Technology transfer and technology development in post-World War II Japan triggered by World Bank projects

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Overseas Development Aid as an instrument of change in society

• The impact of a project provided as part of ODA may result in changes to the society that go beyond the nominal scope of a project.

• Such impacts were clearly visible in two loan projects provided for Japan by the World Bank in the 1950s which aimed at increasing agricultural production.

• Both technology transfer and technology development were carried out in these projects.
World Bank's Loans to Japan

- The World Bank provided Japan with 31 loan projects between 1953 and 1965, with a total amount of $86.3.

- The majority of the loans were for industrial and infrastructure development.

- Only two projects were aimed at agricultural development.
<table>
<thead>
<tr>
<th>Year</th>
<th>Date Signed</th>
<th>Beneficiary</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>15-Oct</td>
<td>Kansai Electric Power Co. Ltd.</td>
<td>Tanagawa thermal power station (two turbines; 75 MW)</td>
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<tr>
<td>1953</td>
<td>15-Oct</td>
<td>Kyushu Electric Power Co. Ltd.</td>
<td>Karita thermal power station (75 MW)</td>
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<tr>
<td>1953</td>
<td>15-Oct</td>
<td>Chubu Electric Power Co. Ltd.</td>
<td>Yokkaichi thermal power station (66 MW)</td>
</tr>
<tr>
<td>1955</td>
<td>25-Oct</td>
<td>Yawata Iron &amp; Steel Co. Ltd.</td>
<td>Steel-plate production facilities</td>
</tr>
<tr>
<td>1956</td>
<td>21-Feb</td>
<td>Nippon Steel Tube Co. Ltd.</td>
<td>Seamless tube production facilities</td>
</tr>
<tr>
<td>1956</td>
<td>21-Feb</td>
<td>Toyota Motor Co. Ltd.</td>
<td>Koromo Plant truck and bus machine tools</td>
</tr>
<tr>
<td>1956</td>
<td>21-Feb</td>
<td>Ishikawajima Heavy Industries Co. Ltd.</td>
<td>Tokyo marine engine turbine production facilities</td>
</tr>
<tr>
<td>1956</td>
<td>21-Feb</td>
<td>Mitsubishi Shipbuilding &amp; Engineering Co. Ltd.</td>
<td>Nagasaki Shipyard diesel engine production facilities</td>
</tr>
<tr>
<td>1956</td>
<td>19-Dec</td>
<td>Kawasaki Steel Corporation</td>
<td>Chiba plant hot and cold strip mills</td>
</tr>
<tr>
<td>1956</td>
<td>19-Dec</td>
<td>Agricultural Land Development Machinery Public Corporation</td>
<td>Several agricultural development projects</td>
</tr>
<tr>
<td>1957</td>
<td>9-Aug</td>
<td>Aichi Waterworks Corporation</td>
<td>Public water project in Aichi Prefecture</td>
</tr>
<tr>
<td>1958</td>
<td>29-Jan</td>
<td>Kawasaki Steel Corporation (2nd loan)</td>
<td>Chiba Works 1,000 ton blast furnace, coke oven</td>
</tr>
<tr>
<td>1958</td>
<td>13-Jun</td>
<td>Kansai Electric Power Co. Ltd. (2nd loan)</td>
<td>Kurobe No. 4 hydroelectric power station (three turbines; 86 MW)</td>
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<tr>
<td>1958</td>
<td>27-Jun</td>
<td>Hokuriku Electric Power Co. Ltd.</td>
<td>Arimine hydroelectric power station (261 MW)</td>
</tr>
<tr>
<td>1958</td>
<td>11-Jul</td>
<td>Sumitomo Metal Industries Ltd.</td>
<td>Wakayama Works 1,000 ton blast furnace and blooming mill</td>
</tr>
</tbody>
</table>
Two Projects for Agricultural Development.

Loan Agreement

(Agricultural Projects)

BETWEEN

INTERNATIONAL BANK FOR RECONSTRUCTION
AND DEVELOPMENT

AND

NOCHI KAISHATSU KIKAI KODAN
(AGRICULTURAL LAND DEVELOPMENT MACHINERY
PUBLIC CORPORATION)

DATED DECEMBER 25, 1956

Loan Agreement

(Aichi Project)

BETWEEN

INTERNATIONAL BANK FOR RECONSTRUCTION
AND DEVELOPMENT

AND

THE AICHI IRRIGATION PUBLIC CORPORATION

DATED AUGUST 9, 1957
Aichi Water Canal Project

- Objectives were: (1) irrigation, (2) drinking water supply, (3) industrial water supply, and (4) hydroelectric power.

- The government of Japan in the early 1950s actively sought the introduction of foreign capital, and the World Bank was the major target.

- The government of Japan put the Aichi Water Canal Project into the list of proposed projects in October 1952.
Meeting increasing water demand in post-World War II Japan

• Japan then produced only 80 percent of its food requirements. To feed 90 million people, Japan imported about 5.5 million tons of food annually.

• By 1965, with an estimated population increase of 100 million, the annual food deficit would be much greater unless production could be increased.

• The need for drinking water, industrial water, and hydroelectric power required the construction of dams and canals.
Exposure to the modern project management approach

- World Bank stipulated that a consulting firm should supervise the entire process of the work and an American consulting firm EFA was selected.

- EFA supervised the Aichi Water Canal Project with a rationalized and sophisticated approach to managing large-scale civil works.

- The idea of splitting the design process and responsibility (between consulting firm and construction firm) was very new to Japan
Introduction of technology to build rock-fill dams

• The engineers of EFA suggested that the Makio dam should be built as a rock-fill dam, on the basis of cost effectiveness, while no large rock-fill dam had ever been built in Japan.

• The construction of the Maiko dam served as a harbinger of large rock-fill dams in Japan.

• Nowadays, the majority of large dams under construction or being planned in Japan are rock-fill dams.
Makio Dam as Initially Planned and Built

Note: Makio Dam used to be called Futagomochi Dam in its planning stage.
Use of large construction machinery to expedite the project

- Aichi Water Canal Project made extensive use of large construction machinery which was imported from the United States using the loan provided by the World Bank.

- Japanese engineers witnessed with surprise the efficiency of construction work using modern construction machinery.

- These engineers promoted the use of such machinery after their return to their own institutes.
“Exhibition of large construction machinery”
Technology transfer by the Aichi Water Canal Project

• Many engineers were seconded to the Aichi Irrigation Public Corporation from the Ministry of Agriculture and Forestry as well as prefectural governments.

• These engineers realized the power of modern management for civil engineering works.

• They served as messengers in bringing the “transferred technology” along with them when they returned to their own workplaces.

• Aichi Water Canal was then called “Aichi Water Canal University” by these engineers.
Consultancy as a new form of business

- Concept of “consulting firm” did not exist in Japan before the Aichi Water Canal Project.

- After completion of the project, some engineers who had worked on the Aichi Water Canal Project established Japan’s first consulting firm, Sanyu Consultants, in 1962.

- Many consulting firms were established in Japan thereafter.
Technology transfer as “hidden objective”

• World Bank gave a loan project for Japan to build the New Tokaido Line (the Shinkansen Project) between Tokyo and Osaka.

• A Senior Japan National Railway management said:

“They taught us how to think about the project, they taught us about rational project analysis, they taught us cost–benefit analysis, they taught us how to think about pricing train tickets in the context of the Shinkansen Project, and they taught us how to think, most of all, about a railway line project, not just in the context of the railway system of our country, but in the context of the entire transport system of Japan.”
What did JNR’s management want?

- The JNR was then reputed to be very inefficient and it constantly generated a large deficit, which the government covered.

- Management of the JNR wished to manage the Shinkansen Project in a more rational and streamlined way, compared with the problematic existing railway systems.
Lessons Learned

• Sector Adjustment Loan is not the only instrument to change management methods in a particular sector.

• Even an ordinary development project may successfully change the “way of business”.

• An ordinary project could be instrumental in creating structural changes in a given sector if the project is carefully designed and implemented.

• Technology transfer may be embedded into an ordinary project, even if technology transfer is not explicitly spelled out in the project.
Technology development by the Shinotsu Peatland Reclamation Scheme in the Mechanical Land Reclamation Project

- Japanese government in 1951 developed a plan to reclaim about 11,000ha of peatland in the Shinotsu region of Hokkaido as part of the Integrated Development Project of the Ishikari River basin.
Absorbing returnees from overseas in Hokkaido after World War II

- Japan lost overseas colonies in Asia and the Pacific (e.g., in China, Korea, Manchuria, and Taiwan) after World War II.

- About three million Japanese immigrants came back to the mainland Japan.

- Hokkaido absorbed many of these returnees by reclaiming forests to develop new farmland.
“Pasture or Paddy field”

• World Bank suggested that the peatland in Hokkaido was more appropriate for dairy farming and wheat cultivation.

• This suggestion was a big surprise for the Hokkaido Development Bureau and the Japanese government, since they had taken it for granted that the Shinotsu region would be reclaimed for irrigated paddy fields.

• Hokkaido Development Bureau finally managed to persuade the World Bank mission that the peatland in the Shinotsu region should be reclaimed for paddy fields, not for pastures.
“Failed project”

- The project was supposed to import 131 pieces of construction machinery, while the imported machinery proved to be of very limited use for peatland reclamation in the Shinotsu region.

- Only 41 pieces of machinery were thus imported within the framework of the project.

- Some of the machinery proved too heavy for use in peatland - for example, the imported bulldozers sank into the peatland and could not move around.
New technology developed to convert peatland into paddy fields

• No “proven” technology existed to convert peatland into paddy fields.

• A Japanese bulldozer producer then developed a bulldozer for swamps, without any technical assistance or technology transfer from abroad.

• Technology was also developed to transfer soil as dense muddy water into farmland.
Lessons Learned

• An ordinary development project may even lead to technology development in the given sector.

• Technology thus developed should be more appropriate for the project command area as compared with the technology developed in a different natural and societal setting (e.g., the donor country of an ODA project).

• Obviously, a new and appropriate technology in a recipient country should only be developed when some prerequisites are met.
Prerequisites for technology development

- When the Shinotsu peatland reclamation was carried out, Japan had highly educated human resources as well as industries to develop new machinery.

- Many present developing countries may not meet such conditions.

- However, the current societal settings of some developing Asian countries resemble those in Japan in the mid-1950s.
Reality of Japan in those days

- Japan used to be an industrialized country before the World War II.

- Technology Development was thus possible in Japan.
Reality of Thailand in these days

- Thailand is no longer an undeveloped country in the film “The King and I”.

- Technology Development may be possible in Thailand in these days.
Q and A