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**The Economic Research Institute (ERI)
Japan Society for the Promotion of
Machine Industry (JSPMI)**

Machine Industry in Japan, 2013 Edition

**The Manufacturing Industry Having Some Fear about a Decline in
Competitive Power Mainly in the Electric Machine Industry**

November 2013

Economic Research Institute

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Engineering Industries of Japan

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Preface

This report is a summarized English version of the Japanese edition, “Machine Industry in Japan, 2013 Edition,” which outlines the trends of the machine industry in Japan from 2012 to the first half of 2013.

Chapter 1 is a general discussion and reports the situation of the production, shipment, capital investment and export and import of the machine industry in Japan for the four fields, i.e., general machines, electric machines, information and communication machines and transportation machines.

Chapter 2 deals with the trends by industrial sector and reports the situation of four sectors, that is, construction machines, farm machines, medical appliances and bearings, which were selected from the 20 business categories discussed in the original Japanese edition.

In compiling this report, we were given information and instruction from the people at the related industrial associations and machine-related companies. We would like to express our deep gratitude to these people for their advice and cooperation. We hope that this report will help the reader understand the recent situation of the machine industry in Japan.

March 2014

Research Department, Economic Research Institute,
Japan Society for the Promotion of Machine Industry

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Overview of the trends of the machine industry in Japan in 2013

The trends of production of the machine industry in Japan in 2012 showed a gradual recovery, getting out of the impact of the Great Eastern Japan Earthquake in March 2011 and the great floods in Thailand in September of the same year. However, electric and electronic devices and information and communication machines suffered a decline in international competitiveness. The cases where business in the field of household electric appliances had to be reexamined occurred one after another; for example, Toshiba withdrew from the domestic production of liquid crystal TVs, Hitachi, from the manufacture of liquid crystal TVs, too, and Panasonic, from plasma TV business. On the other hand, transportation machines achieved an increase of almost 20% in the amount of production, mainly in automobiles and automobile parts, while other machine industries experienced a slower growth; behind this was the fact that the manufacturers of these machines made efforts to improve their management of global supply chains, the important problem arising after the Great Eastern Japan Earthquake and the floods in Thailand and that automakers continuously strengthened their international production and marketing strategies by the policy of “local production for local consumption.” But this was partly the outcome of the subsidies of the Eco-friendly Car Promotion Project (“subsidies for eco-friendly cars”) that was taken advantage of ahead of time, and it is feared that domestic demand may fall when the subsidies are ended. General machines showed some signs of recovery from the impact of the Great Earthquake, etc. but the amount of their production was smaller year by year affected mainly by reductions in capital investment in electric and electronic devices and in information and communication machines and the slower economic growth in China, the production base and importer of these products. In particular, consumer electric machines suffered a decrease in the amount of production for three years in a row. Precision machines experienced a little decrease due mainly to the effect of the Chinese economy and a sluggish rise in export to Western countries.

The total amount of export of general machines, automobile equipment and electric machines showed an upward trend again because the trade conditions were improved as the weak-yen effects caused by “Abenomics.” But when these trends are seen from the condition of importing countries, the situation was still the one where such negative factors as the prolonged stagnation of the European economy and curtailment in capital investment associated with the deceleration of the Chinese economy were supplemented by export to the ASEAN region and other newly developed nations, and the key to the future has been an economic growth in China. While the export of household electric appliances was inactive, the import of overseas home electric appliances and their parts began to show an increasing trend in the second half of 2012. In addition, as for electric and electronic devices, global supply chains were established mainly by the networks with manufacturing bases in China and the ASEAN; in the past, because of long-term strong yen, it became usual for Japanese manufacturers to reimport finished products, parts, etc. from their foreign production bases; but as the tendency of weak yen grew stronger in 2013, moves toward the reorganization of overseas manufacturing bases, mainly those of white goods, and the revival of domestic production sites were found here and there. Thus it may be expected that manufacturers will bring their production bases back to Japan in the near future as a result of weak yen as well as cuts in corporation taxes. But the machine industry’s investment in domestic facilities has still been small and lacked strength. The future task will be how the industry will be able to revitalize its domestic investment by using as the industry’s engines for growth the industrial sectors expected to expand the global market, including medical and health care appliances, aircraft and environmental and energy-saving machines.

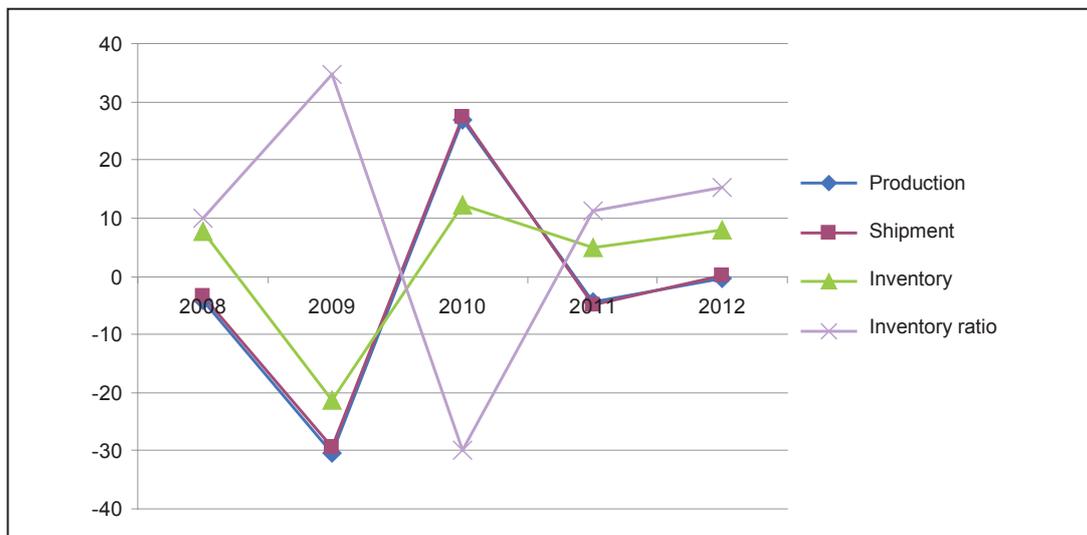
1. Trend of the Machine Industry in Japan

1.1. Trend of the production, shipment, etc. of the machine industry

(1) Trend of the machine industry in the past five years

The production index of the entire machine industry (excluding steel vessels and railway vehicles) in 2012 showed a decrease of 0.3% from the previous year for two consecutive years. Behind this was the fact that the production of mainly the general machine and electronic parts and device industries decreased, although the transportation machine industry enjoyed a greater production. The shipment index rose by 0.1% year on year first in two years. This was because the information and communication machine industry suffered a decrease in shipment but the electric machine industry, transportation machine industry, etc. attained a larger shipment. On the other hand, the inventory index registered a 7.9% growth because the electric machine industry, transportation machine industry, etc. had a greater inventory, despite a decrease in inventory in the information and communication machine industry. The inventory ratio increased by 15.3% year on year, a rise for the second consecutive year (Fig. 1.1.1).

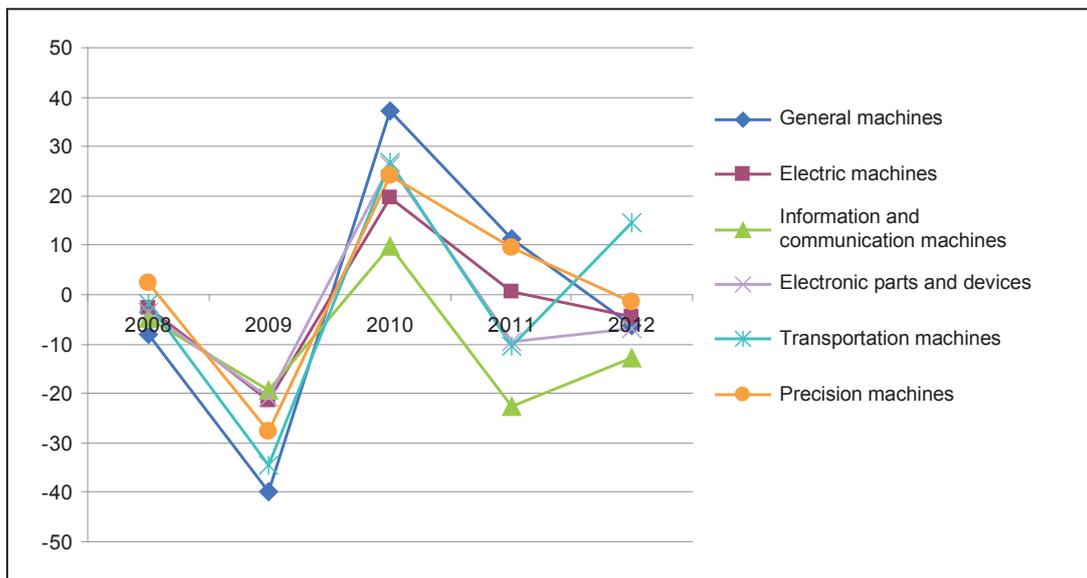
Fig. 1.1.1 Trend of the industrial indexes of the entire machine industry (year-on-year basis)



Source: Based on the Ministry of Economy, Trade and Industry, "Yearbook of Machinery Statistics."

The trend of the production index of the machine industry by business category is as shown in Figure 1.1.2. As this figure indicates, the production index in 2012 has the following four characteristics: first, the production of the information and communication machine industry suffered a substantial decrease of 12.8% from the previous year for two years in a row, and second, that of the electronic parts and device industry declined by 6.8% year on year for the second consecutive year. Third, the production of the general machine, electric machine and precision machine industries fell first in three years (In particular, the general machine industry had a 6.2% decrease in output year on year), and fourth, while the other machine industries registered a smaller production, only the transportation machine industry (excluding vessels and railway vehicles) showed a stronger upward trend, recording a growth of 14.5% year on year, and the entire machine industry was underpinned by the reviving tendency of the automobile industry.

Fig. 1.1.2 Trend of the production index of the machine industry by business category (year-on-year basis)

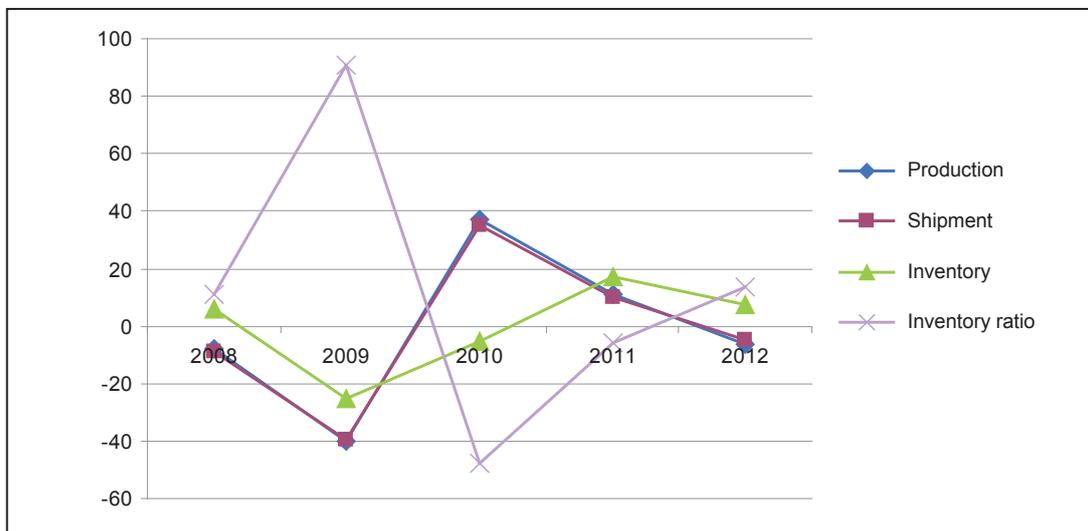


Source: Same as that for Fig. 1.1.1.

(2) Trend of the general machine industry

As shown in Figure 1.1.3, the industrial indexes of the general machine industry (boilers and motors, civil engineering and construction machines, chemical machines, life-related industrial machines, semiconductor and flat-panel devices, wind-powered and hydraulic machines and oil pressure equipment, conveying and carrying machines, industrial robots, farm machines, metal machine tools, metal working machines, textile machines, freezers and applied products, dies, machinery tools, other general machines and general machine parts) in 2012 declined with a 6.2% drop in the production index and a 5.0% fall in the shipment index, which were both a decrease first in three years. By contrast, the inventory index rose by 7.6% and the inventory ratio, by 13.8%.

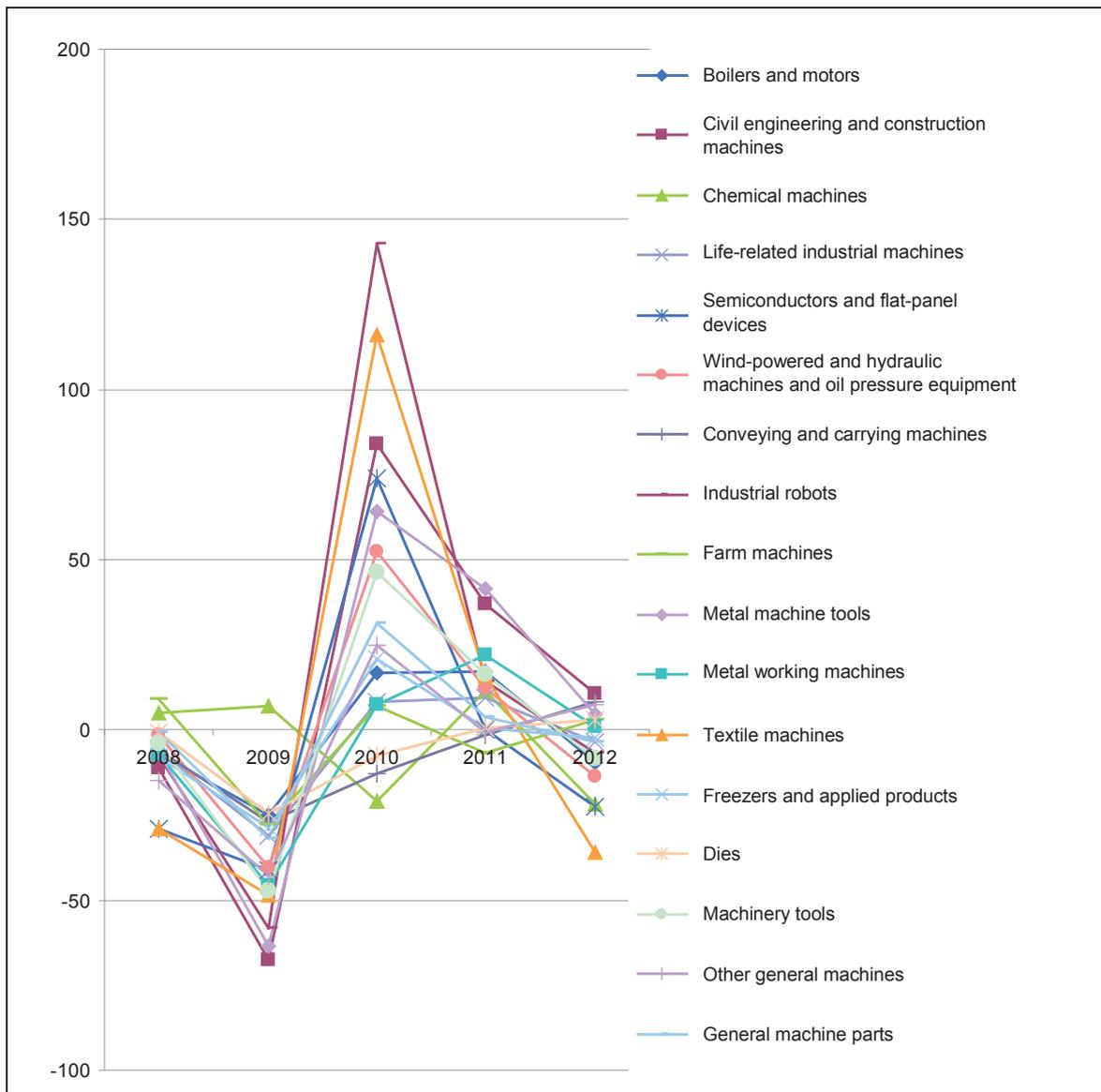
Fig. 1.1.3 Trend of the industrial indexes of the general machine industry (year-on-year basis)



Source: Same as that for Fig. 1.1.1.

Figure 1.1.4 shows the trend of the production index of the general machine industry by business category in 2012. As seen from this figure, the following facts can be pointed out for the production index by business category: first, a downward tendency is remarkable as a whole (A negative year-on-year figure was registered for 10 of the 17 business categories), and second, textile machines suffered a considerable decline as much as 36.1% in particular. Third, semiconductor and flat-panel devices and chemical machines registered a fall of over 20% year on year first in three years for the former and first in two years for the latter.

Fig. 1.1.4 Trend of the production indexes of the general machine industry by business category (year-on-year basis)

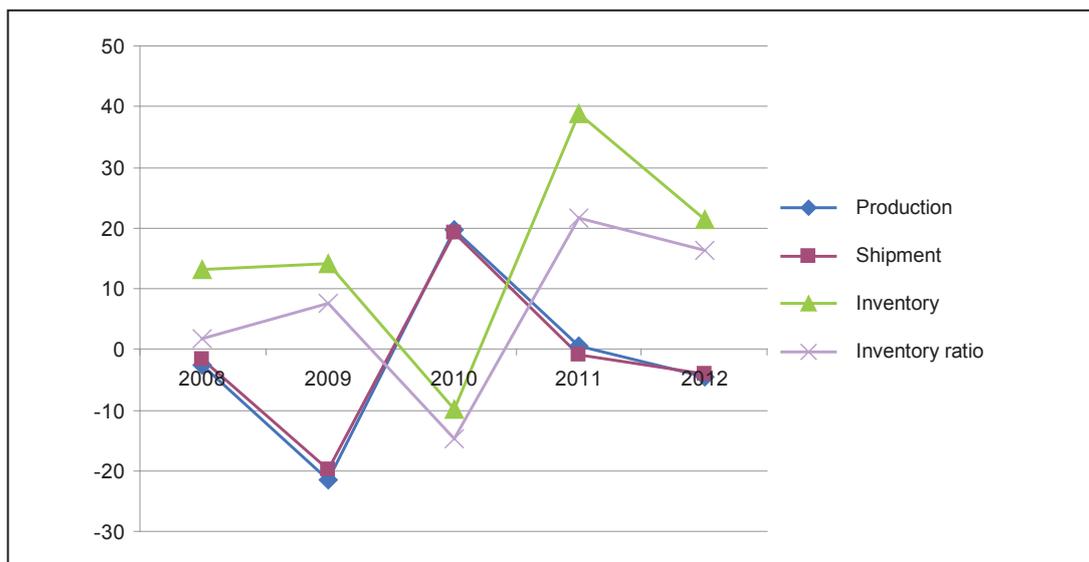


Source: Same as that for Fig. 1.1.1.

(3) Trend of the electric machine industry

As Figure 1.1.5 shows, the production index of the electric machine industry (rotary electric machines, stationary electric machines, switching devices and equipment, consumer electric machines, wiring/lighting appliances, electronic application devices, batteries and other electric machines) in 2012 decreased by 4.5% from the previous year after an interval of three years because the output of electric measuring instruments, batteries, consumer electric machines, etc. went down, although that of other electric machines, etc. rose. The shipment index registered a fall of 4.1% year on year for the second consecutive years, and it can be pointed out that behind this was the fact that the shipment of batteries, electric measuring instruments, switching devices and equipment, etc. dropped while that of electronic application devices, etc. grew. By contrast, the inventory index increased by 21.5% year on year for two years in a row, and the inventory ratio registered a 16.2% year-on-year rise for the second consecutive year as the inventory index.

Fig. 1.1.5 Trend of the industrial indexes of the electric machine industry (year-on-year basis)

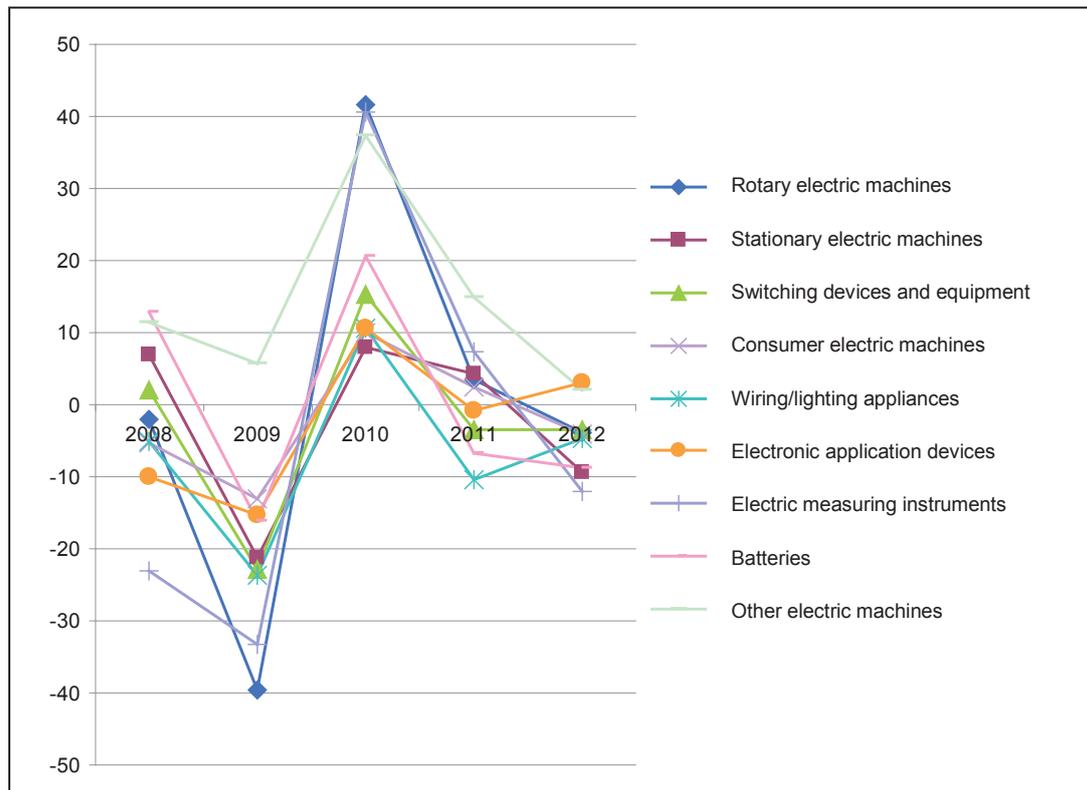


Source: Same as that for Fig. 1.1.1.

The trend of the production index of the electric machine industry by business category is as shown in Figure 1.1.6. As seen in this figure, the tendency of the electric machine industry by business category in 2012 can be summarized as follows: first, the production of electric measuring instruments suffered a fall of 12.1% from the previous year first in three years as a result of a smaller output of semiconductor and IC measuring instruments, electricity measuring apparatuses and industrial measuring and control instruments despite an increase in the production of electricity meters. Second, the output of batteries experienced a decrease of 8.7% year on year for the second consecutive year because the figures for lithium-ion storage batteries, alkaline-manganese batteries and lithium batteries decreased although those for alkaline batteries, etc. rose. Third, the production of consumer electric machines decreased by 4.1% from the previous year for three years in a row

due to a lower output of separate-type air conditioners, electric washing machines, natural refrigerant heat pump-type water heaters, etc. in spite of a greater production of electric refrigerators, etc. Finally, other electric machines enjoyed a higher output by 2.0% year on year for the fifth straight year because solar cell modules recorded a greater production although backlight devices for liquid crystal panels had a lower output.

Fig. 1.1.6 Trend of the production index of the electric machine industry by business category (year-on-year basis)



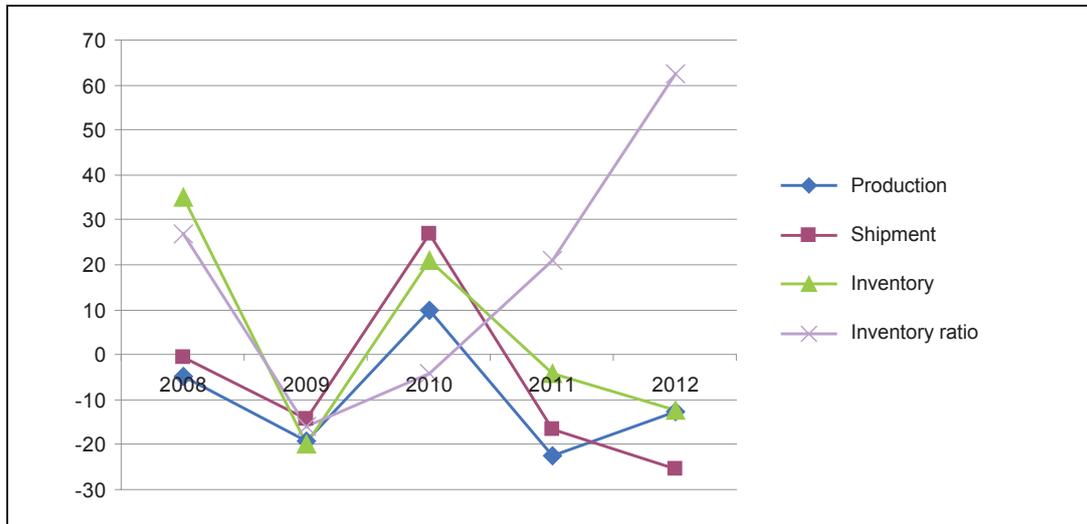
Source: Same as that for Fig. 1.1.1.

(4) Trend of the information and communication machine industry

Figure 1.1.7 shows the industrial indexes of the information and communication machine industry (communication machines, consumer electronic machines, electronic computers and other information and communication machines). As evident from this figure, the production index of this industry in 2012 fell by 12.8% year on year for two years in a row. Behind this was the situation where the production of electronic computers increased but that of consumer electronic machines, communication machines and other information and communication machines registered a decline. The shipment index also suffered a fall of 25.3% from the previous year for two years in a row, and behind this was the fact that the figure for electronic computers increased while that for consumer electronic machines, communication machines and other information and communication machines decreased. On the other hand, the inventory index suffered a year-on-year drop of 12.5% for the second straight year. The factors behind this was the fact that while electronic computers, other

information and communication machines and communication machines recorded a larger inventory, the inventory of consumer electronic machines decreased. The inventory ratio registered a growth of 62.6% over the previous year for two straight years.

Fig. 1.1.7 Trend of the industrial indexes of the information and communication machine industry (year-on-year basis)

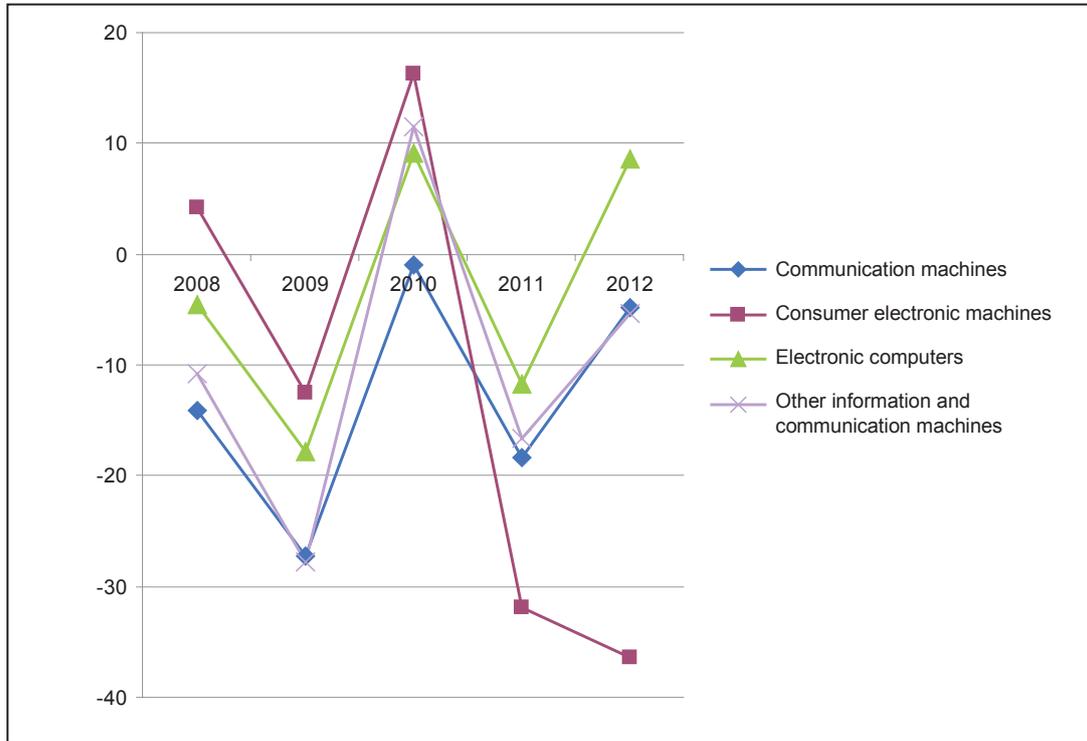


Source: Same as that for Fig. 1.1.1.

The trend of the production index of the information and communication machine industry by business category is as shown in Figure 1.1.8. As this figure indicates, the situation of this industry by business category can be outlined as follows: first, the production of consumer electronic machines suffered a decline of 36.4% from the previous year for the second consecutive year because the output of liquid crystal TVs, digital cameras, DVD videos, etc. fell although that of car navigation systems grew. By product type, liquid crystal TVs had a substantial decline in production of 85.0% year on year, a fall for two years in a row, as a reaction to the earlier demand created by the “eco-point” system. In addition, the output of DVD-videos experienced a decrease of 72.2% for the fourth straight year affected by an inactive demand for liquid crystal TVs. Second, the production of information and communication machines fell for six years in a row with a decline of 4.8% from the previous year as a result of a lower output of cellphones and fixed communication devices in spite of a greater production of base station communication devices, etc. By product type, cellphones had a lower output for the sixth straight year with a fall of 11.5% year on year as a result of the relocation of manufacturing facilities to overseas, while the output of fixed communication devices dropped by 7.4% from the previous year, a decrease for three years in a row, due to a lower demand for disaster radio devices from municipalities. Third, it can be pointed out that the output of other information and communication machines suffered a decrease for two years in a row with a 5.4% year-on-year fall because that of industrial TV sets, etc. grew but terminal devices had a smaller production. By product type, while the output of solar modules recorded a growth for five straight years with an increase rate of 3.6% over the previous year because this product had a greater production for the domestic market for use in mega-solar power plants and for consignment production, backlight

devices for liquid crystal panels suffered a lower output for the sixth consecutive year with a decline of 65.5% from the previous year.

Fig. 1.1.8 Trend of the production index of the information and communication machine industry by business category (year-on-year basis)

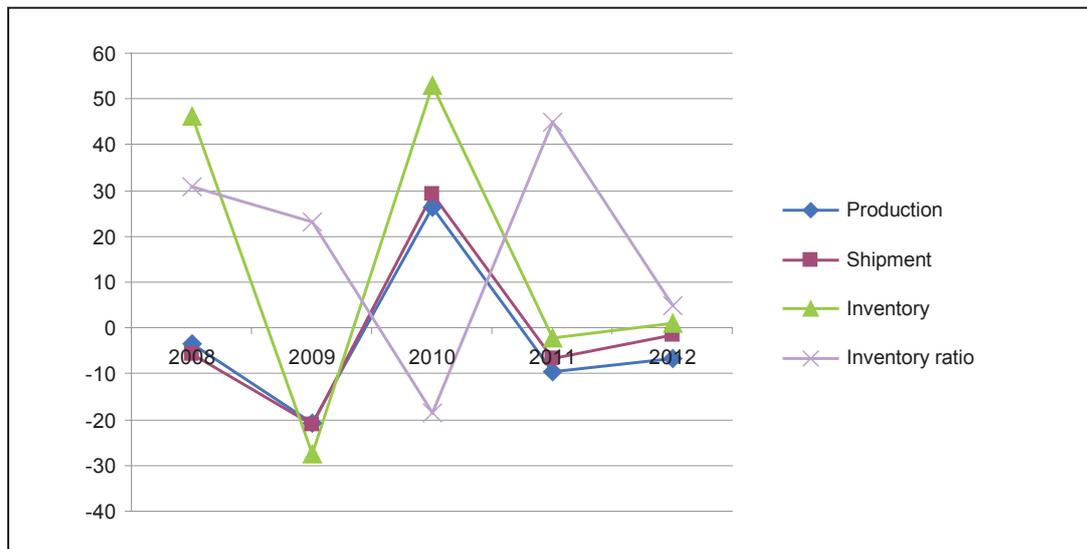


Source: Same as that for Fig. 1.1.1.

(5) Trend of the electronic parts and device industry

Figure 1.1.9 shows the industrial indexes of the electronic parts and device industry (electronic parts, semiconductor devices, integrated circuits and semiconductor parts). As seen in this figure, the production index in 2012 decreased for the second straight year with a year-on-year drop of 6.8%. Behind this was the circumstances where all of the product categories, i.e., electronic parts, integrated circuits, semiconductor parts and semiconductor devices, registered a lower output. By product type, the production of medium- and small-sized active-type liquid crystal elements grew but that of large-sized active-type liquid crystal elements, logic devices, hybrid integrated circuits, etc. fell. The shipment index declined by 1.4% year on year, a drop for the second consecutive year. The factor behind this was the fact that while the shipment of integrated circuits increased, electronic parts, semiconductor devices and semiconductor parts registered smaller shipment. By contrast, the inventory index rose by 0.9% over the previous year, a rise for the first time in two years. The situation behind this was the fact that the inventory of semiconductor devices decreased but that of electronic parts and integrated circuits showed a growth. The inventory ratio increased by 4.9% year on year, a rise for two straight years.

Fig. 1.1.9 Trend of the industrial indexes of the electronic parts and device industry (year-on-year basis)

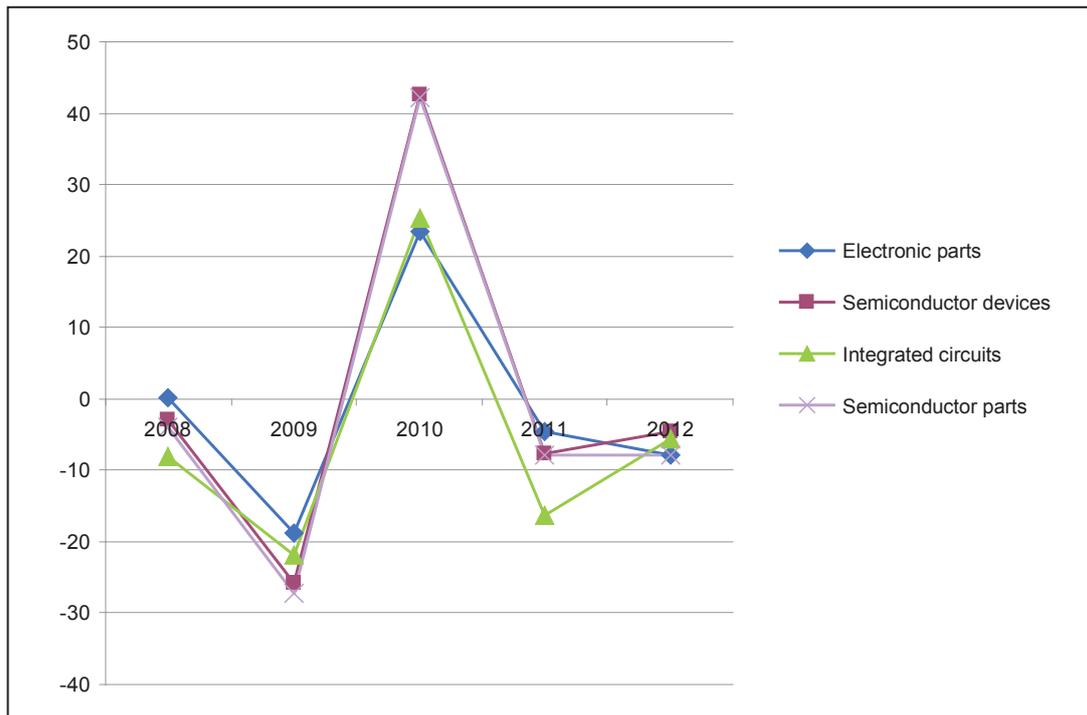


Source: Same as that for Fig. 1.1.1.

The trend of the production index of the electronic parts and device industry by business category is as shown in Figure 1.1.10. As evident from this figure, the tendency by business category can be summarized as follows: first, it can be pointed out that the production of electronic parts suffered a decrease for the second consecutive year with a drop of 7.9% from the previous year as a result of a lower output of large-sized active-type liquid crystal elements, fixed capacitors, electronic circuit boards, etc. despite a greater production of medium- and small-sized active-type liquid crystal elements, etc. By the type of products, the output of large-sized active-type liquid crystal elements suffered a year-on-year decline of 31.7% due to a smaller production of these elements for the domestic market for liquid crystal TV sets, that of fixed capacitors registered a fall of 6.7% from the previous year because of relocation of manufacturing bases to overseas, and that of electronic circuit boards showed a decrease of 5.5% year on year as a result of a lower output of this product for use in cellphones in the domestic market; all of these were decreases for the second straight year. On the other side, medium- and small-sized active-type liquid crystal elements achieved good results with a growth of 9.8% year on year, an increase for three years in a row, as a result of large export of this product for cellphone uses to China. Second, the output of integrated circuits declined for the second straight year with a fall of 5.7% as compared with the previous year because logic devices, hybrid integrated circuits, microprocessors, etc. had a smaller production although the output of CCDs increased. By product type, the output of logic devices fell by 13.4% year on year due mainly to a decreased production for game machines for the domestic market, that of hybrid integrated circuits suffered a drop of 19.7% as a result of a lower output for the domestic market and China, and that of microprocessors went down by 8.3%, a fall for the second consecutive year, because of a decline in the output for game machines for the domestic market. The shipment of integrated circuits increased first in two years with a year-on-year rise of 2.1%, and it may be pointed out that behind this was the

situation where the shipment of logic devices experienced a decline of 11.9% from the previous year, a drop for two straight years but CCDs recorded a substantial growth of 55.4% and microprocessors enjoyed a 4.3% growth, which were both a rise after an interval of two years. Third, the production of semiconductor parts (silicon wafers) experienced a decrease for the second consecutive year with a drop of 7.8% year on year because the output for Taiwan and South Korea decreased.

Fig. 1.1.10 Trend of the production index of the electronic parts and device industry by business category (year-on-year basis)



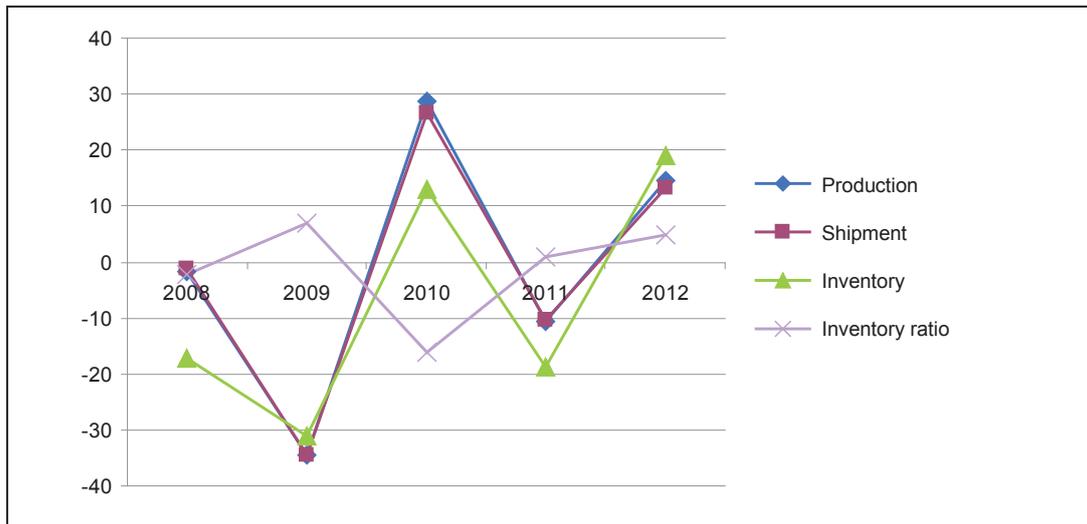
Source: Same as that for Fig. 1.1.1.

(6) Trend of the transportation machine industry

Figure 1.1.11 shows the industrial indexes of the transportation machine industry (passenger cars, buses, trucks, automotive parts, two-wheeled vehicles and industrial vehicles). As this figure indicates, the production index of the transportation machine industry in 2012 rose by 14.5% over the previous year, an increase first in two years. The reason for this was the fact that while the production of two-wheeled vehicles and industrial vehicles declined, that of passenger cars, automotive parts, trucks, etc. rose. The shipment index of this industry also increased by 13.3% year on year, a growth first in two years. And the factor behind this was the situation where as in the case of the production index, the output of two-wheeled vehicles and industrial vehicles went down but that of passenger cars, automotive parts, trucks, etc. went up. In the area of domestic and overseas demand, the shipment index for the domestic market increased by 15.5% from the previous year as a result of greater shipment of passenger cars, automotive parts and trucks despite a decline in the shipment of two-wheeled vehicles. The index for export rose by 7.1% year on year, and this was because the smaller shipment of industrial vehicles and two-wheeled vehicles was made up for by an

increase in the shipment of passenger cars, automotive parts and trucks. The inventory index rose by 19.0%, an increase first in two years, due to a growth in the inventory of passenger cars and industrial vehicles. The inventory ratio rose by 4.8% year on year, a rise for the two years in a row.

Fig. 1.1.11 Trend of the industrial indexes of the transportation machine industry (year-on-year basis)

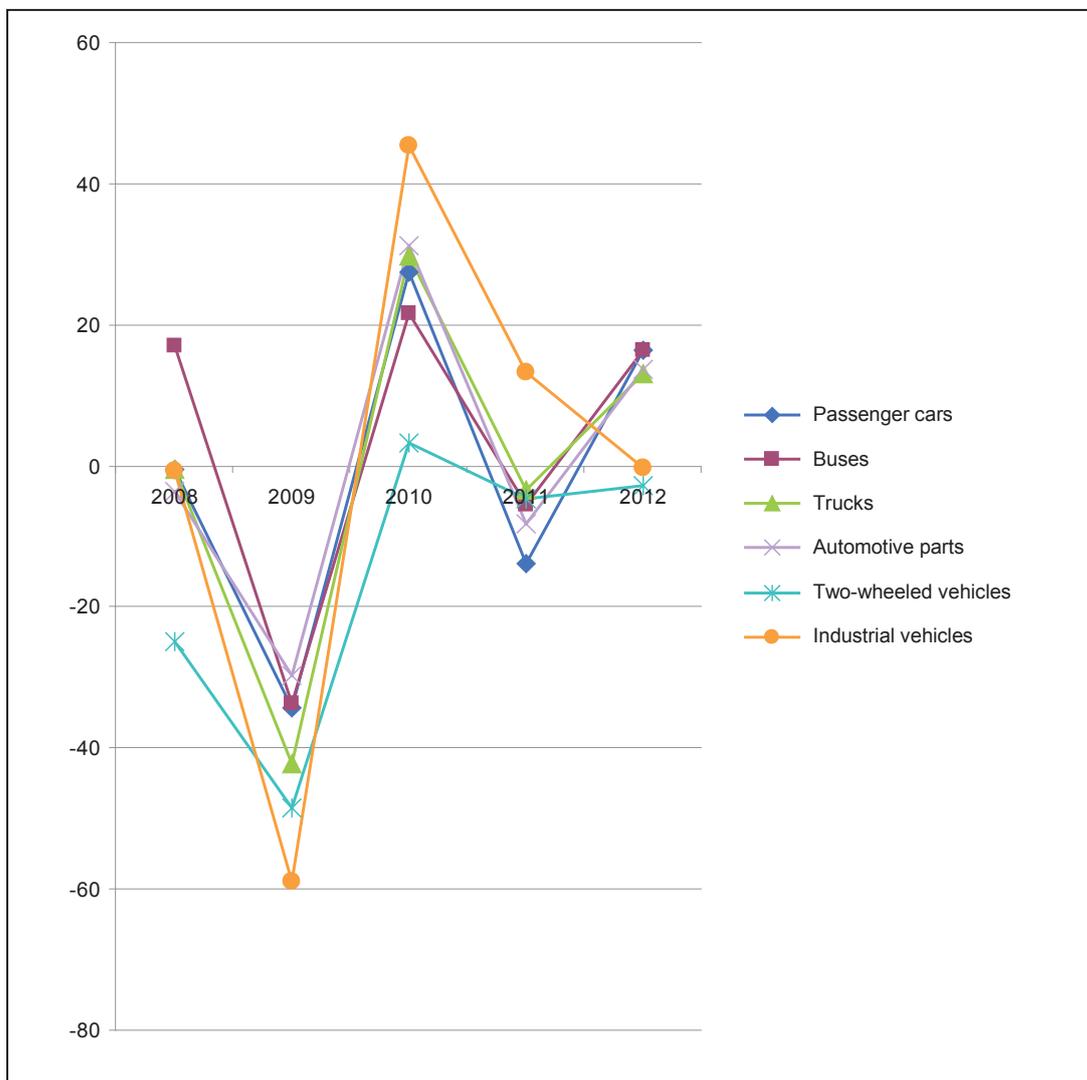


Source: Same as that for Fig. 1.1.1.

The trend of the production index of the transportation machine industry by business category is as shown in Figure 1.1.12. As seen in this figure, the situation of the industry by business category may be summarized as follows: first, the output of passenger cars went up first in two years with a year-on-year growth of 16.3% as automakers further recovered from a shortage of parts caused by the Great East Japan Earthquake and the floods in Thailand in 2011 and supported by the subsidies of the Eco-friendly Car Promotion Project (“subsidies for eco-friendly cars”). By type of vehicle, the output of standard-sized passenger cars increased by 12.2% over the previous year because the production for the domestic market as well as for the U.S., the Middle East, etc. grew, while that of small-sized passenger cars went up by 21.0% year on year as a result of greater production both for the domestic market and for export. Light passenger cars enjoyed a substantial growth of 44.6% due to greater demand for cars of this type supported by the introduction of new models by automakers; this was an increase after an interval of two years together with standard-sized passenger cars. The ratio of the production of hybrid cars to that of passenger cars (excluding light passenger cars) rose by 7.6 percentage points from 12.3% in 2011 to 19.9% in 2012. Second, the production of trucks increased by 13.1% over 2011, a rise after an interval of two years. By type of vehicle, the output of ordinary trucks registered a year-on-year growth of 13.6% because their production for the domestic market and for such markets as the ASEAN and the Middle East increased, while that of small-sized trucks rose by 17.7% as a result of greater production for export as well as for the domestic market, including demand for reconstruction after the great earthquake. The production of light trucks rose by 4.6% year on year due to higher output for the domestic users. The growth was first in two years

for all of these types of trucks. Third, the output of automotive parts went up by 13.6%, a rise after an interval of two years, because production both for the domestic market and for export rose. By product type, while the production of air-conditioners for passenger cars dropped, that of driving, transmission and steering devices and parts, chassis and auto body components, engine parts, etc. went up. Fourth, two-wheeled vehicles suffered a lower output by 2.9% from the previous year, a decline for two straight years, as a result of a fall in the production for both domestic users and export. By product type, both two-wheeled vehicles of 125ml or less and those of over 125ml experienced lower output.

Fig. 1.1.12 Trend of the production index of the transportation machine industry (year-on-year basis)

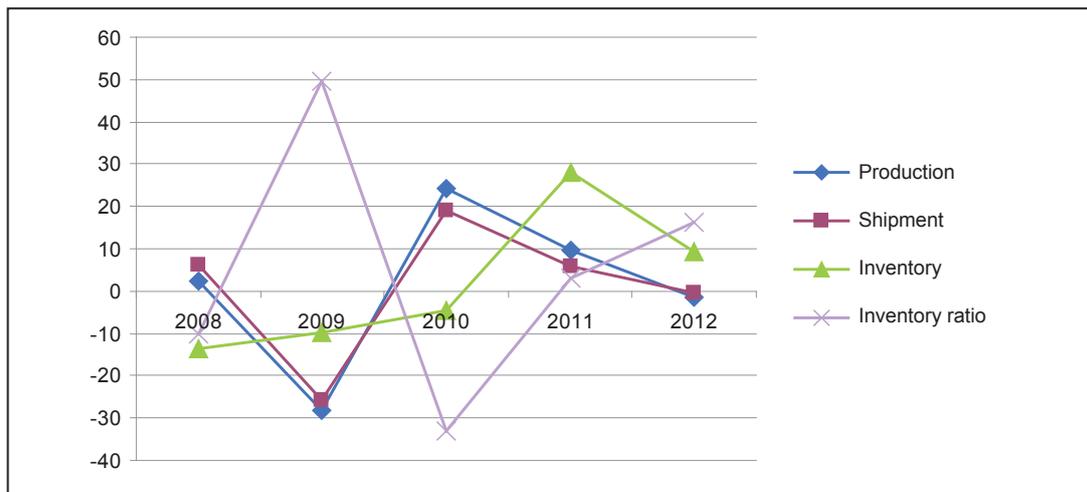


Source: Same as that for Fig. 1.1.1.

(7) Trend of the precision machine industry

Figure 1.1.13 shows the industrial indexes of the precision machine industry (measuring instruments, optical machines and parts and timepieces). As evident from this figure, the production index of this industry in 2012 suffered a decrease of 1.6% year on year, a fall first in three years, because the output of timepieces went up but that of optical parts and measuring instruments fell. By product type, the production of analyzing instruments, etc. rose but that of interchangeable lenses for cameras, precision measuring instruments, industrial length meters, etc. dropped. The shipment index fell by 0.5% from the previous year, a decline after an interval of three years. By business category, the shipment of measuring instruments and timepieces rose, that of optical parts fell. In the area of domestic and overseas demand, shipment for the domestic market increased by 0.1% year on year due to a growth of timepieces and optical parts but that for export dropped by 0.8% as a result of the smaller shipment of optical parts and timepieces. The inventory index increased by 9.2%, a rise for the second consecutive year, because the stock of optical parts and timepieces was increased although that of measuring instruments fell, while the inventory ratio rose by 16.3% year on year, an increase for two years in a row.

Fig. 1.1.13 Trend of the industrial indexes of the precision machine industry (year-on-year basis)

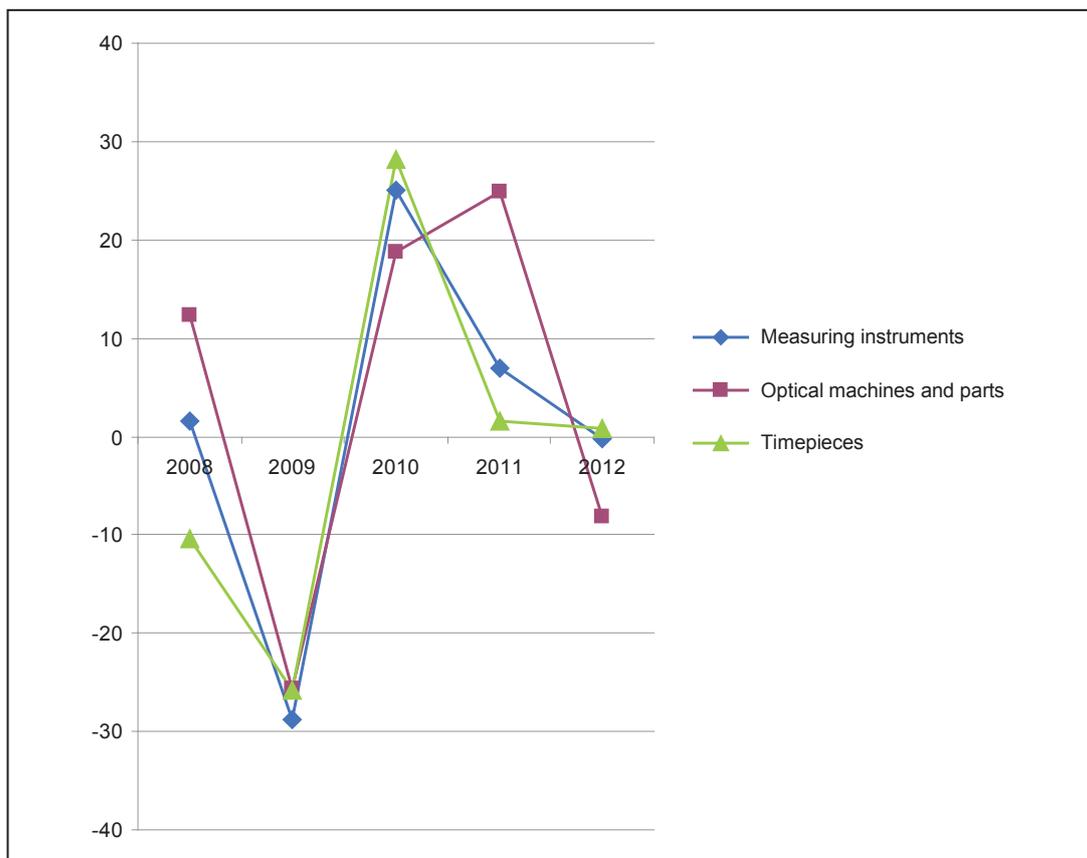


Source: Same as that for Fig. 1.1.1.

The production index of the precision machine industry by business category as compared with the previous year is as shown in Figure 1.1.14. As indicated in this figure, the tendency of this industry by business category in 2012 can be outlined as follows: first, the production of optical parts (interchangeable lenses for cameras) dropped by 8.2% from the previous year, a drop after an interval of three years, because some manufacturers moved up their production greatly in the second half of 2011 and also affected by lower output for the U.S. and Europe. Second, the production of measuring instruments suffered a fall of 0.2%, a decrease first in three years, as a result of lower output of precision measuring instruments, industrial length meters, testing machines, etc. in spite of an increase in the production of analyzing instruments. By product type, the output of precision

measuring instruments fell by 8.5% year on year because that of cylinder gages, form measuring instruments, etc. for the domestic market, the U.S. and China went down, while the production of industrial length meters fell by 7.7% year on year as a result of the lower output of dial gauges and slide calipers for the domestic market, South Korea, the U.S., etc. The production of testing machines registered a decline of 7.4% from the previous year due to the lower output of hardness gauges, etc. for the West and the domestic market. All of these decreases were first in three years. By contrast, analyzing instruments enjoyed greater production at a rate of 6.5% over the previous year, a growth for the third straight year, because the output for blood analyzing devices for South Korea and China went up. Third, the output of timepieces increased by 0.8% year on year, a rise for the third consecutive year, because battery-powered timepieces had greater production although battery-powered timepiece movements suffered lower output. By product type, while the production of battery-powered timepieces registered a year-on-year increase of 18.6%, a rise after an interval of two years, because the output for Asia, etc. went up, that of battery-powered timepiece movements declined by 9.0%, a decrease first in three years, as a result of smaller production mainly for China (Hong Kong).

Fig. 1.1.14 Trend of the production index of the precision machine industry by business category (year-on-year basis)



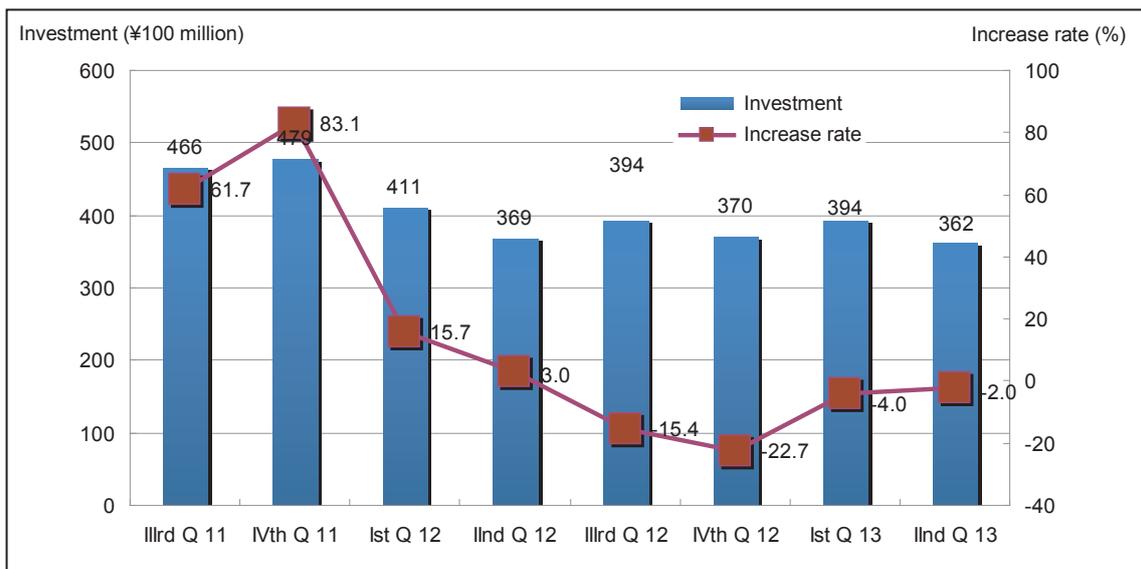
Source: Same as that for Fig. 1.1.1.

1.2. Situation of the capital investment of the machine industry

(1) Situation of the capital investment in general-purpose machine industry

Capital investment in general-purpose machines started a downward trend in the 1st quarter of 2012, and its increase rate decreased to -22.7% in the IVth quarter of 2012. It is supposed that this was affected by curtailment in capital investment resulting from the deceleration of economic growth in China (See Fig. 1.2.1).

Fig. 1.2.1 Situation of capital investment in general-purpose machine industry



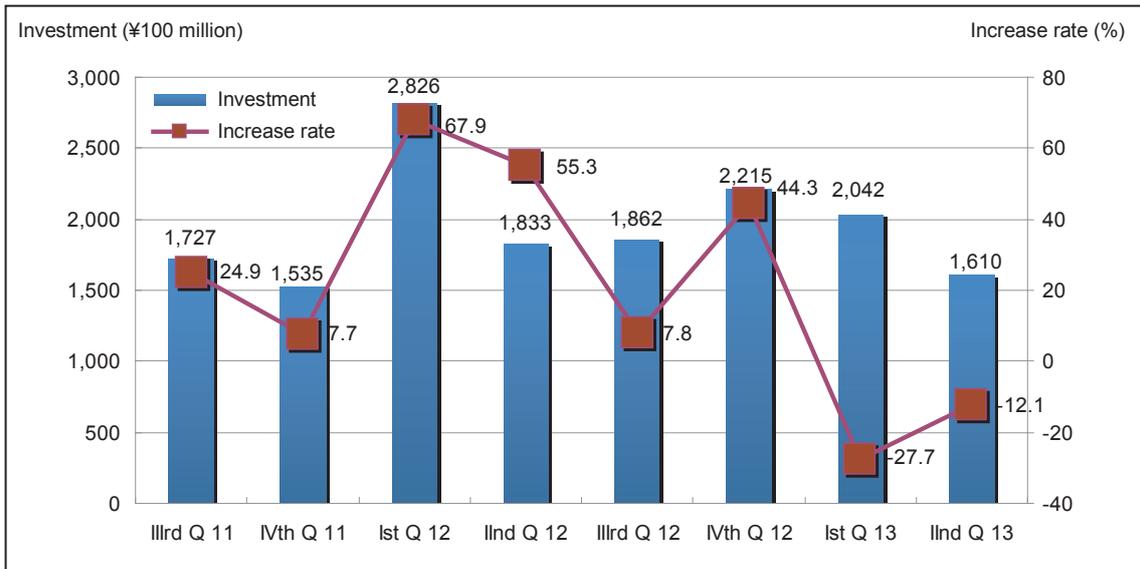
Note: Increase rate figures are those as compared with the same quarter of the previous year. In the IInd quarter of 2009 and after, part of "general machines" and "precision machines" has been reclassified into "general-purpose machines," "manufacturing machines" and "office machines."

Source: Based on the Ministry of Finance, "Financial Statements Statistics of Corporations by Industry."

(2) Situation of capital investment in manufacturing machine industry

Capital investment in manufacturing machines fell greatly in the 1st quarter of 2013. It is considered that behind this was the impact of the drop of the production of general machines for export affected by the Chinese economy (See Fig. 1.2.2).

Fig. 1.2.2 Situation of capital investment in manufacturing machine industry

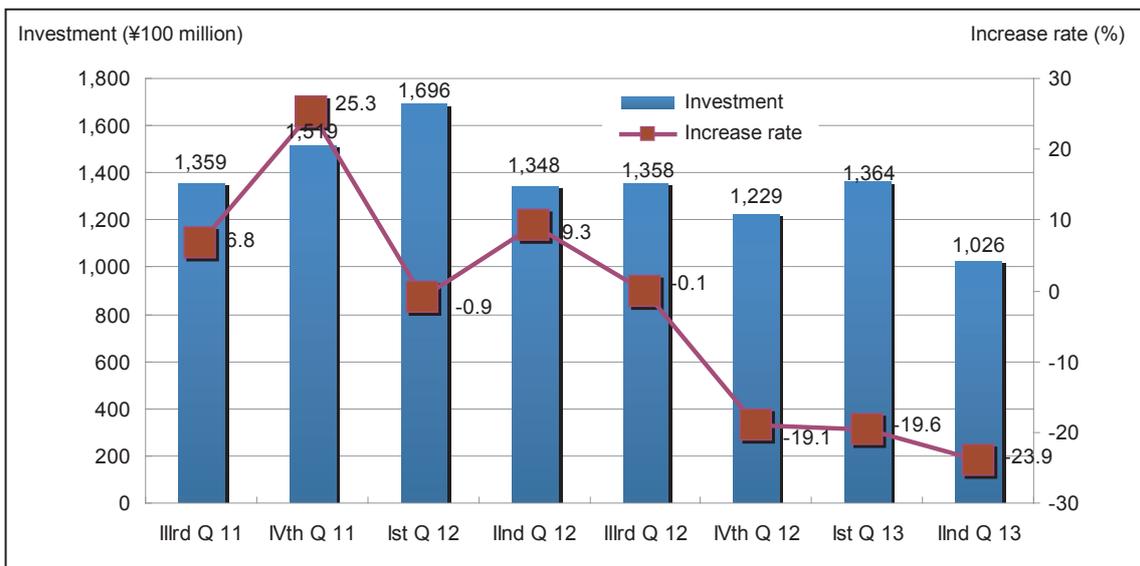


Source: Same as that for Fig. 1.2.1.

(3) Situation of capital investment in office machine industry

Capital investment in office machines showed a marked decrease in increase rate in the IInd quarter of 2013. It is supposed that this was the impact of curtailed domestic capital investment associated with a decrease in the production of precision machines, etc. for export (See Fig. 1.2.3).

Fig. 1.2.3 Situation of capital investment in office machine industry

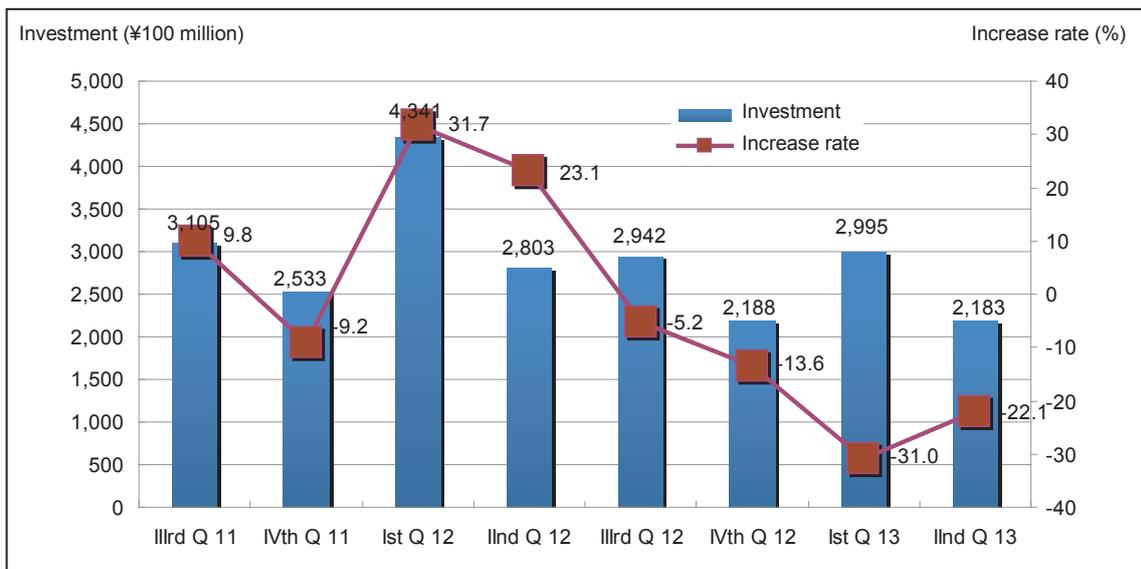


Source: Same as that for Fig. 1.2.1.

(4) Situation of capital investment in electric machine industry

Capital investment in electric machines showed some tendency toward recovery in the IInd quarter of 2013, although the increase rate dropped substantially in the Ist quarter of 2013. It is considered that behind this was the fact that moves for the revival of domestic production were started, chiefly in white goods, due to the good effects of weak yen realized by “Abenomics” (See Fig. 1.2.4).

Fig. 1.2.4 Situation of capital investment in electric machine industry



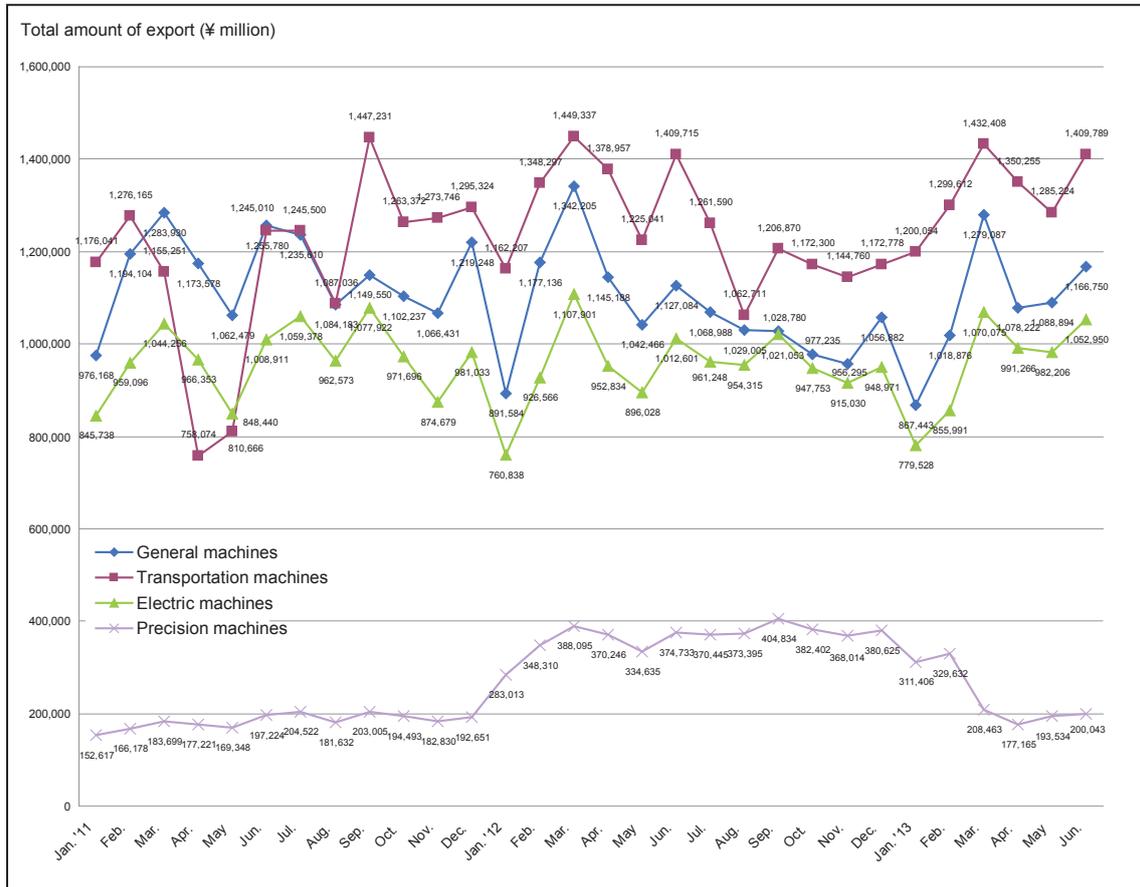
Source: Same as that for Fig. 1.2.1.

1.3. Situation of the export of the machine industry

Figure 1.3.1 shows the trend of the total amount of export of the machine industry (general machines, transportation machines, electric machines and precision machines) from January 2011 to June 2013 according to the customs clearance statistics of the Ministry of Finance. As seen from this figure, the total amount of export, especially the export of general machines, transportation machines and electric machines, went down substantially in April and May 2011 by the influence of the Great East Japan Earthquake that occurred on March 11, 2011 but showed a miraculous recovery thereafter. However, the great floods in the fall of 2011 brought chaos in the global supply chain again, making it unavoidable to slow down export activities. On the other hand, the export of precision machines remained stable even after the great earthquake and kept a high level from January 2012 to February 2013. But in March 2013 and after, the export turned into a downward trend as a result of decline in export to the U.S. and China. The total amount of export of general machines, automobile equipment and electric machines in February 2013 and after showed a growing tendency again as trading conditions were improved due to the weak yen effects of Abenomics. However, the observation of these trends from the trend of importers indicates that the situations has continued where negative aspects, including the prolonged stagnation of the European economy and reduction in capital

investment as a result of the slow-down of the Chinese economy, were supplemented by export to the ASEAN region and other developing countries. In particular, future moves of the Chinese economy will have great effects on the export of the machine industry.

Fig. 1.3.1 Trend of the total amount of export of the machine industry



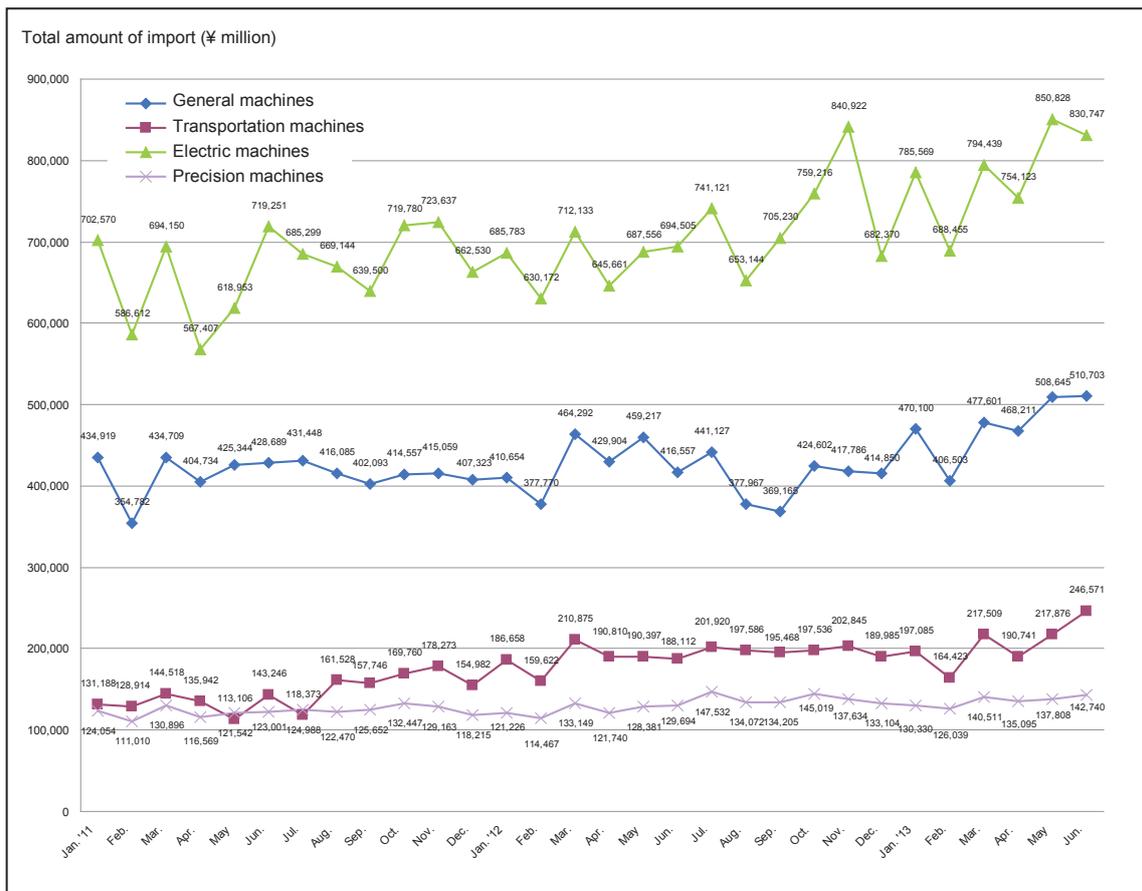
Source: Based on the customs clearance statistics of the Ministry of Finance.

1.4. Situation of the import of the machine industry

Figure 1.4.1 shows the trend of the total amount of import by month of the machine industry (general machines, transportation machines, electric machines and precision machines) from January 2011 to June 2013 according to the customs clearance statistics of the Ministry of Finance. As evident from this figure, the total amount of import of electric machines gradually increased. In particular, the total amount of import of electric machines in November 2012 and May 2013 recorded roughly 85.0 billion yen, indicating the tendency of import for overseas products and parts to grow year by year. More specifically, it can be pointed out that while the export of household electric appliances slackened in growth rates, the import of foreign-made household electric appliances and their parts began to increase in the second half of 2012. It is also supposed that the situation where the international competitiveness of the semiconductor and liquid crystal-related industries in Japan rapidly declined would lead to increases in the total amount of import of electric

machines. In addition, the global supply chains for this industry have been built up mainly by the networks with the manufacturing bases in China and the ASEAN, and the growing amount of import may also be regarded as a result of the situation where, due to prolonged strong yen, it became common practice for Japanese manufacturers to reimport finished products, parts, etc. from their overseas manufacturing sites. But because some moves toward reorganization of foreign manufacturing bases and revival of domestic production sites, mainly for white goods, have sometimes been found, the import of electric machines may edge off in the future.

Fig. 1.4.1 Situation of the total amount of import of the machine industry



Source: Same as that for Fig. 1.3.1.

1.5. Coefficients of specialization and the total amount of trade of the machine industry

Figure 1.5.1 shows the distribution of the coefficients of specialization and the total amount of trade of the four business categories of the machine industry. The longitudinal axis of the figure represents the coefficients of specialization (competitiveness indexes) and the transverse axis, the total amount of trade (amount of export + amount of import). The nearer the upper right of the figure is the industry, the stronger is the industry's international competitiveness, and the nearer the lower left is the industry, the weaker is the industry's international competitiveness. The size of the balls

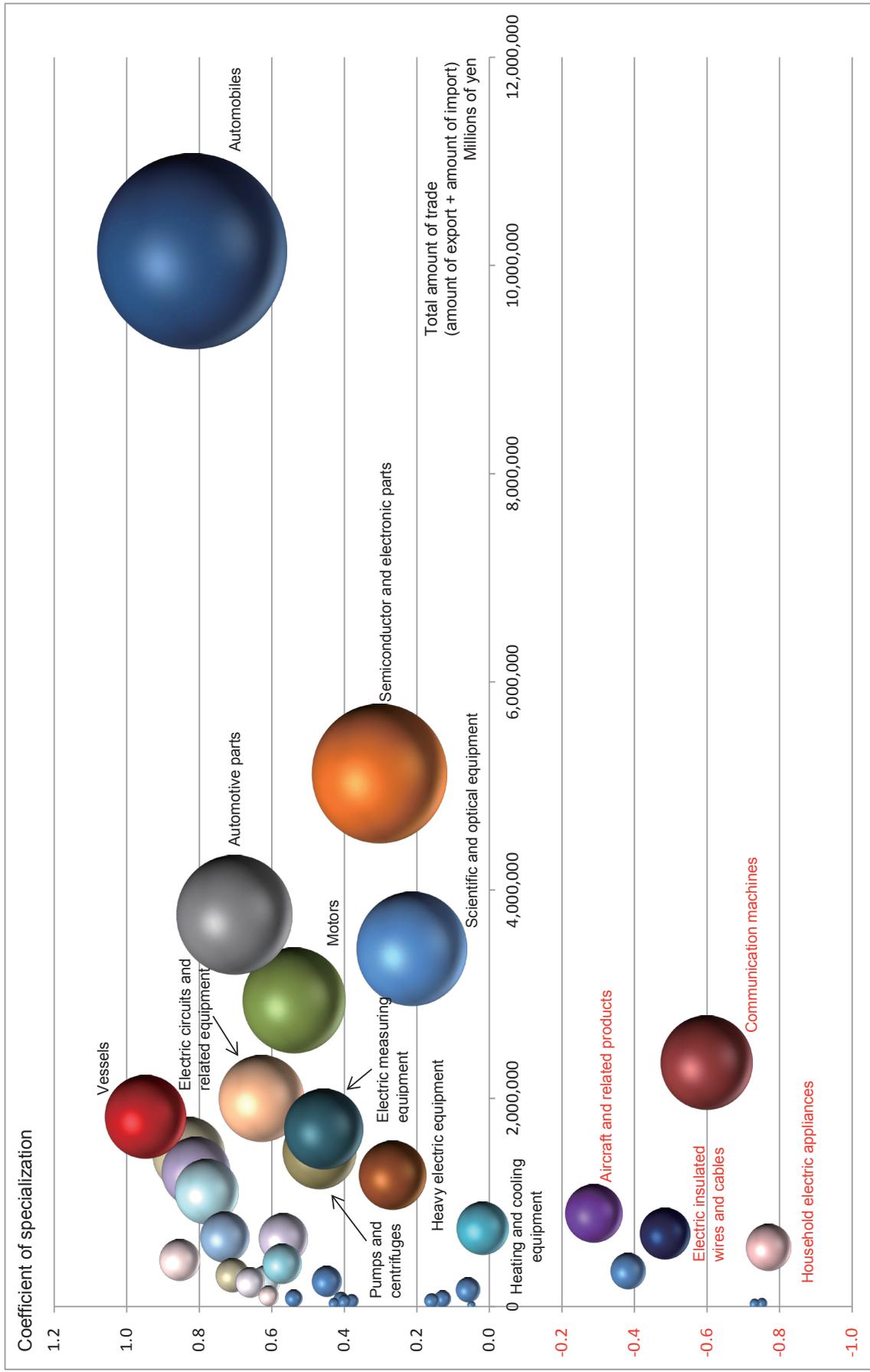
corresponds to the size of the industry's total amount of trade. The characteristics of the industries may be summarized according to the foregoing as follows:

**<Trend of the coefficients of specialization and
the total amount of trade of the entire machine industry>**

- (1) The figure indicates that the automobile industry in Japan has an overwhelmingly greater total trade amount than all the other machine industries and has a very strong international competitive power.
- (2) The figure shows that the semiconductor and electronic parts industry had a considerably great total trade amount, but its international competitiveness is not very strong.
- (3) While the automotive parts industry and the scientific and optical equipment industry have similar total trade amounts, the former has a high international competitive position but the latter's international competitive abilities are not very great.
- (4) The communication machine industry achieves a certain level of total trade amount but its competitiveness in international markets has a negative figure in the figure, putting this industry in a state of excessive import.
- (5) The household electric appliance industry has no very large total trade amount and its international competitiveness is weak, too.
- (6) The shipbuilding industry has no large total trade amount, but its competitive position in international markets is very high.

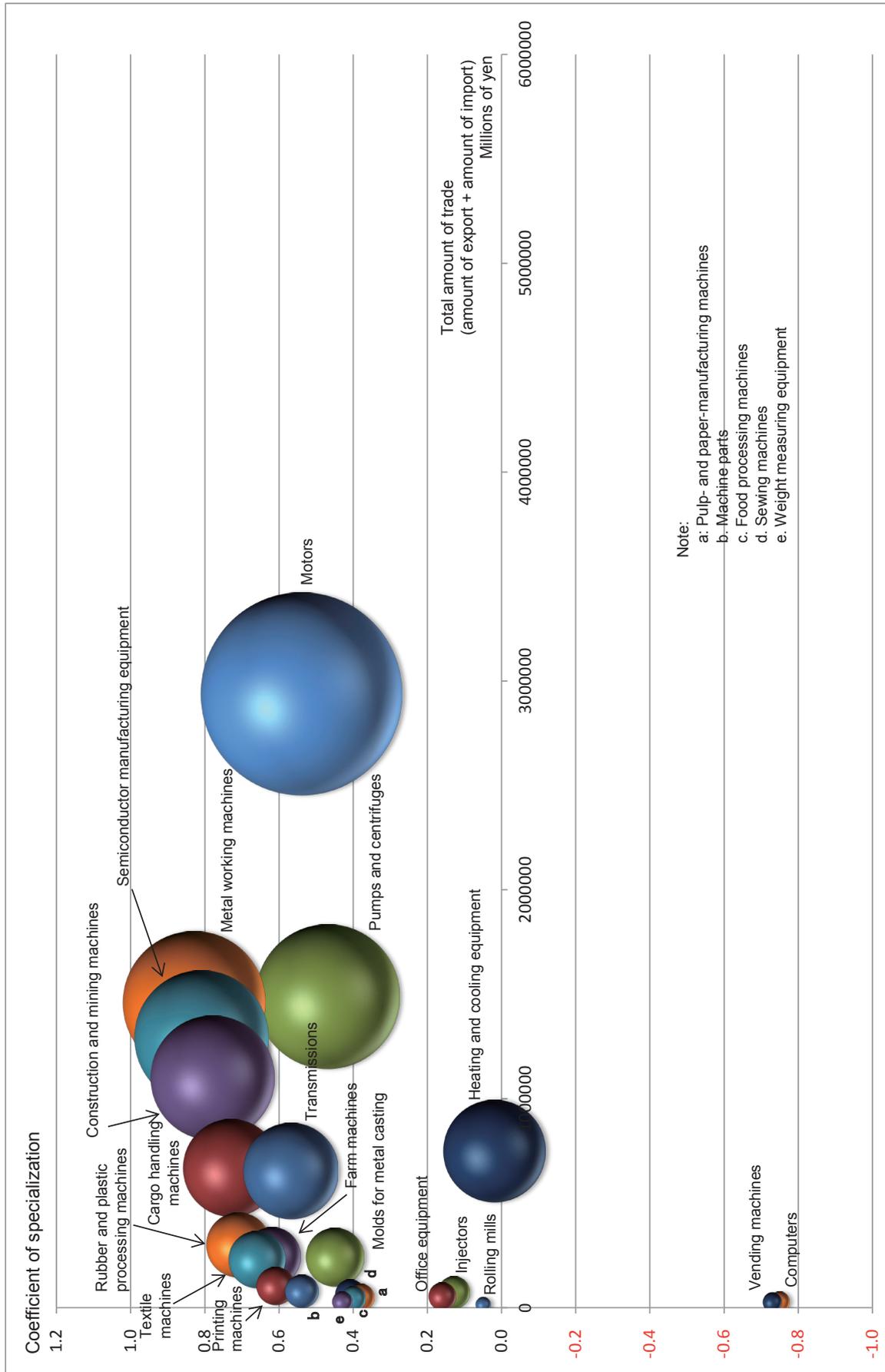
Figures 1.5.2 to 1.5.4 show the situation of the coefficients and the total trade amount by business category. First, Figure 1.5.2 is the distribution of the coefficients of specialization and the total amount of trade of the business categories of the general machine industry. It can mainly be seen from this figure that motors have a very high total trade amount and that the international competitive power of semiconductor manufacturing equipment, metal working machines, construction and mining machines, etc. is great. Then Figure 1.5.3 shows the distribution of the coefficients of specialization and the total amount of trade of the business categories of electric and electronic devices and precision machines. As seen in this figure, semiconductor and electronic parts and scientific and optical equipment have a considerably large total trade amount, but their international competitive abilities are not very great. Acoustic and video equipment parts have a small total amount of trade but a very high international competitiveness. Finally, Figure 1.5.4 is the distribution of the coefficients of specialization and the total trade amount of the business categories (excluding automobiles) of the transportation machine industry. Considering the fact that the aircraft and related products industry are expected to become a growth industry in the future, the industry's total trade amount is small and its ability to compete in overseas markets is poor.

Fig. 1.5.1 Distribution of the coefficients of specialization and the total amount of trade of all of the four business categories of the machine industry (2012)



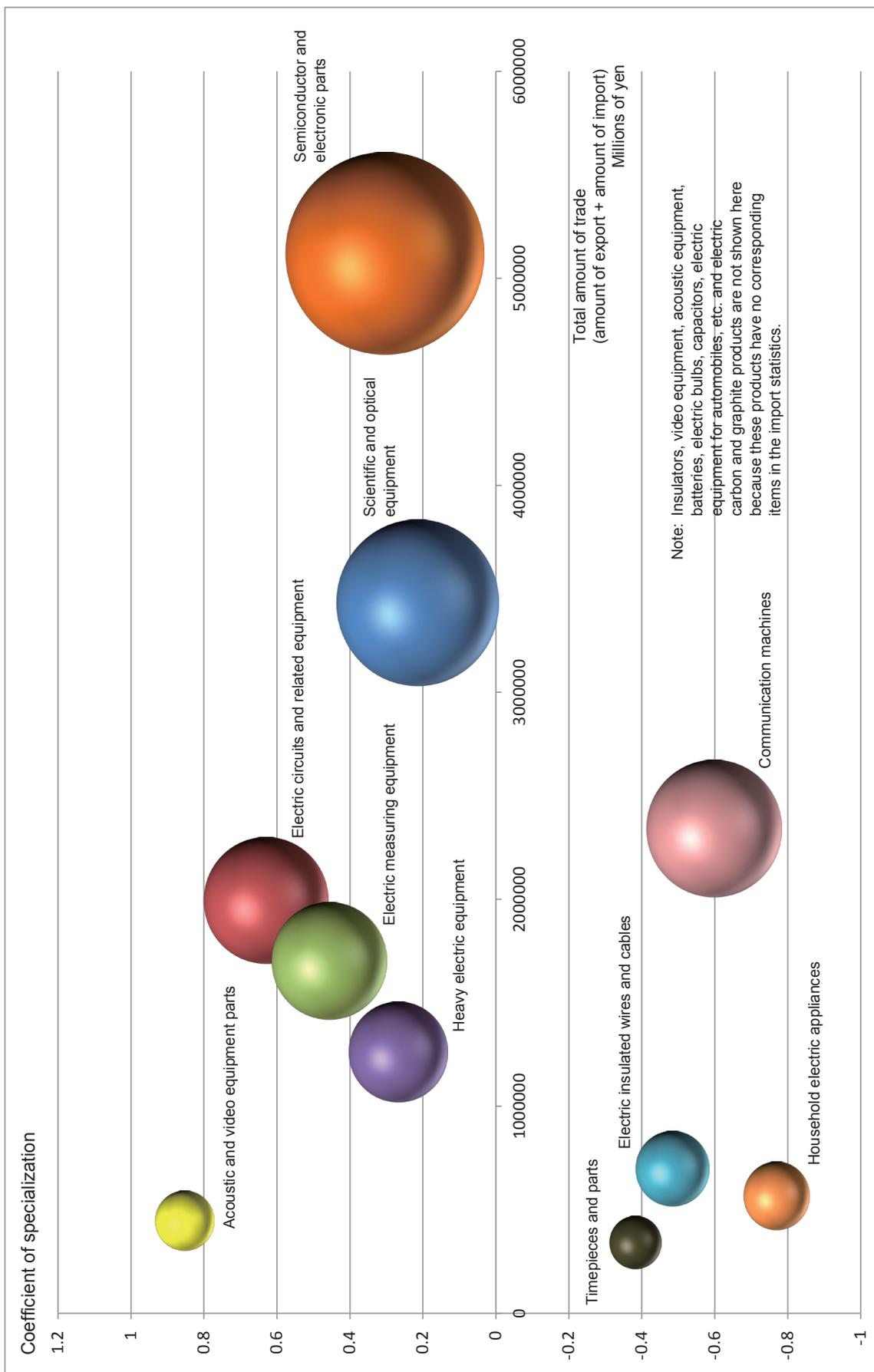
Source: Prepared by the Economic Research Institute.

Fig. 1.5.2 Distribution of the coefficients of specialization and the total amount of trade of the general machine industry (2012)



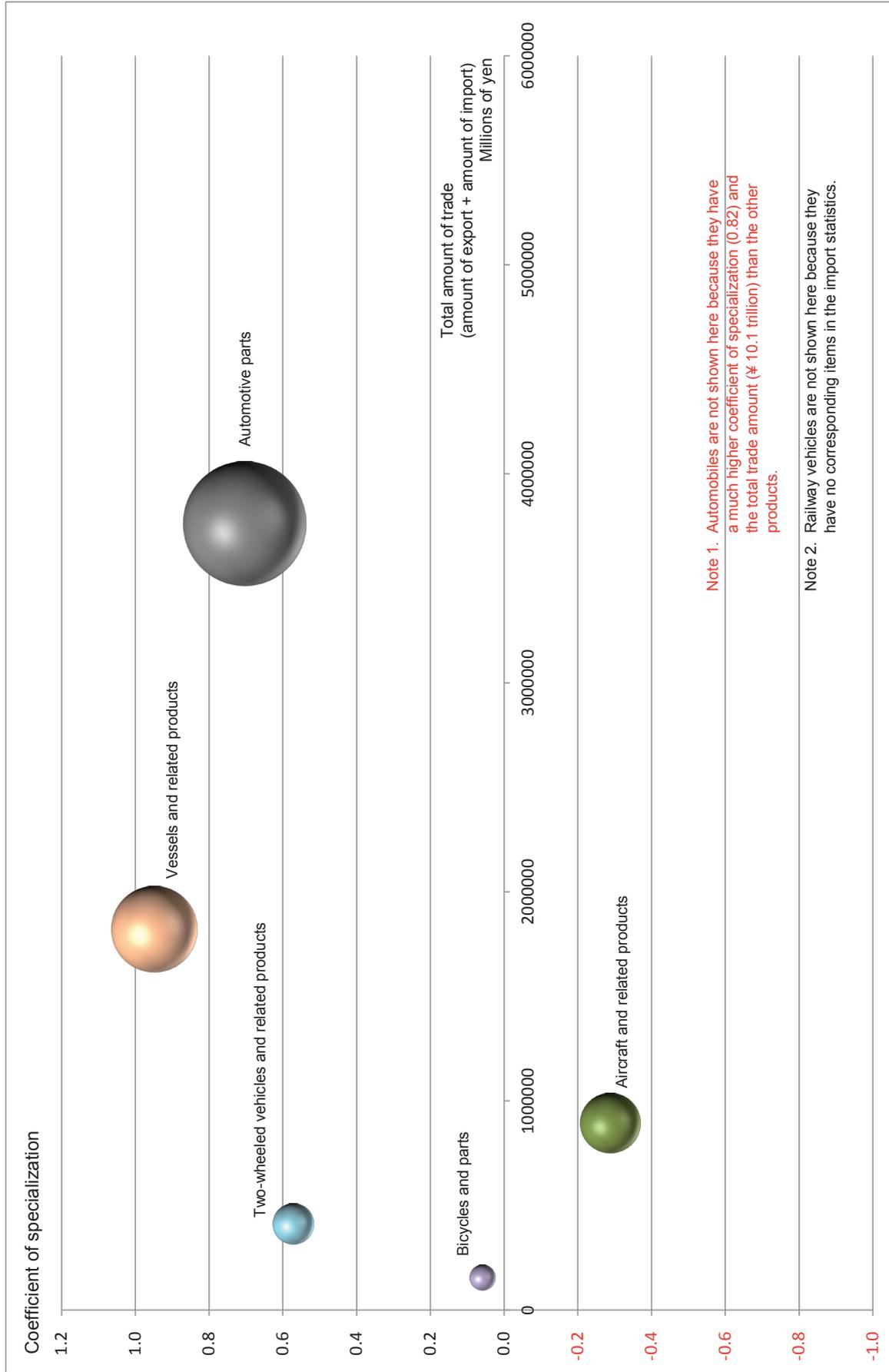
Source: Same as that for Fig. 1.5.1.

Fig. 1.5.3 Distribution of the coefficients of specialization and the total amount of trade of electric and electronic devices and precision machines (2012)



Source: Same as that for Fig. 1.5.1.

Fig. 1.5.4 Distribution of the coefficients of specialization and the total amount of trade of transportation machines (2012)



Source: Same as that for Fig. 1.5.1.

2. Trends by business category

2.1. Construction machines

2.1.1. Supply and demand trend

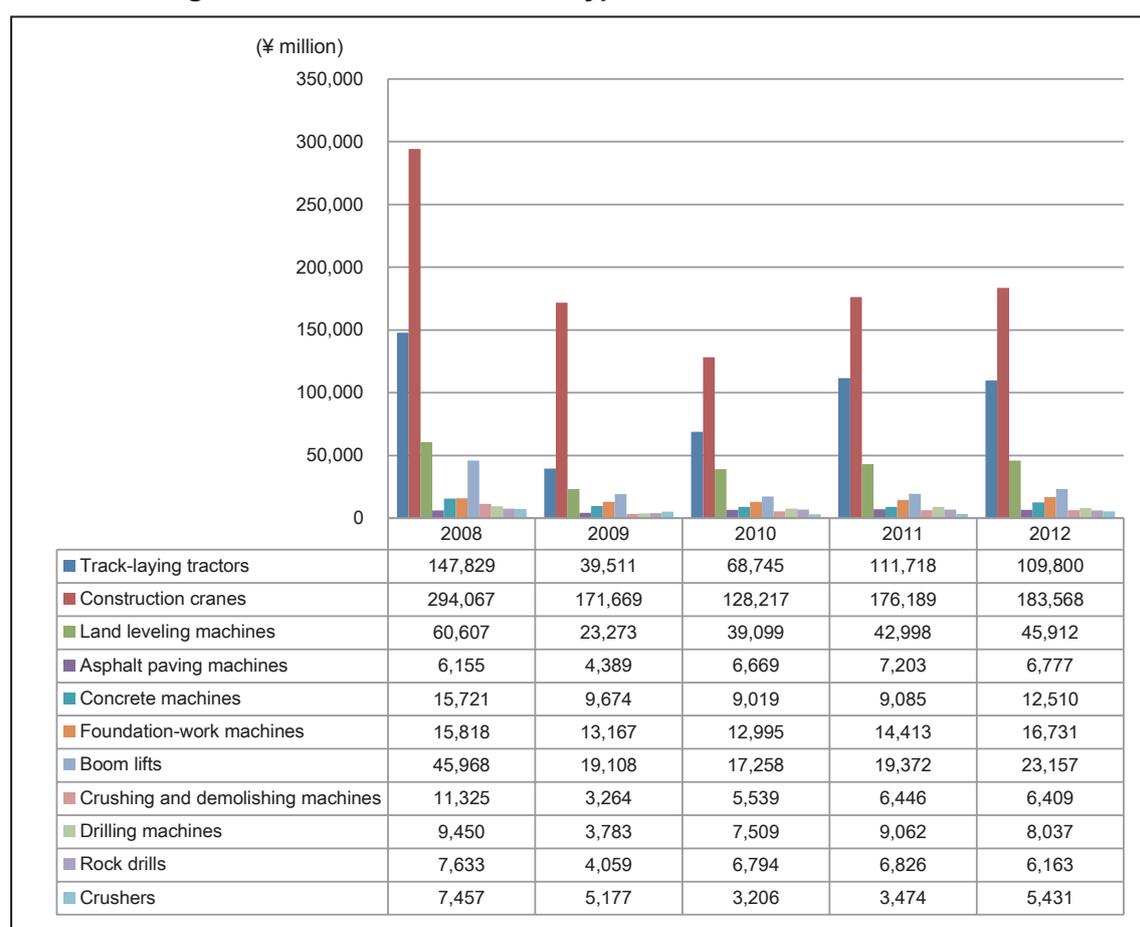
(1) Outline

The production of construction machines in 2012 amounted to about ¥1,609.7 billion, an increase of over ¥134.4 billion over 2011, recording a growth for three years in a row since 2009. The amount of the export and import of construction machines in 2012 was approximately ¥935.6 billion and ¥8.2 billion, respectively. The amount of export and that of import were both smaller than that in the previous year.

(2) Production

The trend of the amount of production of construction machines by the main types of construction machines is as shown in Figures 2.1.1 and 2.12.

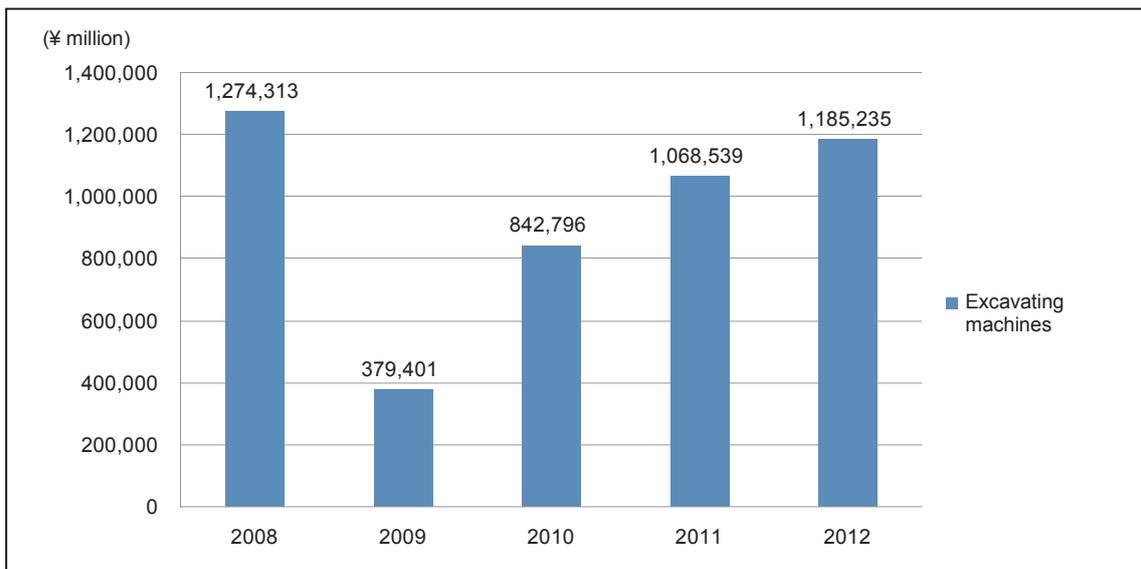
Fig. 2.1.1 Production of main types of construction machines



Source: Based on the Ministry of Economy, Trade and Industry, "Yearbook of Machinery Statistics."

The amount of output of track-laying tractors in 2012 was about ¥109.8 billion, a decrease of roughly ¥1.9 billion from the previous year (down 1.7% year on year). Construction cranes recorded a production amount of about ¥183.6 billion, a year-on-year growth of over ¥7.4 billion (up 4.2%). The production of land leveling machines totaled to about ¥45.9 billion, registering a growth of ¥2.9 billion (up 6.8%). Asphalt paving machines had an output of roughly ¥6.8 billion, down about ¥400 million (a decrease of 5.9% year on year). The production of concrete machines was approximately ¥12.5 billion, up more than ¥3.4 billion or 37.7% over the previous year. Foundation-work machines registered an output of roughly ¥16.7 billion, a year-on-year growth of over ¥2.3 billion or 16.1%. Boom lifts registered production of about ¥23.2 billion, a growth of roughly ¥3.8 billion or 19.5% over the previous year. The production of crushing and demolishing machines amounted to about ¥6.4 billion, a year-on-year fall of about ¥37 million or 0.6%. The output of drilling machines was roughly ¥8 billion, which represented a decline of roughly ¥1 billion or 11.3% from the previous year. Rock drills had production of about ¥6.2 billion, down roughly ¥700 million or 9.7% year on year. Crushers registered an output of approximately ¥5.4 billion, recording a growth of more than ¥2 billion or 56.3% over the previous year.

Fig. 2.1.2 Production of excavating machines

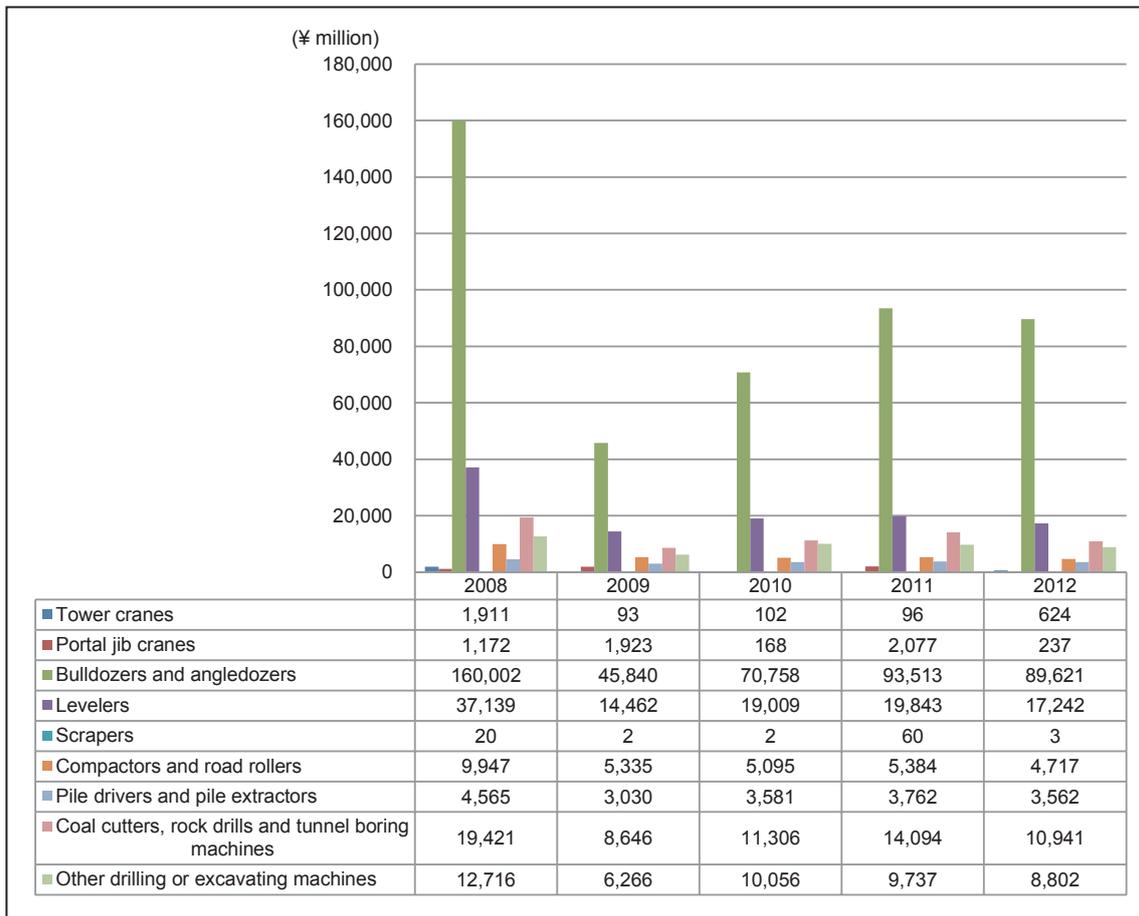


Source: Same as that of Fig. 2.1.1.

The production of excavating machines amounted to ¥1,185.2 billion, which was an increase of roughly ¥116.7 billion or 10.9% over the previous year.

(3) Export and import

The trend of export of main types of construction machines is as shown in Figures 2.1.3 and 2.1.4.

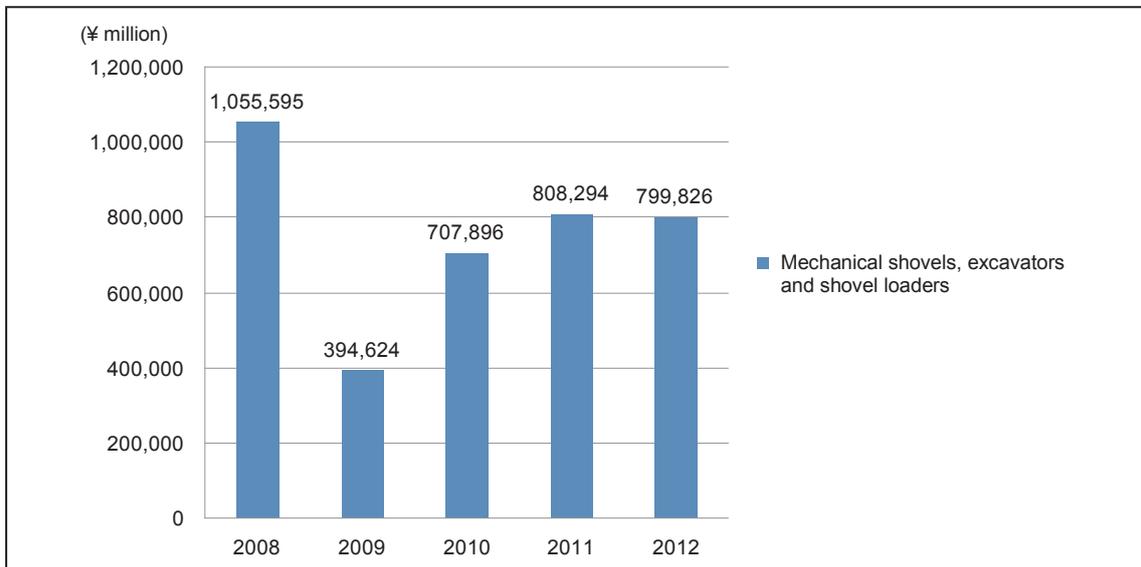
Fig. 2.1.3 Export of main types of construction machines

Source: Based on the Ministry of Finance, "Trade Statistics of Japan."

The amount of export of tower cranes in 2012 was about ¥600 million, which was an increase of roughly ¥500 million or 553.2% over the previous year. The export of portal jib cranes in 2012 totaled to approximately ¥200 million, down more than ¥1.8 billion or 88.6% year on year. That of bulldozers and angledozers in the year declined by roughly ¥3.9 billion or 4.2% from 2011, registering about ¥89.6 billion. The figure for levelers was about ¥17.2 billion, a decrease of approximately ¥2.6 billion of 13.1% from the previous year. Scrapers registered export of about ¥2,590,000, a year-on-year decline of more than ¥57.35 million or 95.7%. The export of compactors and road rollers in 2012 was about ¥4.7 billion, down over ¥700 million or 12.4% year on year, and that of pile drivers and pile extractors in the year amounted to approximately ¥3.6 billion, which was a decrease of roughly ¥200 million or 5.3%. Coal cutters, etc. registered export of roughly ¥10.9 billion, suffering a fall of about ¥3.2 billion or 22.4% from the previous year. The export of other drilling or excavating machines dropped by approximately ¥900 million or 9.6% from 2011,

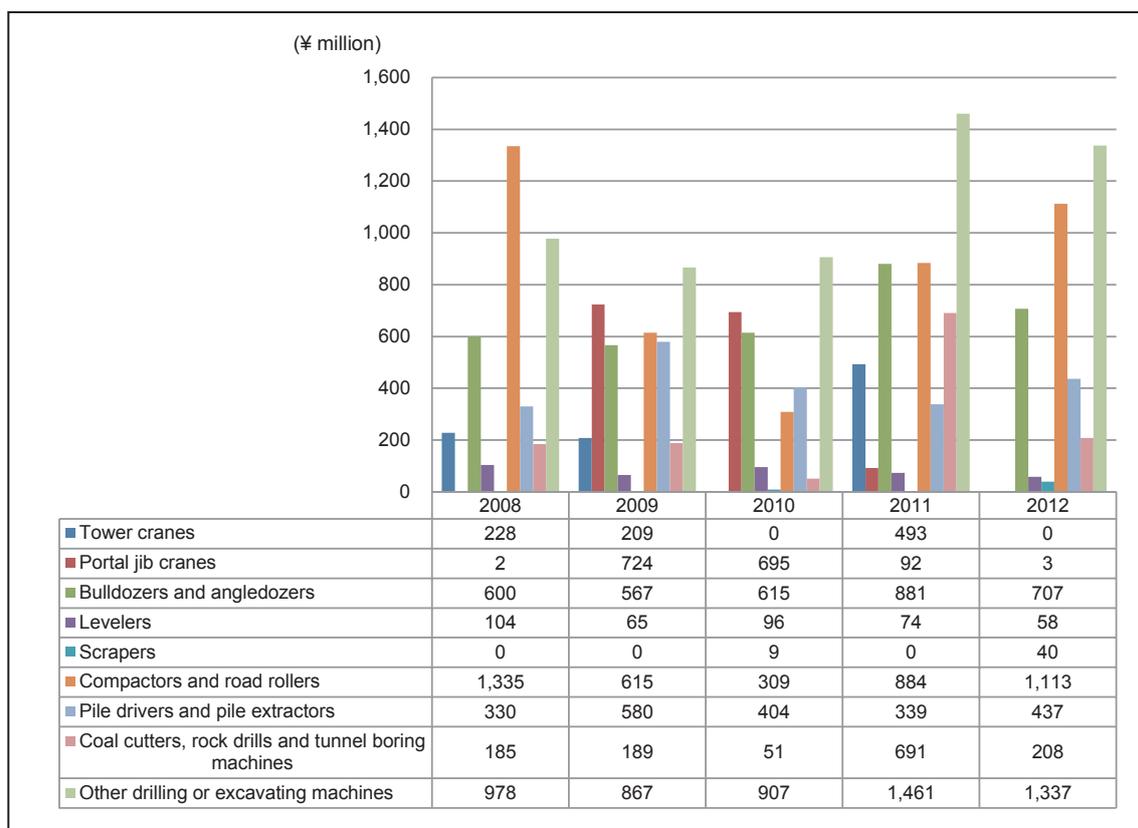
amounting to about ¥8.8 billion. Mechanical shovels, etc. recorded export of roughly ¥799.8 billion, which was a fall of roughly ¥8.5 billion or 1.0% relative to the figures for 2011.

Fig. 2.1.4 Export of mechanical shovels, etc.



Source: Same as that of Fig. 2.1.3.

The trend of import of main types of construction machines is shown in Figures 2.1.5 and 2.1.6. The amount of import of tower cranes in 2012 was none, a decrease of about ¥500 million from the previous year, while that of portal jib cranes amounted to approximately ¥2.84 million, down more than ¥89.25 million or 96.9% year on year. Bulldozers and angledozers had import of about ¥700 million, a fall of above ¥200 million or 19.7% as compared with the previous year, and levelers registered import of about ¥57.86 million, down over ¥15.90 million or 21.6% year on year. The import of scrapers in 2012 was close to ¥40.03 million, a growth of above ¥40.03 million, and that of compactors and road rollers amounted to close to ¥1.1 billion, an increase of more than ¥200 million or 25.9%. Pile drivers and pile extractors registered import of approximately ¥400 million, up about ¥97.45 million or 28.7%. While the import of coal cutters, etc. in 2012 was nearly ¥200 million, falling by over ¥500 million or 69.9%, that of other drilling or excavating machines amounted to about ¥1.3 billion, a year-on-year decrease of above ¥100 million or 8.5% from 2011.

Fig. 2.1.5 Import of main types of construction machines

Source: Same as that for Fig. 2.1.3.

The amount of import of mechanical shovels, etc. in 2012 was about 4.3 billion, which was a growth of more than ¥400 million or 11.5% over 2011.

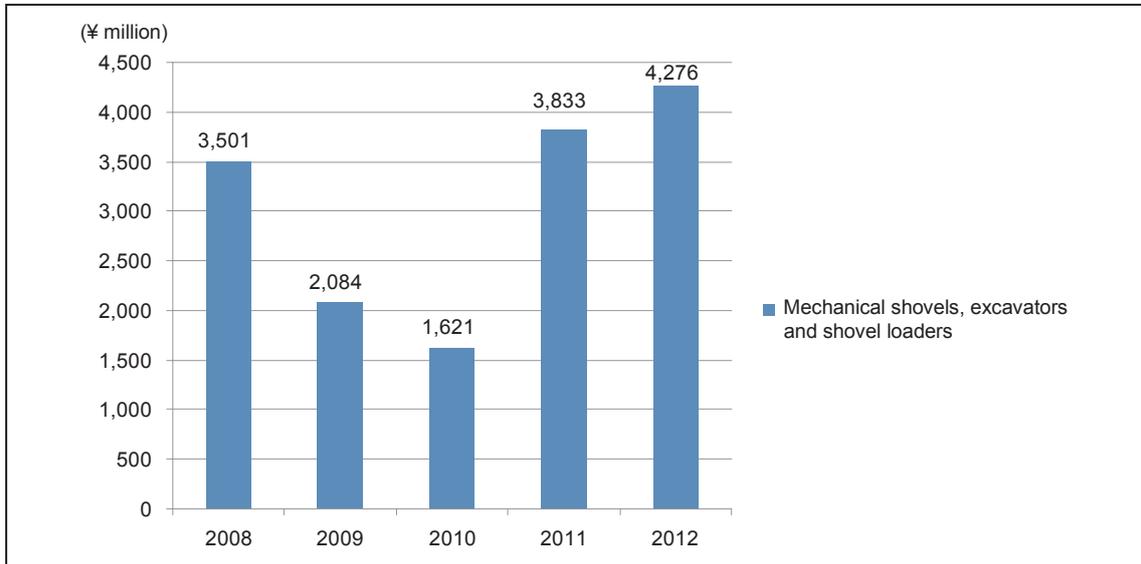
2.1.2. Results of operations

The trend of management of main construction machine manufacturers in 2012 is as outlined below: for the consolidated performance of Komatsu Ltd. for the year ending in March 2013, the sales totaled to about ¥738.9 billion, a decrease of over ¥112.3 billion or 13.2% from the previous year. The company's operating profit was close to ¥45.7 billion, falling by approximately ¥9.6 billion or 17.4% year on year, and its ordinary profit was approximately ¥85.4 billion, a year-on-year decrease of nearly ¥1.7 billion or 2.0%. Behind this was the situation where demand for hydraulic shovels greatly fell in the Chinese market although demand for construction machines for rental went up in the domestic and North American markets.

For the consolidated business results of Hitachi Construction Machinery for the year ending in March 2013, the company registered sales of about ¥772.4 billion, a decrease of over ¥44.8 billion or 5.5% from the previous year. Its operating profit was close to ¥154.8 billion, a fall of ¥1 billion or 0.6% year on year, and its ordinary profit dropped, too, by approximately ¥15.3 billion or 29.6%, amounting to nearly ¥36.4 billion. These poorer performance was the influence of smaller demand in

the Chinese market as well as the fact that declining demand in some parts of the European market spread to entire Europe.

Fig. 2.1.6 Import of mechanical shovels, etc.



Source: Same as that of Fig. 2.1.3.

2.1.3. Future prospects and problems

It may be said that the domestic market of construction machines in 2012 was firm due to demand for and public investment in reconstruction after the Great Eastern Japan Earthquake. The observation of overseas markets of construction machines shows that while the European market was still under the influence of the financial crisis and the Chinese market suffered lower demand as a result of recession, demand grew in the Southeast Asia and North America.

The manufacturers of construction machines in Japan will be required to positively make the most of the demand of not only in the domestic market but also in the foreign markets. To achieve this, they will need to have high-level research and development abilities so as to differentiate their products from those of their competitors. In addition, to make use of demand from the market of newly industrializing nations, price competitiveness will be essential for them. On the other hand, the construction machines produced by these manufacturers have to follow the domestic environmental regulations, which may cause such problems as a long period required for development and rises in the price of construction machines. There may also arise the need for some measures to harmonize domestic and overseas environmental control.

2.2. Farm machines

2.2.1. Supply and demand trend

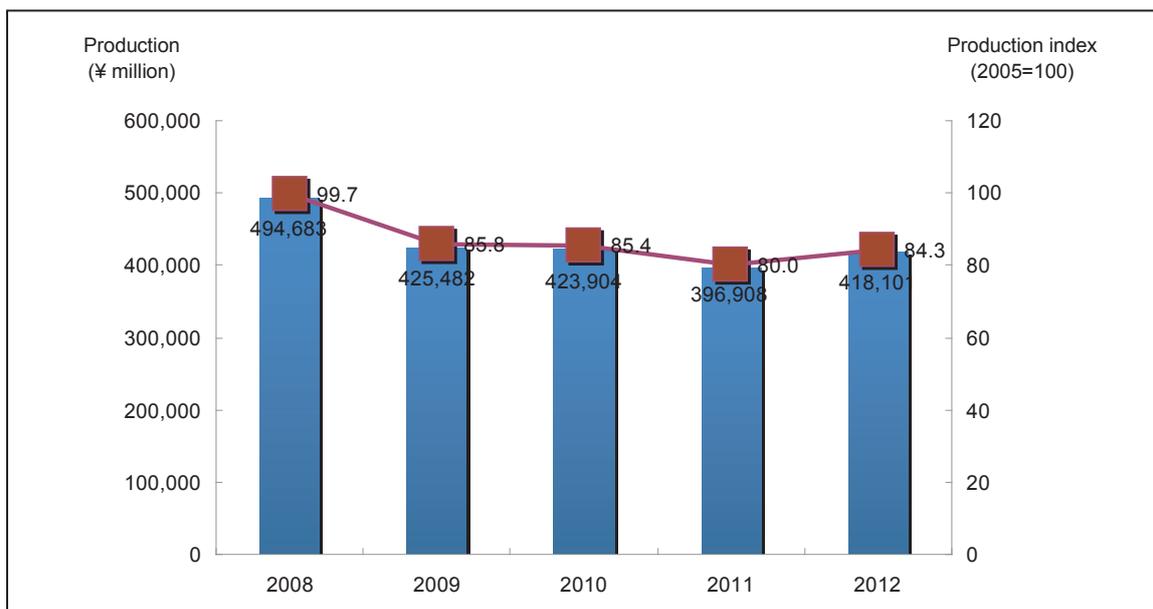
(1) Outline

The production of farm machines in 2012 amounted to about ¥418.1 billion, and the production index supposing that the production in 2005 were 100 was 84.3 points, showing a reviving trend, although a slow one, after reaching a bottom in 2011. The total amount of export was smaller than that in 2011, but by region, export to North America and Asia both turned to an upward trend. The total amount of import showed a stronger tendency toward growth, and Japanese farm machine manufacturers have been making positive efforts to build up a global supply chain management system with a view to promoting “local production of farm machines for local use.”

(2) Production

The production of farm machines in 2012 amounted to about ¥418.1 billion, an increase of ¥21.2 billion or 5.3% over the previous year, and it may be said that this performance showed some signs of recovery although a gradual one (Fig. 2.2.1).

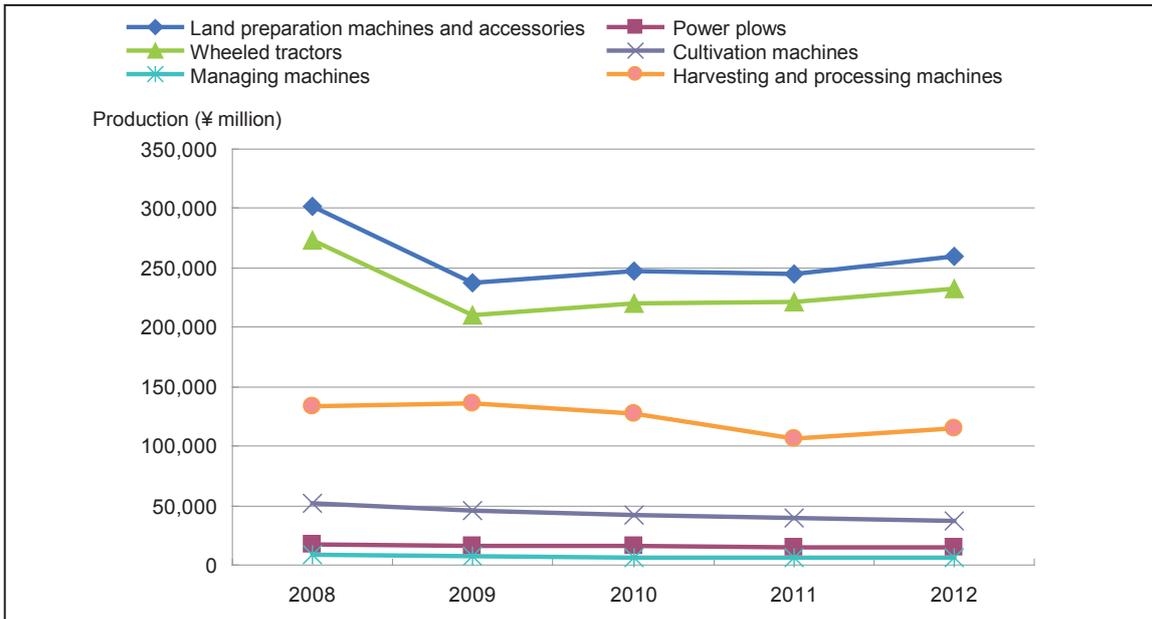
Fig. 2.2.1 Production of farm machines



Source: Based on the Ministry of Economy, Trade and Industry, “Yearbook of Machinery Statistics.”

Figure 2.2.2 shows the trend of the production of main types of farm machines. As evident from this figure, the output of wheeled tractors rose as in 2011 and that of land preparation machines and accessories, power plows and harvesting and processing machines turned to a growth, while cultivation machines and managing machines suffered low production.

Fig. 2.2.2 Production of main types of farm machines

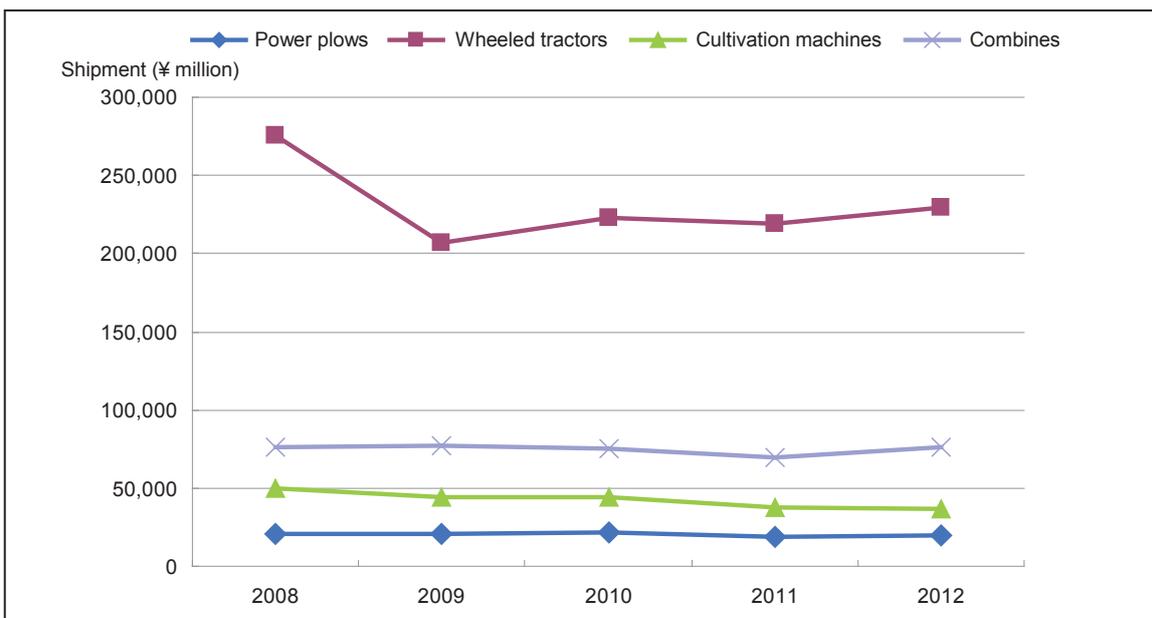


Source: Same as that for Fig. 2.2.1.

(3) Shipment

Figure 2.2.3 shows the shipment of main types of farm machines in 2012. As seen in this figure, power plows, wheeled tractors and combines turned to an upward trend, and combines especially enjoyed larger shipment, but the shipment of cultivation machines fell for the fourth consecutive year.

Fig. 2.2.3 Shipment of main types of farm machines

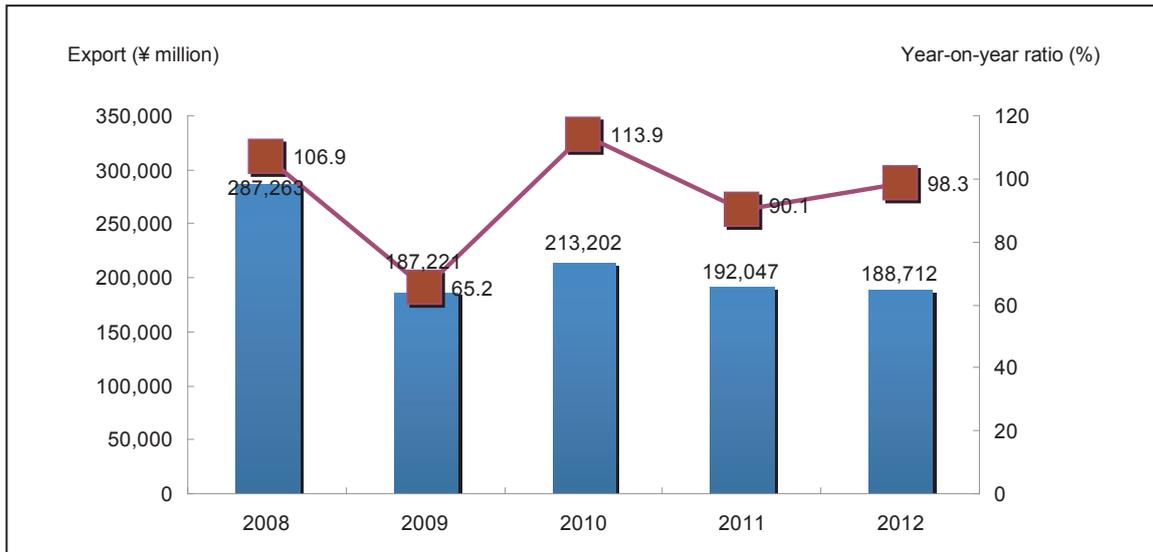


Source: Same as that for Fig. 2.2.1.

(4) Export

According to the customs clearance statistics of the Ministry of Finance, the export of farm machines in 2012 was ¥188.7 billion, down 1.7% from the previous year and a decline for two straight years. It can be pointed out that the situation behind this was a big drop in export to Europe despite greater export to North America and Asia (Fig. 2.2.4).

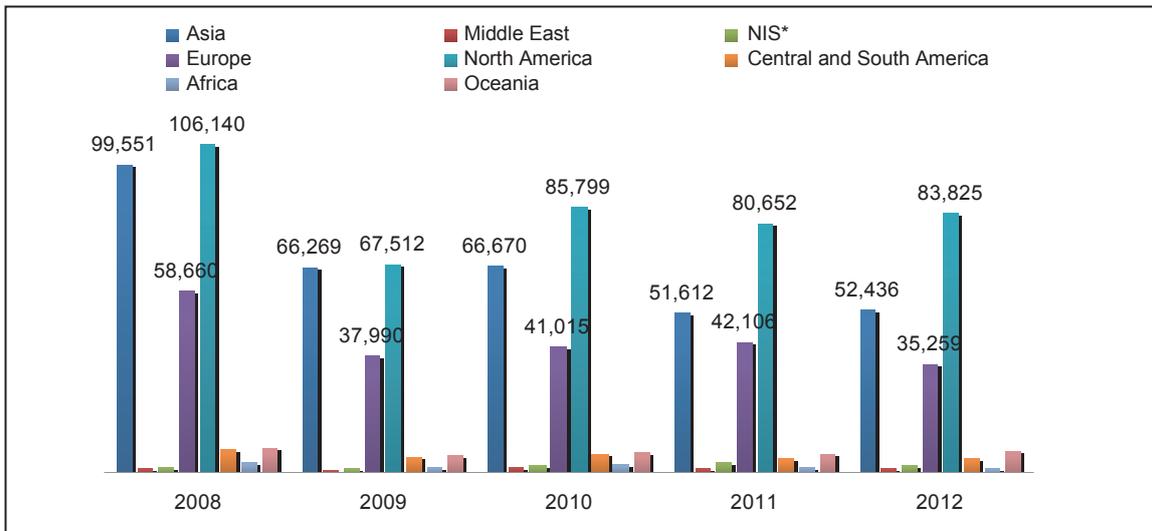
Fig. 2.2.4 Situation of export of farm machines



Source: Based on the Ministry of Finance, "Trade Statistics of Japan."

The trend of export of farm machines by region is as shown in Figure 2.2.5. As evident from this figure, export to North America and Asia increased but the export to Europe had a sharp decrease in 2012. On the other hand, export to Oceania and Central and South America indicated a tendency to a gradual increase.

Fig. 2.2.5 Situation of export of farm machines by region



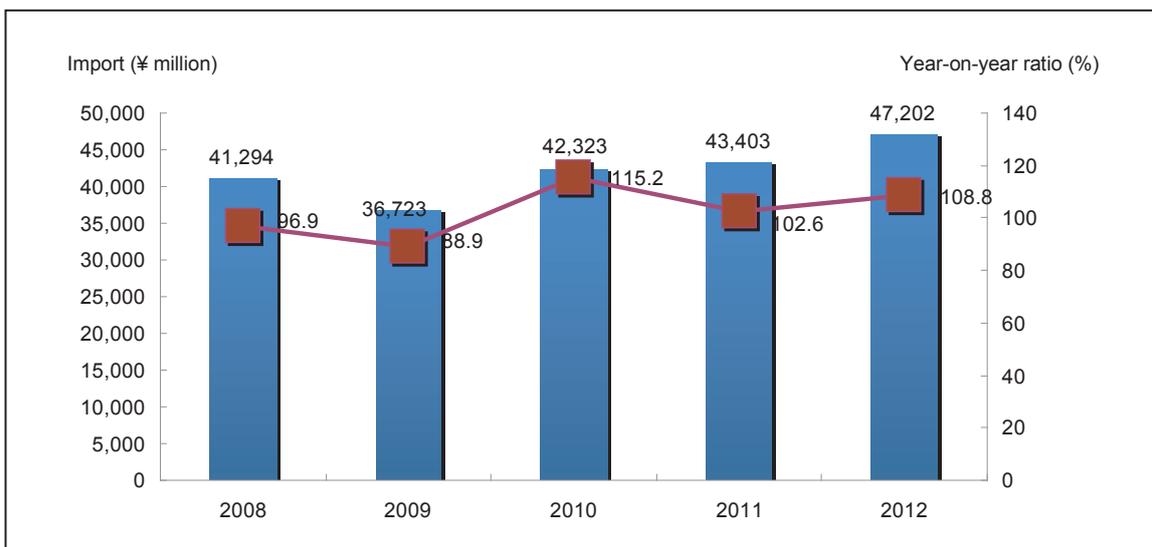
Note. NIS: New Independent States; the 12 countries independent of the former Soviet Union excluding Estonia, Latvia and Lithuania.

Source: Same as that for Fig. 2.2.4.

(5) Import

The import of farm machines in 2012 totaled to approximately ¥47.2 billion, a growth of 8.8% over the previous year. This performance was supported, among others, by a great rise in import from Asia and also by a steady growth in import from Europe and North America (Fig. 2.2.6).

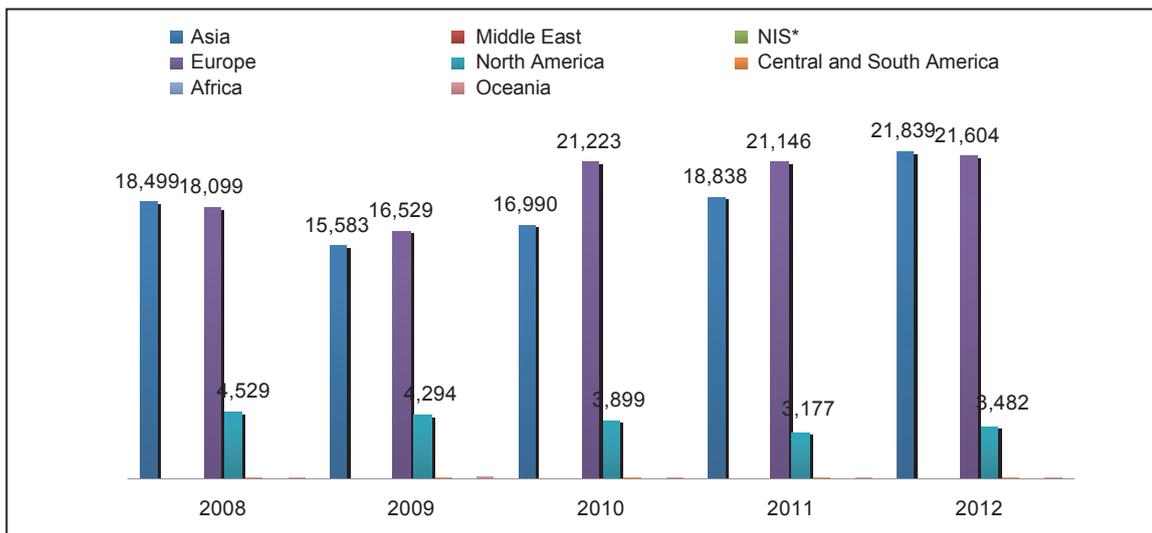
Fig. 2.2.6 Situation of import of farm machines



Source: Same as that for Fig. 2.2.4.

The trend of import of farm machines by region is as shown in Figure 2.2.7. As seen in this figure, the import of farm machines from Asia in 2012 exceeded that from Europe, making this region a top exporter to Japan again after 2008. Import from North America showed a steady growth, too.

Fig. 2.2.7 Situation of import of farm machines by region



Note: NIS: New Independent States; the 12 countries independent of the former Soviet Union excluding Estonia, Latvia and Lithuania.

Source: Same as that for Fig. 2.2.4.

2.2.2. Results of operations and the trend of domestic and overseas business activities

(1) Results of operations

For Yanmar Co.'s consolidated performance in the year ending in March 2013, the sales amounted to ¥577,149 million, a year-on-year rise of 4.7%, the operating profit was ¥33,772 million, up 50.1%, and the ordinary profit was ¥35,850 million, up 61.7% over the previous year. In domestic market, the sales of the company's farm machines were greater than those in the previous year because of recovery after the impact of the Great Eastern Earthquake, higher prices of rice and the firm establishment of the Income Compensation System for Farmers. In overseas markets, Yanmar did well in the sales of its products especially in the Asian market supported by the policy of the Thai government to purchase rice and the positive investment by the Thai governmental farm bank and by a high economic growth rates in Indonesia. The company's total sales overseas were greater than those in the previous year, too.

The consolidated business results of Kubota Corp. in the year ending in March 2013 were as follows: the sales totaled to ¥1,167.6 billion, up 15.8% year on year, and the operating profit, ¥113.2 billion, an increase of 7.1%. In the domestic market of farm machines, the company showed a steady growth due to government policies for stabilizing rice prices and farmers' income. In overseas

markets, Kubota registered a growth similar to one in the previous year in the North American market for tractors of 120 horsepower or less. In the European market, it kept buoyancy in tractors because of high grain prices. In the Asian market, the company achieved good results for tractors and combines in Thailand as farmers' purchasing power increased in the country as a result of the higher prices of farm products and a greater need for mechanization caused by a shortage of workers. In China, the company enjoyed favorable sales, especially steady demand for conventional combines, as farmers anticipated increases in subsidies for farm machine purchase.

As for the consolidated performance of Iseki & Co. in the year ending in March 2013, the sales amounted to ¥155,697 million, a growth of 7.2% year on year, and the ordinary profit was ¥5,414 million, up 38.9% over the previous year. The company's farm machine business in domestic markets was good because farmers' incentive for buying became stronger due mainly to the establishment of the Income Compensation System for Farmers and the recovery of rice prices as well as the appearance of new OEMs. In overseas markets, Iseki suffered smaller sales in Europe where there was severe recession, but increased its takings in other regions supported by the introduction of new tractor models in the North American market and by the sales promotion of riding-type rice planters in China.

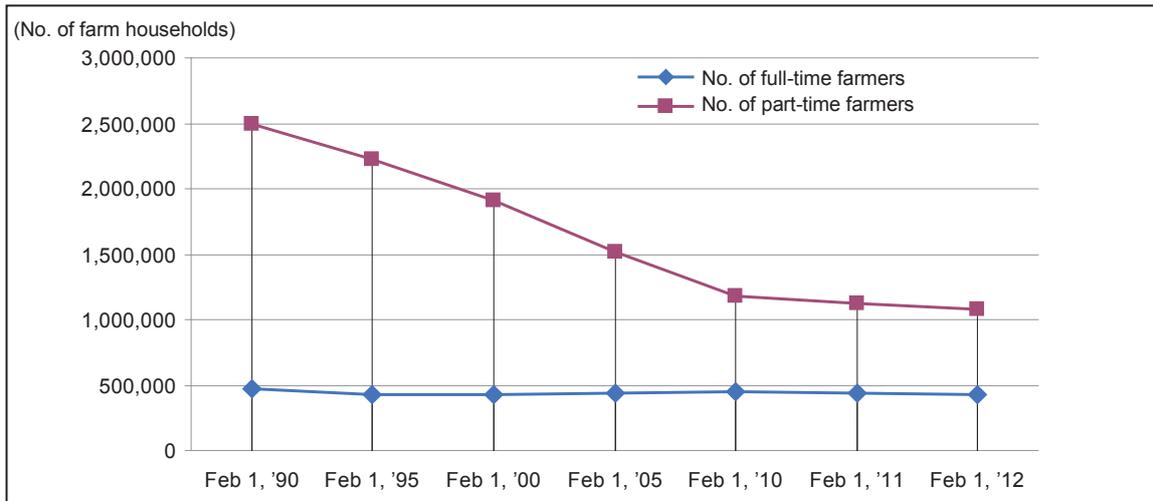
(2) Present situation of Japanese farmers supporting domestic markets

The present situation of Japanese farmers who are supporting the domestic markets for the farm machine industry is outlined below using statistical data, such as the number of commercial farmers and that of farmers by the size of cultivated acreage.

(i) Moves toward the specialization of commercial farmers

Figure 2.2.8 shows the trend of the number of Japanese farmers using the number of full-time farmers and that of part-time farmers. This figure indicates that the number of part-time farmers greatly decreased in the 1990-2010 period. By contrast, the size of decline in full-time farmers from 1990 to 2012 may be regarded as relatively small (Supposing that the figure for 1990 were 100, the figure for 2012 is 43.3 for part-time farmers and 89.4 for full-time farmers). In other words, a downward trend of part-time farmers has become remarkable among Japanese farmers (commercial farmers), and it is supposed that the specialization of commercial farmers has increased.

Fig. 2.2.8 Trend of the number of full-time farmers and part-time farmers



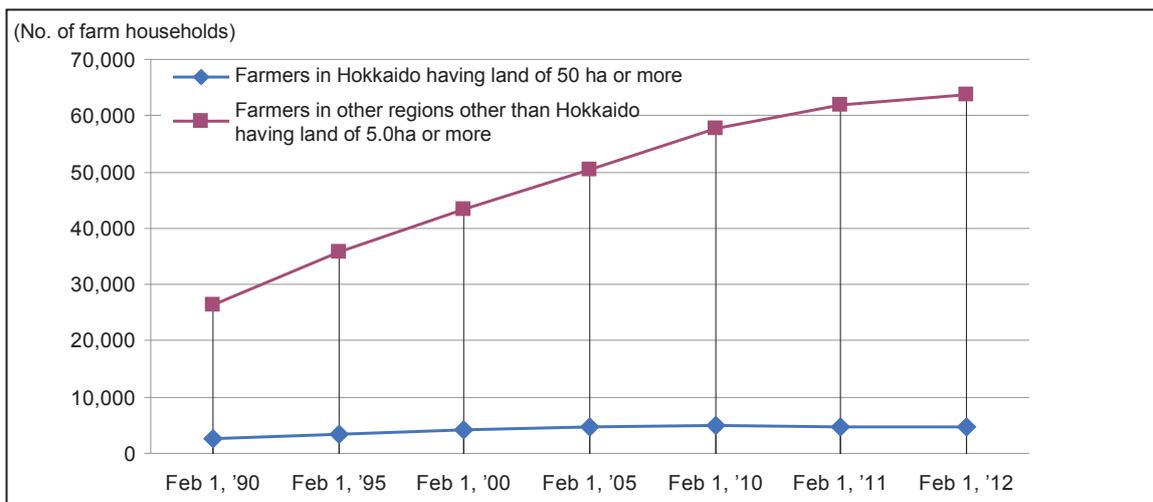
Source: Based mainly on the Ministry of Agriculture, Forestry and Fisheries, "Census of Agriculture and Forestry in Japan."

(ii) Moves toward farm consolidation

Figure 2.2.9 shows changes in the number of farmers by the size of cultivated area. This figure covers the number of farm households having land of 50 ha or more in Hokkaido, where the scale of farmers has long been much larger than that in other regions, and that of farming families in prefectures (all regions other than Hokkaido) having land of 5ha or more. As seen in this figure, there has been the trend for cultivated areas to grow larger even in prefectures.

From the foregoing, it can be pointed out that while commercial farmers in Japan have been decreasing in number, the tendency for farmers to become full-time farmers have been increasing and that farmers having relatively large cultivated areas have been growing in the regions other than Hokkaido, too.

Fig. 2.2.9 Trend of the number of farmers by the size of cultivated area



Note: Figures are the numbers of commercial farmers.

Source: Same as that for Fig. 2.2.8.

(3) Moves toward “Smart Agri”

At present, moves toward “Smart Agri (Smart Agriculture)”¹, a concept adopting robot technology (RT) and information and communication technology (ICT) into farming as described below, have become active in the field of agriculture in Japan.

(i) Utilization of RT

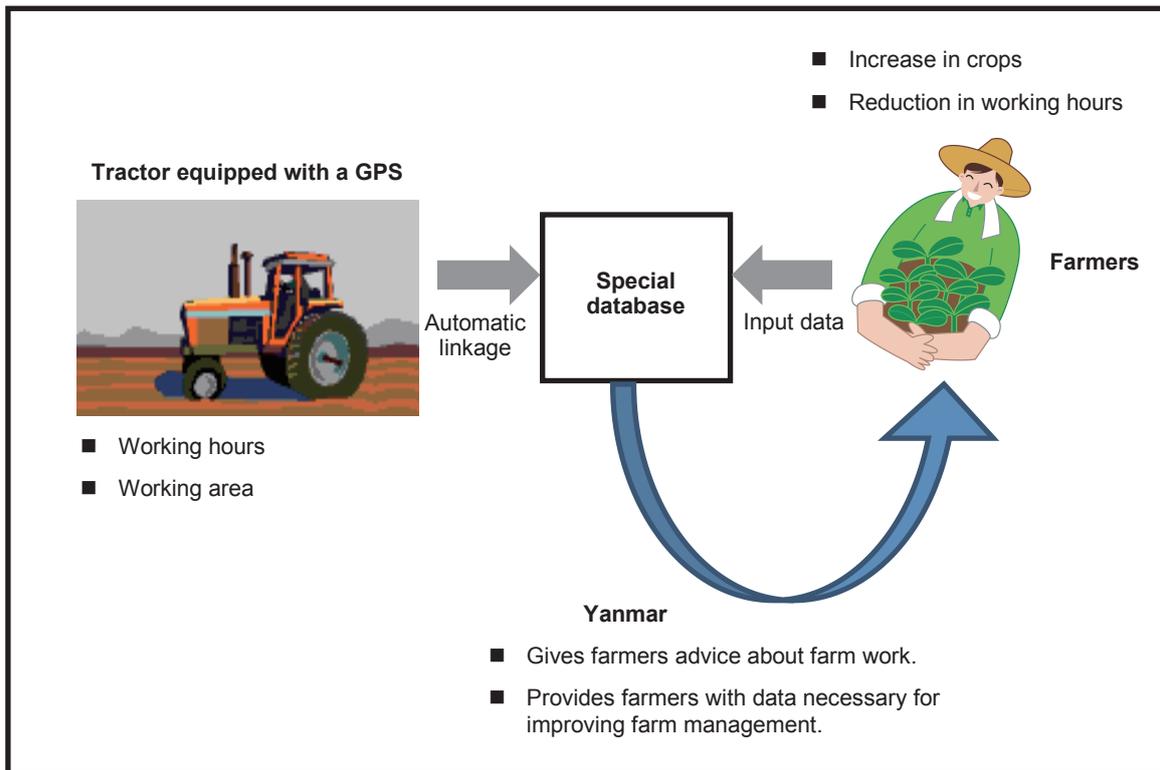
The manufacturers of farm machines are increasing efforts to develop auxiliary tools for farm work. For example, Kubota plans to introduce “ARM-1,” an auxiliary tool for supporting the arms of farmers when they take care of and harvest grapes and pears. On the other hand, Innovate SUZUKA, a cross-industrial group in Nagano Prefecture, developed “Graper,” an instrument for supporting the care of grapes, and Misuya Kogyo in the same prefecture, which manufactures “Graper,” is developing new products meeting the needs of local farmers by making use of its manufacturing expertise.

(ii) Utilization of ICT

Yanmar introduced the “Smart Assist,” a service for linking the farm machines owned by farmers to its information center via a communication system and managing these farm machines, and started to recommend to large-scale farmers the use of the farm machines equipped with the “Smart Assist” function (See Fig. 2.2.10). Kubota also plans to offer information and communication service named “Kubota Smart Agri System (KSAS).” As described above, farm machine manufacturers are positively building up the business models in anticipation of an increase in large-scale farmers.

¹ “Smart Agri” includes the utilization of “big data (a large amount of information),” the subject that the government has started to examine. But any business model taking account of the “sharing of information” has not been constructed in Japan.

Fig. 2.2.10 Yanmar's new service for farmers



Source: Based on the article in the "Nihon Keizai Shimbun" on July 9, 2013 (morning edition), etc.

(4) Overseas business activities

In overseas markets, farm machine manufacturers in Japan have been especially positive in East Asia. Behind this is the fact that demand for farm products has increased in the East Asia region, mainly in China, because of the fact that this region has had rapid economic development and population growth and that needs for the mechanization of farming have become greater there chiefly because of labor shortage in farming areas. In addition, rice is much eaten in East Asia, including India, just as in Japan, and thus Japanese-made farm machines can stand at advantage over those from other countries; this is also the reason that has accelerated the business activities of Japanese manufacturers in this region. Yanmar founded Yanmar Indonesia, a local subsidiary for manufacturing cast parts for diesel engines, in that country; this subsidiary is Yanmar's first overseas manufacturing base of cast parts, and these parts are shipped to the assembly shops in Japan, China and Thailand. The company plans to start the manufacture of several thousands of tons of cast parts at the subsidiary plant and increase the output to about 30,000 tons by 2015. For Kubota, Siam Kubota Corporation (SKC), its joint venture with the Siam Cement Group, the Thai loyal family's corporation, will establish new wholly-owned firms in Cambodia and Laos in January 2014. Iseki plans to found Iseki Sales Thailand Co., Ltd., a joint venture with Mitsubishi Corporation, in order to increase the sales of its farm machines in Thailand.

2.2.3. Future prospects

The situation of agriculture in Japan, the important market for the farm machine industry, has continued to be the one on which we have to keep a watchful eye as moves toward the Trans-Pacific Partnership (TPP) are becoming more active in the circumstance of decrease in and aging of the working population. Against this background, new business models, such as “Smart Agri,” for the application of RT to farm work and the utilization of IT for managing and assisting the entire farm work, have started to be introduced, as already mentioned. In addition, studies of the ways to apply recyclable energy systems to abandoned farmland all over Japan, which has been estimated at about 400,000 ha in total, have been started in various regions in the country.

According to the survey of the Ministry of Agriculture, Forestry and Fisheries, the corporations that newly joined agriculture in the three years from 2009, when the Farmland Law was amended, to 2012 totaled to 1,071 across Japan (By industrial sector, food-related industries: 25.2%; other industries: 20.6%; agriculture and livestock industries: 15.1%; construction industries: 13.4%; specified non-profit organizations (NPOs): 11.4%; other wholesalers and retailers: 5.8%; manufacturers: 5.2%; and medical, welfare and education industries: 3.2%), which suggests a growing interest of other industries in agriculture. As evident from this fact, it may be said that agribusiness in Japan has entered an age of great changes. Activities aiming at “Smart Agri” can be regarded as one of the signs of these changes.

In addition to the East Asian market expected to achieve a rapid expansion, Japanese farm machine manufacturers are focusing on the introduction of large general-purpose tractors into the North American market, too. In the future, they will not only work on the manufacture of their own products but also conduct M&A with Western businesses, etc. positively. The export environment of Japanese manufacturers has begun to improve supported by the effects of weak yen, and it will become more important for farm machine manufacturers in Japan to devise production and marketing strategies for each segment (each region and product model), including those for promoting “local production for local consumption,” while forwarding their global supply chain management.

2.3. Medical equipment

2.3.1. Supply and demand trend

(1) Outline

The Annual Report on Statistics of Production by Pharmaceutical Industry in 2012 says that domestic demand² for medical appliances was ¥2,593.6 billion and registered a year-on-year increase as in the previous year (Fig. 2.3.1). While the global market amounted to about ¥20 trillion, Japan stood third and had a share of 10% or so, but China is appearing on the world market, too. The national medical care expenditure in Japan reached about ¥38.4 trillion in 2012³, a growth of over ¥0.6 trillion over the previous year. As stated, the Japanese government's health care budget has grown tighter, and it has become inevitable for Japan to consider controlling demand for medical appliances.

(2) Production

According to Fig. 2.3.2 that shows the amount of production of medical appliances in 2012, the output of diagnostic imaging systems, which had been on the decrease since 2006, showed a growth first in six years. The production of operating equipment and supplies was on an upward trend although the growth rate dropped, registering an output of ¥468.2 billion, the highest figure in the medical appliance sector. In addition, as in 2011, artificial internal organ apparatuses and assist devices had a higher output and recorded production of ¥288.3 billion, a similar level to the figure for diagnostic imaging systems.

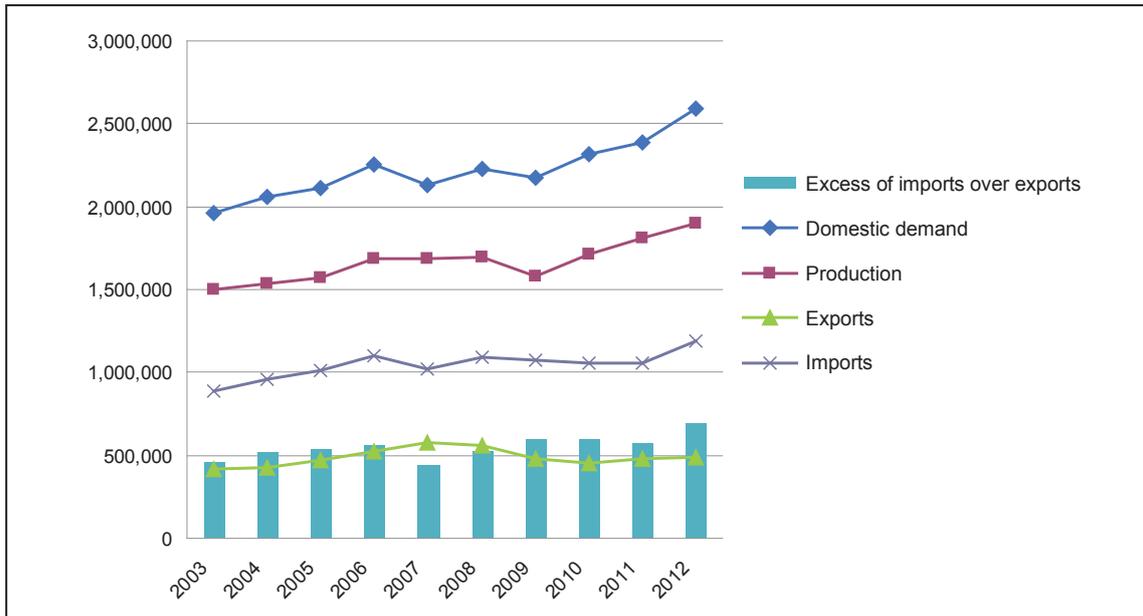
For the production of medical electronic appliances⁴ in 2012 (Fig. 2.3.3), medical X-ray devices achieved a year-on-year increase of 7.4% to ¥158.7 billion, ultrasonic application medical appliances suffered a 8.3% decline to ¥49.1 billion and other medical appliances registered an increase of 1.1% to ¥87.3 billion. As a whole, the output of medical electronic appliances was a rise of 2.6% over the previous year.

² Domestic demand = Amount of import + amount of production - amount of export.

³ Based on the Ministry of Health, Labour and Welfare, "Trend of Medical Care Expenditure in 2012: Annual Totaled Results of Estimated Medical Expenditure."

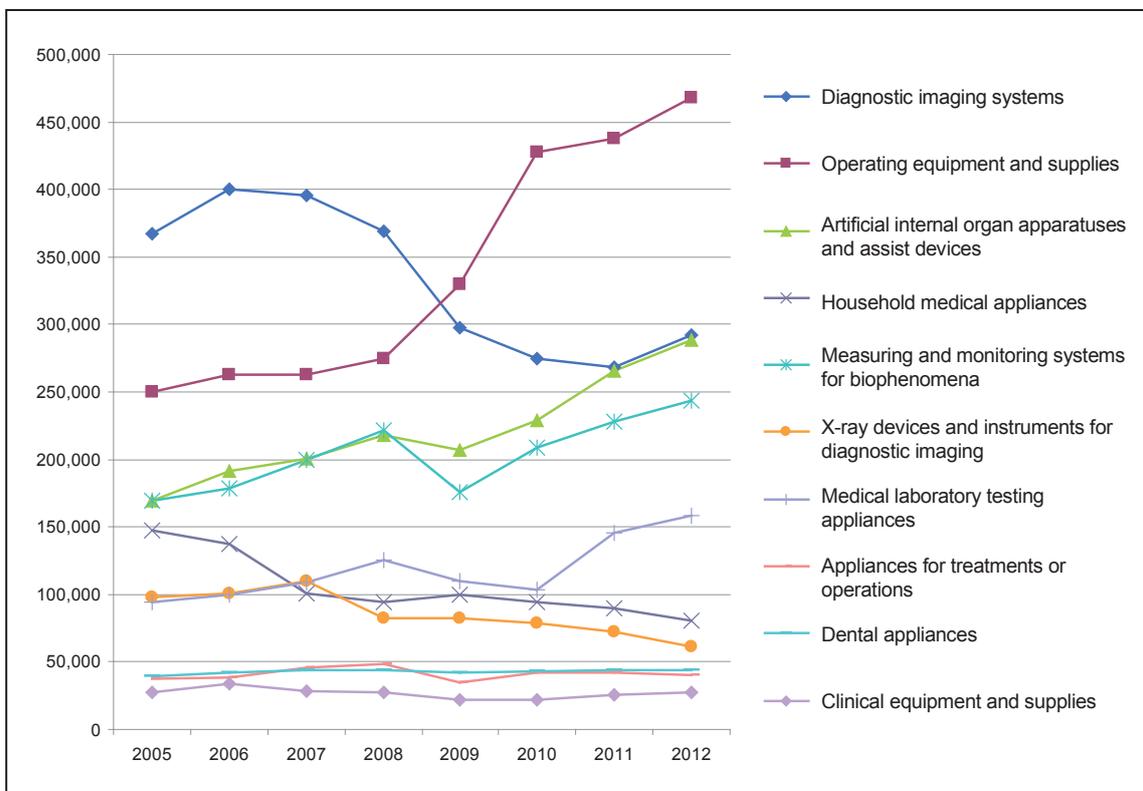
⁴ "Medical electronic appliances" mean the electronic application devices published in the Ministry of Economy, Trade and Industry, "Yearbook of Machinery Statistics," which are for medical care purposes.

Fig. 2.3.1 Trend of supply and demand for medical appliances in amount (¥million)



Source: Based on the Health Policy Bureau, Ministry of Health, Labour and Welfare, "Annual Report on Statistics of Production by Pharmaceutical Industry."
* Including medical materials.

Fig. 2.3.2 Trend of production of medical appliances (calendar years; ¥ million)



Source: Same as that for Fig. 2.3.1.

**Fig. 2.3.3 Trend of production of medical electronics appliances
(calendar years)**

Unit: ¥ million

	2006	2007	2008	2009	2010	2011	2012	Growth rate in 2011-2012
Medical electronics appliances, total	379,122	386,447	339,648	288,864	304,609	287,675	295,122	2.6%
Medical X-ray devices, total	204,308	201,836	173,847	148,653	161,753	147,725	158,712	7.4%
Medical and dental X-ray devices	77,826	78,228	75,083	68,790	76,258	65,089	73,145	12.4%
CT devices	126,482	123,608	98,764	79,863	85,495	82,636	85,567	3.5%
Ultrasonic application medical appliances	88,105	94,356	81,621	58,820	58,079	53,602	49,149	-8.3%
Other medical measuring instruments	86,709	90,255	84,180	81,391	84,777	86,348	87,261	1.1%

Source: Based on the Ministry of Economy, Trade and Industry, "Yearbook of Machinery Statistics."

(3) Export and import

The amount of the export of medical appliances in 2012 totaled to ¥ 490.1 billion, up 1.9% over the previous year. The amount of import was ¥1,188.4 billion or a rise of 12.3% year on year. By the type of product, the export of medical laboratory testing appliances rose by 12.0% to ¥110.4 billion, and that of appliances for treatments or operations increased by 40.3% to ¥4.9 billion; these products showed great growth in terms of money value, too. The export of diagnostic imaging systems showed a rise of 3.0% over the previous year.

The import of diagnostic imaging systems, in which Japan had been strong, registered a year-on-year growth of 29.9% to ¥118.6 billion, and that of household medical appliances was ¥35.0 billion, up 25.8%. The fact that the amount of export leveled off while that of import increased greatly suggests that Japan's competitive power for diagnostic imaging systems has waned substantially and that foreign-made products have become more powerful.

Fig. 2.3.4 Trend of export and import of medical appliances (calendar years)

Unit: ¥ million

	Export			Import		
	2011	2012	Year-on-year ratio (%)	2011	2012	Year-on-year ratio (%)
Medical appliances, grand total	480,851	490,057	1.9%	1,058,373	1,188,388	12.3%
Diagnostic imaging systems	122,074	125,785	3.0%	91,350	118,649	29.9%
Medical laboratory testing appliances	98,517	110,360	12.0%	-	-	-
Operating equipment and supplies	92,128	87,096	-5.5%	234,950	271,211	15.4%
Artificial internal organ apparatuses and assist devices	51,189	49,763	-2.8%	310,280	330,271	6.4%
Measuring and monitoring systems for biophenomena	43,363	44,214	2.0%	56,844	62,003	9.1%
X-ray devices and instruments for diagnostic imaging	29,344	29,875	1.8%	71,864	85,394	18.8%
Dental appliances	14,889	15,567	4.6%	14,147	13,706	-3.1%
Dental materials	8,513	7,475	-12.2%	29,271	29,764	1.7%
Appliances for treatments or operations	3,467	4,863	40.3%	71,864	85,394	18.8%
Clinical equipment and supplies	4,642	4,777	2.9%	-	-	-
Ophthalmic supplies and related products	-	-	-	160,325	169,529	5.7%
Household medical appliances	-	-	-	27,809	34,989	25.8%
Steel appliances	-	-	-	28,950	31,342	8.3%
Others	12,725	10,282	-19.2%	32,581	41,529	27.5%

Source: Same as that for Fig. 2.3.1.

(4) Future prospects

Major Japanese diagnostic appliance manufacturers are positively doing business activities in Asia. The companies of therapeutic apparatuses are reinforcing their domestic business where they were not strong in the past and are constructing new plants in Japan and are improving their overseas plants. In addition, domestic demand for medical appliances has been boosted by rising demand for medical care, mainly among elderly people. In the situation of exchange rates, yen has continued to be weak, and thus the environment of the medical appliance industry has shown signs of improvement.

2.3.2. Market trend seen from electronic application devices**Fig. 2.3.5 Production of electronic application devices**

Unit: ¥ million

	2008	2009	2010	2011	2012	Growth rate in 2011-2012
Electronic application devices	945,273	681,913	886,211	897,360	822,093	-8.39%
X-ray devices	189,405	166,598	179,256	166,963	176,586	5.76%
Medical	173,847	148,653	161,753	147,725	158,712	7.44%
Medical and dental purposes	75,083	68,790	76,258	65,089	73,145	12.38%
CT devices	98,764	79,863	85,495	82,636	85,567	3.55%
Other X-ray devices	15,558	17,945	17,503	19,238	17,874	-7.09%
Radioactive substance application appliances	19,629	16,222	16,594	14,898	13,595	-8.75%
Radiation counters	9,326	8,253	12,479	15,339	16,091	4.90%
Ultrasonic application appliances	148,139	116,266	115,689	112,462	102,512	-8.85%
Washers	9,560	6,000	5,110	3,358	3,189	-5.03%
Medical appliances	81,621	58,820	58,079	53,602	49,149	-8.31%
Welders	16,115	8,103	24,167	19,112	14,078	-26.34%
Other ultrasonic application appliances	40,843	43,343	28,333	36,390	36,096	-0.81%
Other electronic application devices	574,272	371,563	559,850	587,698	513,309	-12.66%
Electron microscopes	47,141	35,217	48,425	46,044	53,315	15.79%
Industrial TV sets	74,582	50,191	66,227	52,353	54,301	3.72%
Medical measuring instruments	84,180	81,391	84,777	86,348	87,261	1.06%
Others	368,369	204,764	360,421	402,953	318,432	-20.98%

Source: Same as that for Fig. 2.3.3.

The amount of production of electronic application devices in 2012 was ¥822.1 billion, a decrease of 8.39% from the previous year. By the type of product, as for medical appliances, the output of medical X-ray devices recorded a growth of 7.44%. Radiation counters also enjoyed a greater amount of production year on year as they did in 2011. Other electronic application devices suffered a substantial decrease in output. While the output of medical appliances included in the category of ultrasonic application appliances, which have a close relation to medical and welfare devices, fell by 8.31%, that of medical measuring instruments grew by 1.06%.

2.3.3. Trend of management

Toshiba Medical Systems Co. achieved higher earnings and greater profits as in the previous year. The company started the operation of the plant established in Sao Paulo, Brazil, in March 2013. The South American health care market, mainly in Brazil, is expected to grow steadily due to improvement in medical service and the progress of development of medical infrastructure. The company also opened an 80-member research and development center in Beijing, China, where it will carry out part of the development activities of CT devices, etc. for overseas sale. Taking advantage of the needs for performance and price unique to China, Toshiba aims at developing competitive products not only for the market of newly industrializing nations but also for medium and small hospitals in industrial countries.

Hitachi Medical Corporation is still continuing price competition for ultrasonic diagnostic devices with its rivals in Japan. But there have been tendencies toward market recovery, chiefly in large urban areas, and the good effects of the integration with Hitachi-Aloka Medical are showing up. For MR imaging devices, the company recorded a year-on-year growth overseas for superconductive magnet-type products but suffered a drop both at home and abroad for permanent magnet-type ones, and its performance was poorer than in the previous year as a whole. As for X-ray CT scanners, Hitachi had better results for 64-slice CT scanners in Japan but poorer performance overseas, registering sales similar to those in the previous year. For X-ray devices, the company's sales in Japan were smaller than those in the previous year when it had had large-scale contracts on blood irradiators, and its total takings were lower, too.

Fig. 2.3.6 Results of operations of main medical appliance manufacturers

	Toshiba Medical Systems ¹⁾	Hitachi Medical ²⁾	Shimadzu Corp. ³⁾	Olympus Optical ⁴⁾	Terumo
Settlement term	Year ended in March 2013				
Unit	¥ million				
Entire company's sales	277,450	159,659	264,048	743,851	402,294
Sales in the previous year	254,959	166,237	266,255	848,548	386,686
Year-on-year ratio	8.8%	-4.0%	-0.8%	-12.3%	4.0%
Operating profit	17,298	1,068	12,116	35,077	53,216
Year-on-year ratio	102.8%	-74.99%	-37.43%	-1.2%	-15.6%
Ratio of operating profit	6.2%	0.7%	4.6%	4.7%	13.2%
Sales of the medical appliance section	-	129,576	55,122	394,724	-
Sales ratio of the medical care section	-	81.2%	20.9%	53.1%	-
Operating profit	-	571	199	87,069	-
Year-on-year ratio	-	175.8%	-79.8%	27.7%	-
Ratio of operating profit	-	0.4%	0.4%	22.1%	-

Notes: The data for the medical appliance division is that for the company's related business segment:

- 1) In October 2003, Toshiba Medical Systems Corp. integrated its medical system division into Toshiba Medical Corp., which took charge of domestic sales and services. Toshiba Medical Corp. is engaged in the development, manufacture, sale and service of medical devices and systems.
- 2) The entire company's sales include those of medical information systems.
- 3) The figures for the medical appliance division are those for the company's medical system field.
- 4) The figures for the medical appliance division are those for the company's medical segment.

Source: Data of each company (on a consolidated basis)

Shimadzu Corp. achieved greater sales in the domestic market mainly because it introduced new products meeting market needs. For X-ray TV systems, the company enjoyed good performance for high-end multi-purpose models and the models equipped with a portable flat-panel display for medium and small hospitals and clinics. In overseas markets, Shimadzu recorded larger sales for digital-type X-ray photography devices for a doctor's round of visits, etc. by securing replacement demand in North America. In Europe, the company was faced with difficult situations continuously but managed to attain greater sales because it did well for X-ray TV systems, etc.

Olympus introduced new endoscopic video scope systems at home and abroad in its main field of digestive endoscopy, which contributed to an increase in the company's sales both in Japan and overseas. In the surgical and treatment tool area, it continued to enjoy high takings of integrated endoscopic video systems, which support endoscopic surgical operations. As a result, the company achieved greater earnings and higher operating profits in its medical care business.

Terumo Corp. experienced a year-on-year decline in earnings because its catheter product group was seriously affected by the revision of drug prices and official prices. The company's income from drug-eluting stents for coronary arteries fell greatly as a result of the introduction of new products by its three rivals. Terumo greatly boosted its share of sales of blood component collection devices, too, but due to the restrained demand that occurred in the first half of the year, suffered a fall in earnings from the previous year. In overseas markets, the company recorded good results in catheter business in all regions. It also increased sales of therapeutic apheresis continuously although it was affected by the poor demand for blood infusion resulting from recessions in North America.

2.3.4. Future prospects and problems

In the medical appliance industry, domestic demand is approaching saturation, especially in diagnostic appliances. Therefore, the industry should work not only to improve existing products but also to properly incorporate the seeds engendered in various academic disciplines into medical needs. In the field of general-purpose medical appliances, it is supposed that low-priced products made in developing countries will be introduced at home and abroad in the future. To win in competition in the domestic market, manufacturers will have to take such steps as a cut in manufacturing costs, improvement in product quality and enhancement in value added. Overseas, they will be required to produce and develop medical appliances suitable for the life and social environment of each country. In addition, the source of the competitive abilities of manufacturers in Japan was mold technology, but considering that 3D printers and other new technologies have been appearing, they will need to pay attention to the trend of these technologies, too.

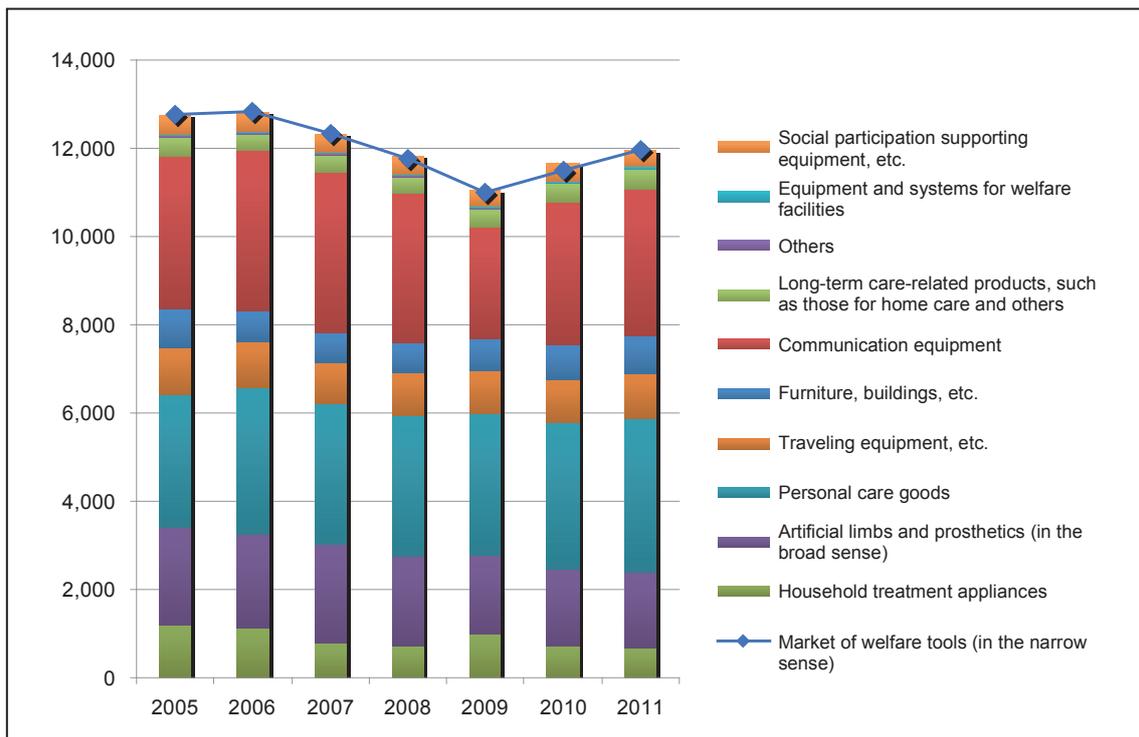
Recently, as a result of the adoption of the medical appliance industry cluster policy chiefly by local governments, those small industries creating high value-added products by making the best use of collaboration among industry, academia and government are arriving on the scene. Regrettably, however, there have often been observed the cases where needs for newly developed products with high value added are limited. Thus the government will be required to provide manufacturers with support not only for new product development but also for marketing strategies.

Supplementary section: welfare equipment market

(1) Market trend

The welfare equipment industry⁵ had a total market of ¥1,195.5 billion in 2011. (Fig. 2.3.7) and finally recovered to the level in 2008, the year just before the Lehman shock hit the world. Although this industry has recently attracted attention as health care business, its pace of growth has to be considered too slow.

Fig. 2.3.7 Trend of the welfare equipment market (calendar year, ¥100 million)



Source: Based on the Japan Assistive Products Association, "Report of the Research on the Trend of the Market of the Welfare Tool Industry," 2013.

By the type of product, while the market size of household treatment appliances, artificial limbs and prosthetics (in the broad sense) and social participation supporting equipment, etc. decreased, all of the other product categories recorded a larger market size. In particular, equipment and systems for welfare facilities showed a remarkable growth of 37.5%, though the market size was small.

⁵ The welfare equipment industry here means the "welfare tool industry in the narrow sense" as defined by the Japan Assistive Products Association.

(2) Trend and problems of the welfare equipment industry

The population of elderly people will continue to increase until 2028, and thus the market of the welfare equipment industry will continue growing. In addition, more than ten years have passed since the introduction of the long-term care insurance system, and demand for wheel chairs and walking frames, which reached the period of replacement, has been going up. The other industries entering the welfare equipment field are increasing, too, and they are expected to introduce products of new ideas by making the most of their own expertise. However, needs for welfare equipment are so diverse that manufacturers will be required in the coming years to build up profitable business models taking account of the diversity of needs.

2.4. Bearings

2.4.1. Supply and demand trend

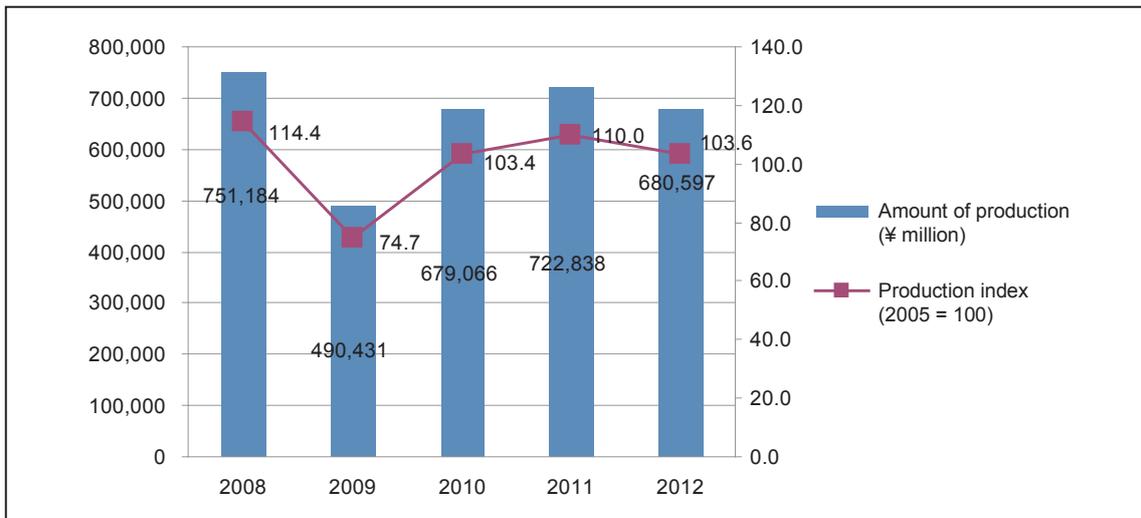
(1) Outline

The amount of production of bearings in 2012 was ¥680.6 billion, and the production index supposing that the level in 2005 were 100 was 103.6. But as compared with the previous year, the figure was a decrease of 5.8%, showing a downward trend. The amount of sales stood at ¥694.4 billion, and the sales index supposing that the level in 2005 were 100 was 104.3. As in the case of the amount of production, the sales figure showed a declining tendency with a year-on-year fall of 5.0%. The export of finished bearing products amounted to ¥412.8 billion, down 10.6% year on year, indicating a marked trend of decline. By contrast, the amount of import was ¥58.0 billion or a year-on-year growth of 4.0%, which demonstrated a rising trend.

(2) Production

The production of bearings (finished bearing products) in 2012 is as shown in Figure 2.4.1. As evident from this figure, the output greatly decreased in 2009 as a result of the Lehman shock but showed a recovering trend in the two years after that although affected by the Great Eastern Japan Earthquake and great floods in Thailand in 2011. However, the performance in 2012 indicated a downward trend again; the factors behind this is probably a fall in demand for bearings from automakers, the most important customers, due to stagnancy in the Chinese market and problems of the Senkaku islands.

Fig. 2.4.1 Production of bearings (finished bearing products)

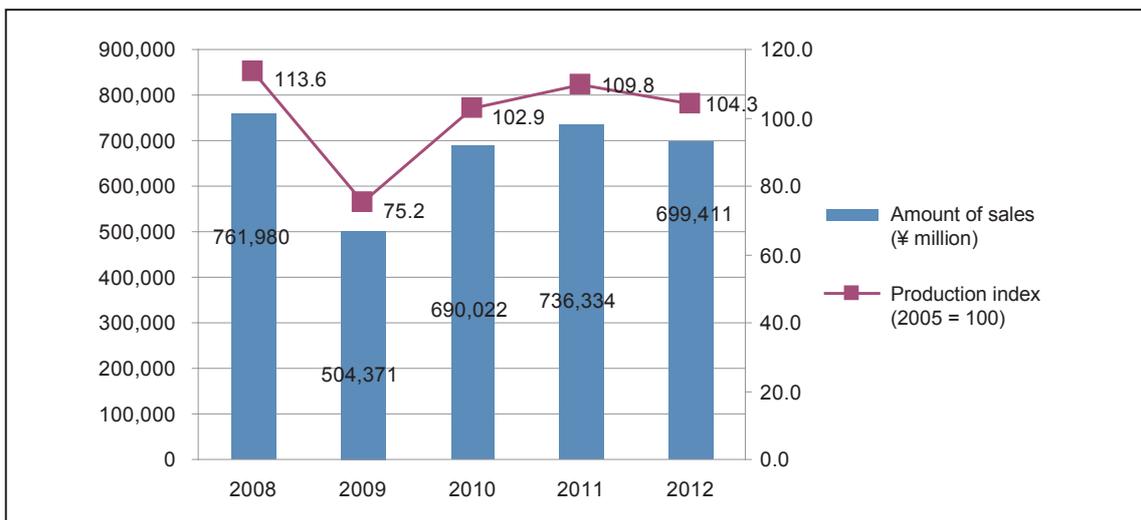


Source: Based on the Ministry of Economy, Trade and Industry, "Yearbook of Machinery Statistics."

(3) Sales

The sales of bearings (finished bearing products) in 2012 are shown in Figure 2.4.2. As indicated in this figure, the sales in 2012 were smaller than in the previous year as for the amount of production because the impact of inactive sales of Japanese-made cars in China, the biggest customer, after the issues of the Senkaku islands came up began to be felt.

Fig. 2.4.2 Sales of bearings (finished bearing products)

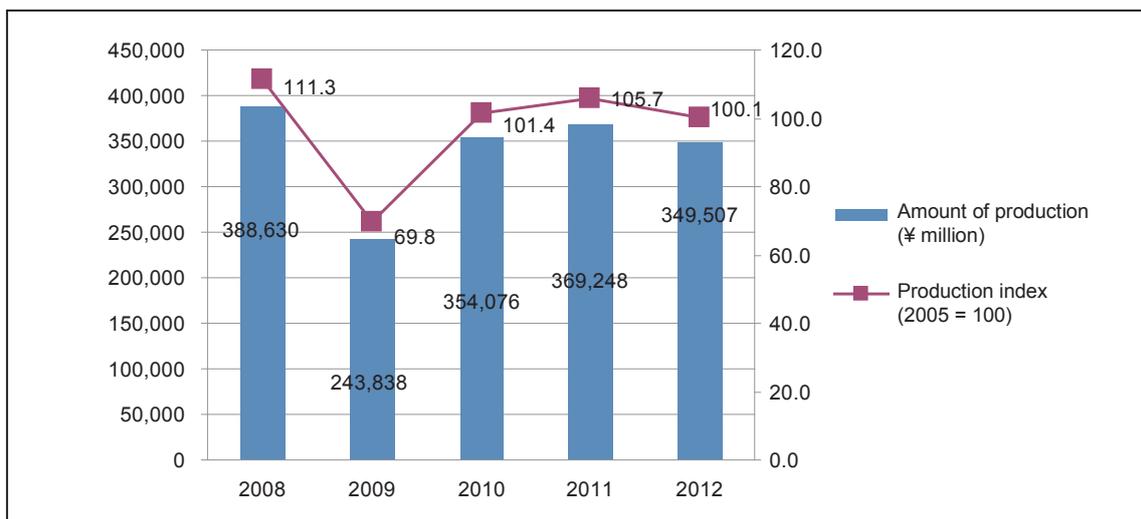


Source: Same as that for Fig. 2.4.1.

(4) Production by the type of product

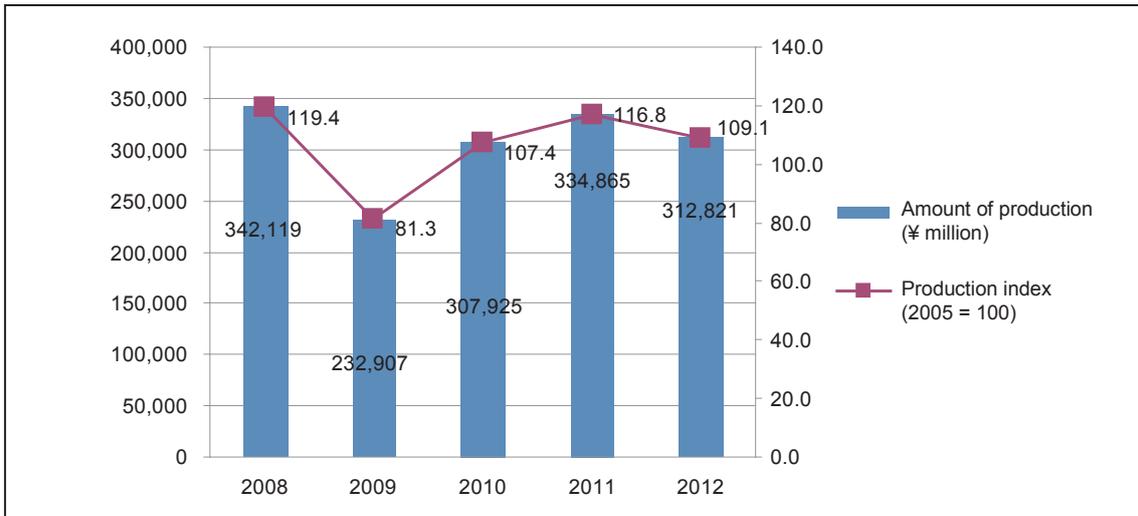
Figures 2.4.3 and 2.4.4 show the trend of production of bearings by the type of product. First, the output of ball bearings in 2012 amounted to ¥349.5 billion, and the production index supposing that the level in 2005 were 100 was 100.1%, a decline to the 2005 level. On a year-on-year basis, too, the production fell by 5.3%, indicating a remarkable declining trend. The output of roller bearings in 2012 was ¥312.8 billion, and the production index supposing that the level in 2005 were 100 was 109.1; it suffered a decrease of 6.6% from the previous year, a larger drop than that of ball bearings.

Probable reasons for this may include a decline in the sales of Japanese-made cars in China affected by the Senkaku islands problems and sluggish demand for general machines for China, such as machine tools and various manufacturing machines, resulting from the slowdown of the Chinese economy itself.

Fig. 2.4.3 Production of ball bearings

Source: Same as that for Fig. 2.4.1.

Fig. 2.4.4 Production of roller bearings

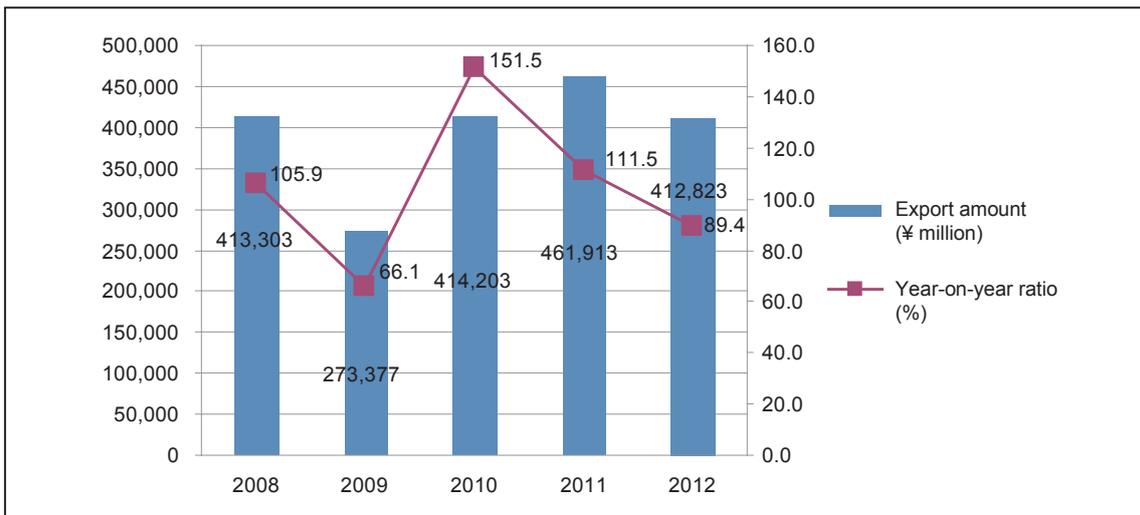


Source: Same as that for Fig. 2.4.1.

(5) Export

Figure 2.4.5 shows the trend of export of bearings (finished bearings and bearing parts). As indicated in this figure, the export in 2012 totaled to ¥412.8 billion, a big fall of 10.6% year on year. What can be pointed out behind this is the impact of slower growth in the export of general machines to China affected by the Senkaku islands problems and the deceleration of the Chinese economy itself.

Fig. 2.4.5 Export of bearings (finished bearing products and bearing parts)

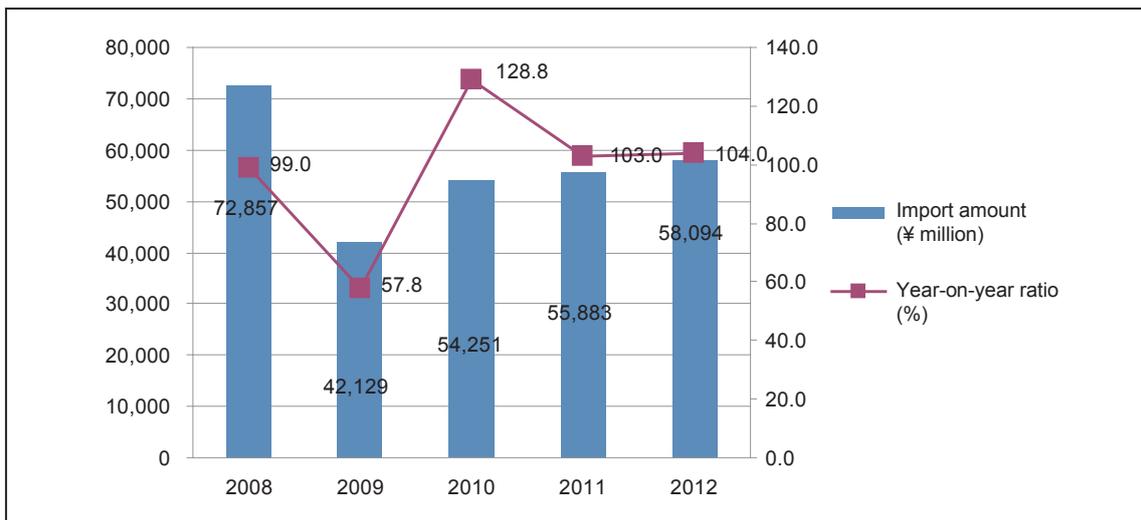


Source: Based on the Ministry of Finance, "Trade Statistics of Japan."

(6) Import

As shown in Figure 2.4.6, the import of bearings (finished bearing products and bearing parts) in 2012 grew by 4.0% over the previous year, amounting to about ¥58.1 billion. This figure indicated an upward trend although it did not yet reach the level before the Lehman shock.

Fig. 2.4.6 Import of bearings (finished bearing products and bearing parts)



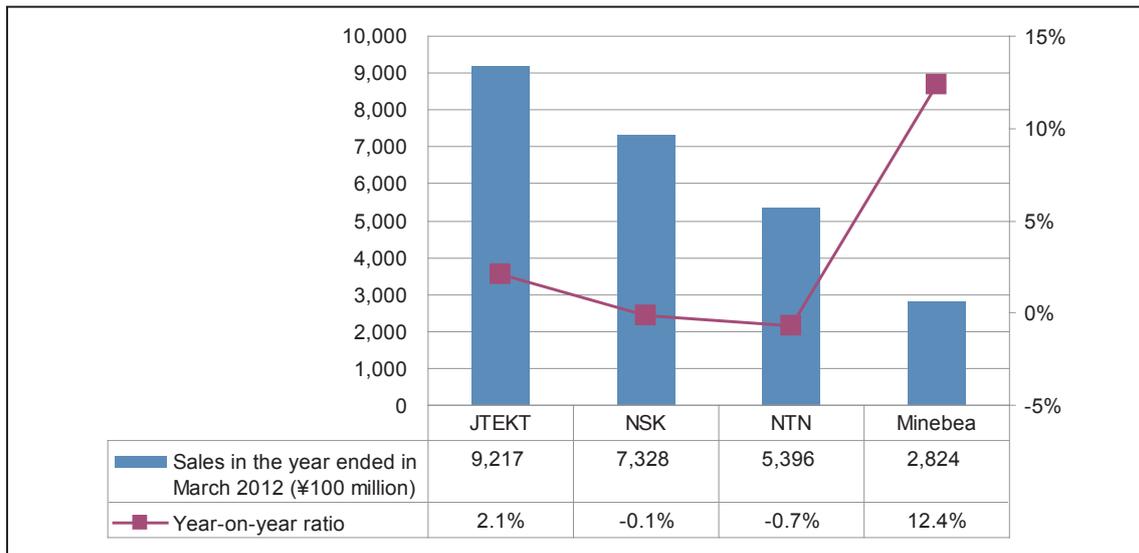
Source: Same as that for Fig. 2.4.5.

2.4.2. Results of operations, overseas activities and the trend of the bearing industry

(1) Results of operations

According to the data of the four major bearing manufacturers, the sales for the year ending in March 2012 and year-on-year ratios are as shown in Figure 2.4.7. As evident from this figure, the performance of these manufacturers was various: while Minebea enjoyed good recovery and JTEKT (machine tool and parts segment) had a small increase, NTN and NSK experienced a slight decline.

Fig. 2.4.7 Sales and the year-on-year increase ratios of sales of the four major bearing manufacturers



Note: The figures for JTEKT are those of the company's machine tool and parts segment.

Source: Based on the statement of accounts of the manufacturers shown above.

The situation of management of the manufacturers in the year ending in March 2012 is summarized as follows: first, for JTEKT (machine tool and parts segment), the sales totaled to ¥921.7 billion (up 2.1% year on year), which are broken down to ¥483.7 billion (up 9.0%) in steering business, ¥318.4 billion (down up 6.1%) in bearing business and ¥119.6 billion (down 0.3%) in driving component business. The factor behind this includes the fact that while steering business grew all over the world, bearing business had a fall in demand for automobiles in Europe although it enjoyed greater demand in Japan, North America and Asia and that driving component business achieved larger demand in other regions than Japan.

NSK registered sales of ¥732.8 billion (down 0.1%) as its industrial machine-related business suffered smaller demand for machine tools and construction machines affected by the slowdown in Chinese economy and for general machines and electric machines in Europe. As a result, the company's sales of industrial machines were ¥216.1 billion (down 15.5%). On the other hand, its automobile-related business recorded larger sales both in automotive bearings and automotive parts. By region, the sales increased in Japan mainly because of the recovery of automobile production and good effects of the "subsidies for eco-friendly cars," and as the sales of Japanese-affiliated automakers revived in North America due chiefly to economic recovery, the takings of electric power steering became higher. In Thailand, too, the company's sales grew as a result of, among others, the government policy for promoting the purchase of automobiles, its takings of automotive bearings and electric power steering were higher. However, the sales in Europe continued to drop due to sluggish market, and the effects of the shrinkage of the share of Japanese-affiliated automakers were observed in China. NSK's automobile-related takings were ¥490.5 billion (up 10.3%).

NTN registered sales of ¥539.6 billion (down 0.7% year on year). By the type of business, the figure was ¥93.7 billion (up 12.1%) for industrial machine business, ¥356.6 billion (up 4.0%) for automobile-related business and ¥89.2 billion (up 5.0%) for repairing and marketing business. By region, the company's performance of bearings for automobiles in Japan was poorer as a whole because of lower customer demand for export although there were signs of recovery from the curtailment of production resulting from the impact of the Great Eastern Japan Earthquake, and its bearings for industrial machines suffered a decline for construction machines, etc. because demand for general machines and customer demand for export to China diminished. In North America, NTN recorded greater sales in general for bearings for automobiles due to greater demand of customers but had a decrease in sales of bearings for construction machines in industrial machine business. The company experienced smaller sales of bearings for automobiles, industrial machines, etc. in Europe as a result of the delayed recovery of the EU economy. In Asia, the takings of bearings for automobiles increased mainly due to revival from the production cut resulting from the great floods in Thailand and increased customer demand in Asia despite smaller demand for products for China and Japanese affiliates, while for products for industrial machines, the sales of bearings for general, office and construction machines suffered a decline.

The sales of Minebea amounted to ¥282.4 billion (up 12.4%). This is broken down to ¥113.6 billion (up 6.2%) for machined product business, ¥101.9 billion (up 11.5%) for rotary equipment business, ¥57.2 billion (up 50.9%) for electronic equipment business and ¥9.7 billion (down 35.8%) for other business. Behind these good results were the fact that the negative factors, including the Great Eastern Japan Earthquake, the great floods in Thailand and substantial increases in the price of rare earth, which had given serious effects until the first half of 2012, were removed and the impact of weakening yen in November 2012 and after. By business segment, ball bearings, the company's main product, enjoyed good results for automobiles, household electric appliances and OA equipment, and the performance of LED backlights, Minebea's electronic appliance business, for liquid crystal displays for smartphones was good, too.

(2) Overseas activities and the trend of the bearing industry

Nachi-Fujikoshi Corp. is increasing its overseas activities according to a long-term plan to raise the ratio of its sales abroad in 2020 to 60%. The company plans to expand its tool manufacturing bases and introduce new products mainly at the new plant in Zhangjiagang, China, that started operation in February 2013, and at the bearing plant in India that began production in July 2013, aiming at boosting its market share and increasing its sales. In addition, it has strengthened the development of globally competent human resources to cope with increased overseas business and in the language training program abroad for new employees that was introduced in 2012, has taken the steps to improve the program, including an increase in the number of countries for training.

Minebea, which leads the world in high-performance bearings used mainly for the drive parts of aircraft wings, acquired Cerobear GmbH, a German company strong at special bearings for aircraft. Behind this is the intention of Minebea, which has Boeing in the U.S. and Airbus in Europe as its major customers, to broaden the product assortment and increase high value-added products for the

aircraft-related market by buying out Cerobear, the company having technology of bearings made of highly heat-resistant, light-weight and corrosion-resistant ceramics, anticipating that demand for bearings for the parts around engines, etc. where the combustion temperature exceeds 1,000°C will increase in the aircraft field in the future.

These positive overseas investment and acquisitions of overseas businesses may be regarded as the common strategies of major bearing manufacturers in Japan. Japanese manufacturers are expanding and reinforcing the function of their overseas production bases aiming at promoting “local production for local consumption” in response to the global market strategies of automakers and the manufacturers of industrial machines, etc. This tendency is likely to continue in the years ahead.

One noticeable fact is that foreign manufacturers of automotive parts are reinforcing their R&D bases in Japan. Autoliv, a Swedish company, established a new R&D department in Chiba Prefecture and will develop parts meeting customer needs from the initial stage, rather than making minor changes to the parts it developed in Europe. Shaeffler, a German firm ranking second in the world in the sales of bearings in 2011 after SKF, a Swedish manufacturer, plans to start in 2016 the basic research of parts for continuously variable transmissions (CVTs), whose adoption has been increased by Japanese automakers (See Fig. 2.4.8).

Fig. 2.4.8 Western automotive parts manufacturers that are reinforcing R&D in Japan

Company	Outline of business and R&D activities in Japan
Autoliv	Sweden-based global-scale supplier of automotive safety systems. The company develops, manufactures and sells airbags, seatbelts, steering wheels, etc. for major automakers. It will establish a new R&D base for accident-prevention and safety parts in Katori, Chiba Prefecture, in 2014 or after.
ZF	ZF is an abbreviation of “Zahnradfabrik Friedrichshafen” (which means a gear factory in Friedrichshafen). German-based automotive parts manufacturer and a global-scale supplier of power trains and chassis components. The company will transfer part of its designing functions of transmissions for passenger cars and related parts to Japan in the near future.
Shaeffler	German-based top bearing manufacturer in the world and a supplier of automotive parts. The company develops and manufactures precision products used for machines, devices, vehicles, aerospace, etc. by the brand names of INA, LuK and FAG. It plans to transfer parts of its developing functions of CVT parts to Japan in 2016.
Johnson Controls	U.S.-based global business providing innovative automotive interior decorations in automotive systems business. In power solution business, the company supplies automotive batteries and batteries for electric hybrid cars. In the fall of 2013, it started the operation of a designing and developing base of automotive seats, etc. in Yokohama, Kanagawa Prefecture.

Source: Based on the website of these companies and an article printed in the “Nihon Keizai Shimbun,” July 13, 2013.

2.4.3. Future prospects

As already noted, the bearing industry was continuously faced with difficulties from 2012 to the first half of 2013 by, among others, reducing production or restricting investment, under the still continued effects of the Great Eastern Japan Earthquake, great floods in Thailand, steep rises in rare earth prices, etc. Thereafter, too, the industry suffered stagnancy in the performance of bearings for industrial machines chiefly as a result of inactive sales of Japanese-made cars in China affected by the worsening Sino-Japanese relations over the Senkaku islands problems and by sluggish capital investment due to the decelerating tendency of the Chinese economy itself. But in the middle of 2013, large bearing manufacturers began to increase earnings taking advantage of foreign exchange gains realized by the weak yen due to Abenomics. In addition, most of automobile-related businesses, the best customers of bearings, started to recover good performance due to the effects of weak yen, and the fact that domestic demand for bearings from Japanese automakers is reviving can be regarded as an encouraging sign. The key to the bearing industry in the coming years will be at what pace demand for bearings for industrial machines, which bring high profit ratios to manufacturers, picks up. But what requires attention here is to what extent bearing manufacturers can rely on exchange profits from weak yen. It is true that the impact of foreign exchange and stock prices on the bearing industry's business activities as the "outer environmental factors" is very great. But it is needless to say that the industry will not be able to make any true innovation if it depends on these "outer environmental factors" only. The bearing industry has many problems of innovation in expanding its global business, including the problem of how to open new markets and in what way it should speedily carry out new product development work in each segment. Figure 2.4.9 summarizes the industry's promising markets and problems in the future by region.

Fig. 2.4.9 Promising markets and problems of the bearing industry in the medium-to-long term

<p>■ Japan</p> <p>[Markets] Aircraft, railways, wind power generation, automobiles, etc.</p> <p>[Problems] Ability to recover of domestic production, costs of electric power, rate of development of recyclable energy.</p>
<p>■ Asia and newly industrializing countries</p> <p>[Markets] Thermal power plants in China, automobiles in Thailand and India, construction machines in Central and South America and the Middle East</p> <p>[Problems] Possibility that the chilly political relations and good economic relations with China and South Korea continue, stability in the Middle East, risks of overseas economic bubbles</p>
<p>■ Europe</p> <p>[Markets] Railways, farm machines, aircraft, etc.</p> <p>[Problems] Ability for economic recovery, competitive power of Japanese products</p>
<p>■ U.S.</p> <p>[Markets] Large-sized farm machines, construction machines, aircraft, etc.</p> <p>[Problems] Competitive power of Japanese products, revival of demand for bearings from mines</p>

Source: Based on various corporate information.

The Economic Research Institute (ERI) Japanese Society for the Promotion of Machine Industry (JSPMI)

This institute conducts surveys and research on various economic and management aspects of the machine industry, and works to spread its findings widely by publishing different kinds of survey and research reports, by hosting lectures and study sessions, and through other activities. In addition, it collects and organizes books, information materials and electronic information concerning the machine industry from both inside and outside Japan, runs the Business Information Commons (BIC) Library and provides support to people involved in Japan's machine industry.

Research activities

The institute works on highly original research projects, on subjects including on growth strategies contributing to the growth of the Japanese machine and information industries, and the improvement of these industries' international competitiveness.

【Major research projects】

- (1) Regional economies/Industrial district;
- (2) Globalization/Newly industrializing economies;
- (3) Fundamental technologies/R&D/Human resources;
- (4) Environment/Resources/Energy;
- (5) Small-to medium-sized business/Venture businesses; etc.

Trend analysis for the Japanese machine industry

The institute issues annual reports entitled "Nihon no Kikai Sangyo"(literally, "Machine Industry of Japan") to provide summaries of supply and demand trends, business and management environments, future challenges and other aspects of more than 30 sectors within Japan's machine industry.

Creation and communication of information

The institute runs the Business Information Commons (BIC) Library, developed by adding business support functions to its predecessor, the Machine Industry Library. By taking advantage of its functions, this library contributes to the further growth of the machine industry through its services for the provision of quality information.

【Main information provision services】

- (1) Undertaking commissioned research projects for members and venture business by taking advantage of the library's statistical data;
- (2) Acting as a point of contact for consultations concerning market and management information related to industry-university-government cooperation ; and
- (3) Providing a wide range of useful services and communication opportunities to associations for machine-related industries and to various other bodies (through our industrial Vision Salon, Consultation Corner, etc.).