Economic Outlook for 2023 and the Medium-Term

[Production]

NATIONAL ASSEMBLY BUDGET OFFICE

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The Economic Outlook for 2003 and the Medium Term III

- Production -

The Economic Outlook for 2003 and
the Medium Term III- Production -

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"Economic Outlook for 2023 and the Medium Term" belongs to a series of reports that present the economic outlook concerning the GDP growth rate and other important areas of the national economy over the next five years, based on objective and expert analysis of the economic conditions in South Korea and abroad. This report is published and distributed for use by the National Assembly when reviewing government budget proposals and bills and when setting items of agenda.

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2022

This report has been produced in accordance with Article 22-2 of the National Assembly Act and Article 3 of the Act on the National Assembly Budget Office to support the activities of the members of the National Assembly. It was published after a review by NABO's Report Publication Review Committee (September 27, 2022).

Foreword

In recent times the Korean economy has been particularly exposed to downside risks for growth, contrary to expectations at the beginning of the year. As uncertainties over supply chains push the prices of raw materials ever higher, leading to growing inflationary pressure, while countries around the world are increasingly disposed to adopt a monetary tightening policy, thus curtailing overseas demand, trade protectionism triggered by the US-China conflict is intensifying, and other conditions facing exporters remain challenging.

Against this backdrop, NABO has published the four-volume report titled "The Economic Outlook for 2023 and the Medium Term". Based on an objective and expert analysis of the economic conditions in South Korea and abroad, the report provides forecasts of the South Korean economy for the next five-year period. The report is intended to be used as a reference material by the members of the National Assembly when they conduct legislative activities related to budget bills and legislative reviews among other matters.

In addition to providing the outlook for the Korean economy with a focus on expenditures, this report has expanded the scope of analysis and outlook to include a variety of other factors that can affect the economy, including growth potential, changes to the industrial structure, and changes in the population structure. Thus, Volume 1, *Expenditures*, contains projections of GDP, consumption, investment, and expenditure items like foreign trade and consumer prices; Volume 2, *Growth and Finance*, contains projections of potential growth rates, total factor productivity, interest rates, and greenhouse gas emissions; Volume 3, *Production*, contains projections of value-added production in key industries like manufacturing and services; and Volume 4, *Income and Population/Employment*, contains projections for the income variable and the population/employment variable, such as gross national income, employee remuneration, and operating surplus.

Despite the COVID-19 pandemic, the manufacturing sector has displayed solid export resilience and acted as a breakwater against the economic slowdown, while a shift to non-contact and digital services is gathering momentum in the service industry, paving the way for the Korean economy to rebound within a short period of time. On the production side, however, the Korean economy, which is heavily dependent on international trade, is expected to make a gradual recovery in 2023, albeit with a lower growth rate lower than that recorded in 2022, with manufacturing growing at a rate of 2.3% and the service industry at 2.2% due to uncertainties at home and abroad.

At a time when uncertainties are growing in domestic and overseas economies, we hope that this report will serve as a useful reference material when the members of the National Assembly have to make important legislative decisions.

October, 2022

Chief of NABO Cho Euysup

[NABO 2023 Production Outlook by Sector]

(Unit: %)

	2018	2019	2020	2021	2022	2023
Real GDP	2.9	2.2	-0.7	4.1	2.5	2.1
Gross value added (GVA)	3.1	2.4	-0.9	4.2	2.9	2.1
Manufacturing	3.3	1.1	-1.1	6.9	2.7	2.3
Services	3.8	3.4	-0.8	3.8	3.3	2.2
Construction	-2.8	-2.6	-1.3	-2.6	-1.7	-0.1
Electricity, gas & water services	-1.7	4.3	4.1	4.0	1.7	2.1
Others[1)]	-0.3	3.3	-5.6	3.7	-0.9	0.6
Taxes minus subsidies on products	1.3	0.8	1.4	3.1	-1.5	2.1

Note: 1) Agriculture, fishing & mining.
Source: National Assembly Budget Office, Bank of Korea(BOK).

Executive Summary

I. Industrial Structure of Korea

1. Changes to and Characteristics of Korea's Industrial Structure

❑ Korea has entered a stage of low growth stage in its business cycle as its industrial structure shifts toward a service economy.

- Due to the structural shift toward a service economy, the service sector accounts for an ever growing portion of the national economy, including production, consumption and employment.
  - Manufacturing is becoming increasingly digitalized and service-oriented with the introduction of key Industry 4.0 technologies such as artificial intelligence (AI), the Internet of Things (IoT), 3D printing, robots, wearable devices, big data and cloud.
- The Korean economy has entered a low-growth period due to a combination of sluggish growth in the manufacturing sector and stagnant growth in the service sector.

  On the domestic front, the bipolarization of Korean society, the extremely high cost of housing, a contraction of consumption resulting from the low birth rate and the aging society, stagnant investment and falling employment are all adding to the current low growth.
  - The export environment has deteriorated due to external factors including saturated supply in the manufacturing sector amid the rapid growth of the emerging economies, and a return to protectionism including the US-China trade conflict.
- (Value added) The average annual growth rate of value added in the service sector began to exceed that of the manufacturing sector in the 2010s.
  - Manufacturing: (1980s) 12.3% → (2000s) 5.5% → (2010s) 2.8%
  - Service: (1980s) 9.7% → (2000s) 4.6% → (2010s) 3.3%
- (No. of newly employed persons) The number of newly employed persons in the service sector began to increase faster than in the manufacturing sector back in the 1990s.
  - Manufacturing: (1980s) 5.7% → (1990s) -2.2% → (2010~2021) 0.5%
  - Service: (1980) 5.1% → (1990) 4.4% → (2010~2021) 1.1%
- (Contribution to growth)[1] The service sector's contribution to growth remained higher than that of the manufacturing sector from 1980 to 2021.

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1) Contribution to growth (contribution rate × overall statistical changes) shows the degree of contribution to GDP growth.

- Manufacturing: (1980) 2.7%p → (2000) 1.7%p → (2010-2021) 1.0%p
- Service: (1980) 4.1%p → (2000) 2.6%p → (2010-2021) 1.7%p

o (Labor productivity) Labor productivity (based on value added) remained higher for manufacturing than for service.

- Manufacturing: (2016) 2.9 → (2021) 6.0
- Service: (2016) 1.5 → (2021) 3.5

2. Changes in the industrial structure after COVID-19 pandemic

❑ The manufacturing sector's ability to cope with an economic crisis enabled it to recover quickly from the uncertainty over COVID-19.

- Although social distancing and other pandemic-related factors dimmed the outlook for domestic demand somewhat, the Korean economy made a quick recovery within a short period of time, driven by the strong export resilience stemming from the manufacturing sector's exceptionally strong competitiveness (world's no. 5).

❑ The industries related to non-contact demand generated by the COVID-19 crisis have expanded in the manufacturing and service sectors.

- As the non-contact economy grows, the "homeconomy"[2] has emerged and a paradigm shift in line with the Fourth Industrial Revolution and digital transformation is rapidly taking place, boosting the exports of the ICT industry.
  - From 2019 to 2021, the real value added created by ICT manufacturing increased by 9.0% per year on average while that of ICT services rose by 5.0% during the same period, exceeding the GDP growth rate of 1.7%.
  - Exports as a share of GDP peaked at 39.4% in 2013 before entering a downward spiral. However, this trend reversed with the onset of the COVID-19 pandemic, rising back to 36.4% in 2019 and to 38.8% in 2021.
- As the non-contact way of life emerged as the "new normal", the value added created by close-to-life service industries as a share of GDP fell significantly.
  - More specifically, the value added created by accommodation and food, transportation, culture and other services close to consumers' daily life as a share of GDP declined to a large degree.
  - On the other hand, the value added generated by medical services, healthcare, social welfare, and IT as a share of GDP increased due to the extraordinary demand created by the pandemic.

2) Homeconomy is a combination of "home" and "economy". It includes food and daily necessities delivery, rental services, home entertainment such as games and content, home care(home cleaning), etc.

3. A Review of Potential Uncertainties

- It is necessary to review potential uncertainties both at home and abroad that may affect domestic industries and the national economy.
  - Unstable global supply networks amid the prolonged Russia-Ukraine war may lead to higher prices, trade deficits and a weaker Korean won, which is expected to weigh on Korean industries that depend heavily on imported intermediary materials.
    - Prices of oil and natural gas rose by 1.7 times and 1.6 times, respectively in July 2022, compared to the period spanning August to October 2019.
    - Expectations are growing that grain prices will likely stabilize, considering the Ukraine-Russia grain export agreement signed on July 21, 2022, positive outlooks of grain yields for 2022, and falling demand due to the strong US dollar.
    - The shipbuilding, steel and petrochemical sectors may see their export competitiveness weaken as the higher prices of oil and raw materials increase their production cost.
  - The slowing growth rate of the Chinese economy has reduced China's demand for imports, which may have a negative impact on Korea's exports as China is a major importer of Korean products.
    - The Chinese government imposed lockdowns in major cities in the second quarter under its severe zero-COVID policy. As a result, the unemployment rate increased, and mining and manufacturing production declined.
    - The Asia Development Bank (ADB) revised its outlook for China's 2022 economic growth rate down to 3.3%. (-1.7%p)
    - The lockup measures in China have markedly affected the petrochemical, machinery, steel, display and automobile industries in Korea due to disruptions in the supply of raw materials and parts and subsequent production halts, and sales have declined due to logistics delays.
    - Although the lockup was lifted in June, the economic slowdown in China is expected to continue weighing on the Korean economy.
  - If US interest rates continue to rise and the dollar remains strong, higher import prices will likely add to the inflationary pressure and keep the trade balance in deficit, while the weakened won is expected to increase the price competitiveness of Korean exports, having only a limited impact on export-oriented manufacturing businesses in the short term.
    - Heavy dependence on crude oil and raw materials is the cause of the trade deficit.
    - Rising import prices are putting upward pressure on domestic producer prices.

- The series of actions recently taken by the U.S. to keep China in check is predicted to have a considerable mid-to-long-term impact on those Korean industries which depend greatly on.
  - The US-China technology war will likely gather momentum due to the digital transformation of the economy that is taking place amid the widening US trade deficit against China, growing security threats on high technology, and unstable supply networks.
  - Considering that semiconductors account for a large share of Korea's export amount, the US-China competition over semiconductor markets could have a significant impact not only on Korea's semiconductor industry but also on the entire Korean economy.

Key Measures for Reorganizing US Supply Networks

- The Indo-Pacific Economic Framework (IPEF) was launched on May 23, 2022 to promote fair and flexible trade and reorganize supply networks for greater stability.
- The US enacted the CHIPS and Science Act on August 9, 2022, under which the US government plans to invest USD 280.0 billion in growing its semiconductor industry.
- In addition, USD 740.0 billion will be spent on promoting the use of electric vehicles, creating a clean energy economy and reducing the US budget deficit under the Inflation Reduction Act enacted on August 16, 2022.

II. Outlook by Production Sector

- Value added for the year 2023 is outlook to increase in manufacturing, service, electricity, gas and water services.
  - Value added in the manufacturing sector rose by 3.0% in the first half of 2022, led by petrochemicals and semiconductor, while it increased by only 2.7% compared to the previous year in the second half, as exports increased at a slower rate due to the growing downside pressure on the global economy. In 2023, it is expected to increase by 2.3% as protectionism will likely expand and countries are predicted to tighten their monetary policy.
  - Value added in the service sector grew by 4.2% in the first half of 2022 as consumer sentiment began to improve, having previously been suppressed by the COVID-19 pandemic. However, growth slowed to 3.3% in the second half as rising interest rates dampened consumer confidence, and it is expected to slow down further to 2.2% in 2023 year-on-year as the pandemic-driven demand that benefited some industries decreases.

- Value added in the construction sector fell by 1.4% in 2022 as the prices of raw materials rose sharply and interest rates increased, and it further declined to 1.7% in the second half year on year. It is anticipated to drop by another 0.1% year-on-year in 2023 as the government maintains its expansionary policy, limiting the downside momentum.
- Value added in the electricity, gas and water service sector rose by 2.2% as the service sector growth that led the rise in demand for power in the first half of 2022 was curtailed by weakened consumer confidence. As the service sector further contracted in the second half, value added increased by 1.7% from one year ago, and it is expected to grow by 2.1% in 2023, led by increasing demand for air-conditioning and heating and for LNG.

[Outlook by Industry]

(Year-on-year change, %)

	2022			2023
	1H	2H	Annual	
Manufacturing	3.0	2.4	2.7	2.3
Services	4.2	2.4	3.3	2.2
Construction	-1.4	-2.0	-1.7	-0.1
Electricity, gas and water services	2.2	1.2	1.7	2.1

1. Manufacturing

❑ The real value added of the manufacturing industry is likely to grow at a slower pace in 2023.

- The real value added of the manufacturing industry is expected to grow by 2.3% in 2023, 0.4%p down from the 2.7% recorded in 2022 due to the global economic slowdown, a decline in international trade, persistent instability of supply networks, monetary tightening by major countries, and growing uncertainty over the global economy.
  - Upside risks include falling international prices of oil and of raw materials, improving supply networks, and the COVID-19 turning endemic.
  - However, global economic growth and global trade volume are outlook to decrease as demand at home and abroad looks likely shrink due to monetary tightening in major countries, high prices and high interest rates.
- The real value added of the manufacturing sector is anticipated to increase by 2.5% on average in 2022 and 2023, which is lower than the average rate of increase of 2.8% recorded during the period 2017-2021.

- Pandemic-related sectors are expected to remain on a solid growth path as contactless ways of doing things continue to be adopted in a growing number of fields in the wake of the COVID-19 crisis, and environmentally-friendly industries, including environmentally-friendly vehicles, are outlook to expand.
- On the other hand, the global trend towards monetary tightening, unstable supply networks, the US-China trade conflict, and other uncertainties are expected to hinder growth.

2. Services

❑ The real value added of the service sector is outlook to increase at a slower rate in 2023.

- The real value added of the service sector is outlook to grow by 2.2% in 2023, 1.1%p lower than the 3.3% recorded in 2022.
  - As the drop in consumer confidence caused by the COVID-19 endemic improves and new technologies to support contactless economic and social activities are introduced, contactless digital transformation will likely accelerate, leading to the recovery of the sector.
  - Still, domestic demand may remain capped as pandemic-related demand looks decreases in some sectors and interest rates go up amid persistent worries over the global economy.
- The real value added of the service sector is expected to increase by 2.8% on average in the year 2022-2023, higher than the average of 2.6% recorded in the period 2017-2021.
  - The upward trend is likely to continue in the wholesale/retail, hotel, restaurant, transportation and business sectors, which have shown signs of recovery after having been hit hard by the pandemic.
  - However, the service sector is outlook to lose some of its growth momentum due to the Russia-Ukraine war, global monetary tightening, and inflation caused by a steep rise in the prices of raw materials.

3. Construction

❑ The real value added of the construction industry declined at a slower pace in 2023.

- The real value added of the construction industry is expected to fall by 0.1% in 2023 from -1.7% in 2022 (outlook).
  - The fall in the industry's value added will likely continue due to the downside risks facing the industry, including the impact of the pandemic, the prolonged war between Russia and Ukraine, and pressure for interest rate hikes.

- Given that the industry's leading indicators and other psychological indicators point to recovery, the fall is expected to slow down.
- Generally speaking, sales of the construction industry increase when prices rise, but gains in operating profit are limited. For this reason, the industry's value added remains little changed even though industry investments are on the rise.

o The real value added of the construction industry is predicted to drop by 0.9% on average in 2022-2023, extending the downward trend observed in the years 2017-2021, with an average of 0.7%.

- Industry indicators show that the construction industry has entered an expansionary phase, and it is outlook to expand gradually as some of the downside risks for the economy are removed.
- The government's policy of increasing the supply of housing will also have a positive impact on the expansionary trend of the construction sector, adding further momentum to the industry's recovery.

4. Electricity, gas and water services

❑ The sector's real value added is outlook to increase in 2023.

o The real value added of the electricity, gas and water services is outlook to increase by 2.1% in 2023 compared to 2022, led by electricity.

- In addition to the base effect from the previous year, the upside risks will also include steadily increasing demand for cooling and heating, rising demand for power backed by higher sales of electronic household appliances, and constantly growing demand for LNG.
- The main downside risks will include the delay in the recovery of supply networks, the slowing production of domestic manufacturing and weaker exports due to increases in the benchmark interest rates in major countries, the declining growth rate of the service industry amid falling domestic demand, and rising LNG prices due to the prolonged war between Russia and Ukraine.

o The real value added of electricity, gas and water services is outlook to increase by 1.9% on average in 2022-2023, which is considerably lower than the average growth rate of 3.4% recorded between 2017 and 2021.

- The outlook was made based on the empirical relationship between the RVA growth rate of the manufacturing and service sectors, gas prices, and temperature.
- Gas prices were predicted based on the trend of oil prices during the outlook period and the number of cooling degree days as expected to rise gradually from the (unprecedented?) low recorded in 2022 (31.2 days in Seoul).

Table of Contents

[Part I. Industrial Structure of South Korea]

[Part II Outlook by Sector]

List of Tables

[Part I]

[Part II]

List of Figures

[Part I]

[Part II]

Part I

The Industrial Structure of Korea

National Assembly Budget Office

Part I. The Industrial Structure of Korea

Chapter 1. Changes in and Characteristics of the Industrial Structure

- Since the 1990s, Korea's industrial structure has undergone rapid change toward a service-oriented economy in which the service sector accounts for a growing portion of the national economy
- The Korean economy has entered a stage of low growth due to the slowdown of the manufacturing sector and the stagnant growth of the service sector.

The term "industrial structure" refers to the economic development stage of a country and the structure of its productive force. It is measured by the value added (or output) of each industry as a percentage of the national economy or as the number of persons employed by each industry. Generally, the industrial structure of a country constantly changes in response to supply-side factors, which include technology, labor, capital accumulation and international competiveness; demand-side factors, which are associated with the changing needs of consumers according to increasing income; and industrial policy factors, which serve as a series of checks and balances for all the other factors.[1] These changes in industrial structure are a part of correcting the imbalances (structural changes) between different industries caused by external or internal factors. Internal factors include changing demand (industrial imbalances caused by changes in consumer preferences), changing supply (changes in the supply structure, etc.), and technological changes, while external factors include a country's industrial policies and regulations and those of its competitor countries.[2] South Korea's industrial structure underwent many changes between 1980 and 2021. First, it has gradually changed into a service-oriented economy since the 1990s[3], with the service industry making up an ever increasing portion of the national economy.

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1) Korea Institute for Industrial Economics and Trade, "Characteristics of Korean Industry in Indicators for Structural Change, and the Implications", KIET Industrial Economy, June 24, 2021.

2) National Assembly Budget Office, "Structural Changes of the Korean Economy and Response Strategies III: Changes in the Industrial Structure and Response Strategies", August 7, 2020.

3) Although the manufacturing sector's share of value added of the national economy as a whole has been steadily increasing, since the 1990s the number of persons employed by the manufacturing sector has been growing at a slower pace than in the service sector.

A shift of the industrial structure (or an economy) toward a service-oriented economy is driven by a variety of factors including rising demand for services in line with rising incomes, de-industrialization caused by the increasingly high value-added nature of the manufacturing sector, the spread of the international division of labor, the rapid development of ICT technology, the aging population, and the growing participation of women in economic activities. In particular, it is defined by manufacturers' greater input of services as intermediary materials into the production process, and also includes their expanding the share of services that they can create in-house, their producing and selling of their products and services, and their outsourcing of services. The convergence of industries and the shift toward a service-oriented economy is expected to further accelerate as the boundaries between manufacturing and services become increasingly blurred by the growing international division of labor that has been taking place over the past few decades, the advent of the Fourth Industrial Revolution led by ICT, and the recent outbreak of COVID-19.[4)]

Second, the Korean economy recently entered the low-growth stage and, consequently, growth in the manufacturing and service sectors, the two pillars of the national economy, is stagnating. This low growth phase has been triggered by domestic factors including the bipolarization of Korean society, the extremely high cost of housing (including high home prices, rising rents, etc.), shrinking consumption due to the low birth rate and the aging population phenomenon, stagnant investment after overinvestment for an extended period of time, and falling employment. External factors include the saturated supply caused by the global manufacturing industry amid the rapid growth of the emerging economies, including China, Brazil, Russia, India and China (BRICs), and the deteriorating export environment caused by the growing tendency to protectionism arising from the US-China trade conflict, among other factors. This report reviews Korea's industrial structure based on data on real GDP (production GDP) from the national accounts, as well as data on RVA by industry and changes in employment released by the National Statistical Office (NSO), with the focus on the manufacturing and service sectors, from the perspective of the Korean economy's shift toward a service-oriented economy.

How is real GDP (production GDP) measured?[5)]

When the estimated value added of all industries in the national accounts are combined, the total does not match the GDP measured in terms of market prices, because the value added of individual industries is measured by basic prices. Therefore, GDP is measured as the sum of the value added of all industries measured by basic prices, i.e., the sum of the gross value added (GVA) plus taxes[6)] less subsidies on products[7)].

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4) Si-wook Lee & Yong-seok Choi, "Mid- to Long-Term Trade Policy in Response to the Shift toward a Service-Oriented Economy", Long-Term Trade Policy Research 20-02, Korea Institute for International Economic Policy, December 30, 2020.

Section 1 Changes in the Share of Individual Industries

Korea's GDP growth rate gradually declined from an average annual rate of 10.0% in the 1980s[8] to 6.9% in the 1990s, 4.4% in the 2000s, and 2.9% in the 2010s. The average annual growth rate during the period 2010-2021 fell further still to 2.7%, indicating that the downward trend looks set to continue. Prior to the 1990s, Korea maintained rapid growth on the strength of its highly-skilled labor force, low wages, a high investment rate backed by low-interest policy loans, and an export-oriented industrialization strategy, all of which was made possible largely by the government's leadership. However, economic growth has been slowing down as the industrial structure has become increasingly sophisticated in line with economic development, while aggregate labor hours and the capital growth rate have also declined. In addition, gross value added (GVA) increased by 9.9% per year on average in the 1980s, 7.0% in the 1990s, 4.6% in the 2000s, and 2.7% in the years 2010-2021, with the downturn continuing to the present. Taxes less subsidies on products also decreased steadily from 1980 to 2021.

[TableI-1] Average Annual Growth of Real GDP, GVA, and Taxes less Subsidies on Products

(Unit: %)

	1980s	1990s	2000s	2010s	2010-2021
GDP	10.0	6.9	4.4	2.9	2.7
GVA	9.9	7.0	4.6	3.0	2.7
Taxes less subsidies on products	11.1	6.3	3.1	2.7	2.6

Note: The figures are the CAGR for each period.

Source: Bank of Korea.

5) BOK, The System of National Accounts of Korea, 2020.

6) Taxes less subsidies on products are taxes imposed on goods and services produced, sold or imported by producers at a fixed amount of money by unit (volume, weight, etc.), unit price, or a certain percentage of the amount of money. They include value added tax, special consumption tax, and securities transaction tax.

7) "Subsidies on products" refers to subsidies granted per unit of goods or services produced, sold or imported.

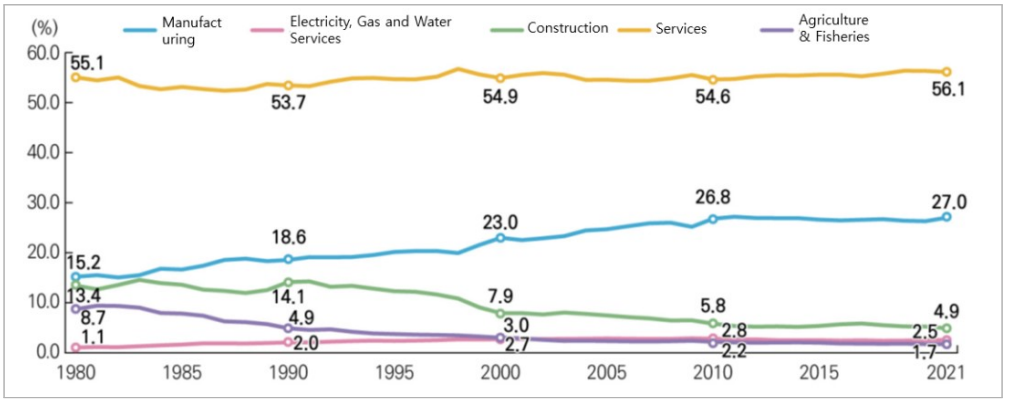
8) CAGR: The Compound Annual Growth Rate is the average of the growth rates for multiple years. It is a geometric average rather than an arithmetic mean.

1. Value Added

The shares of real GDP of different industries changed drastically between 1980 and 2021. In particular, the share of the manufacturing sector has increased greatly while that of construction has shrunk significantly. The share of manufacturing rose from 15.2% in 1980 to 18.6% in 1990, 23.0% in 2000, 26.8% in 2010 and 27.0% in 2021, rising by 11.8%p over the years 1980-2021. On the other hand, the share of the service sector expanded at a relatively slower rate, climbing from 55.1% in 1980 to 53.7% in 1990, 54.9% in 2000, 54.6% in 2010, and 56.1% in 2021, increasing by a mere 1.0%p during the same period. Meanwhile, the construction industry saw its share of real GDP plunge at a relatively fast pace after growing slightly from 13.4% in 1980 to 14.1% in 1990, before falling sharply to 7.9% in 2000, 5.8% in 2010 and 4.9% in 2021, with a total loss of 8.5%p in the period 1980-2021.

Furthermore, the gap in the share of GDP between the construction and manufacturing sectors was only 1.8%p in 1980, but it widened to 22.1% by 2021. The share of agriculture and fisheries also decreased steadily from 8.7% in 1980 to 4.9% in 1990, 3.0% in 2000, 2.2% in 2010 and 1.7% in 2021, losing 7.0%p during the period 1980-2021. Finally, electricity, gas and water services[9] began to occupy an ever growing share of GDP, rising from 1.1% in 1980 to 2.0% in 1990, 2.7% in 2000, 2.8% in 2010, and 2.5% in 2021, edging up by 1.4%p overall during the same period.

[Figure I-1] Changes in the Share of GDP by Industry

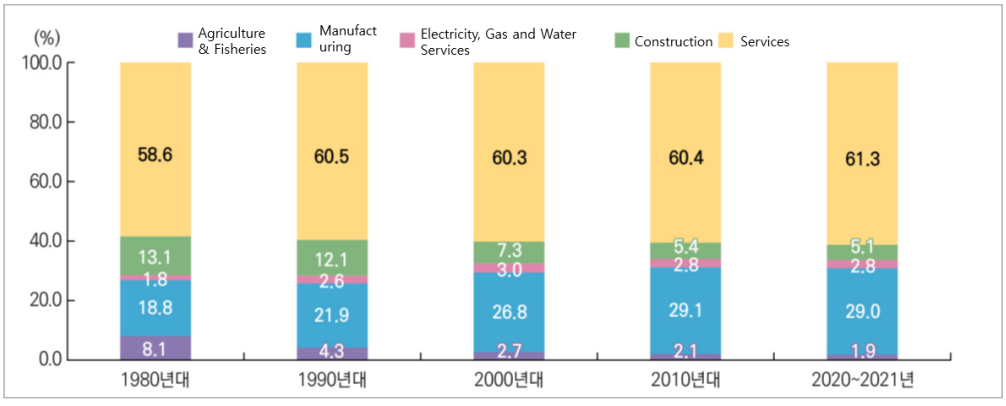


Source: Bank of Korea.

9) Electricity, gas and water services in the national accounts include electricity, gas, heat supply, waterworks and environmental restoration businesses.

The shares of GVA (10-year average) of the manufacturing and service sectors and electricity, gas and water services have increased while those of the construction sector and agriculture and fisheries have dropped over time. The share of manufacturing rose steadily from 18.8% per year on average in the 1980s, to 21.9% in the 1990s, 26.8% in the 2000s and 29.1% in the 2010s, while the average for the years 2020 and 2021 was 29.0%. The share of the service sector remained more or less unchanged at 58.6% on average in the 1980s, 60.5% in the 1990s, 60.3% in the 2000s and 60.4% in the 2010s, before rising to 61.3% in 2020-2021. Electricity, gas and water services' average share of GVA was 1.8% in the 1980s, rising to 2.6% in the 1990s and 3.0% in the 2000s, before falling slightly to 2.8% since the 2010s. As for the construction sector, its share of GVA shrank steadily from 13.1% in the 1980s to 12.1% in the 1990s, 7.3% in the 2000s, 5.4% in the 2010s and 5.1% in 2020-2021. The agriculture and fisheries sector also saw its share decrease from 8.1% in the 1980s to 4.3% in the 1990s, 2.7% in the 2000s, 2.1% in the 2010s and 1.9% in 2020-2021.

[Figure I-2] Share of GVA by Industry (10-Year Average)



Source: Bank of Korea.

The CAGR of the manufacturing industry remained relatively higher than that of the service industry throughout all periods including the 1980s, 1990s and 2000s. However, manufacturing's CAGR was 2.8% in the 2010s, but the service sector began to outpace it, showing a CAGR of 3.3% since that period.

[Table I-2] CAGR of Real Value Added by Industry

(Unit: %)

	Agriculture & fisheries	Manufacturing	Electricity, gas & water supply	Construction	Service
1980s	5.0	12.3	17.5	8.0	9.7
1990s	2.2	8.7	10.0	1.9	7.4
2000s	1.9	5.5	5.1	2.2	4.6
2010s	0.9	2.8	1.3	1.8	3.3

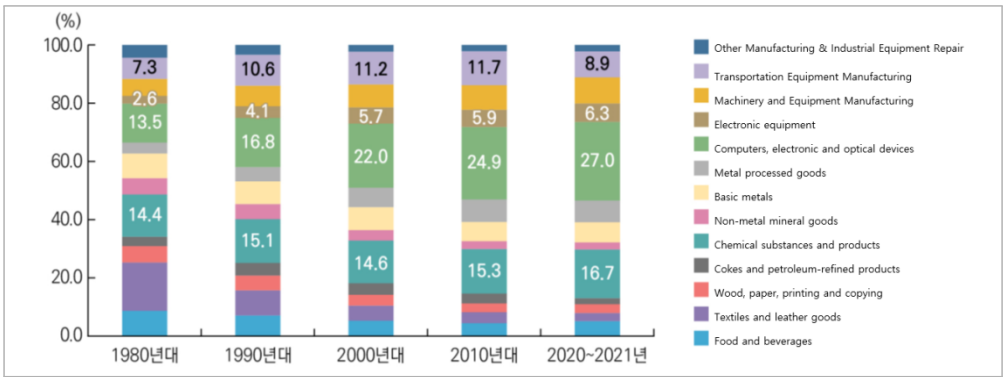
Note: Growth rates are the CAGR for each 10-year period.
Source: Bank of Korea.

As the manufacturing sector's share of GDP continued to grow, the shares (among the thirteen sub-categories of the manufacturing industry) of machinery and equipment, electronic equipment, computers and electronic and optical devices, metal equipment, and chemical substances and products also increased markedly during the period 1980-2021. In particular, the share of computers and electronic and optical devices increased from 13.5% in the 1980s to 24.9% in the 2010s, thus rising by 13.5%p to 27.0% during the years 1980-2021, accounting for the largest portion of GDP.

The key sub-sectors of Korea's manufacturing sector are computers and electronic and optical devices, chemical substances and products, and transportation equipment, whose combined share of GVA jumped from 35.2% in the 1980s to 52.6% in 2020-2021, accounting for more than half of the country's GVA. The share of chemical substances and products remained at around 15% before rising to 16.7% in 2020-2021. Transportation equipment continued to expand its share, reaching 11.7% in the 2010s before experiencing a downturn in 2020-2021.

On the other hand, textile and leather goods, and food saw a decline in their share. Textile and leather goods had the largest share of GVA at 16.6% in the 1980s, but this had dropped to a mere 2.9% by 2020-2021. As for food, it accounted for 8.8% of GVA in the 1980s, but its share also dropped to just 5.1% by 2020-2021.

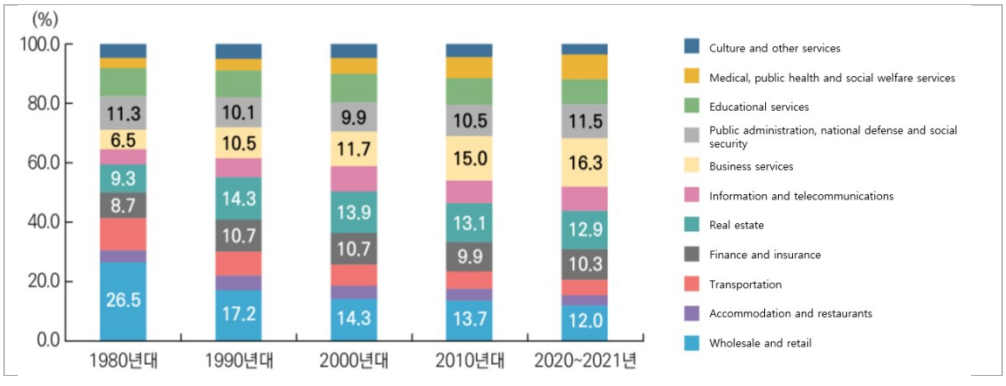
[Figure I-3] Changes in Real Value Added by Sub-sector of the Manufacturing Industry



Source: Bank of Korea.

The share of the service sector in terms of real value added has remained stagnant at around 60%, with wholesale and retail experiencing the steepest decline (14.5%p) from 26.5% in the 1980s to 12.0% by 2020-2021. However, the share of business services[10] grew from 6.5% in the 1980s to 16.3% in 2020-2021, while finance and insurance, real estate, and public administration, defense and social security contributed considerably to GVA, accounting for 10.3%, 10.3% and 11.5%, respectively, in 2020-2021.

[Figure I-4] Changes in Real Value Added by Sub-Sector of the Service Industry

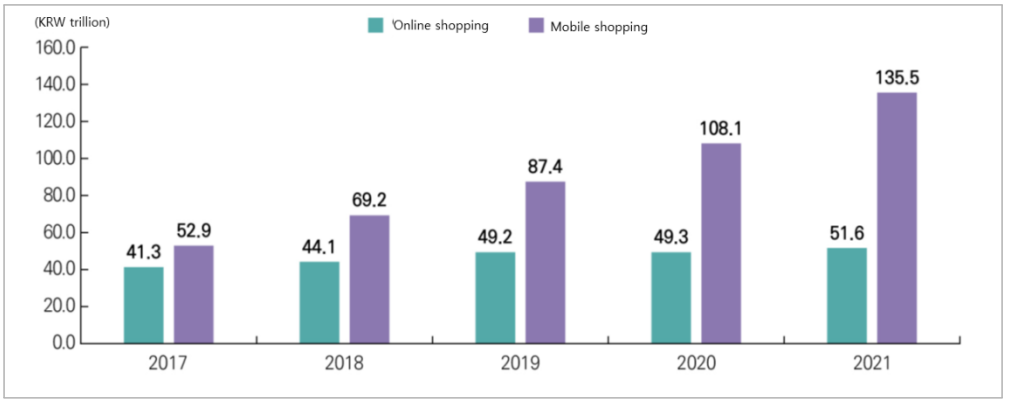


Source: Bank of Korea.

10) "Business services" refers to services rendered and other activities undertaken to create monetary value for the purpose of assisting business activities that do not deliver a tangible commodity. These services are classified into three main categories: professional science and technology services (advertisement, R&D and professional services), business support services (cleaning, sanitation, and facility maintenance, manpower recruitment and supply), and other supportive services.

As the service industry is shifting toward a digital-oriented, contact-free way of doing business, the scale and scope of the industry is expanding rapidly. Notably, the spread of contactless means of doing things since the outbreak of COVID-19 has brought about a dramatic increase of 98.6% in online shopping, with sales rising from KRW 94.1 trillion in 2017 to KRW 187.1 trillion in 2021. In addition, the growth of mobile shopping has outpaced that of Internet shopping by a large margin as smart phones have become widely available. As such, sales from Internet shopping increased by 24.9% to KRW 51.6 trillion, while sales from mobile shopping jumped by 156.1% to KRW 135.5 trillion during the same period.

[Figure I-5] Changes in Online Shopping



Source: National Statistical Office (NSO).

2. Changes in Employment

The number of employed persons stood at 13,613,000 in the 1980s and increased to 18,085,000 in the 1990s, 21,173,000 in the 2000s, 24,033,000 in the 2010s, and 27,273,000 in 2021. The CAGR of total employed persons was 2.8% in the 1980s, 1.3% in the 1990s, 1.3% in the 2000s and 1.4% in the 2010s. The CAGR of the service industry remained higher than that of all employed persons during the entire period since 1980, while manufacturing's CAGR has remained below the CAGR of all employed persons since the 1990s, and is also lower than that of the service industry. In particular, the number of employed persons in agriculture and fisheries has been on a downward spiral since the 1980s.

[Table I-3] CAGR of Employment by Industry

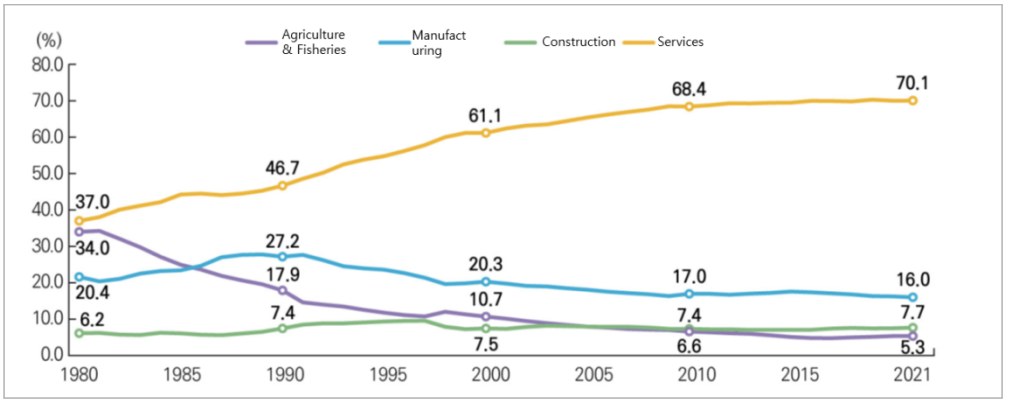
(Unit: %)

	1980s	1990s	2000s	2010s	2010-2021
Total employment	2.8	1.3	1.3	1.4	1.0
Agriculture & fisheries	-3.3	-3.7	-3.4	-1.4	-0.6
Manufacturing	5.7	-2.2	-1.1	0.9	0.5
Electricity, gas & water supply	3.3	-1.3	11.5	3.8	4.4
Construction	3.4	1.0	1.0	1.5	1.5
Services	5.1	4.4	2.5	1.7	1.1

Note: Figures are the CAGR for each period.
Source: Bank of Korea.

The share of the service industry in terms of the total number of employed persons in Korea has increased greatly, while that of the agriculture and fisheries sector has seen a notable decline. Specifically, the service sector's share of the total number of employed persons rose from 37.0% in 1980 to 46.7% in 1990, 61.1% in 2000, 68.4% in 2010, and 70.1% in 2021, a rise of 33.1%p during the period 1980-2021. Meanwhile, the manufacturing sector's share grew from 20.4% in 1980 to a peak of 27.8% in 1989, before embarking on a prolonged decline to 27.2% in 1990, 20.3% in 2000, 17.0% in 2010 and 16.0% in 2021, shrinking by 4.4% overall during the same period. As regards the share of agriculture and fisheries, it plunged from 34.0% in 1980 to 17.9% in 1990, followed by steady drops in subsequent years to 5.3% in 2021, thus falling by 28.7%p during the years 1980-2021. As for the construction industry, its share climbed from 6.2% in 1980 to 7.4% in 1990, and it has been hovering around 7.5% until recently, gaining 1.5%p during the period 1980-2021. Finally, the share of electricity, gas and water services rose by 0.6%p overall, from 0.3% in 1980 to 0.9% in 2021.

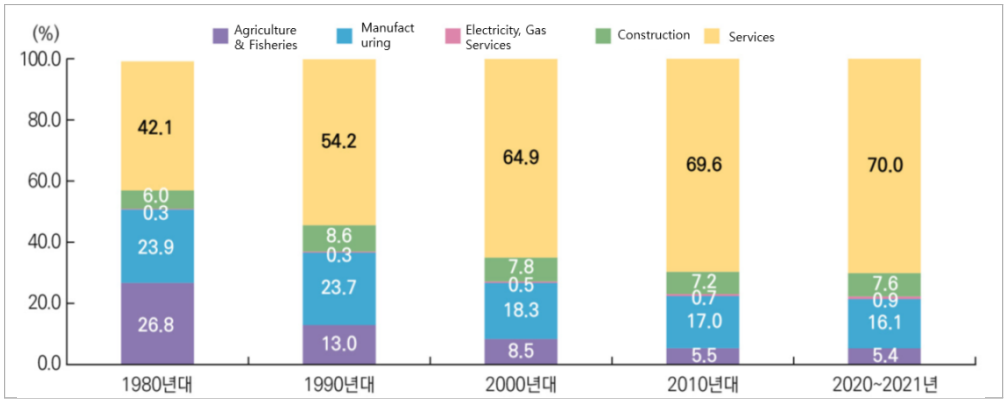
[FigureI-6] Changes in Employment by Industry



Source: "Number of Employed Persons by Industry", Economically Active Population Survey by the National Statistical Office (NSO)(1963-1991, 1992-2000, 2000-2008,2004-2017, 2013-2021). These data have been combined and processed for use in this report.

The shares of the service sector, construction industry, and electricity, gas and water services in terms of employment by industry (10-year average) have increased, while those of the manufacturing sector and agriculture and fisheries have decreased. The CAGR of the service industry has rose steadily from 42.1% in the 1980s to 54.2% in the 1990s, 64.9% in the 2000s, and 69.9% in the 2010s, reaching 70.0% in the years 2020-2021. The CAGR of the construction sector rose from 6.0% in the 1980s to 8.6% in the 1990s, before declining to 7.8% in the 2000s and 7.2% in the 2010s, and then edging up slightly to 7.6% in 2020-2021. The share of electricity, gas and water services has remained almost unchanged, climbing slightly from 0.3% in the 1980s to 0.5% in the 2000s, 0.7% in the 2010s, and 0.9% in 2020-2021. However, the manufacturing sector has seen a steady decline in its CAGR, falling from 23.9% in the 1980s to 23.7% in the 1990s, 18.3% in the 2000s, 17.0% in the 2010s, and 16.1% in 2020-2021. The CAGR of agriculture and fisheries has also taken the same path, falling from 26.8% in the 1980s to 13.0% in the 1990s, 8.5% in the 2000s, 5.5% in the 2010s, and 5.4% in 2020-2021.

[Figure I-7] Changes in the Share of All Employed Persons by Industry (10-Year Average)



Source: "Number of Employed Persons by Industry", Economically Active Population Survey by the National Statistical Office (1963-1991, 1992-2000, 2000-2008 ,2004-2017, 2013-2021). These data have been combined and processed for use in this report.

3. Contribution to Growth

"Contribution rate" and "contribution level" are indicators that show how much the manufacturing and service sectors contribute to the growth of the national economy. Contribution rate is an indicator of how much the manufacturing and service sectors, as components of GDP growth, contribute to changes in GDP, which is expressed as a percentage of changes in individual components against the change in total GDP, or as a percentage (%) of changes in individual components of the statistics against the change in total GDP [11] during a specific time period.

Contribution level shows how much the manufacturing and service sectors contribute to the GDP growth rate. For example, if the consumer price index increases by 1% compared to one month ago and the rise in the price of rice alone is responsible for a 0.25% increase in the consumer price index, the contribution level of the price of rice is 0.25%p.[12][13]

The contribution levels of both the manufacturing and service sectors increased between 1980 and 2021. The average contribution rate of the manufacturing sector was 18.8% in the 1980s, 24.1% in the 1990s, 21.9% in the 2000s, and 29.4% in 2020-2021. Significantly, the manufacturing sector's contribution rate was 28.0%, -76.6% and 39.9%, respectively, in 1998, 2009 and 2020, i.e. three years in which the Korean economy found itself facing an existential crisis.

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11) Contribution rate = (change in the amount of an individual component/ change in the total amount) × 100.

12) Contribution level = contribution rate of a given component × total change in the statistics.

13) "Statistical Glossary & Information", Nuri House of the National Statistical Office.

The service sector's contribution rate averaged 29.4% in the 1980s, 53.3% in the 1990s, 62.5% in the 2000s and 60.5% in the years 2020-2021. In times of crisis, i.e., 1990, 2009 and 2020, the contribution rate of the service industry stood at 26.1%, 139.1% and 63.8%, respectively. The contribution rate of the service sector skyrocketed to 139.1% in 2009, while the manufacturing sector posted a negative contribution rate of -76.6% amid the global financial crisis.

The contribution level of the service industry was greater than that of manufacturing between 1980 and 2021. However, the contribution level of both the manufacturing and service sectors decreased during the same period. The average contribution level of the manufacturing sector was 2.78%p in the 1980s, 2.3%p in the 1990s, 1.7%p in the 2000s and 1.0%p in 2020-2021, while that of the service sector averaged 4.1%p, 1.7%p, 3.7%p, 2.6%p, and 1.7%p, respectively. Notably, the service sector saw a contribution level of -1.2%p, 1.1%p and -0.5%p in 1998, 2009, and 2020, respectively.

[Table I-4] Rates and Levels of Contribution to Real GDP by Industry

(Unit: %, %p)

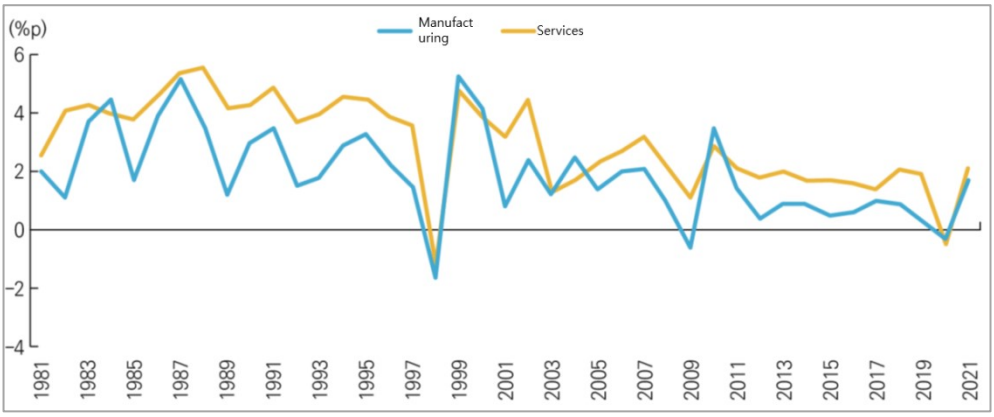
		1980s	1990s		2000s		2001-2021	
				1998		2009		2020
Change in GDP Growth Rate			7.3	-5.1	4.9	0.8	3.1	-0.7
Manufacturing	Contribution Rate	18.8	24.1	28.0	21.9	-76.6	29.4	39.9
	Contribution Level	2.7	2.3	-1.7	1.7	-0.6	1.0	-0.3
Service	Contribution Rate	29.4	53.3	26.1	62.5	139.1	60.5	63.8
	Contribution Level	4.1	3.7	-1.2	2.6	1.1	1.7	-0.5

Note: 1. The contribution rate is expressed as the % of the change in real GDP against the change in GDP during a specific time period, while the level of contribution indicates how individual industries have contributed to GDP growth.

2. Contribution rates are calculated by the National Assembly Budget Office based on contribution levels.

Source: Bank of Korea.

[Figure I-8] Changes in the Contribution Level by Industry



Source: Bank of Korea.

Chapter 2. Post-Pandemic Changes in the Industrial

- The Korean economy quickly rebounded from the uncertainties associated with the COVID-19 pandemic amid a recovery of manufacturing exports.
- Both the manufacturing and service sectors witnessed a rise in non-contact demand-based business.
  - Due to the rise of the 'homeconomy', the ICT industry has grown significantly.
  - The status of different industries changed due to the COVID-19 crisis, most particularly that of the service industry.

Several changes have taken place in Korea's industrial structure in the wake of COVID-19. First, the contribution level of the manufacturing sector exceeded that of the service sector as the value added of manufacturing as a percentage of GDP increased. Second, changes in the sub-categories of the service industry became clear as the demand for non-contact services increased.[14] Third, ICT's share of GDP expanded significantly amid the rising demand for non-contact services, while ICT manufacturing's share of Korea's total exports also increased to a large extent.

However, it remains unclear whether or not this trend will continue or prove to be a temporary phenomenon, given that the available data are limited and the pandemic is still an ongoing process.

Section 1 Manufacturing Industry's Capability to Cope with Economic Crises

In 2020, both advanced and emerging countries experienced reverse growth of -4.5%[15] and -2.1%[16], respectively, due to the COVID-19 pandemic, as a result of which the global economy also recorded its lowest growth rate (-3.1%) since the global financial crisis.[17]

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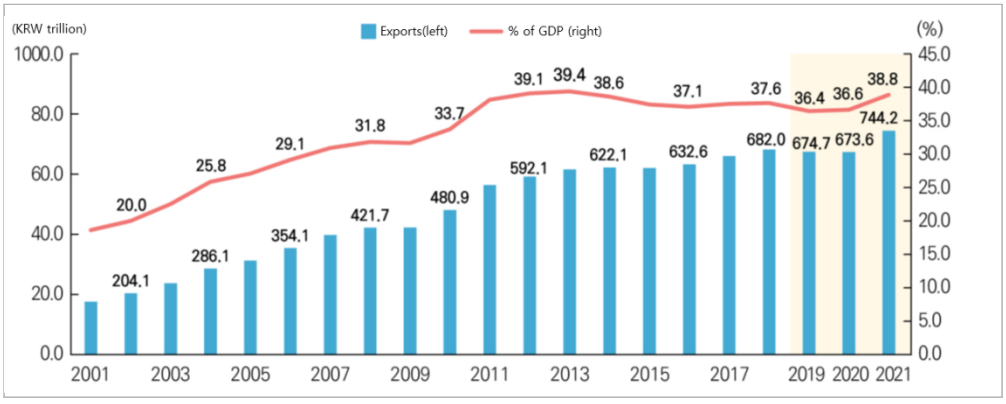
14) Won Joo, "Changes in the Economic and Industrial Structure during the Two-Year Period of COVID-19 and the Implications", Issues and Tasks 22-01, Hyundai Research Institute, January 17, 2022.
15) U.S.A. –3.4%; Eurozone –6.3%; Japan –4.7%; UK –9.8%.
16) India –7.3%; Russia –7.3%; Brazil –4.1%; Mexico –8.3%.

However, the Korean economy suffered a relatively small setback of -0.7% in its growth rate on the back of a strong export recovery in the manufacturing industry, limiting the economic slowdown.[18] Despite the persistently sluggish domestic demand caused by the negative effects of COVID-19, including social distancing, the Korean economy was able to rebound within a relatively short period of time as its highly competitive (no. 5 in the world) manufacturing sector[19] enjoyed a quick export recovery.

Korea's exports as a percentage of GDP increased steadily from the financial crisis, peaking at 39.4% in 2013, until another downward trend began. The trend was reversed around the time of the outbreak of COVID-19, with the share of exports rising from 36.4% in 2019 to 36.6% in 2020 and 38.8% in 2021.

[FigureI-9] Changes in the Share of Exports in terms of GDP



Source: Bank of Korea.

The contribution level of exports was higher than that of the manufacturing and service sectors for the first three years (2010-2012) immediately following the financial crisis. The level remained still higher than that of the two industries in 2020 and 2021 despite the challenging circumstances occasioned by the COVID-19 pandemic.

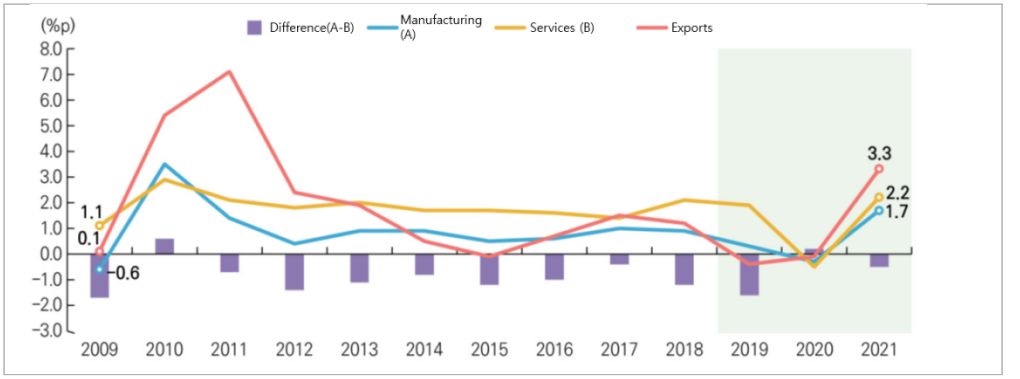
17) IMF, World Economic Outlook, October 2021.

18) Gyeong-in Hwang, "Globally Competitive Korean Manufacturing Industry, the Driving Force behind the Recovery of the Pandemic-Stricken Economy," i-KIET Industry & Economic Issues, No. 108, KIET, May 6, 2021.

19) UNIDO's CIP (Competitive Industrial Performance Index).

Generally, the contribution level of the manufacturing industry has been lower than that of the service industry. From 2009 to 2021, the contribution level of the manufacturing sector was higher than that of the service sector and exports only twice - once in 2010 immediately after the financial crisis and again in 2020 when the pandemic was widespread.

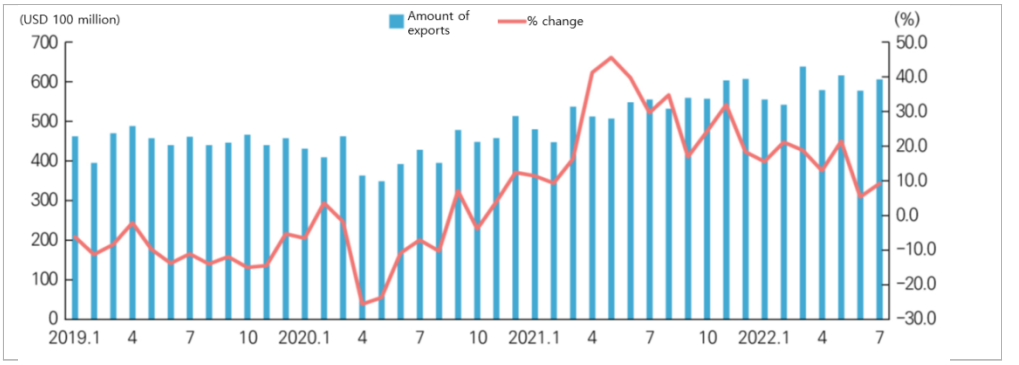
[FigureI-10] Contribution Levels of Manufacturing, Service and Exports



Source: Bank of Korea.

Around the onset of the pandemic, amounts of monthly exports shrank by -25.6% and -23.7% in April and May 2020, respectively, compared to the same months of the previous year, before starting to rebound quickly in what is called a “V”-shaped pattern. Monthly exports jumped by 41.2% and 45.5% in April and May of 2020, growing by over 40% for two consecutive months for the first time in history. The 45.5% increase in May 2020 was the biggest hike in the thirty-two years since August 1988, when the monthly exports increased by 52.6%.

[FigureI-11] Monthly Exports Since the COVID-19 Outbreak and % Changes



Note: The figures for % changes indicate changes from the same month one year previously: Korea International Trade Association (KITA).

Section 2 The Rise of the ICT Industry

As the non-contact economy expands amid the spread of COVID-19, the homeconomy[20] has emerged, the demand for non-contact online services has begun quickly growing, and the market for such services is also expanding, all of which are accelerating a paradigm shift toward the digital economy. As a result, ICT is expected to have a greater impact on the Korean economy, gradually emerging as a key industry. A sharp contraction in contact-based offline activities following the outbreak of the pandemic has resulted in shrinking demand, having a negative impact on the economy. On the other hand, increasing demand for contactless, online services has caused the market for computers and audio-visual equipment to grow, exerting a positive effect on the economy.[21] The growing homeconomy has led to a steep increase in the use of Internet and data,[22] and global IT corporations are finding it necessary to newly create or expand their data centers, as well as increasing the number of servers. Consequently, the demand for semiconductors and storage devices including SSD is also increasing, leading to export growth among the related industries.[23]

Although different organizations may have different classification standards, they are divided into two major categories: ICT manufacturing (computers, electronics and optical devices) and ICT services (information and communications).[24]

ICT products make up 30.4% of all exports (as of 2020), and ICT exports grew by 1.4% per year on average between 2011 and 2020, exceeding the total export growth rate of 0.9%. However, the production inducement coefficient[26] of ICT products[25] in the Inter-Industry Table, which was 1.551 in 2019, was relatively lower than that of electronics (1.791), manufactured goods (1.903) and services (1.684), indicating that ICT products have a relatively smaller impact on domestic production.[27]

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20) Homeconomy is a combination of “home” and “economy”. It includes food and daily necessities delivery, rental services, home entertainment (games and content), home care (home cleaning), etc.

21) Korea Institute for Industrial Economics and Trade(KIET), “New Growth Strategies for the ICT Industry amid Accelerating Digital Transformation”, December 2021.

22) According to the Woori Financial Research Institute (October 29, 2021), data traffic increased 2.5 times over the previous two years, from 50,000 GB/s in 2017 to 125,000 GB/s in 2021, on the back of the growth of Over the Top (OTT) services including Netflix and YouTube.

23) Korea’s semiconductor exports continued rising for 25 consecutive months up until July 2022, with the export amount hovering above the USD 10.0 billion mark for 16 months in a row.

24) The National Statistical Office(NSO) defines ICT by customized classification under the Korea Standard Industrial Classification according to the ICT Industry Classification of the OECD Committee for Scientific and Technological Policy; and it is further divided into ICT manufacturing and ICT services. The OECD defines the ICT industry as those industrial activities which create goods and services used primarily to process, communicate, transmit and display data in an electronic manner.

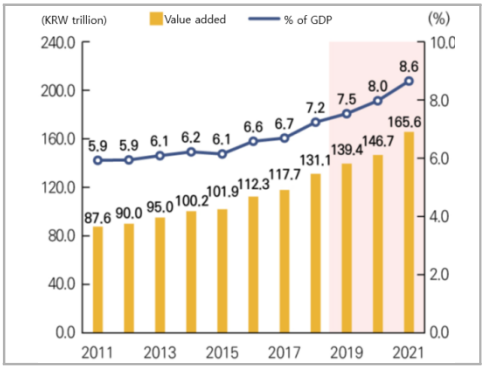
25) ICT manufactured goods include semiconductors, electronic display devices, other electronic parts, computers and peripheral devices, and communications, broadcasting and audio equipment under the middle classification standards. For the upper-level classification, ICT services include information and communication, while broadcasting services and ICT products include ICT manufactured goods and ICT services.

26) Indicates the size of production induced directly or indirectly by one unit of demand generated for goods or services in the electronics industry.

The real value added of ICT manufacturing increased by 6.6% per year on average, or by KRW 78.0 trillion from KRW 87.6 trillion in 2011 to KRW 165.6 trillion, in 2021. The real value added of ICT services grew by 4.0%, i.e. by KRW 29.7 trillion from KRW 61.6 trillion in 2011 to KRW 91.3 trillion in 2021, which is much higher than the 2.6% GDP growth rate during the same period.

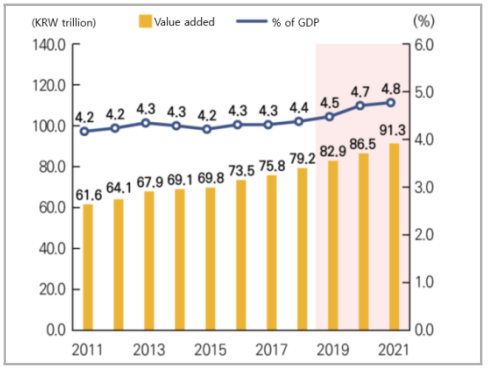
A closer look at the three years (2019-2021) around the outbreak of the pandemic shows that the real value added of ICT manufacturing increased by 9.0% and that of ICT services by 5.0%, presenting a stark contrast to the GDP growth rate of 1.7%.

[Figure I-12] Value Added of ICT Manufacturing and Share of GDP



Source: Bank of Korea.

[Figure I-13] Value Added of ICT Services and Share of GDP



Source: Bank of Kore

Section 3 Changing Status of Sub-Categories of the Service Industry

There have been significant changes in the creation of value added and employment by sub-category of the service industry since the onset of the COVID-19 pandemic. Social distancing has greatly dampened the production and consumption of contact-based services, and, as a consequence, the share of value added of close-to-life services - including wholesale, retail, restaurants, accommodation, transportation, culture and other services - has declined significantly.[28] On the other hand, the share of value added of medical and healthcare, social welfare services, financial and insurance services, and information and communications has increased.

The share of value added of restaurants shrank by a relatively larger degree than that of wholesale and retail, whose share of value added remained virtually unchanged between 2019 and 2021, while that of accommodation and restaurants fell by 0.8%.

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27) Bank of Korea Gyeonggi Headquarters, “Characteristics of ICT Industry Growth and the Impact on Gyeonggi-do’s Local Economy”, January 2022.

28) Joint report of government ministries, “Responses to COVID-19 and Growth Strategies of the Service Industry”, March 3, 2021.

The share of art, sports and leisure-related services in the category of culture and other services was higher than that of other services in 2019, but declined by 0.5%p between 2019 and 2021, bringing it below that of other services which lost 0.2%p in 2021. The use of public transportation declined considerably as social distancing decreased traffic, with many more people who had previously used public transportation switching to cars and other types of personal vehicles.

On the other hand, the share of value added of medical and healthcare services, and social welfare services has risen due to the increased demand for COVID-19 diagnosis and the extraordinary demand for COVID-19 vaccinations. As people are increasingly switching to a contactless way of life amid concerns over infection, the homeconomy (referring to economic activities that are carried out in the home, including consumption, culture and leisure) is quickly emerging as a new phenomenon. As a result, demand for games, e-books and streaming services has skyrocketed since 2020.[29] In addition, remote learning via digital platforms has become widely available to students, and corporations are quickly adopting a culture of working from home. Consequently, the value added of information and communications also increased as the industry expanded its infrastructure investments.

[TableI-5] Value Added of Sub-Categories of the Service Industry

(Unit: %, %p)

Sub-Category	2019	2020	2021	Change
Wholesale, Retail, Accommodation, Restaurants	17.1	16.3	16.2	-0.9
Wholesale & retail	13.1	13.1	13.1	0.0
Accommodation & Restaurants	4.0	3.3	3.2	-0.8
Culture & Other Services	4.1	3.1	3.1	-1.0
Arts, Sports & Leisure-related Services	2.1	1.5	1.6	-0.5
Other Services	2.0	1.9	1.8	-0.2
Medical, Healthcare & Social Welfare Services	8.2	8.4	8.5	0.3
Transportation	6.1	5.1	5.1	-1.0
Finance & Insurance	9.8	10.8	11.1	1.3
Information & Communications	7.9	8.4	8.5	0.6
Communications	2.1	2.3	2.3	0.2
Publication, Broadcasting, Video and Information Services	5.8	6.1	6.2	0.4

Note: The figures for “change” are the changes that occurred between 2019 and 2021.

Source: Bank of Korea.

29) Joint report of government ministries, “Responses to COVID-19 and Growth Strategies of the Service Industry”, March 3, 2021.

The service industry saw a decline in employment led by contact-based services, including accommodation, restaurants, and wholesale and retail, which were hit particularly hard by the pandemic. Specifically, the number of employed persons fell by 4.4% to 160,000 in the wholesale and retail sector and by 6.9% to 159,000 in the accommodation and restaurant sector. The decline in the combined number of employed persons in these two sub-categories in 2020 outnumbered the loss in the number of employed persons in the entire service industry, which saw a decline of 1.2% or 235,000 persons.

In the transportation sector, the number of employed persons in taxi services decreased markedly and has yet to recover. The number of taxis operating nationwide fell by 10,365, or 4.3%, from 240,823 in July 2020 to 230,458 in July 2022, while the number of tax drivers dropped by 18,159, or 5.3%, from 341,418 to 323,259 during the same period. In particular, both the number of registered regular taxis and the number of taxi drivers fell, indicating that employment decreased more among regular taxi drivers who are employees of taxi companies than among owner-taxi drivers who own a taxi business.

[TableI-6] Numbers of Registered Taxis and Taxi Drivers

(Unit: taxi, person)

	Regular-taxi		Owner-owned taxi		Overall	
	Registered No.	No. of Drivers	Registered No.	No. of Drivers	Registered No.	No. of Drivers
2019	80,094	87,453	164,903	252,356	244,997	339,809
2020	76,239	89,650	164,584	251,768	240,823	341,418
2021	70,021	78,639	164,465	250,722	234,486	329,361
2022	66,092	73,751	164,366	249,508	230,458	323,259
Change (% change)	10,147 (-13.3)	15,899 (-17.7)	218 (-0.1)	2,260 (-0.9)	10,365 (-4.3)	18,159 (-5.3)

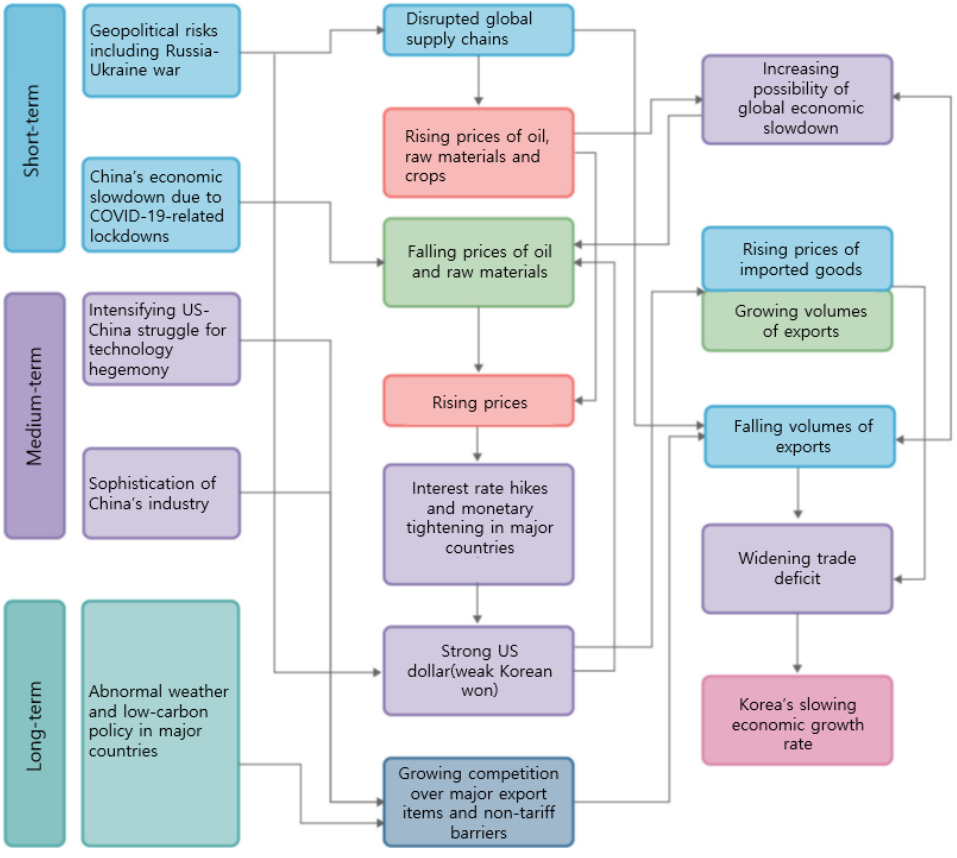
Note: 1. The figures are for the end of July each year.

2. Change (% change) indicates the difference between July 2020 and July 2022:

Source: National Taxi Business Association of Korea.

- The global economy is growing at a slower pace and the US dollar is getting stronger as global supply networks remain unstable amid the prolonged Russia-Ukraine war, the economic slowdown in China, monetary tightening in major countries, and changing international trade circumstances, fueling concerns over the negative impact on the Korean economy and industry.

Figure I-14] The Flow of Potential Risks



Source: National Assembly Budget Office.

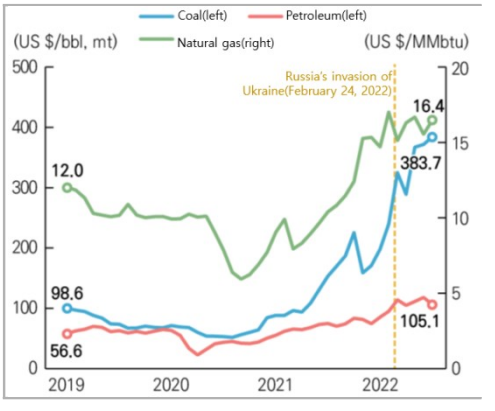
Eun-yeong Cho, Economic Analyst (dolkongs@assembly.go.kr, 6788-4676)

Section 1 Persistent Concerns over Global Supply Networks

As uncertainties continue over global supply networks following Russia's invasion of Ukraine at the end of February 2022, the prices of energy, raw materials and crops have remained high.[30] Economic activities contracted sharply in the first half of 2020 as a result of the lockdown amid the spread of COVId-19, leading to plunges in international energy prices. The prices of coal, crude oil and natural gas fell by 23.6%, 30.3% and 42.0% to USD 50.1 per barrel, USD 39.9 per metric ton, and USD 5.9 per million BTU, respectively, in August-October 2020.

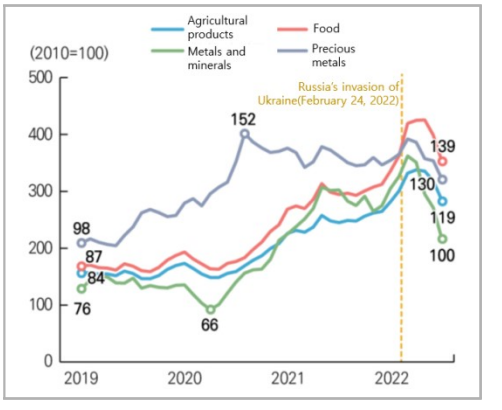
As ever more people were vaccinated in leading countries, economic activities resumed and the demand for energy increased rapidly. Meanwhile, international energy prices have been rising sharply[31] because the OPEC+ agreement to cut oil production remains in effect, US shale gas companies have decided to postpone their new investments, the Europe-Russia conflict continues, and the demand for gas has increased in line with the adoption of a carbon neutrality policy, and also because of the ongoing Russia-Ukraine war. The prices of coal, crude oil and natural gas were hiked 5.8 times, 1.7 times and 1.6 times, respectively, in July 2022, compared to August-October 2019. Ukraine and Russia supply 12.1% of the world's crude oil, 16.6% of natural gas and 5.2% of coal.

[FigureI-15] Changes in Energy Prices



Source: World Bank, OPEC.

[FigureI-16] Changes in the Prices of Raw Materials and Crops



Source: World Bank.

30) Won-bin Doh & Nae-yeong Gang, "Factors that Determine the Prices of International Raw Materials and Won-Dollar Exchange Rates, and their Impact on the Korean Economy," TradeFocus, Vol.17, KITA International Trade and Commerce Research Institute, 2022.

31) The Bank of Korea, "A Review of Recent Trends in the Global Energy Market," International Economic Review, BOK, November 19, 2021.

In March-May 2022, the prices of agricultural products, food, metals and minerals, and precious metals rose by 1.7 times, 1.9 times, 2.2 times and 1.6 times, respectively, from the lowest point of 2019 due to a steep rise in Chinese demand amid the spread of the pandemic and the war between Russia and Ukraine, whose combined share of crops in total exports is relatively high, the poor crop harvest caused by abnormal weather, and labor shortages.[32)]

Under these circumstances, prices rose further still following the outbreak of the Russia-Ukraine war. The prices of agricultural products, food, metals and minerals, and precious metals increased by 8.4%, 12.5%, 7.7% and 5.3%, respectively, between 1-3 months after Russia and Ukraine stopped producing raw materials and exporting crops via the Black Sea, and the US and the EU began to impose economic sanctions on Russia, while Russia introduced export restrictions in response to the sanctions. Ukraine and Russia supply 26.1% of the world's wheat, 13.7% of corn, 11.3% of nickel and 7.2% of iron ore.

However, crop prices took a downturn after peaking in April-June amid a positive outlook for crop production in the years 2022-2023, Ukraine's decision to resume crop exports via the Black Sea following the Ukraine-Russia crop agreement reached on July 21, and falling demand due to the strong dollar.[33)]

As such, higher prices of international crude oil, raw materials and crops have caused domestic prices to rise and trade deficits to expand for the Korean economy, which depends heavily on crude oil and raw materials.[34)] The higher prices of crude oil and raw materials are pushing up the production cost for some industries.[35)] For example, the steep rises in the prices of raw materials, including structural steel, are increasingly weighing on the costs of the shipbuilding industry. In the steel industry, the prices of iron ore and coal used in the production of coke rose sharply in the second quarter. In addition, the petrochemical industry may face weakening export competitiveness if oil prices remain high, as the production cost of NAFTA-based ethylene-related products made by Korean companies increases more than that of shale and natural gas-based products made in North America and the Middle East.[36)]

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32) National Budget Office, "2021 Economic Analysis for Major Countries: Potential Risks Associated with COVID-19 and Increasing Liquidity", p. 28, December 20, 2021.

33) Ji-yeon Kim, et al., "Factors that Determine the Prices of International Crops and the Outlook," KREI Issue Analysis, Vol. 89, Korea Rural Economic Institute, July 2022.

34) According to Won-bin Doh & Nae-yeong Gang (2022), a 10% increase in the prices of raw materials and the exchange rate was not likely to have a significant impact on exports, whereas import prices were outlook to rise by 3.5%.

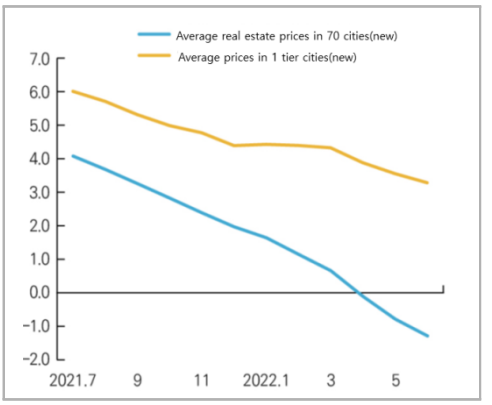
35) According to Doh & Gang (2022), the production costs of domestic corporations rose by 8.8% on average in 2021, with increases in energy prices being responsible for 5.9% of the cost rise.

36) Ji-sang Hong, et al., "A Review of Exports & Imports in H1 2022 and the Outlook for H2," Trade Focus, Vol. 13, International Trade & Commerce Research Institute of the Korea International Trade Institute, June 2022.

Section 2 Economic Slowdown in China

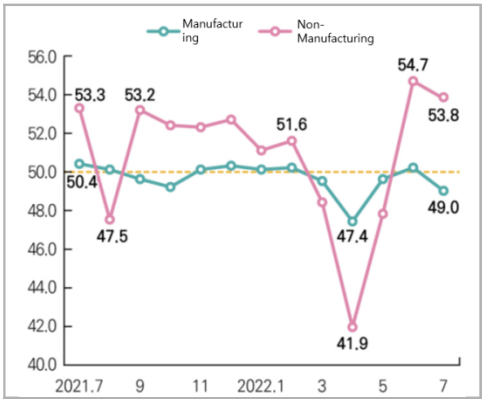
As economic activities contracted to a considerable extent in China after the lockdown resumed, the outlook for China's economic growth has been revised downward.[37] Furthermore, as the number of confirmed cases of COVID-19 began to rise again, the Chinese government re-imposed the lockdown in major cities on March 28, 2022. In addition, power shortages, tightened regulation of the real estate market, and increases in food prices due to abnormal weather conditions, including extreme heat and droughts, caused production, consumption and investment to shrink, with the result that China's second quarter economic growth rate fell to 0.4%, which was much lower than the earlier outlook of 1.2%. Prices of real estate, which represents approximately 30% of the investment and tax income of the Chinese economy, has been on the decline since the government began to impose regulation in 2021, adding to the downward momentum of the Chinese economy.[38] The Purchasing Management Index (PMI) of the manufacturing and non-manufacturing sectors[39] dropped below 50 in March-May 2022, and industrial production declined by 7.5% in January-February from the same period one year previously, before dropping still further to –2.9% in April, with exports also falling from 16.3% to 3.7% during the same period.

[FigureI-17] Real Estate Prices in China



Source: International Finance Center.

[Figure I-18] PMI Growth Rates of China's Manufacturing and Non-Manufacturing Sectors



Source: International Finance Center.

37) Chi-hoon Lee & Ki-bong Kim, "The Economic Outlook for China and a Review of the Risk Factors", Issue Analysis, International Finance Center, August 29, 2022.

38) Sales of excavators, an indicator of the construction sector's performance, have decreased by 53.1% from one year ago, while the real estate business index has dropped to 95.3, the lowest level since 2016.

39) The Purchasing Manager's Index (PMI) is expressed as a weighted figure on a scale of 0 to 100, based on a survey of procurement managers of corporations on questions regarding production activities. As a coincident indicator of the business state, a figure of 50 or above means that the economy is in the expansion stage of the business cycle, while a figure below 50 indicates contraction.

The Chinese government has announced economic stimulus packages amounting to over 1.7% of GDP since May 2022 in a bid not only to encourage investment in the infrastructure for transportation, logistics and 5G, but also to boost demand across the board. In addition, it is easing the policies for suppressing the real estate market that it has been pushing ahead with since last year, as well as its policies regarding IT industry regulation and carbon neutrality. For example, it has eased lending regulations, and put on hold the introduction of a property holding tax that was scheduled to take effect in 2022, while increasing coal mining activities and coal imports in response to power shortages.

Against this backdrop, international organizations predict that the Chinese economy will grow by around 4%, which is around -0.4 to 0.8%p lower than the initial outlook, while the Chinese government's economic stimulus packages aimed at boosting infrastructure investment and spending, along with monetary easing, are expected to have a positive impact on economic growth in China in 2023.

If China's economic growth rate falls, import demand from China will decrease and, consequently, Korea's exports to China will also drop.[40] In fact, the lockdown imposed in China in the second quarter has had an adverse effect on multiple industries in Korea, including petrochemicals, machinery, steel, displays and automobiles, For example, the prices of displays have jumped by 1.7 to 2 times due to the interrupted supply of raw materials, including rare earth elements that are imported from China, while the importation of some parts has been halted. In the automobile and auto parts industries, sales of finished cars by Korean carmakers operating in China have been sluggish, and the re-imposition of the lockdown has caused delays in import and export logistics and the production of finished cars, with orders for SSD and other parts falling due to interruptions in the production of computer manufacturers in China.[41]

Section 3 Fiscal Austerity of the U.S. and Appreciation of the US Dollar

The US government's introduction of a monetary tightening policy led to slower economic growth, which in turn caused a flight to quality. Meanwhile, the widening gap in interest rates and growing international trade deficits between Korea and the U.S. have resulted in a stronger dollar.[42]

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40) Nae-yeong Gang & Ji-won Yang, "The Impact of China's Lockdown on the Korean Economy under Different Scenarios," Trade Brief, International Trade & Commerce Research Institute of the Korea International Trade Association, June 8, 2022.

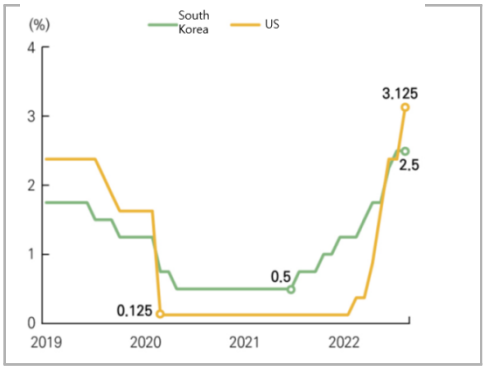
41) Ji-sang Hong, et al., "A Review of Imports and Exports in H1 2022 and the Outlook for H2," Trade Focus, Vol. 13, KITA
International Trade & Commerce Research Institute, June 2022.

42) Won-bin Do & Nae-yeong Gang, "Factors that Affect the International Prices of Raw Materials and Exchange Rates, and the Impact on the Korean Economy," TradeFocus, Vol.17, International Trade & Commerce Research Institute of the Korea International Trade Association, 2022.

The US government cut the benchmark rates and implemented quantitative easing amounting to around KRW 4 trillion in order to cope with the spread of the pandemic[43)44)], and, consequently, consumer prices that had previously increased at a rate of about 1% up until March 2021 suddenly skyrocketed by as much as 9.1% in September 2022. In response, the US Federal reserve has raised the benchmark interest rate five times, from 0-0.25% to 3-3.25%, since March 2022. It hiked the rate by 0.75% on three separate occasions in June, July and September, and additional rate hikes are anticipated by the end of the year. As such, it is widely expected that the US policy interest rates will exceed 4% before the year ends.

On the other hand, the global economy is outlook to slow down considerably amid the prolonged war between Russia and Ukraine, the monetary tightening policies adopted in major economies, and China's zero COVID policy, causing demand for the US dollar, one of the safest assets, to rise, thereby strengthening the US currency.

[FigureI-19] US and Korean Benchmark Rates



Note: The US figures are the average benchmark rates.
Source: Bank of Korea.

[FigureI-20] Changes in the US Dollar Index

Source: FRED.

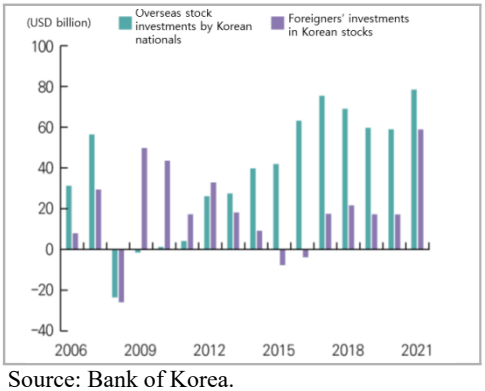
Foreign buying of Korean stocks is declining while Koreans' net purchases of foreign stocks are on the rise, and Korea has been experiencing a trade deficit since December 2021 as the Korean economy depends heavily on crude oil and raw materials, both of which are imported, causing the Korean won to devalue against the US dollar. The won-dollar exchange rate rose to 1,318 in August 2022, the highest level since it reached 1,462 in February 2009.

43) The Fed's total assets increased from approximately KRW.2 trillion in February 2020 to KRW 8.3 trillion in August 2021 as it responded to the pandemic.

44) Amadeo, Kimberly, "How It Allows Central Banks to Create Massive Amounts of Money," The Balance, June 27, 2021.

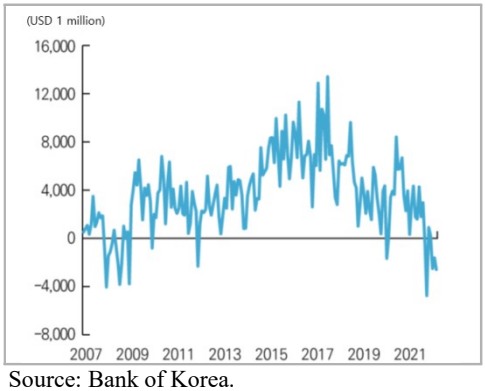
If US interest rates continue to rise and the dollar remains strong, capital outflows will likely exacerbate and rising import prices may put growing inflationary pressure on the Korean economy. The hikes in the US rate could also push up domestic interest rates, which in turn could reduce private sector spending and facility investment, especially by non-IT manufacturing and non-manufacturing industries and small and medium-sized businesses, as well as raising the ratio of marginal companies by decreasing the interest coverage ratio, thereby resulting in an economic slowdown.[45][46] On the other hand, a weaker won could lower the cost of Korean exports, thus making them competitive in the short term. For this reason, the strong dollar is expected to have a limited impact on export-oriented manufacturing businesses over the short term.

[FigureI-21] Stock Investments by Korean Nationals



Source: Bank of Korea.

[FigureI-22] Trade Balance



Source: Bank of Korea.

Section 4 Changing Trade Conditions

The rapid acceleration of the digital transformation of the economy is undermining the stability of the supply of semiconductor, in turn bringing about changes to the global economic order amid the US-China trade conflict triggered by the growing US trade deficit with China and security threats on cutting-edge technology, and unstable global supply networks following the outbreak of the COVID-19 pandemic.

The US government launched the Indo-Pacific Economic Framework (IPEF) on May 23, 2022 in a bid to re-establish a stable global supply network in the post-pandemic era and to promote the growth of high-tech industries including the semiconductor sector.

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45) Gyeong-hoon Park, et.al., "Impact of Rate Hikes on Domestic Demand by Industry," 「BOK Issue Note」 No. 2022-27, BOK, July 2022

46) Hyeon-Seok Kim, "Impact of Rate Increases on Major Manufacturing Sectors and Implications," 「i-KIET Industrial and Economic Issues」 Vol. 131, Korea Institute for Industrial Economics and Trade, April 2022

The IPEF is a “club type” of council launched to discuss new and emerging trade issues including the digital economy, decarbonization, and the re-establishment of supply networks.[47] Unlike existing multilateral trade agreements that focus on eliminating tariff and non-tariff barriers to the trade of, and investment in, goods and services, the IPEF covers a wide spectrum of subjects including digital trade and trade facilitation, the re-establishment of stable supply networks, the construction of infrastructures, decarbonization and clean energy, taxes, and anti-corruption measures. While traditional multilateral trade agreements require the participating members to consent to all of the components, the IPEF allows its members to participate only in some of the pillars if they so wish.

In addition, the U.S. gas led the creation of a semiconductor alliance composed of the U.S., Korea, Japan and Taiwan upon recognition of the need to ensure a stable supply of semiconductors during the spread of the COVID-19 pandemic, and the CHIPS and Science Act went into effect on August 9, 2022 in the U.S. Under this Act, which was enacted over concerns that the share of US-produced semiconductors had dropped to 12% in recent times from 37% in the 1990s, the US government will spend a total of USD 280.0 billion, including USD 52.7 billion of support for the semiconductor industry and USD 170.9 billion of support for research projects. According to the Act, the US government will provide subsidies for facility investment, R&D subsidies for NSTC and high-tech packaging production programs, and a 25% tax credit for semiconductor facility construction projects and semiconductor equipment. However, the Act bans corporations that receive tax credits and other subsidies from investing in unfriendly countries including China.

Finally, the Inflation Reduction Act (IRA), which involves some USD 740.0 billion, was passed on August 16, 2022 in the U.S.[48] Under this Act, the US government plans to spend USD 375.0 billion on reducing greenhouse gas emissions by 40% from the 2005 level by 2030. For example, the Act allows the government to provide a subsidy of up to USD 4,000 for each used EV that meets the criteria, and a subsidy of USD 7,500 for new EVs for ten years starting in 2023, in an effort to encourage more people to drive EVs. In order to be eligible for the subsidy (tax credit), however, the battery and at least 40% of the critical minerals used in the EV need to be produced in the U.S., which means Korean corporations are likely to be adversely affected.

Meanwhile, the series of actions taken by the U.S. government to keep China in check is expected to have a significant mid- to long-term impact on Korean industries that depend heavily on China.

47) Jeong-hwan, “An Overview of the IPEF and the Role of Korea,” i-KIET Industrial and Economic Issues, Vol. 140, Korea Institute for Industrial Economics and Trade, June, 17, 2022.

48) Nan-yi Huh, Su-ryung Park & Hee-eun Mun, “A Summary of IRA and the Implications for Korean Corporations”, Lee & Ko (law firm), September 5, 2022.

Given the high share of semiconductors as a percentage of Korea's total export amount, US-China rivalry in the semiconductor sector looks likely have a great impact not only on Korea's semiconductor industry but on the entire national economy.[49)50)]

[TableI-7] EV Subsidy Eligibility Criteria under IRA

<table>
<tr><th colspan="3">Cost Criteria for Recognition as US-Produced Batteries</th></tr>
<tr><td rowspan="2">Subsidy for New EVs</td><td>Criteria for Critical Minerals (up to USD 3,730)</td><td>- The critical minerals used to produce the battery in an EV must meet the following criteria:
① More than the required minimum ratio of critical minerals has been generated or processed in the U.S.
② The required ratio has been generated or processed in countries with which the U.S. has signed an FTA.
③ The critical minerals have been recycled in North America and are eligible for the subsidy.
- Initially, the required ratio will be 40% from the date of issuance of the ministerial guidelines to the end of 2023. It will be increased by 10% each year until it reaches 80% in 2027.</td></tr>
<tr><td>Criteria for battery parts (up to USD 3,730)</td><td>- EVs are eligible for the subsidy if the required ratio of battery parts manufactured or assembled in the U.S. is met.
- The required ratio will be 50% from the date of issuance of the ministerial guidelines to the end of 2023. It will be raised by 10% each year until it reaches 100% in 2029.</td></tr>
<tr><td>Subsidy for Used EVs</td><td>Up to USD 4,000</td><td>- The amount of the subsidy will be up to 30% of the used EV.
- Available only once every three years.
- Available to used EVs purchased at least two years previously for less than USD 25,000.</td></tr>
<tr><th colspan="3">Final Assembly in North America</th></tr>
<tr><td colspan="3">EV tax credit is available for EVs with final assembly in North America. This requirement took effect on August 16, 2022.</td></tr>
</table>

Source: Nan-yi Huh, Su-ryeong Park & Hee-eun Mun (2021).

49) Following the introduction of export restrictions against China, the value added of strategic industries is estimated to have declined by 5.5% of nominal GDP for Taiwan and by 3.5% for Korea, while the value added of all industries is estimated to have fallen by 9.5% for Taiwan and by 6.6% for Korea

50) Yong-jeong Park, Ji-won Min & Jin-ha Lee, "Impact of US Trade Sanctions against China and the Implications: with the Focus on Changes in the Value Added of Exports," Issues & Tasks, Vol. 22-07, Hyundai Research Institute, 2022.

국회예산정책처

Part II
Outlook by Sector

National Assembly Budget Office

Part II Outlook by Production Sector

Chapter 1. Manufacturing

Section 1 Overview

- The manufacturing sector's share of real GDP has hovered between 26.6% and 27.0% for the last five years.
  - The sector's ability to create new jobs has steadily declined in tandem with increasing investments in automation facilities, including industrial robots.
  - As in Korea, the number of employed persons in all industries of the manufacturing sector has declined as a percentage of the total number of employed persons in major countries.
  - The share of employed people in the manufacturing sector was higher than in Korea only in Germany, Italy and other countries where manufacturing has traditionally been strong.
- In the overall manufacturing sector, computers, electronics and optical devices create the largest share of value added.

Manufacturing refers to the industrial production of tangible goods. Semiconductors, automobiles, petrochemicals, steel and general machinery, which lead Korea's exports and have great ripple effects on other industries, have been designated and managed as key industries. Recently, the scope of manufacturing has expanded with the development of new technologies and the creation of demand for new products.

Manufacturing has long been the driving force behind Korea's economic growth, and its share of GDP has steadily increased. However, it has been stagnant since reaching 27.2% in 2011, and it has remained somewhere between 26.0% and 27.0% until recently. The manufacturing sector's share of real GDP only edged from 26.6% in 2017 up to 27.0% in 2021.

In 2017 and 2018, the manufacturing sector grew at a faster rate than GDP, but this trend was reversed in 2019,

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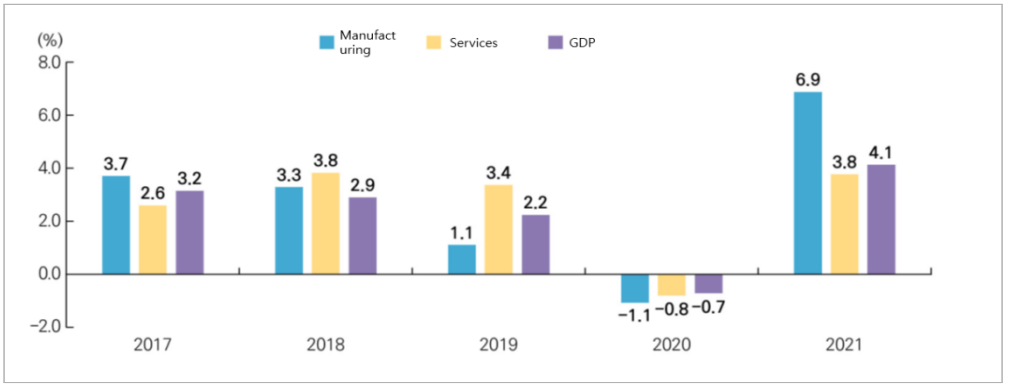
as semiconductor, petrochemical and petroleum products performed poorly amid growing external uncertainties, including the US-China trade war, Japan's export regulations, Brexit, and recent developments in Hong Kong.

Exports denominated in US dollars based on customs clearance decreased in 2020 due to lockdowns and shutdowns implemented in major countries, posting growth of -1.1% compared to a -0.7% contraction in GDP. However, export demand for non-contact sectors including semiconductors, computers and home appliances started to grow in 2021, bouncing back from the aftermath of the pandemic, and, as a result, the manufacturing industry expanded by 6.9%, outpacing the GDP growth rate of 4.1%

[Figure II-1] Growth of Real Value Added



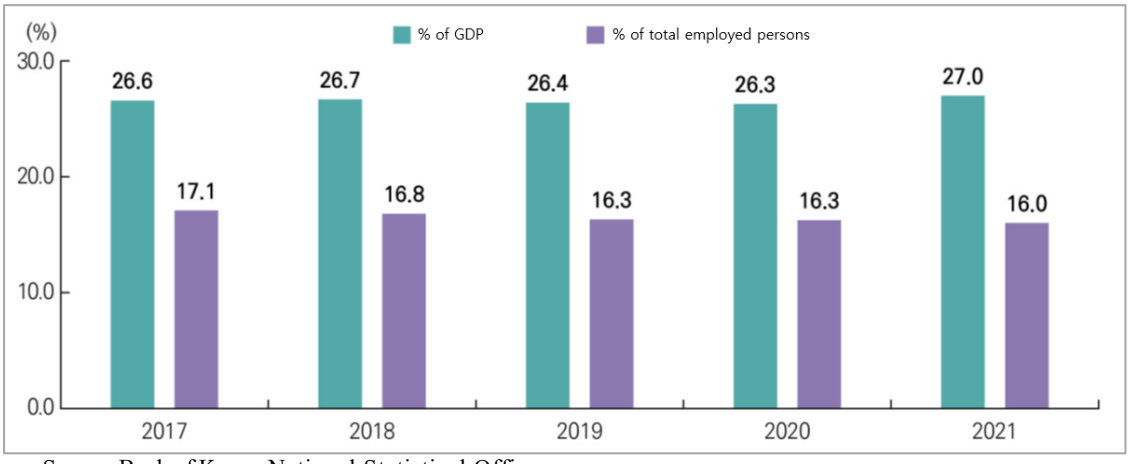
Source: Bank of Korea.

Persons employed in manufacturing sector represented 17.1% of all employed persons and continued to fall to 16.0% in 2021. The sector's share of employed persons has been falling ever since the 1990s due to a decline in its capacity to create jobs associated with increasing investment in automation facilities, including industrial robots, in order to enhance productivity.[1] The employment inducement coefficient in the manufacturing industry stands at 6.2 persons per 1.0 billion[2], which is smaller than the 12.5 persons in the service industry, meaning that the former is capable of creating fewer jobs than the latter. Nevertheless, the manufacturing sector tends to pay higher wages and offer better-quality jobs than the service sector.[3]

1) According to a report published by the International Federation of Robotics (IFR) on January 27, 2019, Korea's robot density, i.e., the number of employees vs. the number of industrial robots was the second highest the world in 2019. The top 10 countries with the highest density of robots are Singapore (918), Korea (868), Japan (364), Germany (346), Sweden (277), Denmark (243), Hong Kong (242), Taiwan (234), the U.S. (228), and Belgium & Luxembourg (214).

2) 2019 Intra-Industry Table

[Figure II-2] Manufacturing's Share of Real GDP and Number of Employed Persons



Source: Bank of Korea, National Statistical Office.

In countries like Germany and Italy, where manufacturing has traditionally been very strong, the manufacturing industry's share of employed persons was higher than that of Korea in 2019. Nevertheless, the share has declined not only in Korea but also in most of the major countries, although it has shrunk at a faster rate in Korea than elsewhere.

[Table II-1] Share of Employed Persons in the Manufacturing Sector

(Unit: %)

	2016	2017	2018	2019	2020
Korea	17.4	17.1	16.8	16.3	16.3
Germany	19.2	19.0	19.1	18.9	-
France	12.1	12.2	11.7	11.8	11.5
UK	9.5	9.1	8.9	9.1	8.7
Italy	18.2	18.2	18.4	18.5	18.7
Japan	16.6	16.5	16.3	16.2	16.0

Source: KIET.

3) Insurance, as a part of the service industry, pays higher wages than manufacturing.

Among the manufacturing industries, computers, electronics and optical devices, which include semiconductors, contributed the largest share (9.4%) to the gross value added in 2021, followed by petroleum-related manufacturing of chemical substances and products at 4.5%, machinery and equipment at 2.8%, and transportation equipment at 2.7%. Computers, electronics and optical devices had the largest share of employed persons at 2.2%, followed by chemical substances and products at 2.0%, and food and beverages at 1.6%.

[Table II-2] Value Added of Manufacturing Sub-Sectors (2021)

(Unit: %)

Sub-sector	% of Gross Value Added	Employed Persons in each sub-sector as a % of total
Food & beverages	1.3	1.6
Textile and leather goods	0.7	1.2
Wood, paper, printing and copying	0.8	0.7
Coke & petroleum products	0.7	0.1
Chemical substances and products	4.5	2.0
Non-metal mineral products	0.8	0.4
Basic metals	1.5	0.5
Metal processing	1.8	1.3
Computers, electronics and optical devices	9.4	2.2
Electronic devices	1.8	1.0
Machinery and equipment	2.8	1.7
Transportation equipment	2.7	2.2
Others, industrial equipment repair	0.6	0.9

Source: Bank of Korea, NSO.

Expenditure on R&D in the manufacturing industry amounted to KRW 63,816.3 billion in 2020. The manufacturing sector's ratio of R&D expenditure to sales rose by 0.14%p to 4.63%, while its R&D expenditure represents 86.7% of the total R&D expenditure of all industries combined. The sector's R&D expenditure increased by 8.1% per year on average in the period 2016-2020, but its share of the total R&D expenditure of all industries dropped by 2.3%p from 89.0% to 86.7% during the same period.

In a breakdown by sub-sector in 2020, semiconductors, automobiles, and chemicals, areas in which Korea is globally competitive, had relatively high shares of total R&D expenditure. Computers, electronics and optical devices, a sub-sector that includes semiconductors, occupied the largest share of 58.1%, followed by transportation equipment (including automobiles) at 14.5% and chemical substances and products at 10.9%. In 2019, the year in which data suitable for a comparison of the R&D expenditure of the manufacturing sector of major countries as a percentage of GDP became available, Taiwan had 91.9% and China had 88.4%, both of which are higher than that of Korea, while Japan's figure of 87.0% was slightly lower than that of Korea.

[Table II-3] Share of R&D Cost by Sub-Manufacturing Sector

(Unit: 100 million won, %)

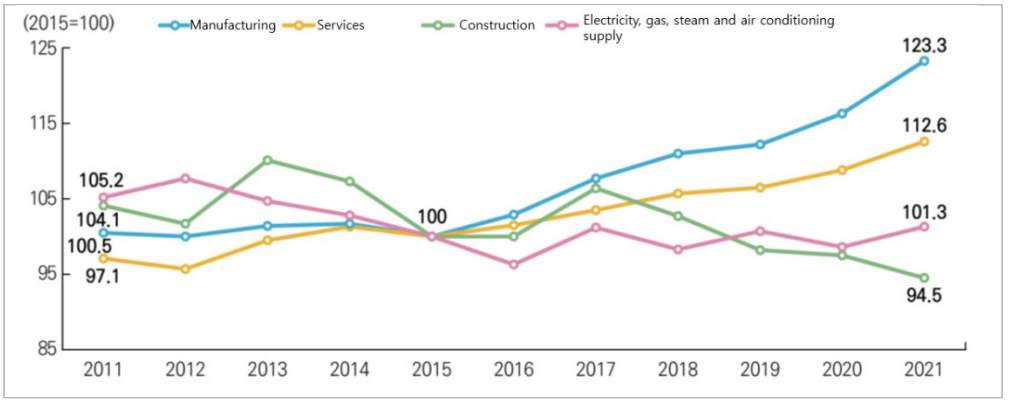
Sub-sector	2016	2017	2018	2019	2020
Computers, electronics and optical devices	539,525	625,634	688,344	715,067	735,998
Manufacturing	480,141	559,867	611,572	625,550	638,163
	89.0	89.5	88.8	87.5	86.7
Food & beverages	1.3	1.2	1.3	1.5	1.5
Textile and leather goods	0.9	0.9	0.8	0.8	0.8
Wood, paper, printing and copying	0.3	0.3	0.3	0.3	0.3
Coke & petroleum products	0.5	0.8	1.0	0.4	0.6
Chemical substances and products	11.0	10.7	10.0	10.5	10.9
Non-metal mineral products	0.4	0.5	0.4	0.5	0.4
Basic metals	1.3	1.3	1.2	1.2	1.2
Metal processing	1.3	1.7	1.2	1.3	1.5
Computers, electronics and optical devices	57.6	58.0	58.9	58.9	58.1
Electronic devices	3.7	3.3	3.4	3.4	3.8
Machinery and equipment	5.8	5.6	6.0	6.0	6.1
Transportation equipment	15.3	15.3	15.1	14.8	14.5
Others, industrial equipment repair	0.5	0.4	0.4	0.4	0.4

Note: The figures for manufacturing represent the shares as a percentage of the total R&D expenditure of all industries combined, while the figures for sub-categories represent the shares as a percentage of the entire manufacturing sector's R&D expenditure.

Source: Korea Institute for Science and Technology Evaluation and Planning (KISTEP).

The manufacturing sector includes sub-sectors that are relatively higher value-added and more technology-intensive than other industries, resulting in higher productivity. Manufacturing's labor productivity index was 123.3 in 2021, which is much higher than that of the service sector (112.6), electricity, gas, steam and air conditioning supply (101.3) and construction (94.5).

[Figure II-3] Labor Productivity by Industry



Note: The figures for labor productivity are based on value added per hour. Source: Korea Productivity Center.

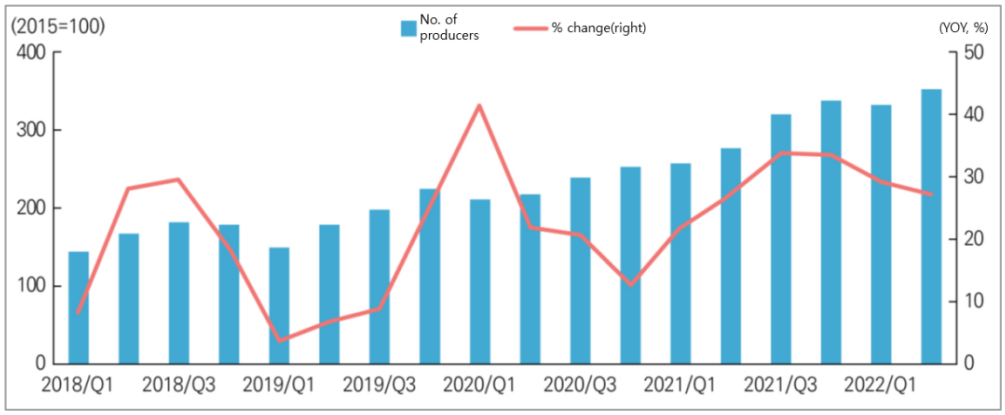
Of the eleven major industries, the report has selected, for the purpose of analysis, semiconductors and automobiles, which are weighted highly in the Industrial Production Index published by the NSO, and chemicals and steel, which have been hit hardest by the recent steep rises in raw material prices.

1. Semiconductors

Demand for semiconductors is growing across the board as the number of smart phone users increases and computer performance continues to improve. In addition, there is also rising demand for the types of semiconductors that are already used in existing machines as automobiles and other machines shift to electronic control systems. According to the World Semiconductor Trade Statistics (WSTS), the overall semiconductor market and the memory semiconductor market grew by 26.2% and 30.9%, respectively, in 2021, but the growth rates are outlook to decrease significantly to 13.9% and 8.2%, respectively, in 2022.[4] Following the supply shortage caused by the COVID-19 pandemic, semiconductor manufacturers have expanded their production capacity, and, as a result, semiconductor production has been on the rise. Semiconductor production increased by 29.2% in the first quarter of 2022 and by 27.3% in the second quarter compared with the same periods one year previously.

4) WSTS (World Semiconductor Trade Statistics), August 22, 2022.

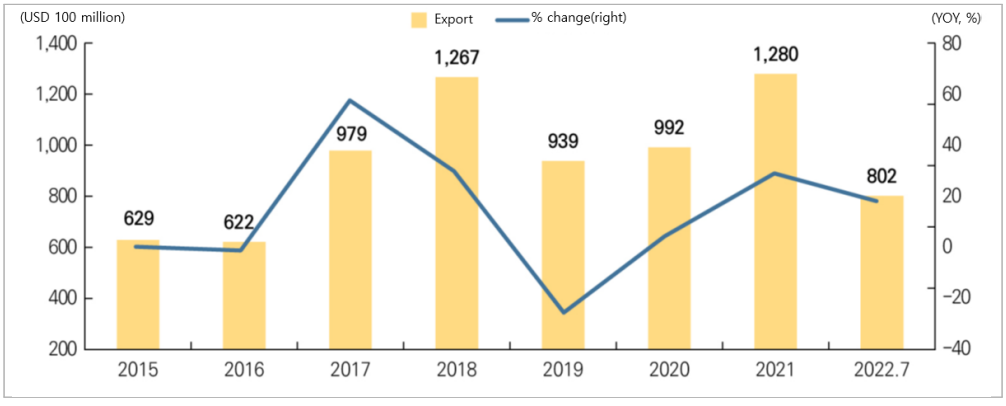
[Figure II-4] Production Index and % Changes in the Semiconductor Industry



Source: NSO.

Semiconductor exports have been also increasing. Annual semiconductor exports rose to USD 128.0 billion in 2021, exceeding, in just three years, the previous record high of USD 126.7 billion in 2018. Cumulative exports in July 2022 rose by 17.8% to USD 80.2 billion compared to the same period in the previous year.

[Figure II-5] Semiconductor Exports and % Changes

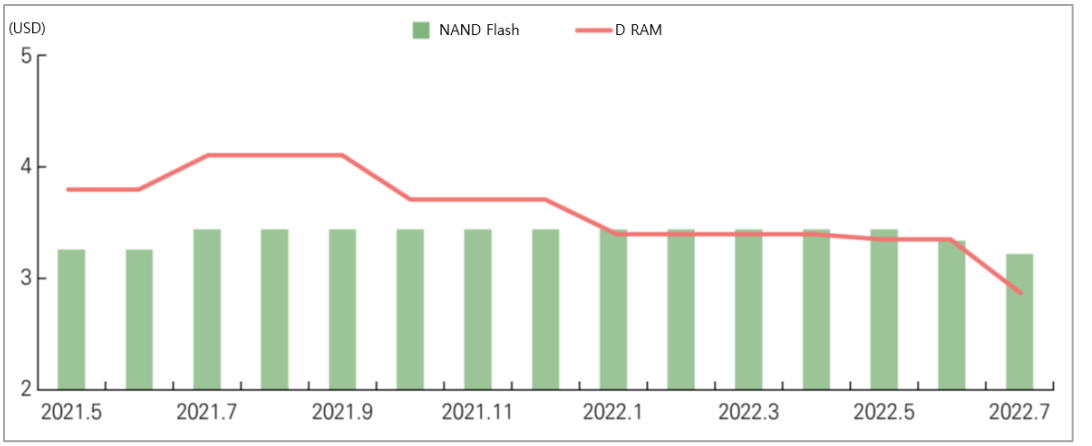


Source: Korea International Trade Association.

System semiconductor exports amounted to USD 4.69 billion in July 2022, posting a two-digit growth rate (40.4%) for sixteen consecutive months amid constantly growing demand in line with digital transformation, while memory semiconductor exports dropped by 13.5% to USD 11.38 billion, compared to the same month one year earlier, due to falling contract prices and weaker demand from upstream industries.

Contract prices of DRAM fell by 14.0% to USD 2.88 in July, the largest decline since February 2019, when the price dropped by 14.5%. Prices of NAND Flash also fell for two consecutive months, by 3.01% to USD 4.67 in June and by 3.75% to USD 4.49 in July.

[Figure II-6] Prices of DRAM and NAND Flash



Note: DRAM refers to DDR4 8GB and NAND FLASH to 128GB, MLC.

Source: Ministry of Science and ICT.

2. Automobiles

The automobile production sector is one of the main pillars of Korea's manufacturing industry not only because it rolls out finished cars, but also because it has strong direct and indirect ripple effects on various other related industries. More specifically, the automobile industry has strong production inducement and technology spill-over effects not only on traditional industries including steel, machines and materials, but also on high-tech industries including information, biotechnology, energy and environmental technology. Furthermore, the automobile industry is a key industry ranking second overall in terms of shipment, employment, value added, and exports.[5)]

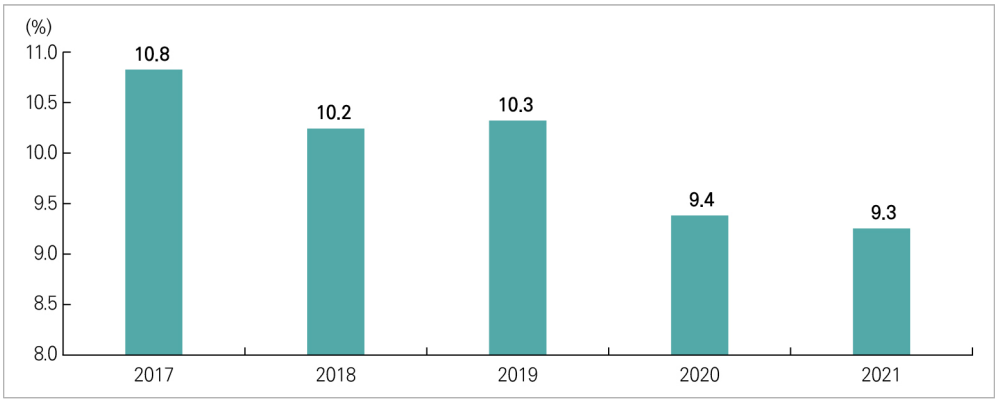
Over the recent five years, the auto industry's share as a percentage of the overall manufacturing sector has been declining. It now has only one-quarter of the share (38.3%)[6)] of the IT industry, which accounts for the largest share of Korea's manufacturing industry. In 1996, however, the auto industry had the largest share at 15.4%, somewhat higher than the IT industry's 10.7% share of the country's entire manufacturing sector.

5) Korea SME and Startup Agency, 「KOSME Industry Analysis Report – Automobiles –」, May 2019.

6) The IT industry is composed of computers, electronics and optical devices, and electronic devices.

This indicates that Korea's industrial structure has gone through a major change. As the recent semiconductor supply shortage shows, a car is no longer merely a mode of transportation as it is rather being transformed into an electronic system. Currently, around 200-300 semiconductors are used on average in a car with a combustion engine, whereas an EV is expected to require about 1,000 semiconductors, and more than 2,000 will be needed for a self-driving vehicle.[7)]

[Figure II-7] Automobile Sector's Share of the Manufacturing Industry



Source: Bank of Korea.

In the first half of 2022, the supply shortage brought the number of automobiles sold in Korea to its lowest figure since 2014, but domestic automobile sales were second highest in amount.

This high sale figure is attributable to the high demand for expensive EVs which make up over 25% of all sales of new vehicles. Despite weak automobile sales, sales of EVs (HEV, EV, FCEV[8)]) increased by 34.1% to more than 200,000 units[9)] in the first half of 2022 compared to the same period one year earlier.

7) Hwang-soo Jeon, et. al., "The Supply Ecosystem for Automotive Semiconductors," Electronics and Telecommunications Trends, Vol. 36, No. 3, June 2021.

8) HEV stands for hybrid electric vehicle, EV for electric vehicle, and FCEV for fuel cell electric vehicle.

9) Korea Automobile Manufacturers Association, An Analysis of Newly Registered Automobiles in the First Half of 2022, August 2022.

[Table II-4] Newly Registered Automobiles by Power Source

(Unit: vehicle, %)

Type	2021				2022		% change
	Annual	%	H1	%	H1	%	
Petroleum	847,805	48.9	460,646	49.9	396,696	48.5	-13.9
Diesel	415,925	24	242,122	26.2	166,318	20.3	-31.3
LPG	105,361	6.1	55,931	6.1	37,719	4.6	-32.6
Electric Vehicles	348,850	20.1	157,040	17	210,647	25.8	34.1
Hybrid	239,971	13.8	113,441	12.3	137,043	16.8	20.8
HEV	165,036	9.5	75,079	8.1	98,540	12	31.2
PHEV	19,750	1.1	11,325	1.2	7,202	0.9	-36.4
MHEV	55,185	3.2	27,037	2.9	31,301	3.8	15.8
Electricity	100,355	5.8	39,273	4.3	68,850	8.4	75.3
Hydrogen	8,524	0.5	4,326	0.5	4,754	0.6	9.9
CNG	1,636	0.1	824	0.1	865	0.1	5
Others	15,004	0.9	7,445	0.8	5,772	0.7	-22.5
Automobiles	1,734,581	100	924,008	100	818,017	100	-11.5

Source: Korea Automobile Manufacturers Association.

Led by EVs (environmentally-friendly vehicles), automobile exports exceeded USD 5.0 billion (USD 5.14 billion) for the first time in July 2022, achieving a record high of finished car exports since December 2014. EV exports have remained strong at over USD 1.0 billion for eleven consecutive months since the export amount passed the USD 1.0 billion threshold for the first time in September 2021, accounting for 28.6% of the total amount of all finished car exports. However, combustion-engine vehicles will still account for the majority of automobile sales both at home and abroad for the time being, but EV sales are expected to keep growing as automobiles become increasingly electronic.

3. Chemicals

The chemicals industry includes the processing of chemicals involved in the manufacturing process, and the production of chemicals and chemical substances by combining or processing the products created from chemical processing. It is broadly divided into two categories: petrochemicals and fine chemicals.

Petrochemicals include synthetic resins (plastic) made from naphtha or natural gas, materials for synthetic fibers (polyester, nylon), synthetic rubber and other basic chemical products. It is a key basic industry that produces basic raw materials for other major industries including textiles, electronic appliances, automobiles and construction. The petrochemical industry is a technology-intensive industry that requires large-scale facility investments,[10] and it is sensitive to oil prices because naphtha, the main raw material, makes up 60-80% of the production cost. Tied closely to the business cycle, it goes through repeated ups and downs on a periodic basis according to the global economy, and changing demand and supply conditions.[11]

Fine chemicals include pharmaceuticals, pigments, dyes, paints, inks, cosmetics and fragrances, which are also used as intermediary materials in other industries including auto parts, construction materials, textiles, tires and leather goods.[12][13][14]

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10) In Korea, the construction of one chemical complex requires around USD 4.0 billion because chemical factories are vertically integrated based on NCC facilities. The chemical industry is a highly technology-intensive area where it is crucial to acquire key technologies in advance.

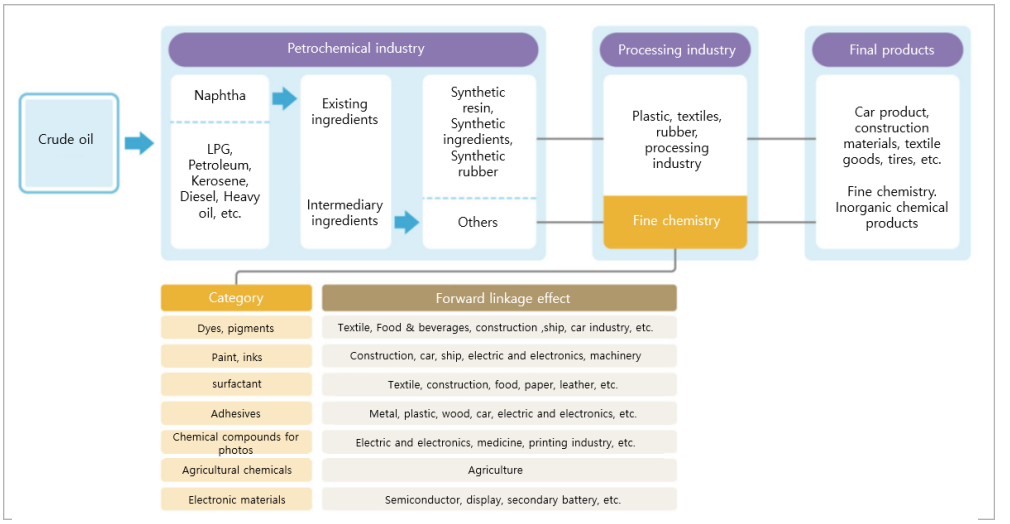
11) Korea Petrochemical Industry Association.

12) Korea Trade-Investment Promotion Agency (KOTRA) , Fine Chemistry, 2015, p. 5.

13) High-purity fine chemicals and materials are widely used particularly in the semiconductor and display industries and they are affected by chemical regulation.

14) Seong-hoon Kim, 「Regulatory Trends on Major Chemical Substances in Korea and Impact by Industry: with the Focus on the Semiconductor and Display Industries」, a report commissioned by the National Assembly Budget Office, 2022.

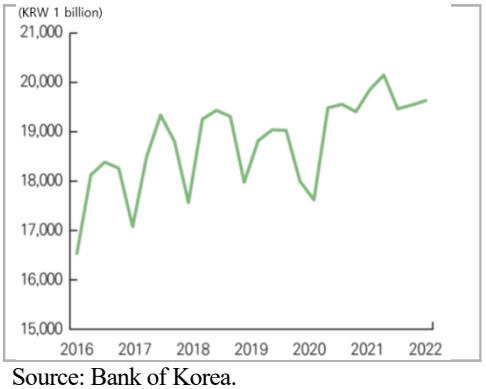
[Figure II-8] A Breakdown of the Chemical Industry



Source: Korea Petrochemical Industry Association.

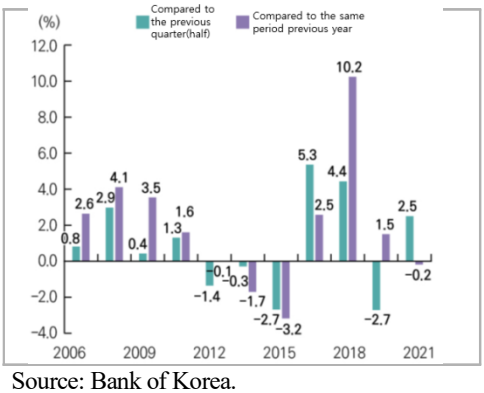
The value added of the chemical industry is outlook to continue increasing. The real value added of the chemical industry in the first half of 2022 amounted to KRW 39.2 trillion, which represents 4.1% of GDP. It grew by 2.5% from the second half of 2021, but decreased by 0.2% compared to the same period of the previous year. This decline is attributed to a fall in exports to China in the wake of China's lockdowns and a disruption in the transportation of synthetic resins amid the truckers' strike in June, even though the production volume increased as a result of an expansion of production facilities at the beginning of the year.[15)]

[Figure II-9] Real Value Added of the Chemical Industry



Source: Bank of Korea.

[Figure II-10] % Changes in Real Value Added of the Chemical Industry

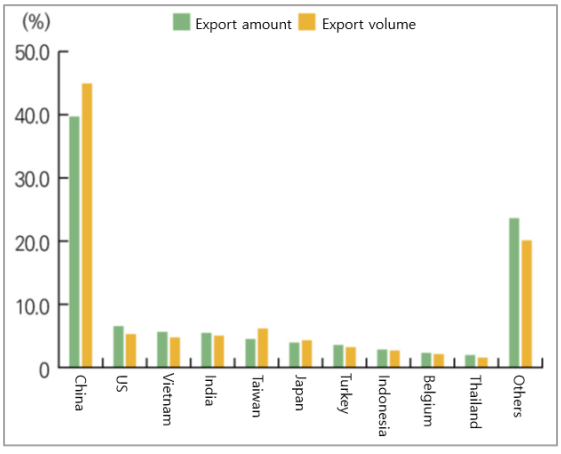


Source: Bank of Korea.

15) Press release by the Ministry of Trade, Industry and Energy, "Export Results for June & H1 2022," July 1, 2022.

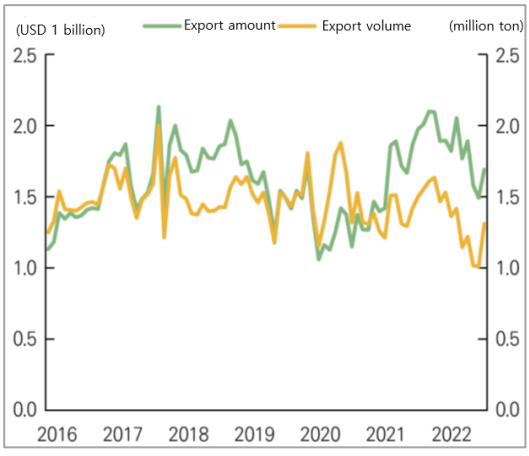
Exports of petrochemicals[16] to China totaled USD 21.9 billion in 2021(USD 11.9 billion in the first half of the year and USD 9.9 billion in the second half), representing around 39.7% of all petrochemical exports. Petrochemical exports to China reached USD 11.0 billion in the first half of 2022, rising by 10.6% over the same period of the previous year on the back of a rise in the unit export price, while exports by weight diminished by 5.0% from 8.1 million to 7.7 million tons.

[Figure II-11] Petrochemical Exports by Country



Source: Korea International Trade Association.

[Figure II-12] Petrochemical Exports to China



Source: Korea International Trade Association.

Although demand for chemicals has been increasing since the second half of 2022, exports are expected to be adversely affected by global oversupply and the high prices of oil and raw materials. Global ethylene demand grew by 4.2%, or 190 million tons, from the previous year, and the production capacity is outlook to expand by 6.1% or 220 million tons. The supply of Korea's major products including ethylene, propylene and butadiene is anticipated to greatly exceed demand as a result of a massive expansion of production capacity in China and other Asian countries. Furthermore, if the prices of oil and raw materials remain high, the export conditions will likely deteriorate as naphtha and LPG-based ethylene products become less competitive than relatively low-cost shale and natural gas-based products made in the U.S. and the Middle East.

Although the rising won-dollar exchange rate may weigh on the cost of imported raw materials, including naphtha and LPG, chemical exports are also sold in US dollars, thus limiting the impact of the devaluation of the Korean won on the industry.[17]

16) These data are based on MTI 21 products.

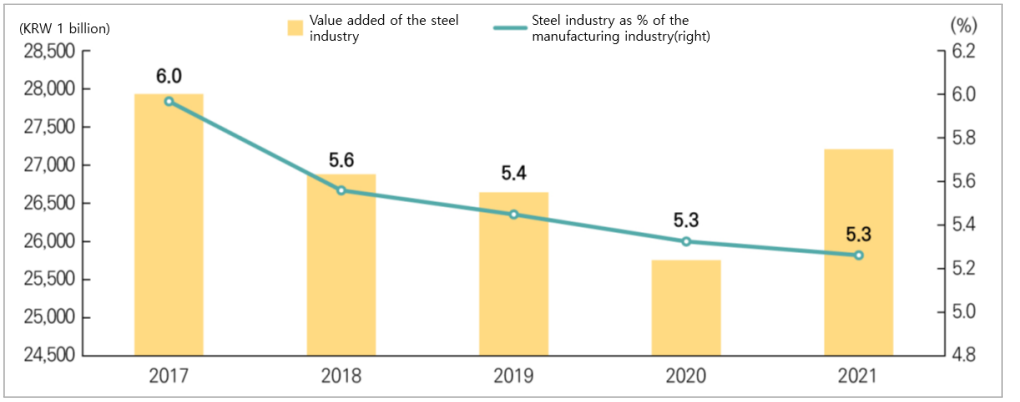
17) Ji-sang Hong, et. al., "Evaluation of Exports and Imports in H1 2022 and the Outlook for H2," Trade Focus, Vol. 13, International Trade & Commerce Research Institute of KITA, 2022, pp. 37-39.

4. Steel

Steel is a large-scale process industry[18] that is capital intensive and closely connected to upstream and downstream industries as it is one of the key industrial materials. Ore and scrap metals are melted into liquid and impurities are removed. The molten metals are made into various steel products, including hot-rolled steel plates, cold-rolled steel plates, plates and steel pipes, by casting and rolling. These steel products are used as basic materials in various industries including automobile, shipbuilding, electronic appliances, machinery and construction. The steel industry depends heavily on domestic demand and is sensitive to the business cycle.

In the recent five years, the steel industry's share of the overall manufacturing industry has gradually decreased more and more. As with other industries, the steel industry's declining share of the overall manufacturing industry is due to the overwhelmingly large share of the IT industry[19]. Given the industry's status as a supplier of intermediary materials to upstream and downstream industries, it is necessary to further enhance its competitiveness. Furthermore, considering that large-scale steel production facilities are being built in Asia and the Middle East, it is essential for Korea to improve its international competitiveness.[20]

[Figure II-13] Steel Industry's Contribution to Manufacturing Industry



Source: Bank of Korea.

18) The industry requires different types of large-scale production facilities.

19) In national accounts, the IT industry includes computers, electronics and optical devices, and electronic equipment.

20) Dong-yi Lee, An Overview of and Tasks for the Korean Steel Industry, KDB Future Strategy Research Institute, August 2020.

The steel industry is susceptible to changing prices of raw materials including ores and scrap metals. While the prices of ores have stabilized somewhat recently, the prices of raw materials have skyrocketed amid growing uncertainty about the global economy due to the COVID-19 pandemic and the prolonged Russia-Ukraine war, which has had a tremendous impact on the steel industry. The price of steel pipes almost doubled from KRW 660,000 per ton prior to the outbreak of the pandemic to KRW 1.11 million in June, 2022 (based on quarterly published prices), while the price of hot-rolled steel plate (based on POSCO SM 355 prices) jumped from KRW 700,000 per roll to KRW 1.32 million per roll during the same period. Clearly, the rising prices of raw materials have led to increases in the prices of steel products.

Since the steel industry is a large-scale process industry, it is difficult to adjust production capacity in response to changing demand. Therefore, strategies need to be developed in order to respond to various threats and other potentially negative factors - including the impact of global oversupply and the rise of China's steel industry - on domestic demand and exports, intensifying competition, environmental regulations, and protectionism.

[Table II-5] Global Steel Production Capacity

(Unit: mmt)

Region	2010	2016	2017	2018	2019	2020
Africa	33.6	39.9	40.7	43.3	44.6	44.7
Asia	1435.3	1629.1	1612.9	1585.2	1617.6	1646.3
China	1056	1188.6	1160.1	1124.2	1149.5	1157.1
Japan	132	129.9	128.5	128.5	128.5	128.5
Korea	76	82.2	81.6	81.6	81.6	81.6
CIS	139.6	142.3	142.3	141.9	143.4	143.6
Europe	308.7	294.3	292.5	292.5	292.4	291
Central & South America	72.7	77.4	78.1	78	78	77.5
Middle East	38.5	68	71.2	74.8	79.5	86.7
North America	155.8	156	156.3	156.9	153.3	156.5
Oceania	9.1	6.4	6.4	6.4	6.4	6.4

Note: mmt is short for million metric tons.

Source: OECD.

One of the most urgent tasks facing the steel industry is to come up with effective ways of coping with changing trends, including the introduction of smart manufacturing. Against this backdrop, the domestic steel industry is seeking ways to deal with these trends, including the introduction of smart manufacturing systems, the development and application of eco-friendly new technologies, and the development of advanced functional products and high value-added materials in line with the latest trends. Notably, ensuring and maintaining a stable supply network has emerged as a major challenge, given that the industry has been considerably affected by the recent disruptions of the global supply network.

As uncertainty over the global economy clears up and the supply network stabilizes, the steel industry is expected to rebound.

Section 2 Outlook for 2023[21]

- The value added of the manufacturing industry is outlook to grow by 2.3% in 2023, a slightly slower rate than the 2.7% recorded in 2022.

(compared to the previous year, %)

2021	2022	2023	2017~2021	2022~2023
6.9	2.7	2.3	2.8	2.5

- Key factors

Upside factors	Downside factors
o Falling international prices of oil and raw materials	o Adoption of tighter monetary policies in major countries
o Easing of supply chain disruptions	o Prolongation of the US-China trade conflict
o COVID-19 enters endemic stage	o Intensification of protectionism

The manufacturing industry saw its production output grow by 3.0% year-on-year in the first half of 2022, led by petrochemicals, IT devices, semiconductors and bio-health.[22] In the second half, the industry maintained its upward trend as exports remained strong despite external uncertainties including the Russia-Ukraine war, global inflation led by steep rises in global oil and raw material prices, interest rate hikes, and lockdowns in China's major cities. Despite positive factors in the second half, including falling international oil and raw material prices, and improving global supply, the recovery of the industry's production volume will likely be limited due to slowing export growth due to the downside pressure on the global economy, declining semiconductor prices, and an expanding manufacturing inventory. The manufacturing sector is outlook to grow by 2.4% year-on-year in the second half, mainly due to uncertainties at home and abroad and the base effect, and by 2.7% in 2022.

In 2023, the global economy is projected to slow down and cross-border trade to shrink due to growing protectionism amid the US-China trade conflict, monetary tightening in major countries in response to inflation, and rising interest rates, falling consumption and the prolonged Russia-Ukraine war.

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21) The outlook is expected to help analyze the risks facing Korean industry due to disruptions in the global supply chains, the impact of growing protectionism triggered by the CHIPS and Science Act and the Inflation Reduction Act on Korea's manufacturing sector, competition against major economies by industry, and labor demand based on the business outlook by industry. An analysis of manufacturing production and changing export conditions could also assist the development of measure for coping with the series of protectionist actions taken by major countries.

22) The manufacturing industry grew by 9.2% in the first half of 2021 and by 4.8% in the second half. The industry expanded at a faster rate in 2021 than in previous years due to the base effect of the COVID-19 crisis.

After the manufacturing sector benefited from the extraordinary demand resulting from the onset of COVID-19's endemic phase, growth is projected to slow from the 2.7% posted in 2022 to 2.3% in 2023, as demand for semiconductors, computers, computer peripherals, electronics, and bio-health looks set to increase.

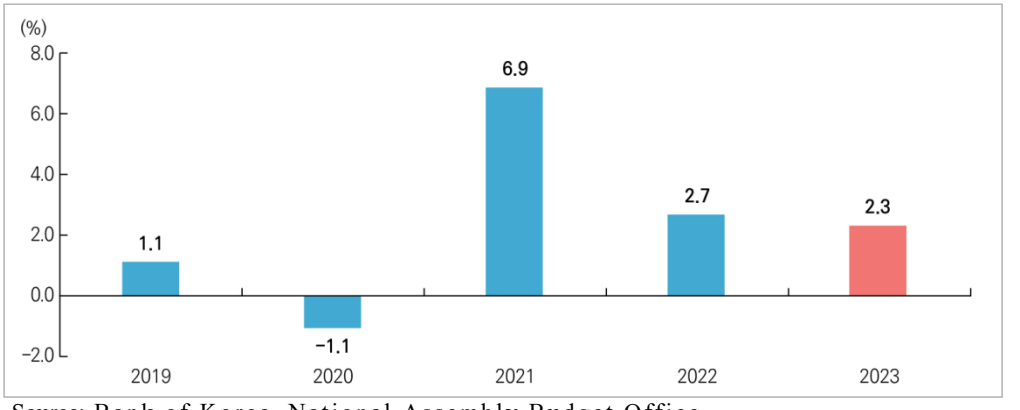
[Table II-6] Outlook for the RVA of the Manufacturing Sector

(Unit: year-on-year growth, %)

2021	2022			2023[f]
	H1	H2[f]	Annual[f]	
6.9	3.0	2.4	2.7	2.3

The key factors used in generating the outlook for 2003, including the global economy, inflation, the trade environment and carbon neutrality, have been examined from the perspective of each individual industry, and divided into upside and downside risks. The upside risks include falling oil and raw material prices, improving global supply, and the entry of COVID-19 into its endemic phase. The downside risks are monetary tightening in the major economies, shrinking demand at home and abroad due to inflation and high interest rates, slower growth of the global economy and declining trade volume due to growing protectionism due to the U.S.-China trade conflict.

[Figure II-14] Outlook of the RVA of the Manufacturing Sector



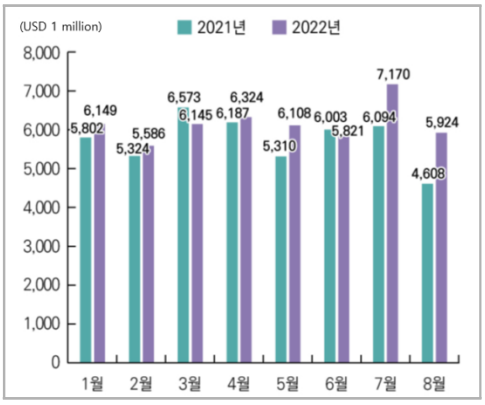
Source: Bank of Korea, National Assembly Budget Office.

According to a preliminary estimate, the production volume of the automobile industry grew by 9.1%, and the export volume and export amount rose by 23.1% and 25.3% respectively in January-July 2022, compared to the same period of the previous year, while domestic demand fell by 3.0%.

Recently, the shortage of automotive semiconductors has eased amid persistent worries about the global supply, and automobile production and exports have increased on the back of the growing market for eco-friendly cars.[23][24]

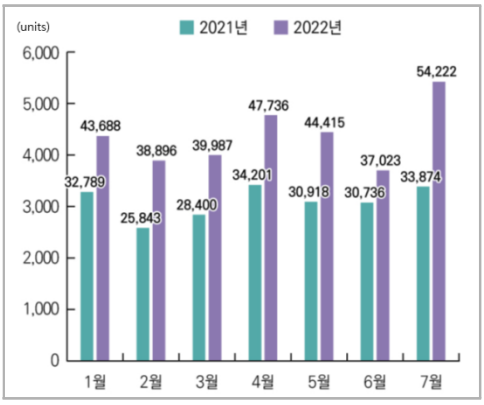
Global demand for automobiles is outlook to remain solid in 2023, although it will fall short of the pre-pandemic level. The upside risks include an accumulation of unmet demand in the global automobile market over the previous two years due to disruption of the automotive semiconductor supply chains, improved supply, and growing demand for eco-friendly cars in which Korean corporations have a competitive edge. Exports of finished cars are expected to remain on the rise as the supply of semiconductors becomes stable, and exports of auto parts will also likely increase, albeit at a slow pace, on the back of the increasing production of finished cars in major markets. In addition, the impact of the Inflation Reduction Act is expected to be offset to some degree by a rising won-dollar exchange rate, as this should keep Korean automobiles price-competitive.

[Figure II-15] Automobile Exports



Source: KITA.

[Figure II-16] Exports of Eco-Friendly Cars



Source: Ministry of Trade, Industry and Energy(MOTIE).

However, the supply is not likely to improve dramatically because the supply of automotive semiconductors is only improving at a slow pace. As a result, unfulfilled demand will continue to increase and the supply of new cars will become stable to a limited degree, as the prices of new cars are expected to rise. Gains in demand are outlook to be limited due to steep inflationary pressure and rising interest rates in the U.S., the country with the highest demand for new cars.

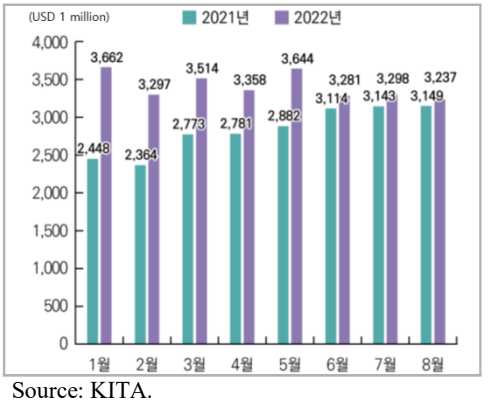
23) Domestic demand for eco-friendly cars in the first half of 2022 increased by 34.3% year-on-year to 210,474, and exports rose by 37.7% to 251,87, with the amount reaching USD 7.31 billion (42.7%), the highest figure recorded in the history of the Korean automobile industry.
24) MOTIE, Automobile Industry Trend in July 2022, August 15, 2022.

The Inflation Reduction Act(IRA), which entered into force on August 16, 2022, could be one of the downside risks as it is likely to have an adverse effect on the demand for cars in the U.S.A., where Korea ranks second in sales of eco-friendly cars.

The steel industry saw its production volume drop by 3.4% in January-July 2022 from the same period of the previous year. Steel exports by volume in January-August dropped by 4.2% while the amount of steel exports increased by 20.5% during the same period.

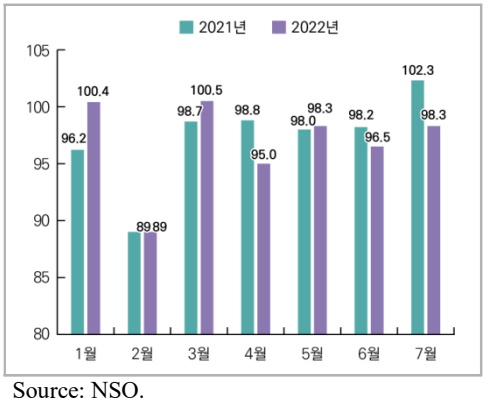
Steel exports remained brisk up until August 2022, extending the upward momentum that began in 2021. Since April, however, the prices of raw materials and steel have been falling and exports have been growing at a slower rate since June. Given these trends, the steel industry is outlook to strengthen in the first half and then weaken in the second half.

[Figure II-17] Steel Exports



Source: KITA.

[Figure II-18] Steel Production Index



Source: NSO.

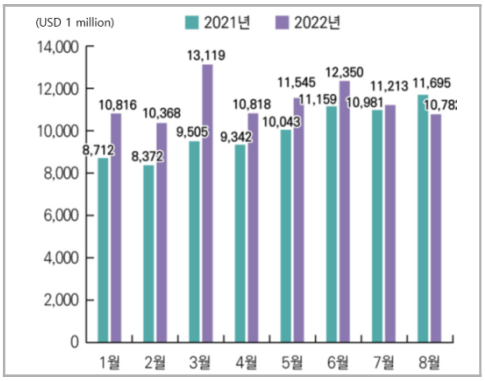
The World Steel Association predicted in April 2022 that demand for steel in China, the world's largest buyer, would grow by just 1.0% from the 950 million tons recorded in 2022 to 960 million tons in 2023. However, demand in other countries is projected to increase by 3.5% from 890 million tons in 2022 to 920 million tons in 2023, so global steel demand is expected to rise by 2.2% from 1.84 billion tons in 2022 to 1.88 billion tons in 2023.

Steel demand has been growing steadily in emerging countries and China has put in place a set of steel policies aimed at reducing steel production and curbing steel exports, which looks likely to remain an upside risk for Korea's steel industry. However, the supply environments for the steel products of major upstream industries will likely differ according to the type of steel and upstream market. The automobile industry, a key buyer of cold-rolled steel plates, is outlook to see its production rebound as it appears that the supply shortage of automotive semiconductors will gradually be resolved.

The shipbuilding industry, a major buyer of steel plates, has recovered mid- to long-term growth momentum as new sources of demand emerge. The delayed recovery of traditional industries is anticipated to be offset by growing demand for energy-related pipes, including line pipes, OCTGs and thick tubes, amid rising oil prices and new demand created in green industries, including photovoltaic and wind power generation structures and lightweight materials for batteries.

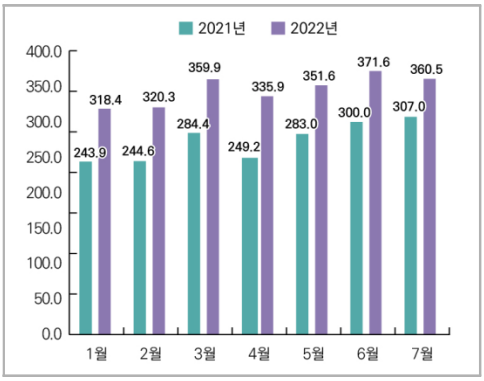
The production output of the semiconductor industry expanded by 29.2% in the first quarter of 2022 and by 27.3% in the second compared with the same period of the previous year.[25] Semiconductor exports fell by 9.0% by volume and increased by 14.0% by amount during the same period. Semiconductor exports remained strong, at over USD 10.0 billion, until August 2022, extending the gains from 2021. However, the export amount took a downturn, reversing the 26-month upward trend as falling semiconductor demand in China led to a fall in global demand.

[Figure II-19] Semiconductor Exports



Source: KITA.

[Figure II-20] Semiconductor Production Index



Source: NSO.

According to the WSTS[26], the global semiconductor market grew by 26.3% in 2021 and by 13.9% in 2022. The growth of the market is expected to slow to 4.6% due to weaker PC demand caused by economic recession and unstable supply. Meanwhile, global demand for memory semiconductors, Korea's key export item, is outlook to fall sharply from 30.9% in 2021 to 8.2% in 2022, and then to climb by a mere 0.6% in 2021.

25) The Index of Manufacturing Production, NSO(2015=100).

26) WSTS (World Semiconductor Trade Statistics), August 22, 2022.

As cars become increasingly electric and self-driving car technology improves, the demand for automotive semiconductors and semiconductors used in data centers and wireless communication is expected to grow, which is one of the upside risks. However, the global demand for semiconductors, having jumped due to the recent delay in the launch of the new CPU and the pandemic-related extraordinary demand, has started to diminish, leading to a quickly growing inventory. This is outlook to be one of the downside risks.

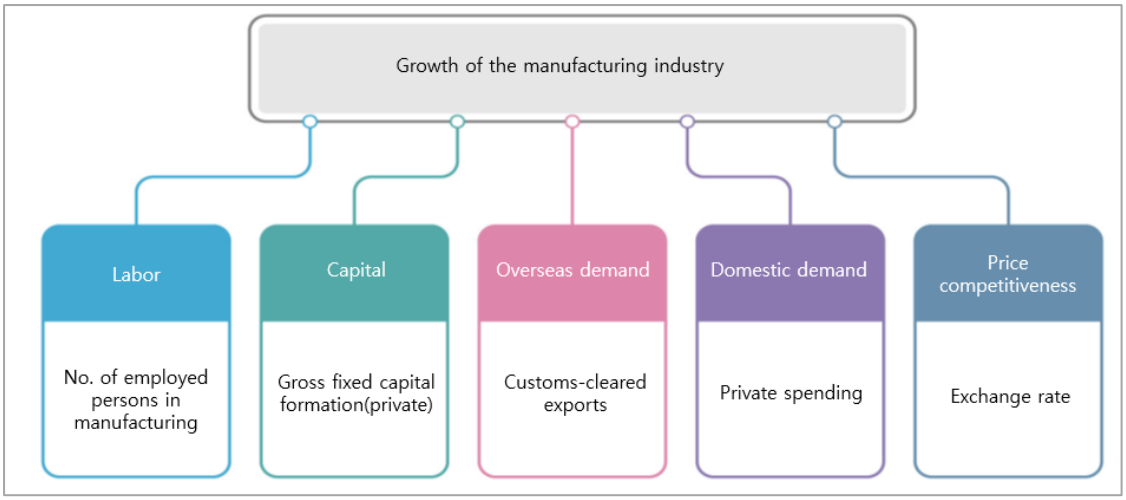
Recently, inventories have been growing, particularly in the IT industry. For instance, the manufacturing inventory index rose by 18.0% according to the trend of industrial activities[27] published in the second quarter of 2022. This is the largest rate of growth recorded in the twenty-six years since the index jumped by 22.0% in the second quarter of 1996, immediately prior to the outbreak of the foreign exchange crisis. In a breakdown by industry, the inventory index of non-metal mineral products increased by 79.7%, cokes, briquettes and refined oil products by 64.2%, electronic components, computers, electronic video and audio equipment, and telecommunication apparatuses by 58.1%, and basic non-ferrous metals by 56.7%. In addition, shipments have declined at a growing rate as demand has been weak recently, and, as a result, both the manufacturing production and shipment indexes dropped in four consecutive quarters. Shipment declined more steeply than production, leading the inventory growth, which presents a downside risk to the broader manufacturing industry.

The value added of the manufacturing industry is projected to grow by 2.2% per year on average between 2022 and 2026. In the recent five-year period 2017-2021, it increased by 2.5% despite the pandemic as exports of manufactured goods quickly rebounded from late 2020. The growth rate is expected to remain at least 0.3%p lower over the next five years (2022-2026) than in the previous period. The growth rate of the manufacturing industry looks likely to slow down from the second half of 2022 amid growing uncertainty over the global economy, extending the downturn into 2023. In 2024 and beyond, the Korean economy is expected to enter a phase of low growth in which manufacturing growth will remain stagnant as Korea's industrial structure becomes increasingly advanced and sophisticated, with the growth rate hovering slightly above 2%.

A few variables have been used to examine the factors that determine manufacturing's value added in the medium term. The value outlook has been generated based on the number of employed persons in lieu of labor, the formation of gross fixed capital in the private sector as a substitute for capital, customs-clearance-based exports from 30.9% in 2021given the Korean manufacturing industry's heavy dependence on exports, private consumption as a replacement variable of domestic demand, and the exchange rate for price competitiveness. The figure below shows the relationship between the individual factors involved in the outlook and the value added of the manufacturing industry.

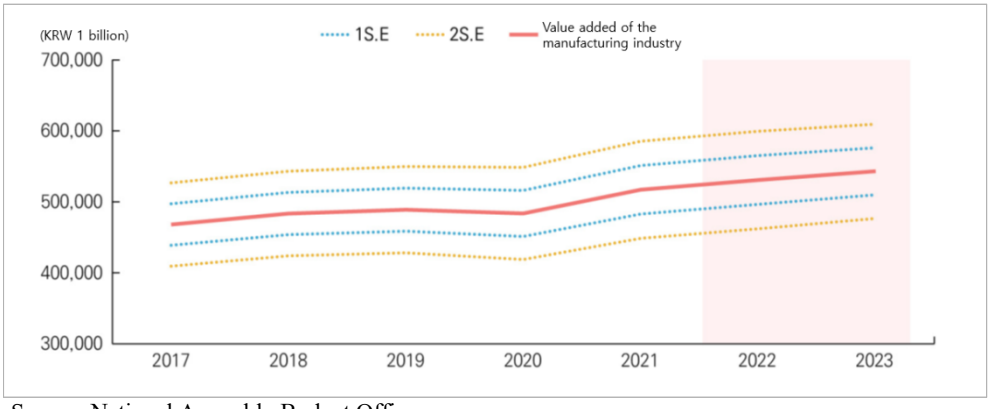
27) Index of Manufacturing Production, NSO (2015=100).

[Figure II-21] Relationship between Manufacturing and Key Determining Factors



Source: National Assembly Budget Office.

[Figure II-22] Outlook of the RVA of the Manufacturing Industry



Source: National Assembly Budget Office.

Chapter 2. The Service Sector

Section 1 Overview

- The share of the service sector's value added is 60%, lower than that of any other major country.
  - Unlike the manufacturing industry, the service industry has demonstrated a gently sloped recovery following the COVID-19 pandemic.
  - The service balance continues to be in the red but the loss has been reduced recently.

The service industry produces intangible economic goods that allow economic agents to change the status or condition of other economic agents or economic objects through their economic activities. It includes wholesale, retail, transportation and telecommunication that circulate and distribute goods; finance, insurance and real estate that deal with financial and real estate assets; and personal services that meet personal service demands. The service industry ranges widely from simple labor to meeting personal demands which require a high level of knowledge and to assisting with other production activities. The scope of the service industry continues to expand as the size of economy grows and living standards rise, causing the demand for services to diversify and change rapidly.

The service industry grew by 3.8% in 2018 and by 3.4% in 2019, higher than the GDP growth rates[28)] during the same period. However, the industry contracted by 0.8% in 2020 due to the pandemic. Although the domestic economy began to show signs of recovery from the pandemic in 2021, the service sector's growth rate stood at 3.8%, which was still lower than the GDP growth rate of 4.1%.

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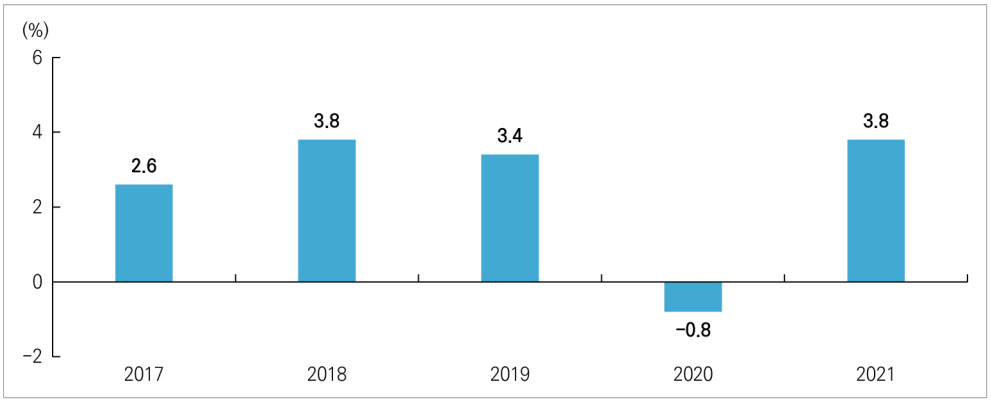
28) 2.9% in 2018, 2.2% in 2019.

[Figure II-23] Real Value Added of the Service Industry, 2017-2021



Source: Bank of Korea.

In the five-year period (2017-2021), the service industry represented less than 60% of the Korean economy, which is lower than in other advanced countries. The industry accounted for 57.0% of nominal GDP in 2021, up by 2.2%p from 2017, but the figure is much lower than that of Germany (63.0%), France (70.2%), and the UK (71.6%).

[Table II-7] The Service Industry as a % of Nominal GDP by Country

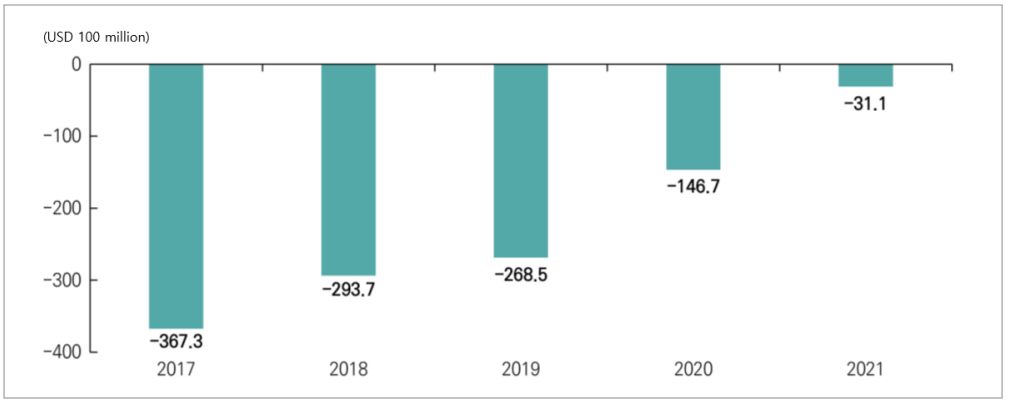
(Unit: %)

Country	2017	2018	2019	2020	2021
U.S.	77.0	76.7	77.2	80.1	-
UK	70.9	70.9	70.9	72.7	71.6
France	70.3	70.1	70.0	71.2	70.2
Germany	61.8	62.1	62.3	63.3	63.0
Japan	69.5	69.4	69.4	69.5	-
Korea	54.8	55.7	57.2	57.0	57.0

Note: This report is based on real GDP, but the table above uses nominal GDP as only nominal GDP data are available for cross-border comparison.
Source: THE WORLD BANK DATA.

Korea's service balance has been in the red although the scale of loss has been reduced recently. The service account deficit declined by 78.8% to USD 3.11 billion in 2021. Other business services[29] experienced the largest deficit among the sub-categories of the service industry, with its deficit reaching USD 12.22 billion in 2021. On the other hand, transportation and other subcategories posted a surplus of USD 15.43 billion as international logistics increased and export shipping cost remained high.

[Figure II-24] Service Account, 2017-2021



Source: Bank of Korea.

The service industry's share of gross value added has been rising in recent years: it was 57.2% in 2000 and 62.5% in 2021.

The employment inducement coefficient of the service industry is 12.5 per KRW 1.0 billion, which is twice as high as that of manufactured goods (only 6.2 persons). The industry creates more jobs than other industries, but employment is concentrated in low value added areas such as wholesale, retail, accommodation and restaurants.[30] Consumer services[31], including wholesale, retail, accommodation, restaurants, education, healthcare, public health and social welfare, tend to create relatively low value added and have high employment inducement effects. Producer services,[32] including finance and insurance, transportation and real estate, create high value added but relatively fewer jobs.

29) Includes R&D services, professional and management consulting services, construction and engineering services, etc.

30) 2019 Intra-Industry Table.

31) Services that are final goods intended for consumers.

32) Services intended for corporations and other producers.

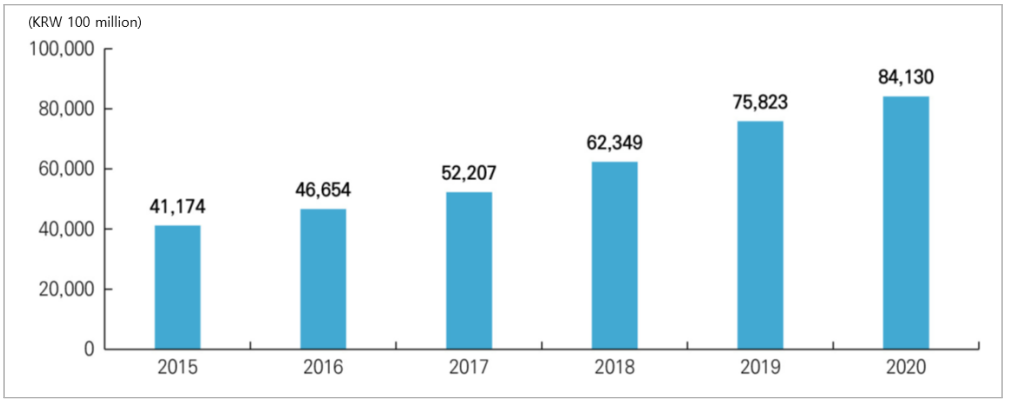
[Table II-8] Value Added and Employment by Sub-Category, 2021

(Unit: %)

Category	Value Added as a % of the Total	Employment as a % of the Total
Service Industry	62.5	70.1
Wholesale & retail	7.5	17.5
Accommodation & restaurants	2.1	11.0
Transportation	3.5	8.3
Finance & insurance	6.6	4.2
Real estate	7.8	2.8
IT	5.2	4.2
Business services	10.2	7.3
Professional services, science and technology-related services	6.8	6.4
Public administration	7.2	6.0
Education services	5.2	9.6
Healthcare, public health, social welfare	5.2	13.3
Culture and other services	2.2	2.4

Source: Bank of Korea, NSO.

[Figure II-25] R&D Expenditure by Industry



Source: National Science and Technology Information Service (NTIS).

The pandemic has taken a heavy toll on accommodation and restaurants, arts, sport and leisure, i.e., sub-categories of the service industry of which small businesses make up a relatively large portion. A contraction in face-to-face services led to shrinking private consumption and eventually to a slowdown of the local economy. Of all service industry workers (14.6 million), small business owners totaled 7.09 million, representing 48.6% of the total. As such, the higher the share of small businesses was, the more losses the sub-sector of the service industry experienced due to the pandemic.

In 2021, small businesses made up as much as 63.2% of arts, sports and leisure-related services, but the production index dropped by 32.6% year-on-year. Small business owners make up a relatively large portion of wholesale and retail, at 2 million or 53.9%, while for accommodation and restaurants the figures are 1.16 million or 61.3%. The production index for wholesale and retail fell by 2.6% year-on-year, while that of accommodation and restaurants decreased by 18.4%. Transportation and warehousing also had a relatively high ratio of small businesses at 53.1%, and its production fell 14.1% in 2021 from the previous year.

[Table II-9] % Changes in the Share of Small Businesses and Production(2021)

(Unit: %)

Sector	Production Index	% of small businesses
Educational services	-4.6	67.2
Associations and groups, repair and other personal services	-8.2	66.5
Arts, sports, and leisure	-32.6	63.2
Accommodation & restaurants	-18.4	61.3
Wholesale & retail	-2.6	53.9
Transportation & warehousing	-14.1	53.1
Professional services & science and technology services	0	30.5
Public health and social welfare	1.5	21.4
IT	1.5	18.1
Waterworks, sewage & waste treatment, materials recycling	3.3	15.3
Real estate	5.5	11.2
Facility management, business support and rent services	-9.9	11.2
Finance & insurance	14	7.7

Source: NSO.

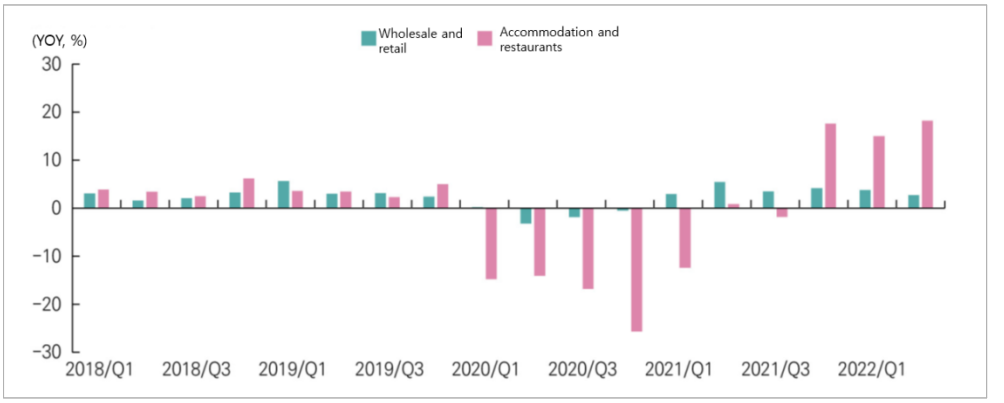
For the purposes of this report, highly weighted businesses were selected based on the production index of the service industry, including wholesale and retail, and accommodation and restaurants among consumer services, and finance and insurance, and transportation among producer services.

1. Wholesale & Retail, and Accommodation & Restaurants

Wholesale and retail serve as a bridge of distribution by carrying goods from producers to buyers without making any changes to them. It is divided into whole and commodities brokerage, and retail business. Accommodation consists of accommodation facility operation and other types of accommodation business. Food and restaurants can be divided into two categories, i.e., the industrial activity of cooking and serving food at facilities where food is served to customers, and the sale of alcoholic and non-alcoholic beverages, and snacks and refreshments. The business also includes the cooking and delivery of food ordered by customers without having a customer-serving facility, and the cooking and serving of foods ordered by customers at banquets and other event venues, which is commonly known as catering.[33)]

A survey shows that accommodation, and food and restaurants have been hit relatively less by the pandemic than wholesale and retail. Wholesale and retail production fell by 4.0% in the second quarter of 2020 compared to the same period of the previous year, hitting the bottom before taking an upturn in the first quarter of 2021. On the other hand, accommodation, and food and restaurants fell by 24.5% in the fourth quarter of 2020 to hit a low and a prolonged downturn, and then beginning to rebound (18.7%) in the fourth quarter of 2021.

[Figure II-26] Production of Wholesale & Retail, and Accommodation, Food & Restaurants



Source: NSO.

The number of employed persons in the wholesale and retail sub-category as a percentage of the total has decreased slightly. The wholesale and retail sector represented 20.3% of the total number of employed persons in 2017, but its share dropped to 17.5% in 2021. The share of accommodation, and food and restaurants also declined slightly from 12.2% to 11.0% during the same period. .

33) Bank of Korea, The System of Korea's National Accounts, 2020.

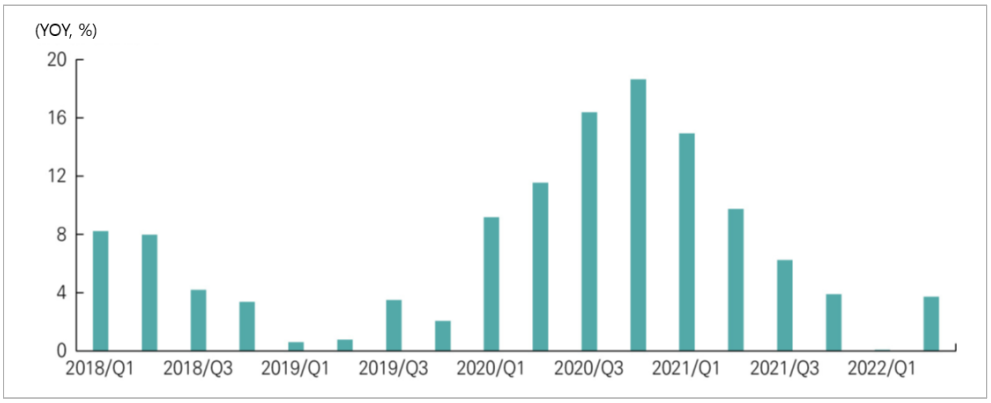
2. Finance and Insurance

Finance and insurance business refers to the industrial activities of financial institutions that conduct primarily financial brokerage or other supportive financial activities. Financial brokerage is the activity of having individual economic agents obtain funds and their financial demands met. Supportive financial activities are not financial transactions per se, but rather activities aimed at ensuring that financial transactions are carried out as intended.[34)]

The production output of the finance and insurance sector continued to increase as the stock trading volume reached a record high in 2020 in a brisk stock market and the amount of deposits and loans grew, but it has been slowing down since then. The combined net profit of domestic banks fell by 9.9% year-on-year in the first half of 2022 due to increasing bad debt costs from rising loan loss provisions, and losses on the valuation of securities amid rising interest rates.[35)]

The number of employed persons in the finance and insurance sector accounted for 4.5% of all employed persons in 2018, but fell gradually thereafter to 4.2% in 2021. Jobs in this sector are relatively high value added. The sector's index of labor productivity per worker was 139.5 in the first quarter of 2022, which was higher than that of the service industry which stood at 102.1.

[Figure II-27] Production Index of the Finance and Insurance Sector



Source: NSO.

34) Ban k of Korea, The System of Korea's National Accounts, 2020.
35) Financial Supervisory Service(FSS), 2022 H1 Results of Domestic Banks, August 19, 2022.

3. Transportation

Transportation refers to industrial activities involving the carriage of passengers and cargoes, either regularly or irregularly, via railway, road, sea, or airway. It also includes cargo-handling business that supports the transportation of passengers and cargoes, warehousing, terminal facility management, freight brokerage and other transportation-related services.[36]

The transportation sector experienced a steep decline in 2020 due to the pandemic before taking an upturn in the second quarter of 2021. Inter-city traffic in large cities decreased by 12.1% in 2020 amid the spread of COVID-19, while the use of public transportation dropped by 26.8%.[37]

Public transportation in particular suffered a greater loss as people who had previously used it switched to cars due to the pandemic.[38] In 2021, car traffic increased by 6.3% on expressways, 1.3% on national roads, and 2.1% on local roads. Passenger transportation via airway also dropped by 58.7% in 2020, but grew by 7.6% in 2021 due to the base effect. National container cargo transportation declined by 0.43% in 2020, but climbed back up to 3.22% in 2021. Container shipments decreased by 3.21% in the first half of 2022 compared to the same period a year earlier as the volume of international trade shrank due to the prolonged war between Russia and Ukraine, disruptions to global trade resulting from China's lockdowns, and the rising prices of key raw materials.[39]

The number of employed persons gradually rose from 1.8% in 2019 to 3.6% in 2020, 7.0% in 2021 and 7.2% in the first half of 2022. The number stood at around 1.4 million in 2019, but has been hovering just over 1.6 million since September 2021. The number of employed persons in the transportation sector as a percentage of the total saw a gradual rise from 2020, reaching 8.3% in 2021.

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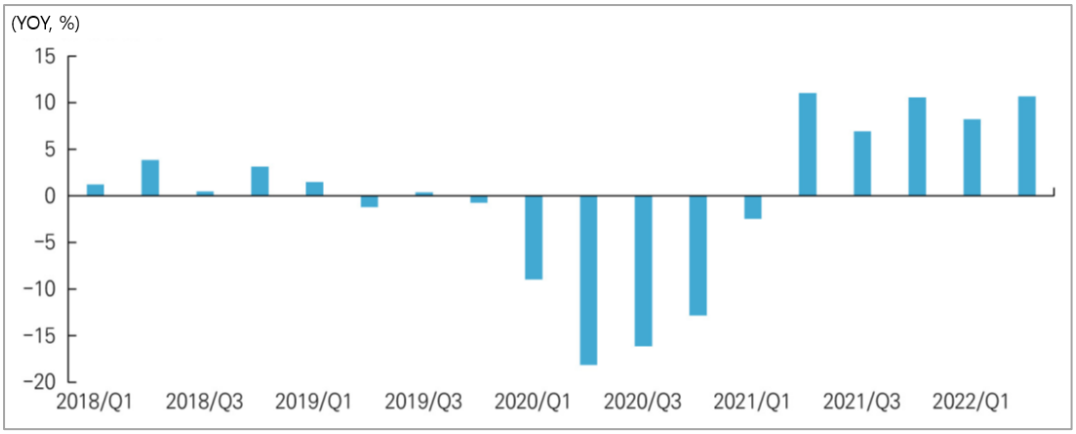
36) Bank of Korea, The System of Korea's National Accounts, 2020.

37) Press release of the Ministry of Land, Infrastructure and Transportation, "Inter-city traffic in major cities declines by 12.1% due to COVID-19," March 21, 2022.

38) Traffic Monitoring System (TMS).

39) Press release by the Ministry of Maritime Affairs and Fisheries, "Ports in Korea handle 379.8 million tons of cargoes in Q2 2022," July 21, 2022.

[Figure II-28] Production Index of the Transportation Sector



Source: NSO.

4. Business Services

Business services are intended to support the business activities of corporations operating in the manufacturing and other industries. They are classified into two groups: professional, and science and technology-related services (business-related professional services, R&D, construction, and science and technology-related professional services), and business support services (business facility management and landscaping, equipment and supply lease, job placement and manpower supply, and other business support services).[40]

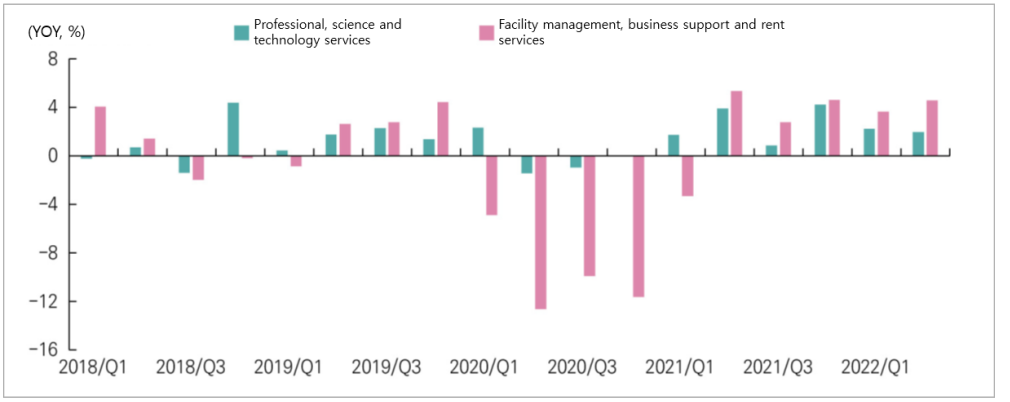
The international trade deficit of the business service sector makes up the bulk of the international trade deficit of the entire service industry. The deficit of the business service sector accounted for 66.4% of the total deficit of the service industry in 2020, with the sector recording an international trade deficit of USD 11.22 billion in 2021, four times larger than that incurred by the broader service industry, which totaled USD 3.1 billion.

The production index of the business service sector has been rising since 2021. The production of professional, and science and technology-related services contracted 1% in 2020 despite the outbreak of COVID-19. Foreign direct investment in the sector, particularly in R&D, professional services, and science and technology has been steadily increasing. FDI rose by 46.2% in 2019 compared to the previous year, 57.2% in 2020, and 15.7% in 2021. Cumulative FDI in the first half of 2022 declined by 62.8%, but it jumped by 43.2% in the business service sector.

40) Bank of Korea, The System of Korea's National Accounts, 2020.

The number of employed persons in the business service sector has been on the increase. Science and technology-related services accounted for 6.1% of the total of employed persons in 2019, 6.2% in 2020, and 6.4% in 2021. The share of employed persons in the business services sector rose from 6.9% in 2019 to 7.2% in 2020, and tp 7.3% in 2021.

[Figure II-29] Production Index of the Business Service Sector



Source: NSO.

Section 2 Outlook for 2023[41)]

- The service industry is outlook to grow by 2.2% in 2023.

(Year-on-year, %)

2021	2022	2023	2017~2021	2022~2023
3.8	3.3	2.2	2.6	2.8

- Major factors

Upside risks	Downside risks
o Improved consumer confidence as COVID-19 enters the endemic phase.	o Rising prices
o Non-contact, digital transformation accelerates with technological development	o Slowdown of the domestic economy due to rising interest rates

The service industry expanded by 4.2% year-on-year in the first half of 2022, led by wholesale and retail, accommodation, and food and restaurants, which grew by 6.1%, and transportation grew by 7.l7%. Industry demand is expected to continue on the recovery both online and offline as consumer confidence improves on the back of the progress with vaccinations[42)] made in 2021 and 2022 and rebounding exports after a period of depression due to the spread of COVID-19.

However, consumer sentiment may be adversely affected by the negative impact of the unstable global supply chains on the domestic economy and interest rate hikes in the second half of the year, which in turn will likely limit the upward momentum. The service industry is projected to grow by 2.4% in the second half of 2022 and by 3.3% in 2022.

The industry is outlook to see its growth slow from 3.3% in 2022 to 2.2% in 2023, lower than the average growth rate of 2.6% over the previous five years (2017-2021) as it goes through ups and downs according to the changing business cycle of the domestic economy and the spread of the pandemic, with the pandemic-driven extraordinary demand falling.

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41) The outlook for the service industry is expected to serve as basic data for formulating policies (including the outlook by sector, the outlook for the number of employed persons and labor demand by sector, and the demand outlooks for upstream and downstream industries related to the service industry). By offering basic data on key items of agenda including digitalization and sophistication of the service industry, the outlook is anticipated to help with the formulation of legislation and the development of policies for supporting the industry's overseas expansion, informatization and standardization, and R&D activities.

42) Progress with vaccination (as of September 19, 2022): The number of people who have received their 1st vaccination (45,110,526), 2nd vaccination (44,674,106), 3rd vaccination (33,583,565).

Wholesale and retail, accommodation, food and restaurants, and transportation are expected to lead the industry's growth in 2023 as demand for contact-based service increases. Listed below are the major upside and downside risks that will determine the outlook for 2023.

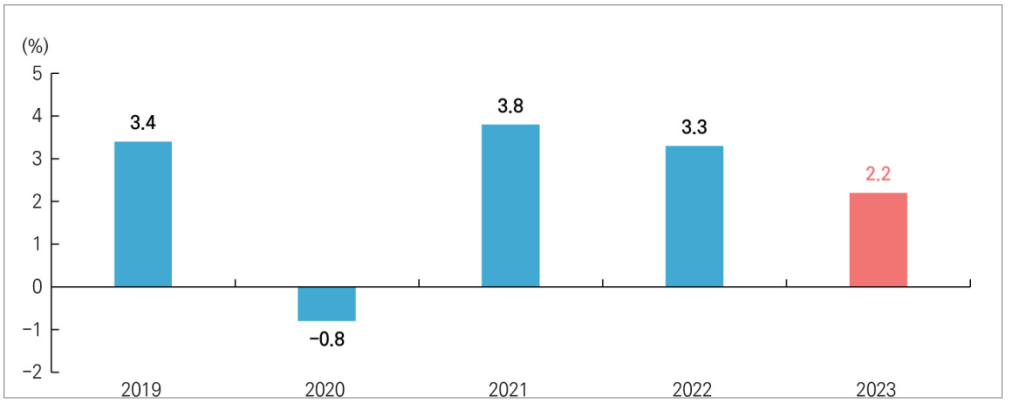
[Table II-10] Outlook for the RVA of the Service Industry

(Unit: year-on-year change, %)

2021	2022			2023[f]
	First half	Second half[f]	Annual[f]	
3.8	4.2	2.4	3.3	2.2

Source: National Assembly Budget Office.

[Figure II-30] Outlook for the RVA of the Service Industry



Source: National Assembly Budget Office.

Wholesale and retail, accommodation, and food and restaurants are expected to see a continuous improvement in consumer confidence throughout 2023 as much progress has been made with the vaccination campaign and COVID-19 is now considered to be endemic. Still, the possibility remains that consumer confidence will worsen, leading to weaker domestic demand if expectations of economic recovery fall due to interest rate hikes and sluggish exports.

Increasing non-contact spending, and stronger quarantine and prevention efforts against COVID-19 will likely have a positive impact on online wholesale and retail sales. Online distribution saw its sales grow by 11.4% in the first half of 2022 compared to the same period of the previous year, as online grocery and other shopping behaviors became highly popular.

Food and beverage sales have been growing as a percentage of total online sales, with the share increasing by 4.7%p from 9.4% in the first quarter of 2018 to 14.1% in the first quarter of 2022.

Offline distribution maintained its recovery trend, expanding by 8.4% year-on-year in the first half of 2022, with department store sales rising by 18.4% and convenient store sales by 10.1%. Sales at department stores improved across the board, including children's clothes, sportswear, and men's and women's clothes as the number of customers visiting stores in person rose. Sales of luxury items and electronic appliances, which led sales in 2021, slowed due to the base effect. With more people shopping at convenient stores as schools and businesses returned to normal, (offline) sales increased by 9.5% in the first quarter of 2022 and by 10.6% in the second, posting gains for two consecutive quarters.

[Figure II-31] Online Sales

Source: NSO.

[Figure II-32] Food Sales as a Share of Total Online Sales

Source: NSO.

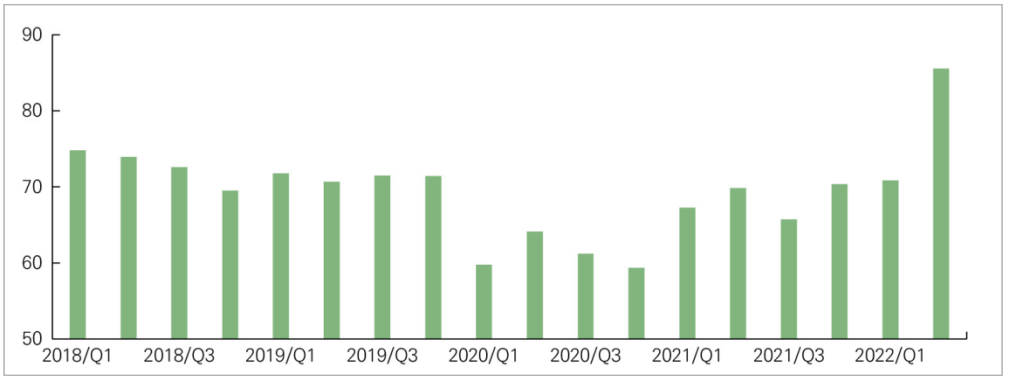
Accommodation, and food and restaurants experienced a steep decline in sales during the spread of COVID-19, but they are expected to remain on the path to recovery as things are returning to normal at a faster pace and the amount of spending is growing. The amount of spending in this sector increased by 5.8% year-on-year in 2021, while the growing rate of vaccination continued to rise, reaching 13.9% in the first quarter of 2022.

Food and restaurants are benefiting from the sharp growth in the number of people ordering in food since the outbreak of COVID-19 as well as from the abolition of the social distancing rules. The sector's strong sales will likely be led by growing sales of meal kits as a home meal replacement in the era of COVID-19 and rebounding demand for alcoholic drinks and beverages, which had been sluggish due to COVID-19. As restaurant sales return to normal, the restaurant industry's diffusion index[43] is showing signs of recovery.

The industry's diffusion index gained 14.72p in the second quarter of 2022, compared to the first quarter, which is higher than the pre-pandemic level.

However, uncertainties still remain as prices could rise if international grain prices go up, leading to an increase in subjectively-perceived consumer prices, while demand could dip if COVID-19 began to spread again.

[Figure II-33] Diffusion Index of the Restaurant Industry

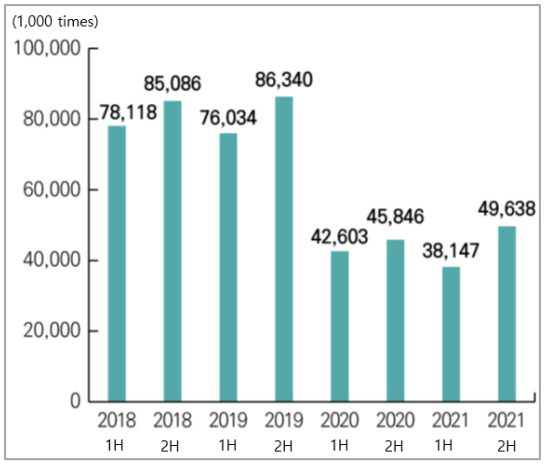


Source: Ministry of Agriculture, Food and Rural Affairs.

Accommodation is outlook to remain on an upward trend, as the number of nights that travelers spent in hotels rose by 8.3% and tourism spending started to grow in the second half of 2021, after the social distancing rules were lifted and traveler confidence began to improve.

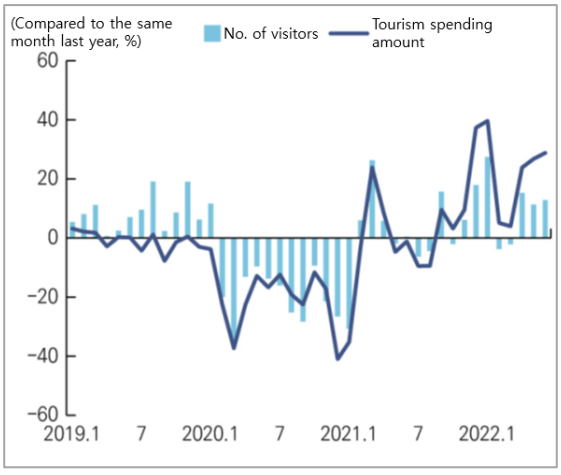
43) A figure below 100 indicates that businesses whose sales were declining from the same quarter of the previous year outnumbered businesses whose sales increased during the same period.

[Figure Ⅱ-34] Number of Domestic Trips Involving the Use of Accommodation at Hotels in Korea



Source: NSO.

[Figure II-35] Number of Domestic Travelers and Amount of Tourism Spending

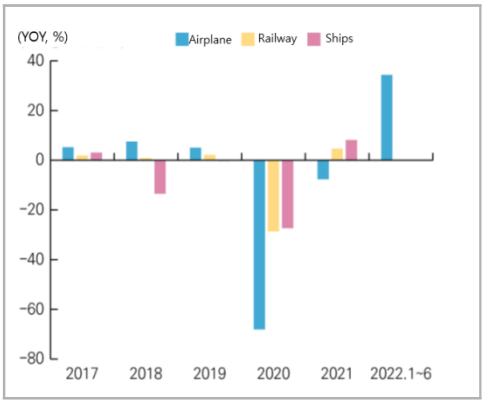


Source: Korea Tourism Organization.

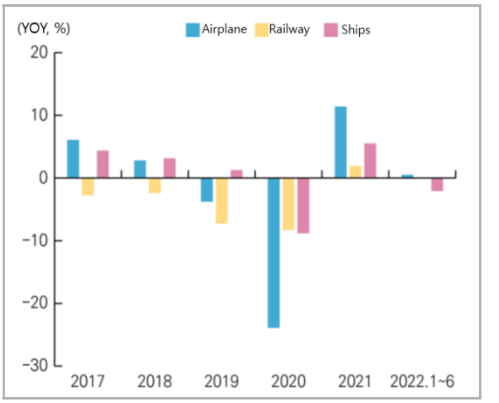
In the transportation sector, passenger transportation is likely to rebound as countries become increasingly open to foreign travelers and remove travel restrictions, but the outlook remains uncertain for cargo transportation as worries about the global economy persist.

According to the International Air Transport Association (IATA), passenger demand is outlook to recover to the pre-pandemic level of 209 in 2024. The number of airway travelers rose by 34.3% year-on-year to 22 million in the first half of 2022 following the lifting of the social distancing rules. Railway passenger transportation and domestic ferry transportation increased by 4.6% and 8.1%, respectively, in 2021, indicating that the upward momentum will likely continue in 2022. Freight transportation tends to mirror the global economy. Domestic air cargo grew by 20.5% year-on-year, but international air freight inched up by only 0.5% in the first half of 2022 as exports shrank due to weak demand for consumer goods due to global inflation. Maritime freight also dropped by 2.1% year-on-year due to the Russia-Ukraine war and China's lockdowns among others.

[Figure II-36] Domestic Passenger Transportation [Figure II-37] Domestic Freight Transportation



Source: MOLIT, MOF.



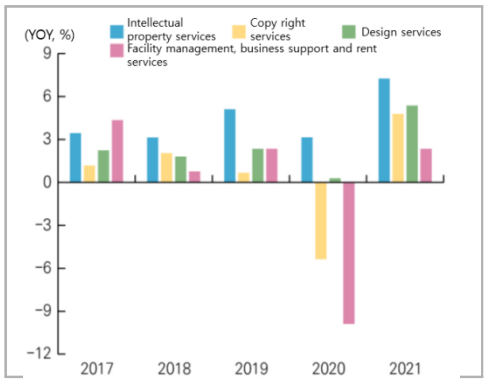
Source: MOLIT, National Logistics Information Center.

As the need to promote the high value-added service industry in a knowledge-based economy has emerged as one of the key issues for the Korean economy, growing interest in the service industry will likely act as an upside risk. Despite COVID-19, the production output of the service industry continued expanding in 2022, led by intellectual property rights, a part of the professional/science and technology-related services category, and design - areas that create high value-added and require relatively less personal contact. The service industry is expected to see continued growth on the back of additional momentum from the copyright service business, which took an upturn following the outbreak of COVID-19.

Of business services, professional services, and science and technology is classified as a high value added sector, while business support services are considered a relatively less value added sector, with a significant portion of its workers being low-skilled, simple manual laborers.[44] Recently, growth started slowing among high-value added businesses in the business service sector, while labor productivity began improving in low value added businesses. Extending the upward trend, business facility management and business support expanded by 3.5% year-on-year in 2021. On the other hand, labor productivity of professional, science and technology services has been on the decrease since 2018, albeit at a slower pace.

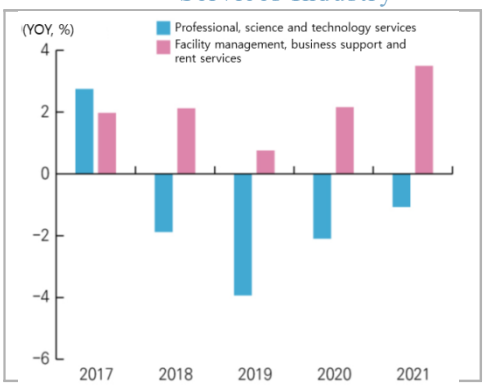
44) Banggeul, Characteristics of and Outlook for the Labor Market of the Business Support Services Industry, Korea Employment Information Service, 2021.

[Figure II-38] Production Index of Service Businesses under the Category of Business Services



Source: NSO.

[Figure II-39] Labor Productivity Index of the Business Services Industry



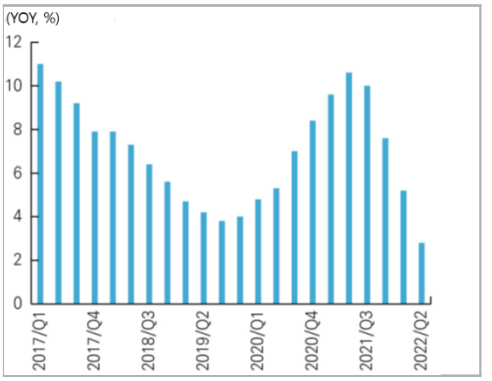
Source: Korea Productivity Center.

In 2023 finance and insurance will likely see growing risks associated with the international economy and financial instability, given the accelerating monetary tightening in the U.S. and the EU due to the recent intensification of global inflationary pressure, in the midst of the rising possibility of global economic slowdown due to the Russia-Ukraine war, for which there seems to be no end in sight at present.

Another downside risk will be the loan loss provisions to be made against risks associated with the financial imbalance that may result from the end of the pandemic-related financial support and reduced liquidity.

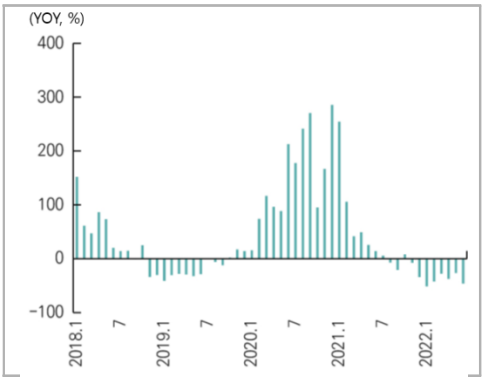
Amid slowing growth in household debts, including credit loans, as a result of a series of recent rate increases, the government is expected to tighten its control over household debt and the recent interest rate hikes will likely weigh on the demand for corporate and household loans. The stock trading amount has been steadily falling amid worries over the global economy, dropping by 46.2% in June from the same month of the previous year, which is also expected to be a downside risk.

[Figure II-40] Household Debt



Source: Bank of Korea.

[Figure II-41] Stock Trading Amount



Source: Korea Exchange.

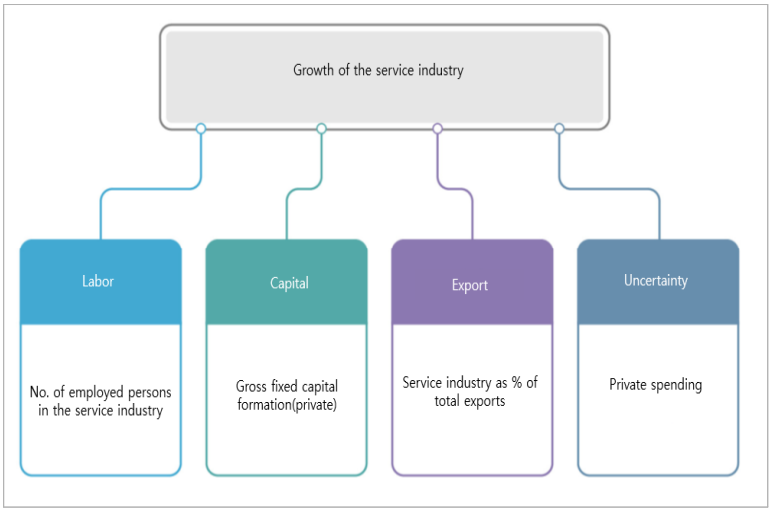
Having been on the path to recovery from the impact of COVID-19, the service industry is expected to continue growing by 2% per year on average, led by wholesale and retail, accommodation, food and restaurants, transportation and business services. As consumer confidence improves and online sales increase further, transactions in both contact-based and non-contact services are likely to gain further momentum and the industrial structure to further diversify, while the knowledge-intensive business service (KIBS) is expected to expand as IT becomes increasingly integrated into the industry.

There is still a possibility, however, that the industry's recovery could be delayed if risks that undermine the global economy - including global inflation resulting from the Russia-Ukraine war, global monetary tightening and steep rises in raw material prices, and the slowdown of the Chinese economy - remain unresolved.

There are a few factors that determine the growth of the service industry. The capital growth rate, which affects the industry's growth, can be assessed by gross fixed capital formation[45](private), while the labor growth rate can be assessed by the number of employed persons in the industry. Private consumption can be viewed as an element of economic uncertainty. Recently, transaction costs have been reduced as non-contact services have become widely used, and the global trade in services has increased. In this context, the ratio of service exports can be used as an indicator of the service industry's global competitiveness. The figure below shows the relationship between the service industry and the key factors that determine its growth.

45) "Fixed assets" refers to tangible and intangible outputs that are used in the production process repeatedly and on a continuing basis over the long term. These assets are used for production activities that take at least one year, and they are a source of profit. They are divided into tangible and intangible assets.

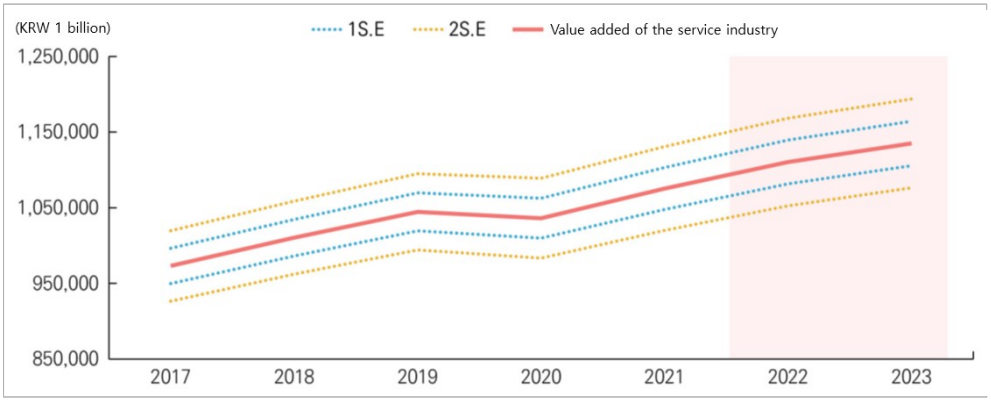
[Figure II-42] Relationship between the Service Industry and Key Growth Factors



Source: National Assembly Budget Office.

The figure below shows the growth projection made for the service industry using an outlook model and confidence intervals.

[Figure II-43] Estimated RVA of the Service Industry



Source: National Assembly Budget Office.

Chapter 3. Construction

Section 1 Overview

- The construction industry contracted by 1.4% year-on-year in the first half of 2022
  - Although the construction industry has entered a stage of expansion, it has contracted due to downside risks from the supply side.
  - The construction sector is outlook to rebound as the downward pressure on the domestic economy gradually decreases, and the government will likely adhere to its policy of building more homes.

The construction industry is divided into two categories: i) general construction, which includes civil engineering and construction, and ii) professional construction, which including the installation, repair and maintenance of facilities, and the installation and dismantling of mechanical equipment and other structures.[46] In the national accounts, the construction industry comprises three categories, namely, building construction, civil engineering, and professional construction. In the construction industry, market entry is relatively easy and new businesses frequently enter and exit the market as the industry goes through ups and downs. As a general industry, the construction industry creates value added by combining a wide range of goods, human resources and technology, and affects various other industries through close its interactions with them. For this reason, the industry has greater production, employment and value added inducement effects than other industries, and thus has a great trickle-down effect on the national economy even though its share of GDP is not so high. Furthermore, the construction sector is often used by the government as a tool to boost the economy or adjust the economic growth, because the industry is heavily affected by the government's development plans and other policies, and has a great impact on the national economy.

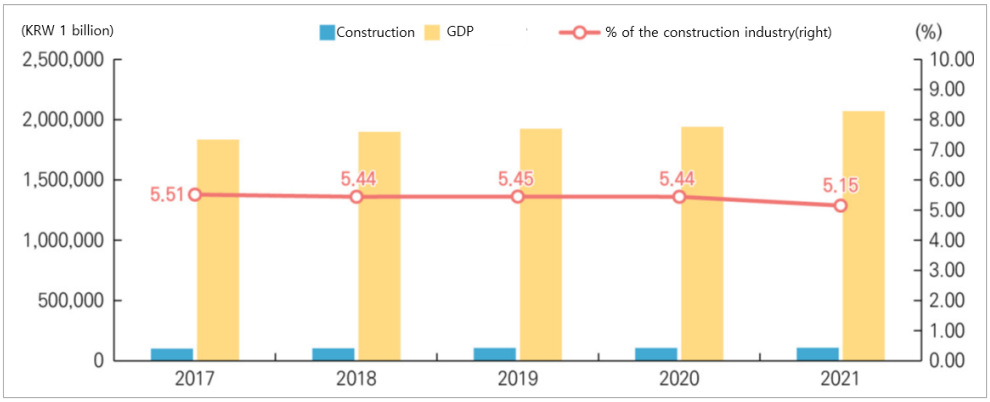
The construction industry's contribution to GDP was a little more than 5% during the recent five-year period 2017-2021.

Yong-gyun Kim, Economic Analyst (kimyk0909@assembly.go.kr, 6788-4791)

46) Articles 2 and 8 of 「The Framework Act on the Construction Industry」, Appendix 1 of the Enforcement Decree.

Although the construction sector's share of GDP is not particularly high, it has a relatively greater trickle-down effect on the inducement of production, value added and employment than other industries. The 2019 Intra-Industry Table published by the Bank of Korea shows that the production inducement coefficient of the construction industry[47] is 1.955, which is higher than those of other industries. Its value added inducement coefficient [48] is also relatively high at 0.815, while its employment inducement coefficient[49] is the second highest at 8.4 after the service industry.

[Figure II-44] The Construction Industry's Share of GDP



Source: Bank of Korea.

47) "Production inducement coefficient" refers to the amount of production generated directly and indirectly in all the processes and stages, including the manufacturing of a product, involved in the process of meeting demand when one unit of demand for that product occurs.

48) "Value added inducement coefficient" refers to the size of value added generated directly or indirectly in all the processes and stages, including the manufacturing of a product, involved in the process of meeting demand when one unit of demand for that product occurs.

49) "Employment inducement coefficient" refers to the number of full-time equivalent waged and salaried workers generated directly and indirectly in all industries when demand for domestic goods amounting to KRW 1.0 billion occurs.

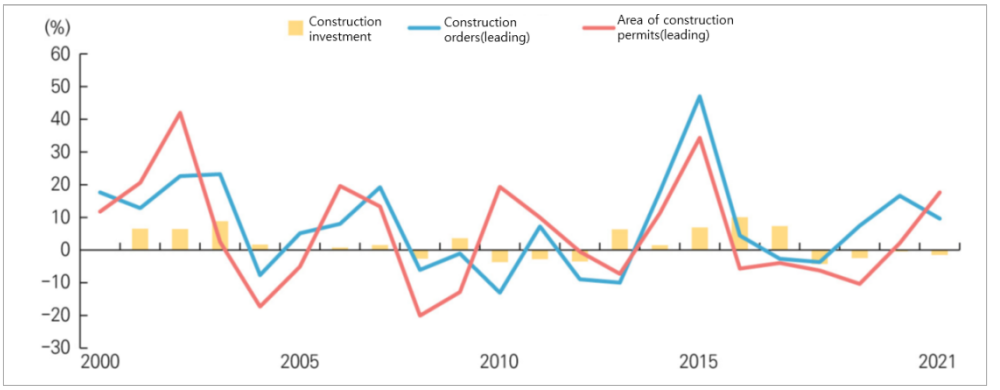
[Table II-11] Intra-Industry Table by Industry

	Production Inducement Coefficient			Value added inducement coefficient			Employment inducement coefficient		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
Agriculture & fisheries	1.760	1.798	1.843	0.854	0.840	0.840	4.2	4.2	4.2
Mining	1.842	1.905	1.915	0.894	0.881	0.884	8.2	7.8	7.3
Manufacturing	1.898	1.887	1.903	0.648	0.635	0.638	4.9	4.7	4.7
Electricity, gas, waterworks and waste	1.536	1.575	1.596	0.598	0.538	0.565	3.4	3.4	3.5
Construction	1.972	1.954	1.955	0.811	0.811	0.815	8.5	8.5	8.4
Services	1.681	1.685	1.684	0.877	0.873	0.873	9.9	9.4	9.2
IT	1.795	1.790	1.791	0.780	0.773	0.780	7.7	7.4	7.4

Source: Bank of Korea.

Construction is a time-consuming process that takes place over an extended period of time, ranging from the planning and design of an actual construction project to its completion. The construction industry is characterized by a business cycle consisting of repeated peaks and troughs. According to the main indicators associated with construction activities, including construction permits, construction orders and building starts, which show the status of the construction business cycle ahead of construction investments, it appears that the construction industry has entered an expansion stage.[50] Since the business cycle of the industry is relatively sensitive to government policy, the government's recent supply expansion policy is expected to provide a stimulus to the expansion of the construction industry.

[Figure II-45] Construction Business Indicators



Source: NSO.

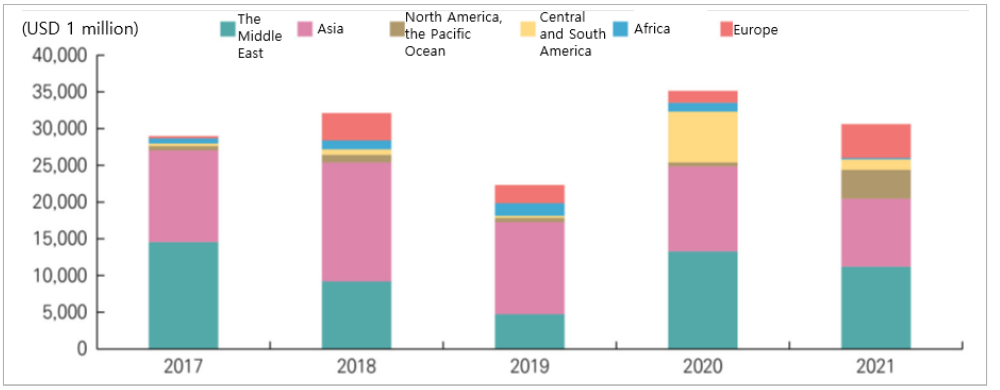
50) Bank of Korea, Evaluation of the Recent Construction Business and Implications: with the Focus on Supply-Limiting Factors, June 13, 2022.

Strong construction business indicators also show that the construction business has entered a stage of expansion, and the government's expansionary policy is expected to have a positive effect on the industry's expansion. Since the industry has just entered the expansion stage of the business cycle, the upward trend is likely to continue. However, recent investment figures show that this expansionary trend has not yet become clearly visible, which is attributable to unexpected, complex downside risks including COVID-19, the prolonged Russia-Ukraine war, and rising interest rates, all of which could limit the recovery of construction investments on the supply side. The main factors that could limit construction investments on the supply side are steep rises in the prices of building materials, shortages of skilled labor, and changes in construction-related polices and regulations. These supply-side obstacles are expected to evaporate as uncertainties about the global and domestic economy decrease.

According to the Export-Import Bank of Korea[51], the global construction market is projected to expand by 5.5% from USD 10.9 trillion in 2021to USD 11.5 trillion in 2022. The market grew by 10.7% year-on-year in 2021, and this growth rate was expected to extend into 2022. However, the growth has slowed due to uncertainties over the global economy, including the rising prices of raw materials, the Russia-Ukraine war, and pressure to raise interest rates in major countries. The amount of overseas construction orders dropped by 12.8% to USD 30.6 billion in 2021. By region, orders from the Middle East amounted to USD 11.22 billion, followed by Asia at USD 9.25 billion, North America at USD 3.93 billion, Europe at USD 4.59 billion, and Central and South America at USD 1.38 billion. Construction orders from major customer regions including the Middle East and Asia, declined by 15.8% and 20.1%, respectively, which is responsible for much of the decline in overseas construction orders received in 2021. In a breakdown by work type, the amount of orders won by the civil engineering sector fell by .9% to USD 5.86 billion, with construction down 55.1% to USD 4.1 billion, and plants down 3.7% to USD 16.4 billion. Nevertheless, overseas construction orders are projected to increase by 4.6% to USD 32.0 billion in 2022.

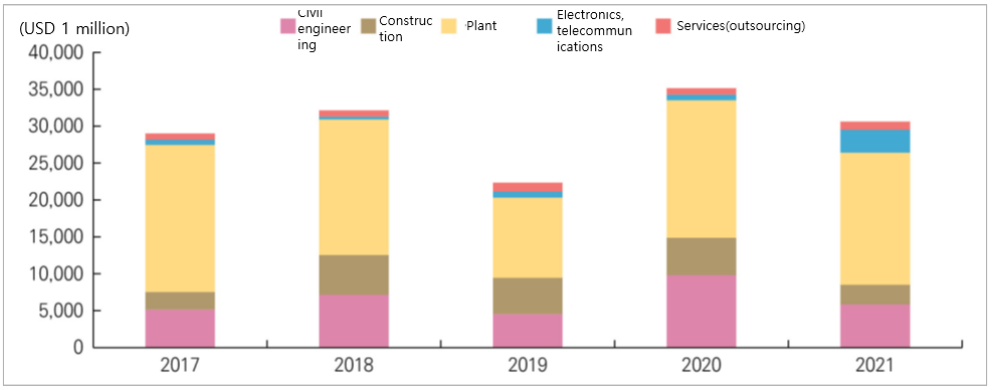
51) Export-Import Bank of Korea, Overseas Construction Industry Trend, H1 2022, May 27, 2022.

[Figure II-46] Overseas Construction Orders by Region



Source: International Contractors Association of Korea.

[Figure II-47] Overseas Construction Orders by Work Type



Source: International Contractors Association of Korea.

Section 2 Outlook for 2023[52)]

- The construction industry is outlook to shrink by 0.1% year-on-year in 2023.

(Year-on-year, average, %)

2021	2022	2023	2017~2021	2022~2023
-2.6	-1.7	-0.1	-0.7	-0.9

- Key Factors

Upside risks	Downside risks
o Construction industry enters a stage of expansion	o Uncertainties over the global economy
o Government policy inclined to increasing housing supply	o Difficulty in securing raw materials and labor

The construction industry contracted by 1.4% in the first half of 2022 due to the rising prices of raw materials and difficulties in securing the timely supply of materials resulting from the Russia-Ukraine war, disruptions to supply chains, and interest rate hikes. The prices of some materials began to rise at a slower pace in the second half, but the prices of key materials still remain very high and wage and mechanical equipment lease rates have continued to rise.[53)] For these reasons, the construction industry is expected to shrink by 2.0% in the second half of the year compared to the same period one year earlier. Even though the industry appears to have entered the expansion stage of the business cycle, it is outlook to fall by 1.7% year-on-year in 2022, as it is likely to be affected by unexpected downside risks.

Uncertainty in the construction industry looks set to decrease somewhat in 2023, as it is expected that the reduction in its growth rate will be slowed to some extent by the government's policy of increasing the supply of homes to 0.1% year-on-year. The recent rises in the prices of building materials appears to be attributable largely to supply-side factors, including increases in the global prices of raw materials. Strong leading indicators and other construction-related psychological indicators point to a recovery, yet the prices of intermediary materials are likely to stabilize only gradually because domestic producers of intermediary building materials are still cautious about their production activities.[54)] As such, even if the overseas downside risks are eliminated over time, it may take some time for the prices of building materials to stabilize.

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52) The outlook for the construction industry is expected to serve as a basic material for the formulation of policies as it can be used to produce various other outlooks on real estate, the number of employed persons in the construction industry, and demand among upstream and downstream industries including steel and cement.

53) Construction and Economy Research Institute of Korea, Construction Trend Briefing, Vol. 872, September 5, 2022.

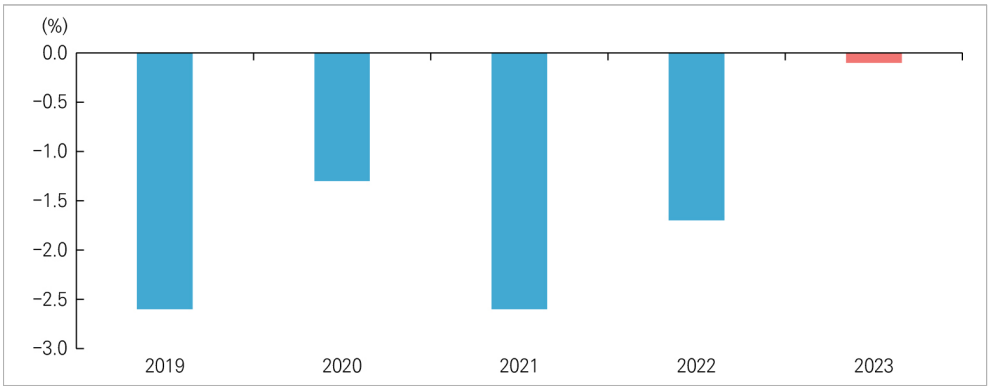
54) Bank of Korea, Factors Limiting the Recovery of Construction Investment: Causes of Hikes in the Prices of Building Materials and Their Impact, March 29, 2022.

[Table II-12] Outlook for the Real Value Added of the Construction Industry

(Unit: YOY, %)

2021	2022			2023 [f]
	H1	H2[f]	Annual[f]	
-2.6	-1.4	-2.0	-1.7	-0.1

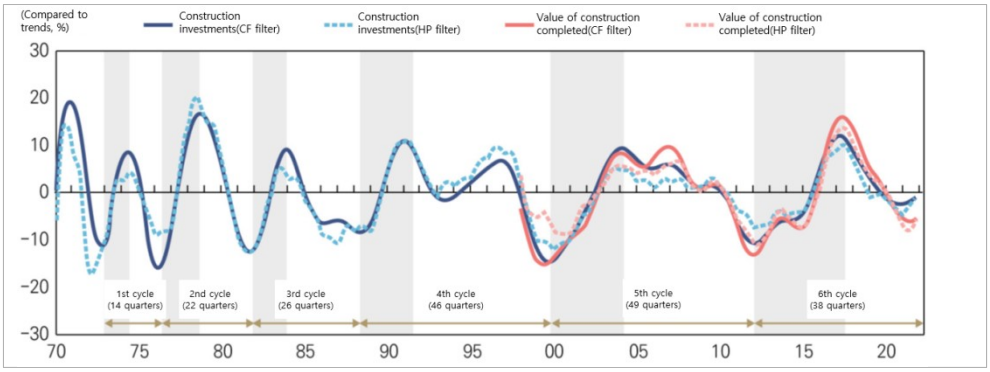
[Figure II-48] Outlook for the Real Value Added of the Construction Industry



Source: National Assembly Budget Office.

(Upside Risks) The main construction business indicators show that the industry has entered the expansion stage of the current business cycle, and the government's policy of increasing the supply of homes is expected to accelerate this expansionary trend. Global economic uncertainties including COVID-19, the Russia-Ukraine war, and the pressure in major countries for a hike in interest rates are likely to ease gradually. As these uncertainties get eliminated, supply-side concerns such as rising raw material prices and disrupted supply chains will also likely disappear, which in turn will lead to clear signs of the industry's recovery. Furthermore, the leading indicators remain solid and construction-related psychological indicators are also showing signs of a rebound. Furthermore, demand-side factors are expected to provide a fresh impetus for the recovery of the construction sector.

[Figure II-49] Business Cycle of Korea's Construction Industry



Source: Bank of Korea, BOK Issue Note, Vol. 2022-20.

The construction business is characterized by a relatively long cycle from the start of a construction project to its completion, and the government's policy for the construction industry also tends to be designed and implemented on a long-term basis. Considering these industry characteristics, once an expansionary stage kicks in, it tends to last for a long time.[55] More specifically, building construction projects requiring three years on average to complete lead the business cycle of the industry, and government policies on housing supply are also designed to last over the long term.

[Table II-13] Duration of Building Construction Projects

(Unit: month)

	Residential	Commercial	Industrial	Others
Average construction project duration	33	33	14	15

Source: Bank of Korea, BOK Issue Note, Vol. 2022-20

[Table II-14] Construction Business Cycle

	All	Expansion Stage	Contraction
1st cycle (Q1 1973~Q2 1976)	14 quarters	6 quarters	8 quarters
2nd cycle (Q2 1976~Q4 1981)	22 quarters	9 quarters	13 quarters
3rd cycle (Q1 1982~Q2 1988)	26 quarters	8 quarters	18 quarters
4th cycle (Q3 1988~Q3 1999)	46 quarters	12 quarters	34 quarters
5th cycle (Q1 2000~Q1 2012)	49 quarters	17 quarters	32 quarters
6th cycle (Q2 2012~)	Around 38 quarters	21 quarters	Around 17 quarters
Average	32.5 quarters	12.2 quarters	20.3 quarters

Source: Bank of Korea, BOK Issue Note, Vol. 2022-20.

55) Bank of Korea, A Review of the Recent Construction Industry Trend and Its Implications: with the Focus on Supply-Disrupting Factors, June 13, 2022.

(Downside Risks) The prices of raw materials are outlook to peak in 2022 and subsequently take a downturn. However, the impact of the high prices of raw materials may still continue beyond their stabilization, considering the large gap in time between the value of construction orders received and the value of construction orders completed. In previous cases, the sales of listed construction companies rose sharply when prices were on the rise due to hikes in raw material prices, but their operating profits barely increased as the high raw material prices weighed heavily on their costs.[56] High raw material prices not only erode contractors' profitability but also put a cap on the future recovery of the construction business.[57] In addition, the recent pressure to raise interest rates is likely to dampen construction investments. According to the Bank of Korea, a 25bp(0.25%) increase in the benchmark rates translated into a 0.07~0.13% decline in construction investment in the first year.[58]

The downside risks facing the construction industry result from unprecedented and complex developments that are difficult to anticipate and cope with proactively, including COVID-19, the Russia-Ukraine war, and urgent pressure for rate hikes in other countries. Since these are not structural issues but only temporary phenomena, once such phenomena end, uncertainty will be removed and economic conditions will also likely return to normal.

[Table II-15] World Bank's Outlook of Raw Material Prices

Raw materials	2020	2021	2022	2023	2024
Coal (Australia, $/mt)	60.8	138.1	250.0	170.0	154.7
Crude oil (Brent, $/bbl)	42.3	70.4	100.0	92.0	80.0
Iron ore ($/dmt)	108.9	161.7	140.0	105.0	90.0

Note: In nominal US dollars, *mt* is short for metric ton, *bbl* for barrel, and *dmt* for drymetric ton.
Source: World Bank, Commodity Markets Outlook, April 2022.

The outlook is based on the national accounts and other data related to the construction business. There are a few factors that determine the value added of the construction industry. Korea's economic growth trend was compiled based on real GDP, and construction orders received were used as a leading indicator. Changes in the prices of raw materials were used to explain changes in the value added of the industry. Private consumption was used as a replacement variable for uncertainty.

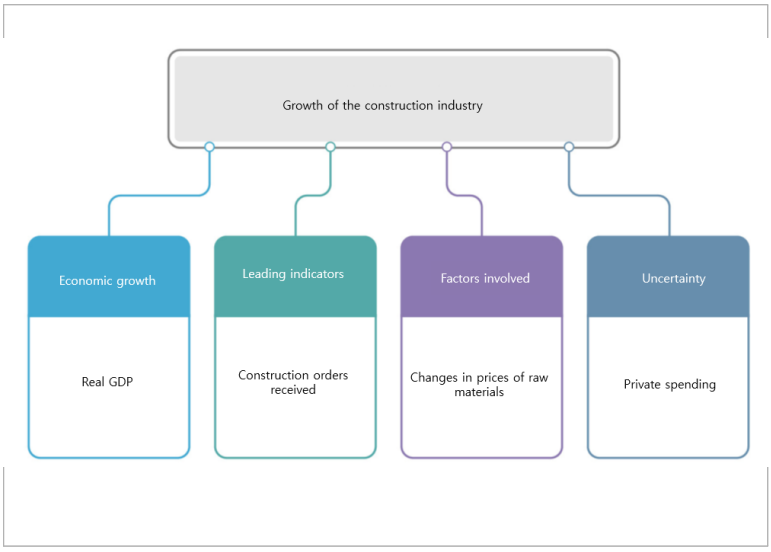
56) Woori Financial Research Institute , A Review of the Impact of Steep Rises in Raw Material Prices on the Construction Industry, June 30, 2022.

57) Bank of Korea, Factors Curbing the Recovery of Construction Investment: Causes of Building Material Price Hikes and Their Impact, March 29, 2022. .

58) Bank of Korea, A Review of the Impact of Rate Hikes on Domestic Demand by Industry, July 27, 2022.

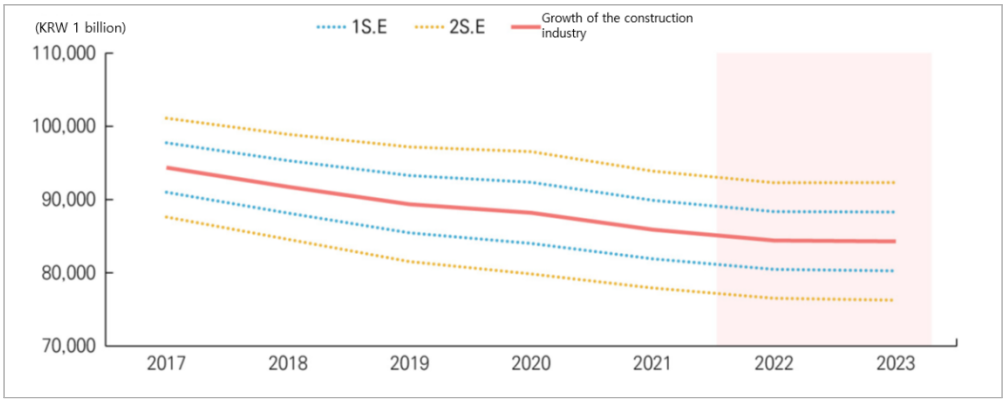
The diagram below shows the relationship between production of the construction industry and the key variables that determine production

[Figure II-50] Relationship between the Construction Industry and Key Determining Factors



Source: National Assembly Budget Office.

[Figure II-51] Outlook for the Real Value Added of the Construction Industry



Source: National Assembly Budget Office.

Chapter 4. Electricity, Gas and Water Services

Section 1 Overview

- The real value added of electricity, gas and water services grew by 2.9%p to 2.5% in the first half of 2022 from the previous half, but fell by2.1%p to 2.2% compared to the same period of the previous year.
  - Electricity sales rose by 7.9% from the previous half and by 7.3% year-on-year, led by services and other sales.
  - Sales of gas and water fell by 2.3% and 1.3%, respectively, from the previous half and by 2.0% and 2.1%, respectively, from the previous year due to LNG price hikes caused by the Russia-Ukraine war and decreased rainfall.

As an industry, electricity, gas and water services encompass the generation, transfer and distribution of power; the production of fuel gas; the supply of distribution pipes; the production and distribution of steam, hot and cold water, and cooled air; and the collection, purification and distribution of tap water and industrial water.[59] In the national accounts, the industry is divided into electricity, gas, steam and air conditioning supply ("gas"), and water supply, sewage and waste treatment, and materials recycling ("water supply"). Although the industry represented only 2.5% of real GDP in 2021, it is still a key basic industry that directly affects the everyday life of citizens and industrial activities, as it supplies energy, and water and sewage services. The public sector plays a leading role in the industry in order to prevent the overlapping or duplication of investments in production facilities and to ensure a stable supply.

Since the industry provides products that other industries need as intermediary goods, it is susceptible to changes in the economic cycle and hence the industry's sales fluctuate widely from season to season according to the changing demand for heating and cooling. Given that Korea depends on imports for most of its energy sources except anthracite, and that the industry is closely connected to carbon neutrality and environmental policies related to the response to climate change, the industry warrants considerable attention from policymakers.

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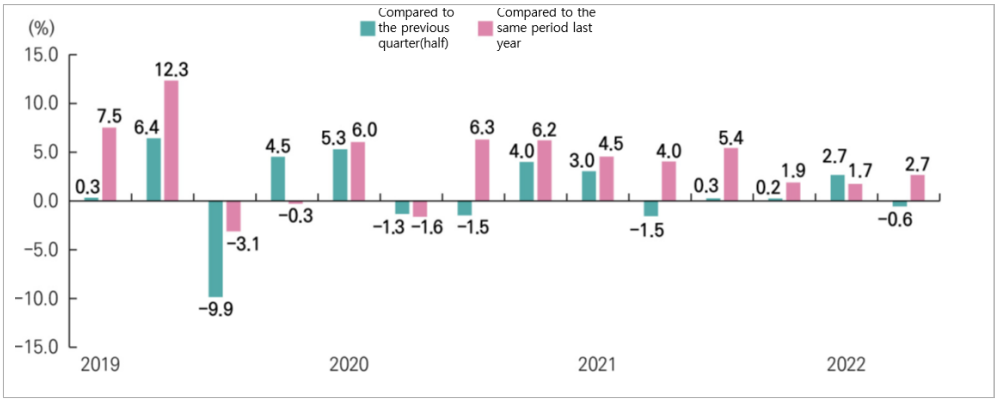
59) Busan Local Culture Encyclopedia

Electricity led the growth in the industry's real value added in the first half of 2022. In the fourth quarter, the industry grew by 2.7% from the previous quarter, but then decreased by 0.6% in the second quarter due to seasonal factors.

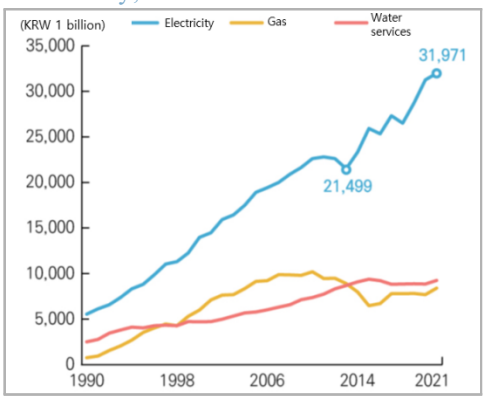
[Figure II-52] Industrial Output of Electricity, Gas and Water Services



Source: Bank of Korea.

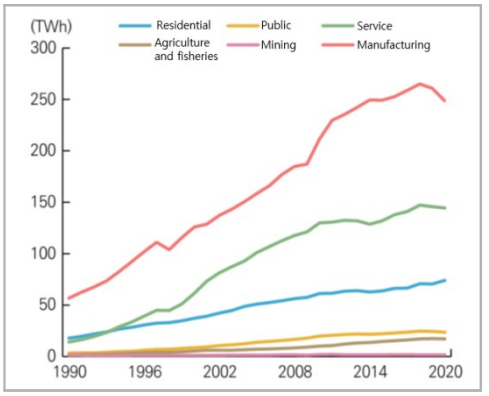
By sub-category, electricity's real value added rose by 8.5% quarter-on-quarter in the first quarter, followed by a 0.5% drop in the second due to seasonal factors. It increased by 6.2% and 8.7% year-on-year in the first and second quarters, respectively. The rise appears to be attributable to a 2.2% increase in electricity sales led by demand from the service and other industries, as private consumption increased by 2.9% in the second quarter after a 0.5% dip in the first following the easing of the social distancing rules on April 18, 2022**.** Electricity sales amounted to 533 TWh in 2021, with manufacturing accounting for 49.2% of the total sales, services and others 27.8%, households 14.5%, public facilities 4.7%, agriculture and fisheries 3.5%, and mining 0.3%. Power sales to the service and other industries rose by 5.2% year-on-year in the first quarter of 2022 and by 6.6% in the second, exceeding the overall sales growth rates, i.e. 4.5% in the first quarter and 3.4% in the second.

[Figure II-53] Real Value Added of Electricity, Gas and Water Services



Note: The figures are based on real value added.
Source: Bank of Korea.

[Figure II-54] Power Sales by Use

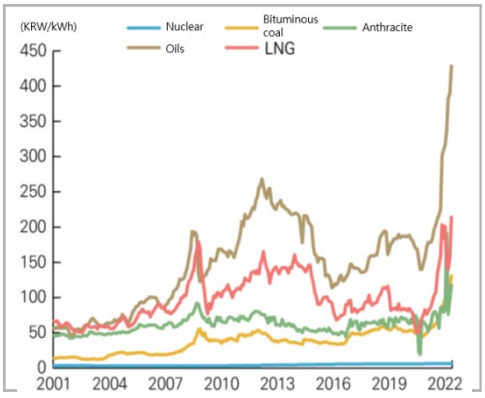


Source: Korea Power Exchange.

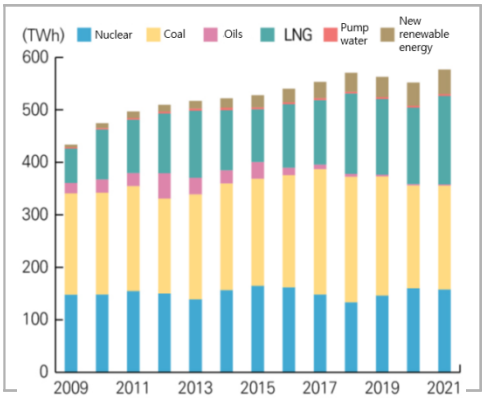
The real value added of gas, steam and air conditioning ("gas") dropped by 3.9% quarter-on-quarter in the first quarter, but then gained 1.4% in the second. The decline in the first quarter was probably due to the seasonally weak demand for heating and falling gas sales, especially for industrial uses, amid the sharp rise in LNG prices due to the Russia-Ukraine war.[60] The real value added of the gas business grew by 3.1% and 0.3% year-on-year in the first and second quarters, respectively. A major factor behind this growth is the steadily growing demand for LNG for the purpose of power generation under the low-carbon policy. As the low-carbon policy is gaining traction, LNG as a share of all energy sources of power generation increased from 22.8% in 2017 to 29.2% in 2021, while the share of coal decreased from 43.1% to 34.3%.

60) Since the introduction of the price sliding system for industrial gases in March 2013, gas prices have been influenced by international gas prices.

[Figure II-55] Unit Fuel Cost of Power Generation [Figure II-56] Amount of Power Generation by Energy Source



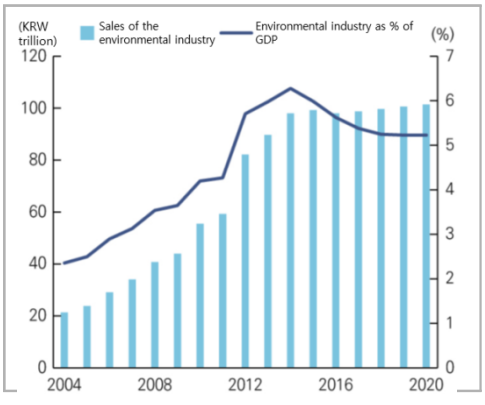
Source: Electric Power Statistics Information System.



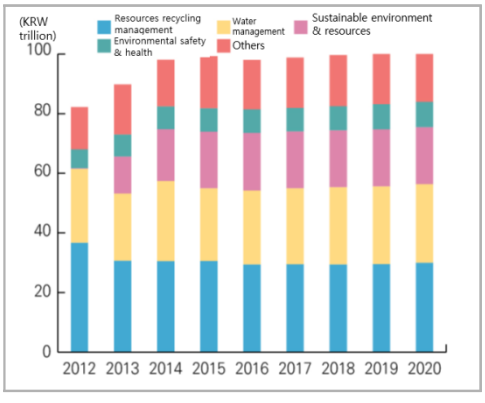
Source: Statistics of Electric Power in Korea.

The real value added of water supply, sewage and waste treatment, and materials recycling ("water supply business") inched up by 1.0% quarter-to-quarter in the first quarter before falling by 1.5% in the second. The water supply business shrank by 0.5% year-on-year in the first quarter and by 3.4% in the second. This contraction is attributed to the far lower amount of rainfall than recorded in previous years, a lower volume of construction waste amid the sluggish results of the construction industry in the first half of the year, and the introduction of a new regulation in 2022 banning the direct admission of waste into the Seoul metropolitan area. Sales of the water supply business started to increase sharply in 2012, accounting for 5.2% of GDP in 2020, compared with 2.4% in 2004. By business division, resource recycling management contributed KRW 30 trillion, or 29.6%, to total sales in 2020, followed by water management (KRW 26 trillion; 26.0%), sustainable environment and resources (KRW 19 trillion; 18.8%), environmental safety and public healthcare (KRW 8 trillion; 8.3%), and others (KRW 17 trillion; 17.2%).

[Figure II-57] Sales of the Water Supply Business [Figure II-58] Sales by Business Division



Source: Ministry of Environment.



Source: Ministry of Environment.

Section 2 Outlook for 2023[61]

- The real value added of electricity, gas and water services is outlook to rise by 2.1% in 2023, up by 0.4%p from the 1.7% recorded in 2022.

(Y-o-Y, %)

2021	2022	2023	2017~2021	2022~2023
4.0	1.7	2.1	3.4	1.9

- Key Factors

Upside Risks	Downside Risks
o Growing demand for electric power and gas as alternative energy sources	o Interest rate hikes in major countries, continued instability of global supply chains, slowing power demand growth in the manufacturing industry due to falling exports amid the global economic slowdown
o Growing demand for cooling in line with the rising average annual temperature	o Slowing power demand growth in the service industry due to rising prices and falling domestic demand
	o Decreasing demand for LNG for power generation due to rising LNG prices amid the Russia-Ukraine war

The real value added of the industry is expected to increase by 1.7% in 2022. Rising consumer prices and interest rate hikes have dampened the revival of consumer confidence [62] that occurred as people became increasingly accustomed to living with COVID-19. As a result, the growth of the service industry that led the rise in power demand is likely to slow in the second half. In addition, exports to China, the U.S. and Europe are outlook to fall by 4.6%, losing 5.3%p from the previous year due to the unstable energy supply, disrupted production in the EU and falling imports, weakening consumer sentiment caused by interest rate increases in major countries, and China's lockdowns.[63] Consequently, the demand for power from the manufacturing and service industries is expected to grow more slowly in the second half than in the first.

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61) The outlook is intended to help establish and adjust the policy direction by providing data on changing supply of and demand for electricity, gas and water, as well as data on key determining factors such as economic growth, energy prices, temperature changes, and the low-carbon policy.

62) Private consumption took an upturn, growing by 2.9% in the second quarter of 2022 after falling by 0.5% in the first quarter quarter-on-quarter.

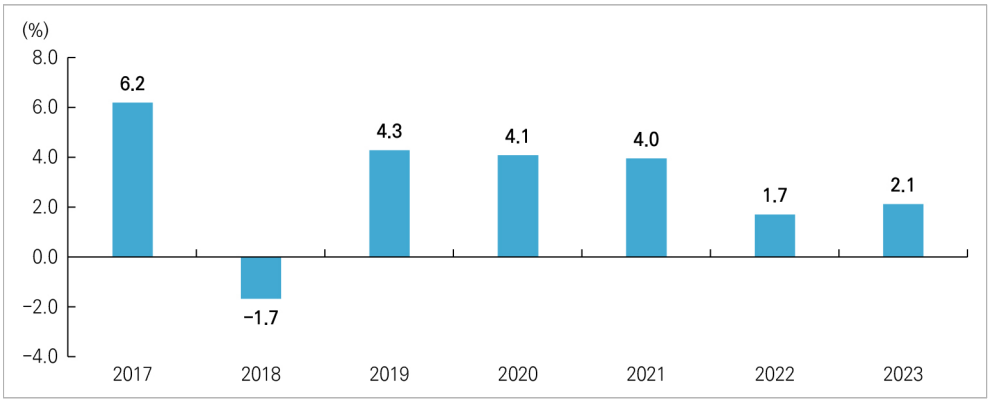
63) National Assembly Budget Office, The Outlook for the Korean Economy in 2023 and the Medium Term, September 2022.

[Table II-16] Outlook for the Real Value Added of Electricity, Gas and Water Services

(Unit: Y-o-Y, %)

2021	2022			2023[f]
	H1	H2[f]	Annual[f]	
4.0	2.2	1.2	1.7	2.1

[Figure II-59] Outlook for the Real Value Added of Electricity, Gas and Water Services



Source: Bank of Korea.

The industry is outlook to see its real value added grow by 2.1% in 2003, led by the electricity business. The reasons for the rise include the base effect, continued increases in demand for heating and cooling, growing demand for power from the spread of EVs, and the constantly rising demand for LNG due to the implementation of the low-carbon policy.

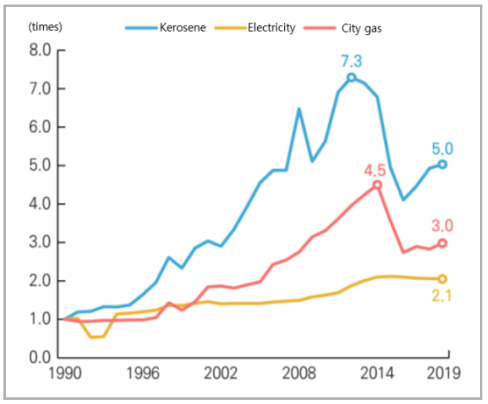
The following are the upside and downside risks that could affect the outlook for the industry in 2023.

(Upside Risks) The upside risks include growing demand for alternative sources of power to oil and coal, and increasing demand for power for cooling and heating amid the rising average annual temperatures.

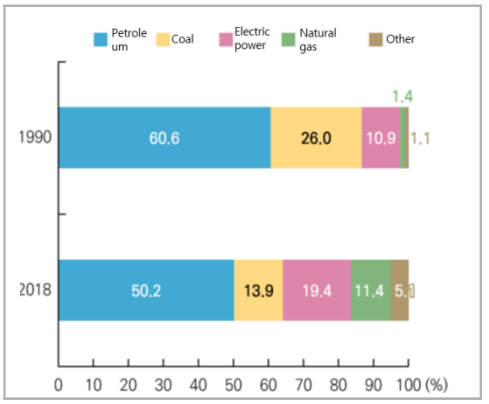
The demand for electricity as an alternative energy source has been rising constantly, which appears to be attributable to low electricity prices coupled with the price volatility of other energy sources. In 2019, consumer prices of kerosene and natural gas increased five-fold and three-fold, respectively, from the levels recorded in 1990, while electricity prices increased by just 2.1 times. Kerosene and natural gas prices have fluctuated widely, rising by 7.3 times by 2012 compared with 1990, while natural gas prices rose by 4.5 times. As a proportion of energy sources based on energy consumption, petroleum's share declined from 60.6% in 1990 to 50.2% in 2018, and coal's dropped from 16.0% to 13.9%, whereas the share of electricity rose from 10.9% to 19.4%.

The consumption of electricity and natural gas has risen consistently on the back of the increasing use of electronic devices and gas. As a result, electricity (43.9%) and natural gas (31.4%) accounted for about 75% of all the building energy consumption in 2018. Based on the consumption of final energy, industrial use represents 61.4%, buildings 20.2% and transportation 18.4%.

[Figure II-60] Consumer Prices of Energy Sources [Figure II-61] Consumption of Final Energy



Note: The figures for gas are based on industrial use.
Source: Korea Energy Agency.



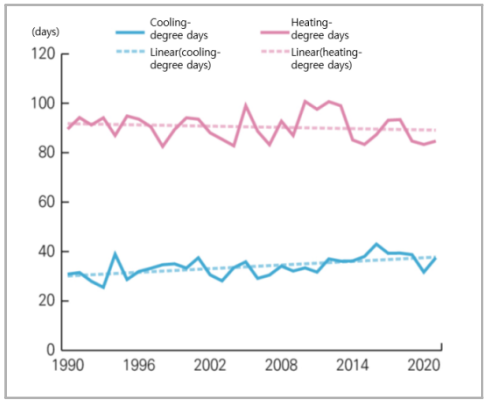
Source: Korea Energy Agency.

Rising average annual temperatures due to climate change have resulted in growing demand for power for cooling purposes. The number of heating-degree days[64] rose from 90.7 in the 1990s to 89.4 in the 2000s, and to 91.1 in the 2010s, displaying relatively small fluctuations over time. Meanwhile, the number of cooling-degree days[65] increased from 31.8 in the 1990s to 32.5 in the 2000s, and to 36.8 in the 2010s. Notably, in the years 2016 and 2018, heat waves struck the country, causing building energy consumption to jump sharply.

64) The number of heating-degree days is the cumulative figure obtained by adding up the differences between the daily average temperature and the benchmark temperature (18°C). If the number is high, it means that the weather is cold and the heating cost is higher. (Source: weather data available on the open website of the Meteorological Administration)

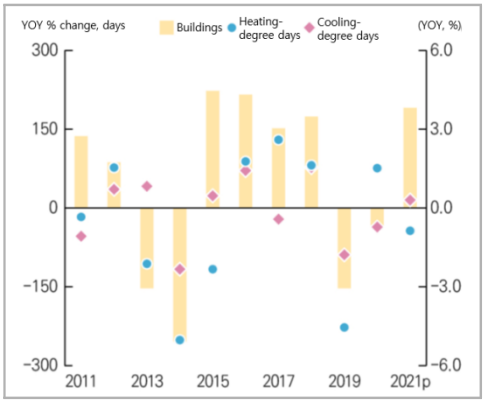
65) The number of cooling-degree days is the cumulative figure obtained by adding up the differences between the daily average temperature and the benchmark temperature (24°C). A high number indicates that the weather is hot and thus that more electricity is consumed for cooling purposes. (Source: weather data available on the open website of the Meteorological Administration)

[Figure Ⅱ-62] Number of Cooling- and Heating-Degree Days



Note: The figures are based on Seoul.
Source: Meteorological Administration.

[Figure Ⅱ-63] Number of Cooling- and Heating-Degree Days and Energy Consumption



Source: Korea Institute of Energy Research.

(Downside Risks) The downside risks include the delayed recovery of supply chains, slowing production and exports of the domestic manufacturing industry amid the global economic slowdown, the declining growth rate of the service industry due to sluggish domestic demand, and steadily rising LNG prices in the midst of the ongoing Russia-Ukraine war.

The slowing growth rates of the manufacturing and service industries is likely to have a negative impact on the growth of the industry's real value added. According to a recent IMF projection (July 2022), the global economic growth rate is outlook to decrease from 3.2% in 2022 to 2.9% in 2023. These figures are down by 0.4%p and 0.7%p, respectively, from the outlook made at the beginning of the year. In particular, the economic growth rates of the U.S. and the Eurozone are expected to fall by more than 1.%p in 2023 amid persistently high prices, monetary tightening, and the prolonged Russia-Ukraine war.

Against this backdrop, Korea's exports are expected to decrease to 4.1% in 2022, down from 4.6%, while manufacturing exports are expected to fall to 2.3%, also down from 2.7%. The private consumption that led economic growth in 2022 is outlook to fall from 2.4% in 2022 to 2.2% in 2023, as household spending power weakens amid rising prices and interest rates. As a result, the real value added of the service industry is also likely to drop from 3.3% in 2022 to 2.3% in 2023.

LNG prices, having skyrocketed due to the prolonged war between Russia and Ukraine, are now stabilizing at a slow pace. As for the price of LNG, it jumped from USD 5.88 per MMbtu in September 2020 to USD 17 in February 2022 after the outbreak of the Russia-Ukraine war. Recently, however, the price has come down to around USD 16, but the delay in the stabilization of LNG prices is still weighing heavily on the implementation of the low-carbon policy because the LNG unit price serves as the benchmark for the unit price of electric power overall.[66] LNG-fueled generation is expected to decrease, while base power generation by nuclear power and coal will likely increase.[67]

This outlook is based on the empirical relationship between the growth rates of the manufacturing and service industries, gas prices and temperatures. The electricity business made up 65.8% of the industry's output in 2021. The manufacturing industry accounted for around 50% of electricity sales, and the service industry for around 25%. In the model, the real value added of exports of goods and services was used in lieu of that of the manufacturing industry due to the autocorrelation to make the outlook.

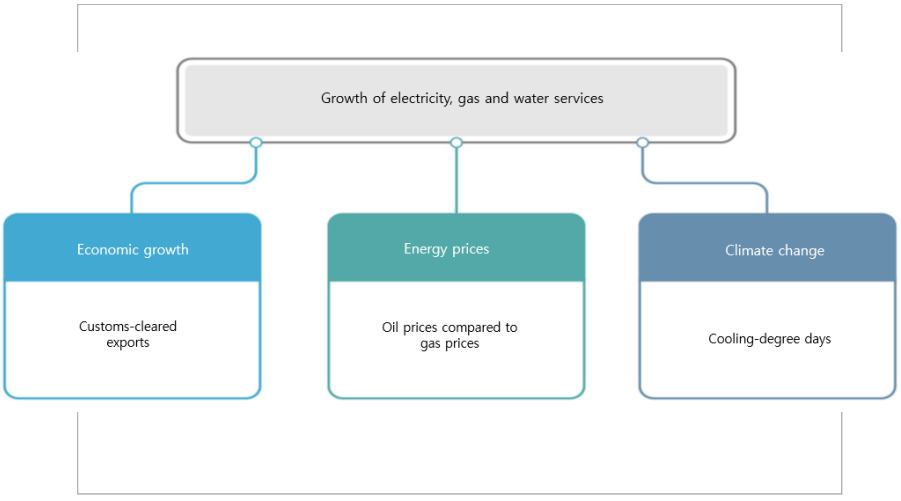
Gas prices were also used as another explanatory variable. If the price of one energy source changes, it may be substituted with another. For example, electricity and gas are the main energy sources used for heating and cooling of buildings. If the price of gas goes up, it is highly likely that more electricity will be used as the latter's price becomes relatively lower than that of the former. Also, changing temperatures can affect heating and cooling demand. The model shows that if the number of cooling-degree days rises, the demand for gas falls. However, the number of heating-degree days and the average annual temperature were not statistically significant. Although it was not included in the model, if the focus of the energy efficiency policy is shifted from energy supply to energy demand, it is expected to lower the real value added of the industry.

The following assumptions were made for the outlook. Since gas prices tend to track oil prices, the same assumption was made for the outlook. The number of cooling-degree days was projected to increase gradually from the low of 31.2 recorded in Seoul in 2022.

66) The unit price of electricity is determined by the system marginal price method, and is determined by the LNG generation unit price at most time slots. In 2021, nuclear power had the highest unit price of fuel generation cost at 6 won/kWh, followed by bituminous coal at 56 won/kWh, anthracite at 66 won/kWh, LNG at 96 won/kWh), and oils at 181 won/kWh).

67) Byeong-wook Gang, et. al., "The Outlook for Mid-Term Energy Demand (2021~2026)", Korea Institute of Energy Research, August 2022, p.78.

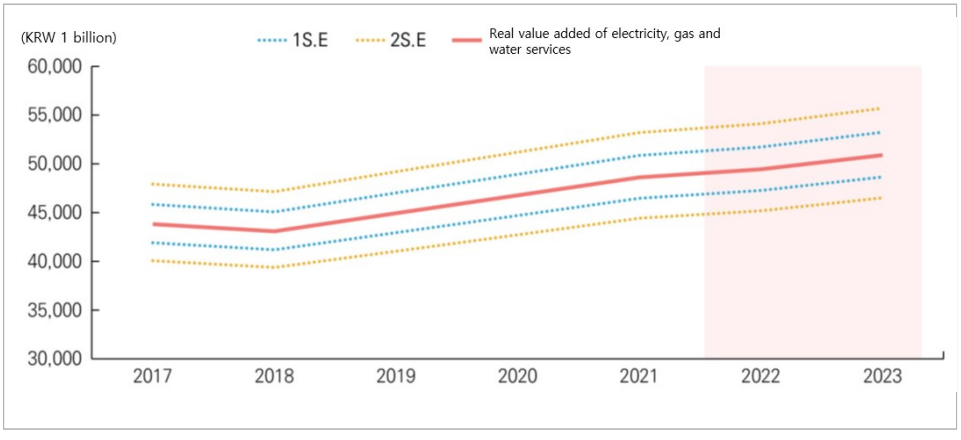
[Picture II-64] Relationship between Electricity, Gas and Water Services and the Key Determining Factors



Source: National Assembly Budget Office.

The figure below shows the outlook and confidence intervals of the outlook model.

[Figure II-65] Outlook of Real Value Added of Electricity, Gas and Water Services



Note: The shaded area represents the outlook.
Source: National Assembly Budget Office.

References

Nae-myeong Gang & Ji-won Yang, “Impact of China’s Lockdown on Korean Economy under Different Scenarios,”「Trade Brief」, I International Trade and Commerce Research Institute of Korea International Trade Association, June 8, 2022.

Byeong-wook Gang, et. al.,「Mid-Term Energy Demand Outlook(2021~2026)」, Korea Institute of Energy Research, August 2022.

National Assembly Budget Office,「A Review of Economic Status of Major Countries in 2021: Potential Risks Associated with COVID-19 and Liquidity Expansion」, December 30, 2021.

_ _ _ _ _ _ _ ,「2023 and Mid-Term Economic Outlook」, September 2022..

_ _ _ _ _ _ _ ,「Structural Changes of the Korean Economy and Responses III: Strategies to Cope with Structural Changes for Sustainable Growth」,August 7, 2020.

Financial Supervisory Service,「H1 2022 Results of Korean Banks」, August 19, 2022.

Seong-hoon Kim,「Trend of Regulation on Major Chemical Substances in Korea and the Impact by Industry: the Case of Semiconductor and Display Industry」, a report commissioned by National Assembly Budget Office, 2022

Jong-ki Kim, et. al.,「New Growth Strategies of the ICT Industry amid Accelerating Digital Transformation」, Korea Institute of Industrial Economics and Trade, December 2021. Ji-yeon Kim, etc., “Factors that Determine Prices of International Crops and the Outlook,” 「KREI Issue Analysis」 Vol. 89, Korea Rural Economic Institute, July 2022.

Hyeon-seok Kim, “ Hyeon-Seok Kim, “Impact of Rate Increases on Major Manufacturing Sectors and Implications,” 「i-KIET Industrial and Economic Issues」 Vol. 131, Korea Institute for Industrial Economics and Trade, April 2022

KOTRA,「Fine Chemistry」, 2015.

Won-bin Doh & Nae-yeong Gang, “Factors that Determine Prices of International Raw Materials and Won-Dollar Exchange Rates, and their Impact on Korean Economy,” 「Trade Focus」 Vol.17, KITA International Trade and Commerce Research Institute, 2022.

Gyeong-hoon Park, et.al., “Impact of Rate Hikes on Domestic Demand by Industry,” 「BOK Issue Note」 No. 2022-27, BOK, July 2022

Sang-woo Park, et. al.「Factors Limiting the Recovery of Construction Investment: Causes and Impact of the Steep Rise in Prices of Building Materials」, BOK, March 29, 2022

Sang-woo Park & Na-yoon Hwang,「A Review of the Recent Construction Business and Implications: with Focus on Supply-Disrupting Factors」, BOK, June 13, 2022.

Ji-won Min & Jin-ha Lee, “Impact of US Trade Sanctions against China and Implications: with Focus on Changes in Value Added of Exports,”
「Issues & Tasks」 Vol. 22-07, Hyundai Research Institute, 2022.

Geul Bang, 「Characteristics and Outlook of the Labor Market of the Business Support Services Industry」, Korea Employment Information Service, 2021. The Ministry of Trade, Industry and Energy,「Auto Industry Trend, July 2022」, August 15, 2022

Ji-yeong Seong,「A Review of Impact of Sharply Rising Prices of Raw Materials on the Construction Industry」, Woori Financial Research Institute, June 30, 2022.

Geun-woo Lee,「Characteristics of Korean Industry Shown in the Structural Change Index and Implications」, Korea Institute of Industrial Economics and Trade, June 24, 2021

Dong-yi Lee,「An Overview and Tasks of Korean Steel Industry」, KDB Future Strategy Research Institute, August 2020.

Si-wook Lee & Yong-seok Choi, 「Mid to Long-Term Trade Policy in Response to the Shift toward a Service-Oriented Economy」, Long-Term Trade Policy Research 20-02, Korea Institute for International Economic Policy, December 30, 2020.

Chi-hoon Lee & Ki-bong Kim, "Chinese Economic Outlook and a Review of Risk Factors",「Issue Analysis」, International Finance Center, August 29, 2022.

Hwang-soo Jeon, et. al., "The Supply Ecosystem for Automotive Semiconductors,"「Electronics and Telecommunications Trend」Vol. 36, No. 3, June 2021.

Relevant government ministries,「The Service Industry's Responses to COVID-19 and Growth Strategies」, March 3, 2021.

Won Joo, "Changes in the Economic and Industrial Structure during the Two-Year Period of COVID-19 and Implications",「Issues and Tasks」22-01, Hyundai Research Institute, January 17, 2022

Korea SMEs and Startups Agency,「KOSME Industry Analysis Report – Automobiles –」, May 2019.

Jeong-hwan, "An Overview of IPEF and the Role of Korea," 「i-KIET Industrial and Economic Issues」Vol. 140, Korea Institute for Industrial Economics and Trade, June, 17, 2022.

Construction and Economy Research Institute of Korea,「Construction Trend Briefing」Vol. 872, September 5, 2022.

Export-Import Bank of Korea,「Overseas Construction Industry Trend, H1 2022」, May 27, 2022.

Bank of Korea Gyeonggi Headquarters, 「Characteristics of ICT Industry Growth and the Impact on Gyeonggi-do's Local Economy, January 2022

The Bank of Korea, "A Review of Recent Trends in Global Energy Market," 「International Economic Review」, BOK, November 19, 2021.

_ _ _ _, "A Review of the Recent Construction Business and Implications,"「BOK 이슈노트」Vol. 2022-20, 2022.

_ _ _ _,「The System of Korea's National Accounts」, 2020.

Korea Automobile Manufacturers Association,「An Analysis of Newly Registered Automobiles in the First Half of 2022」, August 2022.

Nan-yi Huh, Su-ryung Park & Hee-eun Mun, "A Summary of IRA and Implications for Korean Corporations", Lee & Ko(law firm), September 5, 2022.

Ji-sang Hong, et al., "A Review of Exports & Import in H1 2022 and H2 Outlook," 「Trade Focus」 Vol. 13, International Trade & Commerce Research Institute of Korea International Trade Institute, June 2022.

Gyeong-in Hwang, "Globally Competitive Korean Manufacturing Industry, the Driving Force behind the Recovery of the Pandemic-Struck Economy,"「i-KIET Industry & Economic Issues」, No. 108, KIET, May 6, 2021.

Press release of the Ministry of Land, Infrastructure and Transportation, "Inter-city traffic in major cities declines 12.1% due to COVID-19," March 21, 2022.

Press release by the Ministry of Trade, Industry and Energy, "Export Results for June & H1 2022," July 1, 2022.

Press release by the Ministry of Maritime Affairs and Fisheries, "Ports in Korea handle 379.8 million

tons of cargoes in Q2 2022," July 21, 2022.

Traffic Monitoring System(TMS)

Busan Local Culture Encyclopedia

Korea Institute of Industrial Economics and Trade, Nuri

Book of Industrial Statistics

NSO Nuri Book,「Statistical Glossary and Annotations」

NSO, A Survey of Economically Active Population

, Business Demography Statistics

, A Survey of the Service Industry Trend Korea

International Trade Association, Trade Statistics System

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- Production -

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