Industrial Strategy and Economic Transformation

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Diverse economic transformation agenda: Endowment and development phases

• Economic transformation agendas are different among countries which address diverse challenges of economic and social development

• Moreover, agendas are different due to diverse endowments and to development phases

• In most of the cases (of outstanding industrial transformation), the government or public institutions facilitated the process, especially in the area of learning, innovation and infrastructure
Diverse economic transformation agenda

- **Resource-poor**
  - Agrarian
  - Urbanizing & early-industrializing
  - Industrializing (higher skill & technology)
  - High-level technology & innovation capabilities

- **Resource-rich**

  - SINGAPORE 60,688
  - CHILE 17,310
  - BRAZIL 11,640
  - Some Sub-Saharan African countries

  - BANGLADESH 1,777
  - THAILAND 8,646

Some Sub-Saharan African countries

Source: Prepared by the author, based on World Development Indicators database, World Bank.
Two types of dynamic change of endowments, including capabilities

- **Incremental changes of endowment**, especially by accumulation of knowledge and capabilities which enhance factor endowments and/or improve other basic conditions. Accumulation of knowledge and capabilities in general, absorptive capabilities and organizational capabilities, in particular, human resource development, basic and applied R&D, among others, are key.

- **Drastic changes of endowment**, especially by a new large-scale infrastructure, technological innovations (local and/or foreign), etc.

- Both types of dynamic changes generate new industries, new ways of doing business, which produce economic (structural) transformation
Societies’ learning and accumulation of knowledge and capabilities


- Cimoli, Dosi and Stiglitz (2009, p.2): ‘Great transformation’ entails a major process of accumulation of knowledge and capabilities, at the level of both individuals and organizations. Capabilities have to do with the problem solving knowledge embodied in organizations...

- Today’s specializations influence tomorrow’s productivity growth, chances to innovate, and demand potential. (Ibid.p.3)

- Absorptive capabilities fundamentally concern the ways in which past achievement in knowledge accumulation influence future learning potential. (Ibid.p.9)
Main objective of the study

• Obtain insights into **how the crucial factors interact in practice**, focusing on several outstanding cases of what we term “industrial policy”, which **resulted in a remarkable economic transformation** in a country or in regions of a country.

- **Cerrado agriculture**: Miracle of Cerrado in Brazil
- Eastern Seaboard and **“Detroit of Asia”** in Thailand
- **Salmon industry**: Chile’s salmon miracle
- **Transformation of Singapore**: From quality, productivity to innovation
- **Bangladesh garment/apparel industry**
Research questions

(a) how the transformation was triggered (initiated) and how factor endowments dynamically changed
(b) how accumulation of knowledge and capabilities was achieved
(c) what kind of drivers (driving forces) kept the momentum of transformation
(d) what kind of strategy/vision was behind and promoted the process
Triggers, drivers, accumulation of capabilities interacted

- **Triggers**: drastic change of endowments and/or other conditions (breakthrough by a new large-scale infrastructure, technological innovations, external shocks, etc.) These changes trigger economic transformation

- **Readiness**: Incremental changes of endowment: especially accumulation of knowledge and capabilities which enhance factor endowments and/or improve other basic conditions. Accumulation of knowledge and capabilities in general, absorptive capabilities and organizational capabilities, in particular, human resource development, basic and applied R&D, among others, are key.

- **Drivers**: capable actors, individuals, enterprises, organizations and others, which are driving forces to keep momentum of the dynamic process. These drivers are created and strengthened by the accumulation of capabilities
Analytical Perspective

Strategy of industrial development, vision, awareness of challenges, leadership,

Drastic changes of endowments:

Triggers

Incremental changes of endowments and changes of other basic conditions:

Readiness

Economic transformation as a dynamic process

Driving forces to keep momentum of development:

Drivers

Source: Prepared by the author
Analytical perspective and Key factors for economic transformation (some examples)

<table>
<thead>
<tr>
<th>Triggers that change endowments and/or competitiveness</th>
<th>new infrastructure, new technology, external shocks (strong appreciation of yen; sudden increase of energy price; new drastic regulation, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental changes that prepare endowments and other basic conditions</td>
<td>accumulation of capabilities, particularly formation of human capital, especially industrial personnel (engineers and middle-level technical personnel; agricultural productivity; rural women’s preparedness to work in urban areas; awareness regarding environment conservation up to threshold</td>
</tr>
<tr>
<td>Driving forces to keep momentum of development</td>
<td>private enterprises, dissemination of technology, etc.</td>
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<td>Roles of government and market (private sectors’ spontaneous activities) (Roles changes over time according to phases of development</td>
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<tr>
<td>Industrial development strategy, vision, strong leadership</td>
<td></td>
</tr>
</tbody>
</table>
Case 1

Bangladesh Garment Industry: From agrarian to early industrializing phase

- Bangladesh garment industry: Rural development and mobilization of female workers have been crucial.
- Modernization of agriculture based on technology adoption which enabled farmers’ shift from low-yield, single crop, deep-water rice to double cropping of short maturity, high-yield rice, as well as the well-known rapid spread of microfinance and construction of rural infrastructure, were among major factors that changed the rural society.
- The trigger: the collaborative effort of a domestic catalyst (Desh Co.) that mobilized the necessary local resources and a foreign catalyst (Daewoo Co.).
- Connectivity and logistics up-grading by infrastructure.
Bangladesh Garment Industry Today

• In 1981, ten years after Bangladesh achieved independence, raw jute and jute goods were its major exports corresponding to 68 percent of total exports. In 2011, garments and textiles constituted 85 percent of total exports, of which 76 percent corresponded to garments.

• Today, the garment industry has 5,000-6,000 factories with 7-8 million workers using the assembly-line method of production.

• Exports as a percentage of GDP tripled between 1990 and 2010, with much of the increase in the thriving ready-made garment industry, which is highly intensive in female labor.

• This Bangladesh success story is remarkable, because, as a recent World Bank study highlighted, “the country was often held out in the development literature as a hopeless case”
Change of endowments:
Rural development and mobilization of female workers with low opportunity cost

- Rural roads, irrigation, market facilities and other rural infrastructure, micro-credit, school education and so forth, provided by NGOs, central and local governments and donors, all together enabled the remarkable agricultural and rural development of Bangladesh in the last three decades. (WB 2012)

- This process enhanced the mobility and readiness of low-opportunity-cost labor in rural Bangladesh and changed gradually, but steadily, the endowments of the country.

- Hossein, Sen and Sawada (2012, p.5) contend that in the predominant agricultural economy with high population density and high population growth, the critical challenge is to reduce the burden of surplus labor in agriculture. This challenge can be met through sustained sectoral and social policies and attendant institutional changes commensurate to each stage of development to support productivity/growth-enhancing relocation of “surplus” farm labor to non-farm and non-agricultural jobs. (Ibid, p.5; italic is original)
Bangladesh Garment/Apparel Industry

Accumulation of capabilities of small business owners; professionals; traditional technology (Dhaka muslin, etc.) ; rural female workers with low opportunity cost, but ready to work in urban factories; seasonal migration culture; change in rural society (education, IT, rural infrastructure, microcredit, etc.)

Diffusion of tacit knowledge through employee mobility;
Formation of clusters and value-chains;
Local investors;
FDI; expanding global market;
Diversification of products

1978 Collaborative Arrangement
1979 7 months intensive OJT (Korea)
1980 First factory (Chittagong)
1981 Contract Termination
1980 47 factories
1981 594 factories
1986 594 factories
1991 834 factories
1995 2182 factories
2001 3480 factories
2006 4220 factories
2011 5150 factories


EC-GSP: European Community Generalized System of Preferences
EBA: Everything but Arms
Learning, accumulation of knowledge and capabilities: Start up

• Rhee (1990) undertook extensive research on how this country’s garment industry started.

• Desh Garment Company and Daewoo signed an agreement to collaborate in the areas of technical training, purchase of machinery and fabric, plant start-ups and marketing. Desh recruited 130 workers for training at Daewoo’s Busan plant, where “they received some of the most intensive on-the-job training in garment production ever seen in the history of developing countries” (Ibid. p.337) for seven months in 1979.

• Another noteworthy feature of Daewoo’s training is that there were 14 women among the trainees. Rhee (1990, p.337) puts it, “Muslim tradition had precluded females from working in factories in Bangladesh. However, Quader had been so impressed by the efficiency and sheer numbers of women at Daewoo and other garment factories in Korea that he persuaded the Bangladesh government to support female trainees.”
Learning, accumulation of knowledge and capabilities: Early development phase to full-fledged development phase

• Mostafa and Klepper (2011, p.3) emphasize that tacit knowledge seeding was essential for the initial establishment and subsequent expansion of the Bangladesh garment industry. They contend that key to the explosive growth of the industry was knowledgeable workers leaving Desh, and then other successful firms, to set up the production processes of later entrants.

• Mottaleb and Sonobe (2011) conjectured that highly educated entrepreneurs have been attracted to the garment industry by high profitability, which was boosted initially by the Desh-Daewoo infusion of Korean skills and know-how. (pp.4-5) Their analysis indicated that the high-level education of manufacturers and enterprise performance were closely associated.
③ A state-of-the-art cutting machine is pictured at a garment factory.

④ The shipping companies in Dhaka EPZ.

⑤ Female workers in the garment factory.
Change of endowments:
Connectivity and logistics up-grading by infrastructure

• When Desh started its business in 1980, its factory was located in Chittagong, the country’s main port. The first Export Processing Zone (EPZ) was also constructed in 1983 in this port city. Exports from Dhaka, which does not have an efficient port facility nearby, had a serious bottleneck due to the lack of bridges on rivers which cross Highway No.1 that connects the capital city with Chittagong. As trucks had to use ferries, the transport between Dhaka and Chittagong was constrained in terms of time and unpredictability. This handicap affected the competitiveness of the garment industry in Dhaka. It was overcome by the construction of Meghna Bridge in 1991 and Meghna-Gumti Bridge in 1995. The Dhaka EPZ was constructed in 1993.

• Jamuna multipurpose bridge, inaugurated in 1998 as the largest construction in Bangladesh history, has been a major channel for integrating the lagging western region of the country with the leading eastern region, enabling cheaper transportation of gas, electricity and telecommunications, and enhancing the labor mobility of the western region. (Hossein, Sen and Sawada 2012, p. 11)
Case 2

Thai Automobile Industry: “Detroit of Asia” attained by higher skill, technology, supporting industries and clusters through learning and accumulation of capabilities

• Accumulation of knowledge and capabilities has been essential for establishing competitive “supporting industries”, facilitated by a flexible industrial strategy of the government

• Automakers and parts suppliers enhanced their competitiveness when they were agglomerated as a cluster with articulated value chains

• Rapid expansion of Thailand’s automobile production was triggered by an infrastructure, Eastern Sea Board, which significantly changed the endowment of the country
Incremental change of endowments: Accumulation of knowledge and capabilities, and of supporting industries: “Detroit of Asia” today

- Production of 1 million cars achieved in 2005 and 2.5 million cars to be achieved in 2012
- It is estimated that there are about 640 first layered parts maker and 1700 second and third layered parts makers supporting the automobile industry
- Development of an automobile industry requires skilled labor and supporting industries to provide up to 20,000 to 30,000 parts and components. Supporting industries and automobile assembly plants are closely related and provide externality to each other.
- Among several policy measures, a series of initiatives by the Thai government to incrementally enhance the localization of parts production was important for the accumulation of knowledge and capabilities of supporting industries.
  - Techakanont (2008, p.8) considers that “the most important policy of the Thai state was the implementation of the LCR.”
  - Yamashita (2004, p.5) “the process of adaptation to the LCR enabled the accumulation of a very wide range of automobile parts industries and formation of skilled technicians and engineers...”
Development of Automobile Industry in Thailand

- **1960-64**: Industrial Promotion Act / Board of Investment (BOI)
- **1962-64**: Industrial Promotion Act / Board of Investment (BOI)
- **1971-77**: Policy of Promotion of Supporting industry
- **1972**: Industrial Estates Authority (IEAT)
- **1973**: Local contents requirement (LCR) of 25%
- **1977**: Investment Promotion Act
- **1978-90**: Liberalization period 1971-93
- **1985**: Plaza Accord
- **1987**: Liberalization Policy (Trade, etc.)
- **1987**: Policy of Promotion of Supporting industry
- **1987**: Introduction of localization policy 1971-77
- **1991**: Liberalization Policy (Trade, etc.)
- **1991**: Small & Medium enterprises (SMEs) promotion law
- **1993**: AFTA (ASEAN 6)
- **1993**: Eastern Sea Board (ESB)
- **1996**: AICO (ASEAN Industrial Cooperation)
- **1999**: Summit Group, Samboon Group, and others
- **2000**: Detroit of Asia (Production of Asia) 2000-
- **2000**: Formation of clusters
- **2003**: Master Plan of SMEs promotion
- **2005**: Production of 1 million cars
- **2006**: Automobile Human Resource Development Project (AHRDP)
- **2006**: Automobile Human Resource Development Project (AHRDP)
- **2007-11**: New Automobile Investment Policy
- **2007-11**: Automobile Policy
- **2008**: Liberalization Policy (Trade, etc.)
- **2008**: Liberalization Period 1971-93
- **2009**: Introduction of localization policy 1971-77
- **2012**: Production of 2.5 million cars


Source: Prepared by the author, based on Lecler (2002) Table 2.4., Natsuda, Kaoru and John Thoburn (2011)
Drastic change of endowments: Connectivity and logistics up-grading by infrastructure

**Eastern Seaboard**

- The Eastern Seaboard Infrastructure created an export hub and the center for technology-intensive industries: 14 industrial estates; 360,000 workers; 1,300 factories; and 516 automobile-related factories.

- Today, Leam Chabang is Thailand's largest port and plays a significant part in increasing trade in Thailand, and is where Thailand's automobile industry is most heavily concentrated, with many automakers' and parts manufacturers' operations set up in the area.

- The Thai government introduced the New Automobile Investment Policy in 2002, which aimed to develop Thailand into a regional center of the automobile industry in Southeast Asia. Two years later, a further automobile development plan was introduced, the so-called “Detroit of Asia” plan, which was later renamed the “Production of Asia” plan.
Thai Automobile Belt
① The Eastern Seaboard at Rayong became a ‘Detroit of the East’ as a few global manufacturers set up factories there to make pick-ups.

② New Mitsubishi Motors Thailand production ‘Mirage’

③ Auto plants in Thailand include Ford-Mazda AutoAlliance (center) and GM behind it.

④ Honda Thailand announced to build a second assembly & engine plant (2013).

⑤ Factory workers
Case 3

Brazil: Miracle of Cerrado

• The Portuguese word cerrado refers to “closed” land, or land that was for many years regarded as being unfit for agriculture. The total area of this vast region is about 240 million hectares, or 5.5 times the land area of Japan. This land was considered to be unsuitable for agriculture because the soil has extremely high acidity, and because lack of potassium and phosphoric acid, and damage caused by aluminum, hinder crop growth.

• Recent discussions on the Cerrado point out that Brazilian Agricultural Research Corporation (EMBRAPA)’s greatest contributions were soil improvement in the Cerrado and breeding improvement for soybeans and other crops.

• Soybeans, a crop suited to temperate regions, bloom and sprout by sensing differences in day length (photoperiod), and soybean cultivation was therefore difficult in the tropical region.

• Finally, in 1980, the first soybean variety was completed for cultivation in the Cerrado.

• Soybean varieties adapted to tropical zones were essential not only as a new crop but also for soil improvement in the Cerrado.
Cerrado

Scenery before the Cooperation for Cerrado Agricultural Development

(Source: Yutaka Hongo, Senior Consultant of JICA)

Scenery after the Cooperation for Cerrado Agricultural Development
Comments on “Cerrado Agriculture”

“The Miracle of the Cerrado”

“Agricultural Revolution”

World Food Prize Founder Dr. Norman E. Borlaug, who is credited with saving more than one billion lives as the Father of the Green Revolution, called the development of the Cerrado “one of the great achievements of agricultural science in the 20th century,” which, over the past 40 years, “has transformed a wasteland into one of the most productive agricultural areas in the world.”

“The first successful case in human history of rainfed - large scale - grain production in the tropical region”

Source: http://www.worldfoodprize.org/laureates/Past/2006.htm, Prof.S.Ito (Kyushu Univ. 2011)
Development of Cerrado Agriculture

Source: Prepared by the author, based on Hosono, Akio and Yutaka Hongo (2012)
Cerrado and PRODECER Project Sites

★ PADAP
● Phase 1
1. Mundo Novo
2. Irai de Minas
3. Coromandel
4. Entre Ribeiros I
● Phase 2
5. Piuva
6. Ana Terra
7. Ouro Verde
8. Brasil Central
9. Entre Ribeiros-II
10. Entre Ribeiros-III
11. Entre Ribeiros-IV
12. Guarda Mor
13. Bonfinópolis
14. Buritis
15. Piratinga
16. Paineiras
17. Cristalina
18. Buriti Alto
19. Alvorada
○ Phase 3
20. Pedro Afonso
21. Gerais de Balsas
Figure 3.14  Spatial Distribution of Land Use in the Cerrado

Source: Edson Eyji Sano et al, Mapeamento semidetalhado do uso da terra do Bioma Cerrado, P.153
Value chain of Soybean Products in the Western Part of Bahia

1. Labor absorption: 
   Number of workers: 700

2. Labor absorption: 
   Number of workers: 67,000

3. Labor absorption: 
   Number of workers: 4,500

4. Labor absorption: 
   Number of workers: 37,200 (regional 2,200, domestic 35,000)

5. Labor absorption: 
   Number of workers: 37,200 (regional 2,200, domestic 35,000)

6. Labor absorption: 
   Number of workers: 37,200 (regional 2,200, domestic 35,000)

7. Labor absorption: 
   Not defined

8. Labor absorption: 
   Not defined

Notes:
- Soybean oil production quantity: Soybean production quantity * 18% yield rate.
- Poultry production value: Shipping amount * value at plant 2.8R$/kg (Value based on an interview with MAURICEA in Bahia)
- Wholesale: Sales * retail price 20 R$/kg (Price based on interviews with retail stores in Sao Paulo)
- Logistics is excluded from calculating total value added amount due to difficulty of calculation, and the same for labor absorption.

Source: Tetsuo Mizobe, 2011
Connections between Government, Agri-business, and Farmers in the Western Part of Bahia

Seagri: Secretarias de Agricultura, Irrigação e Reforma Agrária
Sema: Secretarias de Meio Ambiente
Ibama: Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis
Embrapa: Empresa Brasileira de Pesquisa Agropecuária
Fundação Bahia: Fundação de Apoio a pesquisa e Desenvolvimento do Oeste Baiano
CPTO: Centro de Pesquisa e Tecnologia Agropecuária do Oeste
COOPROESTE: Cooperativa Agropecuária do Oeste da Bahia
Aiba: Associação de Agricultores e Irrigantes da Bahia
Adab: Agência Estadual de Defesa Agropecuária da Bahia
Abacafe: Associação dos Cafeicultores do Oeste da Bahia
Abapa: Associação Baiana dos Produtores de Algodão
EBDA: Empresa Baiana de Desenvolvimento Agrícola
Fundeagro: Fundo para o Desenvolvimento do Agronegócio do Algodão

Source: Tetsuo Mizobe, 2011
Migration to Cerrado region

The arrows represent the size of transfer of population to the Cerrado. Total residents of the Cerrado as of 2009 were calculated in units of states according to their birthplace, and the thickness of the arrows represent their number.
① The center pivot irrigation system with a radius of 200-500 meters. Movable water pipes encircle a field.

② Loading soybeans onto a barge at the Upper Amazon port of Porto Velho.

③ The city of Lucas de Rio Verde, one of the focal points of the cerrado agricultural development by PRODECER, as it appears today (2011).

④ Center pivot irrigation facilities seen from the air.

⑤ Hosono (center) and Hongo (left) meeting with Tocantins State Governor José Wilson Siqueira Campos.
### Key factors for economic transformation (Case of Cerrado agriculture)

| Triggers that change endowments and/or competitiveness | Technological innovations: related to soil improvement and new varieties for tropical climate  
Institutional innovations: PRODECER |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Incremental changes that prepare endowments and other basic conditions</td>
<td>accumulation of capabilities: capable and diligent farmers of Southern states</td>
</tr>
<tr>
<td>Driving forces to keep momentum of development</td>
<td>private enterprises, dissemination of technology, etc.</td>
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Case 4

Chilean Salmon Industry

• Long-standing vision among Chileans has been the establishment of a new industry for development of the Southern region of Chile

• Salmon sea farming industry developed from scratch

• Government started the Salmon project in 70s and Fundacion Chile, a public-private entity, achieved 1000 ton production scale, confirming the salmon culture’s commercial feasibility in the Southern region of Chile

• Today, Chile and Norway are the largest exporters of salmon and salmon products in the world
The hatchery completed in 1976. The facilities were gradually improved.

Fertile eggs arrived at Santiago Airport after traveling 70 hours from Hokkaido (Japan).

Nagasawa expert was checking the condition of the eggs which normally-developing and about hatched.

The river where chum salmon was found. The name of this bay is Ultima Esperanza (Last Hope).

The hatchery completed in 1976. The facilities were gradually improved.
## Evolution of the World Production in Salmon and Trout Farming (millions of tons)

<table>
<thead>
<tr>
<th>Years</th>
<th>World Production</th>
<th>Norwegian Production</th>
<th>Chilean Production</th>
<th>Chile's % in the world</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>612</td>
<td>262</td>
<td>128</td>
<td>21</td>
</tr>
<tr>
<td>1998</td>
<td>926</td>
<td>387</td>
<td>258</td>
<td>27.8</td>
</tr>
<tr>
<td>2001</td>
<td>1.327</td>
<td>478</td>
<td>450</td>
<td>34</td>
</tr>
<tr>
<td>2004</td>
<td>1.586</td>
<td>602</td>
<td>601</td>
<td>37.8</td>
</tr>
<tr>
<td>2005</td>
<td>1.617</td>
<td>632</td>
<td>614</td>
<td>38</td>
</tr>
<tr>
<td>2006</td>
<td>1.820</td>
<td>709</td>
<td>709</td>
<td>39</td>
</tr>
</tbody>
</table>
Pioneer Companies and Institutions of Chilean Salmon Industry

1970

1975 P. Lago Llanquihue's first investment in trout farming in a lake

1979 Nichiro's First Salmon sea farming

1979/88 Salmones Antartica's Accomplishment of 1000t production

1980

1987/88 Salmones Antartica's Accomplishment of 1000t production

1990

Note: Domsea Farms did not produce farmed salmon.

Source: Prepared by the author, based on Hosono, Akio(2010)
For more information

SHIRAISHI Hatchery (1986)

Fish preserve installed on the opposite shore of the hatchery.

Forage Development Lab. Japanese government assisted the equipment and training program.

Forage Development Lab. Which has been used after 30 years.
Key factors for economic transformation  
(Case of Chilean Salmon Farming)

<table>
<thead>
<tr>
<th>Triggers that change endowments and/or competitiveness</th>
<th>Achievement of Fundación Chile’s sea farming at 1,000t. scale confirming the commercial feasibility of salmon culture; Nichiro’s first venture of sea farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental changes that prepare endowments and other basic conditions: R&amp;D; accumulation of capabilities</td>
<td>accumulation of capabilities: Preparation of salmon culture specialist and R&amp;D on national eggs production, feed production as well as on diseases by Japan-Chile Salmon Project, Fundación Chile and others.</td>
</tr>
<tr>
<td>Driving forces to keep momentum of development</td>
<td>private enterprises, dissemination of technology, etc.; Formation of salmon clusters</td>
</tr>
<tr>
<td>Roles of government and private sectors (changes over time)</td>
<td>Establishment of public-private entity “Fundacion Chile”, International cooperation Chile-Japan</td>
</tr>
<tr>
<td>Industrial development strategy</td>
<td>Ministry of Agriculture’s vision; Fundacion Chile’s strategy and business model;</td>
</tr>
</tbody>
</table>
For more information


⑪ Well boat for transferring salmon
⑫ Salmones Antártica Forage factory in Los Ángeles.
⑬ Transferring salmon using vacuum pipe.
⑭ Farms is growing and their facilities became larger.
Case 5

Singapore’s approach to economic transformation

• Cross-cutting industrial strategy from cheap-labor based manufactured exports to technology and high skilled labor based exports

• Strategy to strengthen transport and logistics hub
Country without natural resources and with large number of unemployed: Background of Productivity Initiative in Singapore

• Singapore, a country without natural resources and of large number of un-employed when it got independence, is one of the first South East Asian countries to promote export-led growth instead of import substitution-led one. However, in late 70s, faced with increasingly stronger competition from late comers whose wage rate was lower, Singapore decided to transform cheap-labor-based export economy into skilled labor-/knowledge-based and higher value-added export one. For this transition, it was considered essential to increase productivity.

• Economic Development Board (EDP) accomplished the leading role and promoted “knowledge based FDIs”. But, FDIs would not have invested in Singapore if the country did not have high productivity labor and other outstanding advantages.
Economic Development Board (EDB)

- EDB was an agent and catalyst of the development of a broader set of capabilities that Singapore has displayed over the decades (Schein (2001), p.2)

- The initial leadership team assumed that the government had to play a lead role and be business oriented. If economic development was to succeed, the key resource would be Singapore’s own people. (Ibid., p.236)

- The primary function of EDB was to promote the establishment of new industries in Singapore and to accelerate the growth of existing ones (Ibid., p. 38)
Singapore’s development of high value-added goods and service sector
Vision of Lee Kuan Yew

• Productivity initiative was strongly promoted by top leaders of the country, especially, the first Prime Minister Lee Kuan Yew: “The shift to knowledge-intensive industrial structure with strong international competitiveness is only possible by human-resource development of 2.6 million people, the only resource Singapore has”, according to Memories of then Prime Minister Lee Kuan Yew. Japan Productivity Organization (1990, p.1)

• Through Singaporeans and Japanese mutual learning, with strong ownership of Singaporeans, Singapore Style Productivity Movement was born. For details, see JICA (2011)

• The institution in charge was developed vigorously adapting itself to the changing position of the country in the world.
In April, 1981, the Singaporean Committee on Productivity was formed by representatives of enterprises, workers’ organizations, government officials, and academia. The Committee reviewed the experiences of productivity movements in Japan, another country without natural resources but with abundant labor, and presented a report to the President of the National Productivity Board (NPB) of Singapore. NPB was designated as the main body for promoting productivity development in Singapore and in June 1983, the Singapore Productivity Development Project (SPDP) was launched with the support of the Japanese government. (JICA/IDCJ/IDJ (2010 p.4/30))
Singapore Industrial Estates

| Number | Estate Name                                      |
|--------|------------------------------------------------|---------------------------------|
| 1      | Kranji Industrial Estate                        |
| 2      | Sungei Kabut Industrial Estate                  |
| 3      | Woodlands Central                               |
| 4      | Woodlands East                                  |
| 5      | Woodlands West                                  |
| 6      | Woodlands D                                     |
| 7      | Yew Tee Industrial Estate                       |
| 8      | Ang Mo Kio Industrial Estate                    |
| 9      | Ayer Rajah Industrial Estate                    |
| 10     | Bishan Industrial Estate                        |
| 11     | Herderson Industrial Park                       |
| 12     | Kallang Basin Industrial Estate                 |
| 13     | Kallang Park Industrial Estate                  |
| 14     | Kampong Ampat Industrial Estate                 |
| 15     | Kolam Ayer Industrial Estate                    |
| 16     | Redhill Industrial Estate                       |
| 17     | St. Michael's Industrial Estate                 |
| 18     | Singapore Science Park                          |
| 19     | Sims Avenue Industrial Estate                   |
| 20     | Tanglin Halt Industrial Estate                  |
| 21     | Tanjung Rhu Industrial Estate                   |
| 22     | Telok Blangah Industrial Estate                 |
| 23     | Tiong Bahru Industrial Estate                   |
| 24     | Toa Payoh Industrial Estate                     |
| 25     | Bedok Industrial Estate                         |
| 26     | Changi North Industrial Estate                  |
| 27     | Changi South Industrial Estate                  |
| 28     | Kaki Bukit Industrial Estate                    |
| 29     | Kampong Ubi Industrial Estate                   |
| 30     | Loyang Industrial Estate                        |
| 31     | Tai Seng Industrial Estate                      |
| 32     | Yio Chu Kang Industrial Estate                  |
| 33     | Tampines Industrial Estate                      |
| 34     | Cleminti West Industrial Estate                 |
| 35     | Jurong Industrial Estate                        |
| 36     | Southern Islands                                |
| 37     | Eunos Techpark & Eunos Technolink               |
| 38     | Tuas View                                       |
| 39     | Tuas Biomedical Park,II                         |
| 40     | North Coast Wafer Fab Park                      |
| 41     | Woodlands Wafer Fab Park                        |
| 42     | Seletor Aerospace Park                          |
| 43     | Pasir Ris Wafer Fab Park                        |
| 44     | Airport Logistics Park of Singapore (ALPS)      |
| 45     | Tampines Wafer Fab Park                         |
| 46     | Advanced Display Park                           |
| 47     | Changi International LogisPark (North)          |
| 48     | Changi International LogisPark (South)          |
| 49     | Biopolis                                        |
| 50     | Fusionopolis                                    |
| 51     | Media Polis                                     |
| 52     | Clementi West LogisPark                         |
| 53     | Toh Tuck LogisPark                              |
| 54     | Toh Guan LogisPark                              |
| 55     | Banyan Logispark                                |
| 56     | Meranti Logispark                               |
Experiences of creation of jobs with higher wage, productivity and international competitiveness in Singapore

• The institutional development in the area of quality, productivity and, now, innovation in Singapore is outstanding:

• Starting point: National Productivity Center under Economic Development Board (EDB); National Productivity Board (NPB); Standard and Productivity Board (SPB); and, now, Standards, Productivity and Innovation Board (SPRING)
Outcome of SPDP

- Some 15,000 Singaporean engineers, managers, and other professionals participated in the project. Two hundred engineers, managers, and other professionals from Singapore took part in training courses in Japan. More than 200 Japanese experts were dispatched to Singapore.

- In 1990, when SPDP ended, 90 percent of workers in the country were involved in productivity development activities, compared with 54 percent in 1986. In 2001, 13% of the total labor force was participating in Quality Control Circles (QC Circles), in comparison with 0.4% in 1983 when SPDP started. QC Circles are considered to be the most effective vehicle for improving quality and productivity with the active participation of workers. Through this participatory approach, workers’ ideas are incorporated into the production process with innovative solutions. Hence SPDP became one of the driving forces for productivity gains in Singapore.

Source: JICA/IDCJ/IDJ(2010), p.16 of Part 4 and p.22 of Part 4
## Key factors for economic transformation (Case of Singapore)

<table>
<thead>
<tr>
<th>Triggers that change endowments and/or competitiveness</th>
<th>Economic Development Board (EDB)’s efforts based on its ‘strategic pragmatism’; Infrastructure for transport and logistics hub.</th>
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<tbody>
<tr>
<td>Incremental changes that prepare endowments and other basic conditions: R&amp;D; accumulation of capabilities</td>
<td>Establishment of National Productivity Council (NPC) in 1981 (Singapore Productivity Development Project (SPDP) followed in 1983) Establishment of Productivity and Standards Board (PSB) (in 1996) and Standards, Productivity, and Innovation Board (SPRING)</td>
</tr>
<tr>
<td>Driving forces to keep momentum of development</td>
<td>Skilled workers, promising FDI with strategic pragmatism (EDB); enhancement of infrastructure of transport; industrial parks</td>
</tr>
<tr>
<td>Roles of government and private sectors (changes over time)</td>
<td>Government institutions and Public-private partnership</td>
</tr>
<tr>
<td>Strategy and vision</td>
<td>Political leaders’ vision, strategy and leadership</td>
</tr>
</tbody>
</table>
Concluding remarks

Successful industrial strategy

• Accumulation of capabilities for years of efforts and learning by doing is, generally, essential for successful industrial strategy aiming at economic transformation: with gradual change of factor endowments

• Government, often with other actors (including private actors and international cooperation), could trigger transformation process by investment in infrastructure, technological and/or institutional innovation, etc.: with rapid and drastic change of factor endowments

• Once transformation started, drivers (investors, both local and foreign; increasing demand; etc.), are necessary to keep the momentum of transformation
Government’s initiative and independent public institutions

• Governments’ initiatives with strategy or vision, generally shared with the society as a whole, including private enterprises, served as a basic guideline

• Public institutions, or public-private institutions, played an important role

• These institutions are generally independent or insulated from short-term political changes and close public-private relationship is maintained
Examples of key public institutions

- **EMBRAPA**, in Brazil’s Cerrado development, insulated from short-term changes of the government (*EMBRAPA Model*) and public-private bi-national entity, CAMPO, insulated as well (Hosono and Hongo (2012));

- **Fundacion Chile**, a public-private entity, in Chile’s salmon industry development;

- **Eastern Seaboard Development Committee and technocrats of National Economic and Social Development Board (NESDB)**, etc. in Thailand (Shimomura and Mieno (2008) p.24);

- In Singapore, Economic Development Board (**EDB**) became the instrument for developing an economic strategy and putting it into practice. (Schein (2001), p. xi) Government build a partnership between public and private sectors for productivity movement in Singapore (Ohno and Kitaw (2011), p.59);
From strategy to policies and practices

• Generally, strategy, shared vision with strong ownership and awareness regarding challenges to address are crucial

• Strategy should be translated into policies and pragmatic measures and practices

• Roles of government evolve over phases of process of transformation: They are crucial particularly in early phases (as seen in the cases of Cerrado agriculture and Chile’s salmon industry)

• Singapore established SME business assistance schemes for every stage of growth: start up, growth, expansion and going overseas stages (Schein (2001), p.57)
Thank you very much

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• Comments welcome
• For details, see Hosono Akio, “Industrial strategy and economic transformation: Lessons from five outstanding cases”, in *Working Papers: Africa Task Force Meeting (JICA and The Initiative for Policy Dialogue)*