EE482 Industrialization: Role of Public and Private Sectors (Section 046401)

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Chapter 4

Industrialization in Taiwan

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Chapter 4

Economic and Industrial Development Case Study of Taiwan

4.1 Introduction

In the previous chapter, the economic and industrial development models of Japan and South Korea in the context of East Asia were presented, showcasing the potential of countries in this region to plan economic development by utilizing industrial development as a means to boost their economies. In the case of Taiwan, a pattern can be observed that is not significantly different from Japan and South Korea, particularly in terms of the government's role in selecting target industries and prioritizing export promotion. Additionally, the role of technology and innovation development is evident, with the government playing a crucial part in establishing research and development institutions, such as the Industrial Technology Research Institute (ITRI), which has a role similar to South Korea's KIST

Although Taiwan has relied on industrial production activities as the primary mechanism leading the country to a high-income level, it has started to encounter issues such as overemphasis on contract manufacturing and the problem of wage increases lagging behind labor efficiency improvements. Furthermore, the future trend of competing with China is a major concern for the Taiwanese government. Professor Chang Tai Hsieh, a globally renowned Taiwanese economist, has suggested future directions. The government needs to change its focus from manufacturing industrial and electronics products towards creating value from new industries and services. The following sections of this case study on Taiwan will cover the sequence of Taiwan's economic development and the current state of its economic system, as well as the future development direction that emphasizes expansion and value creation from the foundation of expertise in electronic product manufacturing.

4.2 The Sequence of Taiwan's Economic Development

According to the presentations by Tsai (1999), Chou (1985), and Li (1995), Taiwan's economic development strategy included government support initiatives that began in the 1960s. The Taiwanese government encouraged SMEs to collaborate with the government to achieve export-oriented goals. Initially, the focus was on import substitution through local production, and later it shifted towards export promotion, emphasizing component manufacturing and building the reputation of "Made-in-Taiwan" products.

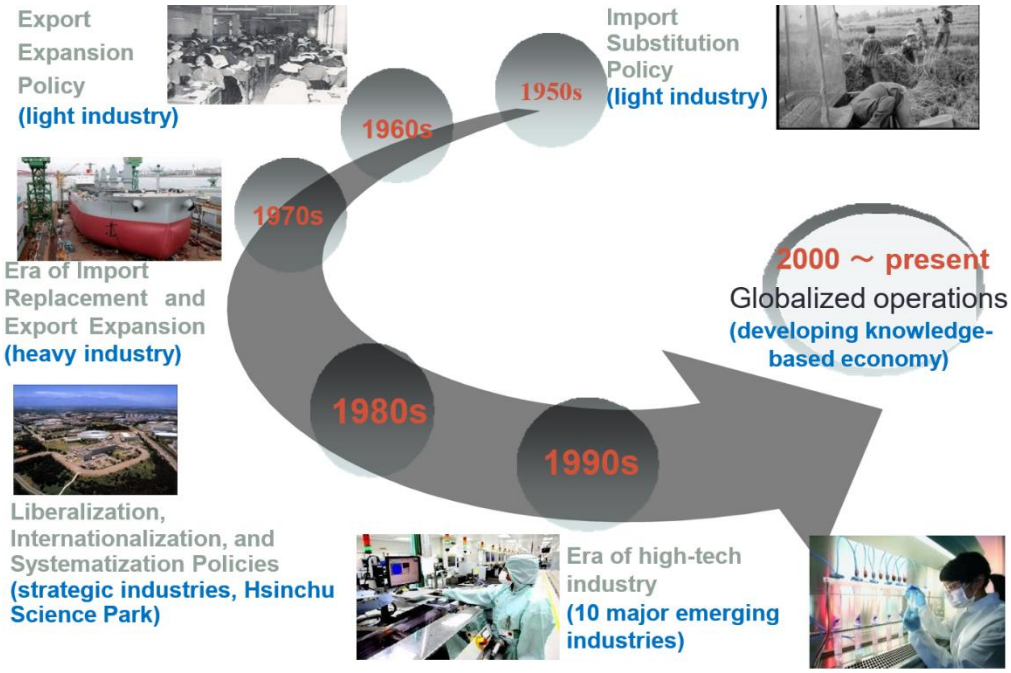

Figure 4.1: The Development of Taiwan's Economy and Trade
Source: The International Cooperation Department (ICD) of The Ministry of Economic Affairs (MOEA) (2013). The Economy of Taiwan.

Taiwan's government continually adjusted its target industries to focus on exports throughout the years 1955-2012, resulting in a 1,531-fold increase in exports during that period. This development strategy bears similarities to the approaches used by Japan and South Korea in elevating their economies through industrial development. The summary of the changes in targeted industries and export products is presented in Table 4.1.

Table 4.1: Evolution of main export products

1971~1980	1981~ 1990	1991 ~ 1999	2000 ~ 2004	2005 ~ 2006	2007 ~ 2008	2009 ~ 2012
•Decoration •Ship dismantling •Footwear •Electric fans	• Gourmet powder • Umbrella • Hat • Tennis rackets •Bicycle • ABS resin • Mini electronics • Sewing machines •Yachts • Monitors	• Scanners • Mother boards • Notebook •Computers •IC packaging • Wafer foundry	• Hub • Record Optical Disk • Mother Board • Foundry • Notebook PC • SOHO Router • LCD Monitor • WLAN • Cable Modem • DSL Modem • Optical Disk Driver • IC Packaging • Glass Fiber • Network Interface Card • ABS Copolymer • Switch • CDT Monitor	• PDA • Servers (System & Pure MB) • Mother Board • IP Phones • Notebook PC • SOHO Router • LCD Monitor • WLAN • WLAN NIC • SOHO Routers • DSL Modem • VoIP Routers • Blank Optical Disks • IC Packaging • LAN Switches • IC Foundry • Mask ROM • ABS Copolymer • Switch • Diving Suits	•Netbook •Mother Board • WLAN NIC • Servers • Notebook PC • DSL CPE • Cable CPE • LCD Monitor • PDA • IP Phone • CDT Monitor • LCD Panel • VoIP Routers • VoIP TA	• Notebook •PC •Mother Board •LCD •CDT Monitor •WLAN NIC •Digital Line (DSL) •Cable Modem •IP Phone •VoIP Gateway

Source: The International Cooperation Department (ICD) of The Ministry of Economic Affairs (MOEA) (2013). The Economy of Taiwan.

Taiwan's development process had its beginnings as a Japanese colony for 50 years before embarking on development efforts following World War II. This development process can be divided into three phases: an initial phase focused on import substitution, a phase emphasizing structural adjustment for export, and a phase primarily centered on export-oriented development. Each phase is characterized as follows:

Phase 1: Development with a Focus on Import Substitution (1950 – 1958)

Phase 2: Development Towards Export Emphasis (1958 – 1963)

Phase 3: Industrial Export Promotion (1963 – 1980)

Figure 4.2: Kuo-Ting Li, a key figure in shaping economic development policies

Source: https://taiwaninfo.nat.gov.tw/news.php?unit=63,75,81,90,182&post=65864 และ Fu-Lai Tony Yu (2007) The Architect of Taiwan's Economic Miracle: Evolutionary Economics of Li Kuo-Ting, Global Economic Review, 36:1, 53-67, DOI: 10.1080/12265080701217249

Taiwan's development planning was significantly influenced by key individuals who played a crucial role in its success. The New York Times even referred to Taiwan's development architect as the "Godfather of Technology." This individual has been a long-standing policymaker, driving Taiwan's economic policies and transforming the country from an agricultural nation to a leading electronics producer in the world. For more details, you can refer to Li (1995).

Phase 1: Development with a Focus on Import Substitution (1950 – 1958)

Taiwan's economic development during the initial phase continued to rely on its agricultural sector. In the early stages of development, land reform policies were implemented from 1949 to 1953, which allowed farmers to reduce the burden of land rentals and increased the land ownership of farmers from 57% to 90%. This led to an increase in agricultural production by over 46% during that period. Furthermore, it boosted household income for farmers by 23%. Agriculture played a crucial role in providing food and essential factors for the population, ensuring an adequate supply for domestic consumption.

Additionally, Taiwan was able to export agricultural products, generating foreign currency income that supported international trade. Moreover, it provided

employment opportunities and income for households with low skills. In this regard, Taiwan differed from South Korea, as South Korea had a smaller agricultural sector but shared a similar challenge during the same period – a shortage of natural resources available for export. In the subsequent development phase, Taiwan focused on developing industries capable of producing goods to replace imports.

During this period, government policies aimed to protect emerging industries through the use of tax incentives. Additionally, development was facilitated through foreign aid, especially from the United States, which provided foreign currency to import high-tech machinery and technologically advanced goods. This was crucial for establishing industries in the early phase to replace imports.

Furthermore, the government's role during this period significantly influenced the expansion of import-substituting industries. Exchange rates were deliberately set higher than their actual values (to deter imports), and the government provided capital support to target industries. This led to structural economic issues similar to Japan, characterized by a dualistic economic system where supported industries were more efficient than others.

Phase 2: Development Towards Export Emphasis (1958 – 1963)

Building on the foundation of basic industries to replace imports had a ripple effect on the development of export-oriented industries. This shift was driven by factors both within the country and external influences.

Internally, the lack of natural resources suitable for export but a substantial labor force that could transition from agriculture to industry played a pivotal role. Externally, this period coincided with sustained global economic expansion.

During this period, the government supported target industries by establishing Export Processing Zones and reducing import taxes on raw materials. These policies facilitated the importation of raw materials for production alongside a low-cost labor force, creating a competitive advantage in the global market. Additionally, the government restructured taxation by reducing its reliance on import taxes and introducing corporate income taxes. Granting tax benefits to corporate income tax became a significant tool for promoting target industries.

Throughout this timeframe, significant changes occurred on both macro and micro levels. The promotion of exports led to a continuous trade surplus and substantial accumulation of foreign exchange reserves. Moreover, it positively

impacted the country's fiscal balance, resulting in budget surpluses. However, it also led to challenges such as the rapid increase in labor costs due to rising labor demand during this period.

Phase 3: Industrial Upgrading for Export Emphasis (1963 - 1980)

The continuous promotion of export-oriented industries was a key focus during this period. This was achieved through the implementation of the National Science Development Plan (1969-1980), which outlined the integration of science and technology into economic development. In 1973, the Industrial Technology Research Institute (ITRI) was established, playing a crucial role in research and development activities and providing expertise to the private sector. This initiative aimed to leverage research for commercial purposes and enhance the competitive capabilities of the private sector in the global market.

As a result, the establishment of the Hsinchu Science Park followed, becoming a vital hub for the electronics industry and information technology sector in Taiwan. This park played a significant role in the global market.

During this period, financial policies helped maintain price stability by keeping interest rates at appropriate levels. By increasing the savings rate, the burden of investment was reduced, shifting away from government support towards a market mechanism that balanced savings and investment. However, during this period, exchange rate policies shifted from controlling exchange rates to keeping them overvalued to promoting exports. This involved maintaining exchange rates below their actual values, further encouraging exports.

The content presented above summarizes the main stages of the development process. Details of this development are divided into a total of 6 time periods, as shown in Figures 4.3 to 4.8. These figures classify the fundamental characteristics of the economy in each time period, including the identification of target industries and the government mechanisms that supported the industrial sector during those times. They also illustrate the significant economic indicators that resulted from achieving these goals.

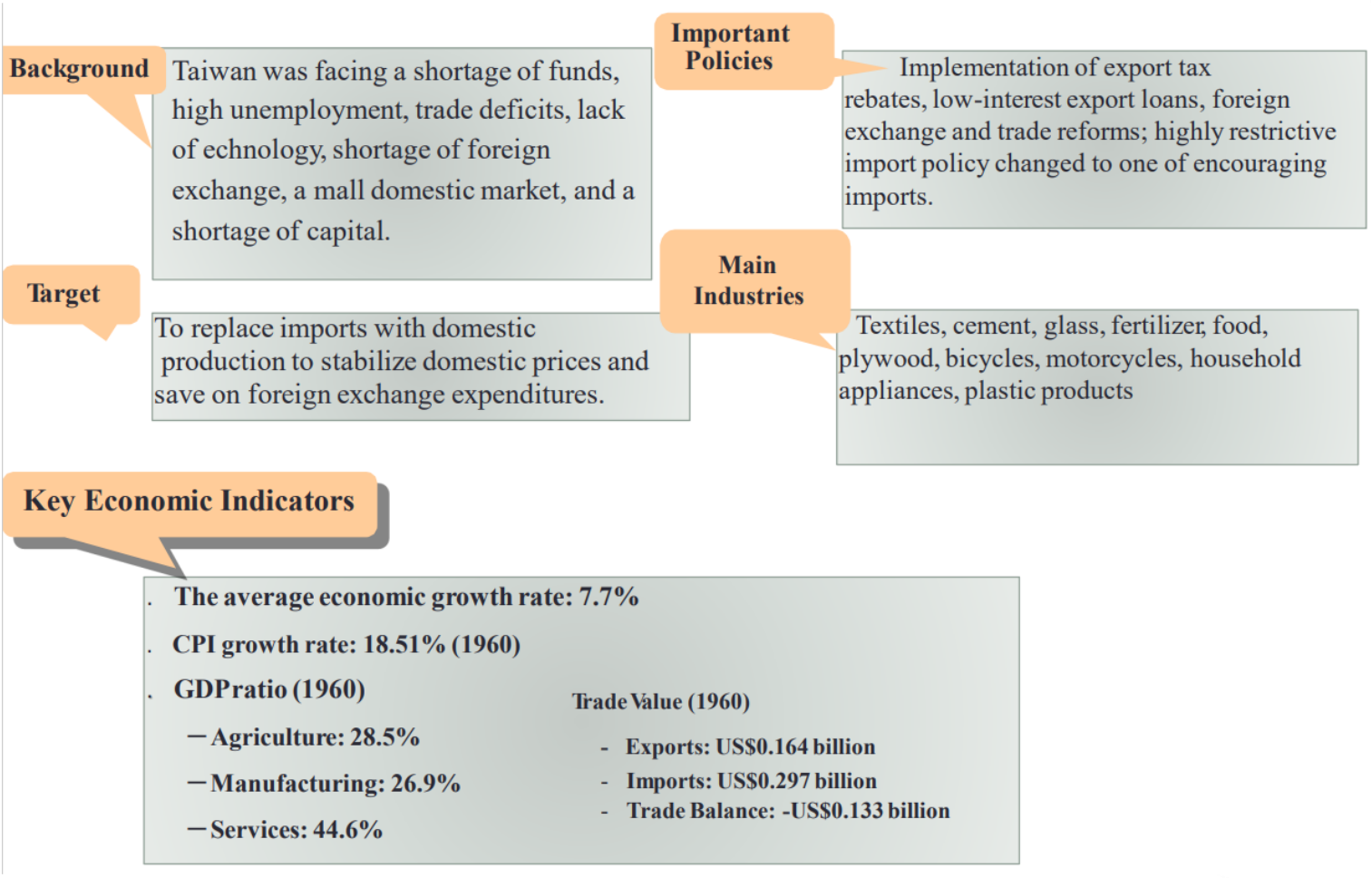

Figure 4.3: Era of Import Replacement (1953～1960) - Development of Light Industry)

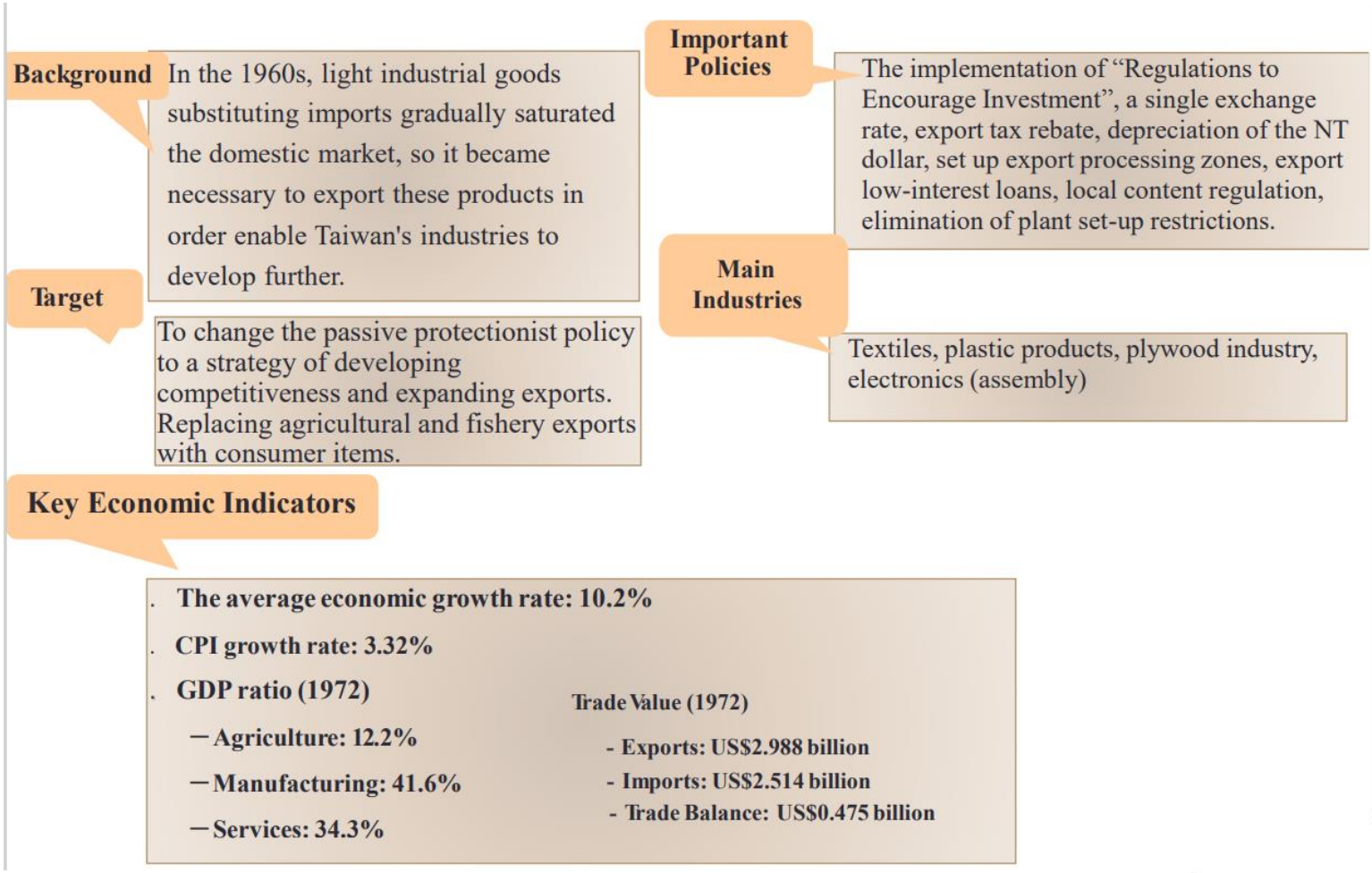

Figure 4.4: Era of Export Promotion (1961～1972) - Development of Light Industry

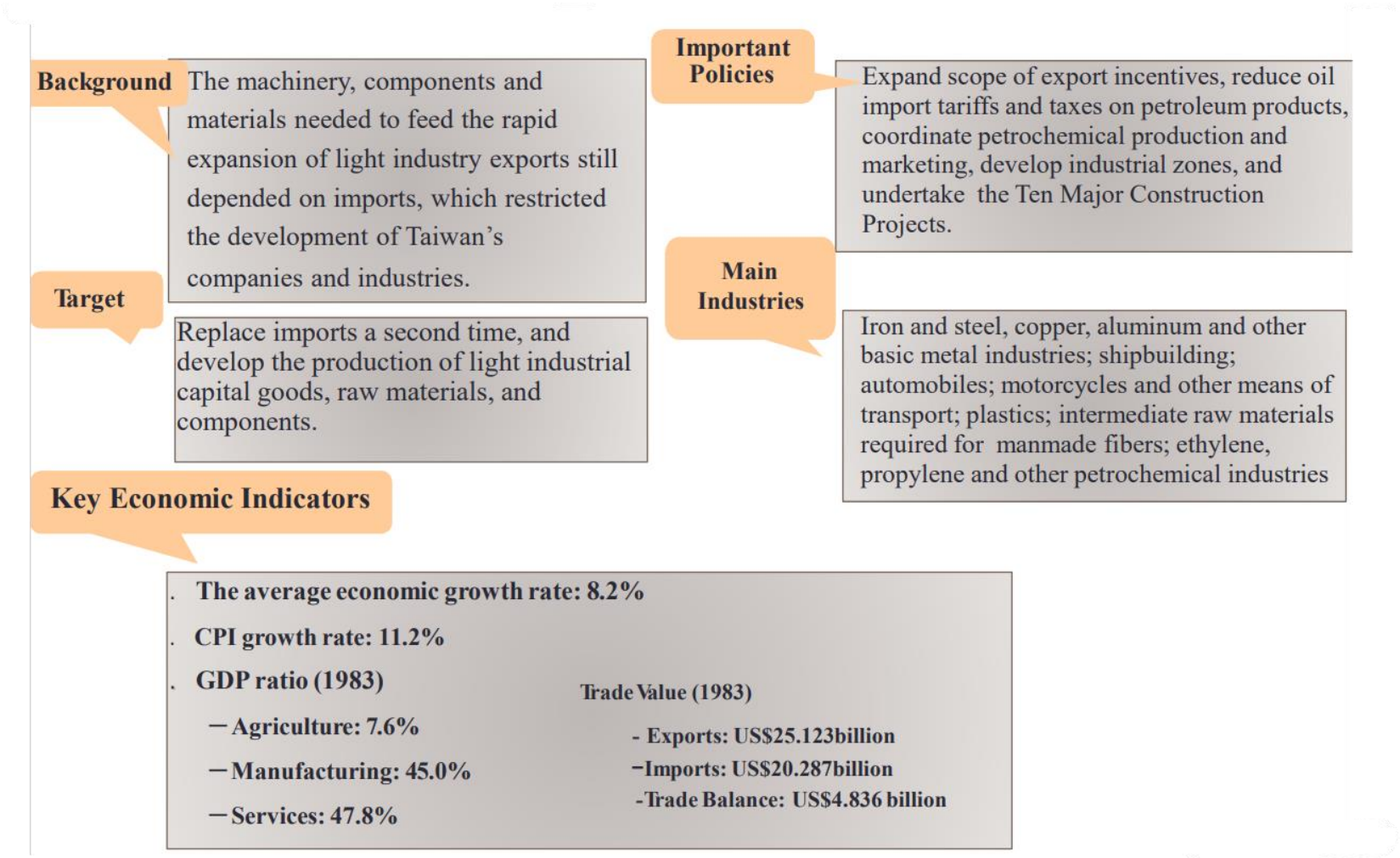

Figure 4.5: Era of Import Replacement and Export Expansion (1973～1983) - Development of Heavy Industry

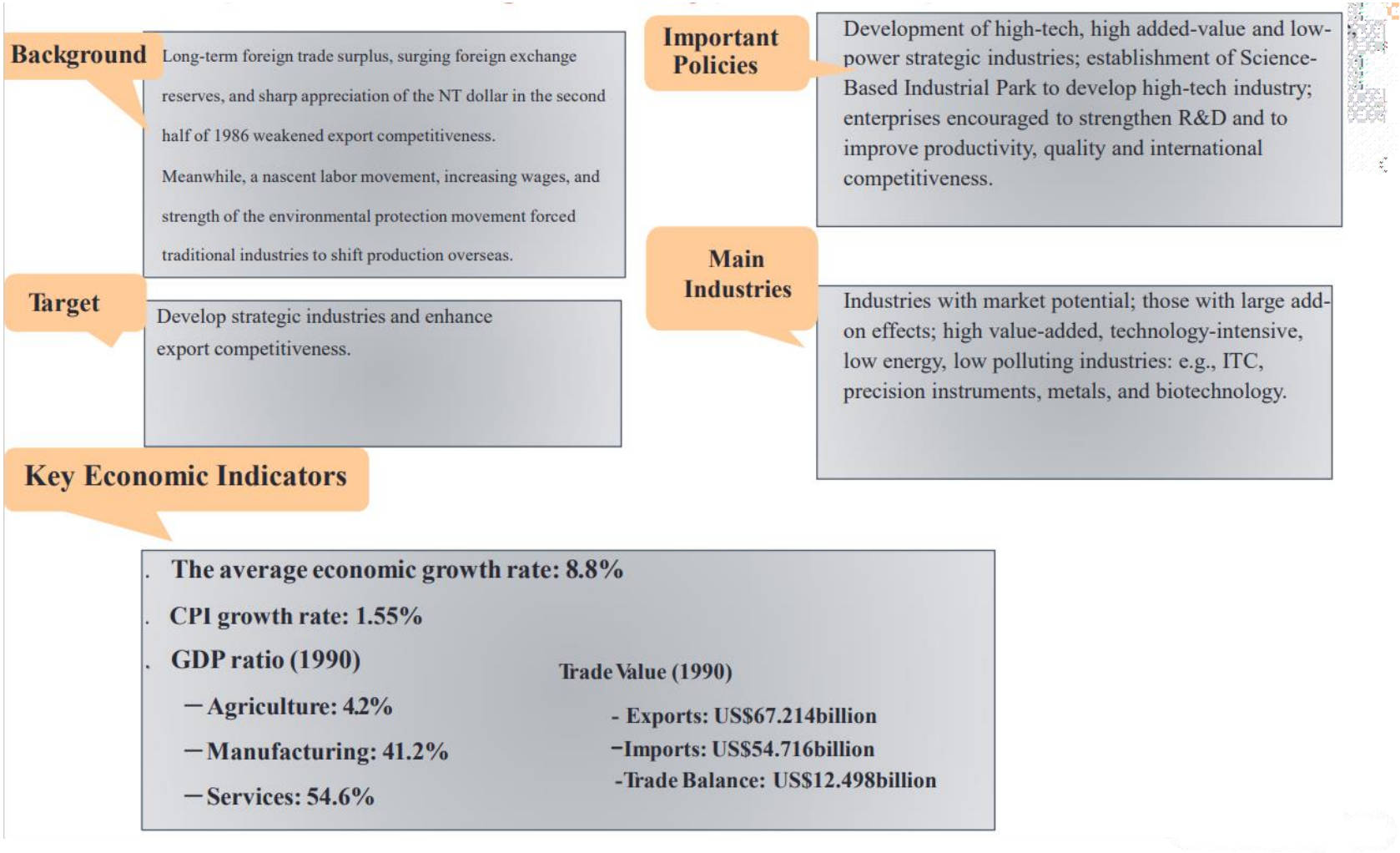

Figure 4.6: Era of Liberalization, Internationalization, and Systematization Targets — The Development of Strategic Industry (1984～1990)

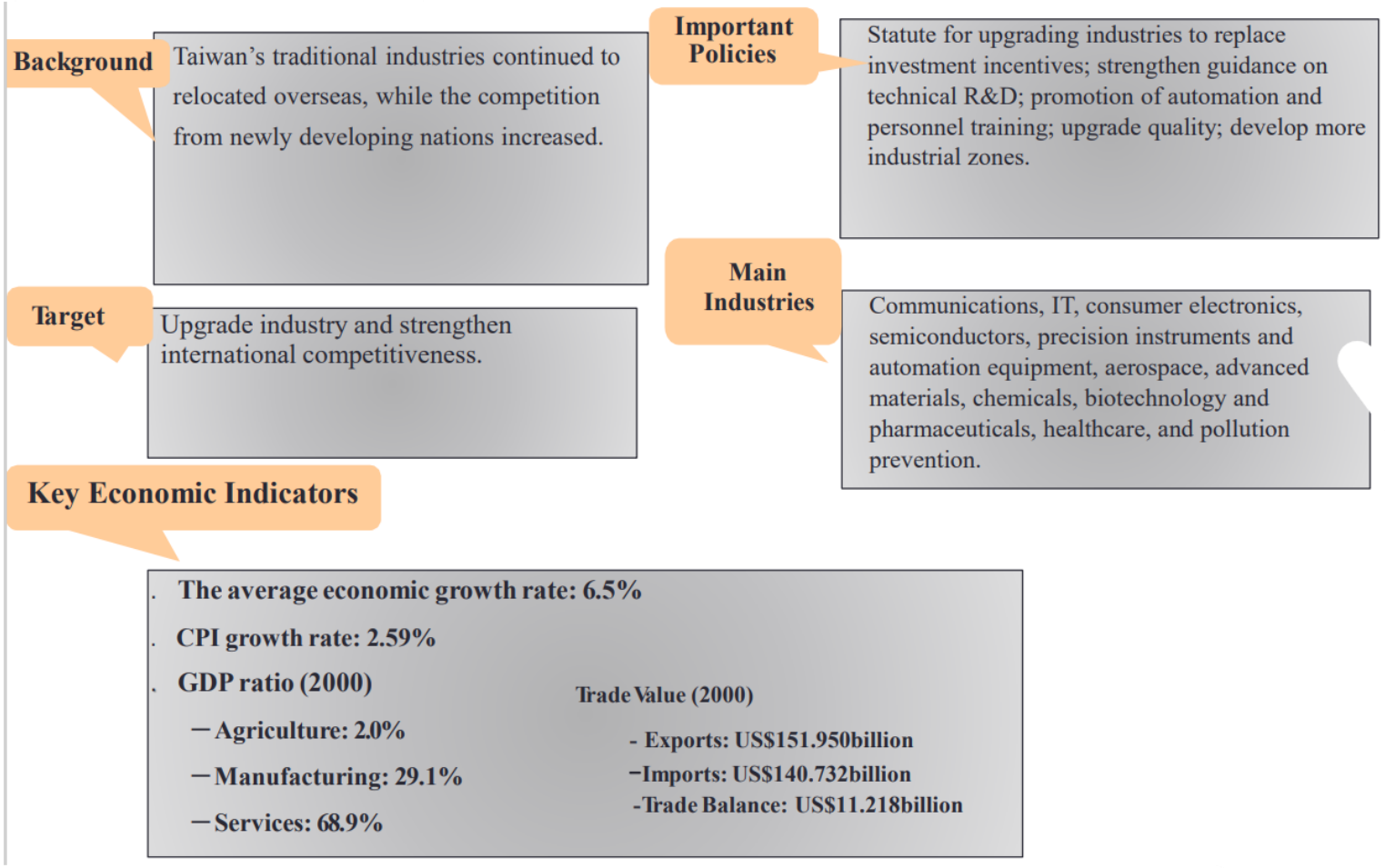

Figure 4.7 Era of High-tech Industries (1991～2000) — Promotion of Ten Major Emerging Industries

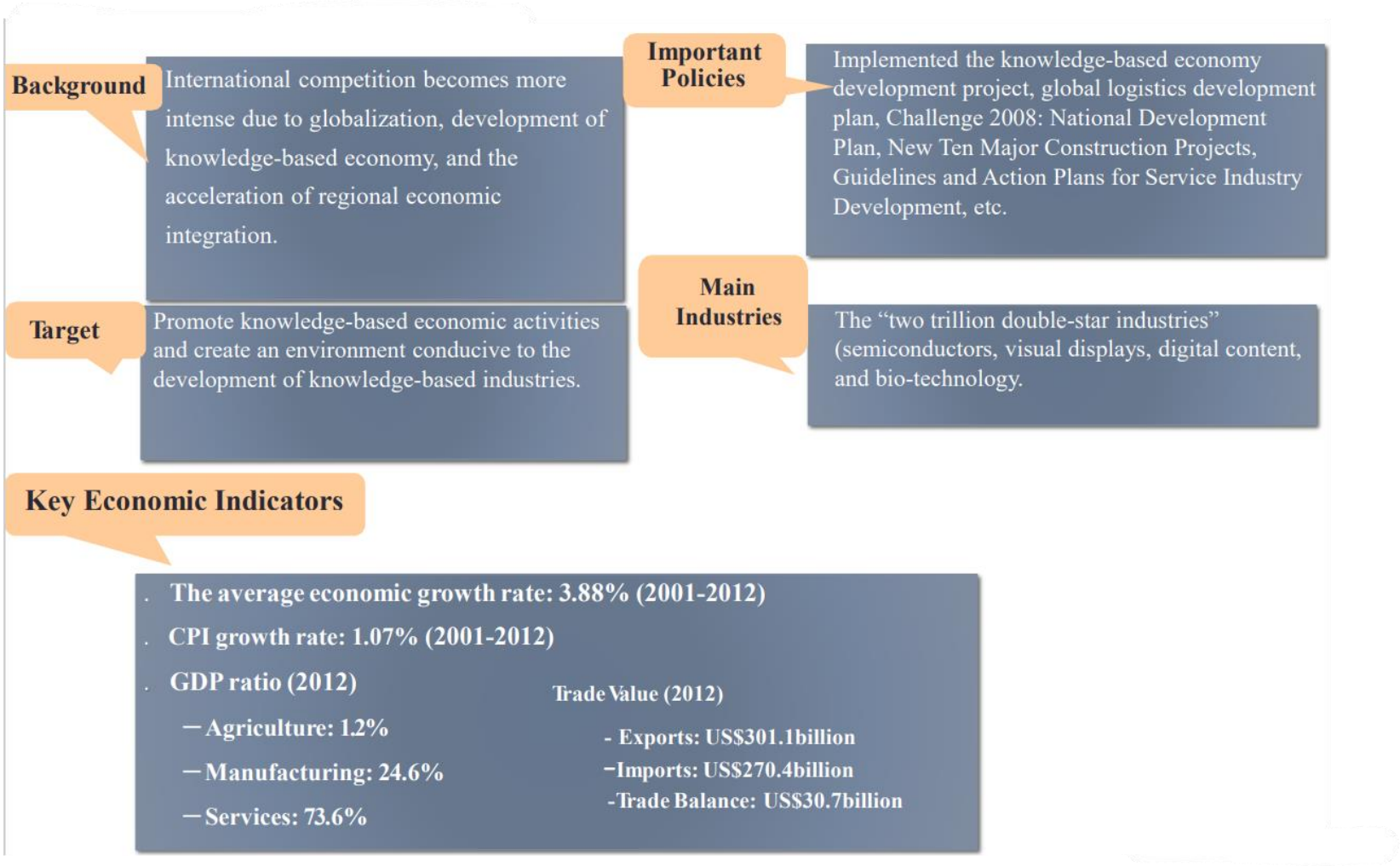

Figure 4.8: Knowledge-Based Economy (2000 ～ present) －The Development of Knowledge-Based Industry

4.2 Important Lessons from the Economic Development Policies of Asian Countries

The economic development processes in several Asian countries, such as Japan, South Korea, and Taiwan, share common patterns. These patterns can be summarized as follows:

1. Limited Natural Resources and Post-War Development: These countries began their development journey with limited natural resources, focusing initially on agricultural reform. Land redistribution was a key policy, allowing most of the population to have access to land for farming. This helped reduce the pressure from food shortages and inflation that followed the wars.
2. Import Substitution in Early Industrialization: In the early stages of industrial development, these nations implemented import substitution policies. This strategy aimed to establish industries that produced essential raw materials domestically. It involved a significant migration of labor from agriculture to these nascent industries. The government supported these industries by providing special loans, tax incentives, and exchange rate adjustments to make them competitive in the domestic market.
3. Export-Oriented Development: As the global market expanded continuously and labor remained abundant and relatively inexpensive (due to the large agricultural sector), these countries shifted to export-oriented policies. The government continued to support target industries using financial tools such as special loans, fiscal policies (including tax exemptions for targeted industries), import tax adjustments to protect these industries, and manipulating exchange rates to maintain competitiveness in global markets.
4. Dualistic Industrial Structure: The development policies led to the emergence of a dualistic production system within these countries. Targeted industries experienced rapid development and high efficiency, while non-targeted industries lagged behind in terms of efficiency.
5. Resource Allocation and Efficiency: The allocation and efficiency of resources, including land, water, energy, and labor, were influenced by the development phase and government's choice of target industries. Environmental regulations were often less stringent in the early stages of development, and target industries enjoyed preferential resource allocation and production factor privileges.

4.3. Results of Economic Development in Taiwan Analyzed Using Growth Accounting

As presented in Chapter 1 regarding the fundamental theory of Growth Accounting and examples of its application in analyzing the impact of technological change on the economies of the United Kingdom and the United States, it has also been applied in the case of Japan to demonstrate the effects of technological advancements through Total Factor Productivity (TFP) and the rapid increase in labor productivity.

In the case of Taiwan, Sun & Fulginiti (2007) employed an econometric approach to analyze the economic growth of Taiwan. The results of the analysis, as shown in Figures 4.9 and 4.10, reveal that economic growth in Taiwan is driven by five factors, which are:

(1) Labor quantity effect - The increase in the quantity of labor.
(2) Capital quantity effect - The increase in the quantity of capital.
(3) Term of trade effect - The effect of changes in the terms of trade.
(4) Productivity growth effect - The effect of productivity growth in production.
(5) Domestic price effect - The impact on domestic prices.

The results of analyzing the components of GDP growth using Growth Accounting have shown that, when excluding the impact of domestic price changes, Taiwan's GDP growth is primarily influenced by productivity growth effect. Following this, the capital quantity effect has the next highest impact. This analysis aligns with the findings of Growth Accounting studies conducted in the case of Japan, emphasizing the importance of continuous investment to increase capital and the development of technology to enhance production efficiency. This corresponds to the main point of Dr. Osamu Shimomura's theory presented in Chapter 2, which underscores the importance of maintaining investment to sustain economic growth at a high level.

In the case of Taiwan, Figures 4.11 and 4.12 demonstrate changes in the internal structure of the economy, with the proportions of production and employment shifting from primary agriculture to light industry and then to heavy industry. These changes are consistent with shifts in the proportion of exports over the development period, as shown in Figures 4.13 and 4.14.

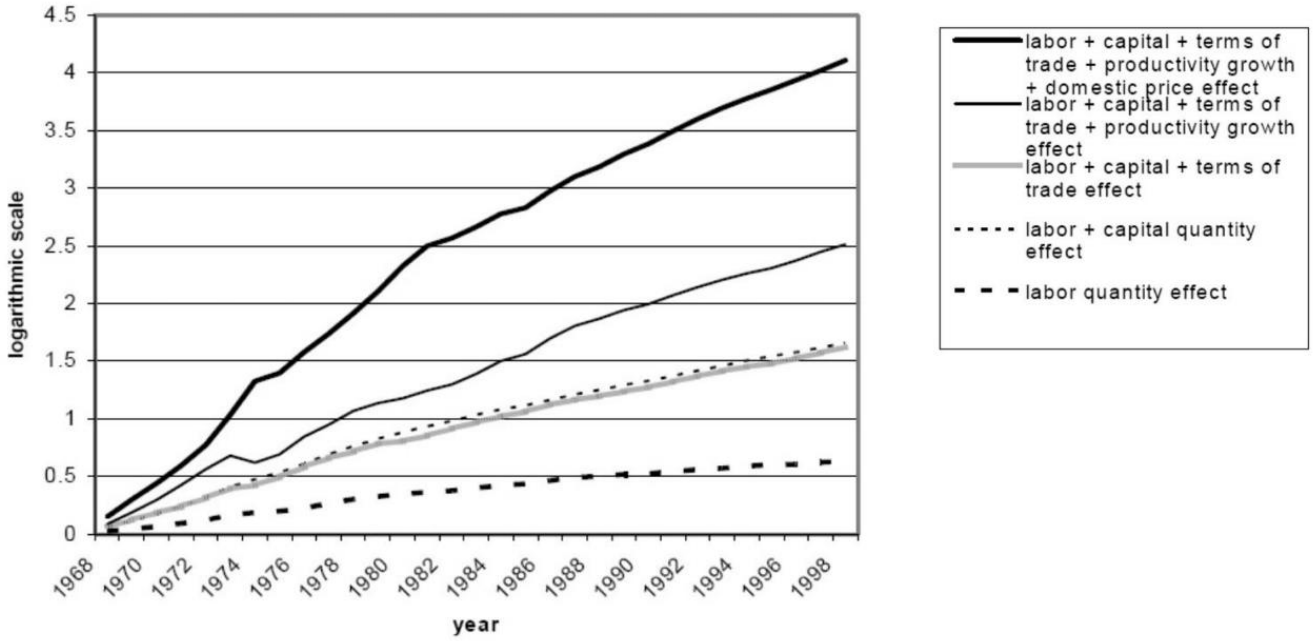

Figure 4.9: Growth Accounting for Taiwanese Nominal GDP Growth (Non-stochastic indexes)

Source: Sun & Fulginiti (2007)

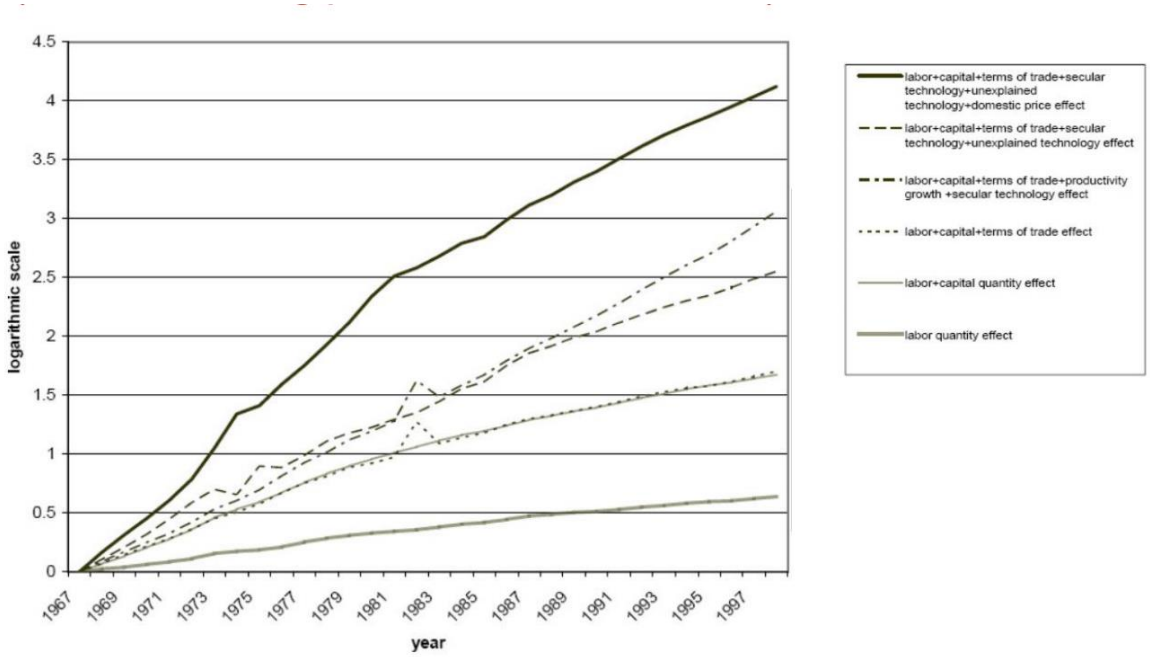

Figure 4.10: Growth Accounting for nominal GDP growth in Taiwan (Indexes using parametric estimates)

Source: Sun & Fulginiti (2007)

	GDP			*Employment*		
	Primary	*Secondary*	*Tertiary*	*Primary*	*Secondary*	*Tertiary*
1905	–	–	–	72.7	6.1	21.1
1910	36.4 (42.1)	28.1 (23.5)	35.5 (34.4)	–	–	–
1915	32.5 (41.4)	31.7 (24.5)	35.7 (34.1)	73.4	7.4	19.1
1920	30.0 (39.0)	29.3 (22.9)	40.7 (38.1)	71.1	9.2	19.7
1925	40.3 (39.6)	22.7 (23.1)	36.9 (37.3)	–	–	–
1930	33.9 (37.3)	28.3 (25.7)	37.7 (37.0)	71.4	9.4	19.4
1935	34.5 (32.0)	27.2 (29.0)	38.3 (38.9)	–	–	–
1940	29.1 (32.5)	31.5 (30.0)	39.4 (38.6)	63.2	12.3	24.7
1945	26.8 (23.4)	25.8 (29.5)	47.4 (47.1)	–	–	–
1950	36.0 (36.8)	15.6 (15.0)	48.3 (48.1)	–	–	–
1952	32.2	19.7	48.1	56.0	16.9	27.0
1960	28.5	26.9	44.6	50.2	20.5	29.3
1970	15.5	36.8	47.7	36.7	28.0	35.3
1980	7.7	45.7	46.6	19.5	42.5	38.0
1990	4.2	41.2	54.6	12.5	40.8	46.3
1998	2.7	34.9	62.3	8.8	37.9	53.2

Figure 4.11 Taiwan's GDP and Employment by Sector, 1905–1998
Source: Cheng (2001)

	Light	*Heavy and chemical*	*Private*	*State-owned*
1952	n.a.	n.a.	43.8	56.2
1960	76.0	24.0	56.2	43.8
1970	65.7*	34.3*	72.3	27.0
1980	53.8	46.2	85.5	14.5
1990	33.6	66.4	89.7	10.6
1998	28.5	71.5	92.1	7.9

Figure 4.12: Production and Ownership Structure in Post-war Taiwan's Manufacturing Sector, 1952–1998
Source: Cheng (2001)

	Agriculture (raw and processed)	*Industrial*	*Heavy and chemical*	*Others*
1952	91.9	8.1	4.7	95.3
1960	67.7	32.3	10.2	89.8
1972	16.7	83.3	26.6	73.4
1980	9.2	90.8	35.6	64.4
1990	4.5	95.5	46.7	53.3
1998	1.8	98.2	64.3	23.9

Figure 4.13: Post-war Taiwan's Export Structure, 1952–1998
Source: Cheng (2001)

	Degree of labour intensity			*Degree of capital intensity*			*Degree of tech intensity*		
	High	*Mid*	*Low*	*High*	*Mid*	*Low*	*High*	*Mid*	*Low*
1982	47.2	30.8	21.9	26.9	45.4	27.6	18.3	32.6	49.1
1985	45.9	35.6	18.5	24.5	48.7	26.8	18.8	33.6	47.6
1990	41.0	38.3	20.7	28.9	50.5	20.5	26.7	38.6	34.7
1995	36.4	40.6	23.0	31.9	56.5	11.6	36.5	41.4	22.0
1997	34.9	43.1	22.1	30.3	60.6	9.1	39.7	41.1	19.2

Figure 4.14: Export Commodities by Intensity of Input Factor for Taiwan, 1982 - 1997
Source: Cheng (2001)

	GDP (real)	*TFP*
1961–73	10.80	0.47
1973–82	7.97	− 0.14
1982–87	9.29	4.31
1987–93	6.63	2.74

Figure 4.15: Growth Rates of GDP and Total Factor Productivity (TFP) in Taiwan (per annum)
Source: Cheng (2001)

Figure 4.15 provides a comparative view that illustrates how approximately half of Taiwan's GDP growth, starting from 1982, is attributed to an increase in Total Factor Productivity (TFP). This development pattern aligns with the characteristics

observed in Japan and South Korea, where industrial development serves as a primary mechanism for advancing towards higher income levels. The growth of TFP is the most crucial component driving economic development in this context.

4.4 ITRI and Taiwan's Economic Development

Similar to the South Korean government, the Taiwanese government recognized the importance of technological development and innovation, as well as the application of development outcomes to enhance the production of complex products, thereby increasing value-added. Consequently, the Taiwanese government established the Industrial Technology Research Institute (ITRI), which is a national research institute akin to the Korea Institute of Science and Technology (KIST) in South Korea. The objective of ITRI is to promote the creation of technology and innovation domestically and apply this technology and innovation to export-oriented products, thereby increasing value-added and the competitive potential in international markets.

The operations of ITRI differ from KIST in terms of its emphasis on promoting new entrepreneurs and providing technology support to medium and small-sized companies. In contrast, KIST focuses on creating new technology for large South Korean companies (chaebols). Figure 4.16 depicts the main office of ITRI, comprising numerous laboratories and research units. Additionally, the structure of ITRI, as illustrated in Figure 4.17, reveals that the number of patents generated by ITRI exceeds the number of researchers currently employed there and surpasses the count of former ITRI researchers. Furthermore, a portion of ITRI's income comes from royalties and patents, reducing its budgetary burden and enabling the allocation of funds for research and innovation. This approach to generating income through copyrights and continuous patents can be beneficial for ITRI's future research endeavors.

Figure 4.16: Industrial Technology Research Institute (ITRI)
Source: ITRI - official permitted by the ITRI

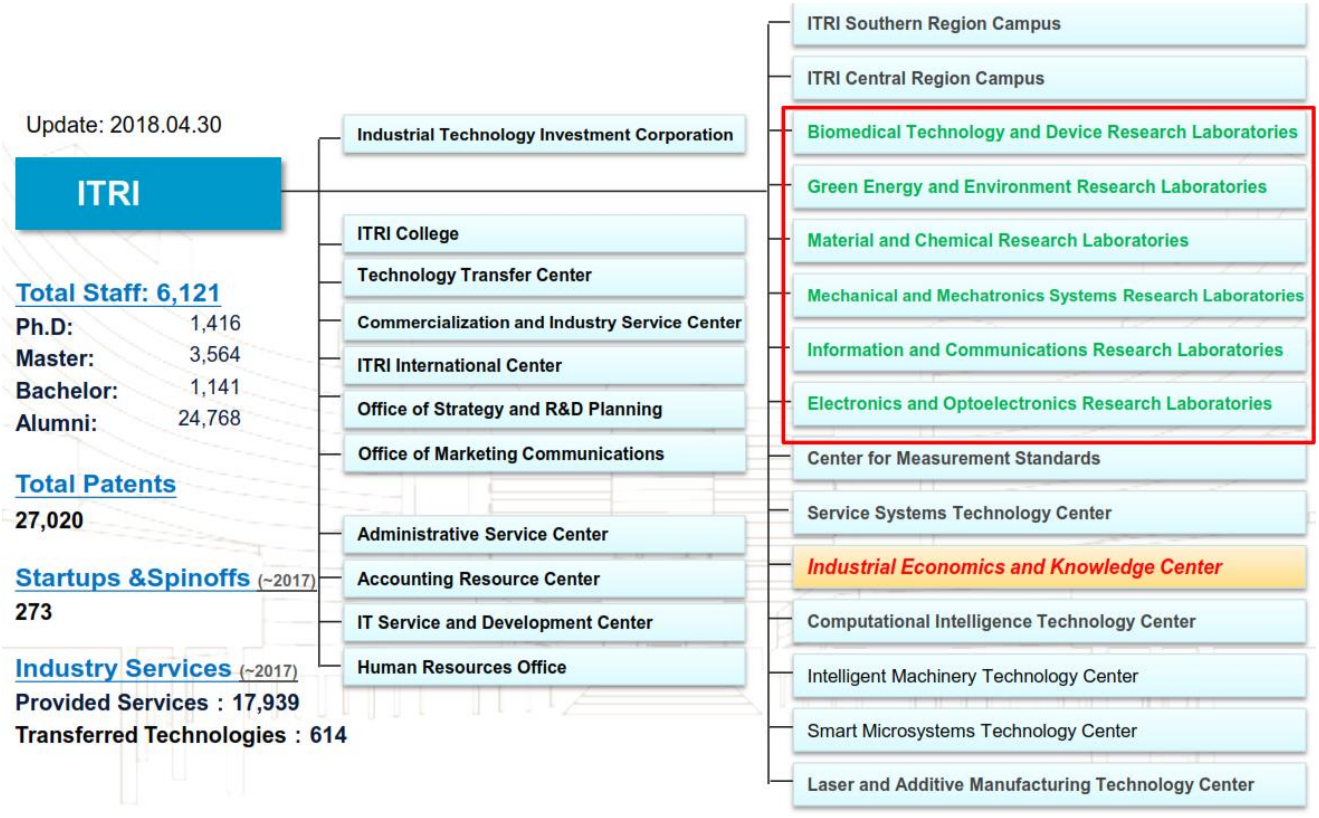

Figure 4.17: Industrial Technology Research Institute (ITRI)
Source: Patrick (2018)

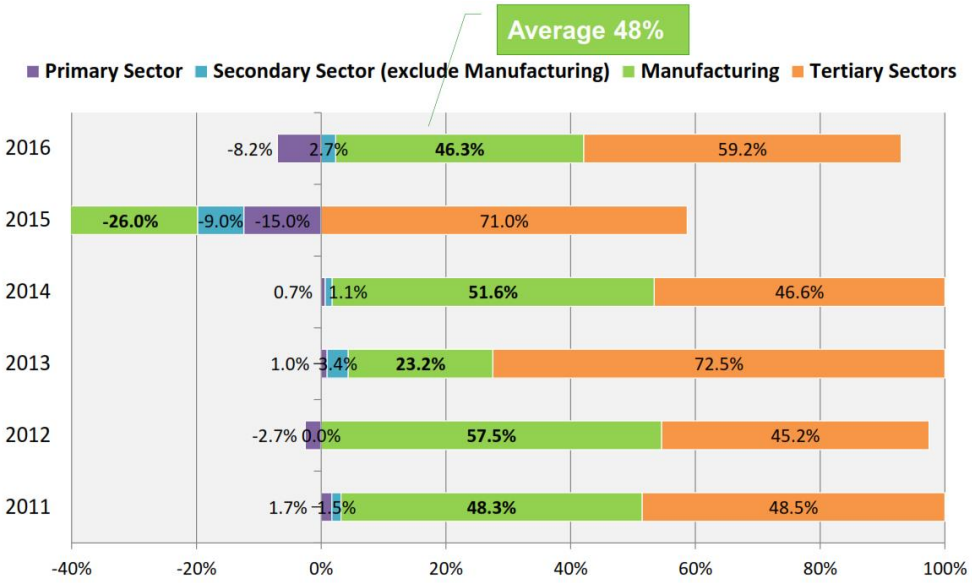

Figure 4.19: Manufacturing Contributes Significant Share of Taiwan's Economic Growth
Source: Patrick (2018)

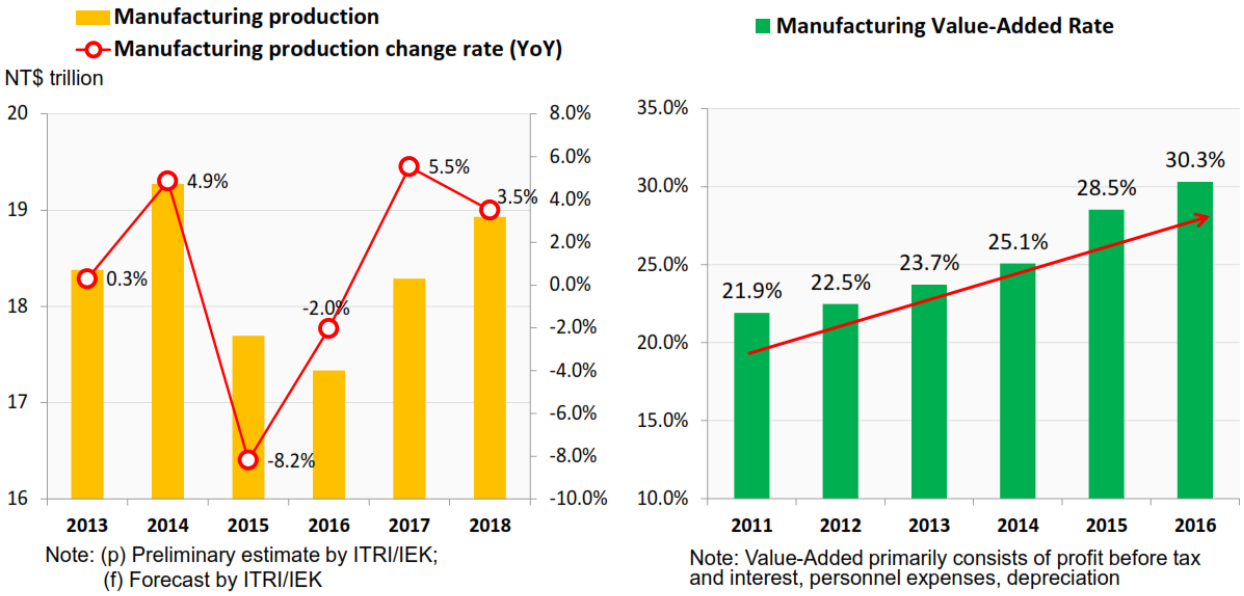

Figure 4.20: Manufacturing Production Grows Steadily, Value-add Continues to Improve
Source: Patrick (2018)

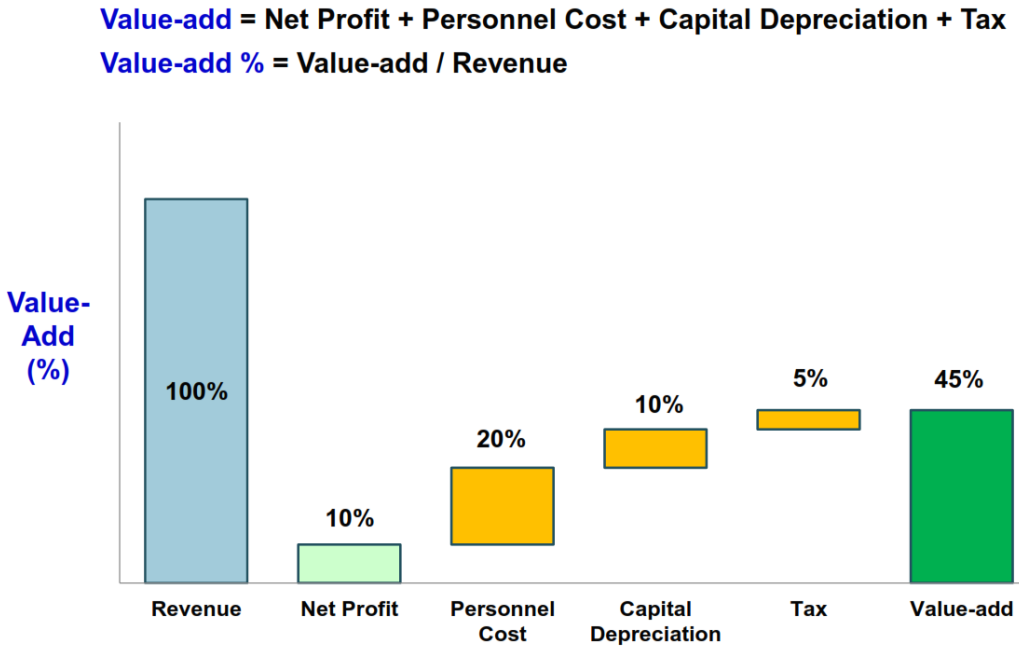

Figure 4.21: Average Value-added rate is 45% in 2016

Source: Patrick (2018)

Continuous development, with ITRI at the forefront of technology advancement, has allowed Taiwan to continuously adjust its economic structure. Consequently, the industrial sector plays the most significant role in Taiwan's GDP (Figure 4.20). However, when considering the components within the industrial sector, Figure 4.20 (left) shows that the growth rate is starting to decline. Nonetheless, Figure 4.20 (right) illustrates the maintenance of value-added growth that continues to rise.

Furthermore, Figure 4.21 presents details of the components within value-added (which is separated into components similar to those in the production and productivity factor table). Within value-added, which constitutes 45% of the product's selling price, profit for the manufacturer accounts for 10%, labor costs for 20%, equipment depreciation for 10%, and taxes for 5%.

When comparing Taiwan to other leading industrial nations worldwide, Figure 4.22 demonstrates that Taiwan can generate more value-added than South Korea but less than the United States, Japan, and Germany. The Taiwanese government has been aware of these issues and has attempted to improve industrial policies and economic development towards new sectors to enhance the potential for increased value-added.

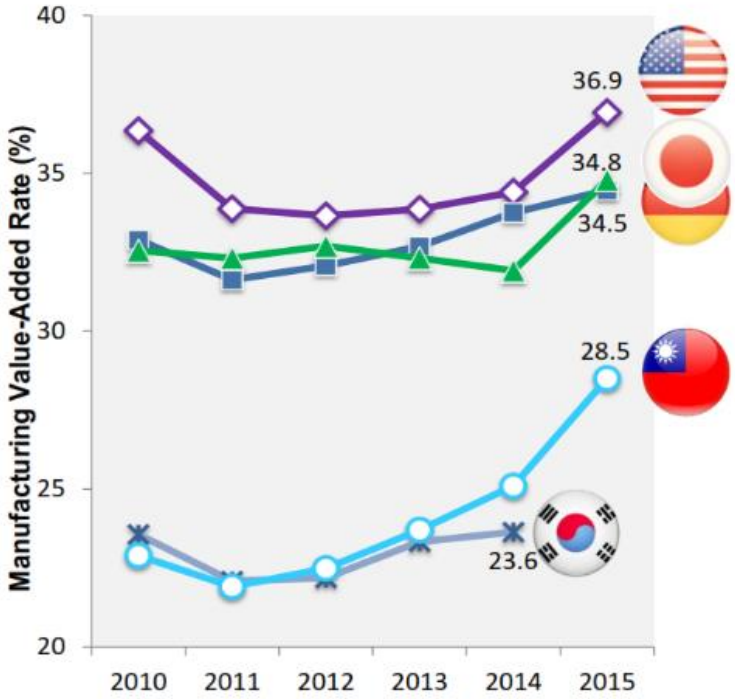

Figure 4.22: Taiwan's Manufacturing Strives Towards Upgrade in Value-added vs. Leading Countries

Source: Patrick (2018)

Figure 4.23 illustrates the concept of the smiling curve (as introduced in Chapter 1), which depicts the value-added at each stage of production. In the electronics industry, Taiwan leads in the upstream (chip and IC manufacturing), commanding over 71% of the global market share, with Taiwan Semiconductor Manufacturing Company (TSMC) being the global leader. In the midstream, Taiwan specializes in contract manufacturing, with Foxconn, the largest contract manufacturer in the world, hailing from Taiwan, capturing a 22% global market share.

While Taiwan has been highly successful as a major player in the global electronics industry, the Taiwanese government has looked to the future and planned for continuous advancement. Figure 4.24 demonstrates the strategies for future enhancement, emphasizing the use of technologies such as the Internet of Things (IoT), Big Data, and Artificial Intelligence (AI) to elevate income generation beyond manufacturing in the upstream and midstream sectors.

In Figure 4.25, the "new S curve" concept applied by Taiwan outlines a three-step process to gradually restructure the electronics industry. The first step

involves the production of electronics with enhanced data analytics capabilities (smart devices). In the second step, the business focuses on creating platforms to connect various devices and aggregate data for various services. Finally, the third step involves the integration of IoT, Big Data, and AI technologies to maximize the benefits of the technology.

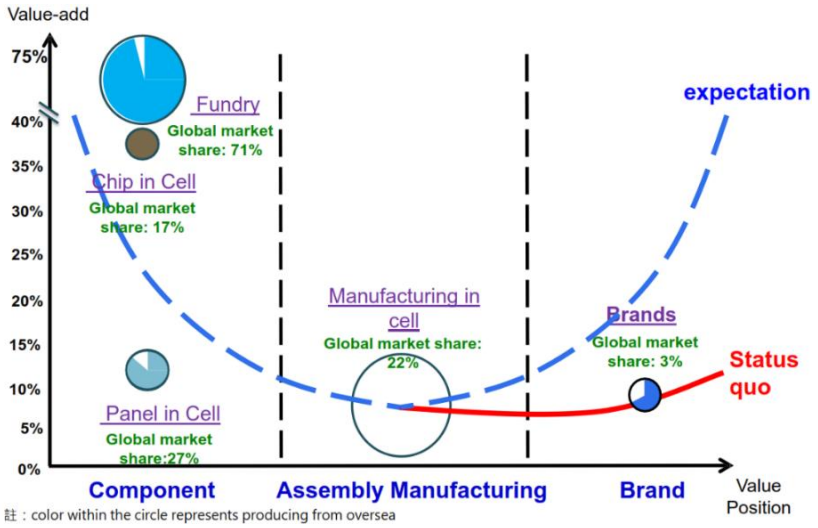

Figure 4.23: The Smiling Curve Model in the Electronics Industry and Taiwan's Role

Source: Patrick (2018)

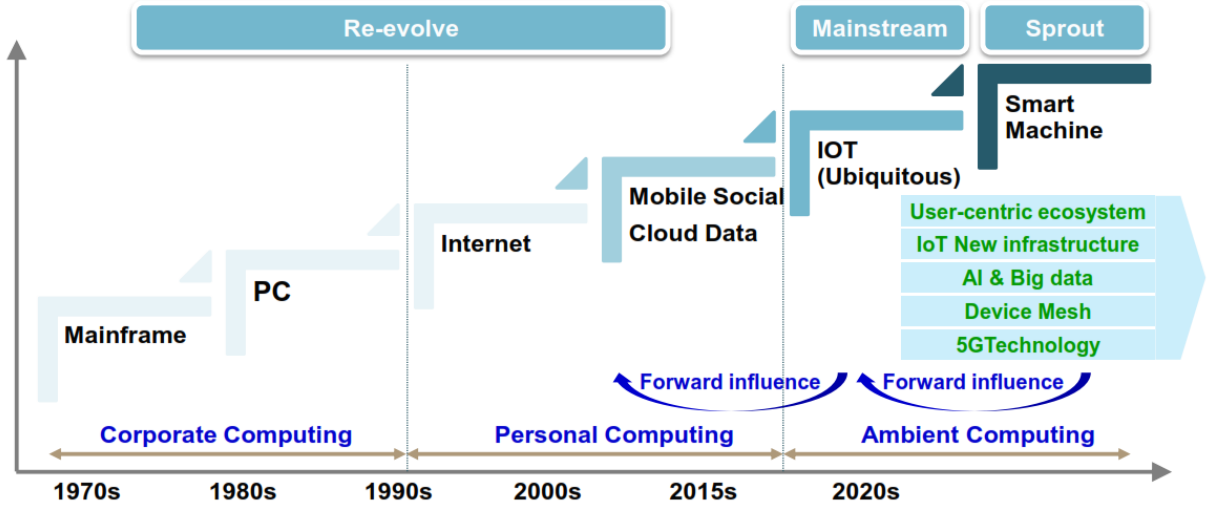

Figure 4.24: The Concept of Upgrading Value-Added Services with New Technologies in the Future

Source: Patrick (2018)

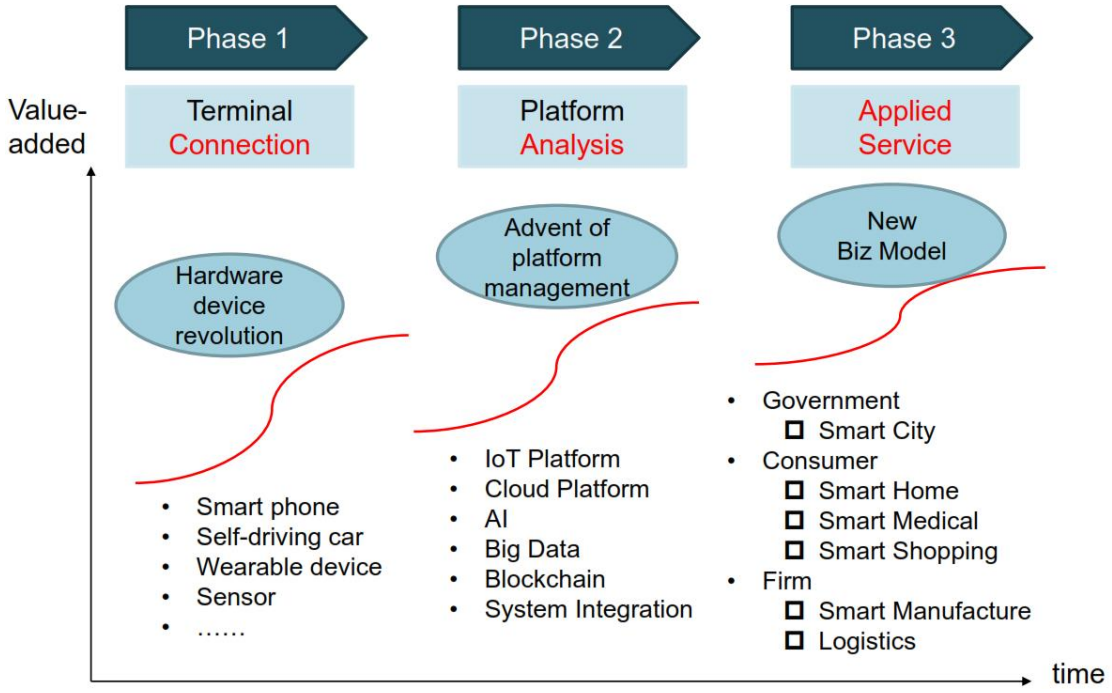

Figure 4.25: Taiwan's New Industry Development Plan Based on the New S-Curve Concept
Source: Patrick (2018)

4.5 Current Economic Challenges in Taiwan

In Chu's (2019) research, the challenges currently faced by Taiwan include:

(1) Most Taiwanese companies are entering positions with the lowest value-added capabilities in the supply chain.

(2) Majority of manufacturers act as contract manufacturers for component production or assembly.

(3) Chinese manufacturers are rapidly improving their capabilities and can compete both in terms of price and quality.

To address these challenges, Taiwan is adopting new strategies to enhance its competitive capabilities beyond the current level. These strategies focus on creating high-value-added products or industries, such as smart machine tools and innovative textiles. The government is providing support to companies with the potential to develop high-value-added products.

Moreover, in addition to future trends, the rising labor costs in Taiwan are also a significant problem. Small and Medium-sized Enterprises (SMEs) constitute the backbone of Taiwan's economy. According to Shin (2019), the typical image of Taiwanese business owners involves traveling globally to seek orders or contracts for manufacturing. This has led to continuous industrial growth and an increase in Taiwan's exports.

The growth of electronic products in the global market, since the 1990s (the second unbundling), has presented substantial economic opportunities for Taiwan as one of the world's primary manufacturing bases. Electronic products accounted for 30% of Taiwan's exports in 2003 and grew to 43% in 2018. Most Taiwanese companies have experienced continuous growth due to this trend. Taiwan's economy relies on being a major producer of intermediate goods for various industries worldwide. Professor Shih Kuang-hsun of CTBC Financial Management College stated, "Without Taiwan as a producer of intermediate goods for various industries globally, there would be a critical gap in connecting raw materials upstream with downstream markets."

For over three decades, Taiwanese businesspeople have been internationally renowned for finding opportunities in the manufacturing sector, particularly by engaging in contract manufacturing and becoming part of the global supply chain. However, competition in contract manufacturing has become a challenge, making it increasingly difficult to negotiate higher profits or value-added.

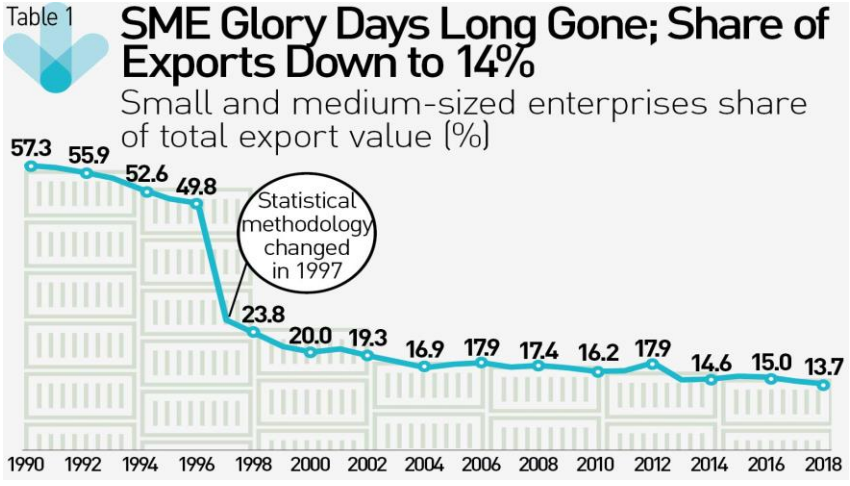

Figure 4.26: Decline in the Export Proportion by SMEs
Source: https://english.cw.com.tw/article/article.action?id=2638

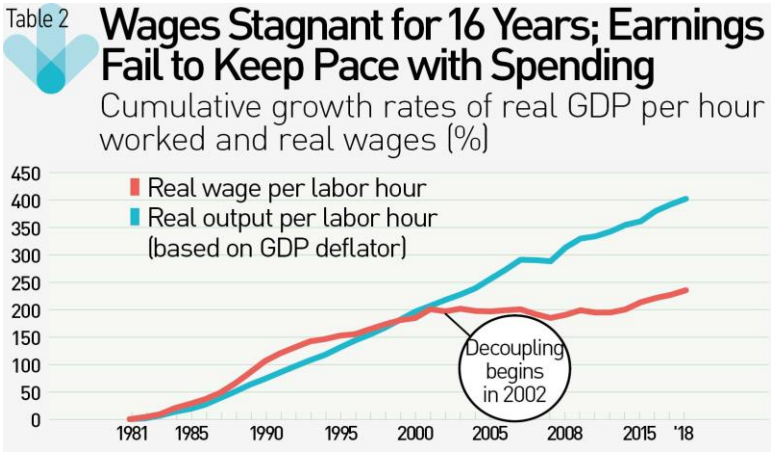

Figure 4.27: Growth of Labor Costs Not Aligned with Labor Efficiency Growth
Source: https://english.cw.com.tw/article/article.action?id=2638

China's rapid development has pushed Taiwan into a "red ocean," characterized by price competition, leading to a continuous decrease in the export prices of Taiwanese products. However, when considering other indicators, it becomes evident that Taiwan's labor efficiency has consistently improved, even as average export prices have declined. Meanwhile, domestic labor costs have increased relatively slowly (growing at rates lower than labor efficiency since the early 2000s). These issues reflect the limitations of Taiwan's economic growth in the future, necessitating changes in mindset and economic structural reforms.

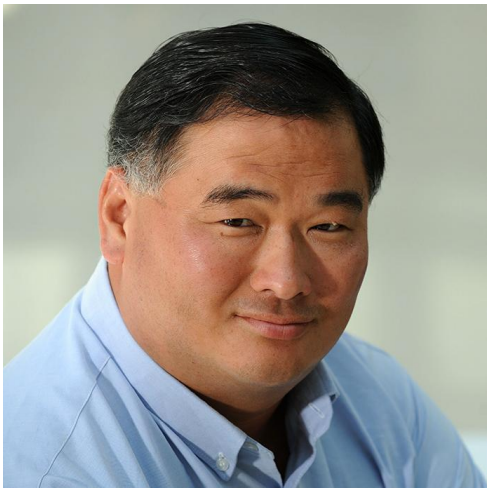

Figure 4.28: Professor Chang-Tai Hsieh
Source: https://www.chicagobooth.edu/faculty/directory/h/chang-tai-hsieh

Box 4.1: Brief History of Chang-Tai Hsieh

Chang-Tai Hsieh is a Taiwanese economist renowned globally, with recognition in the United States, Europe, and China. His research work has consistently been published in top 5 academic journals worldwide. He has been appointed as one of the five judges for the Nobel Prize in Economics, making him the only Asian to hold this position. Remarkably, he was appointed at the young age of 42. Additionally, he serves as an advisor to the World Bank, the Singaporean government, and the Inter-American Development Bank.

Regarding Taiwan's current challenges, Professor Chang-Tai Hsieh acknowledges the Industrial Technology Research Institute (ITRI), established in 1973, as a remarkable policy. It was the world's first institute to create a research institution with a high impact on Taiwan's economy, leading to rapid economic growth. ITRI has been successful in attracting talent and business-savvy individuals, resulting in the establishment of numerous leading Taiwanese electronics companies like Taiwan Semiconductor Manufacturing Company (TSMC), the world's top semiconductor manufacturer.

Professor Chang-Tai Hsieh notes that over the past 30 years, ITRI has evolved into a highly bureaucratic institution, making it difficult to attract top talent as it once did. The economic mindset and structure that Taiwan has employed since the 1980s may not be sufficient for substantial future growth. Value-added processes are no longer limited to component manufacturing or electronics equipment production, as they have shifted towards services, an area where South Korea has excelled. Consequently, Taiwan needs research and innovation institutions that do not adhere to traditional approaches.

Summary

Taiwan's economic development trajectory bears similarities to that of Japan and South Korea. Taiwan's economic foundation, like Japan's, initially relied on agriculture. Following World War II, land reforms led to the distribution of land to small-scale farmers, becoming a pivotal base for economic development through income generation from exports. This enabled Taiwan to accumulate sufficient foreign currency reserves for importing machinery to kickstart industrial production. The evolution of Taiwan's industrial sector follows a pattern similar to that of Japan and South Korea. It began with light industries employing basic technologies and progressed continuously as the government adjusted the target industries over the development stages (or selecting new S-curve industries). Ultimately, Taiwan became a leader in electronic manufacturing, starting from upstream semiconductor

production, with Taiwan Semiconductor Manufacturing Company (TSMC) emerging as the world's largest chip manufacturer, and downstream assembly, led by Foxconn, the world's largest electronics contract manufacturer. This development process has propelled Taiwan into a high-income nation.

The key takeaway from Taiwan's case is its reliance on small and medium-sized enterprises (SMEs) to drive its entire industrial and export sectors. This contrasts with Japan's focus on large-scale producers connected to SMEs through production networks like Keiretsu and Sogo Sosha, and South Korea's emphasis on development through large conglomerates (Chaebols). Taiwan's government agency, the Industrial Technology Research Institute (ITRI), plays a crucial role in enhancing the country's capabilities, similar to South Korea's KIST. However, a significant difference lies in ITRI's emphasis on incubating new entrepreneurs (e.g., TSMC and Asus emerged from ITRI), while KIST focuses on technology development for large corporations (Chaebols).

Despite Taiwan's remarkable success in economic development, it faces challenges due to competition from China. This competition has put pressure on Taiwan's upstream and midstream electronics manufacturing sectors and led to slow wage growth (corresponding to the issues presented in the Smiling Curve concept). As a result, Taiwanese entrepreneurs are shifting towards creating more value-added activities in the downstream and service sectors. This transformation builds upon the foundation of electronics manufacturing, extending to harnessing the potential of big data, the Internet of Things, and artificial intelligence.

Additionally, Professor Chang Tai Hsieh, a renowned Taiwanese economist, warns that Taiwan is still following development approaches dating back to the 1980s, which may not be suitable for the current circumstances. Taiwan should consider lessons from South Korea in promoting new industries and focusing on high-value-added service sectors (e.g., the South Korean film, music, and entertainment industries).

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