International Production Networks and a New Development Strategy in East Asia

Fukunari Kimura
Professor, Faculty of Economics, Keio University
Chief Economist, Economic Research Institute for ASEAN and East Asia (ERIA)
1. The 1\textsuperscript{st} to the 2\textsuperscript{nd} unbundling

- The international division of labor: from industry-by-industry to production process/task wise

- The 2\textsuperscript{nd} unbundling in East Asia, most advanced, particularly in manufacturing
  - Dominance of machinery industries
  - Fragmentation of production and the formation of industrial agglomeration
The 2nd Unbundling

- The 2nd unbundling, i.e., international division of labor in terms of production processes and tasks, has developed since the 1980s, based on drastic reduction in coordination costs due to ICT revolution.
- The 2nd unbundling in the manufacturing sector is most advanced in East Asia.

The fragmentation theory: Production blocks and service links

Tradeoff between the reduction in production costs in PB and the enhancement of SL costs. Fragmentation of production occurs particularly between countries at different development stages (Jones and Kierzkowski (1990)).

Before fragmentation

After fragmentation

PB: production blocks
SL: service links
Two-dimensional fragmentation: An illustration

Source: Kimura and Ando (2005).
The evolution of the 2\textsuperscript{nd} unbundling

Cross-border production sharing (back-and-forth; intra-firm)


Production networks ("networks"; fragmentation and agglomeration; intra-firm in short distance, arm’s length in long distance)

The United States

Consumers

Mexico

Japan

Korea

Vietnam

Taiwan

The United States

The Philippines

Internet auction

Agglomeration

Agglomeration

### Industry shares of value added, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Agriculture, hunting, forestry and fishing</th>
<th>Mining and quarrying</th>
<th>Manufacturing</th>
<th>Electricity, gas and water supply</th>
<th>Construction</th>
<th>Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants</th>
<th>Transport, storage and communications</th>
<th>Financial intermediation, real estate, renting and business activities</th>
<th>Community, social and personal services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myanmar</td>
<td>36.4</td>
<td>0.9</td>
<td>19.6</td>
<td>1.0</td>
<td>4.6</td>
<td>19.7</td>
<td>13.8</td>
<td>0.14.0</td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>36.1</td>
<td>0.6</td>
<td>15.6</td>
<td>0.6</td>
<td>6.4</td>
<td>14.5</td>
<td>8.1</td>
<td>7.4</td>
<td>10.7</td>
</tr>
<tr>
<td>Laos</td>
<td>29.7</td>
<td>9.6</td>
<td>10.1</td>
<td>4.0</td>
<td>5.3</td>
<td>20.2</td>
<td>4.8</td>
<td>6.4</td>
<td>10.0</td>
</tr>
<tr>
<td>Vietnam</td>
<td>20.6</td>
<td>10.9</td>
<td>19.6</td>
<td>4.2</td>
<td>7.0</td>
<td>18.4</td>
<td>4.4</td>
<td>5.6</td>
<td>9.3</td>
</tr>
<tr>
<td>Indonesia</td>
<td>15.3</td>
<td>11.2</td>
<td>24.8</td>
<td>0.8</td>
<td>10.3</td>
<td>13.7</td>
<td>6.6</td>
<td>7.2</td>
<td>10.2</td>
</tr>
<tr>
<td>Philippines</td>
<td>12.3</td>
<td>1.4</td>
<td>21.4</td>
<td>3.6</td>
<td>6.1</td>
<td>17.4</td>
<td>6.5</td>
<td>17.8</td>
<td>13.4</td>
</tr>
<tr>
<td>Thailand</td>
<td>10.5</td>
<td>3.2</td>
<td>31.4</td>
<td>2.8</td>
<td>2.8</td>
<td>17.6</td>
<td>6.9</td>
<td>11.8</td>
<td>13.1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>10.4</td>
<td>12.3</td>
<td>25.6</td>
<td>2.5</td>
<td>3.2</td>
<td>14.2</td>
<td>6.5</td>
<td>12.9</td>
<td>12.3</td>
</tr>
<tr>
<td>Brunei</td>
<td>0.8</td>
<td>50.8</td>
<td>12.1</td>
<td>12.1</td>
<td>0.83.1</td>
<td>3.7</td>
<td>3.4</td>
<td>6.1</td>
<td>19.3</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.0</td>
<td>21.6</td>
<td>1.6</td>
<td>4.2</td>
<td>20.8</td>
<td>12.3</td>
<td>28.8</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>18.0</td>
<td>2.7</td>
<td>14.9</td>
<td>1.8</td>
<td>8.2</td>
<td>17.2</td>
<td>7.3</td>
<td>16.0</td>
<td>14.0</td>
</tr>
<tr>
<td>China</td>
<td>10.1</td>
<td>5.2</td>
<td>32.5</td>
<td>2.4</td>
<td>6.6</td>
<td>10.9</td>
<td>7.0</td>
<td>10.9</td>
<td>14.4</td>
</tr>
<tr>
<td>Korea</td>
<td>2.6.2</td>
<td>30.3</td>
<td>2.0</td>
<td>6.3</td>
<td>10.9</td>
<td>8.2</td>
<td>19.3</td>
<td>20.1</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>102.1</td>
<td>19.7</td>
<td>2.9</td>
<td>5.5</td>
<td>13.8</td>
<td>10.3</td>
<td>16.8</td>
<td>29.7</td>
<td></td>
</tr>
</tbody>
</table>

Data source: APO Productivity Database by the courtesy of Koji Nomura.
Industry shares of value added in manufacturing, 2010

Data source: APO Productivity Database by the courtesy of Koji Nomura.
Export shares of machinery parts and components in total exports indicate the degree of participation in international production networks.

Figure 2. Machinery goods and machinery parts and components: shares in total exports and imports in 2010

The 2\textsuperscript{nd} unbundling

The 1\textsuperscript{st} unbundling

Machinery exports and imports by regions (US$ millions)

The size of industrial agglomerations in East Asia

Jakarta’s cluster size

Bangkok’s cluster size

Source: ERIA.
2. Fundamental changes in development strategies

• Latecomers: jump-start industrialization by participating in international production networks
  – Reduction in three types of costs

• Middle-income countries: agglomeration, industrial upgrading, innovation
## Policies for enhancing the 2\(^{nd}\) unbundling

<table>
<thead>
<tr>
<th></th>
<th>Reduction in network set-up cost</th>
<th>Reduction in service link cost</th>
<th>Reduction in production cost per se</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-level FTAs</strong></td>
<td>- Investment liberalization</td>
<td>- Tariff removal</td>
<td>- Liberalization of production-</td>
</tr>
<tr>
<td></td>
<td>- IPR protection</td>
<td>- Trade facilitation</td>
<td>supporting services</td>
</tr>
<tr>
<td></td>
<td>- Competition policy</td>
<td>- Enhancing institutional</td>
<td>- Investment liberalization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>connectivity</td>
<td></td>
</tr>
<tr>
<td><strong>Development agenda</strong></td>
<td>- Investment facilitation/promotion</td>
<td>- Enhancing physical</td>
<td>- Upgrading infrastructure services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>connectivity (including hard</td>
<td>such as electricity supply and EPZs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and soft logistics infrastructure</td>
<td>- Enhancing agglomeration effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>development)</td>
<td>through SME development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reducing transaction cost in</td>
<td>- Strengthening innovation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>economic activities</td>
<td></td>
</tr>
</tbody>
</table>
Border Development with Enhancement of Connectivity

GDP per capita (2005)

(source) Kudo and Kumagai (forthcoming)
LPIs in forerunner ASEAN and East Asia are relatively higher compared with the indices obtained by regression:

- higher LPI compared with GDP/GNI per capita
- better access between primary cities to primary ports
- high competitiveness in the global market
Innovation in industrial agglomeration

International production networks

Technology transfer/spillover
Managerial knowhow

Market access

Access to technology
Access to finance
Fostering human resources
Establishing industrial organizations

SME-related policies reviewed by SME Policy Index

SMEs
Table 4. Research and development expenditure (% of GDP) in ASEAN

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.048</td>
<td>0.653</td>
<td>2.153</td>
<td>0.244</td>
<td>0.146</td>
<td>0.016</td>
<td>0.0450</td>
<td>0.036</td>
<td>0.162</td>
<td>0.193</td>
</tr>
</tbody>
</table>


*Notes:* Expenditures for research and development are current and capital expenditures (both public and private) on creative *work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development.*

Table 5. Research and development expenditure (% of GDP), comparison with selected neighboring countries

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.070</td>
<td>3.165</td>
<td>2.404</td>
<td>0.737</td>
</tr>
</tbody>
</table>

*Source & notes:* c.f. previous table.

3. Impact on developed countries

- International production networks, important sources of competitiveness of corporate firms
- Can be good for the whole country, too.
  - Relative expansion of domestic operations by expanding multinationals (Ando and Kimura (2012a))
- Stability/resiliency of production networks
  - Ando and Kimura (2012b) on Japan’s exports with the GFC and the East Japan Earthquake
  - Todo, Nakajima, and Matous (2014) on factory operations with the East Japan Earthquake
Outward foreign direct investment and domestic employment by Japanese manufacturing firms: The ratio of firms that expand domestic employment

<table>
<thead>
<tr>
<th>Firms that do not have an affiliate in East Asia</th>
<th>1998-2002</th>
<th>2002-2006</th>
<th>2007-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firms that have affiliates in East Asia: The number of affiliates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increases (including the first direct investment)</td>
<td>33%</td>
<td>64%</td>
<td>52%</td>
</tr>
<tr>
<td>Keep the same number</td>
<td>25%</td>
<td>54%</td>
<td>43%</td>
</tr>
<tr>
<td>Decreases (including withdrawal)</td>
<td>25%</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>All manufacturing firms</td>
<td>32%</td>
<td>53%</td>
<td>42%</td>
</tr>
</tbody>
</table>

4. Implication for productivity studies

• Industry-level productivity to be elaborated.
  – Different activities by production processes/tasks; international relation-specific division of labor
  – Mixture of multinationals and local firms

• Economic environment outside a firm matters.
  – E.g., service link costs crucial to production networks
  – E.g., agglomeration effects (+/-)

• Evolving nature of technological progress
  – New type of middle-income countries
    • Dependency on multinationals, tech. gaps, small R&D
References


• Todo, Yasuyuki; Nakajima, Kentaro; and Matous, Petr. (2014) “How Do Supply Chain Networks Affect the Resilience of Firms to Natural Desasters? Evidence from the Great East Japan Earthquake.” Mimeo. The former version of this paper is in http://www.rieti.go.jp/jp/publications/dp/13e028.pdf.