2. Industrial Machine Sector

2.1 Machine tools

2.1.1 Supply and demand trend

(1) Outline

The amount of the production of machine tools in 2007 was ¥1,303.1 billion and an increase of 7.6% year on year, achieving a growth for five consecutive years after 2003 (based on the Ministry of Economy, Trade and Industry, "Annual Report of Machinery Statistics 2007"). According to the Japan Machine Tool Builders' Association, the amount of orders received was more than the result in the previous year for five years running and recorded ¥1,590.0 billion. In the trend of export and import, the total amount of export was ¥892.0 billion or a decrease of 3.2% from the previous year, and that of import suffered a sharp drop of 46.5% year on year to ¥72.6 billion.

(2) Production and demand

Fig. 2.1.1 Orders received for machine tools by business category

Unit: ¥ million, %

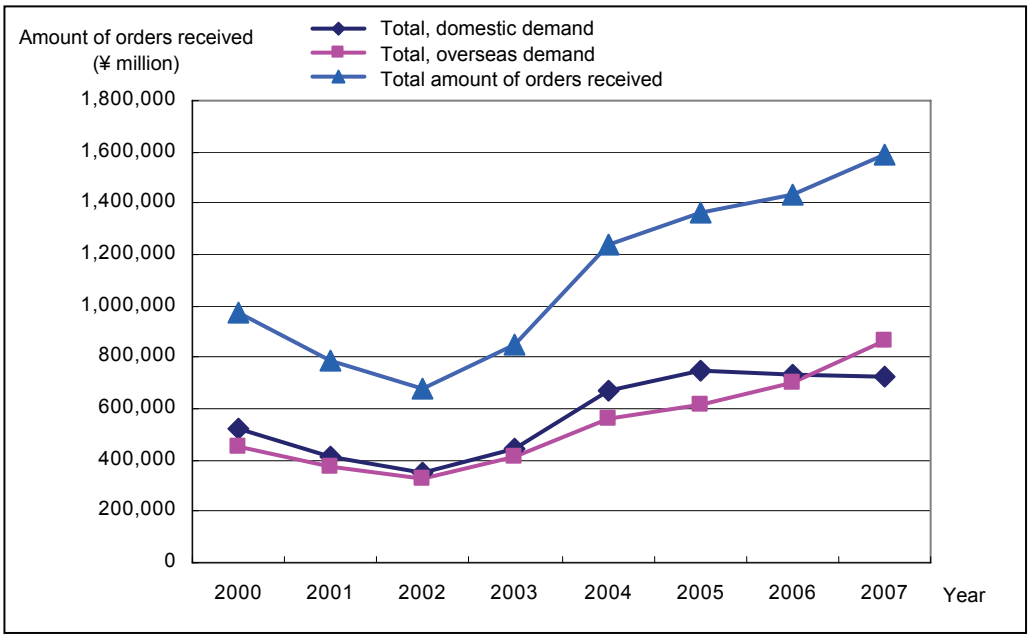
		2000	2001	2002	2003	2004	2005	2006	2007	Year-on-year ratio
Iron and steel/nonferrous metal		7,824	5,189	3,680	5,557	8,613	11,619	12,996	12,664	-2.6
Metal products		18,325	13,383	9,732	15,209	22,067	22,641	21,030	21,582	2.6
Machine manufacturers	General machines	192,850	154,430	120,190	160,512	264,502	302,287	330,108	319,284	-3.3
	(of which dies)	-	39,821	32,327	40,724	65,645	73,807	66,667	56,975	-14.5
	Electric machines	45,922	35,131	22,564	30,483	50,902	44,296	52,333	46,355	-11.4
	Automobiles	129,042	136,541	141,490	158,988	225,632	258,959	195,505	213,125	9.0
	(of which automotive parts)	-	60,410	67,100	76,975	101,945	110,547	89,157	92,180	3.4
	Shipbuilding and other transportation machines	10,227	15,587	14,287	12,074	17,328	23,942	27,066	29,796	10.1
	Precision machines	38,276	22,082	16,459	24,176	32,990	32,913	36,813	31,571	-14.2
	Subtotal	416,317	363,771	314,990	386,233	591,354	662,397	641,825	640,131	-0.3
Other manufacturers		26,557	17,198	14,197	24,507	37,643	33,333	37,719	34,794	-7.8
National/local governments/schools		3,085	3,065	2,125	1,873	1,842	1,588	2,100	2,072	-1.3
Other demand sectors		1,760	853	610	1,644	2,971	6,081	8,368	8,164	-2.4
Trading firms/agencies		47,818	7,666	4,988	6,564	8,349	9,050	8,971	7,017	-21.8
Total, domestic demand		521,686	411,125	350,322	441,587	672,839	746,709	733,009	726,424	-0.9
Overseas demand		453,360	377,773	325,515	409,514	563,353	616,494	703,961	863,567	22.7
Total amount of orders received		975,046	788,898	675,837	851,101	1,236,192	1,363,203	1,436,970	1,589,991	10.6
of which NC machine tools		926,477	745,409	638,831	807,208	1,176,257	1,304,058	1,374,496	1,529,644	11.3

Notes: 1. Figures for dies and automotive parts, which are included in those for general machines and automobiles, respectively, are shown in 2001 and after.
2. Due to rounding off, the total of year-on-year ratios is not 100.0 in some cases.
3. Figures with "-" are negative ones.

Source: Based on Japan Machine Tool Builders' Association, "Machine Tools," No.174, March 2008, p.52-54.

The amount of orders for machine tools in 2007 exceeded that of the previous year for the fifth straight year, recording ¥1,590.0 billion. While domestic demand fell by 0.9% year on year with ¥726.4 billion, overseas demand grew for five successive years after 2003 (¥863.6 billion; up 22.7% year on year). Thus the amount of orders received increased by 11.3% over that in 2006 (¥1,437.0 billion), when an all-time high was attained in the amount of orders first in 16 years after 1990 (Fig. 2.1.1). In addition, overseas demand began to exceed domestic one in late 2006; in 2007 when the orders received recorded a ¥800.0 billion mark for the first time, overseas demand accounted for 54.3% of the total amount of orders, achieving an all-time high for the fourth straight year (Fig. 2.1.2).

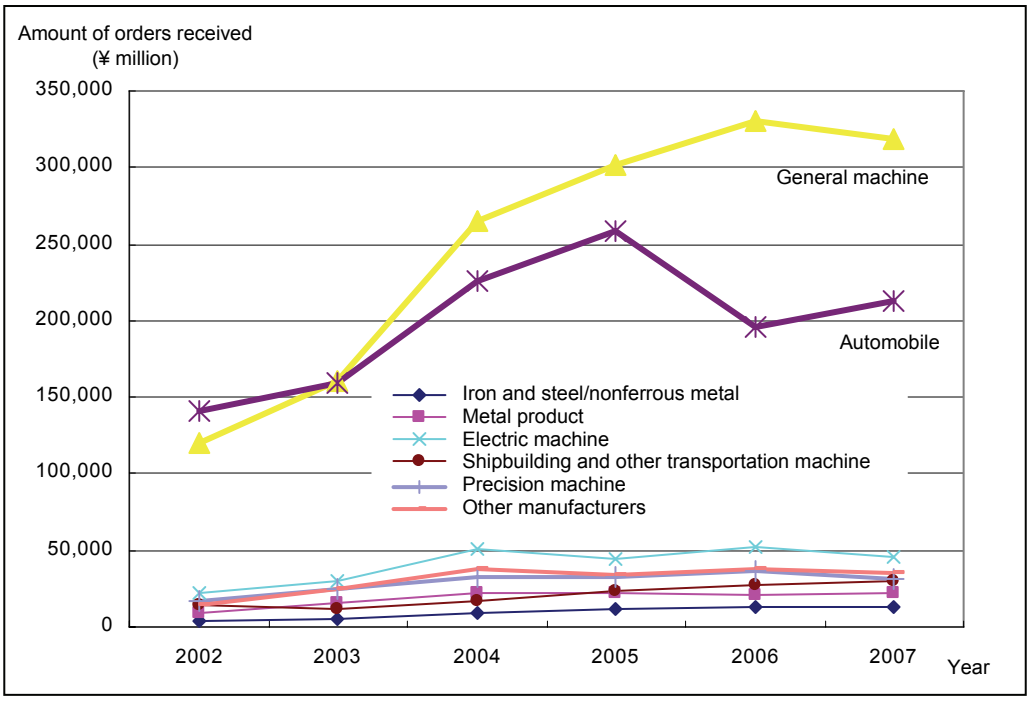
Fig. 2.1.2 Trend of the amount of orders received for machine tools



Source: Same as that for Fig. 2.1.1.

By business category, domestic orders from general machine manufacturers (¥319.3 billion, down 3.3% year on year), electric machine manufacturers (¥46.4 billion; down 11.4%) and precision machine manufacturers (¥31.6 billion; down 14.2%) dropped. On the other hand, transportation machine manufacturers, including automakers (¥213.1 billion; up 9.0%) and shipbuilders (¥29.8 billion; up 10.1%), increased their orders for machine tools (Fig. 2.1.3).

Fig. 2.1.3 Orders received for machine tools by the business category of the manufacturing industry

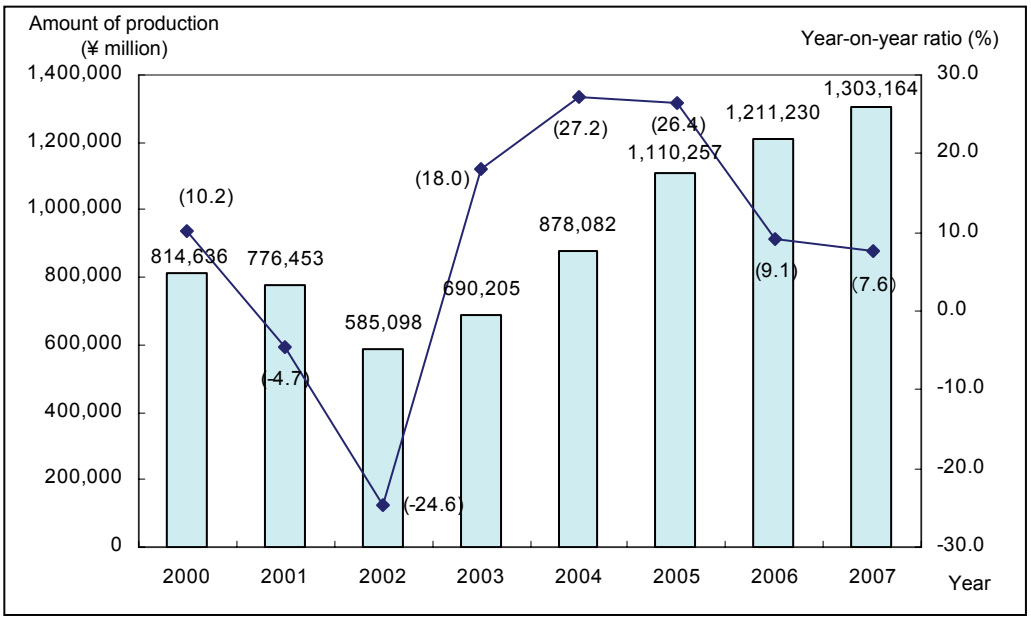


Source: Same as that for Fig. 2.1.1.

The amount of production of machine tools in 2007 was ¥1,303.1 billion or a rise of 7.6% over the previous year, registering growth for five years running after 2003 (based on the Ministry of Economy, Trade and Industry, "Annual Report of Machinery Statistics 2007"; Fig. 2.1.4).

By the main types of machines, the output was greater than that in the previous year for almost all types: lathes (¥310.7 billion; up 12.2% year on year); grinders (¥141.1 billion; up 4.3%); gear cutters and gear finishing machines (¥31.3 billion; up 9.1%), special-purpose machines (¥129.2 billion; up 2.2%), machining centers (¥407.5 billion; up 8.2%), and other metal machine tools, including numerically controlled (NC) drilling machines, NC boring machines and NC electric discharge machines (¥283.3 billion, up 6.1%). For lathes whose increase in output was very rapid, the growth rate was high for NC vertical lathes with ¥52.7 billion (up 21.5%) and NC horizontal lathes with ¥252.9 billion (up 10.9%). The quantity of production of NC vertical lathes was 2,393 units, a decline of 211 units from 2006, but the amount of output increased, which suggests that the production of large-sized ones was on a high level.

Fig. 2.1.4 Production of machine tools



Source: Based on the Ministry of Economy, Trade and Industry, "Annual Report of Machinery Statistics 2007."

For machining centers that recorded the largest amount of production of all machine tools, the output of vertical-type products with a table size of 500mm or more showed a great growth: ¥150.7 billion or an increase of 19.3% year on year. The amount of output of vertical machining centers was just ¥58.6 billion in 2003 but grew as much as 2.6 times in only five years. From this it can be considered that the production of large-sized machining centers for construction machines, shipbuilding, power generation plants and aircraft engines was on a high level in these years.

(3) Export and import

The amount of the export of machine tools in 2007 was ¥892.0 billion or a fall of 3.2% from the previous year, while that of import was ¥72.6 billion, a steep decline of 46.5% year on year. Probable reasons for this are the fact that the period of increase in export for four consecutive years after 2002 passed and that the rapid growth in import after 2004 leveled off (Fig. 2.1.5).

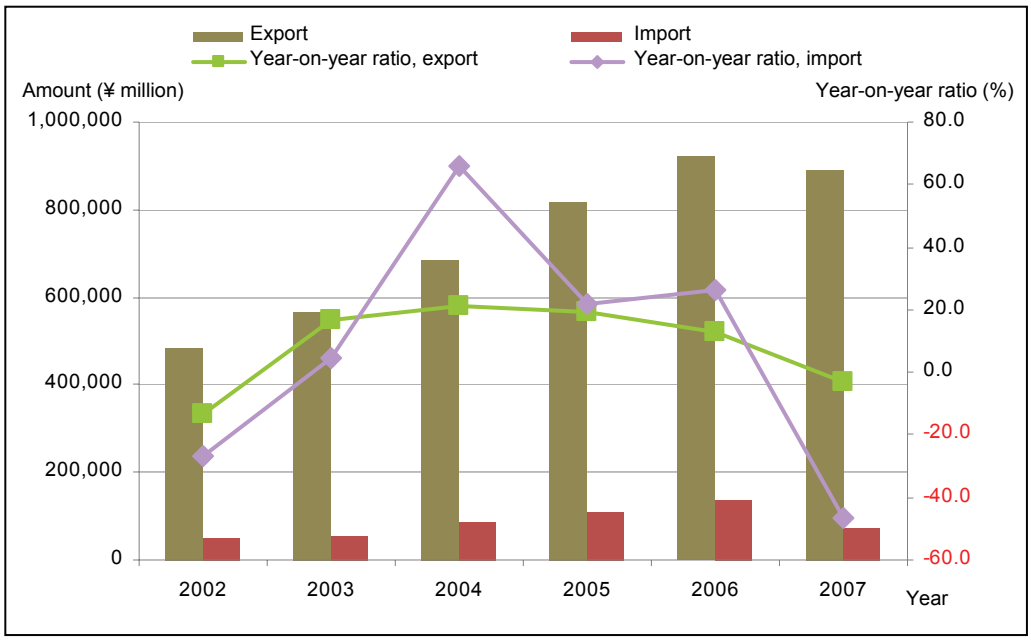
By the destination of exports, the U.S. is the largest importer with ¥198.7 billion (down 13.4% year on year), followed by China with ¥167.3 billion (up 6.5%). According to the brief statements of accounts and other data of machine tool manufacturers, demand was great from automobile, farm machine, construction machine and aircraft manufacturers in these countries, which indicates that export to these industries was great.

The export of NC horizontal lathes was the greatest in amount with ¥226.4 billion (25.4% of all; up 21.8%), followed by horizontal machining centers with ¥179.7 billion (20.1%; up 22.8%).

The import of machine tools from the U.S. suffered a great decrease rate of 81.4% year on year with ¥990 million after recording the highest growth in 2006. The import from the U.S. had negative figures for all types of machine tools excluding grinding machines and finishing machines; the

import from the country of special processing machines showed an especially sharp fall (¥580 million; down 91.1%). Laser machines registered the highest import amount with ¥12.0 billion (16.5% of all; down 28.6%).

Fig. 2.1.5 Export and import of machine tools



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

2.1.2 Results of operations and the trend of the machine tool industry

(1) Trend of management and overseas business activities

Figure 2.1.6 shows the share of machining center and NC lathe manufacturers in the domestic production.

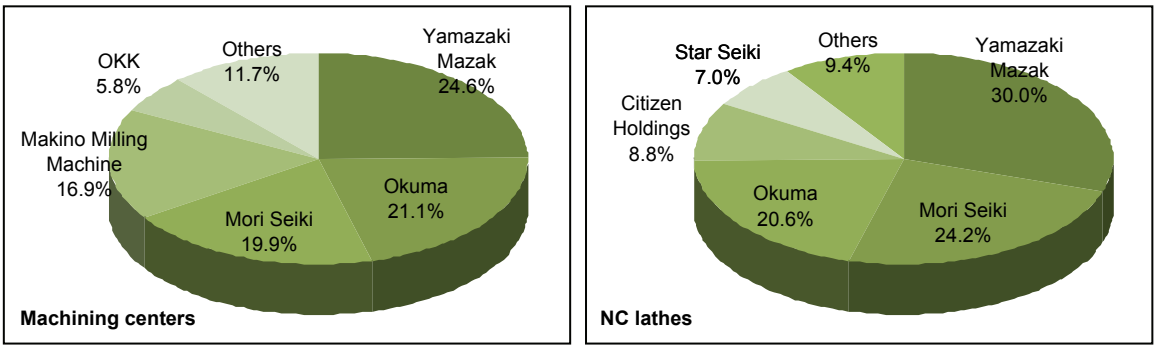
The domestic output of machining centers in 2007 amounted to ¥407.5 billion and achieved a year-on-year growth for the fifth straight year. The top five manufacturers in terms of domestic production estimated by Nihon Keizai Shimbun, Inc. had the same orders as those in 2006. The domestic production of NC lathes was ¥305.6 billion and recorded a year-on-year increase for five years running just as machining centers did.

The trend of management of Yamazaki Mazak Corp., Okuma Corp. and Mori Seiki Co., the top three in the output of machining centers and NC lathes, was as summarized below:

Yamazaki Mazak, which led both of the machining center and NC lathe sectors, attained sales of ¥49.0 billion and a rise of 8.9% year on year in 2007 (for the year ending in March 2008; according to the information of Tokyo Shoko Research, Ltd.). In the machining center sector, the company expanded the assortment and production capacity of medium- and large-sized products and

in particular had big orders for large-sized products from heavy industries. In NC lathes, too, Yamazaki reinforced the product lineup and manufacturing capacity of medium- and large-type compound processing machines with high unit prices and filled active demand, mostly by export, from energy-related, aircraft and construction machine industries. The company also had good sales to medical appliance manufacturers.[1]

Fig. 2.1.6 Share of machining center and NC lathe manufacturers in the domestic production



Note: The share figures are those estimated by Nihon Keizai Shimbun, Inc.
Source: Based on the "Nikkei Sangyo Shimbun," August 5, 2008.

Okuma, which ranked second in machining centers and third in NC lathes, recorded sales of ¥213.8 billion (up 13.3%), of which those of machining centers were ¥108.3 billion (up 16.1%) and those of NC lathes, ¥55.0 billion (up 0.6%) (for the year ended in March, 2008; consolidated). The company enjoyed a marked increase in sales of compound processing machines, too (¥43.6 billion; up 28.5%). Okuma, which has a high share of large-sized machining centers, constructed No. 5 Kani Plant in February 2007 as a plant exclusive to large-sized products. As the new plant started full-scale operation, the company achieved a good performance by filling orders from heavy industries.

Mori Seiki, which took third place in machining centers and second in NC lathes, achieved good results in 2007, too, with sales of ¥202.3 billion and an increase of 17.4% as compared with the previous year (for the year ended in March 2008; consolidated). The company introduced, among others, 5-axis controllers with high unit prices in the machining center segment and compound processing machines in the NC lathe segment.

The above outlines the cases of the top three manufacturers. The results of machine tool manufacturers show that all of them greatly increased overseas sales (Fig. 2.1.7). In particular, as seen in the cases of Okuma, Mori Seiki and Tsugami Corp., growth in the ratio of European markets to total sales was noteworthy. While demand for machine tools was great in Europe as in 2006, it may also be said that the outcome of the strategies of machine tool manufacturers for Europe was reflected on the sales figures.

[1] The "Nikkei Sangyo Shimbun," August 5, 2008.

Fig. 2.1.7 Ratio of sales of main machine tool manufacturers by region (consolidated)

	Okuma		Mori Seiki		Makino Milling Machine		Tsugami	
	FY2006	FY2007	FY2006	FY2007	FY2006	FY2007	FY2006	FY2007
Americas	23.0%	19.9%	22.0%	20.8%	20.5%	20.2%	9.0%	5.4%
Europe	14.7%	20.2%	26.8%	28.7%	10.5%	13.5%	1.7%	9.7%
Asia/Pacific	12.5%	15.6%	9.1%	12.6%	31.3%	31.0%	31.1%	32.8%
Total	50.2%	55.7%	57.9%	62.1%	62.3%	64.7%	41.8%	48.0%

Source: Based on the brief statements of accounts of the machine tool manufacturers.

In the area of overseas production, it was reported that Yamazaki Mazak would invest about ¥12.0-15.0 billion by the end of fiscal 2009 so as to increase the number of products made at overseas plants by about 20%.[2] The company said that it would reinforce the production capacity mainly in China, Singapore and the U.K. and would expand the monthly production capacity abroad by about 20% to 540 units.

Citizen Machinery Co. will also build a new plant in Shandong, China, where the company will start the manufacture of machine tools, which have been supplied from Thailand thus far. Mori Seiki will enlarge the plant of Dixie Machines, a Swiss machine tool manufacturer, that it purchased in 2006, where the company will increase the output of high-function machining centers in an effort to generate more local sales to European customers. In February 2008, Tsugami, which rivals Citizen Machinery and Star Seiki in small-sized automatic lathes, went into partnership with Tornos, a Swiss rival maker, to supply low-priced machine tools to the Swiss manufacturer by an OEM arrangement. As shown in Figure 2.1.7, Tsugami has no strong presence in Europe at present and is probably taking steps to reinforce its business activities there in cooperation with Tornos.

(2) Technological innovation and the business environment

In April 2008, it was reported that Yamazaki Mazak would expand the Oguchi Plant, the site of its head office, with an investment of about ¥2.0 billion and would increase the monthly production of large-sized machining centers to 50-60 units, a rise of over 60%. The report said that the company aimed at improving profits by a greater production of large-sized models with a higher profitability and also at reducing costs by concentrated manufacturing. But according to the report of the Japan Machine Tool Builders' Association in September 2008, Yamazaki's amount of orders received was smaller than that of the previous year for four consecutive months. While large-sized products mainly for shipbuilding barely registered a good performance, weakness was reported mainly for medium- and small-sized machining centers for parts machining, and demand for lathes became poorer. Machine tools, which are the producers of machines and mother machines, will be directly affected by the businesses trying to minimize their capital investment in the recent recession, and the prospect for fiscal 2008 to 2009 will not be very promising. Machine tool manufacturers also forecast that their performance in 2008 would be a negative growth as compared with that in 2007.

In this situation, machine tool manufacturers are all working hard to expand their global

[2] The "Nihon Keizai Shimbun," June 10, 2008.

business as mentioned above. They are not only reinforcing their overseas production capacity but also planning to establish a local technology center as a base for providing repair service, carrying out sales activities and giving the customer pre-purchase explanations about how to develop programs for and use the machines. In particular, when selling compound processing machines and other products requiring special programming technology, it is essential to have a face-to-face session with the customer. In addition, there has arisen the need to provide service-oriented sales activities, including the establishment of a support system for promptly visiting the customer in the event of a trouble.

An example of the introduction of new types of products is that of interesting new products announced by Citizen Machinery. The company expanded the line of "resource-saving" automatic lathes capable of reducing scrap metal generated in the cutting process of parts and other products.[3] These lathes can greatly cut down scrap metal produced in cutting work by processing already molded material ("molded material processing machines" that cut already molded material by forging or pressing and give the material complicated processing, etc.), thereby making it possible to save steel material. The lathes aim at coping with substantial rises in the price of copper, iron and other raw materials, and Citizen Machinery is said to expect demand for these lathes mainly from automotive parts manufacturers.

(3) Future prospects and problems

Orders received are uncertain both in the Japanese and overseas markets, and both production and orders in 2008 are expected to be on the decline. In September 2008, it was reported that orders for machine tools, mainly processing machines for automobiles, were unsteady, and most insiders believe that the amount of orders received will take a downward turn in 2008 first in six years after 2002.

While the declining trend of the total amount of orders cannot be denied, overseas customers were more than Japanese ones in the past several years, and Japanese machine tool manufacturers have rapidly been changing their strategies. But manufactures work quickly for overseas production, they cannot, in principle, make the products likely to be used for military purposes in any country other than the 26 nations approved by the Japanese government, and the manufacture of machine tools in Thailand, India and other countries where the production of automobiles has become active may have reduced the motivation to make expensive products. On the other hand, the production of machine tools in China amounted to $10.0 billion in 2007, making the country take the third place in the world[4], and price competition in low-priced models, at which China is good, cannot be belittled. Japanese machine tool manufacturers should urgently take steps for low price products, too.

In the high-priced models of machine tools, expectations will be high for MRJ, small-sized jet passenger plane for 100 passengers developed by Mitsubishi Heavy Industries. MHI received an order for 21 MRJs from All Nippon Airways and is also promoting the sales of this product all over

---

[3] The "Nihon Keizai Shimbun," June 5, 2008.

[4] The amount of production in China is quoted from the World Machine Tool Output & Consumption Survey.

the world. The delivery of the first MRJ is scheduled for 2013. If the company starts full-scale production of MRJ, that is likely to lead to the installation of new and additional large-sized machine tools, including machining centers, at MHI.[5]

As the targets are differentiated into low- and high-priced machine tools as described above, it is supposed that the division between large manufacturers and medium and small ones will become clearer in the years ahead. In particular, in the world of small-sized machine tools, the activities of China and other Asian rivals in an effort to close the gap have been a threat, and Japanese manufacturers have to take steps for survival. As in the case of Tsugami discussed above, some manufacturers have selected cooperation with rivals abroad, but overseas business and interlocking shareholding are among the alternatives difficult to adopt for medium and small manufacturers. In the future, the machine tool industry will reinforce strategies for market expansion through enlargement of the business scale.

2.2 Construction machines

2.2.1 Supply and demand trend

(1) Outline

The production of construction machines in 2007 amounted to ¥1,917.79 billion and recorded an increase of 15.8% over 2006. By product category, the output of track-laying tractors rose by 17.1%, that of construction cranes, by 24.2% and that of excavators, by 14.2%. The sales of construction machines grew, too: track-laying tractors achieved an increase in sales of 17.2% year on year, construction cranes, 24% and excavators, 13.9%. The export of all construction machines in 2007 was ¥1,481.15 billion. This is a 21.3% rise as compared with 2006. The import of all construction machines was ¥38.29 billion, an increase of 10.7% over 2006.

(2) Production

Let's see Figure 2.2.1. The production of construction machines in 2007 totaled to ¥1,917.7 billion or a growth of ¥262.29 billion over 2006. This means a 15.8% increase as compared with 2006. The output of construction machines rose for five years running after 2002. For example, the production in 2007 was about twice that in 2003.

Then let's look at the trend of construction machines by product category. Figure 2.2.2 shows that all product categories of construction machines had higher output than in 2006 excluding asphalt paving machines (down 12.5% year on year; ¥6.15 billion) and concrete machines (down 8.6%; ¥19.65 billion).

The production of civil engineering and construction machines in 2007 amounted to ¥1,891.26 billion or a growth of 16.0% over 2006. Of civil engineering and construction machines, the output of track-laying tractors was ¥140.58 billion, up 17.1% over 2006, and that of construction cranes,

[5] The "Shokei Kikai Shimbun," August 28, 2008.

¥245.44 billion, up 24.2%. The production of excavators stood at ¥1,341.73 billion or a rise of 14.2% as compared with 2006.

Fig. 2.2.1 Production of main types of construction machines

	2003	2004	2005	2006	2007	Growth rate in 2006/2007 (2007)	Percentage (2007)
Construction machines	9,862.0	12,719.1	13,929.4	16,555.0	19,177.9	15.8%	100%
Civil engineering and construction machines	9,533.4	12,395.2	13,699.8	16,300.0	18,912.6	16.0%	98.6%
Track-laying tractors	657.1	1,047.5	1,205.5	1,200.5	1,405.8	17.1%	7.3%
Construction cranes	836.0	1,148.9	1,475.5	1,976.9	2,454.4	24.2%	12.8%
Excavators	6,962.8	9,096.9	9,885.0	11,746.9	13,417.3	14.2%	70.0%
Land leveling machines	318.6	378.0	381.7	475.9	578.8	21.6%	3.0%
Asphalt paving machines	108.1	134.8	64.1	70.3	61.5	-12.5%	0.3%
Concrete machines	228.1	184.6	185.9	214.9	196.5	-8.6%	1.0%
Foundation-work machines	89.3	105.3	115.8	123.8	169.7	37.0%	0.9%
Boom lifts	239.7	238.2	301.2	393.9	516.6	31.1%	2.7%
Crushing and demolishing machines	93.7	61.0	85.2	96.9	112.2	15.8%	0.6%
Mining machines	132.3	131.6	134.4	177.2	180.7	1.9%	0.9%
Crushers	130.6	105.8	95.2	77.8	84.7	8.9%	0.4%

Source: Based on the Ministry of Economy, Trade and Industry, "Annual Report of Machinery Statistics 2007."

The production of land leveling machines (up 21.6% year on year), foundation-work machines (up 37.0%), boom lifts (up 31.1%) and crushing and demolishing machines (up 15.8%) increased, too. This was so for mining machines (up 1.9%) and crushers (up 8.9%), which are the construction machines not included in the category of civil engineering and construction machines. As stated above, it can be said that the upward trend of the output of construction machines in the past several years still continued in 2007, too. In addition, Figure 2.2.1 indicates that the total output of track-laying tractors, construction cranes and excavators accounted for more than 90% of the production of all construction machines in 2007. Therefore, this section lays stress on these three types of construction machines in discussing the trend of the construction machine industry.

(3) Sales

Let's take a look at the sales of construction machines in 2007. The situation of the sales of mining machines, crushers and others is omitted here because no data concerning these products is included in the "Annual Report of Machinery Statistics 2007."

Let's see Figure 2.2.2 below. The sales of all civil engineering and construction machines in 2007 amounted to ¥1,897.15 billion. Just as in the production, the sales of construction machines registered a substantial increase of 15.7% as compared with those in 2006. The sales of civil engineering and construction machines in 2007 were roughly twice those in 2003. Then look at the trend of the sales of each type of construction machines in 2007 shown in Figure 2.2.2.

The sales of track-laying tractors in 2007 were ¥140.59 billion or an increase of 17.2% and ¥20.63 billion over the previous year. Those of construction cranes grew by 24% year on year to

¥247.44 billion and those of excavators, by 13.9% year on year to ¥1,338.16 billion. As noted, it can be said that the sales of all civil engineering and construction machines, excluding asphalt paving machines and concrete machines, in 2007 were on the increasing trend in the past several years.

Fig. 2.2.2 Sales of main types of construction machines

	2003	2004	2005	2006	2007	Growth rate in 2006/2007 (2007)	Percentage (2007)
Construction machines	-	-	-	-	-	-	-
Civil engineering and construction machines	9,976.4	12,503.6	13,897.0	16,404.1	18,971.5	15.7%	100%
Track-laying tractors	671.0	1,049.8	1,194.4	1,199.6	1,405.9	17.2%	7.4%
Construction cranes	941.3	1,164.8	1,451.7	1,989.0	2,474.4	24%	13.0%
Excavators	7,186.5	9,124.8	10,049.6	11,750.0	13,381.6	13.9%	70.5%
Land leveling machines	345.7	391.4	396.1	495.8	591.0	19.2%	3.1%
Asphalt paving machines	117.6	149.6	79.1	71.8	63.4	-11.7%	0.3%
Concrete machines	243.5	192.9	192.9	226.7	208.0	-8.2%	1.1%
Foundation-work machines	120.8	129.0	142.6	170.2	225.0	32.1%	1.2%
Boom lifts	255.7	239.2	304.5	402.9	508.3	26.2%	2.7%
Crushing and demolishing machines	94.3	62.2	86.2	98.1	114.0	16.2%	0.6%
Mining machines	-	-	-	-	-	-	-
Crushers	-	-	-	-	-	-	-

Source: Same as that for Fig. 2.2.1.

(4) Export and import

Finally, let's look at the export and import trend of the construction machine industry. The export of all construction machines in 2007 substantially increased by 21.3% as compared with 2006 to ¥1,481.15 billion (see Fig. 2.2.3 below). The export of construction machines showed a big growth in recent years. From Figure 2.2.3, it can be seen that the export in 2007 was about twice that in 2003.

Now let's see the export trend of construction machines by product type. The export of track-laying tractors in 2007 was ¥135.23 billion, which means a substantial rise of 31.8% year on year. Similarly, the export of construction cranes amounted to ¥1,035.23 billion or an increase of 52.5%, i.e., over 1.5 times, year on year. The export of excavators also grew by 17.3% year on year and reached ¥1,112.93 billion, exceeding the one-trillion mark. The figure of excavators in 2007 was more than twice that in 2003. By contrast, the import of construction machines in 2007 was ¥38.29 billion, less than the ¥40.0 billion level. The growth rate of the import of all construction machines in 2007 was 10.7% over 2006 and about a half the figure for the export.

Figure 2.2.4 is the graph of the export, trade balance and coefficient of specialization of the construction machine industry. From this graph, too, it can be understood that the construction machine industry in Japan enjoyed huge trade surpluses in these years. In addition, the trend of the coefficient of specialization also suggests that the Japanese construction machine industry had very high export competitiveness. Thus it may be said that the growth in the production of the construction machine industry in Japan was pulled along by the expansion of export as mentioned above.

Fig. 2.2.3 Export of construction machines (1)

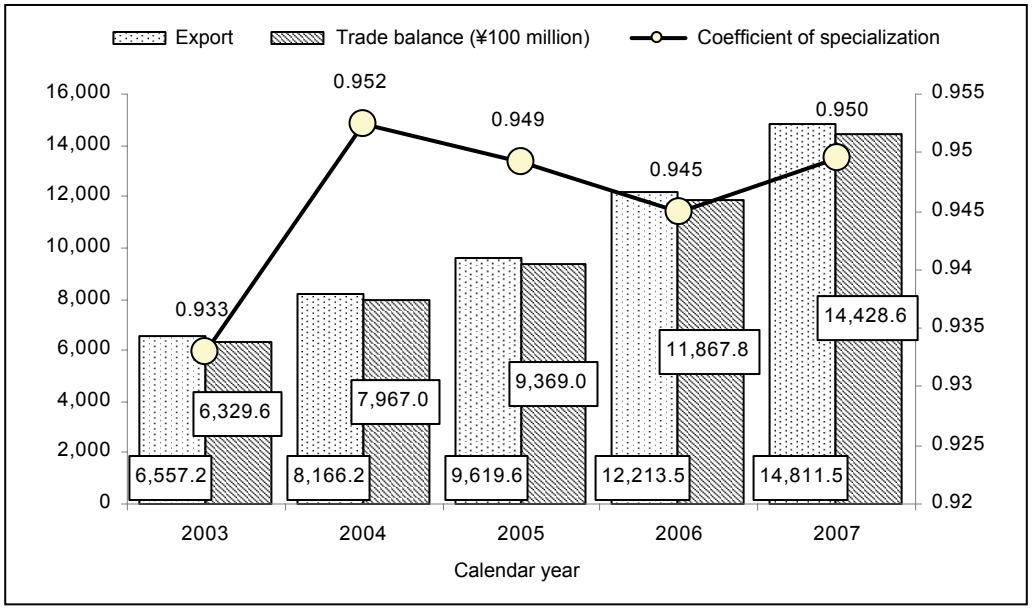
	2003	2004	2005	2006	2007	Growth rate in 2006/2007
Construction machines						
Export	6,557.2	8,166.2	9,619.6	12,213.5	14,811.5	21.3%
Track-laying tractors	513.8	727.1	827.6	1,025.8	1,352.3	31.8%
Construction cranes	372.6	529.2	675.6	915.0	1,395.1	52.5%
Excavators	5,255.8	6,354.7	7,541.0	9,489.0	11,129.3	17.3%
Other construction machines	415.1	555.2	575.4	783.7	934.7	19.3%
Import	227.6	199.2	250.6	345.7	382.9	10.7%
Trade balance	6,329.6	7,967.0	9,369.0	11,867.8	14,428.6	21.6%
Coefficient of specialization	0.933	0.952	0.949	0.945	0.950	-

Notes: 1. The item numbers in the "Trade Statistics of Japan" used in the table are: - all construction machines: 8426.41, 8426.49, 8426.91, 8429, 8430, 8431.42, 8431.43, 8474, 8479.10; track-laying tractors: 8429.11, 8429.19; construction cranes: 8426.41, 8426.49, 8426.91; excavators: 8429.51, 8429.52, 8429.59, 8430.31, 8430.39, 8430.41, 8430.49, 8430.50, 8430.69.

2. Coefficient of specialization = (export amount - import amount)/(export amount + import amount); the closer the value of the coefficient is to 1, the higher is the international (export) competitiveness, and the closer the value is to 0, the lower is the global competitive power.

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

Fig. 2.2.4 Export of construction machines (2)



Source: Same as that for Fig. 2.2.3.

2.2.2 Results of operations and the trend of the construction machine industry

(1) Trend of management

The trend of management of main construction machine manufacturers in 2007 is shown in Figure 2.2.5. For all construction machines and track-laying tractors, Komatsu Ltd. increased sales by 21.7% and operating profit by 38.0% as compared with 2006. The company said that while domestic demand for construction machines was sluggish due to declining public investment and the

North American economy suffered a setback because of the subprime loan problems, demand for infrastructure development and mines substantially increased in Europe, BRIC, Middle East, Southeast Asia and Africa and the market of construction machines expanded. The sales of Furukawa Co. grew by 11.3% and the operating profit, by 15.9%, year on year in 2007. Furukawa also pointed out that the overseas markets "other than the U.S. market" (including Middle East, Southeast Asia, Russia, China and South Korea) were favorable.

Fig. 2.2.5 Consolidated settlement of accounts of main construction machine manufacturers (most recently published settlement of accounts)

(Consolidated; ¥100 million; figures less than ¥100 million rounded off)

	FY2006		FY2007		Year-on-year ratio	
	Sales	Operating profit	Sales	Operating profit	Sales	Operating profit
Komatsu, construction/mining machine sector	15,880	2,206	19,329	3,044	21.7%	38.0%
Furukawa, machine sector	686	59	763	68	11.3%	15.9%
Tadano, construction machine sector	1,397	125	1,687	178	20.8%	42.4%
Kato Works, construction machine sector	177	7	200	14	13.1%	95.9%
Hitachi Construction Machinery, construction machine sector	6,809	752	8,549	1,047	25.6%	39.2%

Notes: 1. The sector shown after the company name is the sector to which the company's construction machine business belongs.
2. Sales figures include those between different sectors.
3. Komatsu adopts the U.S. Accounting Standards.

Source: Based on the financial statements of each company.

In the area of construction cranes, Tadano recorded an increase of 20.8% in sales and 42.4% in operating profit year on year. Kato Works also achieved a rise of 13.1% in sales and 95.1% in operating profit. The two companies said that the Middle East and European markets were buoyant.

For excavators, Hitachi Construction Machinery enjoyed a 25.6% growth in sales and a 39.2% growth in operating profit. This company also said that the good condition of overseas markets excluding the U.S. led to a better performance in its business.

(2) Technological innovation and the business environment

Let's take a look at the technological innovation and research and development activities for construction machines of the main manufacturers. In 2007, partly because business results were satisfactory, all the construction machine manufacturers increased their R&D expenditure (see Fig. 2.2.6). They carried out R&D projects laying stress on eco-friendly construction machines, such as measures to cope with the auto emission control in Japan, North America and Europe. For example, Tadano stated that it developed a truck crane compatible with the third auto emission control in North America and Europe in 2007.

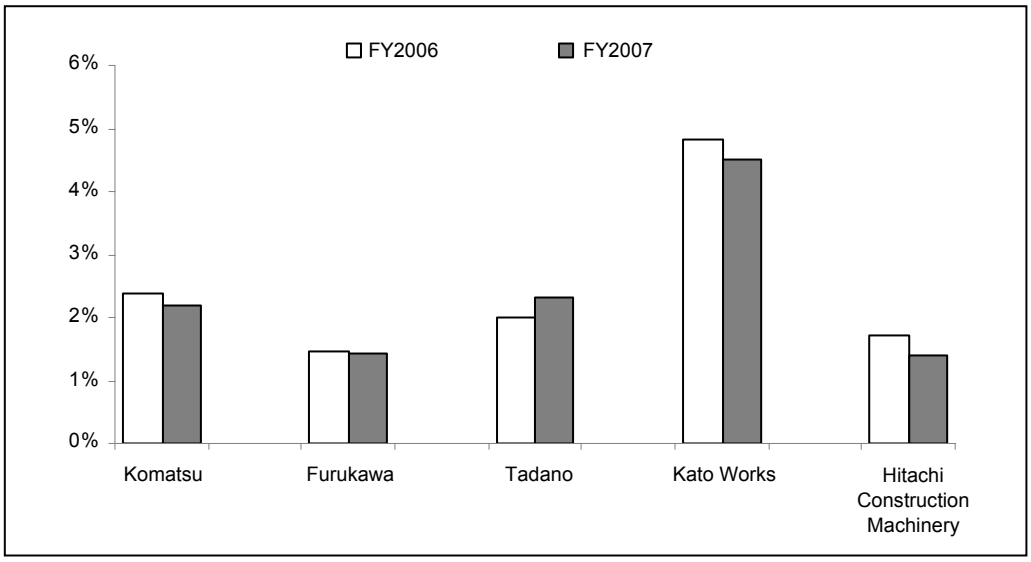
Figure 2.2.7 shows the R&D expenditure to sales ratio of the construction machine manufacturers. This indicator suggests that the situation somewhat differs from what is mentioned above: all of the companies excluding Tadano reduced their ratio. Behind this is probably the fact that not only because sales in 2007 increased more rapid than they had expected but also because they were worried about global business recession, their incentive to R&D was lost a little.

Fig. 2.2.6 R&D expenditures of the main construction machine manufacturers (¥100 million)

	FY2006	FY2007	Growth rate in 2006-2007
Komatsu	376.4	420.8	11.8%
Furukawa	10.0	10.9	9.0%
Tadano	27.8	39.1	40.5%
Kato Works	8.6	9.0	5.6%
Hitachi Construction Machinery	117.5	118.5	0.9%

Source: Based on the financial statements of each company.

Fig. 2.2.7 R&D expenditure to sales ratio of the main construction machine manufacturers



Source: Based on the financial statements of each company.

(3) Future prospects and problems

The trend of the construction machine industry in 2007 has been outlined above. The industry continued the expanding trend in the past several years and recorded all-time highs in production and sales. It is evident from the data that the expansion was pulled along not by domestic demand but by sales and export to overseas markets, including China and other Asian countries, BRIC, the U.S. and Europe.

Business recession in North America and other parts of the world caused by the subprime loan issues will become a serious problem to Japanese construction machine manufacturers in the years to come. In fact, Komatsu and some other manufacturers announced in August 2008 that they would reduce the production of small shovels for housing construction by about 20% to 30%. Behind this was the fact that housing starts were stagnant in Japan, the U.S., Europe and other areas that accounted for a greater part of world demand for construction machines. Business downturn became clearer not merely in the U.S. but also in Europe, including the U.K. and Spain. In March 2008, the total shipment of mini-shovels, that is, the total of domestic shipment and export, was smaller than that in the previous year first in five and a half years.

In such a situation, construction machine manufacturers will be more keenly aware of uncertain business prospects. It is thus feared that as a consequence, manufacturers may tend to take a more short-sighted course and cut down their R&D and other long-term investment.

Meanwhile auto emission control will be gradually tightened in Japan and in the West. In addition, eco-friendly technology is expected to become one of the resources for the competitive power of not only the construction machine industry but also all of the machine industry in Japan. As global business recession is considered a fair possibility, Japanese construction machine manufacturers should not curtail their R&D investment in a shortsighted way. They should focus on the creation of new markets instead by, among others, carrying out R&D on eco-friendly technology.

2.3 Farm machines

2.3.1 Supply and demand trend

(1) Outline

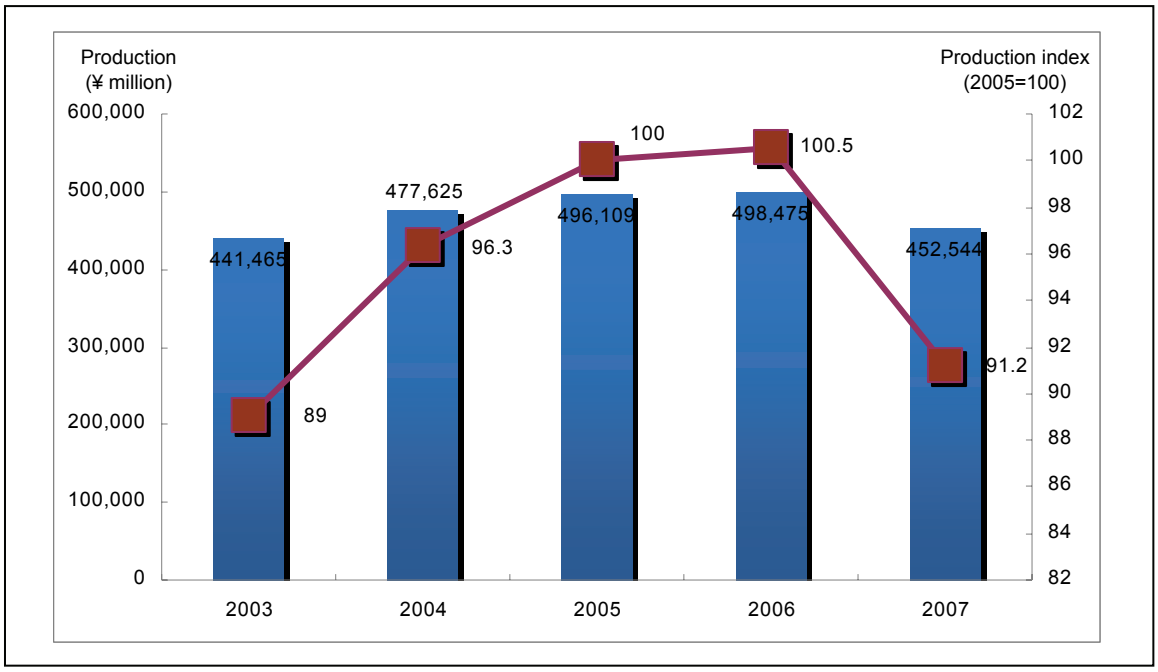
The production of farm machines in 2007 amounted to about ¥452.5 billion, and the production index supposing that the production in 2005 were 100 was only 91.2 points. The year-on-year growth rate was a substantial fall of -9.2 points, declining to the level in 2003 and suggesting a marked downward trend. The export was about ¥2,687.0 billion or an increase of +3.8 points as compared with the previous year. By region, the export to North America was the largest but showed a noticeable declining trend. By contract, the export to Asia grew and that to Europe was greater than in 2006, too. The import was about ¥42.6 billion, a significant decrease of -15.2 points year on year. By region, while the import from Asia continued an upward trend, that from Europe fell greatly.

As the Japanese market became smaller, farm machine manufacturers worked to strengthen their sales to Europe and Asia. In Asia, their positive activities for increasing sales were especially remarkable in Thailand.

(2) Production

The production of farm machines in 2007 was only ¥452.5 billion or a decline of over ¥46.0 billion from the previous year. As a result, the output went down to the level close to that in 2003 (¥441.4 billion). The production index supposing the output in 2005 to be 100 was only 91.2 points (Fig. 2.3.1).

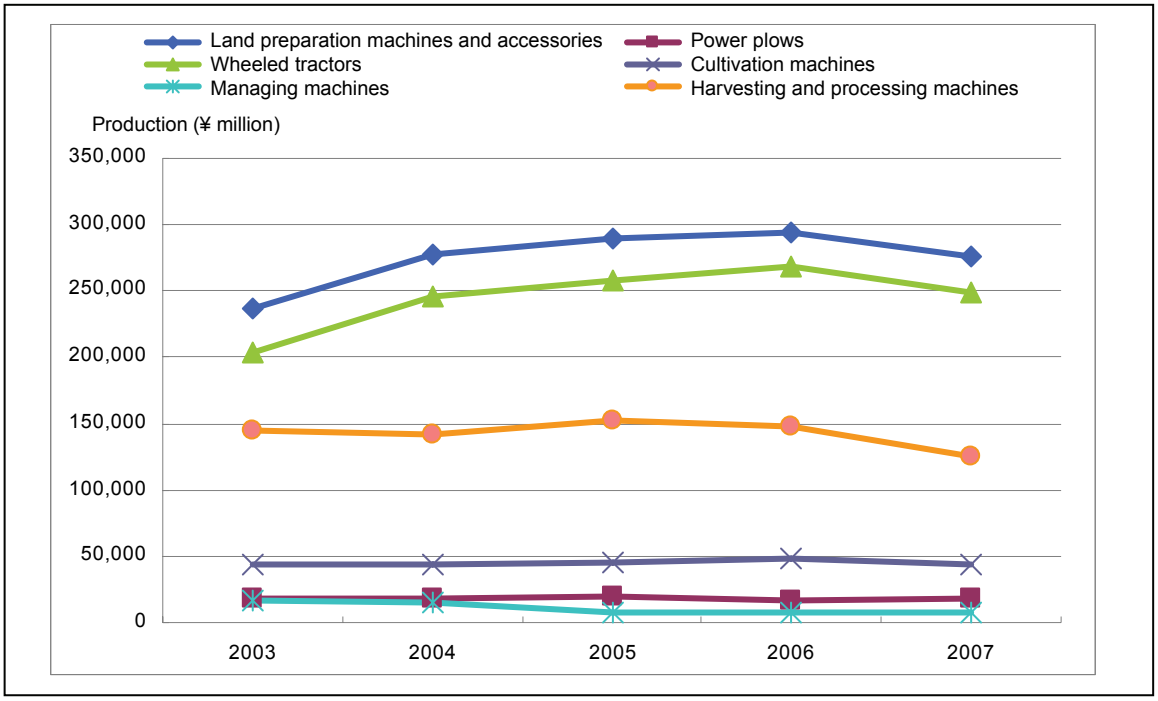
Fig. 2.3.1 Production of farm machines



Source: Based on the Ministry of Economy, Trade and Industry, "Annual Report of Machinery Statistics 2007."

Figure 2.3.2 shows the trend of the production of main types of farm machines. As evident from this figure, the output of all types of farm machines other than power plows decreased. The farm machines with an especially big fall include harvesting and processing machines (84.3% of the output in 2006), cultivation machines (91.2%), wheeled tractors (92.3%) and land preparation machines and accessories (93.7%). It is supposed that the huge drop in production was greatly affected by the inactive output of land preparation machines and accessories and wheeled tractors, which account for large parts of the amount of production.

Fig. 2.3.2 Production of main types of farm machines

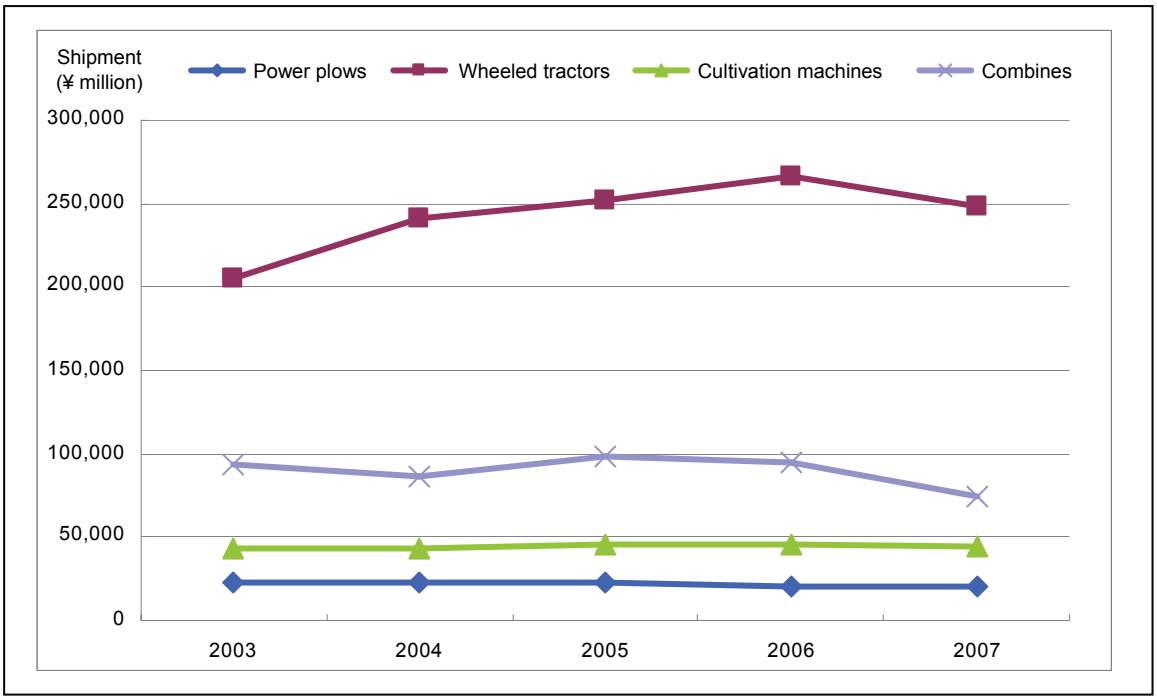


Source: Same as that for Fig. 2.3.1.

(3) Shipment

Figure 2.3.3 shows the shipment of main types of farm machines. As seen in this figure, the shipment of all types of farm machines decreased. Combines indicated an especially marked downward trend: their shipment in 2007 was only 79.2% of that in 2006, a fall of 20.8 points. Tractors, which accounted for the largest part of shipment, also suffered a drop of 6.7 points year on year or 93.3% of the figure in 2006 and greatly affected the amount of total shipment. Behind the inactiveness of tractors was probably the effect of a decrease in housing starts in the U.S., the major destination for export. Because the gardens of houses in the U.S. are very large, demand for tractors is in proportion to the sales of houses, and the sales of houses directly affect those of tractors. It may be said that the subprime loan problem began to show its effect in tractor sales, too.

Fig. 2.3.3 Shipment of main types of farm machines



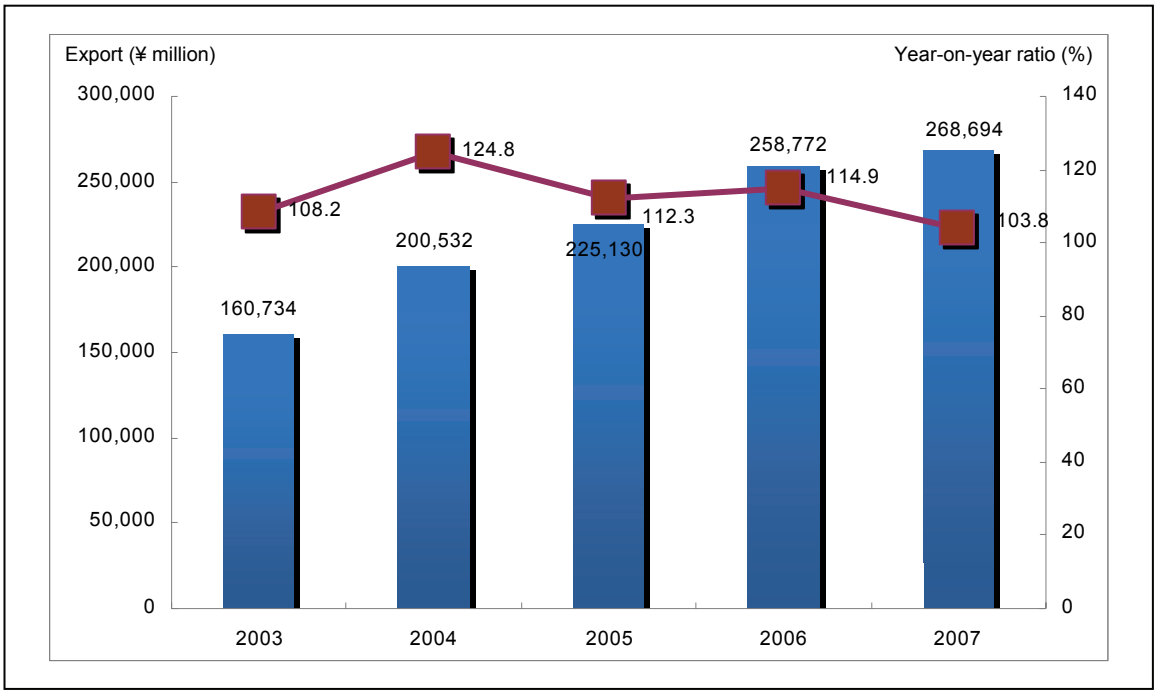
Source: Same as that for Fig. 2.3.1.

(4) Export

According to the Customs Clearance Statistics of the Ministry of Finance, the export of farm machines in 2007 was about ¥268.7 billion (up 3.8% year on year). Although the growth was lower than that in 2006, the export kept buoyancy, and it was suggested that the shrinking domestic market was made up for by shipment to overseas markets (Fig. 2.3.4).

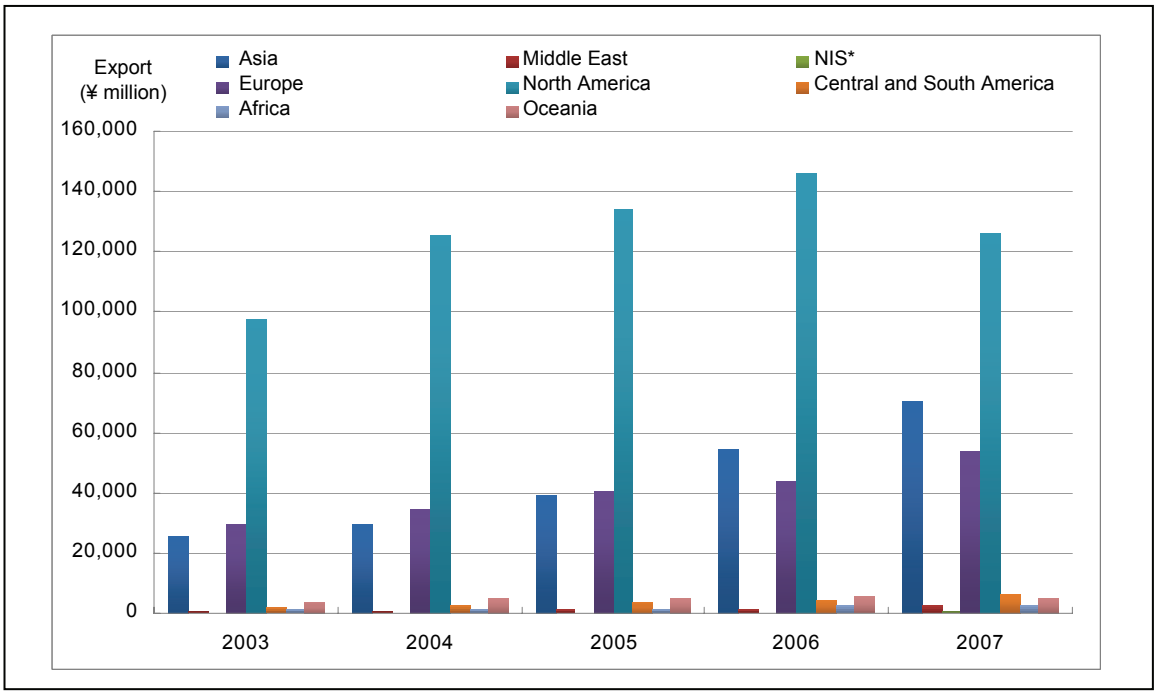
By region, export to North America, the most important destination for export, was ¥126.2 billion (-13.7% year on year) or a decrease of about ¥20.0 billion, indicating the trend of rapidly falling demand for farm machines in this region. Export to Asia, the second largest importer, substantially grew to ¥70.6 billion (+30.3%), which showed the situation of activated demand for farm machines in the Asian region. Export to Europe, the third-ranking destination, also increased to ¥54.0 billion (+22.7%) although the growth was lower than that in Asia. Thus export to Europe supplemented the drop in export to North America together with that to Asia. In other regions, export to Middle East and Middle and South America showed a substantial increase, with ¥2.6 billion (+260.4%) and ¥6.6 billion (+51.3%), respectively, while export to NIS was small in amount but grew rapidly from ¥154 million in 2006 to ¥705.0 million in 2007. Thus it can be considered that demand for farm machines increased in newly industrialized regions, such as Middle and South America and Middle East, and more and more Japanese farm machine manufacturers will begin to view these areas as their new markets (Fig. 2.3.5).

Fig. 2.3.4 Situation of export of farm machines



Source: Based on the Ministry of Finance, "Customs Clearance Statistics."

Fig. 2.3.5 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. 2.3.4.

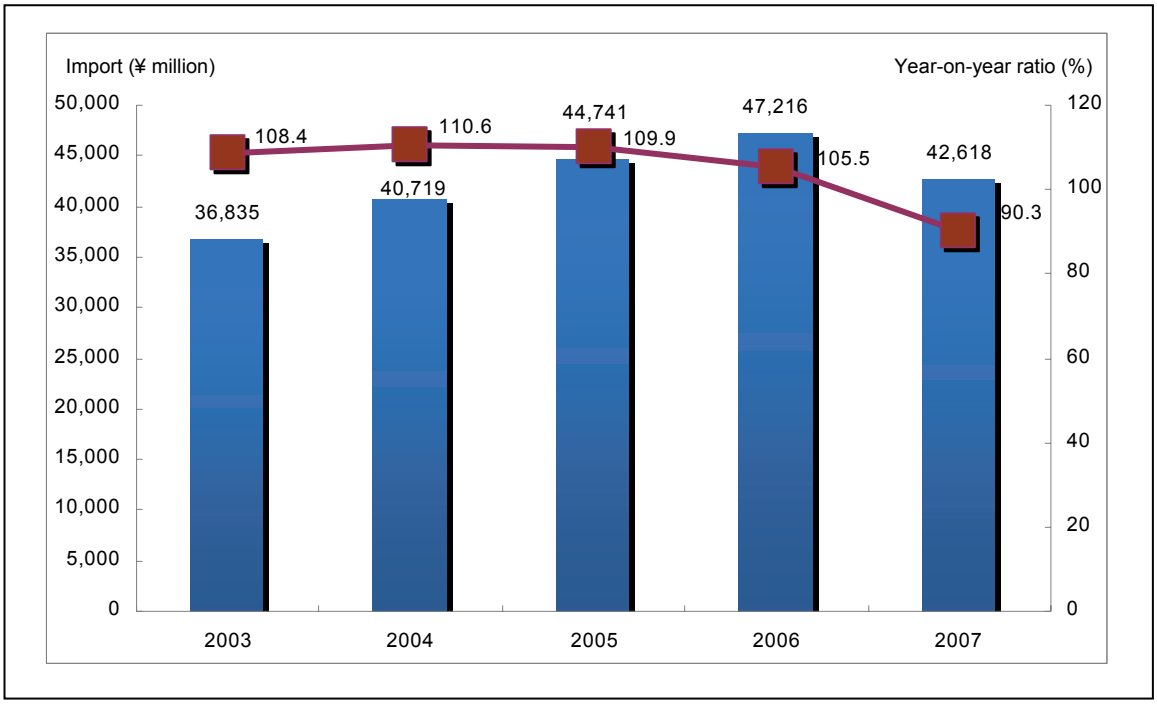
(5) Import

According to the Customs Clearance Statistics of the Ministry of Finance, the import of farm machines in 2007 amounted to ¥42.6 billion or -9.7% year on year, a decrease of almost 10%. Until 2006, the import had shown an upward trend of 10% or so for six consecutive years but fell in 2007, reflecting a sluggish domestic demand (Fig. 2.3.6).

By region, import from Europe was largest with about ¥19.5 billion, but this figure was a considerable fall of -22% from that in 2006, which was ¥25.0 billion. By contrast, import from Asia greatly increased to about ¥18.0 billion, rapidly approaching the level of Europe; this was as good as +8.4% year on year. In other regions, import from North America was only about ¥4.97 billion or a fall of -5.2%, suggesting a remarkable downward trend (Fig. 2.3.7).

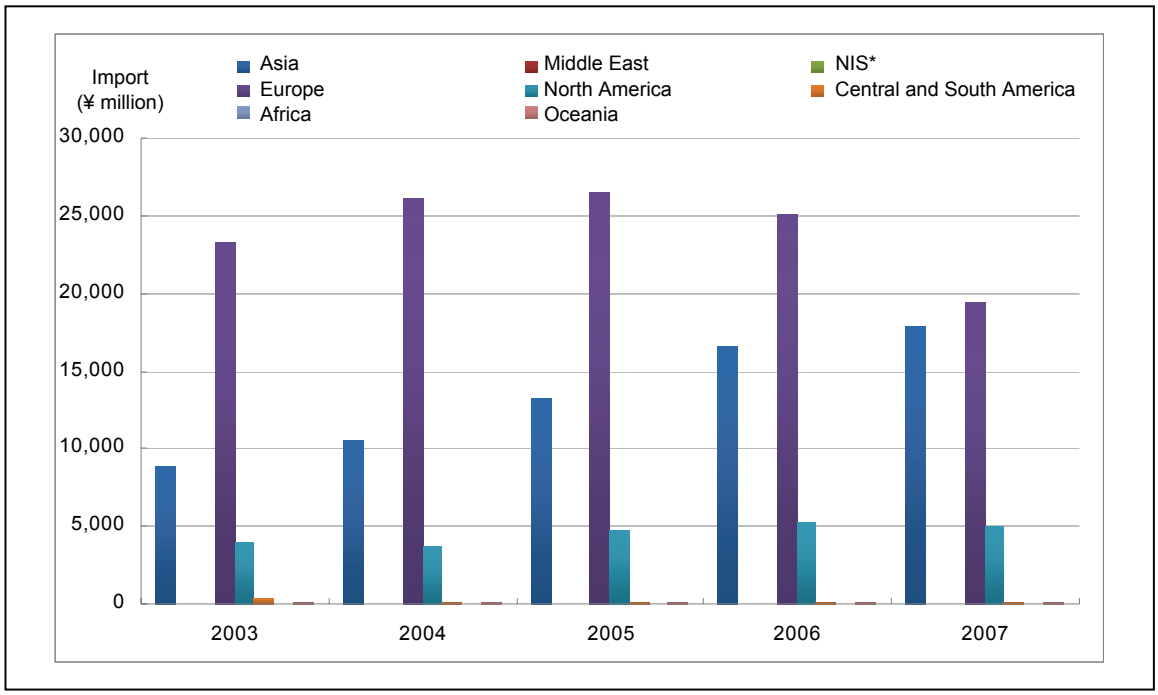
As stated above, the import of farm machines by region in 2007 was sluggish as a whole, but only import from Asia showed a rising trend. It can be pointed out that behind this was the fact that a global supply chain for farm machines was built in manufacturing industries, mainly Japanese manufacturers in Asia. In particular, Japanese farm machine manufacturers have promoted the spread of farm machines in China and Southeast Asia, and it is supposed that the creation of a supply chain has been promoted through cooperation between the network of these manufacturers and that of importers to Japan. Because this tendency is expected to grow more active in the future, it can be considered that the time is rapidly drawing near when import from Asia will win first place instead of Europe, which has long been first in the Japanese import of farm machines.

Fig. 2.3.6 Situation of import of farm machines



Source: Same as that for Fig. 2.3.4.

Fig. 2.3.7 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. 2.3.4.

2.3.2 Results of operations, overseas business activities and the trend of the farm machine industry

(1) Trend of management

Mitsubishi Agricultural Machinery Co. (Matsue, Shimane Prefecture) suffered, in its consolidated settlement of accounts for the year ended in March 2008, a deficit of ¥790.0 million (a deficit in the previous year: ¥5,960.0 million) for the fourth straight year, although the size of deficit was reduced substantially as a result of personnel downsizing. The sales were ¥62.3 billion, a similar level to that in the previous year, and the company estimates that the sales in the year ending in March 2009 will be ¥64.5 billion (up 3% year on year) because of expected increase in export. The company says that due to rising manufacturing costs resulting from higher prices of raw materials, they will raise the domestic selling price of farm machines by 3-8% beginning on the shipment on September 1, 2008. In the consolidated settlement of accounts for the year ended in March 2008, Yanmar Co. registered a fall in profits due to the fact that while the company secured higher profits thanks to growth in the sales of industrial engines, it was heavily affected by higher steel prices and the strong yen. In the sales of farm machines, Yanmar achieved a similar performance to that in the previous year. However, affected by increases in the price of steel and cast parts, the company will also raise the domestic selling price of tractors, plows and other farm machines by 3-7% starting with the shipment on August 1, 2008. Iseki & Co. announced the price increase, too, for tractors, rice planters and other general farm machines by 6-7% and for low-end models by 3-4% beginning on the shipment on August 1, 2008. Thus raises in the selling price associated with the rising prices of

steel and other raw materials have become the prevailing move in the entire farm machine industry. Kubota Corp. will start to bolster up farm machine business by reorganizing its domestic dealers. The company plans to cut by half its 37 existing farm machine dealers by 2012 in an attempt to streamline the management of these dealers. While domestic demand for farm machines is on the decline, Kubota has expanded its market share by bringing out new tractor models and taking advantage of its price competitiveness. According to the company's estimate, it secured a large share of about 45% in 2007, a 1 point increase year on year; but because the profits declined due to intensifying price competition, the company wants to recover its profitability through the reorganization of dealers and the reinforcement of customer service.

(2) Overseas business activities

As the domestic demand is sluggish, Japanese farm machine manufacturers are positively reinforcing their sales activities in Europe and Asia. For example, Kubota plans to increase its tractor sales by 2.5 times that at present by 2010 by selling new tractors for large-scale dairy farmers and expanding its sales networks and building new plants in Thailand. Yanmar has also drawn up the plan to double its sales in Thailand. As noted, it can be supposed that major farm machine manufacturers are changing their target markets from the U.S. to Europe and Asia, and thus capital investment in related parts manufacturers and in the construction of new local plants will become more active in the future mainly in Asia. In management strategies, the creation of global supply chains and after-sales service systems chiefly in Asia will become an important task. For China, the large market, large-scale development projects are carried out in inland areas under the leadership of the Chinese government as the measures to narrow gaps between inland and coastal regions, and high hopes are placed on the country's policies of the mechanization of agriculture. Thus there is an increasing trend for Japanese farm machine manufacturers to regard the inland part of China, where only South Korean manufacturers are doing business at present, as a new market. In addition, Africa can be mentioned as a region with medium- and long-term possibilities as the target of overseas business of farm machine manufacturers. For example, the Japan International Cooperation Agency (JICA) has promoted "NERICA (New Rice for Africa)," the rice that can realize a high yield, in Uganda, and it is said that this rice can achieve an increase in production in other African countries, too. Therefore, new demand for farm machines is expected to develop in Africa. It is highly likely that Japanese farm machine manufacturers will build up their markets in Africa as part of international cooperation projects while making a contribution to regional development.

(3) Trend of the farm machine industry

Yanmar will spin off its facilities division as a new company "Yanmar Green System." The new company has a capital of ¥200 million and aims at achieving sales of ¥15.0 billion in 2008. The main business of the company is the designing, construction and after-sales service of farm-related facilities, such as grain warehouses and compost plants, as well as the sale of allied equipment and materials. Behind the spinoff is the situation where the domestic market of farm facilities has matured, and the company is said to aim, by making the spinoff, at defining the responsibility more clearly, making customer service more promptly and reinforcing the ability to meet diversifying

needs. Kubota will launch a "Kubota e-Project" to revitalize Japanese agriculture in cooperation with its dealers, the National Chamber of Agriculture and others. More specifically, in this project, Kubota will support the revival of abandoned farms in the situation where farmers are decreasing and aging and will accept applications for children who want to experience farm work from among elementary school students in nine prefectures, including Aomori and Iwate. In addition, the company will aid the branding of farm products in various areas. Shin-Daiwa Kogyo Co. (Hiroshima, Hiroshima Prefecture), manufacturer of farm and forestry machines, and Kioritz Corp. (Ome, Tokyo), leading farm machine manufacturer, had agreed on a capital and business tie-up in May 2007, and in April 2008, only about one year after, Shin-Daiwa Kogyo decided on business merger with Kioritz. As a result, the total sales of the two companies exceeded ¥100.0 billion, making the merged company rise to third in the field of small-sized farm and forestry machines in the world. The merger is said to aim at reducing costs and management expenses by unifying the system for procuring materials and jointly owning manufacturing equipment, and as the factor behind this, it can be pointed out that manufacturers have felt more need to face their European counterparts who are positively buying out local companies by enlarging the management scale.

(4) Future prospects

Farm machine manufacturers are positively working to develop products for and provide support to the domestic market where the birth rate is lowering and the population is aging. Especially in the sphere of technology and product development, the National Agriculture and Food Research Organization and Iseki & Co. are jointly developing the machine capable of substantially saving fertilizers and agrochemicals for outdoor vegetable cultivation. By applying manure and chemicals to only the parts required when making ridges, it is possible to reduce the former by over 30% and the latter by over 60% as compared with traditional practice, and Iseki has started to sell five units of the machine on an experimental basis. Nichinoki Seiko Co. (Ashoro, Tokachi District, Hokkaido) has a large market share of over 70% in Hokkaido in the harvesters of beet, which is raised only in Hokkaido in Japan. This company has compiled a manual of the operation and adjustment of weeding plows for each growth period and crop so that even unskilled workers can perform average tasks. For beet harvesters, Nichinoki Seiko's flagship products, the company has devised the way to cause the harvester to run straightly on the ridge even though the tractor pulling the harvester zigzags a little by mounting a sensor on the harvester. As stated, farm machine manufacturers are striving to meet farmers' needs by inventing machines adaptable for the reduction of farm work costs, aging of farm workers and lack of experienced farmers. These activities for developing farm machines suited to farmers' needs are reflected, too, on the fundamental policies for five years from 2008 of the Project for Promoting Development and Practical Use of Farm Machines, etc. started in 1993 by the Ministry of Agriculture, Forestry and Fisheries. In the Fourth Phase of the Project, the Ministry came up with the policy of cooperating not only with research organizations but with producing areas and farmers as well in the implementation of project activities with the aim of realizing earlier practical use of 11 new farm machines by shortening the target development period from five years in the former plan to three years.

In overseas business activities, because the North American market is starting to grow sluggish

affected by the subprime loan problems, farm machine manufacturers have tended to shift their export to Europe and Asia in the years to come. Considering that the European market has been influenced seriously by the subprime loan issues, too, export to the farming areas in Asia, including inland parts of China and Thailand, will be an important factor in the future. In particular, large farm machine manufacturers regard Thailand as a main base for local production, sale and after-sales service in the ASEAN region, and how they can make up for stagnancy in North America and Europe by business in Asia will become an important problem. High expectations are placed on opening up the African market in the medium-to-long term, but it is unlikely that any market will be built up quickly unless there is a guarantee of stable political situation, good infrastructure and consistent agricultural policies. It can be said that Japanese farm machine manufacturers and manufacturers of allied parts are now in the period when they, as comprehensive farm engineering and service providers, should build up new business for addressing environmental issues, safe supply of food and recyclable energy.