	41.81	30.21	30.12	24.74	25.09	**0.434**	44.25	38.61	23.27	27.67	25.26	28.00	**0.367**
	s.d.	14.46	15.14	16.95	19.15	16.64	17.16		15.09	12.64	12.39	17.08	19.22	20.73	
Japan	avg	47.61	40.34	33.18	32.45	31.47	31.64	**0.335**	40.55	31.44	22.73	25.45	23.40	32.77	**0.192**
	s.d.	21.22	17.57	21.76	22.26	29.56	29.62		23.71	20.52	19.28	19.76	16.76	37.13	
Korea	avg	39.34	35.81	19.02	21.91		28.62	**0.273**	35.90	33.01	23.99	20.32		20.75	**0.422**
	s.d.	10.08	12.19	8.26	15.04		21.00		2.28	7.51	18.12	12.50		15.78	

Source: WITS
Note: Classification follows BEC.
† : the formula is (2001-2009)/2001

Tariffs on consumption goods used to be high and are still relatively high. Comparing tariff rates between 2001 and 2009 in weighted average, they have dropped about 20% to 40%, varying by country.

Tariff rates on *consumption* goods (full data)

BEC	Product	Product type	Partner	Simple Average						Weighted Average					
				2001	2004	2005	2007	2008	2009	2001	2004	2005	2007	2008	2009
61	Durable	consump.	China	33.4	29.46	15	12.5	9.6	9.68	34.09	29.92	15	12.5	9.78	9.83
62	Semi-durable			33.52	29.08	14.67	12.55	10	9.9	34.1	23.68	10.69	12.5	10	10
63	Non-durable			33.8	28.86	15.39	12.88	10.54	10.51	34.32	29.23	15.24	12.5	10.27	10.28
112	Mainly for household consumption			44.57	46.39	46.92	47.94	47.07	48.79	36.4	49.93	38.25	37.13	31.64	41.2
122	Mainly for household consumption			50.57	52.09	39.72	46.52	34.71	36.15	68.09	54.43	39.05	41.95	31.98	38.91
522	Non-industrial			70	65	49.58	48.33	36.5	35.5	58.52	44.48	21.41	49.46	57.89	57.78
			avg	**44.31**	**41.81**	**30.21**	**30.12**	**24.74**	**25.09**	**44.25**	**38.61**	**23.27**	**27.67**	**25.26**	**28.00**
			stdev	**14.46**	**15.14**	**16.95**	**19.15**	**16.64**	**17.16**	**15.09**	**12.64**	**12.39**	**17.08**	**19.22**	**20.73**
61	Durable	consump.	Japan	32.83	29.04	14.87	12.5	9.56	9.66	29.59	26.99	15	12.5	8.17	8.55
62	Semi-durable			32.01	28.26	14.25	12.5	10	10	29.99	19.28	5.96	12.5	10	10
63	Non-durable			32.91	28.28	14.46	12.48	9.95	10	34.64	29.77	15.02	12.51	9.97	10
112	Mainly for household consumption			60	39.69	42	51.18	30	30	74.4	35.17	31.1	33.14	30	30
122	Mainly for household consumption			42.89	43	48.47	46.47	45.13	46	63.58	68.83	58.15	62.29	49.49	105.3
522	Non-industrial			85	73.75	65	59.55	84.17	84.17	11.08	8.58	11.17	19.73	32.76	32.76
			avg	**47.61**	**40.34**	**33.18**	**32.45**	**31.47**	**31.64**	**40.55**	**31.44**	**22.73**	**25.45**	**23.40**	**32.77**
			stdev	**21.22**	**17.57**	**21.76**	**22.26**	**29.56**	**29.62**	**23.71**	**20.52**	**19.28**	**19.76**	**16.76**	**37.13**
61	Durable	consump.	Korea	33.21	29.21	15	12.5		9.69	34.9	29.9	15	12.5		9.3
62	Semi-durable			33.4	28.33	14.11	12.5		10	34.39	23.96	12	12.5		10
63	Non-durable			32.96	28.38	14.72	12.16		10.33	34.45	29.74	14.99	12.61		11.71
112	Mainly for household consumption			35	59	20	45.83		47.5	35	42.83	27.74	30.71		39.28
122	Mainly for household consumption			43.16	39.93	35.31	35.98		39.21	40.32	41.64	59.22	41.07		42.8
522	Non-industrial			58.33	30	15	12.5		55	36.36	30	15	12.5		11.4
			avg	**39.34**	**35.81**	**19.02**	**21.91**		**28.62**	**35.90**	**33.01**	**23.99**	**20.32**		**20.75**
			stdev	**10.08**	**12.19**	**8.26**	**15.04**		**21.00**	**2.28**	**7.51**	**18.12**	**12.50**		**15.78**

Source: WITS

Table 12. Tariff rates on capital goods (Summary)

		Simple Average							Weighted Average						
Partner		2001	2004	2005	2007	2008	2009	% change bet. 2001 & 2009†	2001	2004	2005	2007	2008	2009	% change bet. 2001 & 2009†
China	Avg	28.71	26.79	14.32	12.09	8.51	8.88	**0.691**	26.19	23.17	10.15	10.26	8.01	8.33	**0.682**
	s.d.	4.19	2.97	0.96	0.58	1.81	1.59		11.14	7.76	6.87	3.17	2.81	2.37	
Japan	Avg	29.80	27.14	14.31	12.07	7.93	8.87	**0.702**	25.13	27.08	14.24	12.13	8.31	8.89	**0.646**
	s.d.	5.78	3.42	0.98	0.61	1.05	1.60		1.56	3.75	1.07	0.53	2.04	1.57	
Korea	Avg	29.53	27.08	14.30	12.08		8.82	**0.701**	26.39	23.74	9.11	12.04		8.77	**0.668**
	s.d.	5.37	3.42	1.00	0.60		1.67		11.72	8.72	8.34	0.65		1.74	

Source: WITS
Note: Classification follows BEC.
† : the formula is (2001-2009)/2001

The most significant drops in tariff have made in capital goods. Comparing tariff rates between 2001 and 2009, they have dropped almost 70% in 8 years. We interpret this as an indication that Indian government has an intention to attract foreign capital inflows.

Tariff rates on capital goods (full data)

				Simple Average						Weighted Average					
BEC	Product	Product type	Partner	2001	2004	2005	2007	2008	2009	2001	2004	2005	2007	2008	2009
41	Capital goods (except for transport equipment)	capital	China	25.74	24.69	13.64	11.68	7.23	7.75	18.31	17.68	5.29	8.01	6.02	6.65
521	Industrial			31.67	28.89	15	12.5	9.79	10	34.06	28.65	15	12.5	9.99	10
			avg	**28.71**	**26.79**	**14.32**	**12.09**	**8.51**	**8.88**	**26.19**	**23.17**	**10.15**	**10.26**	**8.01**	**8.33**
			s.d.	**4.19**	**2.97**	**0.96**	**0.58**	**1.81**	**1.59**	**11.14**	**7.76**	**6.87**	**3.17**	**2.81**	**2.37**
41	Capital goods (except for transport equipment)	capital	Japan	25.71	24.72	13.62	11.64	7.18	7.74	24.02	24.43	13.48	11.75	6.86	7.78
521	Industrial			33.89	29.55	15	12.5	8.67	10	26.23	29.73	15	12.5	9.75	10
			avg	**29.80**	**27.14**	**14.31**	**12.07**	**7.93**	**8.87**	**25.13**	**27.08**	**14.24**	**12.13**	**8.31**	**8.89**
			s.d.	**5.78**	**3.42**	**0.98**	**0.61**	**1.05**	**1.60**	**1.56**	**3.75**	**1.07**	**0.53**	**2.04**	**1.57**
41	Capital goods (except for transport equipment)	capital	Korea	25.73	24.66	13.59	11.65		7.64	18.1	17.57	3.21	11.58		7.54
521	Industrial			33.33	29.5	15	12.5		10	34.68	29.9	15	12.5		10
			avg	**29.53**	**27.08**	**14.30**	**12.08**		**8.82**	**26.39**	**23.74**	**9.11**	**12.04**		**8.77**
			s.d.	**5.37**	**3.42**	**1.00**	**0.60**		**1.67**	**11.72**	**8.72**	**8.34**	**0.65**		**1.74**

Source**:** WITS

Table 13. Educational Attainments

Country Name	year	India	China	Indonesia	Malaysia	Philippines	Thailand	Singapore	Vietnam
School enrollment, tertiary (% gross)	2010	17.87	25.95	23.12	40.24*		46.17		22.29
	2005	10.82	19.41	16.52	29.31	27.47	43.90		15.69
	2000	9.37	7.95	14.72	25.74		34.88		9.73

* : 2009 for Malaysia
Source: World Bank WDI.

For the industries that require skilled workers or workers with high education India is not the best choice. Compared to China and some of the ASEAN members, India has the lowest enrollment rate in college-level educations.

Table 14. Trade Cost: Trade Facilitation Indicators

Country Name	Year	1	2	3	4	5	6	7	8
India	2005							864	1244
	2007	8	9	4	4.7	18	21		
	2010	8	9	2.34	5.31	17	20	1055	1025
China	2005							335	375
	2007	8	6	2.6	3.8	21	24		
	2010	8	5	2.77	2.56	21	24	500	545
Indonesia	2005							486	675
	2007	4	7	2.5	3.9	18	27		
	2010	4	7	2.12	5.35	17	27	644	660
Malaysia	2005							432	385
	2007	6	7	3.4	3.3	17	14		
	2010	6	7	2.64	2.75	17	14	450	450
Philippines	2005							755	800
	2007	7	8	6.3	5.3	17	18		
	2010	7	8	1.82	5	15	14	630	730
Thailand	2005							848	1042
	2007	7	9	3.4	2.3	17	14		
	2010	5	5	1.59	2.62	14	13	625	795
Singapore	2005							416	367
	2007	4	4	2.4	2.2	5	4		
	2010	4	4	2.17	1.78	5	4	456	439
Vietnam	2005							468	586
	2007	6	8	2.8	4	24	23		
	2010	6	8	1.41	1.73	22	21	555	645

Source: World Bank WDI
Note :
1. Documents to export (number)
2. Documents to import (number)
3. Lead time to export, median case (days)
4. Lead time to import, median case (days)
5. Time to export (days)
6. Time to import (days)
7. Cost to export (US$ per container)
8. Cost to import (US$ per container)

Table 14 shows whether international trade is easy in India compared to China and other ASEAN countries. India requires more documents than other countries in the table. Lead times to import and export are relatively longer than other countries in the table (except for Philippines). Costs to export and import are relatively very high in India. In 2010, cost to export in India is $1,055, which is more than two times higher than in China, Malaysia or Vietnam. As to multinational firms that require high volumes of import and export, India may not be very attractive.

Table 15. Trade Costs: Logistic Performances in India

Country Name	Year	1	2	3	4	5	6	7
India	2007	3.03	3.27	3.08	2.69	3.47	2.9	3.07
	2010	3.14	3.16	3.13	2.7	3.61	2.91	3.12
China	2007	3.37	3.4	3.31	2.99	3.68	3.2	3.32
	2010	3.55	3.49	3.31	3.16	3.91	3.54	3.49
Indonesia	2007	3.3	2.9	3.05	2.73	3.28	2.83	3.01
	2010	2.77	2.47	2.82	2.43	3.46	2.54	2.76
Malaysia	2007	3.51	3.4	3.36	3.36	3.95	3.33	3.48
	2010	3.32	3.34	3.5	3.11	3.86	3.5	3.44
Philippines	2007	2.65	2.65	2.77	2.64	3.14	2.26	2.69
	2010	3.29	2.95	3.4	2.67	3.83	2.57	3.14
Thailand	2007	3.25	3.31	3.24	3.03	3.91	3.16	3.31
	2010	3.41	3.16	3.27	3.02	3.73	3.16	3.29
Singapore	2007	4.25	4.21	4.04	3.9	4.53	4.27	4.19
	2010	4.15	4.12	3.86	4.02	4.23	4.22	4.09
Vietnam	2007	2.9	2.8	3	2.89	3.22	2.5	2.89
	2010	3.1	2.89	3.04	2.68	3.44	2.56	2.96

Source: World Bank World Development Indicators
Note : Logistics performance index: 1=low to 5=high
1. Logistics performance index: Ability to track and trace consignments
2. Logistics performance index: Competence and quality of logistics services
3. Logistics performance index: Ease of arranging competitively priced shipments
4. Logistics performance index: Efficiency of customs clearance process
5. Logistics performance index: Frequency with which shipments reach consignee within scheduled or expected time
6. Logistics performance index: Quality of trade and transport-related infrastructure
7. Logistics performance index: Overall

In terms of logistic performances, India also did not get the highest scores. Consistently, India performs worse than China, Malaysia, Thailand and Singapore. Logistics can be one of the considerations multinationals keep in their mind when they choose the location for production facilities. However, logistic performance is not one of India's attractions as shown in Table 15.

Table 16. Trade Cost: Business Environment in India

Country Name	Year	1*	2	3	4	5	6	7	8	9	10**	11	12	13	14
India	2010	139	34	227	46	1420	5	44	12	29	8	56	258	63.3	7
	2005		34	227	46	1420	5	61	11	71	6	55	264	65.5	10
China	2010	87	34	311	34	406	4	29	14	38	6	7	398	63.5	1.7
	2005		33	416	35	406	4	29	13	48	4	35	872	80	2.4
Indonesia	2010	126	13	158	40	570	6	22	9	47	3	51	266	37.3	5.5
	2005		13	186	40	570	6	39	12	151	3	51	560	37.3	5.5
Malaysia	2010	23	22	260	30	585	5	48	9	17	10	12	145	33.7	2.3
	2005		22	284	30	600	5	144	10	37	10	35	190	36	2.3
Philippines	2010	134	30	85	37	842	8	39	16	36	4	47	195	45.8	5.7
	2005		30	85	37	842	8	39	17	47	4	48	195	49.8	5.7
Thailand	2010	16	8	157	36	479	2	2	7	32	5	23	264	37.4	2.7
	2005		8	157	36	479	2	2	8	33	5	35	264	37.7	2.7
Singapore	2010	1	11	26	21	150	3	5	3	3	10	5	84	25.4	0.8
	2005		11	102	21	120	3	9	6	6	10	5	80	27.7	0.8
Vietnam	2010	90	10	200	34	295	4	57	9	44	8	32	941	33.1	5
	2005		10	200	34	295	4	67	11	50	6	32	1050	40	5

Source: World Bank World Development Indicators

1. Ease of doing business index (* : 1=most business-friendly regulations)
2. Procedures to build a warehouse (number)
3. Time required to build a warehouse (days)
4. Procedures to enforce a contract (number)
5. Time required to enforce a contract (days)
6. Procedures to register property (number)
7. Time required to register property (days)
8. Start-up procedures to register a business (number)
9. Time required to start a business (days)
10. Strength of legal rights index (** : 0=weak to 10=strong)
11. Tax payments (number)
12. Time to prepare and pay taxes (hours)
13. Total tax rate (% of commercial profits)
14. Time to resolve insolvency (years)

Table 16 provides overall domestic business environments in India. These indicators are also not very favorable to India. Column 1 introduces `ease of doing business` index and index for India reveals that doing business in India is overall mot very easy. Compared to Malaysia, Thailand and Singapore, business-related regulations are complicated and restricted. Especially, contract-enforcement-related regulations are not business-friendly. Compared to China, India has less favorable business environment except tax-related regulations shown in columns 12 and 13.

Table 17. Major Trading Partners in 2010

	China			ASEAN			India		
Rank	partners	Mio euro	%	partners	Mio euro	%	partners	Mio euro	%
1	EU27	363,224	17.0	China	184,160	12.7	EU27	63,416	14.8
2	United States	291,972	13.6	Japan	166,185	11.4	U.A.E	45,730	10.7
3	Japan	224,263	10.5	EU27	155,480	10.7	China	44,421	10.4
4	Hong Kong	172,371	8.1	United States	138,839	9.5	United States	32,371	7.5
5	South Korea	156,414	7.3	Malaysia	96,981	6.7	Saudi Arabia	18,795	4.4
6	Australia	65,758	3.1	Singapore	88,073	6.1	Switzerland	17,178	4.0
7	Malaysia	56,113	2.6	South Korea	77,292	5.3	Hong Kong	13,105	3.1
8	Brazil	47,474	2.2	Hong Kong	66,425	4.6	Singapore	12,400	2.9
9	India	46,697	2.2	Indonesia	64,201	4.4	Indonesia	10,766	2.5
10	Singapore	42,999	2.0	Thailand	58,420	4.0	Australia	10,364	2.4

Source: IMF (DoTS) and Eurostat

Besides existing agglomeration effect in East Asian countries and low level of industrialization, India may have had a little closer link with European countries than Asian countries. That can be shown in data of trade volume. China and ASEAN have Japan and South Korea in top 10 trading partners, whereas India does not.

Table 18. The progresses of RTA talks in ASEAN, China, and India by February, 2010

	FTAs signed	Under negotiation	Under review
ASEAN	Australia-New Zealand, China, India, Japan, South Korea	EU	EFTA, Taiwan, U.S.
China	ASEAN, New Zealand, Taiwan, Macao, Singapore, Chile, Pakistan, Peru, Hong Kong	GCC, SACU, Norway, Iceland, Costa Rica, Australia	Korea, MERCOSUR, South Africa, Switzerland, India, China-Japan-Korea
India	South Korea, Japan, ASEAN, MERCOSUR, Nepal, Bhutan, Sri Lanka, Singapore, Afghanistan, Chile	EFTA, EU, GCC, SACU, Malaysia, Thailand, BIMSTEC, Mauritius	South Africa, New Zealand, Taiwan, Russia, Switzerland, Uruguay, Iran, Israel, Egypt, Indonesia, China, Canada, Pakistan, Australia, IBSA

Source: Korea International Trade Association

This table shows the progresses of regional trade agreements of ASEAN, China and India. Since the table shown does not give information about the details of regional trade agreements, it is hard to know how much the trade links have been deepened through RTAs. Japan and South Korea are linked with ASEAN, China and India altogether. ASEAN is also connected with China and India through regional trade agreements. However, there is no specific regional trade agreement between China and India.