Manufacturing



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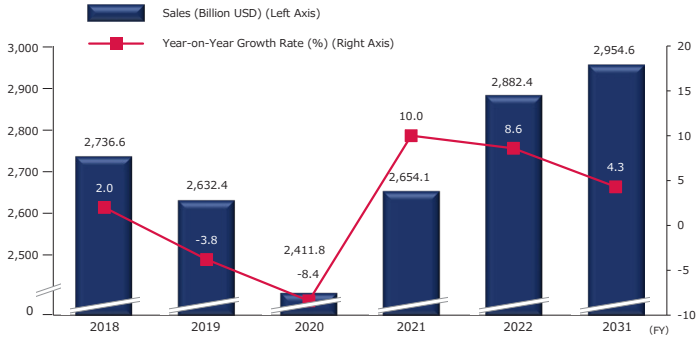
1. Overview

Digitalization and decarbonization will be the driving trends of Japan's manufacturing industry.

The Japanese economy is the fourth largest in the world in terms of GDP, and the manufacturing sector accounts for approximately 20% of the nation's GDP, positioning it as a vital segment of the economy.[1] Japan's electronics and automotive components are particularly competitive globally. The country holds over 60% of the global market share in 220 product categories, greatly surpassing the United States, Europe and China.[2] In addition, Japan's manufacturing industry is expected to improve production efficiency and create new value through digitalization and decarbonization, driving further growth in the overall manufacturing market.

Although Japan's manufacturing industry experienced a temporary decline in sales due to the impact of the COVID-19 pandemic, it recovered in FY 2022 and achieved growth rates exceeding pre-pandemic levels (Figure 1).

Figure 1 **Trends in the total sales of the manufacturing industry**

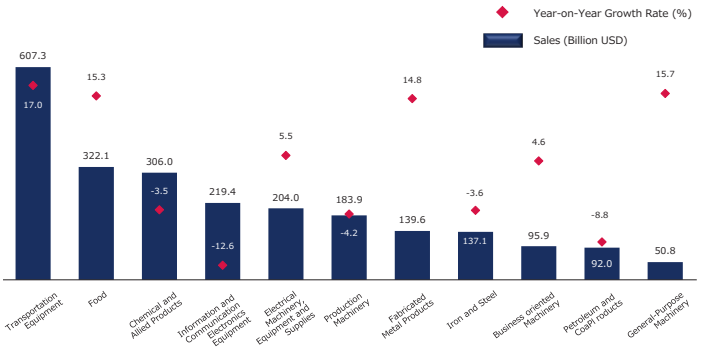


*Total manufacturing sales for FY 2023 are based on the sum of 2023 Apr-Jun, Jul-Sep, Oct-Dec, and FY 2024 Jan-Mar, and the year-on-year growth rate is calculated as the average of the respective periods.

Source: Created by JETRO based on data from the Ministry of Finance (MOF) [3,4]

In the manufacturing sector, sales of transportation equipment, food, fabricated metal products, and general-purpose machinery have significantly increased year-on-year, driving overall sector growth (Figure 2). Among these, transportation equipment recorded outstanding sales and a high year-on-year growth rate, positioning it as a particularly promising market with strong potential for continued expansion.

Figure 2 **Manufacturing industry sales and year-on-year growth rate for FY 2023**



*The sales figures are the sum of 2023 Apr-Jun, Jul-Sep, Oct-Dec, and 2024 Jan-Mar sales, and the year-on-year growth rate is calculated as the average of the respective periods.

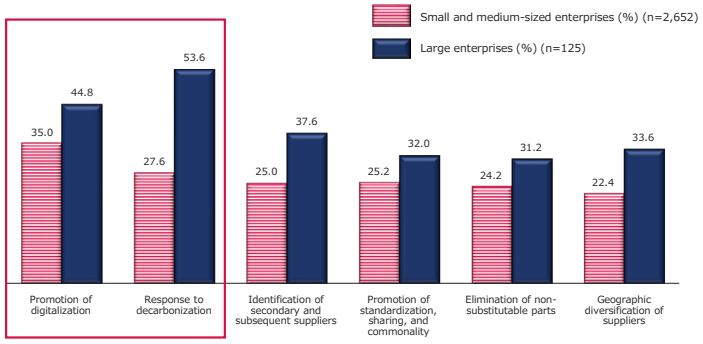
Source: Created by JETRO based on data from MOF[5]

The manufacturing sector in Japan is also a key player in the domestic employment market, accounting for approximately 15% of total employment as of 2023.[6] Although the proportion of manufacturing within all industries is lower in Japan due to the transition to a service economy, its proportion is still comparable to countries such as South Korea, Thailand, and Malaysia, which are the next largest major manufacturing hubs in Asia behind China and Vietnam.[7] Globally, Japan has a high proportion of its workforce employed in the manufacturing sector.

1 Cabinet Office. "3. Gross Domestic Product classified by Economic Activities, IV. Main Time Series," *National Accounts for 2022 (2008SNA, benchmark year = 2015).*
2 Ministry of Economy, Trade and Industry (METI), Ministry of Health, Labour and Welfare (MHLW), Ministry of Education, Culture, Sports, Science and Technology (MEXT). *FY 2022 Measures to Promote Manufacturing Technology* (JP), p. 146.
3 Ministry of Finance (MOF). *Press Release: Financial Statements Statistics of Corporations by Industry, Annually* (FY 2022), p. 1.
4 MOF. *Press Release: Financial Statements Statistics of Corporations by Industry, Quarterly* (Q1, FY 2024), p. 1.
5 See Note 4, p. 1.
6 Ministry of Internal Affairs and Communications (MIC). *Labour Force Survey / Basic Aggregates: Long-term time series data for all prefectures.*
7 Our World in Data. *Manufacturing jobs as a share of total employment, 2000 to 2020.*

On the other hand, the global manufacturing environment has become increasingly uncertain in recent years. Russia's invasion of Ukraine has led to increasing resource and energy prices, higher material procurement costs, and shortages of critical components such as semiconductors. These challenges demonstrate the importance of strengthening supply chains. According to the 2022 survey of Japanese manufacturers, almost 50% of large companies intend to pursue digitalization and decarbonization to build a stable supply chain. Although the proportion of small and medium-sized enterprises (SMEs) is lower than that of large companies, SMEs show the highest enthusiasm for digitalization, followed by decarbonization efforts (Figure 3). Large companies are actively utilizing their abundant resources and capital to drive digitalization and decarbonization, to stabilize their supply chains. SMEs, on the other hand, are more likely to prioritize digitalization for efficiency and cost reduction.

Figure 3 **Future initiatives planned to achieve a stable supply chain (selected survey results)**



*Multiple responses

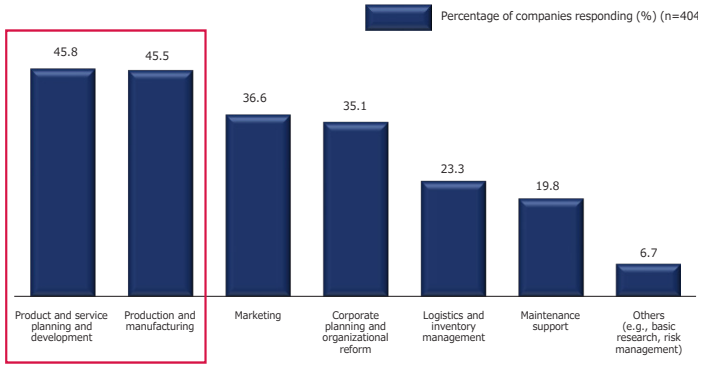
Source: Created by JETRO based on data from the Ministry of Economy, Trade and Industry (METI) [8]

(1) Digitalization

In Japan's manufacturing industry, both the public and private sectors are promoting digitalization to improve production processes and data utilization. The Japanese government is pursuing several policies for promoting digital transformation in the manufacturing industry, including the development of guidelines, evaluations, and metrics in collaboration with companies, governments, and academia, as well as the promotion of data integration and standardization among companies.[9]

Additionally, as digitalization progresses, private companies are increasingly focusing on leveraging data. A 2020 survey found that more than 80% of manufacturing companies use data in at least one operational area[10], surpassing the level of data used in information and communication, energy and infrastructure, trade and distribution, and services. The use of data is particularly advanced in "Product and service planning and development" and "Production and manufacturing" (Figure 4). It can be observed that the simplification and optimization of production and manufacturing processes through digital technologies, as well as the use of data for planning and development, are gaining attention in the manufacturing industry.

Figure 4 **Operations in the manufacturing industry where data is being utilized**



*Data utilization includes not only data analysis but also activities such as data browsing and automated data collection by computers, which can include decision-making and issuing alerts.

Source: Created by JETRO based on data from the Ministry of Internal Affairs and Communications (MIC)[11]

Digitalization is also gaining momentum in the automotive and electronics industries in particular. On the other hand, experts believe that digitalization has lagged in the chemical and materials industry because it is difficult to digitize chemical processes in the first place, in addition to the difficulty of digitizing years of technological accumulation. To improve the digitalization of the industry, initiatives are being taken to achieve higher productivity through data utilization, which helps provide support for on-site technicians.[12] As the chemicals and materials industries digitalize, they have the potential to catch up with other sectors, leading to further growth in the future.

8 METI. *FY 2022 Survey of Manufacturing Infrastructure Technologies: Report on Challenges and Directions for Japan's Manufacturing Industry* (JP), p. 106.
9 METI. *Current State and Challenges of the Manufacturing Industry: Future Policy Directions (May 2023)* (JP), p. 61.
10 MIC. *Report on the Research Study of the Measurement and Utilization of the Economic Value of Digital Data* (JP), p. 47.
11 See Note 10, pp. 25, 47.
12 METI. *Digital Transformation Stocks | DX Stocks | 2024* (JP), pp. 31, 32, 72.

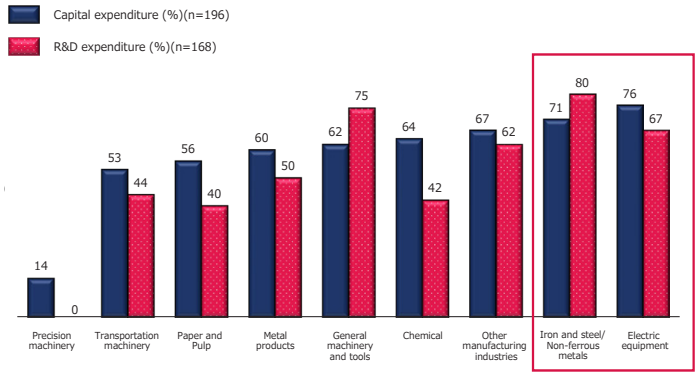
The use of AI and digital twin technology is gaining significant attention among digital initiatives in the manufacturing industry. For example, industrial robots and automation systems that can operate reliably even in emergencies[13] are expected to see increased use in manufacturing. Additionally, Japan's manufacturing sector faces the challenge of an aging workforce. The use of digital twin technology to record the work of experienced workers is recognized as a way of streamlining and facilitating the transfer of their expertise.[14] In this context, the adoption of digital technologies in the manufacturing sector is expected to increase. Overseas companies with cutting-edge technologies are expected to enter into the Japanese manufacturing industry, along with increased technology partnerships and collaborations with Japanese companies.

(2) Decarbonization

In the wake of the Paris Agreement, global momentum towards decarbonization has accelerated, and Japan is also moving forward with the decarbonization of its industries. The manufacturing sector is particularly important, accounting for around 36% of the country's CO2 emissions, surpassing other sectors such as transport, households, tertiary industries, and energy. In FY 2020, CO2 emissions from the manufacturing sector reached 370 million tonnes, with the majority coming from materials industries such as steel, chemicals, paper and pulp, and ceramics and cement.[15]

In 2022, the Cabinet Office conducted a survey targeting Japanese private companies and reported that a significant proportion of companies intend to increase capital and R&D expenditure through green investment by FY 2030. This is particularly evident in the steel and electrical equipment industries (Figure 5). The rising focus on controlling CO2 emissions is believed to have influenced the green investment level within the steel industry, which emits a large amount of CO2 during the manufacturing process. The electrical equipment industry is also likely to be influenced by the growing demand for CO2 emission control in power generators, as highly efficient power generators are expected to contribute to energy savings and decarbonization in a wide range of industries.

Figure 5 Percentage of companies expecting to increase total capital expenditure and R&D expenditure through green investments by FY 2030 (manufacturing sector only)



Source: Created by JETRO based on data from the Cabinet Office[16]

The manufacturing sector is actively working to improve process efficiency, reduce environmental impact, and create new business value through digitalization and decarbonization. Overseas companies with innovations that align with the needs of Japan's manufacturing industry, particularly in digital and green technologies, are expected to have greater business opportunities in Japan, including entry into the Japanese market and collaboration with local firms.

13 JETRO. *Impacts of Changes in GVCs [AI/Sensors × Robotics and Automation (Industry)]* (JP), p. 15.
14 JETRO. *Impacts of Changes in GVCs [Metaverse and Digital Twins (Industrial Applications)]* (JP), p. 15.
15 See Note 9, p. 68.
16 Cabinet Office. *Overview of the analysis results of the survey on Japanese companies' decarbonization efforts* (JP), pp. 12, 13.



2. Government Initiatives

The government-led promotion of digitalization and green transformation is expected to strengthen the supply chain, expand the market, and enhance cross-border cooperation.

(1) Strengthening the supply chain through the promotion of digital transformation investment and global data collaboration

Over the last few years, unpredictable events such as the COVID-19 pandemic and geopolitical instability have forced Japan to strengthen its supply chain. In response to this pressure, the Japanese government is considering various policies, including visualization and cooperation for initiatives targeting all businesses that utilize digital technology.[17]

The Ministry of Economy, Trade and Industry (METI) believes that it is vital to optimize the entire supply chain, through data sharing that goes beyond the traditional fixed and transactional relationships. To strengthen the resilience of the supply chain, the government is considering measures such as creating use cases with foreign-affiliated companies in Japan to promote data collaboration between companies. METI is also promoting investments into digital transformation, through tax systems and subsidies that incentivize digital transformation.[18]

The new taxation system for promoting digital transformation investment provides tax credits and special depreciation for digital-related investments that utilize cloud technology.[19] The subsidy for promoting productivity improvement in manufacturing, commerce and, services provides support for capital investment aimed at developing innovative services and improving manufacturing processes.[20] These incentives are expected to promote digital transformation among both Japanese and overseas companies.

(2) Green growth strategy and green transformation-related measures to support companies pursuing carbon neutrality

To achieve carbon neutrality by 2050, the Japanese government has formulated the Green Growth Strategy Through Achieving Carbon Neutrality in 2050, and is working to transform the industrial and socioeconomic structure. Under this strategy, 14 sectors have been designated as priority sectors with potential for growth, which include sectors related to manufacturing, including automobiles and storage batteries, semiconductors, ships, food, aircrafts, and carbon recycled materials. Particularly, in the automobile sector, the Japanese government has set targets related to electrification and decarbonization of automobiles, increase of the production capacity and implementation of storage batteries, and development of charging infrastructure (Figure 6).

Figure 6 **Green Growth Strategy Through Achieving Carbon Neutrality in 2050 (automobiles and storage batteries)**

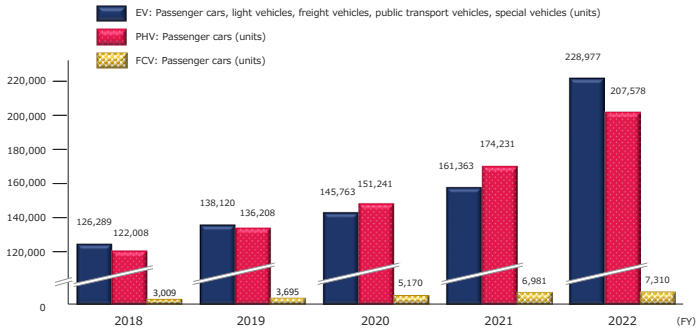
Major Future Policies	Overview
Setting electrification targets	Passenger vehicles: 100% of new vehicles sold will be electric by 2035.
	Commercial vehicles (light): By 2030, 20-30% of new vehicles sold will be electric, and by 2040, 100% of new vehicles sold will be electric/decarbonized fuel vehicles. Commercial vehicles (heavy): 5,000 electric vehicles will be introduced in the 2020s, and the target for the number of electric vehicles by 2040, will be set by 2030.
Setting storage battery targets	Domestic automotive battery manufacturing capacity will increase to 100GWh by 2030.
	The cumulative installed capacity of household, commercial and industrial storage batteries will reach approximately 24GWh by 2030.
Setting charging infrastructure targets	150,000 charging infrastructure units, including 30,000 public fast chargers, will be installed by 2030.
	Approximately 1,000 hydrogen stations will be installed in optimal locations by 2030.
Implementing a package of measures to promote electrification	Utilization of fuel efficiency regulations, promotion of implementation support and replacement, promotion of large-scale investment in storage batteries, expansion of charging infrastructure, etc.

Source: Created by JETRO based on data from METI[21]

17 Ministry of Economy, Trade and Industry (METI). *Digital Transformation in the Manufacturing Industry* (JP), p. 1.
18 See Note 17, pp. 12, 14.
19 METI. *Digital Transformation Investment Promotion Tax System* (JP).
20 METI. *Subsidy for Promoting Productivity Improvement in Manufacturing, Commerce and Services* (JP), p. 6.
21 METI. "Automobiles, Storage Batteries," *Green Growth Strategy Through Achieving Carbon Neutrality in 2050* (JP).

To achieve these goals, the Japanese government has introduced subsidies to promote the introduction of clean energy vehicles[22] and is supporting the introduction of CEVs, charging facilities, and hydrogen stations.[23] These subsidies also apply to vehicles sold by foreign-affiliated companies in Japan. For example, new vehicles sold by Tesla (United States) are eligible for CEV subsidies with some exceptions.[24] With the support of the government, the number of alternative fuel vehicles, including electric vehicles, has been increasing steadily (Figure 7). These trends are expected to result in further expansion of the market.

Figure 7 Trends in next-generation vehicle ownership



*EV: Electric Vehicles, PHV: Plug-in Hybrid Vehicles, FCV: Fuel-cell Vehicles

Source: Created by JETRO based on data from the Next Generation Vehicle Promotion Center[25]

The Japanese government is incentivizing investments toward the promotion of green transformation in the material industry (iron and steel, chemicals, paper and pulp, and ceramics and cement), which has a particularly high CO2 emission rate among manufacturing industries.[26] Specifically, the government has established the project to support the transformation of energy and manufacturing processes in industries where emission reduction is difficult. It supports capital investment for the transformation of manufacturing processes (transformations for innovative electric furnaces, chemical recycling, the biorefinery industry, etc.) and fuel conversion projects for private power generation facilities, and has allocated 220 million USD* (32.7 billion JPY) in its FY 2024 budget.[27] Furthermore, to reduce CO2 emissions in the supply chain, a package of measures is identified as a future direction, including compensation for the purchase of decarbonized products based on the Green Transformation Value, which allows each company to quantify the environment friendliness of its products for its end consumers, measures to encourage the provision of decarbonized products with consideration of the entire product life cycle in sharing services, and institutional measures to promote preference for products with high Green Transformation Value.[28,29] The government plans to promote the implementation of the green transformation value system for public procurement and to provide incentives for introducing the system in sectors such as the automobiles and building materials.[30] These are some examples of government subsidies and investment plans to promote green transformation, which are also applicable to foreign-affiliated companies in Japan.

(3) Efforts to revitalize regional areas

With several foreign-affiliated companies in Japan having manufacturing and processing bases in the Kanto region (the central region of Japan which includes the Greater Tokyo Area) (Figure 8), the national and local governments have been making efforts to attract both Japanese and overseas companies from a wide range of industries to local regions, including manufacturing, in order to promote regional revitalization.

Figure 8 Prefectural rankings of the number of manufacturing and processing bases belonging to foreign-affiliated companies (2020)

Rank	Prefecture	Region
1	Tokyo	Kanto
2	Kanagawa	Kanto
3	Aichi	Chubu
4	Osaka	Kansai
5	Saitama	Kanto
6	Hyogo	Kansai
7	Chiba	Kanto
8	Shizuoka	Tokai
9	Ibaraki	Kanto
10	Fukuoka	Kyushu

Source: Created by JETRO based on data from METI[31]

As part of tax incentives for strengthening local business facilities, companies that meet certain conditions are eligible for preferential treatment when they establish, expand, or relocate (with certain exceptions) their head office functions (offices, research institutes, training institutes, etc.) to a regional city outside the Greater Tokyo Area (Figure 9).

22 METI. "*FY 2023 supplementary budget Subsidy for introduction of clean energy vehicles* (JP)."
23 METI. *FY 2023 supplementary budget and FY 2024 initial budget "Subsidies for the introduction of charging infrastructure to promote the growth of clean energy vehicles* (JP)."
24 Official website of Tesla.
25 Next Generation Vehicle Promotion Center. *EV Ownership Statistics* (JP).
26 Cabinet Secretariat. *Realizing Japan's Green Transformation* (JP), p. 13.
27 METI. *Outline of FY 2024 budget (PR material: Green transformation promotion measures expenses)* (JP), p. 2.
28 METI. *Approach to Green Transformation Market Creation* (JP), p. 4.
29 METI. *Current Status and Issues Facing the Manufacturing Industry Future Policy Direction May 2024* (JP), pp. 71, 72.
30 Cabinet Secretariat. *Sector-specific investment strategies* (JP), pp. 24, 26.
31 METI. *Outline of Survey of Trends in Business Activities of Foreign Affiliates,* p. 9.



Figure 9 **Incentives provided as tax incentives for strengthening local business facilities**

Tax System	Established/expanded head office functions into regional areas	Head office functions transferred from Tokyo's 23 wards into regional areas
Employment Promotion Tax System	A tax credit of up to 3,963 USD*(600,000 JPY) for each additional employee	A tax credit of up to 5,945 USD*(900,000 JPY) for each additional employee
Tax Reduction on Capital Investment (Office Tax Reduction)	[Target] Buildings, building attachments and other structures for head office functions [Acquisition price] Above 132,000 USD*(20 million JPY) [above 66,000 USD*(10 million JPY) for SMEs]	
	[Tax benefits] Special depreciation of 15% or tax deduction of 4% on the above acquisition cost	[Tax benefits] Special depreciation of 25% or tax deduction of 7% on the above acquisition cost
Local Tax Exemption/ Non-uniform Taxation	Approved businesses are subject to the enterprise tax (only in the case of relocation from Tokyo's 23 wards), real estate acquisition tax, and fixed asset tax from local governments. Companies may also be eligible for exemptions or reductions of local taxes in certain cases.	

Source: JETRO's data[32]

Local governments and economic blocs have started setting up incentives for foreign-affiliated companies in Japan. An example of such an incentive by a local government is the Greater Nagoya Initiative in the Chubu region (the central region of Japan consisting of nine prefectures). The initiative positions a region with a radius of approximately 100 km around the city of Nagoya (extending into the Aichi, Gifu, and Mie Prefectures) as a single economic zone and promotes international economic exchange by attracting companies, technologies, human resources, and information from around the world. The incentive specifically contributes to the expansion of manufacturing companies in Asia and Europe into the Japanese market by inviting them to Japan, providing business matching services, along with legal and financial support for business expansion.[33]

An example of collaboration between a foreign-affiliated and Japanese companies under the Greater Nagoya Initiative is the collaboration between TOGO SEISAKUSYO (Japan), a manufacturer of precision spring accessories for automobiles, and SCHERDEL (Germany). SCHERDEL and TOGO SEISAKUSYO collaborated to make up for each other's technological shortfalls, including solving the labor shortage at TOGO SEISAKUSYO and providing opportunities for SCHERDEL to introduce manufacturing parts to Japanese automakers. As another example, Juken Kogyo (Japan), a manufacturer of small precision plastic parts, and Hummingbird Scientific (United States), a manufacturer of sample holders used in transmission electron microscopes (TEM), are collaborating in the sale and manufacture of sample holders.[34]

Other examples include the establishment of a joint semiconductor manufacturing facility in Yokkaichi City, Mie Prefecture by KIOXIA (Japan) and Western Digital (United States)[35], and the relocation of Gestamp Automoción's (Spain) Japanese subsidiary to Matusaka City, Mie Prefecture following the establishment of a factory in the same city.[36] In this way, a number of foreign-affiliated manufacturing companies are making use of incentives from local governments to invest in and expand into local regions.

32 JETRO. *Incentive Programs.*
33 Official website of Greater Nagoya Initiative.
34 Chubu Bureau of Economy, Trade and Industry, Greater Nagoya Initiative Center. *Examples of Activities and Cooperation by Foreign Companies in Greater Nagoya* (JP), pp. 8, 9.
35 Western Digital. *Kioxia and Western Digital Celebrate the Opening of Fab7 at Yokkaichi, Japan.*
36 See Note 34, p, 5.



3. Attractive Markets

In this report, we focus on the following four attractive markets in the manufacturing industry.

(1) Semiconductors: Strong investment support from the government

(2) Industrial Robots: Rising demand due to declining labor population

(3) Automobiles: Rapidly moving toward decarbonization and autonomous driving through government support

(4) Aerospace: Increasing cross-border cooperation

(1) Semiconductors: Strong investment support from the government

Japan's semiconductor shipment value experienced a significant increase from 2020 to 2022.[37] In response to this increase, the Japanese government aims to raise the total revenue of domestic semiconductor companies to over 99.09 billion USD* (15 trillion JPY) by 2030. It also plans to secure an additional 79.27 billion USD* (12 trillion JPY) in public and private investment by the same year.[38]

In 2023, the Ministry of Economy, Trade and Industry (METI) revised the Strategy for Semiconductors and the Digital Industry to reflect advancements in information processing and communication technologies, as well as the impact of the COVID-19 pandemic and Russia's invasion of Ukraine. The updated strategy focuses on three key areas: strengthening the production base for IoT semiconductors, establishing next-generation semiconductor technologies through Japan-US cooperation, and advancing future technologies through global partnerships. As part of its global R&D efforts, the next generation semiconductor project was launched. Two key facilities are planned to be constructed under the project: an open R&D center focused on advanced design and cutting-edge technology for devices and materials, and a production facility focused on future high-volume manufacturing. The project will involve collaboration with international research institutions and companies, with the aim of both innovative R&D and the creation of scalable manufacturing infrastructure.[39]

Additionally, the Japanese government is promoting global cooperation as well as enacting policies to promote investment from foreign-affiliated companies. These policies include assistance with plans to establish and equip advanced semiconductor production facilities and related manufacturing operations. As of October 2023, the total maximum grant amount has reached approximately 5.15 billion USD* (780 billion JPY). This support applies to the Japanese branches of overseas companies, such as TSMC (Taiwan), Western Digital (United States), and Micron Technology (United States) as well. The expansion of TSMC in Kumamoto Prefecture is predicted to have an economic impact of approximately 45.58 billion USD* (6.9 trillion JPY) on the electronic device industry over the next ten years, demonstrating the significant impact of this project.[40] In addition, METI is considering supporting PSMC (Taiwan), a major semiconductor manufacturer, in establishing a semiconductor manufacturing facility in Miyagi Prefecture. This support will address PSMC's needs for production infrastructure development and workforce training.[41]

The Japanese government is also undertaking a project to establish a short TAT mass production infrastructure for next-generation semiconductors. Under this project, the government is establishing an R&D center (LSTC, Leading-edge Semiconductor Technology Center) for advanced design along with technologies related to advanced equipment and materials, and a manufacturing center (Rapidus) to establish a mass-production system in the future. R&D is carried out not only in Japan but also in collaboration with overseas research institutions and companies. For example, Rapidus in Japan has signed a joint development partnership and Memorandum of Cooperation (MOC) with IBM (United States), Imec (Belgium), and Tenstorrent (Canada). Such cooperation with overseas academic and research institutions and companies is expected to continue in the future.[42]

In addition to the technological cooperation support mentioned earlier, the Japanese government is strengthening its efforts to attract major overseas semiconductor companies such as TSMC to enhance the domestic semiconductor supply chain. In May 2023, the then Prime Minister Fumio Kishida held discussions with senior executives of leading global semiconductor companies, encouraging them to invest in Japan, aiming for the revitalization of Japan's semiconductor industry and expressing his commitment to support the semiconductor industry and to help stabilize global supply chains.[43]

37 Ministry of Internal Affairs and Communications (MIC). "23 Trends in Japan's semiconductor market (shipment value)," *Information and Communications White Paper 2023* (JP), Chapter 4, Section 5.
38 Ministry of Economy, Trade and Industry (METI). *Current Status and Future Directions of the Semiconductor and Digital Industry Strategy* (JP), pp. 163, 175.
39 See Note 38, pp. 4, 7, 42.
40 See Note 38, pp. 36, 37.
41 KAHOKU SHIMPO PUBLISHING CO. *Miyagi Governor Yoshihiro Murai requests financial support from Ministry of Economy, Trade and Industry for development of semiconductor hub* (JP).
42 See Note 38, pp. 42, 43, 49.
43 JETRO. *Prime Minister Kishida meets executives of major overseas semiconductor companies, encourages expansion of investment in Japan* (JP).



In response to the Japanese government's initiatives to encourage entry into the domestic semiconductor market, several foreign-affiliated companies have initiated plans to establish new manufacturing facilities. For example, Micron Technology has announced an investment of up to 3.3 billion USD* (500 billion JPY) to expand its manufacturing facility in Higashihiroshima City, Hiroshima Prefecture.[44] PSMC and SBI Holdings (Japan) have formed a partnership to establish a semiconductor manufacturing facility in Sendai.[45] In addition, IC LAYOUT DESIGN TECHNOLOGY CORPORATION (Taiwan), a semiconductor design company, established its Japanese subsidiary, Golden Layout Technology Japan, in Kanagawa Prefecture under the prefecture's Select Kanagawa NEXT business attraction initiative.[46]

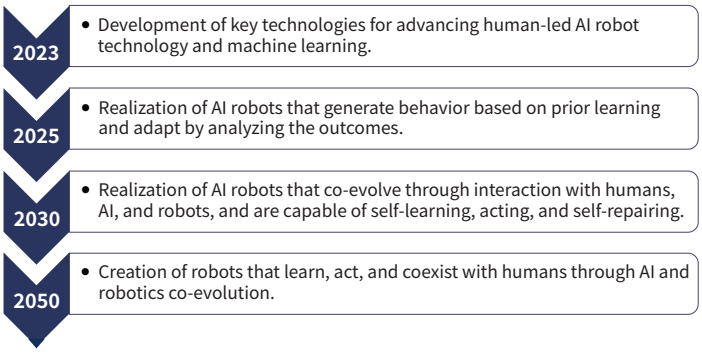
The Japanese government is strongly encouraging foreign investment by providing various incentives to expand the semiconductor market. These initiatives provide an excellent opportunity for overseas semiconductor companies to establish manufacturing facilities in Japan.

(2) Industrial Robots: Rising demand due to declining labor population

Japan is a leading producer in the industrial robot market, with a 46% share of the global market. In 2022, the number of industrial robots installed in Japan was 50,413, up 9% year-on-year and surpassing the pre-pandemic record of 49,908 in 2019.[47]

To further strengthen Japan's leadership in industrial robots, the Japanese government set milestones for moonshot goal 3 in 2020. This initiative supports research and development aimed at creating robots that can learn, act autonomously, and coexist with humans, by 2050 through the co-evolution of AI and robotics (Figure 10). Traditionally, industrial robotics has focused on automation and productivity in manufacturing. Moonshot goal 3 focuses on integrating technologies and ideas to improve the capabilities, safety, and adaptability of industrial robots.

Figure 10 Milestones in moonshot goal 3



Source: Created by JETRO based on data from the Japan Science and Technology Agency[48]

Furthermore, Japan's declining birthrate and an aging population are leading to labor shortages in the manufacturing sector.[49] As a result, the demand for AI-driven industrial robots to replace human workers in factories and production facilities is likely to increase. This trend presents significant opportunities for overseas industrial robot companies to enter the Japanese market.

ABB (Switzerland) is an example of a foreign-affiliated company in Japan that has successfully entered the Japanese market in response to the growing demand for industrial robots. ABB employs approximately 600 people in Japan and operates a sales and service network with 13 locations.[50] The company has previously collaborated with Kawasaki Heavy Industries (Japan) to share knowledge and promote the use of dual-arm collaborative robots.[51]

Partnerships between Japanese and foreign-affiliated companies in Japan are also progressing in the implementation of digital twins for production line visualization in the manufacturing sector. For example, a collaboration between Kawasaki Heavy Industries and Microsoft (United States) has enabled the remote operation of robots using digital twin technology.[52] Such examples illustrate how foreign-affiliated companies in Japan are increasingly adopting digital twin platforms, including metaverse technologies, to enhance simulation capabilities for manufacturing processes.

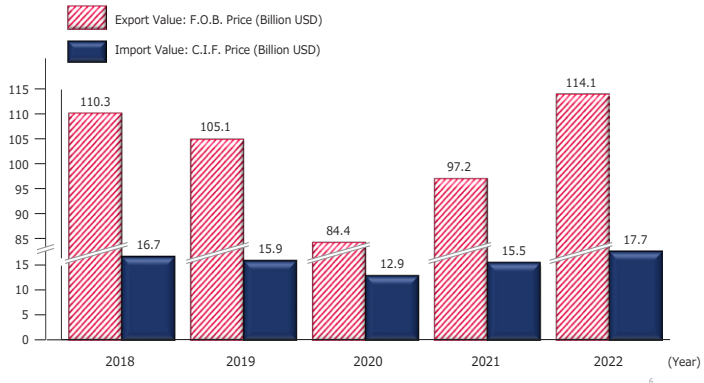
44 Micron Technology. *Micron to Bring EUV Technology to Japan, Advancing Next-Generation Memory Manufacturing.*
45 SBI Holdings. *Notice Regarding the Selection of the Planned Semiconductor Foundry Construction Site in Japan,* p. 1.
46 Kanagawa prefecture. *Two overseas companies which specialize in automotive software development and semiconductor design are expanding in the prefecture!* (JP).
47 International Federation of Robotics. *IFR report shows a 9% increase in robot installations in Japan.*
48 Japan Science and Technology Agency. Moonshot Goal Program Progress Status Report "*Realization of AI robots that autonomously learn, adapt to their environment, evolve in intelligence and act alongside human beings, by 2050* (JP)," p. 7.
49 Bank of Japan. *Tankan Summary (June 2024),* p. 6.
50 Official website of ABB (JP).
51 Kawasaki Heavy Industries. *ABB and Kawasaki announce collaborative robot automation cooperation,* p. 1.
52 Kawasaki Heavy Industries. *Kawasaki DX featured at Microsoft Build 2022.*

The number of successful cases of collaboration between foreign-affiliated and Japanese companies, similar to the ones mentioned above, is slated to increase with the Japanese government actively encouraging investment in the industrial robotics sector.

(3) Automobiles: Rapidly moving toward decarbonization and autonomous driving through government support

The automobile industry holds a significant position in Japan's manufacturing sector. In 2022, Japan ranked third in the world in automobile production volume with 7.84 million units, positioning Japan as a major automobile production base in the Asia-Pacific region next to China.[53] The value of manufactured goods shipments from the automobile manufacturing industry in FY 2021 increased 5.5% from the previous year to approximately 372.57 billion USD* (56.4 trillion JPY), accounting for 17.1% of the total value of manufactured goods shipped by the entire manufacturing sector. Capital expenditures for automobile manufacturing in FY 2021 were approximately 9.25 billion USD* (1.4 trillion JPY), and R&D expenditures were approximately 23.78 billion USD* (3.6 trillion JPY). Additionally, the number of people employed in the automobile industry was 5.54 million (about 8% of the total population), indicating that the automobile industry has a significant impact on the Japanese economy. In terms of trade, both exports and imports have been on an increasing trend since 2021, exceeding the pre-pandemic level despite the effects of the COVID-19 pandemic and the depreciation of the Japanese Yen (Figure 11).

Figure 11 **Trends in total exports and imports of automobiles**



*FOB: Free on Board Price, CIF: Cost, Insurance, and Freight Price

Source: Created by JETRO based on data from the Japan Automobile Manufacturers Association [54]

The Japanese government is actively working to promote decarbonization and autonomous driving in the automobile industry to further secure Japan's advantage. In June 2021, the government revised the Green Growth Strategy Through Achieving Carbon Neutrality in 2050 to promote the decarbonization of the automobile industry, setting forth a strategy to promote the electrification of automobiles. As part of the strategy, the government plans to install 150,000 charging stations, including 30,000 quick chargers for public use, with the aim of achieving the convenience level of gasoline-powered vehicles by 2030 at the latest. Additionally, to accelerate the spread of charging infrastructure, the government plans to begin the installation of between 100,000 and 200,000 units of charging facilities for electric vehicles in new apartment buildings by 2030.[55]

With regards to autonomous driving, OEM manufacturers are developing Level 3 autonomous driving (conditional autonomous driving), and the government has started initiatives to introduce Level 4 autonomous driving (fully autonomous driving under certain conditions). Demand for autonomous driving is higher in rural areas than in urban areas due to the aging population, the lack of public transportation, and the shortage of taxi drivers. In addition, 5G networks are spreading rapidly in the rural areas of Japan, and it is estimated that the Japanese market is in a position where the spread of autonomous driving is feasible not only in urban areas but also in rural areas.[56] One example is RoAD to the L4, a joint project between METI and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) to develop and implement advanced mobility services such as Level 4 autonomous driving. The goal of this project is to expand the areas and vehicles that can support autonomous driving and to provide autonomous driving services at 50 locations by FY 2025. The initiative is not limited to urban areas, but is also being developed in rural areas such as Eiheiji in Fukui Prefecture.[57] As of February 2024, 26 prefectures, including urban and rural areas, are predicted to be able to provide autonomous mobile services in FY 2025.[58]

Decarbonization and autonomous driving are the major trends in the Japanese automobile industry and the government is actively supporting policies in both these fields. As a result of these efforts, overseas companies specializing in decarbonization and autonomous driving are expected to find it easier to enter the Japanese market.

53 Japan Automobile Manufacturers Association. *Global production, sales, ownership, dissemination rate, and exports* (JP).
54 Japan Automobile Manufacturers Association. *Automobile Manufacturing as a Key Industry* (JP).
55 METI. *Proactive Installation of Charging Facilities for Electric Vehicles in New Apartment Houses* (JP).
56 JETRO, *Impact of changes in GVC [Autonomous driving × Automobiles]* (JP), p. 15.
57 Official website of RoAD to the L4 (JP).
58 RoAD to the L4. *Overview of the RoAD to the L4 Project - Implementation of Level 4 Autonomous Driving Society* (JP), p. 26.



(4) Aerospace: Increasing cross-border cooperation

Japan's space industry was worth 26.42 billion USD* (4 trillion JPY) in 2020[59], and its aerospace industry production value in 2021 ranked sixth among major countries, excluding the EU as a whole.[60] Under the Basic Plan on Space Policy by the Cabinet Office, the government and private sectors are working together to expand the space industry's market size to 52.85 billion USD* (8 trillion JPY) by 2030.[61]

The Japanese government is trying to strengthen its domestic space industry and focusing on partnerships with overseas private companies to ensure international competitiveness. As part of these efforts, METI matches Japanese SMEs with overseas companies and supports product development and new business transactions.[62] In addition, Space Port Japan was established in 2018 with the aim to open a spaceport in Japan, and its main activities include information exchange and cooperation with related companies, both in Japan and overseas, along with the creation of business opportunities.[63]

Private space cooperation between Japan and other countries is also advancing at a fast pace. An example is the partnership between SKY Perfect JSAT (Japan), the largest satellite communications company in Asia, and Thales Alenia Space (France), a leading telecommunications and space exploration company, for the construction of JSAT-31, a new-generation software-defined satellite.[64]

In this way, with the support of the Japanese government and cooperation with overseas companies, including overseas satellite carriers, the Japanese aerospace market is attracting increasing attention and is set to grow further in the future.

*Calculated based on the Bank of Japan exchange rate of 1 USD for 151.38 JPY (as of April 1, 2024)

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59 Cabinet Office. *Outline of the Basic Plan on Space Policy* (JP).
60 The Society of Japanese Aerospace Companies. *2024 Japan's Aerospace Industry Takes Flight* (JP), p. 4.
61 See Note No.59.
62 METI, Organization for Small & Medium Enterprises and Regional Innovation. *Announcement of the FY 2024 [Business Matching for Aerospace Industry Jointly Hosted by Ministry of Economy, Trade and Industry and Small & Medium Enterprises and Regional Innovation]* (JP), pp. 5-8.
63 Official website of Space Port Japan (JP).
64 Thales Alenia Space. *SKY Perfect JSAT selects Thales Alenia Space to build a new cutting-edge software-defined satellite "JSAT-31."*