Chapter 2
Industrial Policies for Learning, Innovation, and Transformation: Insights from Japan and Selected Countries

Akio Hosono

2.1 Introduction

Over the last decade, a resurgence of interest in industrial policies has been witnessed at a global level. Goal 9 of the Sustainable Development Goals (SDGs), adopted by the United Nations (UN) General Assembly in 2015, is to 'build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation' [42]. To achieve this goal effectively, industrial policies will be needed, because 'promoting industrialization' is the fundamental aim of industrial policies. As such, it implies that UN member states adopting the SDGs inherently recognized the importance of not only industrial growth but also industrial policies that have a stronger focus on inclusiveness and environmental sustainability.

This chapter aims to obtain insights into an appropriate industrial policy package for today's developing countries as they face a variety of emerging challenges of industrialization, transformation, and growth. Section 2.2 reviews essential aspects and typologies of industrial policies and their instruments, with special reference to learning. Drawing from these typologies to provide a comparative perspective, this chapter examines the industrialization process and industrial policies in five countries in Asia and Latin America (Japan, Korea, Malaysia, Brazil, and Chile). To deepen the comparative analysis, Sect. 2.3 elaborates on the cases of three transformative industrial sectors—the steel industry, automobile industry, and resource-based industry. Based on these findings, Sect. 2.4 compares the experiences of each country in terms of the essential aspects and key instruments of industrial policies. Building on the

A. Hosono (✉)
JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, Japan
e-mail: Hosono.Akio@jica.go.jp

I. Ohno et al. (eds.), *Introducing Foreign Models for Development*,
Emerging-Economy State and International Policy Studies,
https://doi.org/10.1007/978-981-99-4238-1_2

analysis from Sects. 2.3 and 2.4, Sect.2.5 discusses the effectiveness of industrial policies in the five countries from the 'translative adaptation and indigenous learning' perspectives, with the conceptual framework (key ingredients for such adaptation and learning) presented in Chap. 1 of this volume. Finally, the chapter provides some concluding remarks.

2.2 Essential Aspects of Industrial Policies and Typology of Industrial Policy Measures

To undertake a comparative analysis of industrial policies and industrialization between countries, it is necessary to classify both industrial policy measures/instruments and processes in which these policies are formulated and implemented. This classification enables an examination of each country's industrial policies in terms of the package of instruments that has been adopted and how these instruments have been formulated and implemented. For this purpose, this section reviews some aspects of the emerging consensus on industrial policy, such as its broader scope, stronger emphasis on learning, structural transformation as an overarching purpose of industrial policy, typologies of key areas of industrial policy/instruments, and the process of its formulation and implementation.

2.2.1 Broader Scope of Industrial Policy

In recent discussions of development agendas, industrial policy is conceptualized to have a much broader scope than before, particularly in terms of the sectors to be promoted, policies to be implemented, and the purposes of industrial policy. Greenwald and Stiglitz [13] explain that 'The term is used more broadly than just those policies that encourage the industrial sector. A policy which encourages agro-business, or even agriculture, is referred to as an industrial policy' (3). More recently, Aiginger and Rodrick [3] asserted that, 'As the world economy turns increasingly towards services, it is clear that we will require a conception of industrial policy that addresses the need to nurture and develop modern economic activities more broadly, including but not limited to manufacturing. The appellation "industrial policy" may be misleading insofar as it clouds this broader mission. Other alternatives, such as "productive development policies," "structural transformation policies," or "innovation policies," do exist' (3–4). They also use the term "future- and welfare-oriented industrial policy."

2.2.2 Critical Role of 'Learning' for Industrial Policy

The importance of policy learning and societal learning, as discussed in Chap. 1, and enhancement of capabilities of governments, firms, and industrial human resources (workers, managers, and others) to successfully implement industrial policy—as well as to achieve industrialization—is now much more widely recognized. Noman and Stiglitz [31] noted that 'a particularly important set of industrial policies comprises those targeted activities that promote learning and technological upgrading' (1). Cimoli and Dosi [6], in their article "Industrial policies in learning economies," present a taxonomy of variables and processes that institutions and policies act on in general and with particular reference to technological learning. More recently, the United Nations Industrial Development Organization [44] highlighted the importance of learning for production capacity: 'Building production capacity takes time, as [this] requires a medium- to long-term process of learning and accumulating knowledge.' The above-cited authors emphasize the importance of learning and learning capacity for industrialization at large.

Furthermore, other authors argue that industrial policy is itself about learning. Agosin and Fernández-Arias [1] highlight that the book *Rethinking Productive Development: Sound Policies and Institutions for Economic Transformation*, to which they contribute, 'builds on a new policy paradigm that is emerging, namely that [productive development policy] is a learning process' (28–29). Aiginger and Rodrik [3] likewise affirm that 'The more ambitious the goals of industrial policy are, the less government knows about the techniques available to solve them. Industrial policy is therefore a search process in unknown territory, which should be open to new solutions, experiments, and learning.' In short, these authors argue that industrial policies are a learning process or a search process. Ohno [33], in his book *Learning to Industrialize: From Given Growth to Policy-Aided Value Creation*, proposes a 'way to learn pragmatic policymaking for developing countries that must cope with the strong pressure of market-orientation and globalization of our time' (ix).

2.2.3 Structural Transformation as an Overarching Purpose of Industrial Policy

Industrialization is a key to the structural transformation of economies. Together with the broader scope of industrial policy and the centrality of learning, we are witnessing a growing emphasis on structural transformation as an overarching purpose of industrial policy in the literature from recent years. Among the studies, Crespi et al. [7], Noman and Stiglitz [30], UNCTAD [43], and McMillan et al. [27] include 'transformation' in the title of their books/articles. The growing concern over structural transformation is partly due to the stronger need for employment opportunities, as highlighted by UNCTAD [43]. Today, as the SDGs set out, 'there is growing pressure to reduce unemployment and stimulate economic growth in the industrialized world

and to create more and better employment in developing countries. These needs have revived interest in industrial policy, putting structural transformation at the core of the policy agendas of many developing and developed economies and making it the focus of one of the United Nations' Sustainable Development Goals (Goal 9)' (2). As noted above, Goal 9 of the SDGs is to promote inclusive and sustainable industrialization.

2.2.4 Typology of Industrial Policy Instruments/Measures

From the above-mentioned perspectives, the cited authors identified and classified key areas or domains of industrial policies and their instruments. Ohno [33], drawing mainly from East Asian experiences, lists a number of standard policy measures. He especially highlights 'measures that enhance industrial human resource and enterprise capability, an objective that should be at the core of a nation's industrialization strategy' (63). Policy measures are classified into the following seven areas: legal and policy frameworks, industrial human resources, enterprise capability, finance, foreign direct investment (FDI) attraction, marketing and business linkages, and innovation (63–64). In addition, he states that there are also other important industrial measures related to infrastructure, logistics and distribution, social and environmental issues, and regional development.

Stein [38] classifies industrial policies into vertical policies (focusing on specific sectors) and horizontal policies (broad-based and not attempting to benefit any industry in particular). Each of these two categories of policies is further divided into public inputs and market interventions. Consequently, there are four groups of policies: horizontal public inputs, horizontal market interventions, vertical public inputs, and vertical market interventions (33–35). This classification takes into account the problems of rent-seeking and capture. For example, 'rent-seeking problems are likely to be more prevalent in the case of vertical interventions' ([38], p. 35). Crespi et al. [7], based mainly on Latin American experiences, as well as the above-mentioned conceptual framework by Stein, discuss seven key areas: policies to foster innovation, policies in support of entrepreneurship, technical education and training for work, finance, cluster-based policies, internationalization (exports, FDI, and GVCs), and priority sectors for productive transformation.

McMillan et al. [27] discuss a set of conditions that are most crucial for effective industrial policy leading to economic transformation (45). They define economic transformation as a continuous process of (i) moving labor and other resources from lower to higher-productivity sectors (structural change) and (ii) raising within-sector productivity growth. They provide a typology of policy approaches for supporting economic transformation: 'those [policies] intended to accelerate the relative growth of higher value-added sectors in the economy—in other words, policies to support structural change—and those intended to accelerate the pace of within-sector productivity growth.' Within each of these policy sets, they further distinguish 'between "horizontal" or enabling interventions and targeted interventions.' This produces a

two-by-two classification matrix (ix, 26). They list 'targeted policies to support structural changes' comprising export push policies, exchange rate protection, selective industrial policies, spatial industrial policies, and national development banks. As 'horizontal policies to support structural changes,' they include investment climate reforms, financial sector development, and strengthening state-business relations (26).

Andreoni [5], through an extensive overview of the literature on the typologies of industrial policies, presents a taxonomic approach. He distinguishes, first, between supply-side and demand-side measures. Then he subdivides supply-side measures into six specific factor-inputs policies: (i) innovation and technology infrastructure; (ii) higher education and workers' training; (iii) production capacity and advanced manufacturing operations that include conditional subsidies and incentives, with matching grant schemes; (iv) long-term financial capital; (v) resource access (energy and technology policies); and (vi) infrastructure and networks. Demand-side measures include internal demand and public procurement, and external demand and international market development (258–260).

2.2.5 Key Policy Areas and Domains of Industrial Policy

Summing up, the typologies referred to above generally coincide in three essential supply-side measures related to learning, capabilities, and innovation: (i) education, training, and nurturing industrial human resources; (ii) firms' capabilities; and (iii) technology and innovation.[1] Moreover, they coincide in two other supply-side measures: (iv) finance, and (v) infrastructure. Most of these industrial policy measures are intended to provide public goods for industrialization. The typologies also include policy measures related to internal markets, international trade, and foreign investment, which are normally related to both demand and supply sides, such as (vi) domestic market (size, protection, and competition); (vii) international trade, especially export promotion; (viii) foreign direct investment (FDI), and (ix) participation in global value chains (GVCs). These key policy areas are summarized in Table 2.1.

Section 2.3 below will build on these nine types of industrial policy areas—or domains—to compare countries' experiences in order to obtain insights for establishing an appropriate industry policy package for today's developing countries as they face a variety of new challenges of industrialization, transformation, and growth.

[1] These three supply side measures are interrelated and critical for societal learning, adaptation, and innovation. However, other policy measures are also very important for learning: for example, FDI and trade as channels for acquiring technology, infrastructure for communication as a vehicle for disseminating knowledge with wider or targeted populations, and so forth (see Chap. 1).

Table 2.1 Key policy areas and the process of industrial policy formulation and implementation

Typology	Key areas of industrial policy	Process of industrial policy formulation and implementation
Supply-side measures (related to learning, capabilities and innovation)	1. Education, training and industrial HRD	The role of government: public–private partnerships • Planner • Catalyzer • Coordinator • Rule-maker • Protagonist (SOEs) and biz.partner (JV etc.) Factors affecting the process • Types of industries • Purposes of industries • Phases of industrialization
	2. Firm capabilities	
	3. Technology and innovation	
Supply-side measures (biz. environment)	4. Finance	
	5. Infrastructure	
Demand and supply-side measures	6. Domestic market (e.g., size, protection, competition)	
	7. International trade (esp. export promotion)	
	8. FDI attraction	
	9. GVC participation	

Source Elaborated by the author, based on comments by Professor Izumi Ohno

2.2.6 *Process of Formulation and Implementation of Industrial Policy*

In the process of formulating and implementing industrial policy, most authors emphasize the importance of the relationship between the government and the private sector, together with their institutions. Ohno [33] argues that, 'if effective channels of public–private partnership are established, government and private firms come to trust each other and can constantly share information on global and domestic situations as well as strengths and weaknesses of local industries' (34). Primi [36] emphasizes that industrial policy works better when it has clear priorities and is capable of establishing a constructive dialogue between the public and the private sectors (180).

Andreoni [5] introduces a policy-governance model that is 'defined according to the way in which a country frames its industrial policy and the different actors involved in its design, implementation, and enforcement' (259). The key actors, according to Andreoni, are institutions such as government agencies and departments, development banks, intermediate R&D institutions, industry associations, and chambers of commerce. He argues that 'countries may frame their industrial policies either within *central plan-based strategies* or within *multiple decentralized initiative-based measures*' (259; emphasis in original). He further states that, 'to avoid industrial policy coordination problems, government that could rely on well-developed institutional settings adopted a multilayered policy model combining top-down and bottom-up policy measures' (259).

Stein [38] concludes that 'modern productive development policies have become less of a top-down affair, and increasingly involve public–private collaboration in

both policy design and implementation,' and that 'this collaboration is key, as the private sector has information about the sector's challenges and opportunities that is critical for effective policymaking' (58). Aiginger and Rodrik [3] also highlight the importance of the public–private relationship. They argue that 'the contemporary conception and practice of industrial policy is much less about top-down incentives and much more about establishing a sustained collaboration between the public and private sectors around issues of productivity and social goals' (4). As mentioned above, they consider industrial policy a searching process. Therefore, they state that 'government and business should engage in an intensive dialogue' (14).

The roles of the public sector in the above-mentioned public–private relations appear to differ according to types of industries, purposes of industrial policies, industrialization phases, and so on. The government undertakes the role of planner, catalyzer, coordinator, and rule maker as well as protagonist (in cases of state-owned enterprises) and partner (in cases of public–private joint ventures, actions, initiatives, and so forth) in the process of industrial policy formulation and implementation.

2.3 Country Experiences

This chapter has so far discussed key issues of industrial policies, including policy measures and instruments, the process of formulation and implementation, and public and private relations. This section draws together these elements in examining the experiences of five countries, with special reference to the steel industry, automobile industry, and natural resources-based industries. These industries have been purposefully selected by taking into account their transformative impacts as well as their different sector-specificities in terms of forward and backward linkages, participation in GVCs, and economies of scale.

2.3.1 Japan

The process of industrial policies and industrialization in Japan after the end of World War II can be divided into four distinctive phases: first, post-war reconstruction through to the mid-1950s; second, high economic growth through to 1970 [34, 45]; third, the post-oil crisis phase through to the mid-1990s; and fourth, the low economic growth phase [45]. I will primarily discuss the first two phases because they correspond to the main process of Japan's catching up to advanced industrial countries through industrial transformation. Many of the industrial policies implemented and institutions established in these phases were essential for the prolonged industrialization process in Japan ([34], p. 479).

'The Policy Concerning Industrial Rationalization' (*Sangyō gōrika ni kansuru ken*), adopted in 1949 by the Cabinet, was 'one of the most crucial milestones of postwar Japanese industrial policy,' because it contained the seeds of the Japan

Development Bank (JDB), the Foreign Capital Law, the reform of the tax system to favor industrial growth, and the creation of the 'Industrial Rationalization Council (*Sangyō gōrika singikai*) ([22], p. 215). One of the most concrete results of this Cabinet's decision was the passing of the Enterprises Rationalization Promotion Law of 1952, of which the main policy measures were the tax system with preferential treatment, and the fiscal investment and loan program (FILP). Both of these were designed for strategic industries. Below, I will discuss the effect of this policy, focusing on the case of the iron and steel industry.

In 1954, the 'Comprehensive Policy for Economic Expansion' was agreed upon, and based on this policy, the 'Outline of the New International Trade and Industry Policy' was announced. These documents reflected the view within the Ministry of International Trade and Industry (MITI) that the only way to break out of Japan's inevitable balance of payment constraints was through 'heavy and chemical industrialization,' by which was meant the building of an industrial structure whose export products would have a much higher income elasticity of demand than Japan's traditional light industries, even though it flew in the face of so-called comparative advantages ([22], p. 228). The main industries promoted in this period were synthetic fiber, petrochemicals, machinery and machine parts, electronics, and so forth. I will discuss the case of the automobile industry later in this chapter.

From the end of the 1940s through the 1950s, several core institutions for industrial development were created. JDB was established in 1951. It had the autonomy to decide its lending based on its own appraisal without political bias. It had 'two important principles: one was self-finance and the other was complementarity with private banks' ([37], pp. 166–167). In the export promotion area, the Supreme Export Council—composed of the Prime Minister, ministers of MITI, finance, agriculture, and so forth—was established in 1954. Another new institution, the Japan External Trade Organization (JETRO), was established in 1958.

In June 1960, the Cabinet adopted the 'Plan for the Liberalization of Trade and Exchange.' Six months later, it formally adopted the 'Long-term Economic Plan' (well known as the Income-doubling Plan). In 1961, the Industrial Structure Investigation Council (*Sangyō kōzō tyōsakai*) was created. This council and the Industrial Rationalization Council were integrated into the Industrial Structure Council (*Sangyō kōzō singikai*) in 1964. Johnson [22] considers the concept of 'industrial structure' and the creation of the Industrial Structure Investigation Council as 'the most important bureaucratic response to liberalization' (252–253).

The main objectives of industrial policies in the 1960s could be summarized as follows: (i) to establish a new industrial structure to address liberalization of trade and capital flow; (ii) to coordinate 'industrial plant and equipment investments' (*Setubi tōsi*); (iii) to promote coordination and specialization of production, especially of small and medium-sized enterprises (SMEs) through the Law for Promotion of Modernization of SMEs; (iv) to establish an integrated energy supply system; and (v) to promote some strategic industries on the basis of laws enacted in the 1950s, such as the machinery industry, electronic industry, and so forth ([41], pp. 55–56).

2.3.1.1 Japan's Steel Industry

Japan's production of steel before the end of World War II peaked at 7.65 million tons in 1943. It recovered to this level in the first half of the 1950s, before reaching 9.41 million tons in 1955. The expansion of production in the high-rate growth period was remarkable: it peaked at 120 million tons in 1973, the year of the oil crisis. Steel was mainly produced for the domestic market in the 1950s. Japan's steel exports were 3 million tons in 1960. Exports increased rapidly, achieving the level of 34 million tons in 1975. The share of the total exports from Japan increased from 9.6% in 1960 to 18.2% in 1975. Japan's share of world steel exports increased to more than 20% at the beginning of the 1970s ([24], pp. 58–59, 62).

In this process, the steel industry's investment in plant and equipment was facilitated by finance from JDB, special and accelerated depreciation, and other industrial policy measures. At the same time, three 'Steel Industry Rationalization Plans' (1951–1955; 1956–1960; and 1961–1966) and licenses granted for the import of foreign technology facilitated the modernization and technological upgrades. These policies were considered effective for the steel industry's development and technological progress in its initial phase, especially in the 1950s, and for establishing the basis of the steel industry's growth in subsequent phases ([41], p. 275). It should be emphasized that strong competition among steel companies was an important factor for the industry to achieve these results.

With these policies, investments were made in integrated steel mills. These financed new blast furnaces, strip mills, continuous casting methods, LD converters (BOF), and so forth, together with expansion of the scale of production. This modernization and technological progress, along with the location of these mills in industrial estates in coastal industrial areas, was advantageous for international trade. Moreover, the introduction of large-scale vessels specialized in transporting iron ore significantly improved the competitiveness of the Japanese steel industry. These factors enabled Japan to reduce the costs of steel production. The total costs were higher than the US in the mid-1950s (at 1.08 times the US cost in 1956), but were reduced to a level much lower than US costs by the mid-1960s (0.63 in 1966) ([47], p. 263).

Essential and cutting-edge technologies for steel production, such as LD converters and continuous casting, were adapted and improved in Japan. The strategy of locating steel mills in coastal areas and the introduction of iron ore carriers was effectively indigenous. As such, the development of the steel industry of Japan was not just a catching-up process. It was rather an indigenous learning, adaptation, and innovative process.

2.3.1.2 Japan's Automobile Industry

Production of automobiles in Japan increased from 69,000 cars in 1955 to 1,876,000 cars in 1965 and 6,946,000 cars in 1975. It was led first by the domestic market in the 1960s, and export-led development started in earnest in the 1970s. Japan's export

of automobiles comprised 7,000 cars in 1960 but had increased to 1,827,000 cars by 1975 ([24], p. 152).

The main promotion policies for automobile industry development consisted of finance from JDB and the Japan Finance Corporation for Small and Medium Enterprise (JASME). These also included, among other factors, special depreciation, licenses for the import of foreign technology, and exemption on tariffs for machinery and equipment imports. Restrictions of automobile imports and constraints on FDI in the car industry were the main protective measures, but they were gradually liberalized in the 1960s (the import of commercial vehicles in 1961, import of passenger cars in 1964, and FDI in 1971). Competition among Japanese automobile companies was fierce, both before and after liberalization.

Efforts were made to adapt and develop technologies and to work out innovative solutions in order to address a series of challenges that faced the Japanese automobile industry. Some of the most important of these were the development of supporting industries largely made up of SMEs and the introduction and dissemination of Japanese-style management methods to improve quality and productivity—such as Total Quality Management (TQM), the Toyota Production System (TPS), and another systems commonly known as the *Kaizen* approach [21]. The Japanese automobile industry also needed to address low-quality roads and highways, as well as narrow streets in major urban areas, in the initial phase of motorization—and later, air pollution. From the 1950s through to the mid-1960s, buses and trucks led automobile industry development. Regarding passenger cars, light vehicles (K cars), which proved convenient and affordable for Japanese consumers, have been developed intensively since the mid-1950s.

The Act on Temporary Measures for the Promotion of Machinery Industry, passed in 1956 (valid until 1970), was one of the major instruments for the development of a supporting industry for automobile production, consisting mainly of SMEs. The following three areas were promoted by this law: (i) basic machinery including machine tools, forging machines, cutting tools, molds, and electric welding machines; (ii) common parts including gears, screws, bearings, bulbs, and the parts necessary for material molding, such as die-casts and strong powder metallurgy; and (iii) specific purpose parts including automobile parts, sewing machine parts, watch parts, and railway vehicle parts. Many studies confirm that this law was very effective in the development of the machinery industry in general and the automobile parts industry in particular. Labor productivity of automobile parts production improved 21.4% from 1956 to 1961 ([32], p. 15).

2.3.2 Korea

The industrialization process in Korea can be divided into four distinctive periods: light industry-centered import-substitution industrialization (ISI) in the 1950s, transition to export-oriented industrialization in the 1960s, a heavy and chemical industry (HCI) drive in the 1970s, and further industrial upgrading, including the promotion

of information technology (IT) industries in the 1980s and onward. This chapter mainly focuses on the second and third periods.

Lim [26] states that, 'if Korea's transition to export-oriented industrialization in the early 1960s had mostly to do with discovering its latent comparative advantage in labor-intensive manufacturing, Korea's subsequent development had more to do with upgrading its comparative advantage with a view toward increasing the domestic content of its exports' (76). Finance for strategic sectors, export promotion, and technology development were among the main instruments of industrial policy in this process. Yo [48] notes that policy-based finance was the most important. The lending capacity of banks was strengthened in 1962. Several public banks for specific sectors were created in the 1960s. Policy-based finance comprised more than 50% of the total lending of banks from the 1960s through to the mid-1980s (3). Export promotion was another important instrument of industrial policy in Korea. From 1964 President Park Chung Hee chaired monthly export promotion meetings. The interest rate for export finance was less than half of the market rate. Export finance constituted 62% of total policy-based finance for the manufacturing industry in the period between 1962 and 1980 (4) (see Sect. 2.4 for more details on export promotion in Korea).

The HCI drive was formally launched in 1973 by President Park with the objective of firmly establishing 'a self-reliant economy' and achieving 10 billion USD in exports by 1981. Six industries were selected as leading industries: (i) iron and steel, (ii) nonferrous metals, (iii) shipbuilding, (iv) machinery, (v) electronics, and (vi) chemicals. Lim [26] argues that the 'HCI drive helped to build the formation of many of Korea's leading industries. […] It greatly strengthened backward and forward linkages among these industries as well as related industries such as automobiles, to increase the local content of exports' (79). The HCI share of total manufacturing production increased to a higher level than light industries in the mid-1970s and 59% in 1985 ([48], p. 7). As regards technology development, the public sector played a dominant role in R&D, mainly through newly established government labs in the 1960s and 1970s. However, as Korean firms came to realize that they should go beyond imitation and assimilation and do their own innovation to succeed in the global market, they began to drastically increase their R&D spending ([26], p. 79).

2.3.2.1 Korea's Steel Industry

Until 1973, Korea had no capacity to produce the iron needed for steel production. Consequently, scrap or crude iron was imported to produce steel using small electric furnaces. The government had to depend on external finance and foreign technology when it commenced plans to establish the Pohang Iron and Steel Company (POSCO) and construct the first integrated steel mill at the beginning of the 1970s. The production volume of POSCO increased from 2.1 million tons in 1976 to 9.5 million tons in 1986, when the company attained its status as one of the top steel mills in the world.

The crucial factor which enabled this successful development of POSCO was very active support from the government, especially from the President. Through this

support, POSCO was able to obtain external finance, favorable conditions for technological transfer, construction of related infrastructure, and so forth [40]. Another important factor was the intensive efforts of POSCO to develop its own engineering capacity through the four phases of plant construction. The availability of very high-quality labor and the low level of turnover was also crucial.

Korea's high learning capacity was praised by Amsden [4]. Thanks to aggressive technology acquisition, it did not take long for POSCO to become technologically self-dependent. It implemented a lot of improvements and adaptations of absorbed technology at the Quality Control Department and production sites. It began to develop new products and finally decided to centralize R&D activities by establishing an R&D center in 1977. Furthermore, POSCO became an exporter of its own technology towards the end of the 1970s [18].

2.3.2.2 Korea's Automobile Industry

The law for the protection of the automobile industry was promulgated in 1962 by establishing restrictions on imports of automobiles and parts. Car production was started through technological contracts with foreign companies. However, due to the limited size of the domestic market, it was difficult to achieve the economies of scale of production required to achieve competitiveness. In 1973, the government announced an ambitious long-term plan for developing the automobile industry, establishing targets for integrated production of national cars based on original models, parts production and assembly with the competitiveness to export. Hyundai was the only company able to satisfy the requirements of the plan. In 1975, the company made a large-scale investment in constructing a new plant to produce the first national model, Pony, in a joint venture with Mitsubishi together with technology transfer ([28], p. 188).

The second oil shock of 1979 led to a severe recession in the automobile industry. Measures for the rationalization of this industry were announced in 1981. As the country recovered from the recession, production of automobiles (including trucks) increased from 123,000 cars in 1980 to 2.5 million cars in 1995, with Korea becoming the fifth largest country in terms of car production. Exports of cars increased from 25,000 to 1.0 million during the same period. In this process, the leading player was Hyundai, which attained economies of scale in increasing exports. It started to develop its own original model in 1990, achieving the production of original engines and transmissions in 1994.

2.3.3 Malaysia

Four phases can be distinguished in Malaysian industrialization after independence: the ISI-led process through the 1960s; export-oriented (EO) and inter-ethnic redistribution policies in the 1970s; heavy industrialization policies (1981–1985) followed

by economic liberalization in 1986–1997 (First Industrial Master Plan, IMP I); and post-economic crisis management and IMP II and III. This section focuses on the second and third phases.

In the second phase, export orientation (EO) based on the attraction of FDI was the main approach. Two main types of export-oriented industries were developed. First, 'resource-based industries have involved the increased processing of older (e.g., rubber, tin) and newer (e.g., palm oil, timber) primary commodities for export.' Second, many non-resource-based export industries have mainly involved the relocation of certain labor-intensive manufacturing processes to stable, low-cost environments, such as those offered by Malaysian free trade zones (FTZs) with the Free Trade Zone Act of 1971, and licensed manufacturing warehouses (LMWs). The most dramatic growth has involved electrical and electronic components ([23], p. 11). Foreign companies that operated their plants in FTZs and benefited from LMWs were the main driver of EO. As such, EO and FDI attraction by government institutions, including the Malaysian Investment Development Authority (MIDA), have been closely related.

In the third and fourth phases, heavy industrialization initiatives were implemented under the leadership of Mahathir with his 'Look East' vision aimed at learning from Japan, South Korea, and Taiwan. The Heavy Industries Corporation of Malaysia (HICOM) was set up in 1980 to further diversify manufacturing activity, develop more local linkages (which both ISI and EO failed to do), promote small and medium Malay enterprises, and lead technological development by collaborating with foreign firms and investing in local R&D. Mainly involving joint-ventures with Japanese firms, ownership of these industries was dominated by the government before the sale of shares to the public from the mid-1990s ([23], p. 13). The establishment of Proton, a national carmaker, in 1983, was driven by 'the economic motive of creating a broad industrial base as well as a social motive of assisting Malay workers and Bumiputra firms' ([33], p. 221). The First Industrial Master Plan (IMPI, 1986–95) aimed at outward-looking industrialization, modernization of supporting industries, and strengthening of industrial linkages. A number of liberalization measures were undertaken in this process.

2.3.3.1 Malaysia'sPalm Oil Industry

In line with the transition to EO industrialization from the late 1960s, the government introduced various new sectoral policies, which included encouraging resource-based industrialization, such as palm oil refining. Since 1968, duty exemptions for higher value-added processed palm oil products were introduced. In 1978, a more complex export duty formula was established to encourage additional processing. 'The palm oil refining industry is probably the most successful story of Malaysian resource-based industrialization. […] With a current estimated annual refining capacity of about 8 to 9 million tons, […] exports of processed palm oil grew at a compounded annual rate of about 25% over the past two decades, and accounted for 60% of the world's refined palm oil products' ([16], p. 162). In order to support the refining

industry, the government created institutions to assist with R&D, training, and market promotion: the Palm Oil Research Institute, Palm Oil Registration and Licensing Authority, and Malaysian Palm Oil Promotion Council. The incentives and new institutions, together with the enhancement of entrepreneurship and accumulation of skills, facilitated technological and organizational development (indigenization) that enabled optimization of processing, bulk processing and exports, and economies of scale. All of these contributed toward strengthening the industry's competitiveness ([16], p. 175). Today, Malaysia leads worldwide R&D and innovation in the palm oil industry. The country is deepening the value chain and extending it to higher value-added products, such as detergents, medicines, and bio-diesel. Local companies are the main players in the value chain ([12], pp. 136–137).

2.3.3.2 Malaysia's Automobile Industry

The automobile industry's development process in Malaysia between 1970 and 2000 can be divided into two phases. The first phase started with a policy to promote an integrated automobile industry. The government targeted an increase in local content in production from 10 to 35% between 1971 and 1982. However, due to the excessive number of assemblers in the small local market, it was difficult to achieve economies of scale, which resulted in high prices of cars with low levels of local content limited to tires, batteries, paints, filters, seat belts, and glass items. The second phase started in 1982 with a state-led 'national car' project for the country to become a full-fledged car manufacturer. Perusahaan Otomobil Nasional (Proton) was established in 1983 as a joint venture between HICOM (with a 70% share), Mitsubishi Motor Corporation, and Mitsubishi Corporation. This project 'became the most important instrument for heavy industrialization policy' ([33], p. 235). With strong support from the state, Proton managed to capture 77% of the domestic passenger car market and exported cars to 28 countries, accounting for 23% of total sales as of 1995. The government also initiated a second national car project named Perusahaan Otomobil Kedua (Perodua) as a joint venture between state firms and foreign firms, including Daihatsu [16].

The learning and adaptation process and its role in establishing the Malaysian automobile industry is summarized as follows by Ohno ([33], p. 236): 'Unlike neighboring countries, Malaysia took a go-it-alone approach to automobile manufacturing. It hoped to build core capacity and compete squarely in the world market instead of attracting foreign giants to form an automotive industrial base as done in most other developing countries […]. IMP II targeted the automobile industry as a vital sector in which internal development of technology and engineering know-how was top priority […].' Regarding Proton's achievements, he highlights that 'The existence of Proton as a hub of domestic car production enabled the development of local part and component makers through the Vendor Development Program. By the end of 2005, there were 4,865 automobile parts and components produced locally, and 286

suppliers in producing parts and components for Proton. […] Proton's effort at internalizing core automotive capability was admirable but not good enough to compete with global giants' ([33], p. 236).

2.3.4 Brazil

The process of industrial policy and industrialization in Brazil can be divided into four periods: the ISI-led process from the 1930s through to the mid-1950s, then a proactive industrial policy followed by heavy and chemical industries-led industrialization from the mid-1950s through the 1970s. In the 1980s and 1990s, there was increased liberalization with an emphasis on building technological capacity and competitiveness, and finally, there has been a return to industrial policies since 2004. This section focuses mainly on the second period.[2]

President Kubitschek's Plano de Metas (Plan of Targets) 1956–1961 was the first comprehensive ISI plan aimed at national economic integration. It had 30 development goals to realize the '50 years of economic progress in 5 years.' The Plan of Targets focused on energy and transport infrastructure, which were considered to be bottlenecks to development. The plan included sectoral strategies for agriculture and food (wheat production, grain storage, cold meat storage, slaughterhouses, agriculture mechanization, fertilizer), basic materials (steel, aluminum, ferrous metals, cement, chlorine, paper and pulp, rubber, iron ore export), and capital goods (automobile industry, naval construction, heavy electric materials, and machinery). Kubitschek also launched the Executive Group of Automotive Industry (GEIA), which was intended to attract foreign assemblers to install full-fledged production units in Brazil.

Experiences of increasing fiscal deficits and inflation through the mid-1960s were followed by successful macroeconomic stabilization from 1964 to 1967. Antonio Delfim Netto, the Finance Minister (1967–1974), issued the Strategic Plan of Development (PED, 1968–1970). The PED was the first to recognize the role of the National Economic Development Bank (BNDE, later National Economic and Social Development Bank: BNDES) as the leading institution of development policy. He considered that a government failure is more problematic than a market failure and approved the role of government in developing infrastructure and essential material industry. In the context of high economic growth in 1968–1973, the first National Development Plan 1972–1974 (I PND) was carried out. It focused on the construction of the infrastructure for transportation, telecommunications, and energy, created state-owned enterprises for naval construction, steel, and petrochemical industries, induced Brazilian enterprises to participate in strategic sectors, and paved the way for the triple alliance scheme of state, private, and foreign capital in industrial development. The second PND of 1974–1979 focused on basic industrial materials (steel, nonferrous metal,

[2] The following two paragraphs draw heavily on [15].

petrochemical products, fertilizer, pesticides, paper and pulp, materials for the pharmaceutical industry, nonmetal minerals, and products such as cement and sulphur), capital goods, food, and energy.

2.3.4.1 Brazil's Steel Industry

Brazil has a long history of charcoal iron production. The number of charcoal blast furnaces increased from 6 in 1925 to 134 in 1975, when iron production by charcoal amounted to 3.63 million tons. This was still higher than iron production by coke, in spite of the rapid increase of production by integrated iron and steel plants constructed in the 1950s and 1960s [39], as explained below. As such, Brazil had accumulated specific capabilities, knowledge, and specialized personnel related to iron production when the country started investing in the steel industry in earnest. Vargas created Companhia Siderúrgica Nacional (CSN), the first steel mill, in 1940, together with the Companhia Vale do Rio Doce (CVRD, later Vale), an iron ore mining firm, as well as a railway in order to transport iron ore from the center of Brazil to the Southeast, where the mill was going to be located. In the 1960s, BNDE financed about 70–80% of all capital investments in the steel industry [29].

From the viewpoint of absorbing cutting-edge technology, the development of the steel industry by another state company, Usinas Siderúrgicas de Minas Gerais S. A. (USIMINAS), is outstanding. Brazil and Japan agreed on the establishment of USIMINAS in 1957. BNDE provided much of the finance. The construction of the steel plant was carried out in cooperation between Brazil and Japan. As production partly started in 1961, three Japanese steel companies jointly dispatched nearly 500 persons to USIMINAS over the five years until 1965. By 1967, all the responsibilities of plant operation had been transferred to Brazilians. According to Dahlman and Fonseca [8], 'USIMINAS passed from know-how stage to know-why state' (163). In 1971, the National Plan for the Steel Industry was announced, and by the mid-1970s, USIMINAS had achieved blast furnace productivity comparable to that of Japan, which was the world leader during that period. USIMINAS's share of the total steel production of Brazil increased to 25% in 1976. Most significantly, USIMINAS maintained a high share of flat sheet products, which contributed substantially to the development of the shipbuilding and automobile industries in Brazil. Since the mid-1970s, USIMINAS has been in a position to provide technical assistance to other steel mills and downstream activities, such as capital goods industries. Brazil became the biggest exporter of steel products from the developing world, with a share of over 4% of total world exports in 1985 compared with only about 0.2% in the mid-1970s. USIMINAS was the first case of the privatization of a state enterprise in Brazil, taking place in 1991.

2.3.4.2 Food Value Chain in the Cerrado Region

The major regional action of the second PND was the agricultural development of the Cerrado, an area of tropical savanna in Brazil. This was initiated by the Central-West Region Development Program (POLOCENTRO, 1975–1979), followed by the Japanese Brazilian Cooperation Program for Cerrados Development (PRODECER, 1979–2001). Through these and other initiatives, Brazil achieved a significant transformation to become a top-class global exporter of grains and meat, strengthening food value chains in the Cerrado region previously considered unfit for agriculture. For this process, it was essential that soil management technologies be improved and new crop varieties suited to tropical zones be developed ([20], pp. 14–17). To address these needs, the Brazilian government judged that it was necessary to establish a public organization to foster the necessary technological innovations. The Brazilian Agricultural Research Corporation (EMBRAPA) was established in 1973, and EMBRAPA's Cerrado Agricultural Research Center (CPAC) achieved success very early. Financial resources were provided by the government and international cooperation programs ([19], p. 5). Together with the development of food value chains, the public–private partnership for the learning and innovation ecosystem in clusters of the value chain networks has been strengthened. This ecosystem involves farmers, providers of agricultural and agro-industrial inputs, food processing plants, traders, and other stakeholders ([19], pp. 23–24).

2.3.5 Chile

Chile's industrialization process can be divided into at least three phases: government-led ISI from 1938 to 1973, a liberalization and export- and FDI-led process in the 1970s and 1980s, and a renewed horizontal policy-led process in the 1990s and onward. This section focuses mainly on industrial policies of the 1970s through to the 1990s.

According to Agosin et al. [2], 'the import substitution stage of Chilean development (roughly from 1938 to 1973) saw an increasing emphasis on industrial policy.' Not only did the government protect domestic industry through high tariffs, but in addition, state agencies became the most important entrepreneurs in sectors such as steel, petroleum extraction and processing, sugar, electricity, and telecommunications. Agosin et al. [2] consider that, 'contrary to conventional thinking, many of these proved profitable.' The Corporación de Fomento de la Producción (CORFO)—a development agency established in 1939 with broad attributions including taking on the role of a development bank—was in charge of implementing the industrial policy (5).

Since the mid-1970s, the government started liberalizing trade and FDI, as well as privatization. The government removed practically all restrictions on FDI. DL 600 (a foreign investment law) was introduced in 1974. Under this law, foreign investors settled contracts with the Chile Foreign Investment Committee, which guaranteed the

application of provisions of DL 600. The government recognized the critical externalities of generic export promotion. Thus, early on, ProChile, an agency attached to the Ministry of Foreign Affairs, was set up to carry out such activities. However, most of the policies implemented in the second phase were of a horizontal nature. Since 1973 and until very recently, Chile basically eschewed vertical industrial policies with very few but significant exceptions ([2], p. 6).

In the period of the 1990s and 2000s, the government deployed myriad instruments of industrial policy, mainly through CORFO, but also through other institutions such as ProChile and even the line ministries. According to Agosin et al. [2], most policy instruments, including those of CORFO, were horizontal programs involving market interventions (through taxes or subsidies). They further state that, since the early 2000s, this insistence on horizontality has been giving way to a more realistic appraisal of the need to achieve a critical mass in the provision of government support. Today, Chile's most exported products, after copper, are salmon, forestry products, fresh fruits, and wine. This section discusses the salmon industry and forestry sectors, promoted mainly by vertical industrial policies.

2.3.5.1 Forestry Products Industry in Chile

One of the areas that the Chilean government has targeted most explicitly is the forestry sector through a mix of policy interventions, including laws, incentives, subsidized credit lines and other tools to attract private investments in the sector [25]. The military government made a strategic bet on a non-existent but potentially profitable sector. It had long been known that radiata pine grew faster in certain parts of Chile than practically anywhere else in the world. In effect, the authorities resolved a coordination problem, which allowed this sector to take off. In 1965 the Chilean government created the Forestry Institute, a technological research institute attached to the Ministry of Agriculture and the country's first institution responsible for conducting R&D in the forestry sector, specifically in areas of forestry economics and wood-related technologies ([2, 25], p. 7).

The Chilean authorities have successfully targeted the forestry sector through several tools and legal interventions. One of them was Decreto Ley 701, which granted cash subsidies amounting to 75% of the costs of planting and the initial management of forests. The Central Bank provided incentives and subsidized credit lines for investments in the forestry sector between 1974 and 1979 ([25], p. 19). Measures were also taken to ban the exploitation of forest trees younger than 18 years old, as well as the export of raw wood and debarked logs. These measures benefited the domestic cellulose and paper industries, which took advantage of low raw material prices. Another intervention—less vertical in its design but beneficial to the forestry sector in particular—was a program of debt-equity swaps introduced in 1985. Investments made as a part of the debt-equity swaps program stimulated the industrial processes needed to transform the developing forestry sector through value-added wood products.

2.3.5.2 Chile's Salmon Industry

Agosin et al. [2] affirmed that there was only one institution in Chile devoted to making strategic bets, Fundación Chile (FCh), in the 1970s and 1980s. Its most outstanding project was the salmon industry. Salmon did not exist in Chile until the 1970s. Today, Chile is one of the world's top salmon-exporting countries, on par with Norway. The salmon industry did not develop through voluntary private-sector investments from the outset. Market failure was averted by FCh and the Japan-Chile salmon project. FCh made an investment large enough to produce salmon through sea farming on a significant scale (one-thousand-ton program) and recouped this investment. FCh thus demonstrated the commercial profitability of large-scale sea farming in 1988 ([17], pp. 51–52). Furthermore, as a public good, it provided the technology to farm salmon for free or for a fee so as to allow many companies to invest in the salmon industry without having to make a sizable investment in R&D.

FCh, following this successful achievement, decided to sell the venture through international bidding. Nissui, one of the major Japanese fisheries, won the bid and became a pioneer in introducing advanced salmon processing technologies. Chile, in its ascendance as a world producer, has formed a full-fledged, overarching salmon value chain covering each phase from the production of salmon farming and a whole system of upstream goods and services (especially R&D) to processed products, marketing and export. In 2008, processed products accounted for 63% of total salmon exports of Chile. The Japan-Chile salmon project, implemented under an agreement between Chilean and Japanese governments for 20 years from 1969, provided technology and personnel trained by the project, which allowed private salmon firms to save on the cost of investment in R&D and training of industrial personnel.

2.4 Comparison of Industrial Policies in Key Areas: Insights from Country Experiences

Drawing on the case studies of Sect. 2.3[3] as well as the related literature reviewed in Sect. 2.2, I will compare the industrial policies of the five countries, focusing on key areas such as major industrial policy instruments, policy formulation and implementation, and public–private relations as shown in Table 2.1. First, essential industrial policy instruments in these countries will be compared. Regarding policies related to the supply-side, crucial areas covered in the literature are technology, long-term finance (development banks), and firm capabilities, particularly of SMEs for supporting industry. In relation to these, policies toward FDI will be discussed together because FDI normally provides technology and finance. Second, policies related to the demand side, competition in the domestic market, scheduled trade liberalization, and export promotion will be discussed. Third, public–private relationships in the process of policy formulation and implementation will be compared.

[3] Some findings not mentioned in Sect. 2.3 are referred to in this section.

2.4.1 Technology, Long-Term Finance, and FDI

Policies related to FDI, considered an effective vehicle for acquiring foreign technology and finance, differed widely between the countries. Korea and Japan were reluctant to count on FDI during the HCI drive, when FDI was not very widespread globally. ASEAN countries, which started HCI later, actively attracted FDI. Chile's process was FDI-led from the mid-1970s onwards. Brazil opted for a hybrid approach, both attracting FDI and promoting indigenous technology development together with establishing a powerful development bank. Combinations of these two were different among the diverse industrial sectors in Brazil.

Japan and Korea needed to import foreign technologies through licensing. Efforts to absorb such technologies with adaptation and proper innovation were comprehensive and far-reaching. Governments promoted and systematically supported indigenous technological development. For instance, in Korea, as Lim [26] states, 'the government established the Korea Institute of Science and Technology (KIST) in 1966 and the Korea Advanced Institute for Science and Technology (KAIST) in 1971.' Following this, 'it passed the Technology Development Promotion Law in 1972, providing tax and other incentives to encourage private-sector R&D. It also established five industry-specific research institutes in shipbuilding, electronics, machinery, metal, and chemical industries, according to the Specialized Research Institute Promotion Law of 1973' (10). In Japan, in addition to a similar systematic approach by the central government, efforts to support the technological development of SMEs are worth mentioning. As Andreoni [5] states, *Kosetsushi* (public testing/research laboratories) are run by regional governments (prefectures), providing support for local SMEs with a variety of quasi-public good technologies for testing, trial production, and scale-up, as well as training services. He further states that 'a number of sector-focused centers also support SMEs in the adoption of new advanced technologies and conduct joint applied research' (269).

In Brazil, the provision of technology has differed greatly between sectors—for example, automobiles, airplanes, and electronics. While FDI was the major driver in Brazil's automobile industry, as was the case for most of the ASEAN countries, indigenous technological development was the main vehicle in the case of airplane production by EMBRAER (Empresa Brasileira de Aeronáutica), which became one of the world's top airplane manufacturers. On the other hand, the 'unfortunate case of the electronics and informatics industry illustrates an ineffective industrial policy where the government just provided companies with protected local markets but did not extend support to basic research or human resource development' ([15], pp. 122–125; see also [1], pp. 16–18).

Regarding Malaysia, Jomo [23] concludes that, 'through various generous incentives, the government has sought to encourage investments in higher value-added economic activities as well as research, design and developing activities. Government policy has also created a range of institutions and programs to promote research activities, especially in the public sector, besides facilities and incentives for private-sector research and development. Although such government efforts have met with

limited success, there is evidence of significant technological progress in Malaysian manufacturing in recent decades' (xxiii).

The governmental role in R&D could be essential in the initial phase for the development of new industries, particularly when it is risky and/or costly for private companies to invest in the R&D required for such industries. The cases of Cerrado agriculture with the food value chain in Brazil and the salmon farming and processing industry in Chile are clear examples: R&D by EMBRAPA and a public–private entity, Fundación Chile, undertook the pioneering role of providing technology as a public good.

Regarding long-term finance, JDB played a crucial role in Japan. Commercial banks were important providers of finance as well. As Shimada [37] highlighted, JDB had, among other aspects, the following critical features: (i) it 'had autonomy to decide its lending based on its own appraisal, and without political bias' (166–167); and (ii) because of the complementarity among industrial sectors financed by JDB, 'the loans were used as a kind of subsidy to the target industries with "crowding-in effects" in mind […]. The complementarity or spillover effects among sectors are one of the important characteristics of the JDB loan' (167–168); (iii) a JDB loan sent 'an important signal to private banks (the *signaling effect* of the government's industry policy) to provide loans. JDB loans catalyzed loans from private banks by lowering the risk' (169; emphasis in original).

In Korea, the government established the National Investment Fund (NIF) to finance long-term investment in HCIs in 1973. Government-controlled banks also supported the HCI drive by providing policy-oriented loans on favorable terms ([26], p. 9). Gustafsson [14] affirms that 'the Malaysia government has not used development banking as extensively as South Korea has' (48).

In Brazil, the role of BNDES (former BNDE) was pivotal to remedying private financial institutions' short-term and risk-averse attitudes: 'Private bank loans are not only scarce and volatile in terms of volume, but they are also high-cost, and their loans are strongly skewed to the short maturity segment.' Moreover, 'BNDES has been central to industrial policy formulation with qualified technical staff and technical autonomy' [15]. In this regard, Ferraz and Coutinho [11] claim that 'BNDES had technical autonomy, namely a collective capacity to approve or reject projects based exclusively on an explicit project and credit evaluation criteria […]. It is widely accepted that BNDES has high competency to examine the eligibility of borrowers on a purely technical basis' [15].

As far as technology, long-term finance, and FDI are concerned, both horizontal and vertical instruments have been implemented in countries of case studies of Sect. 2.3. They have usually been complementary. Vertical industrial policy measures responded to each sector closely and enhanced the effectiveness of industrial policy, especially when the industrial policy was formulated with in-depth information about each sector, obtained through public and private partnerships [15, 45].

2.4.2 Firm Capabilities, Especially of SMEs

Strengthening firm capabilities and nurturing industrial human resources are among the most critical aspects of industrial policies, with an emphasis on learning for strengthening production capacity. In addition to presenting a standard policy menu for industrial capability enhancement (referred to in Sect. 2.2), Ohno [33] highlights six industrial policy measures among the most popular policy instruments for enhancing industrial capability in East Asia: *Kaizen* (quality and productivity improvement at factories), *Shindan* (enterprise management consultant system), engineering universities and technical colleges, TVET-industry linkages, industrial estates, and strategic FDI marketing (63–64, 65–80).

A SME policy is one of the most widely implemented policy packages for firm capability enhancement. In most East Asian countries, comprehensive SME support systems have been established. Both horizontal policies and vertical policies show effective results. Among the horizontal policies, a very widely applied approach is the introduction of the *Kaizen* method and several management systems based on *Kaizen* [21].

Among vertical policies, initiatives to strengthen automobile parts industries consisting largely of SMEs are worth mentioning. For industries that are dependent on thousands of parts, such as the automobile industry (which can involve 30,000–40,000 parts) as well as other machinery industries, the capabilities of parts suppliers are essential. To enhance the competitiveness of the automobile industry, both horizontal policies to support SMEs and vertical policies to promote key sectors for supporting industry are required. In Japan, the Act on Temporary Measures for the Promotion of Machinery Industry was very effective in this regard, as discussed below (see Sect. 2.4.4). In Malaysia, the government launched the Vendor Development Program (VDP), under which multinational and local 'anchor companies' would provide guaranteed purchasing contracts and technical assistance to local vendors, who would also receive subsidized finance from local banks and technical support from government institutes ([9], pp. 73–74).

2.4.3 Competition in Domestic Markets, Scheduled Trade Liberalization, and Export Promotion

In cases of industrial sectors requiring economies of scale, including the steel industry, petrochemical industry, and automobile industry, the size of the market matters. Domestic markets, together with (or without) export markets, need to be large enough to take advantage of the economies of scale. Given sufficient size, even if the domestic market is protected, domestic firms will be encouraged to improve their competitiveness when they face competition in domestic markets and/or trade liberalization is reasonably scheduled.

Export promotion was one of the most widely implemented approaches of industrial policies among all the countries studied. Korea introduced a number of measures to facilitate export-oriented industrialization. The short-term export credit system had been streamlined as early as 1961, with the automatic approval of loans to those with an export letter of credit (L/C). This allowed businesses to have access to trade financing without having to put up collateral. The government established the Korea Trade Promotion Corporation (KOTRA) in 1962. The government also gave exporters various tax deductions, tariff exemptions, and concessional credits: 'These subsidies took the form of performance-based rewards in a competitive setting rather than handouts with no strings attached' ([26], p. 75). After 1964, then-President Park Chung Hee chaired monthly export promotion meetings (for details of these meetings, see the next section).

In Japan, the mainstream vision in the mid-1950s was to promote both exports and domestic sales. Johnson [22] cites a Japanese analyst, who argued that 'the only industries in which we have seen export increase induce a production increment—instead of the other way round—are transistor radios and perhaps cameras. […] Export increases of all our other products have been induced mainly by expansion of the domestic market' (230). The Supreme Export Council and JETRO were created in 1954 and 1958, respectively. Scheduled trade liberalization and efforts to strengthen competitiveness to cope with liberalization became one of the main agendas of industrial policies of the 1960s.

In Chile, ProChile has been one of the main instruments of Chile's horizontal industrial policies from the late 1970s and onward. Today, ProChile is considered one of the most effective institutions for export promotion in Latin America.

2.4.4 Formulation and Implementation of Industrial Policies and the Public and Private Relationship

In Japan, the Industrial Structure Council is the central body of industrial policy formulation. Under the umbrella of this council, many subcommittees for specific industrial sectors have been set up. For different issues of industrial development, specialized committees have also been established. Representatives of the government—generally from the Ministry of International Trade and Industry (MITI)—enterprises, and academics participate in meetings of these organizations. Wada [45] states that the formulation and implementation of sectoral industrial policy during the rapid growth period was carried out through collaboration with companies and industrial associations, instead of strong government-led power. Many policies have been formulated as an outcome of the collaborative work of the government, enterprises, and sector associations. They share knowledge of issues and challenges of each sector and collaborate in the process of implementation of policies. Sectoral industrial policies are formulated based on the in-depth analysis of very distinct sector-specific challenges. In this regard, the case of the Act on Temporary Measures

for the Promotion of Machinery Industry could be among the most representative. For the automobile parts sector, 42 main parts (26 at the inception) were selected and rationalization plans for each of the parts were prepared through the collaboration of public and private sectors. The participation of many stakeholders made the process of formulation and implementation of plans very transparent. The policies implemented by this law (1956–1970) were successful due to the cooperation of the public and private sectors, as well as networks among firms working effectively ([32], pp. 14–15).

In Korea, where exports were one of the top priorities of industrial policy, export promotion meetings attended by President, high-ranking government officials, and business representatives functioned as an effective platform for public–private collaboration. Lim [26] states that 'these meetings provided a forum to monitor progress and devise institutional innovations and solutions to emerging problems' (76). Export insurance was one of many institutional innovations that were introduced as a result of recommendations from monthly export promotion meetings. Lim emphasizes that, 'most importantly, Korea adopted an integrated approach to export promotion, with comprehensive and interrelated measures, policies, and institutions' (76). Regarding public–private coordination, Lim concludes that;

> the government formulated indicative plans at the national level but delegated much of their implementation to business groups, which in turn tried to coordinate productive activities at the group level in addition to engaging in market transactions. Based on close public-private consultations and performance-based rewards, this two-tier approach to coordination helped to address information and incentive problems. [...] Korea maintained an outward-oriented, bottom-up, and integrated approach, relying on close public-private consultation and international benchmarking. While continuing to pursue export-oriented industrialization for its resource allocation, scale economies, and dynamic learning effects, the government and the *chaebol*[4] systematically studied what had to be done to fill the missing links in the domestic value chain and move up the quality ladder through technology acquisition, human resource development, and construction of optimal-scale plants aimed for the global market. ([26], p. 84)

Public and private collaboration through different types of partnerships provided a platform for learning about industrial policies due to the fact that government, public organizations, enterprises and their associations, and other stakeholders exchanged information and co-created innovative solutions. Learning, adaptation, and innovation are inherent in this process, as highlighted by Wada [45] in the case of Japan. Mainly due to public and private partnerships at different levels from deliberation councils to meetings of specific industry stakeholders, '[w]ith 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' (167). In-depth information on sector-specific idiosyncrasies was indispensable in formulating industrial policy measures appropriate for specific industrial

[4] A *chaebol* is a large family-owned industrial conglomerate with diversified affiliates in South Korea.

sectors. Wada [45] also refers to the viewpoint of the horizontal bureaus as follows: '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' (167).

Page, one of the authors of the World Bank [46] *The East Asian Miracle*, emphasizes the importance of formal deliberation councils established in five of the High Performing Asian Economies (HPAEs)—Hong Kong, Japan, Korea, Malaysia, and Singapore. He considers that they probably improved coordination among firms and the flow of information between businesses and government: 'Politically, they helped establish a shared commitment to growth and reduced rent-seeking. Information sharing made it harder for firms to carry special favors from the government and for government officials to grant special concessions' ([35], p. 49). He affirms that few Latin American economies have applied these lessons of institutional development. Based on experiences of these economies, Fernández-Arias et al. [10] state that, 'In some countries, such as Costa Rica, business is expected to be near the policy design process on matters that affect it directly. In others, such as Chile, government (especially high-level officers) keeps a distance. As a result, policies in Chile tend to be top-down, while policies in Costa Rica tend to follow a more participatory, bottom-up approach' (377).

2.5 Translative Adaptation and Local Learning: Insights from Country Experiences

The literature coincides on the importance of learning and enhancement of capabilities of governments, firms, and industrial human resources (workers, managers, and others) to be successful in industrial policy implementation, as well as in industrialization, as stated in Sect. 2.2. In this regard, the case studies of Sect. 2.3 revealed that the processes of learning, adaptation, and local innovation effectively took place in all 10 cases of transformative industrial development.

The processes are characterized by (i) attention to the uniqueness of each country and society, (ii) country ownership with the proactive roles of governments and private sector development, and (iii) process orientation through trial and error, and the establishment of systems that correspond to the stages of learning, adaptation, internalization, and scaling up. These are key ingredients of 'translative adaptation and effective local learning' identified in Chap. 1.

As summarized in the left-hand side column of Tables 2.2, 2.3, and 2.4, the countries were aware of their uniqueness from the perspective of the industrialization process, development of their respective industries, and endowment of knowledge/technology/capability and natural resources, as well as other idiosyncratic factors including geographic location.

Table 2.2 Steel industry: learning, adaptation, and innovation, and key ingredients of 'translative adaptation and effective local learning'

	Attention to the country's uniqueness	Country ownership (proactive roles of the government and the private sector)	Process orientation with trial and error (stages of learning, adaptation, internalization, and scaling-up)
Japan	Need to introduce cutting-edge technology as well as attain economies of scale, and import iron ore at lower cost	Steel industry rationalization plans addressing the country's uniqueness; long-term finance; eagerness of the private sector	Substantial improvement of technology; location of steel mills in coastal areas and introduction of iron ore carriers
Korea	Need to catch-up from scratch; need to play the role of one of the leading industries for HCI drive with linkages to other essential industries	Strong ownership of the country establishing POSCO with the President's leadership	Intensive learning through POSCO construction phase; improvement of absorbed technology
Brazil	Rich endowment of iron ore and technology of charcoal blast furnaces; need to introduce integrated steel plants and construct infrastructure for iron ore transport	Strong ownership of the country establishing CSN, USIMINAS, and other state steel plants, as well as CVRD; long-term finance by BNDES	Intensive learning of technology through USIMINAS construction phases and its dissemination to other state steel plants

Source Created by the author

In all cases, as concisely indicated in the central column of Tables 2.2, 2.3, and 2.4, ownership of the countries was conspicuous and the proactive roles of the governments were generally strong. Industrial policies to support development of the respective industries were comprehensive and generally effective as discussed in Sect. 2.4. In some cases, state-owned companies were established (to be privatized later), and in other cases, institutions or agencies were created to promote the development of specific industries.

A continuous process of learning, adaptation, internalization, and innovation took place, mainly through repeated trial and error, as summarized on the right-hand side of Tables 2.2, 2.3, and 2.4. At the advanced phases of the process, most of the countries achieved outstanding cutting-edge technologies, in many cases attaining innovative solutions to address the respective challenges they faced.

As mentioned above, three columns of Tables 2.2, 2.3, and 2.4 correspond to the three key ingredients of the process of 'translative adaptation and effective local learning,' as identified in Chap. 1. Therefore, the development of selected industries in the five countries could be considered cases of 'translative adaptation and effective local learning.'

Furthermore, we can identify some notable aspects of industrial policy that facilitated learning, adaptation, and innovation, as well as enhancing the capabilities of

Table 2.3 Automobile industry: learning, adaptation, and innovation, and key ingredients of 'translative adaptation and effective local learning'

	Attention to the country's uniqueness	Country ownership (proactive roles of the government and the private sector)	Process orientation with trial and error (stages of learning, adaptation, internalization, and scaling-up)
Japan	Need to attain higher quality and productivity for liberalization of imports and become competitive in international markets; develop supporting industry; address low quality roads and highways	Scheduled liberalization of automobile imports and foreign direct investment in car industries; supporting industry promoted by the Temporary Measures for the Promotion of Machinery Industry; 'K cars;' long-term finance	Introduction and continuous improvement of TQM and other *Kaizen*-based management approaches, later achieving higher productivity than other automobile industry countries
Korea	Need to develop the car industry from scratch, attaining scale economy (limited size of domestic market) through exports from early development phase	Ambitious long-term plan with targets of integrated production of national cars based on original models, parts production and assembly with competitiveness in exports	Intensive learning by Hyundai achieving scale economy and competitiveness for export
Malaysia	Need to promote car industry to create a broad industrial base and assist Malay workers and Bumiputra firms; need to achieve scale economy and higher level of local contents	Strong ownership of the country with a state-led 'national car' project to become a full-fledged car manufacturer; enhancing supporting industry through the Vendor Development Program	Great efforts of Proton to 'internalize core automotive capability;' development of around 300 car suppliers to provide about 5,000 parts and components

Source Created by the author

governments, firms, and industrial personnel from the above-mentioned case studies. The following aspects are among the most important.

First, the capacity for policy learning by governments was strengthened significantly through mutual learning between government and firms and other stakeholders involved in industrial development. The private sector also benefitted from mutual learning in this process. Deliberation councils were effective platforms for public–private mutual learning, and their importance was emphasized by the World Bank's *East Asian Miracle* study. The Industrial Structure Council and its affiliate committees in Japan, as well as export promotion meetings in Korea and Japan were well known examples. The government was able to understand the actual activities of each specific industry and was capable of formulating and implementing effective industrial policies through intensive learning among these platforms. In Brazil and Chile,

Table 2.4 Resource-based industries: learning, adaptation, and innovation, and key ingredients of 'translative adaptation and effective local learning'

	Attention to the country's uniqueness	Country ownership (proactive roles of the government and private sector)	Process orientation with trial and errors (stages of learning, adaptation, internalization, and scaling-up)
Malaysia: Palm oil industry	Need to establish competitive palm oil refining industry and produce higher value-added products	Strong ownership creating institutions to promote the industry: Palm Oil Research Institute and others	Leads worldwide R&D and innovation, and value chain of high value added products: detergents, medicines, and bio-diesel
Brazil: Grain and food value chain	Need to promote sustainable agriculture in the Cerrado and to develop Central west region	Strong ownership of the country establishing EMBRAPA, and providing long-term finance	Development of soil management and new crop varieties suited to tropical zones and their dissemination; continuous R&D and innovation
Chile: Forestry products industry	Possibility of developing competitive forestry production based on radiata pine trees	Strong ownership of the country establishing Forestry Institute for R&D, providing finance and several incentives, and discouraging export of raw wood	Development of higher value-added wood products and expansion of their exports, as one of the most important non-copper export segments
Chile: Salmon farming and processing industry	Possibility of developing competitive salmon farming due to favorable natural conditions	A public–private joint venture, Chile Foundation's investment in R&D and in a pioneering company to produce at scale	Improvement of salmon farming and processing technologies; establishing salmon value chain, and exporting processed products

Source Created by the author

some public entities such as BNDES and CORFO were crucial for these countries' policy learning and contributed to industrial development.

Second, in most of the above-mentioned cases, public or semi-public institutions for promotion of new industries and/or for their technological development (such as government agencies and departments, development banks, R&D institutions, industry associations, and chambers of commerce drawing from Andreoni [5]) were established. The case studies reveal that reasonably good institutional 'islands' can be highly effective when created for specific purposes, as distinct from an overhaul of the entire institutional structure. In particular, specialized institutions, with or without diverse incentives, achieved significant learning, adaptation, and innovation. For example, specialized R&D institutions carried out many indigenous learning

and innovation initiatives to address the distinct challenges that each country faced. They shared know-how and technology as a public good with private companies. This process substantially enhanced the productive capacity of newly established industries.

2.6 Concluding Remarks

As discussed in Sect. 2.2, in order to carry out a comparative analysis of industrial policies and industrialization among countries, it is necessary to classify both the industrial policy measures/instruments and the processes in which these policies are formulated and implemented. Bearing these classifications in mind, this chapter conducted case studies of the experiences of five countries from Asia and Latin America (Sect. 2.3). The development of the selected industries of these countries that contributed significantly to their transformation was not achieved in a laissez-faire market. In all cases, vertical (or selective) policies have been applied, in addition to horizontal policies applicable to all industrial sectors.

From the experiences of these countries, it is highly evident that what matters for industrial development is which combination of industrial policy instruments is appropriate in different circumstances, given sector-specific characteristics (sector-specific idiosyncrasies) and challenges, and how these policies are formulated and implemented. Regarding the combination of policy instruments, horizontal and vertical instruments have generally been complementary. Furthermore, horizontal policy instruments have not always been neutral for all industries. They have very often had stronger impacts on some sectors than others. On the other hand, as each industrial sector has its own specialties, a sectoral (vertical) industrial policy can respond to each sector closely and enhance the effectiveness of the industrial policy. Regarding the formulation and implementation of industrial policies, public–private partnerships are extremely important, as discussed in Sects. 2.2 and 2.4, based on recent literature and confirmed by the case studies.

The case studies of this chapter provide some valuable insights into the concept of the 'translative adaptation and effective local learning' discussed in Chap. 1. The case studies show that the countries were aware of their uniqueness from the perspective of the industrialization process, development of their respective industries, and endowment of knowledge/technology/capability and natural resources, as well as other idiosyncratic factors. Accordingly, industrial policies introduced by these countries were diverse because they were formulated taking into account their unique potential. This diversity could be considered compelling evidence of local learning and translative adaptation effectively advanced in these countries. Generally, in the process of developing the above-mentioned industries, public–private collaboration, through partnerships between the government, firms, their associations, research institutions, and other stakeholders, has been essential in learning, adaptation, and innovation. In this process, both policy learning and societal learning as well as adaptation—as emphasized in Chap. 1—took place. Public or semi-public institutions established

for promotion of new industries and/or for their technological development were highly effective in, for example, carrying out many indigenous innovation initiatives to address the distinct challenges that each country faced.

References

1. Agosin M, Fernández-Arias E (2014) Rethinking productive development. In: Crespi G, Fernández-Arias E, Stein E (eds) Rethinking productive development: sound policies and institutions for economic transformation. IDB, Washington, DC, pp 3–31
2. Agosin M, Larraín C, Graú N (2010) Industrial policy in Chile. IDB Working Paper Series. IDB-WP-170
3. Aiginger K, Rodrik D (2020) Rebirth of industrial policy and an agenda for the twenty-first century. J Ind Compet Trade 20:189–207
4. Amsden A (1989) Asia's next giant: South Korea and late industrialization. Oxford University Press, New York
5. Andreoni A (2017) Varieties of industrial policy: models, packages, and transformation cycles. In: Noman A, Stiglitz JE (eds) Efficiency, finance, and varieties of industrial policy: guiding resources, learning, and technology for sustained growth. Columbia University Press, New York, pp 245–305
6. Cimoli M, Dosi G (2017) Industrial policies in learning economies. In: Noman A, Stiglitz JE (eds) Efficiency, finance, and varieties of industrial policy: guiding resources, learning, and technology for sustained growth. Columbia University Press, New York, pp 245–305
7. Crespi G, Fernández-Arias E, Stein E (2014) Rethinking productive development: sound policies and institutions for economic transformation. IDB, Washington, DC
8. Dahlman C, Fonseca FV (1987) From technological dependence to technological development: the case of the USIMINAS steel plant in Brazil. In: Katz J (ed) Technological generation in Latin American manufacturing industries. Macmillan Press, London, pp 154–182
9. Felker G, Jomo KS (2007) Investment policy in Malaysia. In: Jomo KS (ed) *Malaysian industrial policy*. National University of Singapore Press, Singapore, pp 35–55
10. Fernández-Arias E, Trejos A, Stein E (2014) Two to tango: public-private collaboration. In: Crespi G, Fernández-Arias E, Stein E (eds) Rethinking productive development: sound policies and institutions for economic transformation. IDB, Washington, DC, pp 359–389
11. Ferraz JC, Coutinho L (2019) Investment policies, development finance, and economic transformation: lessons from BNDES. Struct Chang Econ Dyn 48:86–102
12. Goto K (2019) *Azia keizai towa nanika: Yakusin no dainamizum to nihon no katuro* [What is the Asian economy?: dynamism of breakthrough and the way forward for Japan]. Chuko-shinsyo 2571. Chuokoron-Shinsha, Tokyo
13. Greenwald B, Stiglitz J (2012) Learning and industrial policy: implications for Africa. Paper presented to an International Economic Association Roundtable Conference on New Thinking on Industrial Policy: Implications for Africa, Pretoria, July 2012
14. Gustafsson F (2007) Malaysian industrial policy, 1986–2002. In: Jomo KS (ed) *Malaysian industrial policy*. National University of Singapore Press, Singapore, pp 35–55
15. Hamaguchi N (2022) Industrial policy and structural transformation of Brazilian economy. In: Ohno I, Amatsu K, Hosono A (eds) *Policy learning for industrial development and the role of development cooperation*. JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, pp 151–201
16. Hasan H, Jomo KS (2007) Investment policy in Malaysia. In: Jomo KS (ed) *Malaysian industrial policy*. National University of Singapore Press, Singapore, pp 56–81
17. Hosono A (2016) The Chilean Salmon industry takes off: from the commercialization to the early development phase. In: Hosono A, Iizuka M, Katz J (eds) Chile's Salmon industry: policy challenges in managing public goods. Springer, Tokyo, pp 45–75

18. Hosono A, Hamaguchi N (2001) Experiences of technological partnership of Japan with the overseas: the case of steel industry. Kobe Economic and Business Review 46:27–46
19. Hosono A, Hamaguchi N, Bojanic A (2019) Innovation with spatial impact: sustainable development of the Brazilian Cerrado. Springer, Tokyo
20. Hosono A, Campos da Rocha CM, Yutaka Hongo A (2016) Development of sustainable agriculture: the Brazilian Cerrado. Palgrave Macmillan, New York
21. Hosono A, Page J, Shimada G (eds) (2020) Workers, managers, productivity: Kaizen in developing countries. Palgrave Macmillan, Singapore
22. Johnson C (1982) MITI and the Japanese miracle: the growth of industrial policy, 1925–1975. Stanford University Press, Stanford
23. Jomo KS (2007) Malaysian industrial policy. National University of Singapore Press, Singapore
24. Kohama H (2001) *Sengo Nihon no sangyō hatten* [Industrial development of postwar Japan]. Nippon Hyoronsha, Tokyo
25. Lebdioui A (2019) Chile's export diversification since 1960s: a free market miracle or mirage. Dev Chang 50(6):1624–1663
26. Lim W (2012) Chaebol and industrial policy in Korea. Asian Econ Policy Rev 7(1):69–86
27. McMillan M, Page J, Booth D, Willem te Verde D (2017) Supporting economic transformation: an approach paper. Overseas Development Institute, London
28. Mizuno J (1996) *Kankoku no zidōsya sangyō* [Automobile industry of Korea]. Institute of Developing Economies, Tokyo
29. Musacchino A, Lazzarini SG (2014) State-owned enterprises in Brazil: history and lessons. Mimeo. OECD, Paris
30. Noman A, Stiglitz JE (eds) (2015) Inustrial policy and economic transformation in Africa. Columbia University Press, New York
31. Noman A, Stiglitz JE (eds) (2017) Efficiency, finance, and varieties of industrial policy: guiding resources, learning, and technology for sustained growth. Columbia University Press, New York
32. Odaka K (2013) Kishin hō to zidōsya buhin: Kōdo seityō-ki ni okeru sangyō-seisaku no keizaiteki kōka ni tuite [Act on temporary measures for the promotion of machine industry and automobile parts: economic effect of industrial policy in the high growth era]. In: Odaka K, Matsusima S (eds) Maborosi no sangyō seisaku: Kisinhō [Illusions of an industrial policy: act on temporary measures for the promotion of the machine industry]. Nikkei Business Publications, Tokyo, pp 75–105
33. Ohno K (2013) Learning to industrialize: from given growth to policy-aided value creation. Routledge-GRIPS Development Forum Series. Routledge, London
34. Okuno M, Suzumura K (1984) Honsyo no matome [Conclusion of the book]. In: Komiya R, Okuno M, and Suzumura K (eds) Nihon no sangyō seisaku [Japan's industrial policy], pp 479–85. University of Tokyo Press, Tokyo
35. Page J (1997) The East Asian miracle and the Latin American consensus: can the Twain ever meet? In: Birdsall N, Jaspersen F (eds) Pathways to growth: comparing East Asia and Latin America. IDB, Washington, DC, pp 13–49
36. Primi A (2015) The return of industrial policy: (what) can Africa learn from Latin America? In: Noman A, Stiglitz JE (eds) Industrial policy and economic transformation in Africa. Columbia University Press, New York, pp 162–196
37. Shimada G (2017) Inside the black box of Japan's institution for industrial policy: an institutional analysis of the development bank, private sector, and labor. In: Noman A, Stiglitz JE (eds) Efficiency, finance, and varieties of industrial policy: guiding resources, learning, and technology for sustained growth. Columbia University Press, New York, pp 245–305
38. Stein E (2014) A conceptual framework for productive development policies. In: Crespi G, Fernández-Arias E, Stein E (eds) Rethinking productive development: sound policies and institutions for economic transformation. IDB, Washington, DC, pp 33–58
39. Taniguchi R, Serizawa Y (1982) Brazil no mokutan-seitetu [Charcoal ironmaking in Brazil]. Tetu to Hagane [Iron and Steel] 15:22–30
40. Toda H (1986) Gendai sekai tekkōgyō-ron [Theory of world steel industry]. Bunshindo, Tokyo

41. Tsuruta T (1984) Kōdo seityō ki [The era of high rate of growth]. In: Komiya R, Okuno M, Suzumura K (eds) Nihon no sangyō seisaku [Japan's industrial policy]. University of Tokyo Press, Tokyo, pp 45–76
42. UN (United Nations) (2015) Transforming our world: The 2030 agenda for sustainable development. https://sdgs.un.org/2030agenda
43. UNCTAD (United Nations Conference on Trade and Development) (2016) Virtual institute teaching material on structural transformation and industrial policy. UNCTAD, New York and Geneva
44. UNIDO (United Nations Industrial Development Organization) (2022) Industrial development report 2022. The future of industrialization in a post-pandemic world. UNIDO, Geneva
45. Wada M (2022) The role and characteristics of industrial policy in postwar industrial recovery and development in Japan: implications for developing countries. In: Ohno I, Amatsu K, and Hosono A (eds) Policy learning for industrial development and the role of development cooperation. JICA Ogata Sadako Research Institute for Peace and Development, Tokyo, pp 151–201
46. World Bank (1993) The East Asian miracle: economic growth and public policy. Oxford University Press, Oxford and New York
47. Yamawaki H (1984) Tekkō-gyō [Steel industry]. In: Komiya R, Okuno M, Suzumura K (eds) Nihon no sangyō seisaku [Japan's industrial policy]. University of Tokyo Press, Tokyo, pp 255–276
48. Yo I-m (2016) Kankoku no sangyō kōzō henka, sangyō hatten, sangyō seisaku [Change of industrial structure, industrial development, and industrial policy in Korea]. RIETI Discussion Paper Series 16-J-025. RIETI, Tokyo

Akio Hosono is a Senior Research Advisor of the JICA Ogata Sadako Research Institute for Peace and Development. He holds a doctorate in economics from the University of Tokyo. He served as Vice-President at Tsukuba University in Tsukuba Science City; Japanese Ambassador to El Salvador; Professor at the National Graduate Institute for Policy Studies (GRIPS) in Tokyo; Professor at the Research Institute of Economics and Business Administration, Kobe University; and Professor at the Institute of Policy and Planning Sciences, Tsukuba University. He was Senior Advisor at JICA (2007) and later served as Director of the JICA Ogata Research Institute (2011–2013). He edited and authored a number of publications including: *Workers, Managers, Productivity: Kaizen in Developing Countries* (Palgrave Macmillan 2020, co-edited); and *SDGs, Transformation and Quality Growth* (Springer 2022).