3. Electric Machine Sector

3.1 Consumer electric machines and appliances

3.1.1 Supply and demand trend

(1) Outline

The classification of consumer electric machines and appliances was often revised in the last several years and thus no strict comparison of annual statistics has been possible. But the situation of shipment, which indicates the trend of the domestic market, has roughly been leveling off, although it has continued a slow downward trend after reaching a peak in 2000. As domestic business activities are heading for a slow recession phase, it does not seem possible to place much hopes on any further expansion of the domestic market. Meanwhile it is difficult, too, to expect that domestic production will increase dramatically because more and more Japanese manufacturers have shifted their manufacturing functions to overseas locations and the reimport of products made by the foreign subsidiaries of Japanese companies has increased. In this difficult environment, the consumer electric machine industry in Japan is working hard to cultivate the domestic market as the base of high value added products and as that for supplying to overseas markets. Domestic demand for large-sized and high-function commodities has shown a steady tone. For medium-quality products, the reimport of products made by the overseas subsidiaries of Japanese manufacturers has grown and so has the export of products manufactured by these overseas subsidiaries to third countries, which aims at acquiring new markets abroad. Thus, Japanese consumer electric machine manufacturers are expanding their global business in the world. In the global market, they have already started keen competition not only with local manufacturers but with South Korean and other third-country makers as well and have been in a difficult situation.

(2) Trend of production

According to the Japan Electric Machine Industry Association, the production of consumer electric machines and appliances in 2007 was ¥1,273.0 billion. This is a little smaller than the figure for 2006 (¥1,357.8 billion) but roughly that on a similar level. More specifically (Fig. 3.1.1), natural refrigerant heat pump-type water heaters recorded the highest growth. This product has a high probability of being adopted for newly-built housing, such as apartments and detached houses and has some advantages, including smaller CO_2 emissions than conventional water heaters and substantially low costs that can be realized by, for example, taking advantage of low midnight power rates and using subsidies for housing construction. Thus electric power companies and others have publicized this water heater giving it the nickname “Eco-cute,” and its output has greatly been increased in an apartment boom in the last several years. The production of cooking heaters has leveled off; this product seems to have the same tendency as the water heater mentioned above because it is introduced into apartments, detached houses and other new housing. However, besides the problem of housing starts tending to be delayed after the amendment to the Building Standards Law that made the confirmation and inspection rules of newly constructed buildings stricter, domestic business activities have entered a recession phase, as a result of which the construction of

Fig. 3.1.1 Trend of domestic production of consumer electric machines and appliances (number of units, ¥ million)

Product	2003		2004		2005		2006		2007	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric stoves	1,542,911	7,620	550,589	3,538	-	-	-	-	-	-
Electric *kotatsu*	247,735	1,092	-	-	-	-	-	-	-	-
Electric blankets	1,013,413	3,231	-	-	-	-	-	-	-	-
Electric carpets	1,415,901	13,013	863,252	7,065	-	-	-	-	-	-
Microwave ovens	1,716,763	39,066	1,248,182	32,977	760,499	26,936	628,384	23,644	575,423	22,795
Electric rice cookers	4,307,767	52,385	4,424,291	54,519	4,354,601	57,432	4,285,352	59,167	4,491,872	64,057
Toasters	546,007	1,194	-	-	-	-	-	-	-	-
Electric hot plates	465,231	2,034	285,855	1,329	-	-	-	-	-	-
Electric pots	3,552,154	17,156	3,155,076	15,837	2,666,509	13,824	1,872,655	9,755	1,622,973	7,790
Dish washing and drying machines	945,502	42,653	949,531	45,326	853,646	38,844	822,426	34,693	684,362	28,758
Electric refrigerators	2,858,983	280,743	3,019,604	315,649	2,821,077	289,378	2,783,449	260,774	2,433,299	219,002
Cooking heaters	-	-	674,872	66,571	801,842	68,238	799,717	70,737	827,013	69,980
Freezers	70,909	13,163	46,542	12,803	39,300	11,391	48,903	15,074	48,767	14,007
Electric fans	1,384,397	4,843	555,126	2,391	-	-	-	-	-	-
Ventilation fans	6,875,433	91,959	6,982,132	100,626	7,377,453	119,021	7,117,335	118,127	6,481,565	111,728
Electric water heaters	235,955	43,861	247,667	51,628	246,422	41,803	243,283	40,497	237,550	38,304
Natural refrigerant heat pump-type water heaters	-	-	-	-	205,793	25,212	279,525	31,788	367,799	51,031
Household electric well pumps	272,856	12,295	272,956	12,691	267,799	12,214	257,555	12,178	241,241	11,632
Air purifiers			1,147,058	16,679	954,844	12,188	1,057,088	16,205	701,837	11,856
Dehumidifiers	192,068	7,830	356,269	10,820	256,470	10,121	206,697	8,111	147,165	7,317
Electric washing machines	3,132,701	135,415	2,847,961	135,294	2,621,640	136,304	2,558,094	145,856	2,397,243	125,194
Washing machines (fully automatic; twin-tub)	-	-	-	-	1,601,518	46,943	1,498,232	45,447	1,521,317	47,696
Washing and drying machines	-	-	-	-	1,020,122	89,361	1,059,862	100,409	875,926	77,498
Fully automatic washing machines	2,895,099	130,353	2,631,936	130,670	-	-	-	-	-	-
Twin-tub washing machines	237,602	5,062	216,025	4,624	-	-	-	-	-	-
Washing dryers	182,993	7,125	151,011	6,213	-	-	-	-	-	-
Electric irons	1,612,245	3,777	1,672,017	3,800	-	-	-	-	-	-
Vacuum cleaners	4,809,931	66,392	4,654,560	62,441	4,182,938	60,096	3,158,561	49,771	2,948,743	49,666
Mini-vacuums	269,884	1,191	-	-	-	-	-	-	-	-
Toilet seats with warm water	2,412,149	72,144	2,612,570	74,656	2,404,242	69,101	2,528,513	73,499	2,413,415	74,622
Electric razors	6,922,586	36,443	6,253,757	33,960	2,813,688	16,601	2,068,562	13,749	1,687,378	14,506
Electric massage machines	422,067	44,102	632,024	49,173	363,676	48,986	304,533	39,782	239,682	30,349
Hair dryers	1,541,967	4,651	1,392,806	3,985	-	-	-	-	-	-
Household garbage processors	103,345	3,890	104,510	3,427	110,916	3,472	92,837	3,144	77,332	2,717
Other consumer electric machines and appliances	22,673,054	126,406	22,787,937	79,161	-	-	-	-	-	-

Note: The system of the Dynamic Production Statistics combined electric *kotatsu*, electric blankets and toasters in “Other consumer electric machines and appliances” in 2004, and combined fully automatic washing machines and twin-tub washing machines in “Washing machine (fully automatic, twin-tub)” and abolished electric heaters, electric carpets, electric hot plates, electric fans, washing and drying machines and other consumer electric machines and appliances in 2005.

Source: Based on the statistical database of the Japan Electric Machine Industry Association.

new apartments is beginning to become stagnant. This will have serious impact on the production of natural refrigerant heat pump-type water heaters and cooking heaters. The output of almost all of

other products declined as compared with the previous year. For example, for microwave ovens and washing dryers, high value added products were introduced into the market and the production was increased favorably. But in 2007, the output fell a little although it leveled off roughly. For other products, no substantial change was observed in the declining trend of production in the last several years. These products have already had a relatively marked trend of reimport, and this trend will not change in the future. Although raises in power rates are scheduled as a result of recent hikes in crude oil prices, it is uncertain considering the business conditions in 2008 that replacement demand for eco-friendly household electric appliances consuming less electricity will continue.

The Japanese economy will be directly affected by the financial crisis in the U.S. starting from the subprime loan problem, and domestic business activities will suffer recession. Specifically, the price of real estate in Japan has already begun to drop, and the construction of apartments has substantially decreased partly due to the amendment to the Building Standards Law as mentioned earlier. This fact is likely to seriously affect the production of natural refrigerant heat pump-type water heaters and cooking heaters that are very likely to be installed at newly built houses as well as that of high-grade microwave ovens, washing dryers and the like.

(3) Situation of shipment

As noted above, it is supposed that domestic demand for consumer electric machines and appliances is on the decline mainly because of business recession at home and delays in the construction of apartments affected by the amendment to the Building Standards Law. But the impact of these situations was not very strong; according to the Japan Electric Machine Industry Association, the shipment amounted to ¥1,452.2 billion and roughly leveled off as compared with the figure for 2006 (¥1,425.1 billion). By the type of products, natural refrigerant heat pump-type water heaters showed a high growth but the shipment of other products leveled off or decreased. Some products registered greater shipment than in 2006 (Fig. 3.3.2).

Fig. 3.1.2 Situation of domestic shipment of consumer electric machines and appliances (1,000 units, ¥ million)

	2003		2004		2005		2006		2007	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric refrigerators	4,233	347,733	4,433	358,866	4,389	359,254	4,252	339,601	4,188	348,424
of which 401ℓ or more	1,497	208,384	1,575	222,587	1,597	228,175	1,523	214,402	1,587	227,586
Electric washing machines	4,347	224,106	4,437	236,707	4,623	264,442	4,744	274,843	4,652	278,216
Fully automatic washing machines	3,994	215,185	4,117	228,571	4,326	257,001	4,463	267,885	4,392	271,753
of which washing dryers	621	-	822	94,547	1,121	129,588	1,306	154,805	1,307	162,170
Vacuum cleaners	5,578	114,099	5,867	116,303	5,932	116,712	5,795	108,625	5,651	109,477
Ventilation fans	7,053	105,130	7,671	115,359	7,352	111,269	6,989	108,759	7,059	114,790
Air purifiers	2,037	42,312	1,611	30,587	1,840	37,260	1,572	31,620	1,493	31,405
Microwave ovens	3,566	78,957	3,461	73,289	3,604	78,023	3,509	74,217	3,551	73,979
of which multifunctional microwave ovens	2,653	69,067	2,599	64,207	2,735	69,216	2,685	65,585	2,717	65,394
Electric rice cookers	6,228	89,116	6,315	88,803	6,488	92,025	6,516	96,160	6,453	104,181
of which IH-type	3,377	68,945	3,519	70,341	3,729	74,157	3,883	79,088	4,031	88,238
Toasters	2,667	8,865	2,648	8,049	2,715	8,027	2,638	8,047	2,697	8,561
Electric hot plates	1,338	11,439	1,290	10,533	1,338	10,551	1,360	10,648	1,350	10,760
Electric pots	4,778	30,361	4,686	28,913	4,615	28,438	4,299	26,750	4,034	24,972
Dish washing and drying machines	899	47,855	935	49,759	875	44,063	853	40,583	766	36,608
Table top-type	480	25,200	462	25,223	371	19,805	319	15,868	228	11,389
Others	418	22,655	473	24,536	504	24,257	534	24,715	538	25,219
Cooking heaters	587	51,308	642	63,525	703	77,731	809	98,684	853	105,393
of which IH-type	507	50,149	599	62,854	695	77,546	805	98,582	850	105,321
Electric irons	2,055	10,410	1,935	9,505	1,943	9,253	1,769	8,374	1,781	8,408
Electric razors	7,754	45,607	7,787	45,972	7,827	46,491	7,406	42,264	7,249	42,863
Hair dryers	4,496	21,303	4,125	18,365	3,913	17,071	3,729	17,171	3,872	18,189
Electric toothbrushes	2,799	7,803	1,706	5,311	1,445	5,347	1,470	5,344	2,147	7,055
Electric stoves	1,054	8,760	807	6,916	954	8,984	942	11,010	919	10,908
Electric carpets	1,106	15,270	955	12,679	1,006	12,944	940	12,522	835	11,490
Humidifiers	1,198	14,752	1,188	13,985	1,415	16,595	1,282	15,607	1,237	14,806
Dehumidifiers	685	18,203	683	17,174	644	16,528	714	17,773	766	17,750
Consumer electric machines and appliances, total	73,342	1,381,527	71,363	1,391,790	71,507	1,440,415	69,040	1,425,112	68,916	1,452,278
Natural refrigerant heat pump-type water heaters	-	-	-	-	196,428	30,626	267,610	40,413	360,272	61,574

Notes: 1. Based on the Japan Electric Machine Industry Association, “Independent Statistical Survey on Consumer Electric Appliances.” Figures for natural refrigerant heat pump-type water heaters are based on the Ministry of Economy, Trade and Industry, “Dynamic Production Statistics.”

2. Of the figures for fully automatic washing machines, those for washing dryers up to December 2001 include those for drum-type washing machines with no drying function, and the survey on the amount of shipment of washing dryers was started in April 2003.

3. Cooking heaters are the built-in-type and stationary-type ones using IH (induction heating), halogen, radiant heat, seeds, etc. as the heat source (excluding table top-type ones).

4. Figures for “Consumer electric machines and appliances, total” include those for all of the products stated above and some other products (excluding room air conditioners).

Source: Same as that for Fig. 3.1.1.

Decreases in the shipment quantity and the increasing amount of shipment obviously show that product quality has improved and suggest that the domestic market has been shifting to higher value added products. For example, the number of refrigerators shipped fell from about 4,250,000 units in 2006 to about 4,180,000 in 2007, whereas the amount of shipment rose from ¥339.6 billion in 2006 to ¥348.4 billion in 2007. Larger-size refrigerators of 401λ or more registered a growth both in the

quantity and amount of shipment. Similar tendencies are observed in washing machines and rice cookers, too. Since the advent of the 2000s, larger refrigerators, multifunctional microwave ovens complete with a steaming function, IH-type rice cookers, IH cooking heaters and washing dryers have become increasingly popular, and the greater sales of these high value added products have led to declining shipment quantity and growing shipment amount. As stated above, the ratio of main products made overseas is rising, and domestic production will become limited to high value added products in the future. In this respect, increasing demand for high-grade products in the domestic market has been one of the factors supporting domestic production. In particular, the increasing trend of giving higher performance to the products in this field has, coupled with raises in the unit product price and innovations, brought competitive advantage to Japanese-made consumer electric machines and appliances. But because the economy is entering a recession phase, future trends should be watched carefully.

Fig. 3.1.3 Trend of export of consumer electric machines and appliances (number of units, ¥ million)

Product	2003		2004		2005		2006		2007	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric refrigerators, total (excluding used ones)	68,236	1,826	69,440	2,103	71,670	2,826	103,163	3,548	218,940	5,570
Refrigerators/freezers (excluding used ones)	34,654	955	26,189	1,124	23,785	1,319	42,958	1,190	159,648	3,887
Refrigerators (compression type) (excluding used ones)	32,706	869	42,843	976	46,352	1,501	56,875	2,351	59,292	1,682
Refrigerators (absorption type)	876	3	408	2	1,533	7	3,330	7	-	-
Other refrigerators (excluding used ones)	6,604	178	7,658	193	4,767	118	2,490	67	7,984	43
Electric freezers, total	7,128	2,261	7,965	2,479	8,978	3,200	10,629	3,717	12,376	4,292
Horizontal freezers	1,578	442	1,649	418	1,698	551	2,330	730	3,082	745
Vertical freezers	5,550	1,819	6,316	2,061	7,280	2,649	8,299	2,987	9,294	3,547
Refrigerator parts	-	1,183	-	1,373	-	1,109	-	2,264	-	2,580
Dish washing machines	1,863	58	1,164	37	597	13	946	36	789	32
Electric washing machines, total (excluding used ones)	111,107	2,724	99,059	2,593	106,451	3,357	102,041	2,691	69,893	1,819
Fully automatic washing machines (excluding used ones)	65,143	1,755	65,311	1,884	66,285	2,564	56,632	1,864	41,626	1,226
Other washing machines, total (excluding used ones)	45,964	968	33,748	709	40,166	793	45,409	828	28,267	593
Washing machine parts	-	2,409	-	4,284	-	3,496	-	2,850	-	3,215
Clothing dryers	4,561	168	5,100	163	7,427	244	5,657	201	8,498	305
Vacuum cleaners (with an electric motor; output: 1500W or less)	262,775	2,336	295,134	2,691	279,855	2,409	260,023	2,260	112,808	940
Floor polishers	83	1	60	2	32	2	21	1		0
Fans, total	556,422	1,044	565,974	1,070	387,940	826	447,155	954	381,323	992
Hoods for ventilation/circulation	13,575	122	16,848	207	18,892	271	21,984	324	13,281	234
Parts for fans, etc.	-	29,770	-	37,885	-	42,749	-	48,792	-	63,154
Kitchen disposers	33	3	7	3	73	6	12	4	-	-
Juicer-mixers	324,910	1,701	366,301	1,825	347,699	1,788	385,987	2,055	403,681	2,243
Other food mixers, grinders, etc.	242,258	1,597	250,453	1,678	252,354	1,706	318,415	2,151	327,900	2,199
Electric razors, total	993,306	2,968	1,041,857	2,950	1,132,694	2,930	1,100,516	2,881	1,031,732	2,773
Electric hair clippers	706,268	2,040	609,453	1,942	582,160	1,704	635,380	1,912	720,170	2,156

Electric hair removers	722	11	231	0	4,301	13	34,161	104	17,776	55
Parts for razors and hair clippers	-	5,710	-	5,391	-	6,016	-	6,122	-	6,528
Household electric appliances with a motor	340,887	924		0	144,868	786	161,772	1,045	418,130	2,709
Appliances with a motor/battery	305,648	474	131,002	198	-	-	-	-	-	-
Other electric appliances with a motor	35,239	451	29,079	378	-	-	-	-	-	-
Parts for other electric appliances with a motor	-	2,467	-	2,474	-	2,002	-	1,558	-	968
Electric water heaters	18,169	461	17,295	425	15,117	298	21,522	504	18,120	566
Electric blankets	2,930	7	2,728	8	1,800	4	0	0	1,405	4
Electric heating appliances, etc.	69,097	442	133,817	1,346	130,028	1,042	195,062	2,178	237,603	1,613
Heat storage radiators	6,705	9	2,874	3	260	4	4,186	65	2,092	42
Other electric heating appliances, etc.	62,392	433	130,943	1,343	129,768	1,038	190,876	2,113	235,511	1,571
Hair dryers	371,055	834	242,461	540	228,464	561	315,490	832	181,957	472
Other hairdressing appliances	89,901	478	71,152	352	83,942	291	25,297	204	23,939	239
Hand dryers	431	32	412	39	966	51	690	57	686	48
Electric irons	719,900	1,587	811,470	1,645	807,574	1,702	831,439	1,899	804,683	1,936
Microwave ovens	45,450	1,630	70,669	2,330	70,854	2,392	72,939	2,744	84,533	3,153
Coffee-/tea-makers	14,688	338	26,686	620	17,004	392	14,897	299	11,683	217
Toasters	8,506	19	5,405	5	0	0	1,100	2	5	1
Electric rice cookers	319,905	2,510	354,098	2,671	377,682	3,007	379,936	3,329	402,161	3,613
Other ovens, cookers, etc.	42,035	346	25,755	203	29,940	473	11,996	311	19,586	459
Other electrothermal appliances	412,747	2,062	536,087	2,208	441,399	2,065	846,752	2,458	923,803	2,475
Electrothermal resistive elements	-	17,655	-	20,890	-	19,234	-	27,536	-	26,254
Parts for electrothermal appliances	-	5,228	-	5,906	-	5,732	-	5,686	-	4,672

Source: Same as that for Fig. 3.1.1.

(4) Situation of export and import

The reimport of consumer electric machines and appliances has been increasing, and the trend of procuring almost all low value added products from imports from abroad has been established. As a result, this situation has been reflected clearly on the trade of these products.

The export in 2007 amounted to ¥235.5 billion, showing an increase of about 13% over 2006 when the export was ¥203.4 billion. After registering a fall in 2002, the export has continued growing, and there has been no change in the situation where exports have shifted from finished products to parts (Fig. 3.1.3). By product type, the upward trend of the export of refrigerators, freezers and microwave ovens has continued; in particular, the export of refrigerators in 2007 was twice in quantity and 1.5 times in amount as compared with that in 2006. The export of parts in 2007 amounted to ¥168.1 billion, a rise of about 22% over ¥137.1 billion in 2006. The ratio of parts to the export of consumer electric machines and appliances in Japan reached 71% in 2007, a higher percentage than that in 2006 (66%). The ratio has been 70% or so since 2001, and this trend is likely to continue in the years ahead. This also suggests that Japan has been an important supplier of parts for consumer electric machines and appliances and that there are still some types of parts that cannot be procured from any other countries. Because the reimport of consumer electric machines and appliances has continued, it is unlikely that the export of finished products will increase in the

future. But for parts, if Japanese manufacturers continue to shift parts production from Japan to overseas locations, the structure of providing some of parts from Japan will go on in the years to come.

Fig. 3.1.4 Trend of import of consumer electric machines and appliances (number of units, ¥ million)

Product	2003		2004		2005		2006		2007	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric refrigerators, total	1,827,166	27,269	2,007,878	31,397	2,141,041	36,058	2,135,305	42,157	2,519,320	65,436
Refrigerators/freezers	1,468,978	23,426	1,581,492	27,134	1,705,834	31,383	1,707,629	37,358	2,163,971	61,703
Refrigerators (compression type)	338,860	3,606	401,259	3,950	420,112	4,400	414,173	4,497	355,349	3,733
Refrigerators (absorption type)	19,328	237	25,127	314	15,095	275	13,503	302	-	-
Other refrigerators	235,018	1,088	103,401	819	124,406	1,213	130,606	1,089	105,414	1,050
Electric freezers, total	273,017	4,868	373,028	6,174	353,449	6,296	331,765	6,578	342,296	6,999
Horizontal freezers	74,411	1,383	123,206	2,202	99,439	1,868	112,001	2,120	118,804	2,406
Vertical freezers (900ℓ or less)	-	-	-	-	-	-	219,764	4,458	223,492	4,593
Vertical freezers (400ℓ or less)	198,606	3,485	249,822	3,972	254,010	4,427	-	-	-	-
Dish washing machines	109,128	2,919	155,040	3,663	128,545	3,508	83,936	2,336	84,994	2,381
Electric washing machines, total	1,922,974	25,237	2,630,236	38,908	3,071,522	48,856	3,134,450	53,648	3,131,437	59,130
Fully automatic washing machines	1,541,143	21,459	2,339,810	36,154	2,815,456	46,357	2,906,627	51,321	2,929,361	56,788
Other washing machines, total	381,831	3,779	290,426	2,754	256,066	2,499	227,823	2,327	202,076	2,342
Twin-tub washing machines	341,822	3,626	259,667	2,607	237,826	2,431	209,132	2,276	186,822	2,300
Other washing machines	40,009	153	30,759	147	18,240	68	18,691	51	15,254	42
Washing machine parts	-	5,281	-	5,720	-	5,607	-	9,399	-	12,291
Clothing dryers	14,994	295	11,067	201	7,709	155	3,249	160	2,281	172
Vacuum cleaners (with an electric motor; output: 1500W or less)	7,190,930	19,129	6,813,852	20,596	7,316,534	28,910	7,813,391	35,795	7,176,196	44,160
Vacuum cleaners (battery-type)	2,328,894	3,860	1,550,707	2,220	1,967,692	3,465	1,971,150	3,737	1,443,073	3,898
Vacuum cleaners (electric-type)	4,862,036	15,268	5,263,145	18,376	5,348,842	25,445	5,842,241	32,057	5,733,123	40,262
Floor polishers	25,809	63	47,711	99	46,720	106	44,437	77	15,978	31
Fans, total	13,761,082	18,923	11,897,274	15,064	13,971,965	17,452	13,330,862	19,418	12,052,755	18,627
Electric fans	8,640,012	13,962	7,391,498	10,607	8,413,133	12,486	9,567,564	14,389	7,819,459	13,658
Ventilation fans	-	-	-	-	-	-	896,324	1,388	1,494,152	2,460
Other fans	5,121,070	4,961	4,505,776	4,457	5,558,832	4,966	2,866,974	3,641	2,739,144	2,509
Hoods for ventilation/circulation	105,632	896	136,224	1,533	139,527	2,010	116,423	1,917	108,054	2,015
Parts for fans, etc.	-	3,439	-	4,571	-	5,933	-	6,844	-	9,605
Kitchen disposers	32,382	361	35,186	386	27,789	277	32,815	365	36,050	398
Food mixers, juicers, etc.	4,677,124	6,443	4,871,717	6,777	3,920,493	6,147	4,277,194	6,816	3,812,153	6,827
Electric razors, total	8,644,022	16,479	8,311,270	13,040	8,950,137	13,122	9,961,760	15,311	10,456,441	16,719
Electric hair clippers	1,066,604	1,296	1,074,731	1,254	1,284,430	1,336	1,671,011	1,731	2,049,603	1,877
Electric hair removers	1,201,743	2,693	784,635	1,711	881,619	1,700	716,020	1,921	680,346	1,547
Parts for razors and hair clippers	-	5,025	-	5,265	-	4,365	-	4,478	-	3,967
Other electric appliances with a motor	24,237,832	20,267	13,508,407	17,639	11,897,504	18,076	15,206,723	27,079	12,708,820	26,814

Parts for other electric appliances with a motor	-	4,454	-	6,776	-	8,013	-	8,512	-	3,117
Electric water heaters	1,101,421	2,858	1,352,442	4,420	1,491,987	4,160	1,479,021	3,265	1,451,368	2,877
Electric blankets	1,163,050	1,375	1,314,710	1,374	1,718,179	2,063	2,559,777	3,428	2,065,766	2,758
Electric heating appliances, etc.	10,669,499	33,258	7,489,181	23,648	7,436,379	25,509	9,281,512	34,606	7,691,629	31,447
Heat storage radiators	248,707	3,819	192,881	3,368	276,110	4,702	427,222	7,120	375,191	7,865
Other electric heating appliances, etc.	10,420,792	29,440	7,296,300	20,280	7,160,269	20,807	8,854,290	27,487	7,316,438	23,581
Electrothermal hairdressing appliances, total	12,058,061	12,473	12,560,022	12,093	13,954,524	13,180	14,948,473	15,252	14,741,167	16,504
Hair dryers	8,194,507	8,074	7,817,177	7,240	7,876,747	7,451	7,771,250	8,207	8,148,689	9,277
Other hairdressing appliances	3,863,554	4,398	4,742,845	4,853	6,077,777	5,729	7,177,223	7,045	6,592,478	7,226
Hand dryers	6,308	33	38,819	186	48,425	264	113,027	396	51,000	364
Electric irons	2,495,377	3,625	3,009,152	4,187	3,506,116	4,684	2,964,848	4,087	2,494,504	4,076
Microwave ovens	2,346,929	15,536	2,606,131	18,631	3,388,159	26,060	3,470,533	30,078	3,769,012	35,320
Mono-functional ovens	1,174,668	5,229	1,178,207	5,813	976,134	4,151	963,610	4,283	1,056,604	5,210
Other microwave ovens	1,172,261	10,308	1,427,924	12,819	2,412,025	21,909	2,506,923	25,796	2,712,408	30,110
Coffee-/tea-makers	2,215,260	3,947	1,851,678	3,192	2,171,207	3,747	2,168,917	4,414	2,000,057	5,076
Toasters	4,212,310	4,555	4,089,985	4,547	4,047,861	4,813	4,132,045	5,400	3,599,893	5,268
Other ovens, cookers, etc.	3,803,862	9,225	3,820,058	8,579	4,339,069	10,151	4,098,652	11,868	3,930,319	13,445
Electric rice cookers	2,914,054	9,824	2,847,190	9,037	3,049,878	9,567	2,831,444	9,404	2,669,766	9,919
Other electrothermal appliances	8,083,664	10,692	9,008,152	11,943	11,377,250	15,381	14,157,555	20,201	14,411,423	22,620
Electrothermal resistive elements	-	9,789	-	10,996	-	11,273	-	13,122	-	16,320
Parts for electrothermal appliances	-	9,025	-	10,380	-	12,428	-	15,912	-	15,996
Air filters or air purifiers (excluding battery-type ones)	-	-	17,563,151	18,226	11,538,518	23,995	11,299,112	24,431	10,021,114	25,123

Source: Same as that for Fig. 3.1.1.

The import of consumer electric machines and appliances is on the rise and has continued to break a record since 1999. The import in 2007 was ¥540.3 billion, an increase of about 12% over ¥481.2 billion in 2006. Main exporters to Japan are Asian nations, led by China, followed by Thailand and Malaysia. By product type, the import of refrigerators, washing machines and almost all of other products showed a growth year on year (Fig. 3.1.4). What is noteworthy here is the fact that the pace of increase in the import amount has been faster than that in the quantity of import. As discussed in the section on domestic shipment, this probably means that the value added of products for the domestic market has been enhanced for imports, too. Reimport in the past had the structure of supplying high value added products from domestic manufacturers and low value added ones from abroad, but it is supposed that the value added of imports from abroad has been boosted, too, in recent years. This fact will suggest that even high value added products may be faced with price competition and that unless Japanese manufacturers shift their production functions to overseas bases quickly enough, they may be unable to win the price competition. In other words, it is considered that the introduction of higher value added products to the domestic market is becoming faster and the pace of falls in the price of these products is growing quicker, too. As a result, the ratio of overseas production is likely to increase further.

Fig. 3.1.5 Trend of the ratio of imports to apparent demand

	2003		2004		2005		2006		2007	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric refrigerators, total	39.6%	8.9%	40.5%	9.1%	43.8%	11.2%	44.3%	14.1%	53.2%	23.5%
Electric washing machines, total	38.9%	16.0%	48.9%	22.7%	55.0%	26.9%	56.1%	27.3%	57.4%	32.4%
Microwave ovens	58.4%	29.3%	68.9%	37.8%	83.1%	51.5%	86.2%	59.0%	88.5%	64.3%
Electric rice cookers	42.2%	16.5%	41.2%	14.8%	43.4%	14.9%	42.0%	14.4%	39.5%	14.1%

Note: Ratio of imports = imports/(production - exports + imports): ratio of imports to apparent domestic demand.
Source: Same as that for Fig. 3.1.1.

As for this situation from the viewpoint of the ratio of imports to apparent domestic demand, Figure 3.1.5 shows that imports already have high ratios for most products in quantity but that as of 2003, the amount of imports was very small. This indicates that low value added products were procured mainly from imports in the year. In 2006, however, not only the quantity of imports but the amount as well began to increase. Because the unit price of imports is rising, too, it is supposed that the upward trend of import amount is accelerating.

3.1.2 Results of operations and the trend of the consumer electric machine and appliance industry

(1) Trend of management

No strict comparison of the business results of main manufacturers of consumer electric machines and appliances is possible because some of the manufacturers cover the fields other than that of these products, too. But it is difficult to say that all of these manufacturers achieved substantial growth in sales in 2007 as compared with 2006, and there was no great change in the ratio of the sales of this segment to the total sales (Fig. 3.1.6). Large differences in performance can be observed between the companies, though. For example, the profit of the appliance segment of Panasonic has continued rising since 2004 and the company's sales declined a little in 2006 but have since been on the increase. By contrast, the digital media and consumer appliance segment of Hitachi has had greater sales since 2004 but suffered deficits in profit in 2006, which deficits are growing after that. This may suggest that Japanese manufacturers have tended to be being divided into two groups.

Fig. 3.1.6 Results of operations of the consumer electric machine and appliance segment of main manufacturers (¥ million)

		Sales	Ratio to total sales	Operating profit
Panasonic: appliance segment	2006	1,247,136	13.7%	83,084
	2007	1,316,402	14.5%	86,412
Toshiba: household electric appliance segment	2008	748,930	10.5%	9,676
	2009	774,294	10.1%	3,912
Sanyo Electric: consumer segment	2010	684,595	36.4%	-8,636
	2011	761,176	37.7%	17,741
Hitachi: digital media and consumer appliance segment	2014	1,506,073	14.7%	-58,434
	2015	1,504,692	13.4%	-109,914
Mitsubishi Electric: household electric appliance segment	2016	921,948	23.9%	36,644
	2017	932,791	23.0%	67,467

Source: Based on the financial statements of each company.

But reflecting the recession phase that started in the second half of 2007, the situation of the consumer electric machine and appliance industry cannot be described as one where they had a great growth in that year. This tendency is likely to continue in 2008; housing starts will be stagnant, too. Thus the results of operations in 2008 are likely to be discouraging ones. New activities, including the reorganization of manufacturers, will be started in the future to cope with this situation.

(2) Trend of the consumer electric machine and appliance industry

In the consumer electric machine and appliance industry in Japan, the shipment of high value added products has relatively increased. In addition, users' interest in eco-friendly household electric appliances has grown mainly due to raises in crude oil prices, and manufacturers have adopted the strategy of urging users to buy these green products to replace the old ones. Increasing demand for high-grade products has worked favorably for manufacturers who laid emphasis on the domestic production of high value added products. But considering the recession phase of business in the latter half of 2007 and low stock prices after the financial unrest in the U.S., demand for consumer electric machines and appliances, especially for high value added products, will decline considerably. Moreover, housing starts have suffered a sharp fall as mentioned above, and the sales of cooking heaters and large-sized refrigerators, which have enjoyed a good performance thus far, will have a setback. This will result in a substantial decrease in domestic production. On the other hand, the reimport of products made abroad to Japan was mostly that of low value added medium-quality products. But recently high value added products have been in the keen price competition environment, leading to rapid falls in the price. Thus manufacturers have tended to shift to overseas production for high-grade products, too. How domestic production will be in this environment is worthy of note.

In light of the fact that there is a growing tendency for Japanese manufacturers to switch to overseas production, if they positively employ the strategy of exporting the products they made abroad to a third party, the role of their domestic production function will clearly become a very limited one. On the other hand, it is considered that users' awareness of energy saving has firmly been established. The reason that eco-friendly household electric appliances are attracting much

attention will not only be the user's growing awareness of the environment; a more important factor is probably the fact that these appliances can save electricity charges. Raises in power rates are planned to cope with rising crude oil prices, and if business activities continue to slow down in the years to come, the household electric appliances that help cut the household expenditure will evidently become more advantageous. The problem is how to stimulate replacement demand in the situation where demand is likely to fall, and an incentive will be the eco-friendly features of products.

An important activity for consumer electric machines and appliances together with environmental conservation is recycling. At present, washing machines, freezers, refrigerators, air conditioners and TVs are the products covered by the recycling program. The recycling system of these products has been established, and manufacturers are taking account of recycling in their product development and production activities. The Japanese government is now discussing the possibility for adding two products, flat-screen TVs and clothing dryers, newly to the list of products to be recycled. The shipment of clothing dryers, which belong to the category of consumer electric machines and appliances, has considerably declined recently because washing dryers are being introduced, but the number of units shipped in 2004 when statistics were available totaled to about 150,000. Because clothing dryers have two types, i.e., gas-type and electricity-type, the dryers will need two different collection routes. As stated, the products for the recycling program under the Law on the Recycling of Specific Household Equipment may increase in the future, and manufacturers have to develop and make products according to this law.

Crude oil prices have taken a downward turn and are unlikely to rise greatly in the future. But the consumer electric machine and appliance industry has various other problems, including planned raises in electricity charges, declining demand due to business recession and measures to be taken for the recycling program. An important future task is how to build up a system for continuing to earn profits at home in the situation of falling demand, sluggish international production and continued shift to overseas production. In addition, manufacturers will be more and more required to make recyclable products so as to fulfill their corporate social responsibility (CSR). The manufacturers of consumer electric machines and appliances are now confronted with the situation where they have to deal with such problems as reduction in costs and saving of materials and power and at the same time to take steps that may push up costs.

3.2 Batteries

3.2.1 Supply and demand trend

(1) Outline

The production of batteries in 2007 amounted to ¥772.5 billion or an increase of 9.6% over the previous year, recording growth for the third consecutive year after 2005 (based on the Ministry of Economy, Trade and Industry, "Annual Report of Machinery Statistics 2007.") The sales were ¥810.0 billion, up 12.9% year on year, passing the ¥800 billion mark. Both the export and the import

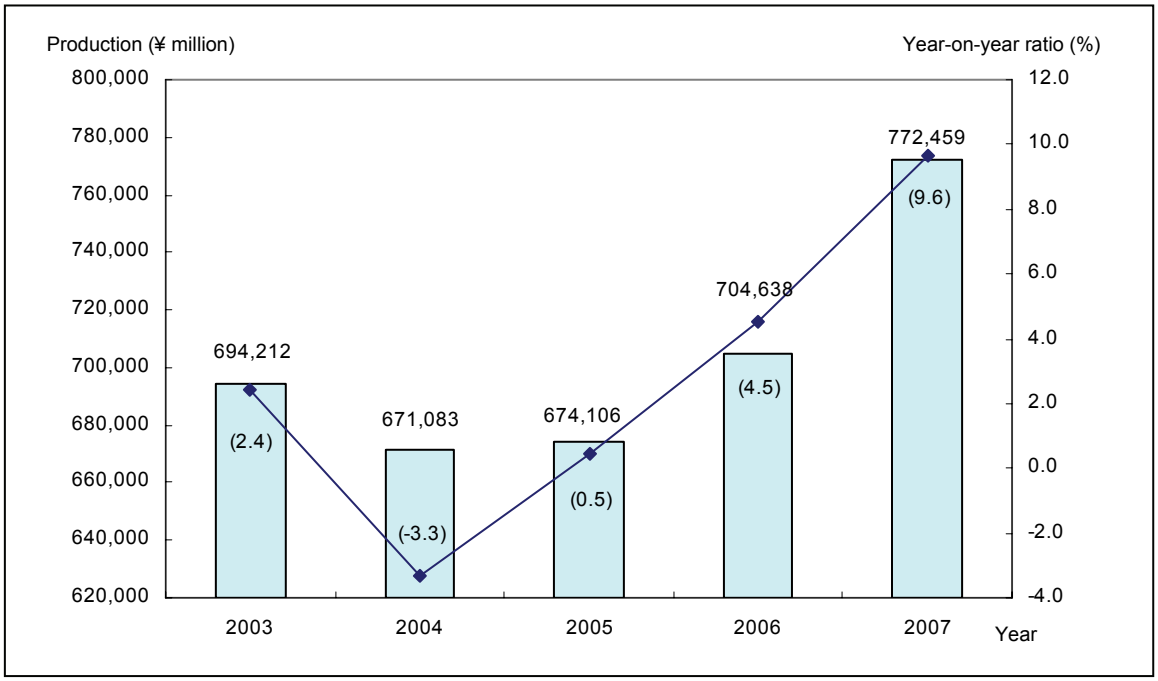
grew: the export totaled to ¥424.0 billion, a 12.0% rise, and the import, ¥98.6 billion, a 19.8% increase, year on year.

(2) Production and demand

The production of batteries in 2007 was ¥772.5 billion, a gain for three years running after 2005. While the output of disposable primary batteries, such as manganese dry batteries, fell by 3.0% year on year to ¥137.2 billion, showing the downward trend, that of secondary batteries recorded a substantial increase of 12.8% with ¥635.3 billion (Figs. 3.2.1 and 3.2.2). Of secondary batteries, alkaline storage batteries enjoyed an especially high growth: the figure was ¥45.0 billion (up 25.8% year on year) for fully enclosed alkaline storage batteries, ¥123.4 billion (up 34.8%) for nickel and hydrogen batteries and ¥171.7 billion (up 31.7%) for all alkaline storage batteries.

Of all types of batteries, lithium-ion storage batteries (¥315.1 billion; up 6.9%) accounted for the largest part: 40.8% of the output of all batteries.

Fig. 3.2.1 Trend of production of batteries



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

Fig. 3.2.2 Trend of production of batteries by type

Unit: ¥ million

Year			2003	2004	2005	2006	2007	Year-on-year ratio (%)
Primary batteries	Manganese dry batteries		18,474	×	×	×	×	0.0
	Silver oxide batteries		10,243	10,255	9,845	9,515	10,256	107.8
	Alkaline manganese dry batteries		75,991	66,859	67,167	63,885	61,242	95.9
	Lithium batteries		47,804	45,790	41,238	44,277	44,801	101.2
	Other dry batteries (including wet batteries)		3,052	×	×	×	×	0.0
	Primary batteries, total		155,564	146,915	143,006	141,376	137,154	97.0
Secondary batteries	Lead storage batteries	For automobiles	87,802	87,292	83,304	84,314	94,170	111.7
		For two-wheeled vehicles	8,153	7,453	7,312	5,790	4,628	79.9
		Small-sized control valve-type	7,268	7,706	7,079	7,240	7,737	106.9
		Others	39,375	41,677	40,883	40,857	41,978	102.7
	Lead storage batteries, total		142,598	144,128	138,578	138,201	148,513	107.5
	Alkaline storage batteries	Fully enclosed type	44,525	40,213	39,316	35,740	44,970	125.8
		Nickel hydrogen batteries	51,102	61,479	73,373	91,584	123,430	134.8
		Others	2,605	2,699	2,682	3,087	3,300	106.9
	Alkaline storage batteries, total		98,232	104,391	115,371	130,411	171,700	131.7
	Lithium-ion storage batteries		297,818	275,649	277,151	294,650	315,092	106.9
	Secondary batteries, total		538,648	524,168	531,100	563,262	635,305	112.8
Batteries, total			694,212	671,083	674,106	704,638	772,459	109.6

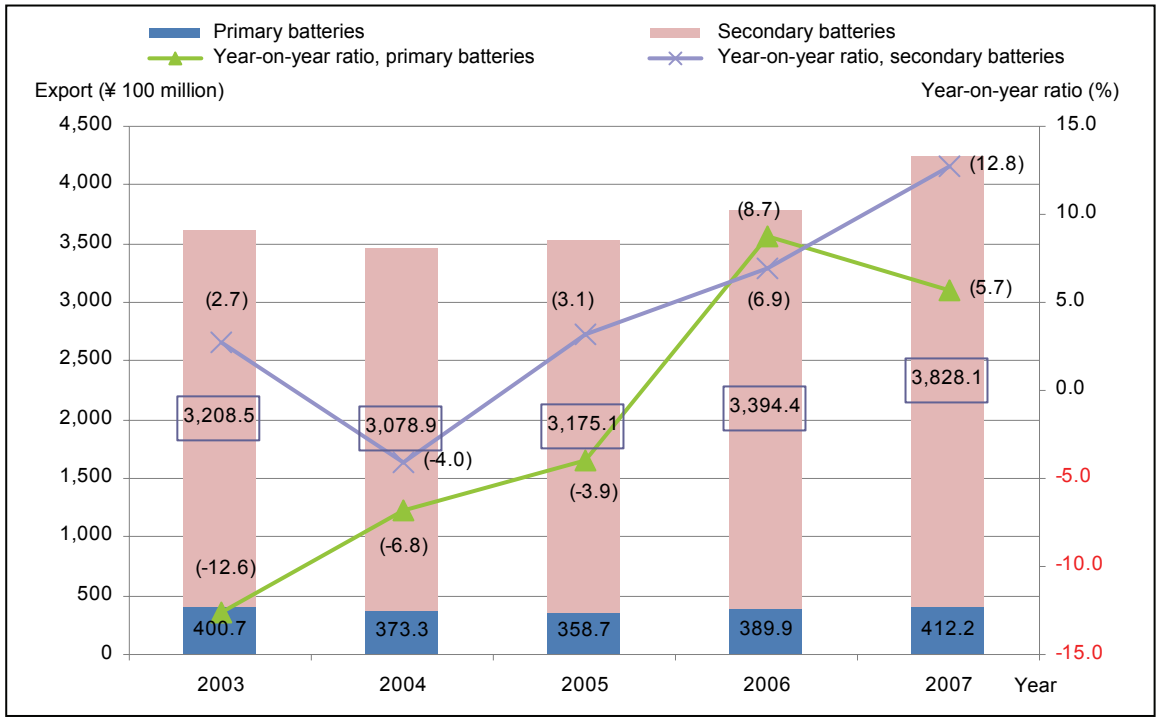
Note: "x" means that the classification of batteries in question was abolished in 2005.
Source: Same as that for Fig. 3.2.1.

The sales of batteries in 2007 broke through the ¥800.0 billion mark after having passed the ¥700.0 billion mark in 2006 (¥810.0 billion; up 12.9%). Just as in the case of production, the sales of primary batteries amounted to ¥143.2 billion or a 1.1% decline as compared with the previous year, while those of secondary batteries was ¥666.8 billion (up 16.5%), breaking through the ¥600.0 billion mark. The sales of alkaline batteries showed the highest growth with ¥172.8 billion (up 31.4% year on year), and those of nickel-hydrogen batteries grew most with ¥122.7 billion (up 36.0%). Nickel hydrogen batteries, which are used mainly for cellular phones and notebook computers, and lithium-ion storage batteries, which have the same uses as, but have a higher capacity than, nickel-hydrogen batteries, will continue to be mainly used ones in the future. Thus the tendency mentioned above will continue until the technology of fuel cell batteries and other next-generation batteries is established and these batteries become principal products.

(3) Export and import

The export of batteries in 2007 substantially increased to ¥424.0 billion, a rise of 12.0% as compared with the previous year. The growth was the highest in secondary batteries with ¥382.8 billion or a 12.8% growth. Primary batteries also showed an increase in export with ¥41.2 billion, a gain of 5.7% year on year (Fig. 3.2.3).

Fig. 3.2.3 Trend of export of batteries



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

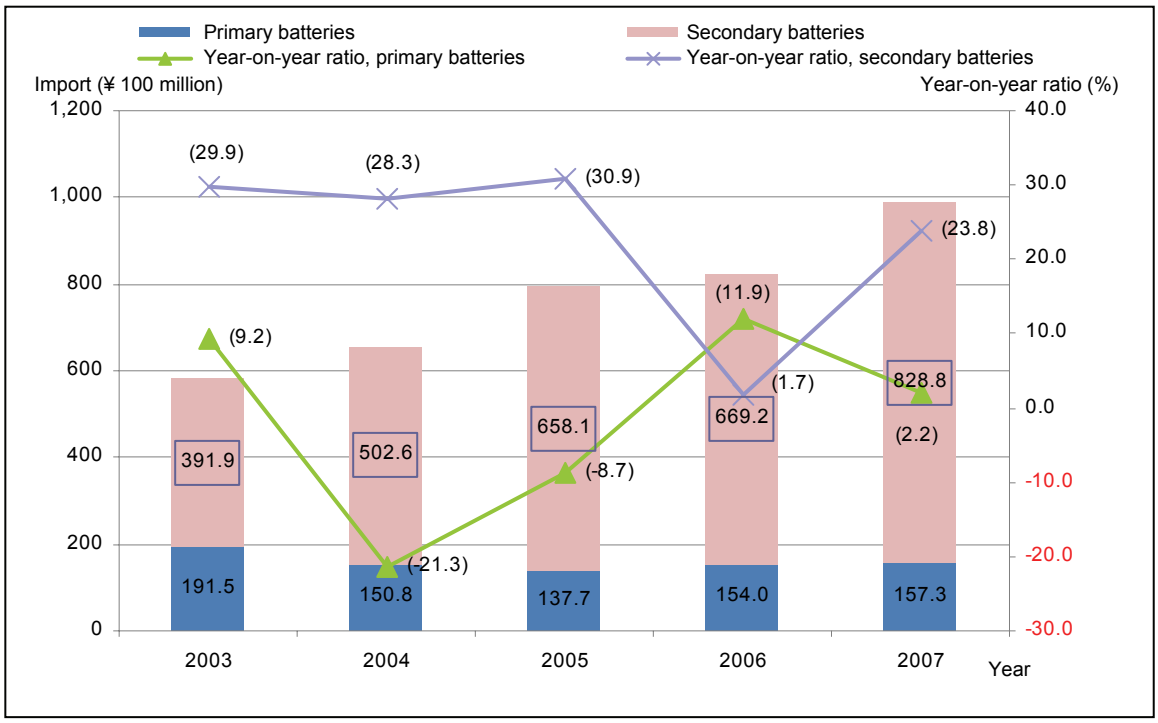
By product type, the export of primary batteries was ¥41.2 billion, accounting for 9.7% of the total export, and that of secondary batteries, ¥382.8 billion or 90.3%. Secondary batteries were far important in export just as they were in production. The export of lithium-ion batteries, which are secondary batteries, was the largest with ¥261.3 billion, accounting for 61.6% of the total export. Nickel hydrogen batteries, also secondary batteries, followed with ¥50.4 billion or 11.9% of all.

The most important destination of export was China, recording ¥176.6 billion or 41.6% (up 14.5% year on year) of the total. The share of secondary batteries was the largest: 45.5% (¥174.4 billion; up 14.8%) of the export of secondary batteries went to China. Of secondary batteries, lithium-ion batteries accounted for 57.2% (¥149.5 billion; up 20.3%) of the total export and parts for secondary batteries, such as containers and covers, 70.5% (¥190.4 billion; down 6.9%). These figures indicate the importance of China as the importer of batteries from Japan.

The import of batteries amounted to ¥98.6 billion with a high growth rate of 19.8% as in the case of export. Secondary batteries showed the greatest rise in import, too; the import was ¥82.8 billion or an increase of 23.8% over the previous year. The import of primary batteries was ¥15.7 billion, a 2.2% gain as compared with the previous year (Fig. 3.2.4). By product type, primary batteries accounted for 16.0% of the total import, amounting to ¥15.7 billion, and secondary batteries, 84.0% with ¥82.9 billion. The products having the largest import amount were nickel-cadmium storage batteries and storage batteries other than nickel-iron storage batteries (classified as "other storage batteries"): the import of these batteries was ¥44.8 billion (45.4% of all), and a greater part of them is considered to be lithium-ion batteries, which are secondary batteries. The lead storage

batteries for automobiles whose voltage is 6V or 12V followed with ¥18.6 billion and 18.9% of the total import.

Fig. 3.2.4 Trend of import of batteries



Source: Same as that for Fig. 3.2.3.

By exporting country, China held the most important position as in export: import from China was ¥52.4 billion, accounting for as much as 53.2% (up 16.7% year on year). The import from China was ¥7.1 billion (45.4% of all; up 23.5%) for primary batteries and ¥45.3 billion (54.6%; up 15.6%) for secondary batteries. China was the far largest exporter for nickel-iron storage batteries, secondary batteries (¥160 million; 95.2% of all; down 36.6%), and "other storage batteries" (¥36.5 billion; 81.4%; up 23.5%).

3.2.2 Results of operations and the trend of the battery industry

(1) Trend of management and overseas business activities

Battery manufacturers in Japan are mostly large businesses. The manufacturers focusing on dry batteries include Matsushita Battery Industrial Co., Sanyo Electric Co., Sony Corp., Toshiba Battery Co. and Hitachi Maxell, Ltd. Main secondary battery manufacturers are Matsushita Battery Industrial, Sanyo Electric, GS Yuasa Corp. and Shin-Kobe Electric Machinery Co. In the discussion below, emphasis will be placed on the situation of major secondary battery manufacturers as to battery products having large amount of production, such as lead storage batteries for automobiles,

nickel-hydrogen batteries and lithium-ion batteries.

Sanyo Electric has a global market share of about 25% in the area of secondary batteries and ranks first in the production of secondary batteries.[1] In 2007, the company enjoyed greater sales in all types of secondary batteries, i.e., lithium-ion batteries, nickel-hydrogen batteries and nickel-cadmium batteries. In particular, for lithium-ion batteries for which Sanyo has strong competitiveness, the company's sales reached ¥967.3 billion or an increase of 7.4% over the previous year (for the year ended in March 2008; consolidated)[2] as a result of its efforts to expand uses for information and communication appliances and to find new uses, including power sources for electronic tools.

In October 2008, Sanyo announced that it will construct a new plant in the premises of the "Kaizuka Plant of Sanyo Energy Twicell Co." (Kaizuka, Osaka) and will start the operation of the new plant by the end of fiscal 2008 to reinforce the production capacity of lithium-ion batteries in an effort to secure the top position in the years to come. The company also says that beginning in 2008 it will make a large-scale investment in and accelerate business activities for lithium-ion batteries for hybrid electric vehicles (hereinafter "HEVs"). Sanyo will complete a mass production line of these batteries in the Tokushima Plant, which introduced the trial manufacture line of lithium-ion batteries for HEVs in March 2006 and has since conducted the trial production and shipment of sample batteries, by the end of March 2009, introduce latest manufacturing equipment capable of saving labor enough to cope with low-cost production and make batteries for 15,000 to 20,000 HEVs a year. The company also said that it would decide to invest about ¥80.0 billion in total in lithium-ion battery business for HEVs by 2015 after grasping the demand trend, and it is considered that this investment will increase the company's production capacity in 2015 to 10 million units per month. In addition, Sanyo announced that it would speed up the development of lithium-ion batteries for plug-in HEVs; they would expand further the development of and business activities for these batteries and offer high technical capacity for secondary batteries. Behind the company's focus on lithium-ion batteries are probably a large potential market for secondary batteries as well as the agreement announced in May 2008 on the joint development of next-generation lithium-ion batteries for HEVs with the Volkswagen Group in Germany (hereinafter "VW").

Sony also announced in August 2008 that they would invest ¥40.0 billion in Sony Energy Device Corp. (Koriyama, Fukushima Prefecture), its subsidiary, during the three years from 2008 to 2010, build a new plant for the mass production of electrodes, the main parts for lithium-ion batteries, in the Motomiya Office (Motomiya, Fukushima Prefecture), and reinforce the assembly line of "battery cells," key parts, in the Tochigi Office (Shimotsuke, Tochigi Prefecture). In addition, the company will start the mass production of lithium-ion batteries for cellular phones at its Singapore plant in August 2008. Sony will strengthen the production system in China, too, and plans to increase their entire monthly manufacturing capacity by over seven times from 41.0 million at

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[1] See the "Nihon Keizai Shimbun," August 5, 2008. The title of the article on this paper was "Sony (global share: about 20%) and Matsushita, rivals to Samsung, pursue the second place in the world."

[2] The sales figure for Sanyo includes not only those of primary batteries, secondary batteries and solar batteries but also those of the component segment, including semiconductors and electronic parts.

present to 74.0 million by the end of fiscal 2010. In July 2008, Matsushita Electric Industrial announced, too, the construction of a new plant for lithium-ion batteries in Osaka and said that it would reinforce its existing plants in Wakayama Prefecture and other areas and expand its production capacity by over three times that at present to over 900 million a year by the fall of 2011.

Similar moves have been observed not merely in other manufacturers of lithium-ion batteries but in those of lithium-ion battery materials as well, and scrambles for the market of these products are now becoming fiercer (Fig. 3.2.5).

Fig. 3.2.5 Projects for lithium-ion batteries of main manufacturers

Sanyo Electric	Lithium-ion batteries	• Build a new plant in Minami-Awaji, Hyogo Prefecture, and in Kaizuka, Osaka. • The investment will total to about ¥54.0 billion with the aim of starting the operation of the new plants in 2009. • Plan to increase the entire company's production capacity by about 30% as compared with that at present.
	Lithium-ion batteries for HEVs	• Start mass production at the plant in Tokushima Prefecture and plan to make batteries for 15,000 - 20,000 HEVs a year. • Invest a total of about ¥80.0 billion by 2015 and build a new manufacturing base that will follow the Tokushima Plant in 2010.
Sony Corp.	Lithium-ion batteries	• Invest ¥40.0 billion in Sony Energy Device. • Increase the entire company's production capacity from 41.0 million batteries/month to 74.0 million/month by the end of 2010. • Start the mass production of batteries for cellular phones at the plant in Singapore.
Matsushita Electric Industrial Co.	Lithium-ion batteries	• Build a new plant in Osaka and reinforce existing plants, too. The total investment: about ¥123.0 billion. • Plan to increase the production capacity by over three times that at present to over 900 million batteries/year by the fall of 2011.
Sumitomo Chemical Co.	Separators	• Reinforce the manufacturing equipment at the Ehime Plant by 2009 so as to increase the production capacity by over five times that at present. • The investment will be about ¥10.0 billion and further investment will be considered depending on the demand trend.
Asahi Kasei Corp.	Separators	• Build a new plant in Miyazaki Prefecture with an investment of about ¥6.0 billion, and the new plant will start operation in 2010.
Mitsubishi Chemical Corp.	Positive electrode materials	• Build a new equipment with the production capacity of 600 tons a year at the Mizushima Plant aiming at the mass production of positive electrode materials for lithium-ion batteries for HEVs. • In addition, to start the business of separators in one to two years, plan to achieve initial sales of ¥100.0 billion for all types of parts for lithium-ion batteries.

Source: Based on the news releases of each company and newspaper reports.

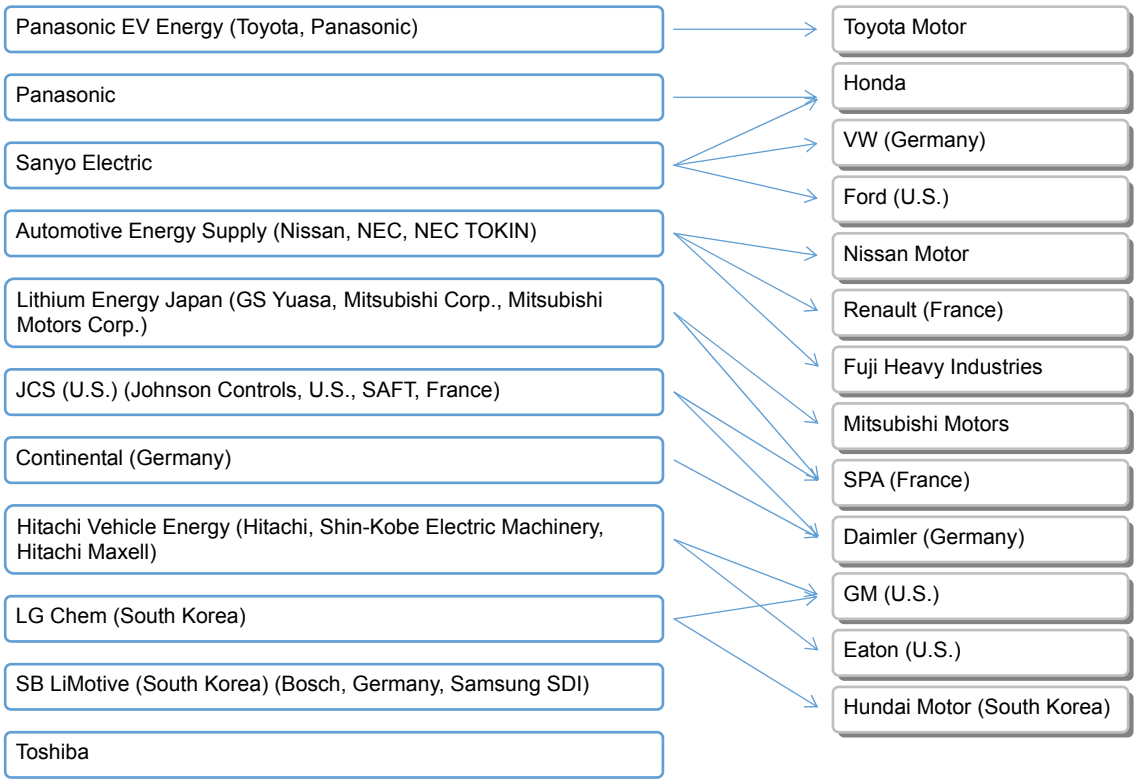
(2) Technological innovation and the business environment

Secondary batteries account for a greater part of battery production and are one of the businesses for main parts for automobiles, which was started with the beginning of domestic car production. Secondary batteries are used recently for audio-visual (AV) appliances and portable information appliances in large quantities. Great attention is now given to the future trend of the development of not only next-generation automobiles but fuel cells and lithium-ion batteries for automobiles as well.

What has especially been watched is the supply chains of batteries for automobiles. As already seen in the relation between Sanyo and the VW Group, the manufacturers of secondary batteries for

HEVs and electric vehicles (EVs) are starting to install these batteries in main models of cars and to seek out new customers, and as of October 2008, the supply chains as shown in Figure 3.2.6 were established. It is considered that demand for lithium-ion batteries for HEVs and EVs will increase in the future, and Japanese manufacturers, excluding Sony regarded as not active enough in the development of lithium-ion batteries for automobiles, seem to be in a hurry to switch from nickel-hydrogen batteries, for which they have established a strong position, to lithium-ion batteries.

Fig. 3.2.6 Supply chains for batteries for automobiles



Source: Based on the news releases of each company and newspaper reports.

(3) Future prospects and problems

The battery industry made rapid evolution as a result of technical progress from manganese dry batteries to storage batteries. As discussed above, lithium-ion batteries and other secondary batteries are now the main products, but fuel cells, whose production is still on a small scale, will become a large market in the years to come. In addition, the present goal of lithium-ion batteries is regarded as installation in the products required to have great safety, such as HEVs, and it is urgently needed to reduce their weight and production costs. Lithium-ion batteries are also expected to be utilized as the power sources of other next-generation automobiles.

The fuel cell industry has attracted attention mainly as the manufacturer of products for automobiles. Although it is pointed out that the pace of fuel cell development is too slow, the

newspaper reported in August 2008 that ENEOS Cellteck Co. would build a new plant in the Tokyo Plant of Sanyo Electric in Gunma Prefecture in order to establish a mass production system of "ENE FARM," a household fuel cell cogeneration system.[3] This company is a joint venture for fuel cell business between Sanyo Electric and Nippon Oil Corp. founded in April 2008. The report in August also said that a mass production system of commercial household fuel cell cogeneration equipment was established to prepare for the full-scale sale of the system scheduled to be started in 2009. In the future, for the products requiring new technology in starting up a business just as in the case of fuel cells, it will be undeniable that manufacturers will cooperate with each other in an effort to get combined effects of their respective technical capabilities and to increase the speed of development in the field of fuel cell business that they have developed, following the example of Sanyo and Nippon Oil that jointly founded ENEOS Celltech.

3.3 Medical electronics

3.3.1 Supply and demand trend

(1) Outline

According to the Annual Report on Pharmaceutical Production Statistics 2006, the domestic demand for medical appliances, obtained by deducting the amount of export from the sum of the amounts of import and production, was ¥2,258.6 billion (Fig. 3.3.1). This amount will mean the second largest market after the U.S. in the global market of about ¥20 trillion.[4] The situations of medical service in Japan, where the environment of medical care is changing as a result of, among others, population aging, advanced medical technology and systems and the exhaustion of the social security benefit system and where national medical expenditure has exceeded ¥30 trillion, are having diverse impacts not only on the medical appliance industry but also on medical organizations and patients.

(2) Production trend

In the production of medical appliances in 2006 (Fig. 3.3.2), diagnostic imaging systems increased by 8.9% year on year to ¥400.0 billion. All other products, excluding household medical appliances, enjoyed higher output than that in the previous year, and the total production of medical appliances was ¥1,688.3 billion or a gain of 7.4% year on year.

According to the figures of the electronic application devices designated as medical ones in the Annual Report of Machinery Statistics 2007 (Fig. 3.3.3), the output of medical X-ray devices

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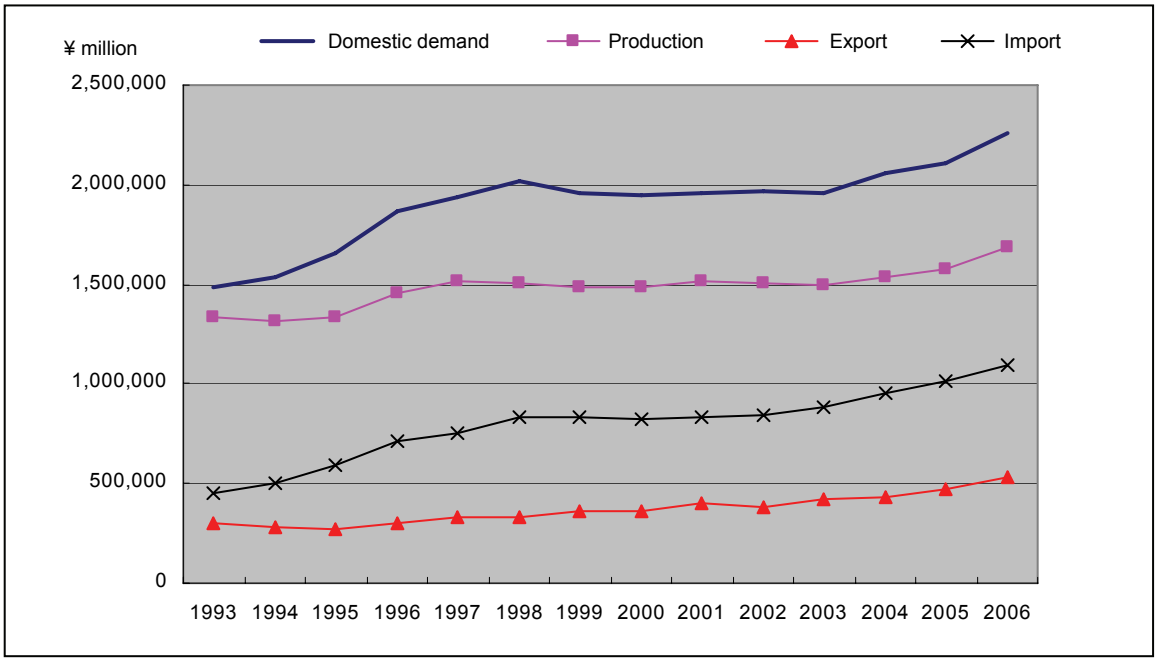
[3] According to the report, ENEOS Celltech will start operation partly in April 2009, complete the mass production system at the end of fiscal 2009 and establish the structure capable of manufacturing about 10,000 cogeneration systems per year in fiscal 2010. In addition, the company plans to make additional investment in 2011 and after so as to establish a production system of about 40,000 systems a year by fiscal 2015 and to produce a total of about 150,000 systems during the fiscal 2009-2015 period.

[4] The Advanced Medical Technology Association in the U.S. reported that the shipment of the medical appliance industry in the U.S. in 2006 was $123.0 billion.

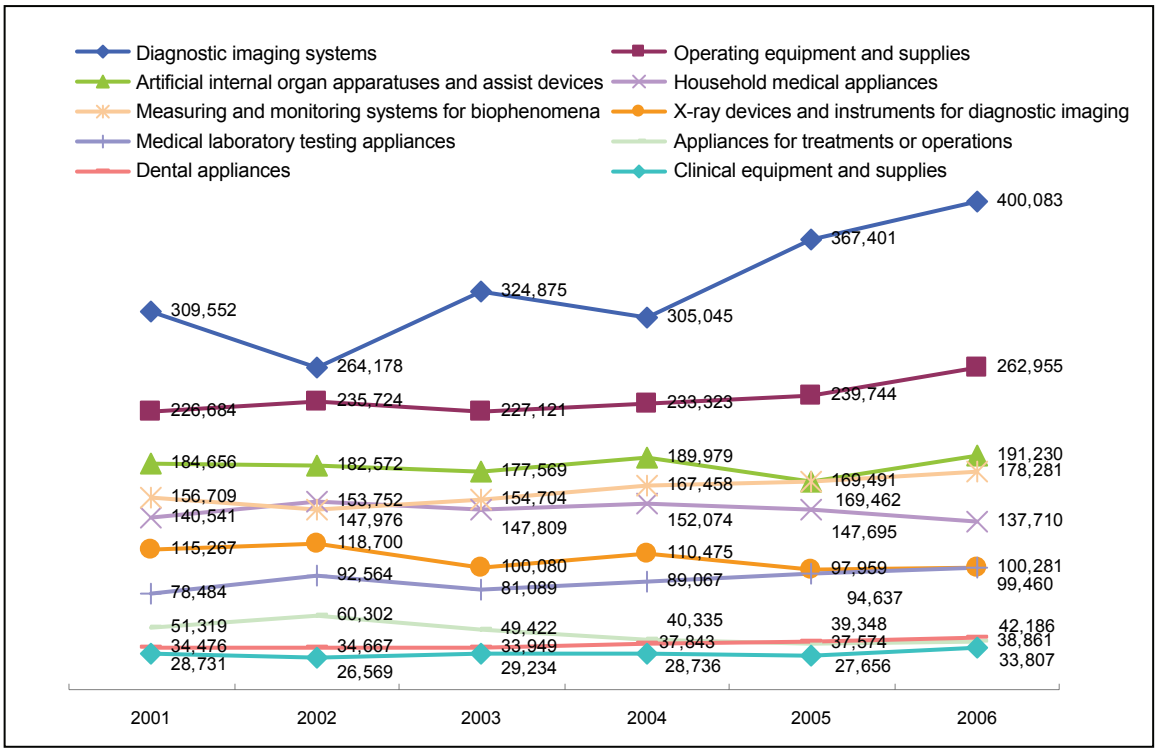
declined by 1.2% year on year to ¥201.8 billion, that of ultrasonic application medical appliances grew by 7.1% to ¥94.3 billion and that of other medical measuring instruments increased by 4.1% to ¥90.2 billion. The production of all medical electronic appliances totaled to ¥379.1 billion or a 1.9% gain year on year.

Fig. 3.3.1 Trend of supply of and demand for medical appliances (in amount)



Source: Ministry of Health, Labour and Welfare, "Annual Report on Pharmaceutical Production Statistics 2006." * Including medical materials. Domestic demand = production - export + import.

Fig. 3.3.2 Trend of production of medical appliances (calendar years; ¥ million)



Source: Ministry of Health, Labour and Welfare, "Annual Report on Pharmaceutical Production Statistics 2006."

Fig. 3.3.3 Trend of production of medical electronic appliances (calendar years)

¥ million

	2002	2003	2004	2005	2006	2007	Year-on-year ratio (%)
Medical appliances, total	278,064	289,922	290,140	367,618	379,122	386,447	1.9
Medical X-ray devices, total	149,265	161,193	152,212	191,367	204,308	201,836	-1.2
Medical and dental X-ray devices	72,719	78,113	75,076	76,454	77,826	78,228	0.5
CT devices	76,546	83,080	77,136	114,913	126,482	123,608	-2.3
Ultrasonic application medical appliances	78,505	72,587	75,846	94,799	88,105	94,356	7.1
Other medical measuring instruments	50,294	56,142	62,082	81,452	86,709	90,255	4.1

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

Note: Figures with '*' are those of the part of electronic application devices that is used for medical care, which are included in the total figures of electronic application devices.

(3) Trend of export and import

The total amount of export of medical appliances in 2006 increased by 11.3% over the previous year to ¥527.5 billion, showing an upward trend as in 2005. The import attained a growth of 8.5% year on year, registering ¥1,097.9 billion (Fig. 3.3.4).

By the type of product, the export of diagnostic imaging systems was ¥208.2 billion or a gain of 12.8% year on year, continuing a favorable performance as in 2005, while the import grew by 2.6% year on year to ¥121.4 billion. The import of household medical appliances achieved a marked increase of 28.9% year on year, although the amount was as small as ¥21.8 billion.

Artificial internal organ apparatuses and assist devices had the largest amount of import with ¥310.8 billion, a 1.5% decline from the previous year. The import of measuring and monitoring systems for biophenomena showed the highest growth rate of 39.1% with ¥42.0 billion. Household medical appliances also recorded a great rise of 28.9% year on year in import, which amounted to ¥21.9 billion.

Fig. 3.3.4 Trend of export and import of medical appliances (calendar years)

¥ million

	Export			Import		
	2005	2006	Year-on-year ratio (%)	2005	2006	Year-on-year ratio (%)
Medical appliances, grand total	473,915	527,526	11.3%	1,012,045	1,097,867	8.5%
Medical appliances, total	461,472	511,359	10.8%	797,079	836,697	5.0%
Diagnostic imaging systems	184,623	208,229	12.8%	118,400	121,449	2.6%
Operating equipment and supplies	76,492	81,345	6.3%	242,836	259,199	6.7%
Measuring and monitoring systems for biophenomena	44,162	48,035	8.8%	30,182	41,983	39.1%
Artificial internal organ apparatuses and assist devices	36,488	41,448	13.6%	315,499	310,798	-1.5%
Medical laboratory testing appliances	52,808	57,422	8.7%	12,317	14,703	19.4%
X-ray devices and instruments for diagnostic imaging	31,246	36,279	16.1%	7,786	9,337	19.9%
Dental appliances	14,317	16,207	13.2%	10,171	10,354	1.8%
Household medical appliances	10,920	10,102	-7.5%	16,971	21,877	28.9%
Appliances for treatments or operations	5,866	7,729	31.8%	34,709	39,464	13.7%
Clinical equipment and supplies	4,550	4,563	0.3%	8,208	7,533	-8.2%
Other medical appliances	12,443	16,167	29.9%	214,966	261,170	21.5%

Source: Based on the Ministry of Health, Labour and Welfare, “Annual Report on Pharmaceutical Production Statistics.”

(4) Future prospects

Major Japanese manufacturers are reinforcing their sales system considering business activities in China and other markets in Asia. It is expected that as the pace of economic growth of Asian nations is becoming faster, these manufacturers will be able to create markets for diagnostic imaging systems and other advanced medical appliances.

3.3.2 Results of operations and the trend of the medical appliance industry

(1) Results of operations

Toshiba Medical Systems Corp. continued to enjoy the good result of 64-row multislice computerized tomographs (CTs), and the fact that these CTs were highly rated in the U.S. has led to greater sales in other regions, too. The company’s sales were steady, mainly overseas, in all fields, CT, MRI, X-rays and ultrasonic diagnostic devices.

Hitachi Medical Corp. experienced difficulties in the market of diagnostic imaging systems both at home and in the U.S. The company’s sales of MR imaging devices increased in Europe but

suffered a fall in Japan.

In July 2007, Hitachi Medical introduced new multislice CT devices into the domestic market, but this has not leaded to any growth in annual sales. No substantial increase can be expected in the domestic market of diagnosing imaging appliances in the future, but the company believes that the market will expand in European countries and BRIC and plans to build a sales promotion system making the most of trading firms and agencies.

Fig. 3.3.5 Results of operations of main medical appliance manufacturers

	Toshiba Medical Systems [1)]	Hitachi Medical [2)]	Shimadzu Corp. [3)]	Olympus Optical [4)]	Aloka Co. [5)]
Accounting period	Year ended in March 2008				
Unit	¥ million				
Entire company's sales	290,689	110,386	289,971	1,128,875	56,112
Increase/decrease year on year	4.4%	-6.7%	10.5%	6.3%	3.8%
Operating profit	17,937	3,309	27,597	112,623	5,074
Increase/decrease year on year	-13.4%	7.6%	9.2%	14.1%	30.0%
Ratio of operating profit to net sales	6.2%	3.0%	9.5%	10.0%	9.0%
Sales of the medical appliance section	-	99,823	55,423	353,269	49,557
Ratio of sales of the medical care section	-	90.4%	19.1%	31.3%	88.3%
Year-on-year ratio	-	-7.8%	10.6%	13.3%	4.1%
Operating profit	-	3,461	2,677	98,420	-
Increase/decrease year on year	-	40.7%	25.2%	12.0%	-
Ratio of operating profit to net sales	-	3.5%	4.8%	27.9%	-

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

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

1. In October 2003, Toshiba Medical Systems Corp. was founded by integrating Toshiba Medical System Corp. into Toshiba Medical Corp., which took charge of domestic sales and services. The company 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 company's medical appliance section is the medical appliance department.
4. The figure for the company's medical appliance section is that for its medical care company.
5. The company's medical appliance section is in charge of medical electronic and analyzing devices excluding general-purpose analyzing devices.

At Olympus Optical, the products taking a leading role in the field of medical endoscopes in the domestic market included endoscopes capable of performing special optical observation, upper gastrointestinal (UGI) tract scopes for transnasal intubation and UGI tract scopes for both transnasal and oral intubation, which will contribute to early detection of cancer and other diseases. In overseas markets, high-definition endoscope systems complete with a special optical observation function showed a good performance.

In the area of surgical and endoscopic treatment, Olympus enjoyed greater sales both at home and abroad not only in homeostatic instruments, such as clips and sampling instruments, chiefly forceps for biopsy, but also in guide wires and other pancreaticobiliary instruments. Overseas, high-definition endoscope systems achieved good results.

Shimadzu conducted a steady business in the domestic market in X-ray-related products, including X-ray TV systems and general photographing devices. Overseas, the company enjoyed a steady demand for general photographing devices and X-ray devices for the doctor's round visits in Asia and the Americas. Because the company has now a complete lineup of large visual-field FPD X-ray photographing devices for circulatory organs, it will have stronger competitive power in the future as clinical applications are broadened.

Ultrasonic diagnostic devices, Aloka' flagship products, have been affected by the cut in medical fees less than other diagnostic imaging devices and have been a relatively stable market in the number of units sold. But price competition has become fiercer in the situation where medical institutions have tended to cut down the budget as the hospitals that introduced the diagnosis procedure combination(DPC)-based lump-sum payment system are increasing and working to raise the efficiency of their management. Because of this, although Aloka introduced a new product developed based on the concepts of small sizes, high functions and eco-friendly features, it has achieved no good results. But the new product has been highly rated in North America and Europe and will continue to expand a market share in the future. In addition, Aloka's pre-examination processing system has been adopted by various institutions because the system is not only labor-saving but also offers various functions and features for keeping the quality of specimens as well as optimal features suited to the scale of the institution; thus this system has contributed to the company's sales.

(2) Future prospects and problems

The medical appliance industry has a close relation to medical institutions, pharmaceutical companies and health insurance systems and plays an important role in health care for people. When the industry is engaged in the production of medical appliances in various ways, it should understand great changes in health care systems, medical technology and the sites of medical service as well as the needs in these sites.

Environmental changes affecting today's health care are diverse. For example, in hospital management, there is a growing tendency where more importance is attached to the quality of medical treatment and service for the patient. From this viewpoint, medical appliance manufacturers will be required in the future not merely to improve the function and performance of their products but to pay more attention to the standpoint of the patient in making products.

The pattern of health care service has increasingly been specialized with the progress of health care. As a result, the categories of health care have been defined clearer as preventive care, treatment care, convalescence care and the like.

From the standpoint of preventive care, in order to prevent becoming bedridden, suffering from diseases, etc. in old age and to extend people's healthy life expectancy, there is the need to establish a preventive lifestyle for avoiding lifestyle-related diseases and other problems at an early stage and to detect and treat diseases and other troubles as early as possible by medical examinations and other means. Sick persons, people with disabilities and elderly people will need to complement and strengthen their physical functions so as to lead an active life.

In the field of preventive medical examination where the effect of controlling medical expenditure is expected to be brought about, the health care service will be expanded in the monitoring of people's health conditions at ordinary times in such areas as general care, specialized care, brains, women, sports, elderly people and thorough physical examinations for children with the aim of maintaining health and realizing early detection and treatment.

There has arisen the need, too, to utilize images and data in a various phases of medical treatment more than in the past, and the point of care (POC) provided at the bedside of the patient, instead of going to the examination room, is increasing. In this situation, it is expected that cellular phones and other appliances for information and communication and information processing will be combined with the health care field, which will lead to the solution of problems of, and improvement in, health care and related service, as well as to further technological innovation of appliances for these tasks.

In the area of home health care and first-aid health care, there is the need for highly maneuverable diagnosing appliances. Thus, application technology for microminiaturization will continue to contribute to the value added of these appliances in the future. To develop ambulances with a CT function, doctor cars capable of selecting the unit medical appliances needed and first-aid helicopters, the medical appliance industry needs cooperation with other industries. It is expected that medical appliance manufacturers will develop this market newly, at the same time as studying innovative medical appliances, such as automatic remote operation robots.