Chapter 1

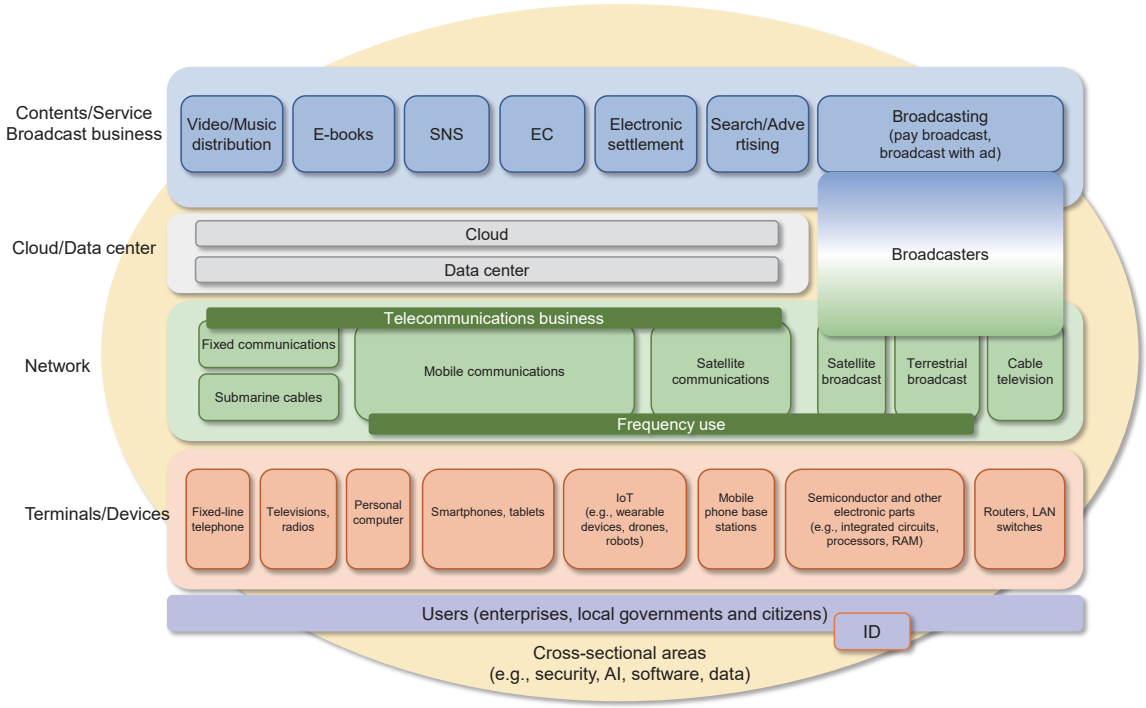
Trends in the ICT Market

Section 1 Trends in the ICT Industry

1. Size of the ICT Market

ICT includes devices and terminals that serve as user interfaces, networks provided by telecommunications and broadcasting companies, cloud and data centers, content services such as video and music streaming, and security and AI (**Figure 2-1-1-1**).

Figure 2-1-1-1 Structure of the ICT market by layer

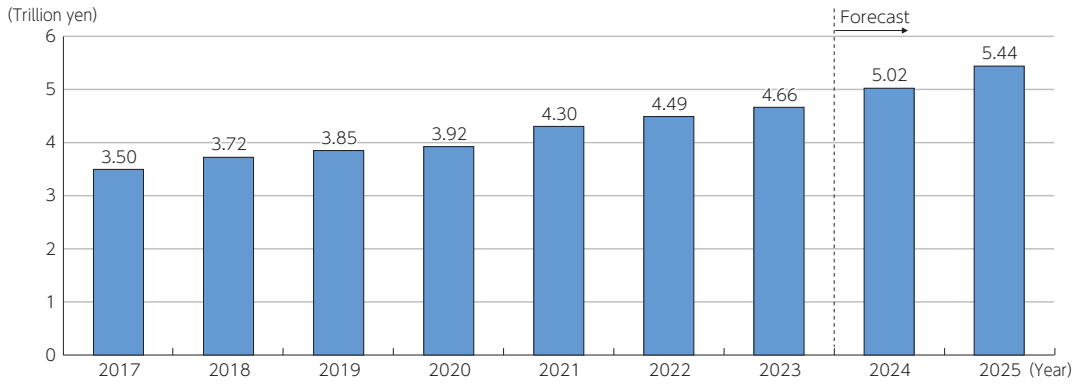


(Source) Prepared by MIC

The global ICT market (expenditure)[1] has been on an upward trend in recent years. It is expected to reach 5.02 trillion dollars in 2024 (a 7.7% increase from the previous year), and 5.44 trillion dollars in 2025 (an 8.3% increase from the previous year) **(Figure 2-1-1-2)**.

[1] It includes IT services, communications services, software, infrastructures, devices, peripheral equipment, and cybersecurity, etc.

Figure 2-1-1-2 Changes and forecasts of the size of the global ICT market (expenditure)

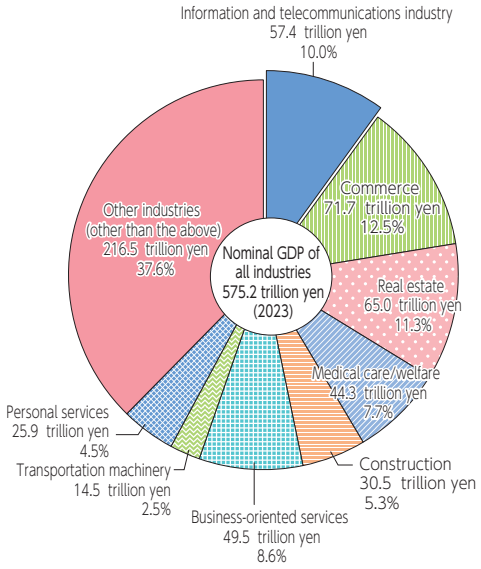


(Source) Prepared based on data from Canalys[2]

2. Gross Domestic Product (GDP) of the ICT industry[3]

The nominal GDP of the information and communications industry in 2023 was 57.4 trillion yen, a 3.5% increase compared to the previous year (55.5 trillion yen) (**Figure 2-1-1-3**, **Figure 2-1-1-4**). When examining the nominal GDP trends by sector within the information and communications industry, most sectors have remained relatively stable, while the information services and Internet-related services sectors have shown an increasing trend (**Figure 2-1-1-5**).

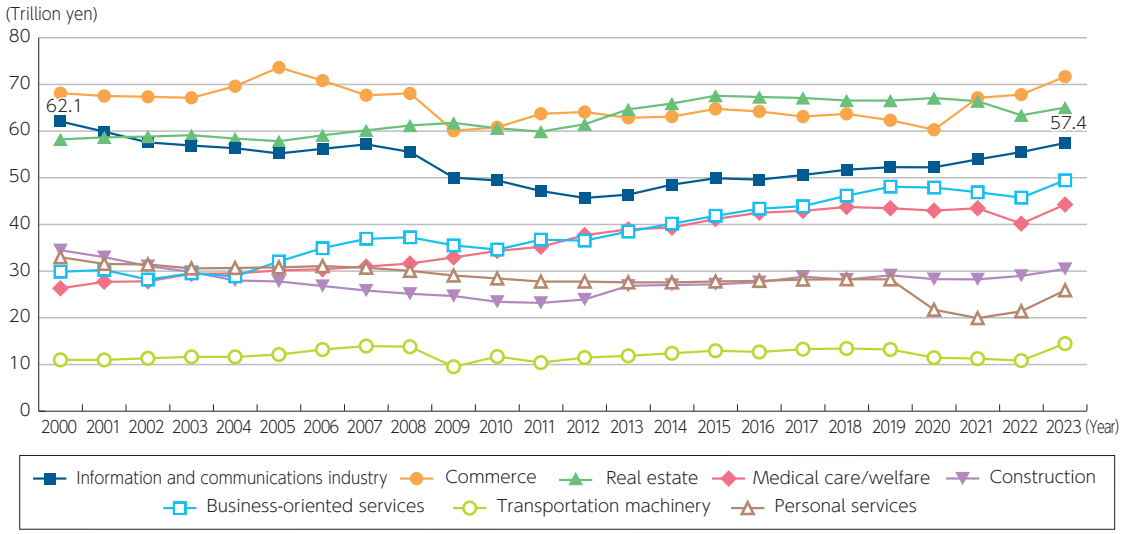
Figure 2-1-1-3 GDP of major industries (nominal)



(Source) MIC(2025) "Survey on Economic Analysis of ICT in FY2024"

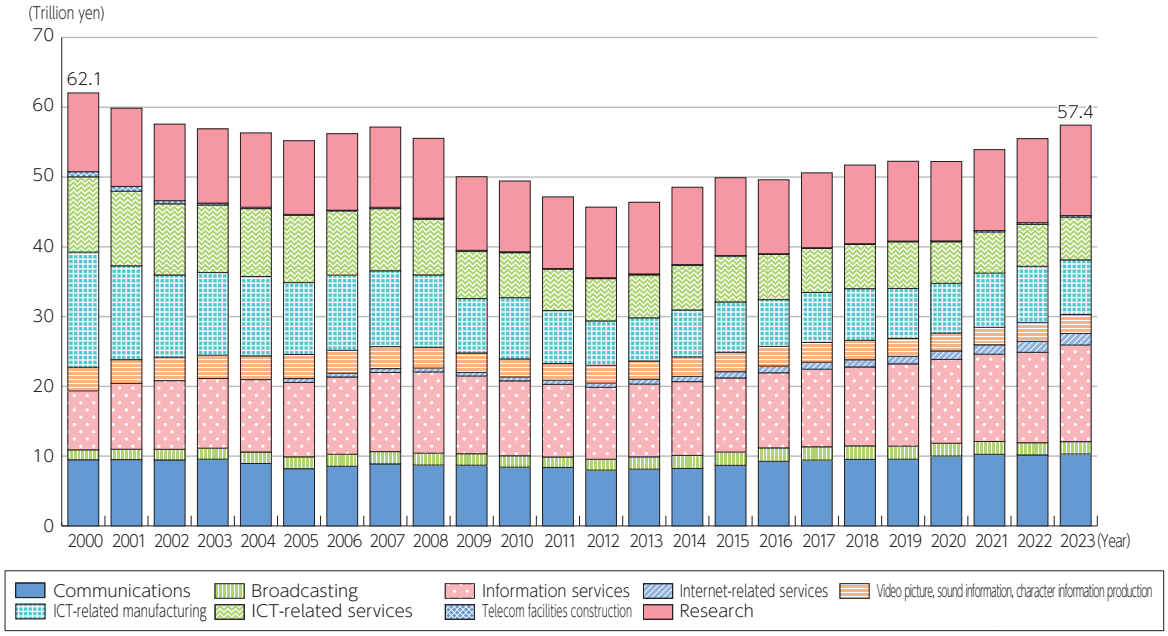
[2] https://www.canalys.com/insights/it-spending-forecasts-2025
[3] The ICT industry consists of nine sectors: telecommunications, broadcasting, information services, services incidental to the Internet, video/sound/text information production, manufacturing related to information and communications, services related to information and communications, construction related to information and communications, and research.

Figure 2-1-1-4 Changes in nominal GDP of major industries



(Source) MIC(2025) "Survey on Economic Analysis of ICT in FY2024"

Figure 2-1-1-5 Changes in nominal GDP of the ICT industry



(Source) MIC(2025) "Survey on Economic Analysis of ICT in FY2024"

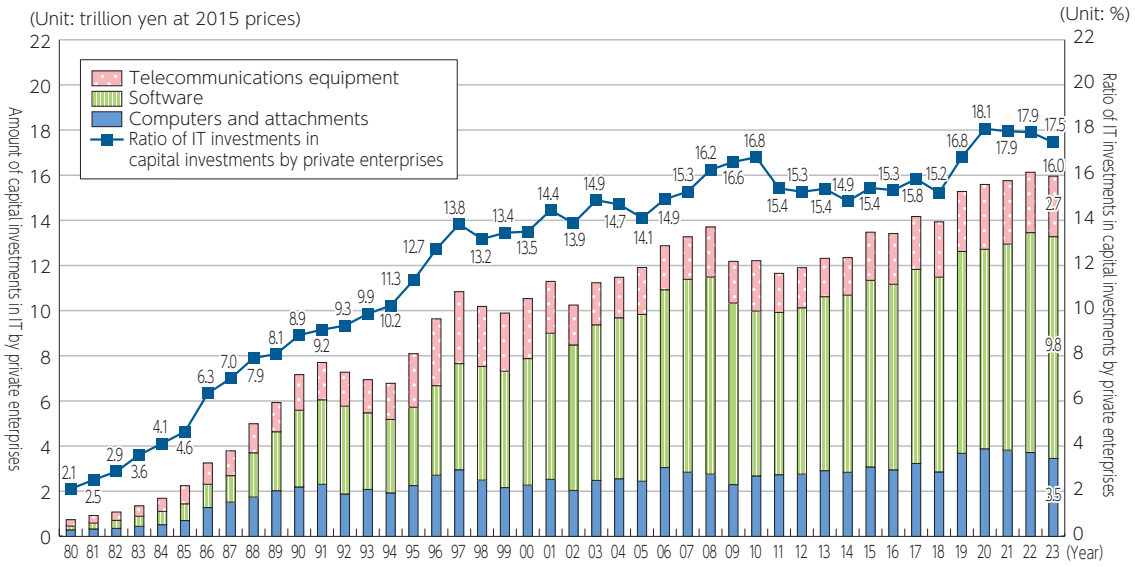
3. ICT investment[4]

In 2023, private sector ICT investment in Japan amounted to 16.0 trillion yen (2015 year prices), a 1.1% decrease from the previous year. Software (custom development and packaged software) accounted for 9.8 trillion yen, nearly 60% of the total. The ratio of information investment to total private sector capital investment was 17.5% (a 0.4 percentage point decrease from the previous year) in 2023, indicating that ICT investment holds a significant position within capital investment (**Figure 2-1-1-6**).

Comparing the trends in ICT investment between Japan and the U.S., ICT investment in the U.S. showed a steady increase despite temporary setbacks, while Japan's ICT investment continues to show a gradual increase or flat trend (**Figure 2-1-1-7**).

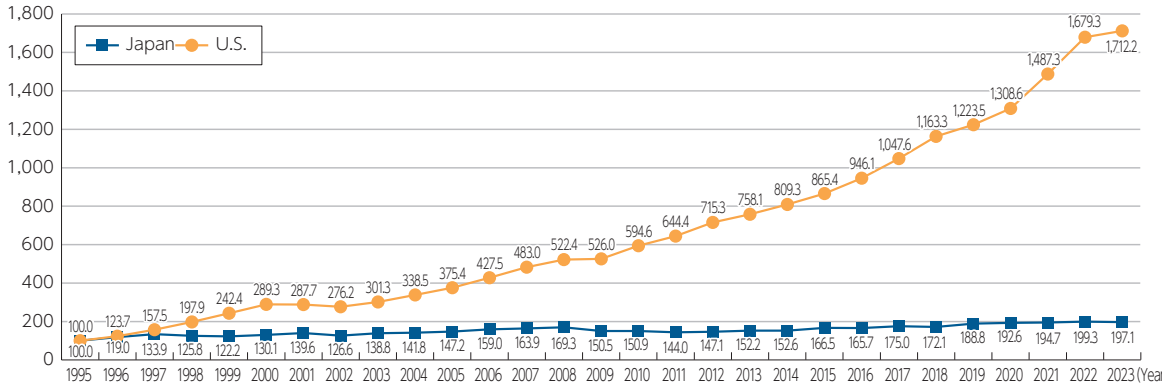
[4] Here the term refers to investment in information and communications capital goods (computers and peripheral equipment, telecommunications equipment, software). The use of cloud services that have spread drastically in recent years is the purchasing of a service rather than the purchasing of capital goods and therefore is not included in IT investment here.

Figure 2-1-1-6 Changes in ICT investment in Japan



(Source) MIC(2025) "Survey on Economic Analysis of ICT in FY2024"

Figure 2-1-1-7 Comparison of ICT investment in the private sector in Japan and the U.S.



* Indexing year 1995=100 (Japan: price in 2015, the U.S.: price in 2012)

(Source) MIC(2025) "Survey on Economic Analysis of ICT in FY2024"

4. Exports and imports in the ICT field

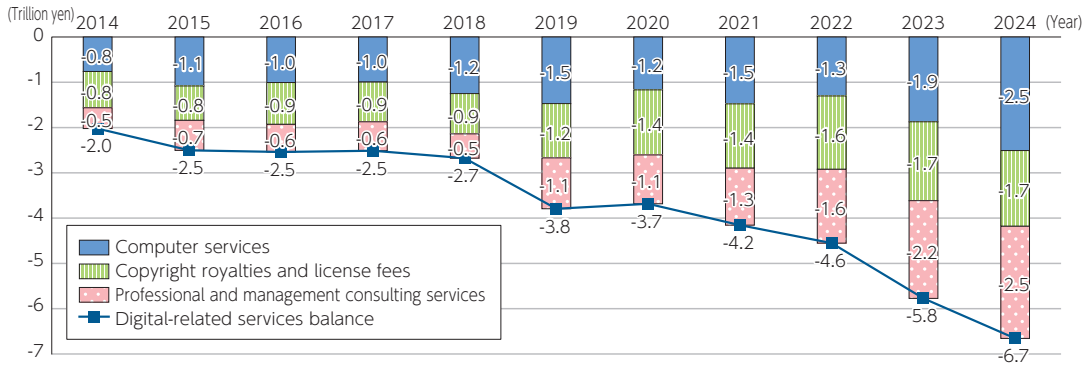
Regarding the services balance in the balance of payments statistics, the Bank of Japan Review "Globalization of Services Trade as Seen in Balance of Payments Statistics[5]" classifies digital-related items as follows: (1) computer services, (2) copyright royalties and license fees, (3) professional and management consulting services, in addition, (4) communications services, and (5) information services. In recent years, the total deficit amount for items (1) through (3) in particular, has increased rapidly, gaining attention as the so-called "digital deficit." It should be noted that this includes balance of payments related to services other than the digital field.

For example, the total balance of (1) computer services, (2) copyright royalties and license fees, and (3) professional and management consulting services was in deficit in 2024, with a deficit of approximately 6.7 trillion yen (an increase of approximately 0.9 trillion yen from the previous year) (if (4) communications services and (5) information services are added to this, the deficit would have been approximately 6.8 trillion yen (an increase of approximately 0.9 trillion yen from the previous year)) **(Figure 2-1-1-9)**.

Regarding "Communications, computer, and information services," which are largely composed of computer services such as fees for cloud services and online meeting systems, the balance of payments by country and region shows that in 2024, the largest deficits were with the U.S, Singapore, the Netherlands, China, and Sweden, in the respective order. In terms of the payment amounts, the amounts were the largest for the U.S., Singapore, and the Netherlands in 2024, in the respective order.

[5] https://www.boj.or.jp/research/wps_rev/rev_2023/data/rev23j09.pdf

Figure 2-1-1-9 Changes in the digital-related services balance



* Here the figures indicate the total balance of payments of computer services, copyright royalties and license fees, and professional and management consulting services

(Source) Prepared based on "Balance of Payments Statistics" by the Ministry of Finance

Figure (related data) Changes in the digital-related services balance (computer services, copyright royalties and license fees, professional and management consulting services, communications services, information services)
Source: Prepared based on the Ministry of Finance's "Balance of Payments Statistics"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00094
(Data collection)

Figure (related data) Changes in amounts received and paid for the digital-related services (computer services, copyright royalties and license fees, professional and management consulting services, communications services, information services)
Source: Prepared based on the Ministry of Finance's "Balance of Payments Statistics"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00095
(Data collection)

Figure (related data) Changes in communications, computer and information services balance (by recipient, payment destination country and region)
Source: Prepared based on the Ministry of Finance's "Balance of Payments Statistics"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00096
(Data collection)

Based on trade statistics from the Ministry of Finance[6], the difference between the amount of ICT goods[7] exported from Japan and the amount of ICT goods imported into Japan shows that the deficit has been increasing in recent years, reaching a deficit of 3,416.8 billion yen in 2024. It should be noted that these statistics only show the amount of exports from Japan to overseas and the amount of imports from overseas to Japan, and do not reflect exports from overseas production bases of Japanese companies to countries other than Japan, and that when products produced at overseas bases of Japanese companies are import into Japan, it is counted as an "import."

Looking at each item, "other electronic components" had the largest surplus in 2024, and the surplus in "integrated circuits" was also large. On the other hand, the largest deficit was in "mobile phones," and the deficit has been increasing in recent years. The second largest deficit was in "personal computers," followed by "computer units (excluding personal computers)," and "wired telecommunications equipment." Parts and components, etc. tend to generate larger surpluses, while final products tend to have larger deficits.

Looking at the top countries and regions that account for large shares of Japan's imports and exports of major ICT goods with large trade amounts, China was the largest source of imports of mobile phones and personal computers in 2024. As for exports, Taiwan was the largest destination for integrated circuits, China for other parts, and the U.S. for computer peripheral equipment.

[6] The import value in trade statistics is based on CIF (Cost, Insurance and Freight, which includes the price of the cargo as well as insurance and freight costs to the destination), and the export value is based on FOB (Free on Board, which is the shipping price in the exporting country. It does not include after-shipment insurance and freight costs to the destination). Here, the difference between the export value and the import value is calculated mechanically.

[7] The following goods are included in the scope of ICT goods in the Ministry of Internal Affairs and Communications "Information and Communications Industry Input-Output Table. " Personal computers, computer units (excluding personal computers), computer peripheral equipment, wired telecommunications equipment, mobile phones, wireless telecommunications equipment (excluding mobile phones), telecommunication cables and optical fiber cables, office machines, semiconductor devices, integrated circuits, liquid crystal panels, flat panels and electron tubes, and other electronic components.

Figure (related data) Changes in the value of Japan's imports and exports of ICT goods based on the Ministry of Finance's trade statistics
Source: Prepared based on the Ministry of Finance's "Trade Statistics"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00098
(Data collection)

Figure (related data) Countries and regions where major ICT goods are imported from or exported to (top 3 countries)
Source: Prepared based on the Ministry of Finance's "Trade Statistics"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00099
(Data collection)

5. Trend of R&D in the ICT field

(1) Situation of research and development expenditure

A Trends in research and development expenditure in major countries and regions

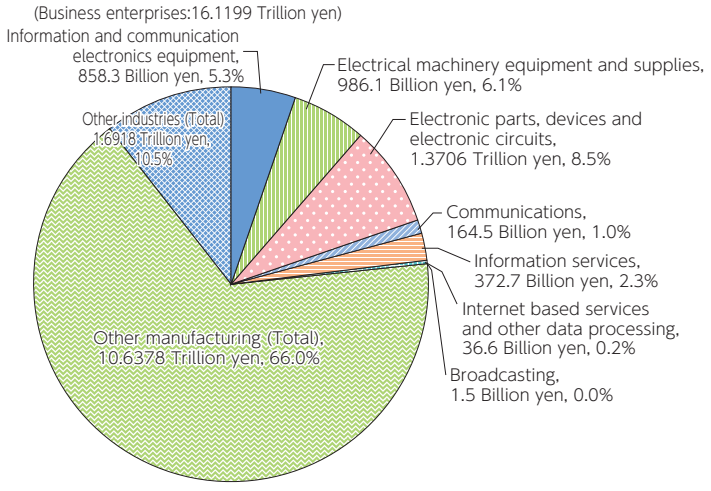
In 2021, the U.S. maintained the top position in research and development expenditure at 806 billion dollars. Following the U.S. were China, the EU, and Japan, with Japan's research and development expenditure showing a flat trend, and the gap with the top countries widening.

Figure (related data) Trend of total expenditure on research and development in major countries and regions
Source: Japan Science and Technology Agency, Research and Development Strategy Center "Overview of Research and Development Report (2024)"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00102
(Data collection)

B Situation of research and development expenditure in our country

In FY2023, the total amount of research and development expenditure in Japan (the sum of research expenditure by business enterprises, non-profit institutions and public organizations, universities and colleges) (hereinafter in this section referred to as the "R&D expenditures") was 22.497 trillion yen, with the R&D expenditures of business enterprises amounting to 16.1199 trillion yen. Among the R&D expenditures of business enterprises, the R&D expenditures in the information and communications industry[8] were 3.7902 trillion yen (23.5%) **(Figure 2-1-1-11)**, and it has shown a trend of stagnation in recent years **(Figure 2-1-1-12)**.

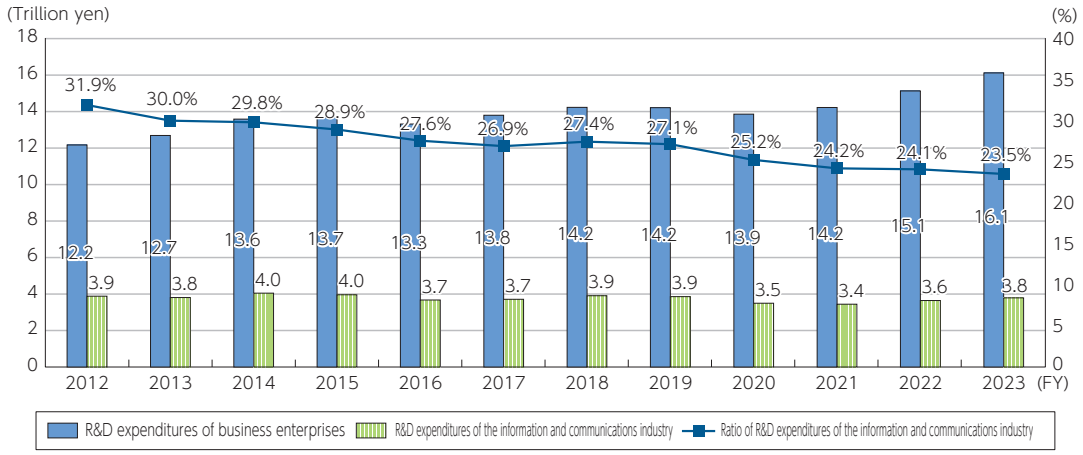
Figure 2-1-1-11 Percentage of R&D expenditures of business enterprises (FY2023)



(Source) Prepared based on MIC "2024 Survey of Research and Development"[9]

[8] Here, the term refers to information and communication electronics equipment, electrical machinery equipment and supplies, electronic parts, devices and electronic circuits, information and communications (information services, communications, broadcasting, and Internet based services and other data processing
[9] https://www.stat.go.jp/data/kagaku/index.html

Figure 2-1-1-12 Trend of R&D expenditures of business enterprises



(Source) Prepared based on MIC "Survey of Research and Development"[10] for each FY

(2) Situation of persons employed in research and development

A Trends in the number of researchers in major countries and regions

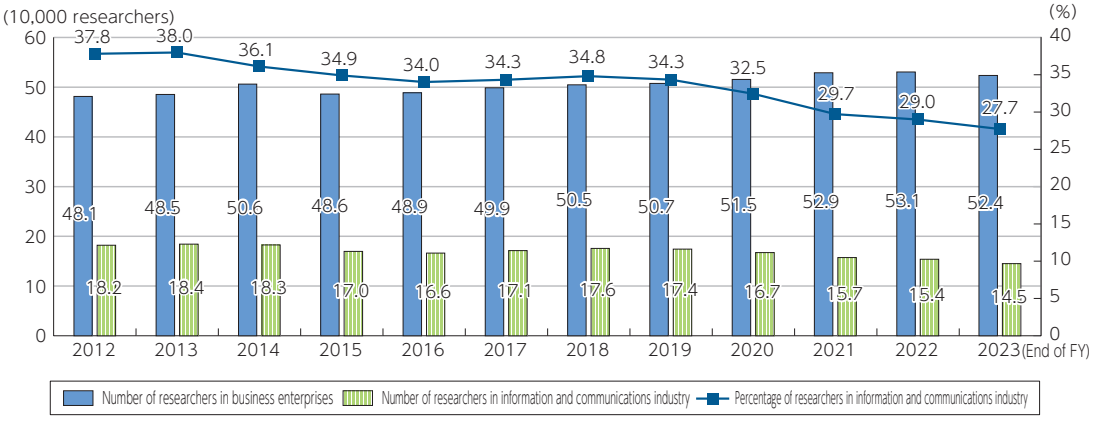
The number of researchers in major countries[11] is increasing. In 2023, the number of researchers in Japan was 0.706 million, ranking third in size after China (2.406 million in 2021) and the U.S. (1.639 million in 2021). Looking at the latest values for other countries in descending order: the Republic of Korea (0.489 million in 2022), Germany (0.485 million in 2022), France (0.346 million in 2022), and the UK (0.296 million in 2017).

Figure (related data) Changes in the number of researchers in major countries and regions
Source: National Institute of Science and Technology Policy in the MEXT "Science and Technology Indicators 2024"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00113
(Data collection)

B Number of researchers in our country

At the end of FY2023, the number of researchers in Japan (the total number of researchers in business enterprises, non-profit institutions and public organizations, universities and colleges) was 907,363 with the number of researchers in business enterprises being 523,548. Among the researchers in business enterprises, the number of researchers in the information and communications industry was 145,122 (27.7%), showing a decreasing trend in recent years **(Figure 2-1-1-13)**.

Figure 2-1-1-13 Trend in the number of researchers in business enterprises



(Source) Prepared based on MIC "Survey of Research and Development" for each FY[12]

[10] https://www.stat.go.jp/data/kagaku/index.html
[11] Measured by converting research work into fulltime employment.
[12] https://www.stat.go.jp/data/kagaku/index.html

Figure (related data) Percentage of the number of researchers at business enterprises by industry (as of March 31, 2024)
Source: Prepared based on MIC "2024 Survey of Research and Development"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00115
(Data collection)

(3) Patent situation

The number of patent applications to the U.S. was 0.594 million in 2022. The proportion of applications from non-residents has been increasing in recent years, suggesting that the U.S. market is attractive to overseas entities. The number of applications to Japan was 0.290 million in 2022, ranking third in size after China and the U.S. However, the number of patent applications has been decreasing since the mid-2000s, leading to a growing gap.

Looking at the proportion of patent families[13] across technology fields in Japan, the U.S., and China, it is evident that the proportion of "Information and Communication Technology" is increasing in the U.S. and China, while it is stagnant in Japan.

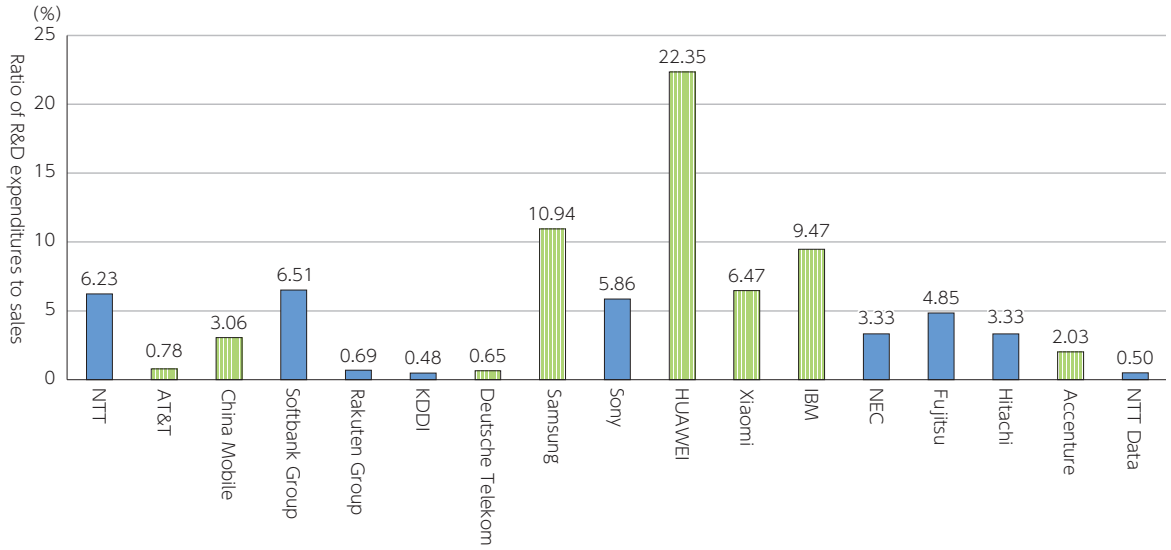
Figure (related data) Changes in the patent application in major countries and from major countries
Source: National Institute of Science and Technology Policy in the MEXT "Science and Technology Indicators 2024"
URL: https://www.soumu.go.jp/johotsusintokei/whitepaper/ja/r07/html/datashu.html#f00115
(Data collection)

(4) Trends in research and development of major domestic and international companies in the ICT field

The ratio of research and development expenditures to sales in 2023 for major domestic and international information and communication-related companies remained below 10%, with the exception of some companies **(Figure 2-1-1-15)**.

For major Japanese telecommunications companies, the ratio of research and development expenditures to sales in 2023 was approximately 6 to 7% for NTT and Softbank Group, and less than 1% for KDDI and Rakuten Group, while GAFAM14 and BAT15, excluding Apple and Alibaba, had a ratio of approximately 10% to 30%, indicating their active commitment to research and development **(Figure 2-1-1-16) (Figure 2-1-1-17)**.

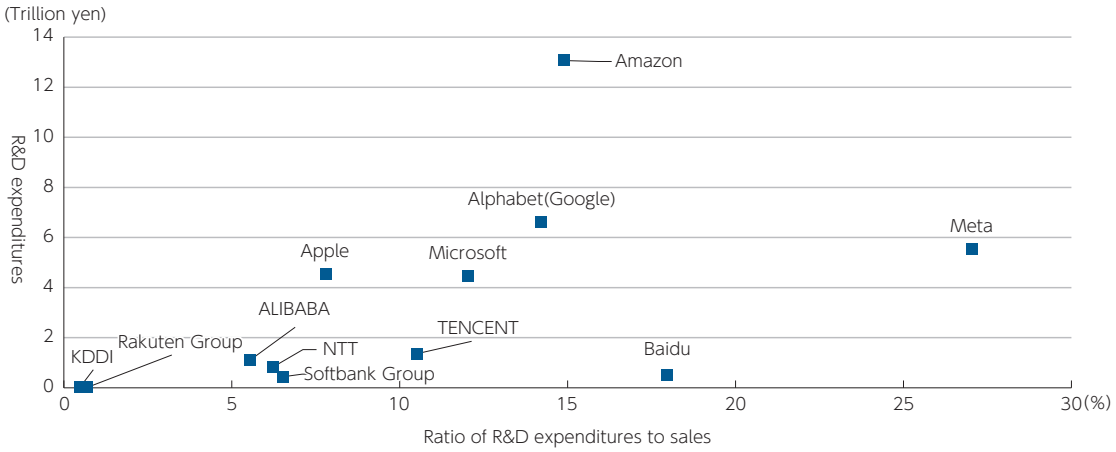
Figure 2-1-1-15 Comparison of research and development expenditure by telecommunications carriers, communications devices and IT service providers (2023)



(Source) Prepared based on the "EU Industrial R&D Investment Scoreboard" and annual reports etc. by each company[16]

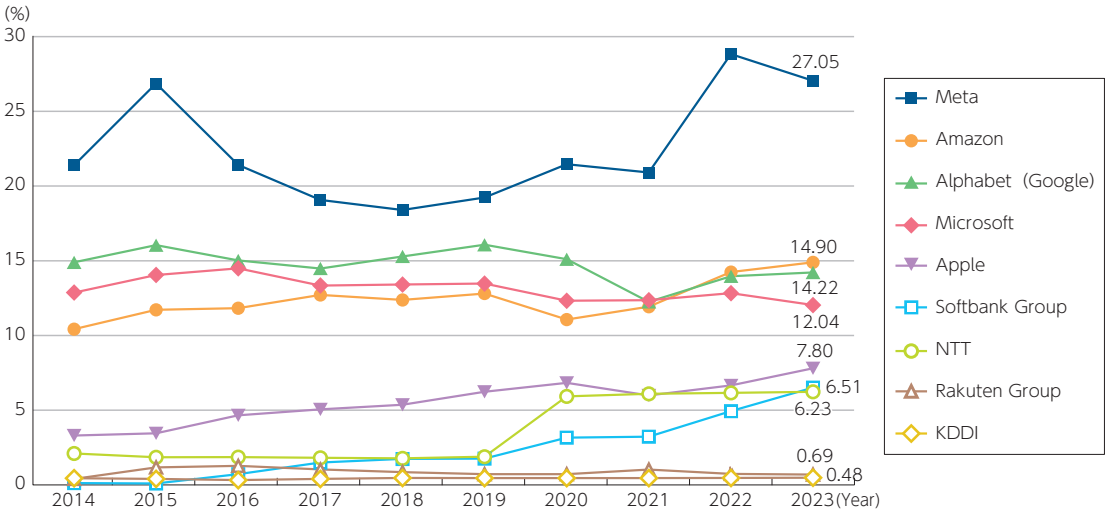
[13] A patent family is a bundle of patent applications in two or more countries that are linked directly or indirectly by priority rights. Generally, patents with the same content that are filed in more than one country belong to the same patent family. Thus, counting patent families prevents the same application from being counted twice. In other words, the number of patent families is considered to be approximately the same as the number of inventions.
https://www.nistep.go.jp/sti_indicator/2024/RM341_46.html
[14] Alphabet (Google), Amazon, Meta (facebook), Apple, Microsoft
[15] Baidu, Alibaba, Tencent
[16] Note that a simple comparison cannot be made with the corresponding data contained in previous White Papers on Information and Communications in Japan because different data sources are used.

Figure 2-1-1-16 Comparison of research and development expenditure between major Japanese telecommunications carriers and GAFAM & BAT (2023)



(Source) Prepared based on the "EU Industrial R&D Investment Scoreboard" and annual reports etc. by each company[17]

Figure 2-1-1-17 Changes in the ratio of research and development expenditure to sales among major Japanese telecommunications carriers and GAFAM



(Source) Prepared based on the "EU Industrial R&D Investment Scoreboard"

[17] Note that a simple comparison cannot be made with the corresponding data contained in previous White Papers on Information and Communications in Japan because different data sources are used.