CHAPTER

4

The Role and Characteristics of Industrial Policy in Postwar Industrial Recovery and Development in Japan: Implications for Developing Countries

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1. Introduction

Industrial policy is used to promote industrial activities for national economic development. It is also seen as an intervention or an exertion by the government to the market economy.

While there are several negative opinions against industrial policy, especially from the perspective of the free market economy, there are also opinions that value its role positively in postwar Japan's economic recovery, which led to high economic growth and industrial structure upgrading.

This chapter will first classify Japanese industrial policy based on the actual conditions of various industrial policies implemented in postwar Japan. After giving an overview of the diversity of the policies, it will discuss the characteristics of implementation of postwar industrial policy in Japan and summarize its key aspects that developing countries could learn for the formulation and implementation of their own industrial policy. I worked at the Ministry of International Trade and Industry (MITI, currently the Ministry of Economy, Trade and Industry: METI) for about 30 years from 1966. Whilst there, I was involved in the formulation and implementation of industrial policy including the promotion of chemical industry, pollution prevention and safety measures, as well as regional development such as assessing factory locations and technology developments for new energy. Based on my experiences, I would like to discuss various roles of organizations and institutions, including MITI, in relation to industrial policy.

2. Japanese Industrial Policy in the Postwar Period

The goals and instruments of industrial policy change depending on the socio-economic status of the country and the development stage each industries are in. It is also influenced by the international environment.

In the case of Japan after the World War II, industrial policies were used for the recovery of industrial activities that had been destroyed during the war. The government implemented policies of rapid rationalization of its domestic industry in order to enhance export competitiveness, to promote export for earning foreign currency, and to increase the country's self-sufficiency rate. During the Cold War period, the United States (US) led the world economy, and Japan made efforts to catch up with the industrial level of the western states. It worked on reconstruction, rationalization and modernization of the key industries, and adopted and developed new industries from abroad. Advanced technologies, machinery and equipment were actively imported, while the government gave permission for the spending of large amounts of foreign currency, and offered financial support for the development and expansion of industrial activities. By the late 1960s, the catch-up was mostly successful and Japan was able to establish itself as an industrialized country. However, due to the US-Japan trade friction around this time, Japan was put under pressure to liberalize trade and capital, which demanded further measures to be taken to strengthen industrial competitiveness. Furthermore, sound industrial policy had to be planned well in relation to the Antimonopoly Law, negative externalities such as environmental pollution and industrial safety issues.

Subsequently, the rapid appreciation of the Japanese yen forced the government to review Japan's industrial structure and industrial activities aiming for international market. Followed by that was the oil crisis in the 1970s. This led to dramatic changes in Japan's development base for the heavy and chemical industry, which were the main industries at that time. These incidents accelerated strict cost reduction and a strategical shift to high value-added manufacturing. Value-addition was realized by developing high-performance materials and using sufficient energy saving measures. This gradually led to an upgrading of Japan's industrial structure where advanced processing and assembly industries, such as the automobile and electric industries became the leading industries. In turn, the Japanese manufacturing industry became one of the most competitive

industries in the world.

Today, as the global socio-economic environment continues to evolve, there is a need for industrial policy to respond to major changes such as globalization of economic activities, internet of things (IoT) development, and digitization. In each of these areas, industrial policy goals and instruments are changing rapidly, which requires multifaceted development. Likewise, Japanese industrial policy has worked to respond properly to these changes in the economic environment. I would like to emphasize the need for appropriate quick responses to changes, including developing countries, during this period of transformation as there is a need for constant change and diversity in industrial policy. The Japanese experience in the post-war period would be useful for industrializing developing countries.

3. Industrial Policy System Classified by Various Objectives and Implementation Measures

Japan implemented various industrial policies in the postwar reconstruction period, the rapid economic growth period, the industrial upgrading period, and the long stagnation period. While it is difficult to describe these various industrial policies in a systematic way, this section will outline the Japanese industrial policy and its related framework, focusing on the objectives and implementation aspects.

3.1. Classification based on the objectives of postwar industrial policy

The objective of postwar industrial policy in Japan was to realize sound development of industrial activities. The policy objectives can be classified into the following four categories: (i) industrial promotion and industrial alignment for specific industries; (ii) industrial adjustment; (iii) establishing a common foundation to support industries generally, such as infrastructure development; and (iv) responding to the negative externalities of industrial activities for harmonization with society. These policy objectives have changed over time, and various policy instruments have been devised and implemented to achieve them.

3.1.1. Industrial promotion and industrial alignment for specific industries

(1) End of the World War II to the mid-1950s
- Supporting the reconstruction of basic industries: Selecting important industries for the recovery of Japanese economy, such as the steel and coal mining industry, to provide intensive support for their reconstruction (Priority Production System).

(2) Mid-1950s to the early 1970s
- Rationalizing, modernizing, and strengthening the international competitiveness of various industries such as the textile industry and light machinery industry. Developing export-oriented industries.
- Enacting main regulations for these objectives such as the Act on Temporary Measures for the Promotion of the Machinery Industry, and the Small and Medium-sized Enterprise Modernization Promotion Act.
- Transplanting foreign new technologies, fostering them, and development of new industries such as the petrochemical industry.

(3) 1970s
- Upgrading existing industries to knowledge-intensive industries: Developing high-performance products, introducing new production processes in the basic material industry and shifting to the higher value-added products.
- Promoting the upgrading of industrial structures. Developing advanced processing and assembly industries such as the automotive and electrical industries.

(4) 1980s
- Creating new industries, such as the electronics industry, and developing new fields which have become new world-leading products.
- Creating new field of industrial development and enhancing support for entrepreneurship.

3.1.2. Industrial adjustment

(1) Adjusting supply and demand: Adjusting production, sales, and capital investment plans to eliminate excessive competition and

prevent prices from soaring.
(2) Measures for structural recession industries such as the coal mining and textile industries: Supporting the recovery of competitiveness, or the reduction and transformation of businesses. In the process, job-creation and local economy support measures are also necessary.
(3) Industry reorganization and the transformation and upgrading of industrial structures (including supporting the merger and acquisition of companies and new entry).

3.1.3. Establishing a common foundation to support industries in general

(1) Industrial locations and regional development: Strengthening support for industrial infrastructure development, balanced regional development, recession area promotion, and local self-sustaining development capabilities.
(2) Trade policy: Promotion of export for foreign currency earning, new market development and handling complaints from overseas markets. Responding to trade friction. Taking measures to prevent the rapid appreciation of the Japanese yen. Domestic industry protection through tariffs and regulation of foreign capital activities in the domestic market. Responding to trade and capital liberalization. Economic and technical cooperation with developing countries.
(3) Securing natural resources and energy: Overseas resource development and stable import measures for resources and energy. Resource and energy reserves. Resource and energy saving measures.
(4) Protecting, developing, and activating small and medium-sized enterprises (SMEs): Protecting and nurturing SMEs, improving vitality through modernization (management and technical consulting, human resource development, and financial support for equipment modernization), technological improvement and reform of subcontracting structures, venture support, upgrading of local industries, supporting business development for local SMEs, organizing SMEs, and supporting collaborative activities of SMEs.
(5) Technology policy: Supporting the introduction of foreign technologies. Supporting the development of new technologies (research and development (R&D) subsidies, joint research support, and launch of national R&D projects), industrial standardization, quality control, and patent policy.
(6) Responding to the information society: Development of information

infrastructure and its related human resource development.

3.1.4. Responding to the negative externalities of industrial activities

In many cases, mandatory regulatory measures were taken through the introduction of laws and regulations.

(1) Eliminating unfair business practices including unfair competition restrictions.
(2) Measures to prevent pollution (air pollution, water pollution, and soil pollution) and to maintain comfortable environments (noise prevention and green space maintenance). In recent years, global environmental problems are also included.
(3) Fire and safety measures, occupational health management and dangerous goods management.
(4) Guaranteeing a safe society through consumer protection.
(5) Correcting the excessive concentration of economic functions in one area and regional economic disparities.

3.2. Classification of industrial policies based on implementation measures

Implementation measures of industrial policy can be divided into: (i) establishing legal support systems and regulatory policy with enforcement mechanisms; (ii) administrative guidance policy, which was not enforceable as it was not based on law but was effective for bringing about compliance of the business community; and (iii) vision presentation policy which provided information of policy direction and advice to induce desired actions.

3.2.1. Building legal support systems and regulatory policy with enforcement mechanisms

There were two types of industrial policy laws. One aimed to build support systems and provide support, and the other aimed to regulate corporate behavior.

(1) Supporting laws
Supporting laws stated the objectives of the support, the target groups,

the supporting contents and its process, and how follow-up measures shall be considered. Specific supporting instruments varied from financial and tax support, the establishment of various supporting organizations, various subsidies for business activities, the provision of information, and technical consulting. Target groups were often narrowed down to specific industries and business domains that required support, such as SMEs.

In terms of the supporting process, applications including documents such as business plans were submitted by companies and industrial associations to MITI. After the applications were reviewed and approved by MITI, the instruction was delivered to the executing agencies, who implemented financial and other supports.

(2) Regulatory laws

Regulatory laws defined various rules and regulations on individual corporate behavior to ensure that industrial activities do not impose adverse effects to the society. While supporting policies tended to be the emphasis during the industrial development stage, these regulatory actions were also essential for the sound development of industrial activities.

When companies carried out business, they needed to obtain various permits from the government. These regulations attached obligations on production and investment, such as authorization and fraud monitoring, as well as pollution, safety, and disaster prevention measures. In this case, governmental intervention in business activities was necessary.

3.2.2. Administrative guidance

Governments often requested industrial associations and individual companies to attempt to induce their corporate activities in a particular direction. These requests were not legally binding, hence there was no obligation for the companies to follow them. However, MITI exchanged opinions with the business community about the economic environment and future issues surrounding industries and individual companies on a daily basis. Through these exchanges, the business community was often able to understand the government requests and choose to comply with them.

In addition, public-private dialogues were held to discuss important issues such as large-scale new investment, trade frictions, and so forth. These discussions were attended by MITI, the business community, and academic experts. It served as a forum for determining investment plans and responses to external issues.

3.2.3. Vision presentation policy

The detailed and extensive information, and the results of analysis made by the government were indicated to the business community so that the business community could make management decisions smoothly. This played a crucial role in Japan's industrial policy. In this sense, the type of its industrial policy can be categorized into the policy for indicating the future status of its industrial development. This vision presented by the government showed the basic philosophy and direction of governmental policy, which was important for corporate management and had the effect of inducing action amongst the business community.

In addition to presenting the official vision, MITI exchanged opinions on the actual implementation of policy with the business community, in an effort to increase policy effectiveness.

3.2.4. Other policy measures

In addition to the above-mentioned industrial policies, MITI was directly involved in the implementation of certain industrial policy areas.

(1) R&D programs: Research and development activities based in national research institutes and national universities (Local governments also had their own public research institutions which provided technical guidance and advice for local SMEs, as well as developing new businesses for local economic revitalization). The management of patent law was also carried out by the Patent Office, which was an external agency of MITI.
(2) Trade negotiations and economic cooperation programs: Dispatching MITI officials to the Japanese embassies as commercial attachés, the Japan External Trade Organization (JETRO), and other public organizations to directly obtain overseas information and negotiate various trade issues.
(3) Management of policy enforcement agencies: MITI managed the

operation and activities of various public policy enforcement agencies with jurisdiction over the fields of financial insurance, overseas trade, SMEs, regional development, natural resource development, technology development, and so on.

4. Mechanisms and Characteristics of Postwar Industrial Policy in Japan: From Formulation to Implementation

This section summarizes the mechanisms and characteristics of the formulation and implementation process of Japanese postwar industrial policy.

4.1. Flexible response to changes in political and economic environments: Long-term and daily response

The greatest feature of industrial policy in postwar Japan was its ability to respond flexibly to changes in the country's economic circumstances and in the global political and economic environments. In response to these changes, objectives and instruments were adapted and diversified.

When considering the effective implementation of industrial policy in developing countries, it is necessary to understand the mechanisms behind the planning of such policy and whether they are effective or not. In particular, it is important that policy makers and implementers are able to gather and analyze information and to understand the actual state of industrial development with a sense of responsibility and fairness. Similarly, the business community, which is the target of industrial policies, needs to understand the purpose of the policy and be willing to follow it in order to maintain a relationship of trust with policy makers and implementers.

In 1949, the Ministry of Commerce and Industry and the Trade Agency were combined, and MITI was established as the key agency for industrial policy. Since then, many organizations and institutions have been involved in the process of policy formulation and implementation, working closely with MITI at the center to implement effective policies. The mechanisms and roles of these related organizations will be described below.

4.1.1. How policy planning works

Every ten years, in response to major medium and long-term changes, MITI held open discussions and presented the major policy developments in its industrial policy vision at the Industrial Structure Council. Through the mechanism of the 'New Policy Discussion Meeting,' the policies of that time and the implementation status of each year were reviewed on an annual basis. In this meeting, MITI determined new policies and effective ways to implement current policies, and where necessary, made changes to laws and regulations on policy implementation for the following year. As a result, Japanese industrial policy can be said to have responded constantly and flexibly to the changing environments of the times and to increase its effectiveness. What made this possible was the institutional framework that was developed, with the MITI as its center to: (i) collect and analyze information in collaboration with various organizations related to industrial activity; and (ii) devise and implement effective instruments. MITI staff recognized industrial policy as a temporal policy that requires constant review, and this view was shared with related organizations.

4.1.2. Preparation of bills and submission to the National Diet

In general, to pass a bill, the proposed bill needs to be discussed between relevant ministries. It is then submitted to the Diet.[1] There, the final decision to pass the bill will be made after some deliberation. For the deliberation of bills, it is also important to explain the content to members of the Diet, including opposition members, in advance. In many cases, industrial policy bills are devised by MITI's staff members and then established with the consent of lawmakers (some laws such as a Cabinet Orders or Ministerial Orders do not require a resolution from the Diet). In order to obtain budget approval, the detailed budget statement containing the reasons for budget requests is submitted to the Ministry of Finance; this is then examined, and discussed, before the budget bill is submitted to the Diet for final approval.

4.1.3. Policy implementation and operation

After a policy is formulated, it needs to be effectively put into operation. This was the day-to-day task of MITI (and the current METI), and

[1] The 'Diet' is the name given to the Japanese parliament.

required constant effort to increase its effectiveness. As described above, this happens through the New Policy Discussion Meeting every year.

The roles that MITI played in implementing policy varied and included the operationalization of laws and regulations, licensing activities, implementation of administrative guidance, and provision of various types of support instruments and advice. Implementation mechanisms and executing agencies were diversified, depending on the target industrial sectors, companies, and regions because it was necessary to create a mechanism that was suitable for each target. MITI also needed to establish follow-up systems to ensure that these mechanisms worked properly and displayed sufficient results.

4.2. Mechanisms to enhance policy effectiveness

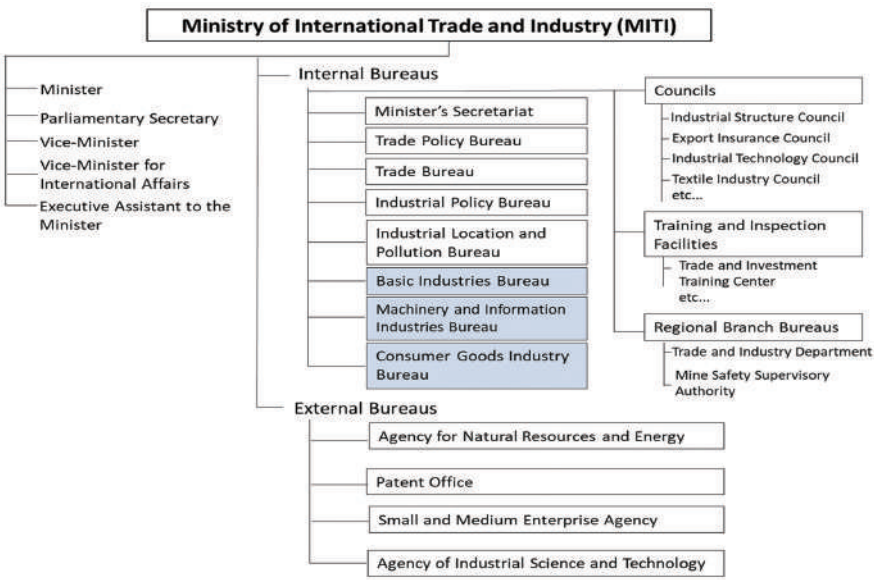
4.2.1. Reorganization of ministries in charge of industrial policy: Horizontal and vertical bureaus of MITI

It is important to consider the institutional structure of the responsible governmental organizations when we consider industrial policy.

Over the years, the ministry responsible for postwar industrial policy has changed its name and organizational structure from the Ministry of Commerce and Industry, to MITI, and then to METI. MITI was established shortly after World War II, by adding the responsibility for international trade issues to the then Ministry of Commerce and Industry. This was probably due to the recognition that international trade issues could not be separated from industrial activities. This system, where one ministry deals with both international trade and industrial issues, has been maintained until today, and is a feature of Japanese industrial policy. Under the reorganization of central government ministries and agencies in 2001, it was determined that MITI's responsibilities should be broader than just international trade and industrial issues, but should also include broad economic issues. Accordingly, the name was changed as stated above.

Another feature of MITI was that its internal organization was composed of both horizontal and vertical bureaus (Figure 4.1). Its vertical bureaus were responsible for implementing sectoral industrial policies such as heavy industry, chemical industry, and light industry, and they maintained a close relationship with each industrial sector in charge. Their views were

exchanged on a daily basis, while MITI strived to understand specific issues in each industrial sector with an attempt to find solutions. On the other hand, its horizontal bureaus were responsible for understanding the latest status of the common framework of all industrial activities, such as economic legal systems, tax systems, international trade issues, local economy, SME issues, and technology development. The bureaus sought to develop and improve the basic supporting system from a holistic perspective. These two types of bureaus, the vertical bureaus and the horizontal bureaus, shared collected information, exchanged views, and discussed what industrial policies should look like. Finally, concepts of new industrial policies were put together by the Ministerial Secretariat Bureau in MITI.



Source: Ministry of International Trade and Industry, 1979.
Note: Internal bureaus: horizontal bureaus are shown in white boxes, vertical bureaus are in grey boxes.

Figure 4.1. Organizational Structure of the Ministry of International Trade and Industry (MITI), as of 1973

The implementation of industrial policy requires an understanding of the actual circumstances of each specific industry, on top of policy planning and establishment of implementation systems. In this sense, the role of the vertical bureaus in MITI was extremely significant. During the

period of rapid economic growth, each industrial policy was formed and implemented with a specific target industry. As such, the coordinating mechanism between vertical and horizontal bureaus functioned highly efficiently. In 2001 MITI was reorganized to METI, and as the organization's strategy for industrial development shifted from the conventional target industry approach, the size of vertical bureaus were significantly reduced. However, it must be worthwhile to reflect on the balanced coexisting structure that was realized by the then vertical and horizontal bureaus, when thinking about future policy planning and implementation process.

4.2.2. Strong desire of government officials to revitalize Japanese industry

It should be noted that each MITI staff member was strongly motivated and proud to be involved in the formulation and implementation process of industrial policy from the period of postwar Japanese industrial recovery to the time of the upgrading of industry. While such feelings were of course related to the historical and social background, it was also a great joy for all of the Japanese people and the business community to be able to contribute to the economic development of Japan. Everyone desired a fast recovery and reconstruction of Japanese industry. There were shared goals between MITI and the business community, and they were working together to achieve these goals.

Furthermore, as a MITI official at that time, it was common to hold informal study group meetings together with business people and academics outside of work hours. These group meetings were the places where they could have various discussions and frank debates. At that time, almost no one considered that such a close relationship with the private sector should be avoided because it may lead to corruption. This was because not only MITI officials but also the industry side felt that such day-to-day exchange of opinions was a very valuable opportunity to study together and to get better solutions for Japanese economic development. I hope that central government officials in developing countries today can think of themselves in the same position as the former MITI, working with pride to implement policies for the development of their own industries.

4.2.3. *Three policy measures (implementation of policy based on laws and regulations, advice through administrative guidance, and presenting a vision) and the business community's trust towards government decisions*

As mentioned in 3.2, three policy measures were used in the implementation of Japan's industrial policy. It should be highlighted here that the business community complied well with the laws and regulations posed by the government, and administrative guidance from MITI was actually made useful when deciding on their management policy. It is said that such positive response by the business community was possible due to their trust towards MITI, not only because MITI is the legal authority, but also because they trusted MITI's decisions. The trust MITI gained from the business community was also based on its high capability on information gathering and analysis, its broad perspectives, and fair judgement.

It is my view that efforts are needed to increase trust in the judgements and decisions of government in developing countries today.

4.2.4. *Multiple organizations in policy implementation: Close coordination between MITI and the host organizations*

Many institutions and organizations are involved in industrial policy making and implementation. In Japan, these institutions and organizations have a close working relationship with the central government and have opportunities to exchange information and to share opinions on a daily basis; this has had a significant effect on improving the effectiveness of Japanese industrial policy.

While licensing and budget allocation pursuant to industrial policy laws and regulations was the responsibility of MITI, much of the practical work was entrusted to MITI's regional bureaus and to local governments. Many public institutions were established for the provision of financial support, overseas market development support, regional economic support, natural resource development, various economic surveys and analysis, and R&D support. In relation to policy targets, there were many industrial associations made up of companies at the national and local levels, which acted as support channels. Here, communication was promoted through the close relationship among the policy-making agency MITI, various policy enforcement agencies, and the industrial associations

and individual companies that were the targets and beneficiaries of these policies. These practices continue up to the present day.

It was also necessary for MITI to discuss industrial activities and to collaborate with other ministries with related influence, such as the Ministry of Finance, the Ministry of Construction, and the Ministry of Transport (currently, the Ministry of Land, Infrastructure, Transport and Tourism), the Ministry of Health and Welfare, the Ministry of Labor (currently, the Ministry of Health, Labor and Welfare), and the National Environmental Agency (currently, Ministry of Environment).

Related agencies, other than the MITI headquarters, that were involved in the implementation of policy include: (i) MITI regional bureaus and local governments; (ii) public agencies responsible for financial support, regional development, and SME promotion; and (iii) industrial associations that served as points of contact for companies that are the targets of policy. Their roles are provided below.

4.2.4.1. MITI regional bureaus and local governments (prefectures and municipalities). The recipients of industrial policies were located all over the country. In order for the central government to grasp the real situation of policy implementation status, it was necessary to establish a local coordination network. The role played by local governments in the operation of regional industrial policy was significant. For example, some tasks, such as licensing and support for individual companies, were delegated to local governments. Local governments also had their own industrial policies, and it was important that information was shared and opinions were coordinated with MITI and its regional bureaus. Moreover, MITI regional bureaus and local governments were the implementing entities of SME support and regional development policy. Regional industrial development was supported by prefectural and municipal testing and research laboratories, chambers of commerce, and industry associations in each region.

4.2.4.2. Public agencies related to industrial policy. Various public agencies were established to support the implementation of industrial policies in the fields of financial support, overseas market development support, natural resource development support, regional development support, SME support, and in practical terms many policies were implemented by these agencies. The following is a list of main

representative agencies in each policy field.[2]

- Financial support: Japan Development Bank, Japan Finance Corporation for Small and Medium Enterprise, and the Export-Import Bank of Japan.
- Trade and economic cooperation promotion: JETRO and the Institute of Developing Economies.
- SME support organizations: The Japan Small Business Corporation and local consulting centers (management advice, consultations, and human resource education).
- Regional development support organizations: Japan Regional Development Corporation (infrastructure development and industrial park construction).
- Natural resources and energy development: The Metal Mining Agency of Japan and the Japan National Oil Corporation.
- Research and development: National research institutions (AIST and Riken), the New Energy and Industrial Technology Development Organization (NEDO), universities, local government testing and research laboratories.

4.2.4.3. Industrial associations in the private sector. Private industrial associations represented both the targets and receivers of industrial policy. They were a focal point on policy implementation and played an indispensable role in effective industrial policy implementation. These industrial associations were composed of both national and regional level associations. The national-level associations included the Keidanren (Japan Business Federation), the Japan Chamber of Commerce and Industry, the National Federation of Small Business Associations, sectoral industrial associations (such as the Iron and Steel Institute of Japan and the Japan Machinery Federation), and research associations in specific fields (such as the Japan Productivity Center). At the local level, we can see prefecture and municipal chambers of commerce and local sectoral industrial and business associations. The total number of these associations are in the thousands. While MITI formulated and implemented industrial policy, it usually did so in coordination with these associations; it developed plans with their input and had the associations share policy details with their member companies and then implemented the policies effectively.

[2] Many organizations were reorganized and integrated in recent years and their names were changed. The old names are used here.

When thinking about industrial policy in Japan, I would like to highlight the importance of these business associations, which contributed to the smooth policy implementation.

Business newspapers also played a unique role in the whole process of industrial policy making in Japan as they were a very important source of information about real industrial activities. In Japan, there are variety of business newspapers that specialize in each specific industry, and they report about detailed interviews they conducted with MITI and the companies on a daily basis. The reports were very detailed and provided valuable information for both policy makers and the businesses community. By reading the newspapers, people in the industries better understood the purposes and background of each policies, while MITI was able to understand the actual responses from the business side.

4.3. Other noteworthy points in relation to the implementation of industrial policy

4.3.1. Emphasis on sectoral industrial policy

One of the major features of industrial policy during Japan's rapid growth period was the rationalization and modernization of the specific industries. In particular, in the move towards the rapid growth period, laws such as the Act on Temporary Measures for the Promotion of the Machinery Industry, the Act on Temporary Measures for the Promotion of the Electronics Industry, and the Small and Medium-sized Enterprise Modernization Promotion Act were established. Under these laws, the detailed rationalization plans were implemented for more than 100 specific industries, which contributed to the modernization of Japan's industries. What made this possible was highly attributable to the role that was played by the vertical bureaus of MITI. With the presence of vertical bureaus, MITI was able to understand the actual activities of each specific industry, and was capable in formulating and implementing effective industrial policies suited to each case. On the other hand, Japanese companies formed business groups by industry, region, or function, and they tended to work together to solve common problems. Therefore, vertical bureaus in MITI was able to respond to the requests from such business groups. At that time, it was thought that gathering the real issues of each industry and considering them as an overall industrial policy from the viewpoint of the horizontal bureaus in MITI, effectively grounded Japanese industrial policy. However, based on the principles of the market economy, the view

since the 1990s has been that sectoral industrial policy may hinder free choice in the market. The sectoral approach, therefore has been weakened since 2001, and the activities of the vertical bureaus of MITI were reduced.

The formulation and implementation of sectoral industrial policies during the rapid growth period was made possible not because of the government's strong leadership, but it owes more to the collaboration between MITI and the individual companies and industrial associations. In other words, the then industrial development was based on the coordination between policy makers, and the receivers of industrial policies. Again, a government's strong will is not enough for industrial policies to succeed. Their success requires to obtain interests from the recipient side.

4.3.2. Responding to negative externalities: Coordination with other ministries and agencies

The goals of industrial policies are not simply to expand production and improve product quality; but rather, they must be based around the idea that industrial development shall contribute to the safety and well-being of the lives of the citizens, and establish friendly international relations. In the case of Japan, its sound and assured industrial activities today were established by the government's efforts in responding to and tackling the various negative externalities induced by industrial development. These negative externalities included issues such as the unfair execution of industrial activities, problems of health and safety for employees, various environmental pollution issues, the global environmental issues, and more around international trade. The various laws and regulations that were laid to tackle those negative externalities were put into effect by ministries other than MITI, and were effectively implemented through coordination among the relevant ministries and agencies.

As an example, let us look at how industrial pollution issues were handled. During the rapid growth period, air and water pollution led to serious health problems such as Yokkaichi Asthma and Minamata disease due to mercury poisoning. While many laws and regulations were enacted around production activities to resolve such problems, at the initial stage, there were oppositions to the introduction of such measures as it would inhibit the development of industrial activities. Nonetheless, pollution control measures were taken in response to the

strong demand from the general public. The business community also came to understand that the acceptance of their doing industrial activities by the local society was more important than anything else. Since then, the business community accepted even stricter regulations and worked on solving those issues by their own initiative. Today, Japan enforces strict environmental regulations to industrial activities, which are well adhered to. This is an outcome of MITI's recognition that industrial activities must be coordinated well within a society. Similarly, the business community enhanced their awareness towards 'corporate social responsibility.'

In any case, solving the social problems caused by economic activities require top-down regulations to be imposed by the government, however, that is not enough. It also requires willingness by each company to comply them. It can be said that Japan was successful in gradually raising this awareness of corporate social responsibility.

Problems of negative externalities occur after industrial development reaches a certain level, and affects the lives of the citizens. Meanwhile, the purpose of industrial policy was not only to expand industrial activities in scale but also to assure safety and sound development of industrial activities with wide acceptance by the society. In this sense, it should be strongly recognized that issues of negative externalities shall be considered as an important issue already from the initial stage of industrial development. This is also a lesson from the Japanese industrial development process.

4.4. Foreign capital investment and domestic industry: seeking a balance

Attracting foreign capital investment as an economic development model is considered the most effective strategy for developing countries today. This not only makes it possible to obtain advanced production and management technologies without paying for them, but also secures sales channels (mainly for export). However, this strategy was not adopted in Japan in the 1950s and 60s. On the contrary, Japanese companies obtained advanced technologies from overseas by paying significant amount of money. These technologies were adapted and internalized, and then improved by the Japanese companies, which later on enhanced their competitiveness in the international market.

In response to calls from overseas for capital liberalization, the Government of Japan prepared a liberalization schedule tailored for each industrial sector. Efforts were made to strengthen the competitiveness of domestic companies in line with the schedule. Protection policies were adopted so as to limit the entry of foreign companies until domestic companies gained competitiveness. However, these protection policies were only temporary. Hence it made it possible to avoid the domestic industry becoming too reliant on the protection policy and the neglect making self-efforts.

As business activities today are becoming globalized, this policy against attracting foreign companies to domestic markets may no longer be suitable. Now, the strategy of promoting economic development through the attraction of foreign companies has strong advantages, and we have to consider the most effective measures for introducing foreign companies into domestic markets in a way that leads to the sound development of the national economy. To select the right strategies wisely, we should make efforts to understand the business strategies of foreign companies in the developing countries.

5. Issues for Consideration in Implementing Industrial Policy in Developing Countries Today: Based on the Japanese Experience

From postwar reconstruction to rapid growth period, Japanese industry was upgraded continuously. The economic and social environment surrounding Japan at the time was significantly different from the situation in developing countries today. This section sheds light on the Japanese experience, which may be useful for developing countries today when designing and implementing industrial policy.

5.1. The meaning of industrial policy in the market economy: The relationship between protection and competition policy, and development support and regulation of the negative externalities

Today, industrial policy should be designed in line with the market economy and the economic globalization regime. That being said, in the case of developing countries, protection measures for domestic industries including direct support from the government, are sometimes allowed. In

contrast, when Japan succeeded in developing and strengthening domestic industries, it implemented trade and capital liberalization progressively, and raised the competitiveness of domestic industries. Then, gradually, the government reduced its direct involvement in industrial activity. As part of this process, protection policy and industrial adjustment policy, which would limit competition among companies in the domestic market, were also adopted; however, these were temporary and limited in time. The final target was to encourage domestic companies to make efforts to expand their business and to eventually make them competitive in domestic and international markets. To this end, the government presented to the industry clear targets and deadlines for their efforts and provided support for achieving these goals, through coordination between the public and private sectors.

One of the goals of industrial policy today is to maintain a competitive environment in the market, and ultimately, to let private companies operate without the support of the government. Industrial protection and support measures could raise the dependency of private companies on government. Therefore, when protection and support measures for private companies are to be implemented, those measures should be temporal and encourage companies to make efforts to become independent from government support.

On the other hand, it is necessary to strictly handle the negative externalities of industrial activities. One of the most important issues in industrial policy is the nurturing of industrial activities supported by citizens. To this end, the proper organization of government agencies and awareness raising among their staff members against those issues is critical. Regulations need to be applied strictly and fairly, and a monitoring system should be installed. Significant efforts must be made for the coexistence and healthy relationship between the industry and the local communities. In addition, the companies could engage in organizing business communities locally, and raise their awareness of social responsibility towards each other.

5.2. Industrial policy after Japan's catch-up: What is the true meaning of 'catch-up'?

During the 'catching-up period,' the goals of industrial policies were clear, and it was easy to build close coordination between policy makers and the business community to achieve these goals. However, when the catch-up

period was over and the Japanese economy had developed sufficiently around the early 1990s, the two parties began to act independently. At that point, policy goals were diversified, and it was difficult to set common goals that all relevant parties could agree on. Moreover, as the power of private companies increased, they no longer favored government intervention and placed greater emphasis on their independent activities. The role of the government then changed to being a complementary one.

Looking at the current stage of developing countries, their production capacities in some industrial sectors already seem to have reached the level of the global players. However, further examination is needed to judge whether the catch-up stage really ended. Today, the transfer of production functions is easier than in the past. This is an era in which production technologies have been digitalized and the essence of technologies is embodied in mechanical equipment so that top-class products can be produced easily anywhere by importing advanced automatic machinery and key parts. Yet we need to understand that the essence of technology has now become a form of 'black box' and that the actual transfer of the essence of technology is becoming difficult.

Technology is constantly evolving and being upgraded. For businesses to maintain their competitiveness, they must understand the real essence of the introduced technology by doing their own research and development, and continue to improve their own technologies. Although it is sufficient to start with the transfer of production functions, afterwards, there is a need for policy support aimed at understanding the essence of the production technology and promoting self-sufficient development.

5.3. Direction of industrial policy amidst great changes to the economic environment: The need for new industrial policy vision

Today, the global economic environment is in a period of great change. The progress of globalization of supply chains is leading to an international horizontal division of labor that does not solely rely on domestic supply chains, such as mechanical parts and basic material producers. Developed countries are outsourcing manufacturing functions to developing countries and focusing on R&D and market development without factories in their home country. The fabless manufacturing system is becoming popular in developed countries. Furthermore, the advent of the Fourth Industrial

Revolution is proclaimed, and a completely different form of industry could appear in the near future. Under such circumstances, it is necessary to create an approach for fostering industry that is suitable for the new era. This approach will be different from that of which Japan applied in its developing stage.

Thus, new concepts, styles, and instruments are needed with an understanding of the changes of industrial activities, positions of domestic industries in the global economy, and how this will evolve. Above all, it is necessary for governments to examine and present medium- and long-term industrial visions. Next, more specific instruments must be devised under an implementation setting in the direction indicated by the vision. Agencies responsible for industrial policy need to build a broader information network that includes private business circles. The network should be used as a means to analyze various information and opinions, and to then propose specific policies and instruments. In doing so, government officials need to improve their capabilities for information gathering and analysis, as well as exercising fair judgement, and to take responsibility for the industrial development of the nation. Talented staff are needed to create such organizations, and above all, the work of the governmental agencies needs to be respected by the citizens.

5.4. Who takes role of industrial activities? Diverse approaches to industrial policymaking depending on industrial actors

This section reviews the various actors engaged in industrial activities. Broadly speaking, there are two types of actors: domestic companies and foreign companies. Domestic companies can be divided into state-owned enterprises (SOEs) and private-owned enterprises. Furthermore, private-owned enterprises could be categorized by scale, ranging from large companies, small- and medium-enterprises (SMEs), to micro-enterprises. It must be taken into consideration that industrial policy objectives and approaches differ depending on their scale. For example, the degree of dependency to the national government differs between large companies and SMEs. The role that local governments play also differs. Depending on the scale of the subject company, its impact towards the industry differs as well. Policy makers shall change the contents and approaches of industrial policies depending on who they aim to reach out, as there are diverse types of industrial actors.

5.4.1. State-owned enterprises and large companies

In developing countries, it is often the case that SOEs are established for the purpose of nurturing key industries, since private enterprises are not fully established yet. Post-war Japan was in the same situation. Railroad companies, communications, airlines, and petrochemical companies all experienced some degree of nationalization in those days, but today, they are all privatized.

SOEs generally operate under the generous protection of the government; this often makes their management less disciplined and prevents them from growing into internationally competitive enterprises. Therefore, SOEs should operate their business with future privatization in mind.

Private companies include large companies, and some of them have developed into conglomerate groups. Particularly in developing countries, large companies have strong influence towards the government, and there are cases where this influence is improperly used. As such, a framework to monitor impropriety is therefore necessary. In the case of large companies, they may easily obtain a monopoly position, protected from competitors in the domestic market. However, we should not expect them to remain in the domestic market, but to compete in the international market.

5.4.2. Importance of SME policy

SMEs are engaged in a wide range of economic activities in every country. Accordingly, SME policies are one of the most important elements of industrial policy in developing countries. The modernization and healthy development of SMEs are essential for the activation and smooth development of the economy. This means the promotion of SMEs are essential. The business activities of SMEs are often limited to a narrow geographical area. Thus, possible policy measures need to be taken at the local level, not at the national level. Also, to implement effective SME policy in developing countries, close coordination with local governments and communities is considered necessary.

In the case of developing countries, many SMEs emerge along with economic development; but their business operation is often unstable due to lack of sufficient financial, managerial, and technological ability. Therefore, there is a need for the public sector to establish business

development support function, in order to organize these SMEs and provide management consulting and various advices to SMEs.

5.4.3. Role of foreign companies

In the current era of economic globalization, one of the goals of industrial policy in developing countries is to attract foreign investment and entice them to engage in business in the domestic market in order to boost the economy.

Here, a question is often raised to what degree the activity by foreign companies contributes to the development of the nation's economy. Many countries hope foreign investment will advance their industries and research functions. Although many of them prepare various incentives to attract foreign investment, even if investment is obtained, there is a possibility that distorted industrial structure can emerge, where for example all raw materials are imported and parts suppliers are left undeveloped. Today, there is severe competition among developing countries around how to attract foreign investment. Foreign investors, therefore, have the advantage to choose the location where they plan to construct their manufacturing sites. In these circumstances, it is necessary to strategically consider how to attract, retain, and further develop the activities of foreign companies by enhancing the attractiveness of the country. For this purpose, it is necessary to have a full understanding of the business strategies of the targeted foreign companies and to develop a plan to attract them and meet their expectations.

In addition, it is necessary to consider the fact that the impact of foreign investment on the industrial development in developing countries is not limited to the transfer of production activities but to their role as a buyer of domestic goods. As buyers, foreign companies seek various conditions, not only cheap prices, good quality, and safety, but also sound production and transportation methods, and suitable delivery times. Domestic suppliers need to be able to respond to these conditions appropriately. Various efforts should be made to meet the strict requirements of foreign buyers and to increase the competitiveness of domestic companies in the international market. Encouraging and supporting such efforts by the domestic companies should be considered an important element of industrial policy.

5.5. Need for sectoral industrial policies and organization of sectoral industries

In postwar Japan, the government adopted supporting instruments tailored to each specific industry based on the sectoral industrial policies, which resulted in a number of achievements. The applicability of such sectoral industrial policy to developing countries should be worth considering. Considering diversity of industries in a country and their specific characteristics, the importance of taking a sectoral industrial policy approach is evident. It is critical for policy makers to be able to identify the target industry and understand well its characteristics in order to provide effective sectoral industrial policies.

In a market-based economy, some argue that it is not appropriate for governments to engage in resource allocation in favor of specific industries. However, it should be emphasized that sectoral approach is an important policy method for the effective promotion of industrial development in developing countries. In the case of Japan, there was a system in which various industrial associations were organized. Under this system, the critical issues of each sectoral industry were recognized fully and suitable policy for solving each of them was considered. However, presently, many developing countries do not always have such active industrial associations, where the member companies and outside advisors can freely discuss common issues. When industrial policies are enacted, it is often the case that there are no organizations tasked with inviting the member companies and cooperating with the governments on the matters of implementation. It is important for governments in developing countries to take full responsibility for planning and implementing policies for the development of specific industries while seeking collaboration from universities, research institutions, international organizations, and foreign consulting companies in order to collect and analyze information about specific industries. Accordingly, the organization of industrial associations is key, and it is the task for governments to establish a space for information sharing and for exchange of opinions among policy makers and the industrial associations with their member companies.

5.6. Effective implementation of industrial policy: Increasing sympathy for policy objectives and trust to government by building collaborative relationships with the beneficiaries of policies

Most Japanese industrial policies have been implemented through rules and regulations or strong administrative guidance backed by government authority and trust. I have already mentioned that at each stage of policy formulation and implementation, MITI organized specific forums to facilitate the exchange of views and discussions between the government, academics, and the business community. This coordination mechanism made the effective implementation of policies possible.

In developing countries today, it will be necessary to build a coordination mechanism between the public and business community as seen in Japan, to ensure effective formulation and implementation of industrial policy. Above all, I would like to emphasize the importance of maintaining a relationship of trust and coordination between the government that creates and implements industrial policy and the business community whose members are the targets and beneficiaries of the policy. I would also like to mention the importance of constructing a mechanism for shared awareness of critical issues to solve problems faced by industries.

5.6.1. Ideal administrative organizations: Responsibility as a professional organization with thorough understanding of the industries

Japanese administrative agencies were originally professional organizations consisting of experts engaged in policy making and implementation. They maintained a neutral and fair position in relation to politics, while proposing new policies to the government and gaining consent to implement the policies.

Building on this neutrality and fairness, government officials in charge of the industrial policy need to be highly motivated to be engaged in the policy formulation and implementation. Accordingly, they should make efforts to increase their capabilities to do so effectively and in order to gain the trust from the business sector. More specifically, it is required for them to work to understand the actual circumstances of the business sector so as to make accurate decisions in policy planning and implementation

as professional organizations. Staff members are required to take responsibility and pride in their work. Because of their professional status, they would be reminded of the importance of the organization's high expertise by maintaining neutrality from political pressures and fairness as much as possible. Finally, administrative agencies, including local governmental organizations and public institutions, need to change its organizational structure where necessary.

5.6.2. Generating trust towards the government: Opportunities for information and opinion exchange on a daily basis

During the rapid growth period in Japan, trust and dependence towards the government from the business community was high. This was because the government (particularly MITI) received an outstanding amount of information from their rich information networks. Moreover, because of the relevance and fairness of the government's judgement and decisions, the business community had high trust towards the government's decisions and also high expectation to its leadership. Additionally, the management capabilities of companies were still weak, hence they were more dependent on the government. There were many opportunities for the day-to-day exchange of information with an atmosphere where dissent could be expressed. In this way, the business community felt more security and respect towards the policies determined by the government.

Based on the discussion above, it can be said that governments in developing countries today need to have an advantage over private companies in collecting domestic and overseas information. Given the superior position of governments, if they make efforts to develop industrial policy with serious and fair attitude, it is possible to gain deep trust and positive expectations towards its leadership from the business community in their countries. It is anticipated that such expectations from both the private and business community will increase the motivation of staff in the central government agencies to get involved in the planning and implementation of industrial policy. As experts on industrial policy, central government officials should work hard and be proud of their efforts to propose and implement the best policies for the people and the nation.

6. Sectoral Industrial Policy Case Studies: Public-Private Coordination as Industrial Policy[3]

This section provides an overview of specific examples of sectoral industrial policy from the 1960s to the 1980s, which was the highlight period of industrial policy in Japan. The following two cases are discussed: (i) the legal system and actual implementation under the Act on Temporary Measures for the Promotion of the Machinery Industry; and (ii) the development process and industrial policies of the petrochemical industry. The petrochemical industry was expected to become one of the most rapid-growing industries in the postwar period by importing foreign technologies. These case studies provide concrete examples of how industrial policy has affected specific industries, and show the importance of coordination between the government and the business community. When looking at Japan's industrial policy up to the 1980s, it is important to highlight the coordination efforts of both the public sector and the business community, in which they shared their awareness of key issues for industrial development through active discussion.

6.1. Case study 1: Process from enforcement to implementation of the sectoral industry promotion law 'Kishinhō'[4]

To understand the actual state of industrial policy formulation and implementation in Japan, it is helpful to look at specific examples of industrial policy implementation. By trying to understand the relationship between the government and companies that were subject to this policy, it is possible to better understand the characteristics of industrial policy implementation in Japan. The Act on Temporary Measures for the Promotion of the Machinery Industry (*Kishinhō*) played a significant role in the modernization, rationalization and steady development of many key industries in Japan in the 1960s. Therefore, using the *Kishinhō* as an example, the following section examines the drafting of the law, the content of its support instruments, the approach used to implement it, and the collaborative relationship between the enforcement entity of the *Kishinhō*, the government, the private companies that were subject to this policy, and the various organizations involved in the process.

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3 This section is based on the information contained in MITI (1979).

4 This section is based on Tsuruoka (2004).

After the World War II, rebuilding the key industries was the most important issue for the reconstruction of the Japanese economy. Much of the machinery and equipment were destroyed, and what remained were deteriorating. Therefore, the aim of *the Kishinhō* was to modernize and rationalize the industry through the renewal of machinery and equipment, and introduce new production technologies and management methods from the advanced Western countries. Policies were introduced for this purpose, including the enforcement of many laws and regulations (Matsushima 2004).

The rationalization policies introduced during this period of reconstruction are shown in the chronological table below.

Key Rationalization Policies and Commencement of Implementation

Jun 1949	Industrial Standardization Act revised (establishment of the JIS system).
Sep 1949	Industrial Rationalization Council established.
Apr 1950	Establishment of R&D subsidy system for development of mining and manufacturing industrial technology (supporting R&D by private companies).
May 1950	Foreign Capital Act enacted (activating the introduction of foreign technology).
Aug 1950	Rationalization plan of the coal and steel industries (supporting investment for modernization. Approved for implementation from the following year).
Feb 1951	Export-Import Bank of Japan established.
Apr 1951	Japan Development Bank established (providing loans for investment for modernization and rationalization).
Apr 1951	Customs Tariff Act revised (reducing and exempting import duties for key machinery).
Aug 1951	Act on Special Measures Concerning Taxation revised (reducing and exempting taxes for investments for rationalization).
Mar 1952	Enterprise Rationalization Promotion Act enacted (specifying industries and formulating rationalization plans and implementation support).
Mar 1955	Japan Productivity Center established (dispatching many study visits to the West, promoting the concepts of productivity improvements and quality control).
Jun 1956	Act on Temporary Measures for the Promotion of the

Machine Industry *(Kishinhō*).

Jun 1957 Act on Temporary Measures for the Promotion of the Electrical Industry (promoting the modernization of various industries and parts producers).

Amidst this process, *the Kishinhō* was formulated in 1956 for the purpose of modernizing the machinery industry (a key industry) in Japan. This Act was enacted with a 5-year time limit, which was extended twice before it was combined with the Electrical Industry Promotion Act in 1971 and became the Act on Temporary Measures for the Promotion of Specified Electrical and Machinery Industries. Promotion of the industry continued in 1978 with the Act on Temporary Measures for the Promotion of Specified Machinery and Information Industries, which continued until 1985. This is a typical example of sectoral industrial policy.

6.1.1. Preparation of the Kishinhō, deliberation of the bill, passage through the Diet

According to the Heavy Industries Bureau within MITI, at the start of the 1950s, the domestic machinery industry was technologically behind compared to Western countries; equipment and machinery were aging, and the industry was seen as significantly inferior to Western countries in terms of competitiveness. MITI strongly believed that there was a need for the urgent modernization of the machinery industry, which was such a key industry.

The 'Industrial Rationalization Council' (later renamed the 'Industrial Structure Council') was established by MITI in 1949. In 1951, the Council issued a report on 'Rationalization Measures of the Japanese Industry,' which was viewed as the first measure to be implemented in the promotion of the modernization of industrial machinery and equipment. Based on the response to this report, MITI began a full-scale consideration of measures to rationalize the machinery industry and commissioned the Japan Machinery Federation to conduct a fact-finding survey of the machinery industries in Europe and the US from 1954 to 1955. The survey items included (i) labor productivity; (ii) unit required amount and material yield; (iii) production structures; (iv) market research; (v) high quality materials such as special steel, for advanced machineries; and (vi) the relationship between assembly and parts manufacturers in the global machinery industry. Surveys were conducted in relation to these

items in various sectors in the machinery industry. Based on the results of these basic surveys, the concepts for the establishment of the 'Machinery Industry Promotion Agency' were finalized. The concept behind this Agency was that it would purchase the latest foreign machinery and equipment and lend them out to companies with preferential loan conditions. It was hoped that this would bolster the modernization of companies and preparations were made to submit this concept to the Diet. However, opposition to the establishment of an Agency led to the idea being abandoned without its deliberation in the Diet. MITI was then forced to hastily consider another measure for the rationalization of the machinery industry, eventually drafting the Act on Temporary Measures for the Promotion of the Machinery Industry. This concept was also discussed within the Machinery Subcommittee of the Industrial Rationalization Council, and their opinions were also incorporated into the design. A bill was submitted to the Diet in early 1956 and was successfully passed in May of the same year.

The formulation of this bill and the deliberations within the Diet were conducted in close coordination with industrial associations who provided their feedback. Within MITI, the matter was overseen by the Heavy Industries Bureau. The machinery industry policy work was shared and implemented by a system of ten different Divisions and one Office within the same Bureau, namely, the Heavy Industries Division, the Heavy Industries Export Division, the Steel Business Division, the Steelmaking Division, the Industrial Machinery Division, the Casting and Forging Division, the Telecommunications Division, the Automobile Division, the Measurement Division, the Weapons and Aircraft Division, and the Office of Vehicle Management.

There was also a system to ensure these divisions had meaningful contact with the industries that they were responsible for, exchanging opinions and sharing awareness of issues facing the industry on a daily basis. This was the reality of the vertical bureau of the MITI organization, within which legislation was prepared.

The preparatory process for new industrial policy began with gathering and analyzing plentiful information, from a wide range of sources. These sources often included public institutions (for example, the Japan Development Bank, JETRO, the Plant Association, SMEs, universities, national laboratories, and public testing laboratories), industrial

associations, private companies, industry newspapers, and research institutions. Overseas information came from an extensive range of sources including the overseas offices of the Export-Import Bank, JETRO and the Plant Association, as well as from the commercial attaché seconded from MITI to Japanese Embassies and direct information from foreign governments.

6.1.2. Content of the Kishinhō

The content of the Act is as follows.

(1) Purpose: The modernization of equipment in the machinery industry, the improvement of efficiency, the promotion of improved production technologies, and the comprehensive promotion of the machinery industry contributing to the sound development of the national economy.
(2) Target Industries for Rationalization: The *Kishinhō* was a system that provided support for targeted individual machinery industry sectors, making rationalization plans for each industry sector and providing individualized rationalization support.

The target industries were specific industry sectors that met the following conditions: they had machinery that required particular performance or quality improvements and they had a need to reduce production costs. These could be roughly divided into three categories:

- Key Machinery: Machine tools, electric welders, power tools, general tools, moulds, measuring machinery, testing machinery, forging machinery, gas cutting machinery, hydraulic machinery, and pneumatic machinery.
- Common Parts: High strength cast iron, die casting, powder metallurgy, screws, bearing, gears, and valves.
- Specified Parts: Sewing machine parts, watch parts, automobile parts, railroad vehicle parts, telecommunications equipment parts, and binocular parts.

At the time the Act came into force, 18 specific industrial sectors had been targeted. This number later increased to 48 specific industrial sectors.

(3) Rationalization Implementation Process: MITI first formulated 'Basic Rationalization Plans' for all targeted industries. The industries specified by government ordinance then formulated rationalization implementation plans based on these basic plans and submitted them to the division in charge at MITI. The responsible division then reviewed the submitted rationalization plans, and with the approval of MITI, moved to implement them as implementation plans.

6.1.3. Formulation of Basic Rationalization Plan and Implementation Plan

As stated above, after the passage of the Act, the targets for support were designated as target industries by government ordinance. MITI then formulated a 'Basic Rationalization Plan' for the general promotion of the machinery industry based on discussions within the Industrial Rationalization Council. Then, Rationalization Implementation Plans were formulated based on the Basic Rationalization Plan and implemented for each target industry. These Implementation Plans were formulated based on discussions between industrial associations for each industry and the division in charge at MITI, and were then submitted to MITI for examination.

The Basic Rationalization Plan described the contents that needed to be included in the Implementation Plans. The contents were as follows: (i) model performance; quality, and production through rationalization in the targeted industry; (ii) new types of machinery and equipment to be newly installed with associated costs; (iii) disposal of aged machinery and facilities; and (iv) other matters such as technical improvements, establishment of production systems, and the unification of standards and specifications.

Implementation Plans set out the concrete instruments to be used by an industry in line with the Basic Rationalization Plan. These plans were developed by industrial associations and then submitted to MITI where they were examined by the Division in charge of the Heavy Industries Bureau. They were then implemented with the approval of the Minister and specific support measures were provided.

Under the *Kishinhō*, the template for support was basically the same across the target industries. However, the types of key machinery and equipment

and the quantities that needed to be purchased varied depending on each industry. In some cases, the rationalization was attempted through joint ventures between multiple SMEs. Also, each industry-specific condition was reflected.

Implementation Plans were formulated and examined on an annual basis. The plans were then updated based on the progress made each year. In formulating the Implementation Plans, it was necessary to understand the actual condition of the industry (also requiring detailed domestic statistical data). Where the aim was to catch up with the levels in more advanced countries, the target SMEs were also requested to conduct a detailed comparative analysis to identify any gap between domestic products and overseas competitors in terms of quality, price, and ease of use. In those cases, efforts were also made to jointly import sought-after technologically advanced machinery from overseas, to disassemble it, analyze the materials used for individual parts, the performance, and the quality, and then reproduce it (reverse engineering) to establish accurate targets. Naturally, this analytical information was shared with companies within the industry. Under the *Kishinhō*, it can be said that the goals of the Implementation Plan were given to all the companies in the industry, and the work of rationalization was a collaborative effort. Loans and subsidies were provided for such collaborative survey and research work.

The work of formulating Implementation Plans was undertaken by industrial associations, but in the process, discussions were also held with the MITI Bureau and the divisions in charge; the work could therefore be considered as a collaborative undertaking. In the process of formulating Implementation Plans, detailed information about the industry that could not be learned from official statistics was collected and analyzed to confirm the existence of specific issues in the industry. These analyses resulted in a more accurate understanding of the issues facing the industry and had the side effect of improving the management capabilities of individual companies. By participating in the creation of Rationalization Implementation Plans in accordance with this law, the exchange of information and cooperation within industries was enhanced, a willingness to rationalize and a sense of crisis was shared, and individual member companies showed increased enthusiasm for the implementation of the Rationalization Plan.

6.1.4. Implementation of Rationalization Implementation Plans

Rationalization Implementation Plans were formulated and implemented every year. The content of the plans included quality improvements, the introduction of fine processing machinery, productivity improvements, work environment improvements, and sales and overseas market strategies. Although the key issues in each industry differed, if the Implementation Plan was approved, policy support was provided for its implementation.

Implementation Plans were submitted to MITI and examined by the bureaus (or divisions) in charge, before being approved. Applications could also be made to MITI after pre-screening within the relevant industrial association, which highlighted the importance of the role of industrial associations. The status of MITI examinations was often featured in trade papers, and information was shared with many stakeholders.

Implementation content varied, and the support was provided not only to individual companies but also joint ventures as already stated. In addition to the import, disassembly, and analysis of advanced machinery and equipment from other countries mentioned above, processing machinery and inspection equipment were introduced and also joint production and inspection centers were established for the manufacturing of shared high-performance products and performance inspections. The criteria were standardized. Additionally, the use of machinery was shared, joint pollution control facilities were created, and quality standards were standardized.

The role of industrial associations was important in the implementation of plans, and key guidance was also provided by support organizations such as the Japan Development Bank, the Finance Corporation for Small and Medium Enterprise, and public inspection laboratories. In addition, as SMEs were often the main target, local governments frequently became the main entities for policy implementation.

6.1.5. Specific support content

The primary focus of support efforts set out in the *Kishinhō* was preferential loans from the Japan Development Bank to be used for investment in the latest machinery and equipment. This support aimed to promote

the modernization of the industry. In addition to the financial support, various non-financial support was available during the formulation and implementation stages of the Implementation Plans. The following summarizes the supporting measures provided under the Act:

- Investment promotion and tax incentives: Special depreciation, income tax reduction, and low interest loans for fixed asset tax reduction (Japan Development Bank, and the Finance Corporation for Small and Medium Enterprise) and deferred payment. Joint investment (stock acquisition).
- Import/export related: Protective tariffs (increasing tariffs on competing imports), foreign currency allocation, import restrictions, or import licenses.
- Grants for various surveys and overseas visits: Subsidies and survey support.
- Technology development support: Subsidies, technical guidance, and support for launching joint research.
- Provision of information, various advice and guidance: Opportunities for daily contacts among industrial associations, businesses, and government agencies, engaging in appropriate discussions and the exchange of opinions.

6.1.6. Follow-up on implementation status

When policies are implemented, follow-ups are required. This involved responsible MITI bureaus making efforts to understand the status and impact of implemented policies, including on-site surveys. In particular, policies that were stipulated by law needed to be monitored for their effectiveness. Moreover, in examining the Implementation Plans for the next year, an evaluation was made of the implementation status of the previous year's plans. Here again, industrial associations played a significant role as implementing entities. Information was constantly collected through collaboration among MITI, local governments, and many other organizations related to policy implementation, and measures were taken for further improvements.

The above is an overview of the process of Japanese industrial policymaking and implementation, as well as the process of evaluating the results of implementation, based on the example of the *Kishinhō*. There were strong public-private partnership in the process of the drafting of

the law, implementation, and follow-up. In this sense, the process of industrial policymaking was not a government-led initiative, but a joint work between the government and the companies that were the subjects of the policy. This has been a major feature of industrial policy in Japan.

6.2. Case study 2: Petrochemical industry - Example of fostering and developing new industries through the introduction of technologies and the technology transfer process in Japan[5]

The petrochemical industry is a key material industry that supplies polymer products such as synthetic resin, synthetic fiber, and many basic chemical products by using petroleum as the new raw material. The development of high molecular technologies progressed in the US before and during the World War II, and synthetic resins, synthetic fibers and synthetic rubber were mass-produced as a substitute for natural products.

Japan was at the forefront of polymer research before and during the war. Acetylene chemistry was already well established before the war, and acetic acid, vinyl acetate and vinyl chloride were produced. However, coal was used as the raw material. The postwar reconstruction of Japan's organic chemical industry began with so-called coal chemicals such as carbide acetylene, while the US was converting to mass-produced petrochemical processing using petroleum and natural gas as raw materials for high-performance polymer products such as polyethylene and nylon. At that time, Japan relied on coal for its organic chemical products; but the trend around the world was shifting to oil. The Japanese government and chemical industry were aware of the structure of the Japanese chemical industry and the risks of technological delays. They felt that it was necessary to immediately establish a petrochemical technology system for the transition from coal chemistry to petro chemistry.

6.2.1. Start of Phase 1 Plan: Decision on petrochemical promotion measures and establishment of a business plan examination and approval system

In February 1955, MITI established the Petrochemical Technology Council to discuss 'the industrialization of petrochemical technologies' with the participation of representatives from the public sector and

[5] This section is based on Japan Petrochemical Industry Association (2008).

business community. During this discussion, it became clear that if Japan wanted to commercialize petrochemicals at that time, they had no choice but to rely on the introduction of technology from overseas for almost all areas. Foreign currency was precious at this time and was strictly managed under the Foreign Capital Act to ensure its effective use. A foreign currency usage permit system, which required an examination of the purpose of use and its expected positive impact on the Japanese economy, was put in place to regulate consent. MITI used this mechanism to examine the petrochemical commercialization plans of each company, and considered adjustments to the content of each plan with reference to the overall demand and supply balance. This was a framework that enabled the government to exercise influence on petrochemical plans as private companies attempted to move forward, without the need for any special laws targeting petrochemicals.

In July 1955, MITI determined the 'measures for nurturing the petrochemical industry' at the ministerial level. These measures set out the goals of petrochemical development as being: (i) securing the domestic production of synthetic resins such as polyphenol resin and synthetic fibers such as nylon, and securing petroleum as raw input; (ii) the domestic production of import-dependent ethylene-based products; and (iii) realizing the reduction of product prices and supporting the sophistication of industrial structures, and gaining international competitiveness of the chemical industry and related industries. From the beginning, the aim was not to protect domestic industries with measures such as import restrictions, but for companies to manufacture petrochemical products that could compete with those of overseas. Support policies included investment coordination, preferential treatment for companies that were able to commercialize, and the development of the business environment.

Investment coordination involved the setting of investment standards with the expectation of demand. With this purpose in mind, it was decided that a technology introduction permit system should be introduced under the Foreign Capital Act as a way of examining the investment plans of each company. Preferential treatment given to companies included loan facilitation from the Japan Development Bank. It was thought that the improvement of business environments needed to involve the low-price sale of state-owned land (former arsenals). In this case, while the petrochemical industry was not a target industry of the *Kishinhō*, it was targeted based on administrative guidance. Appropriate measures

were mobilized from the menu of existing general policies for industrial promotion.

In response to the determination of the 'nurturing measures' mentioned above, many companies decided to enter the petrochemical industry. By September 1956, investment plans by fourteen companies including the four ethylene centers, had been permitted under the Foreign Capital Act. Accordingly, these companies were permitted to use foreign currency to introduce technology and import machinery and equipment.

Prior to the introduction of various forms of technology to be used in the chemical plants owned by those companies, an examination was made by the division in charge at the Chemical Industry Bureau, and the results of this were submitted to the Foreign Investment Council for final permission. I personally worked within the Chemical Industry Bureau at MITI and was responsible for the examination of proposals for technology introduction. This was a rewarding work for me that involved obtaining details from the companies about their reasons for submitting the proposal. The hearings included asking the background to the technology introduction, the reasons for choosing that form of technology, the content and superior aspects of the technology to be introduced, the anticipated economic impact of its introduction, and any conditions that needed to be addressed at the time of introduction. Additionally, all production plans, the amount of investment and source of funds, and the demand forecasts and sales plans for products to be produced needed to be examined. Other reference information was also obtained to make a final decision, and we were working together with the companies to help make these major projects successful. I think that at the time, many of the MITI officials worked with this kind of spirit. By examining the technology introduction plans of many different companies, I was able to compare each one and learned a great deal about the latest developments in the global petrochemical industry. It can be said that MITI at that time provided many educational opportunities for its personnel.

The first ethylene center started its operation in March 1958, and this was the birth of the petrochemical industry in Japan. By today's standards, this center was very small with a production capacity of only 20,000 tons per year. The first phase up to 1960, proceeded smoothly and gave rise to the Japan Petrochemical Industry Association. Petrochemical operators formed a Petrochemical Industry Roundtable Conference in 1957, which

became the Japan Petrochemical Industry Association in June 1958. This association played an important role in the subsequent formulation and implementation of policy for the petrochemical industry.

6.2.2. Phase 2 Plan

Phase 2 began in 1960. By then the Japanese economy had entered a period of rapid economic growth. With the announcement of many new expansion plans, investment coordination was necessary.

In 1960, MITI announced the 'Current Processing of Petrochemical Commercialization Plans.' This set out policy for the expansion and strengthening of Phase 1 plans as well as the promotion of raw material supply for the transition of the raw materials for existing chemicals (from coal to oil). It also signaled the start of the Phase 2 Plan for the petrochemical industry. With the Japanese economy booming, many companies were trying to enter the market in the new growth field of petrochemicals, and additional five ethylene centers were approved. In total, nine centers were established, and it commenced its operation between 1962 and 1964. The scale of these businesses was larger than that of the Phase 1 Plan.

6.2.2.1. New approach to investment coordination. Establishment of the Petrochemical Coordination Roundtable Meeting. As the petrochemical industry continued to grow, there were constant movements for further expansion of businesses in this sector. Under these circumstances, MITI and the petrochemical industry saw the need to coordinate investment plans, as they did in the past. However, with the move towards the liberalization of capital, there were questions over how long the Foreign Capital Act could be used for permitting the introduction of technology.

Incidentally, in 1961 MITI announced the 'Bill on Temporary Measures for the Promotion of Designated Industries.' This was an instrument in preparation for trade liberalization, specifying designated industries in which operators would receive special benefits in order to enhance their international competitiveness. This also included a policy for the coordination of investment and production plans through public-private partnership. Under this Act, the petrochemical industry was specified as the designated industry, and investment coordination was viewed in the same way as in the past. However, there were debates about whether this coordination should be through public-private partnership or through

coordination within private businesses. The Act was submitted to the Diet three times between 1963 and 1964, but was eventually abandoned without discussion. The MITI Chemical Industry Bureau that had performed investment coordination for new petrochemical expansion using the Foreign Capital Act believed that it was necessary to maintain a mechanism for investment coordination, even if not based on the Act. At the end of 1964, the Petrochemical Coordination Roundtable Meeting was launched as a body for public-private partnership. This roundtable meeting consisted of MITI (Chemical Industry Bureau), the business sector, and academics and functioned as a *de facto* authorized body to examine the investment plans of each company.

6.2.2.2. Issues emerged from the rapid development of the petrochemical industry and the government's response. The petrochemical industry made great progress during the 1960s, but there were issues that arose in the process such as the increasing seriousness of environmental pollution, security, and shortage of location area for new ethylene centers. In the late 1960s, environmental pollution issues were becoming more serious at ethylene centers around Japan. The government established various laws and regulations to prevent pollution and protect the environment. Companies were forced to invest a significant amount in pollution control and were somehow able to comply with the law. These regulatory standards have been revised and strengthened many times, gradually improving the environment. In the process, there were severe conflicts between companies and local residents. Thanks to strong guidance from local governments, companies gradually considered how they could coexist with local communities. Dialogues between companies, local residents and local governments progressed, and mutual trust was built. Today, many companies emphasize 'corporate social responsibility' and continue to contribute to the local community.

In terms of the land issue, the increase in new expansions due to high growth necessitated new factory locations, the creation of new factory sites, and the development of infrastructure. Demand for new locations was huge, and this was woven into the government formulation of the 'National Comprehensive Development Plan.' Information on land area requirements for the growth rate of petrochemicals and favorable land conditions, and requests from industry were provided from MITI to the Ministry of Construction that was responsible for the formation of this National Comprehensive Development Plan. Such information

was used as a reference in the formulation of this plan. Activities to promote development plans for new factory sites were also conducted in coordination with local governments. Regarding regional development, MITI had regional bureaus under its umbrella, and it carried out activities in coordination with such organizations. Petrochemical factories were required to locate in the coastal areas. Many large-scale seaside ethylene centers were formed through construction projects including large-scale landfill projects. However, following the oil crisis, circumstances changed completely and with no companies located in newly developed large-scale industrial areas, open spaces were exposed for a long time.

6.2.3. The 300,000 ton Ethylene Plan

Under the Phase 2 Plan (1962-66), five ethylene centers were added bringing the total number of centers to nine. In 1965, the standard was set for new ethylene production capacity to reach 100,000 tons or more, and under this standard four more ethylene centers were added. The need for investment coordination rose in an already excessively competitive market.

In June 1967, MITI determined the 'Standards for the New Installation of Ethylene Production Equipment' based on discussions held during the Petrochemical Coordination Roundtable Meeting. The minimum capacity was raised immediately to 300,000 tons per year. This was an attempt to increase the annual production capacity of ethylene to the level of leading overseas centers and to pursue economic rationalization by expanding the scale and increasing the types of derivative products in ethylene centers. MITI expected that the number of the companies would decrease because fewer companies could handle additional investments to realize this scale expansion. It also expected that collaboration among companies and industry restructuring would be promoted accordingly. However, the reality was different. While investment coordination for the standard of 300,000 tons resulted in some joint and rotational investment, each company desperately expanded and revised their investment plans, and from 1969 to 1972 all ethylene centers in the country constructed 300,000-ton ethylene facilities. This 300,000 ton plan turned out to be a disappointment in terms of investment coordination and industry restructuring, but at this point the Japanese petrochemical industry became one of the most competitive in the world, in particular in relation to: (i) the expansion of the production scale of derivative products in

ethylene centers while keeping the price of basic materials low to establish a stable supply system; (ii) the complete conversion of raw materials from existing chemicals to petrochemicals; and (iii) the achievement of comprehensive use of naphtha. However, due to a subsequent recession, excess production capacity and reduced utilization occurred, and in 1972, for the first time a depression cartel agreement (production quantity regulation) was signed by ethylene manufacturers. In addition, aromatic products turned to exportation and an export cartel agreement was made to prevent dumping.

6.2.4. Structural changes after the oil crisis

The oil crisis of 1973 forced a major shift in the management policy of petrochemical industry which had continued its scale expansion until then. In the 1980s, in response to soaring oil prices, major efforts were made to develop high-performance products, promote energy saving, and improve productivity. This meant transformation of the Japanese petrochemical industry from quantitative to qualitative development, a move that was largely successful. From the 1990s, however, a period of low growth continued in Japan while other countries in the Middle East and Asia experienced remarkable growth in their petrochemical industries. In general, common petrochemical products lost their competitiveness, and Japan's presence in the global petrochemical industry has declined significantly.

Today, the Japanese petrochemical industry is focused on the development and manufacturing of high value-added products such as high-performance plastics and is attempting to transform into a new advanced material industry.

Above we looked at the policy of industry coordination in the process of developing the petrochemical industry. Here we can recognize the following facts: building on public-private partnership, plans proceeded based on the opinions of both parties, while discussing how to design and implement policies. Throughout the process, the two parties maintained strong collaborative relationship. Furthermore, the staff in charge at MITI had the opportunity to hear from each company, obtain various information, and learn about various business plans. By comparing such information and plans, MITI staff nurtured their capacity to make more accurate judgements. I believe that this process resulted in individual

private companies educating the staff in charge at MITI to be able to make fair and accurate decisions, which in turn led to an increase in trust in the judgements of the government.

The development policy for the Japanese petrochemical industry can be regarded as one model of fostering a new key industry based on public-private partnership, in the form of the Petrochemical Coordination Roundtable Meeting. This was carried out by making full use of the existing general support laws and regulations, without having special designation under a petrochemical development law.

6.2.5. Process of technological development in the Japanese petrochemical industry[6]

The following section discusses the process of technology transfer by which the petrochemical industry, that was new for Japan in the 1950s, came to be transplanted to Japan, subsequently developed on its own, and grew into an industry with the highest level of technology in the world. By looking at this from a technology transfer perspective, we present the Japanese actual experience of technology transfer whereby foreign technology was introduced, assimilated, absorbed, and then improved to become self-reliant.

Almost all technologies introduced during Phase 1 was primarily in the form of products and production processes that had already been commercialized overseas for 10-20 years, although there were some advanced technologies that had just been developed such as Ziegler's process for polyethylene. At the time, all technologies that were not in the country were introduced because of a desire to close the technology gap with the West, and Japan succeeded in narrowing the gap rapidly. The 14 forms of technologies that were introduced and then commercialized in Japan in the 1950s were already commercialized in the West on average 16.5 years earlier (Wada 1971). In the first half of the 1960s (1960-64), the newly introduced 12 technologies was behind by 11.6 years in commercialization period compared to the West. By the latter half of the 1960s (1965-69), the number of introduced technologies had fallen to 7, and the difference in commercialization periods had also fallen significantly to 3 years. It can be said that by this point the technological gap with the West had all but

[6] This section is based on Wada (1971).

disappeared, and that the Japanese petrochemical technology has caught up rapidly.

Some polymer research, in relation to materials such as polyethylene and nylon, continued during and after the war in Japan, and reached the level of prototype production. However, this domestic technology was not commercialized, while decisions were made to import overseas' technology. Nevertheless, the existence of the domestic technological base became the foundation to quickly assimilate, absorb, and improve any foreign technology that was brought to Japan.

We will look at whether such imported advanced technology was able to take root in Japan. 'The History of the Petrochemical Industry by Decade' (Wada 1971) describes in detail the process of how these forms of technologies were accepted. To summarize, initially there was adherence to the design of the foreign engineering companies, but then work was put into the mastering and operation of these technologies. As part of this process, various small troubles were resolved as they sought to learn the operating conditions for themselves.

In the case of petrochemicals, advance surveys, testing of the foreign technology, and in some cases experiments in pilot plants were conducted prior to the introduction of foreign technologies to create the foundation for installing new technologies. After their introduction, efforts were made to thoroughly understand the essence of the introduced technology. This included the confirmation of the operating conditions following revision of the operating manual. It also worked on clarifying the limits of equipment and operating conditions, the tolerance level. After those points were addressed, they determined by themselves the optimal operating conditions in terms of productivity, aside from what was mentioned in the manual. Furthermore, they constantly made efforts to improve production capacity by reworking the equipment.

This was an effort to understand the essence of the technology through trial and error, without relying on the manual. By such an effort, it was common for the companies that introduced the technology achieved higher productivity in a few years than those where technology originated. The re-exportation of improved technologies became common. There are also cases where unfinished Western technologies at that time were improved and completed in Japan, largely due to the strong will of

Japanese companies and engineers to fully master and perfect the newly introduced technologies. This may have been rooted in the fact that there was a fiercely competitive environment among companies that acquired these introduced technologies at a high price.

It is often said that in the period after the introduction of new technology, Japanese engineers had doubts about the operating conditions and manuals that they were given and immediately set about to change them. Japanese engineers skillfully operated the new equipment and improved it with details such as changing the way of installing pipe and equipment, often increasing production capacity and productivity. Their operating skill and fine improvements strengthened the influence of Japanese engineers when making expansions. They began placing orders for foreign designs and then making the fine adjustments to the designs themselves. Japanese people are skillful at up-scaling equipment, and the No. 2 polyethylene machine built by Sumitomo Chemical in 1951 overtook the ICI company (UK), which had 15 years of advanced production experience. Particularly in the case of polymers, market needs in Japan differed from those in the places from which the technology was introduced, making it necessary to develop a new grade of product to meet Japanese market demand; this development and improvement happened quickly. Toray Industries Inc. introduced nylon technology from DuPont, but DuPont did not have the nylon products that were suitable for the Japanese market and the original nylon fishing nets developed by Toray were their first successful nylon products in Japanese market. So even in the case of international standard technologies, such as petrochemicals, adjustments were always sought when these were introduced to the Japanese domestic market, and products were often improved and completed in Japan. In this way, the petrochemical industry was able to master and improve its operating technologies, and began developing its own technologies in the latter part of the 1960s.

What should not be overlooked when considering the process of introducing petrochemical technologies is that at that time petrochemical plants were not controlled by computer but were operated manually that required the operators to master the operating techniques; this required a sufficient understanding of the essence of the technology, which meant that reverse engineering was particularly effective during this era. Next, it is worth noting that the process of assimilation and improvement led to the emergence of other related industries such as

the engineering industry, the chemical machinery industry, the materials industry (special corrosion resistant materials), various instrument manufacturers, and the information processing industry including technologies of computer control. These industries became independent from foreign technologies at the same time as chemical companies. They took advantage of various opportunities created by vigorous investment from petrochemical companies in such things as in construction and operation of new facilities, accumulated know-how and learned a great deal about how to operate the facilities smoothly. The rapid development of the Japanese petrochemical industry occurred at the same time as the development of related supporting industries. This led to the development of complete domestication of technologies, including engineering and the manufacturing of chemical machinery, and the development of domestic chemical processing. My paper (Wada 1971) explains that many forms of domestic technology were developed and commercialized during the late 1960s. During this period, the Japanese petrochemical industry became the most productive and competitive industry in the world.

As mentioned above, MITI utilized the foreign currency allocation system in order to examine the relevance of the new expansion plans and sound development. Policy implementations were decided through close communication with the business community, based on which MITI carried out its permission procedures. As a result, the private sector was ready to accept decisions made by MITI. Again, this is evidence of the effective industrial policy implementation in Japan. Through sufficient communication between policy makers and policy beneficiaries, both parties were able to consent to the policies.

The assimilation, absorption, and further improvement of technology in a short period of time was not limited to the petrochemical industry during this postwar period, but can be said to have been the traditional model for Japanese technology transfer since the Meiji Restoration. This has been made possible in part by the economic concept of making the most of technologies obtained through the payment of large amounts of money, but also by the traditional Japanese disposition of wanting to make new foreign ideas their own.

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