3. Electric Machine Sector

3.1 Consumer electric machines and appliances

3.1.1. Supply and demand trend

(1) Outline

The production and shipment of consumer electric machines and appliances in 2006 decreased as in the previous year affected mainly by the unsettled weather in summer. This downward tendency was accelerated by increases in so-called "reimport" of mostly low value added, small-sized products mainly from China. In Japan, while there is the trend of expansion in the production and shipment of high value added products, the domestic production of other products, which account for a greater part of domestic demand, is expected to fall off due to increase in "reimport."

But growing demand for high value added products, such as washing and drying machines and cooking heaters, is expected to continue growing in the future. In addition, 2007 is the tenth year after 1997 when the consumption tax was raised from 3% to 5% and when many households bought consumer electric machines and appliances in a hurry before the tax increase; thus it is expected that demand would go up because these households would buy new ones to replace those bought a decade before. Due to the expectation that a greater demand for these high value added products and replacement demand would be combined to boost domestic demand substantially, it is anticipated that the production and shipment of consumer electric machines and appliances would expand in the years ahead. Attention has been paid to the future activities of the consumer electric machine industry that would be done by watching the direction of growth of the Japanese economy.

On the other hand, care should be taken of the future direction because it has often been pointed out that the recent recovery phase of the Japanese economy is not so powerful that the consumer cannot feel that the recovery is real. But it is supposed that the increasing trend of "reimport" would continue in the future, there will be no big change in the structure where the manufacturer has to continue its domestic production activities by continuously inputting high value added products and new products into the domestic market.

(2) Trend of production

The method of classifying consumer electric machines and appliances was greatly changed in the recent several years and it is impossible to simply compare year-to-year figures. But the production in 2006 was ¥1,357.8 billion, a slight growth over the previous year when the figure was ¥1,310.5 billion. By product category, the production of washing and drying machines and cooking heaters increased favorably as shown in Figure 3-1. By contrast, due to unsettled weather, the output of refrigerator tended to decline and so did the production of other main products. And there is the possibility that demand for newly built condominiums would stagnates as a result of the rising condominium price caused by higher land prices, mainly in the center of Tokyo, and raises in housing loan interest, and thus, it cannot be denied that new demand for cooking heaters would fall

consequently. As in the case of the expectations for growing demand mentioned earlier, the future situation should be watched carefully. The direction of increased production would be limited as in the past to washing and drying machines, cooking heaters and other high value added products, and step-up in production can not be expected for general and low-priced products due to an increasing trend of "reimport." Considering the direction of the growth of the Japanese economy and new demand, much care should be required about expansion in the production of consumer electric machines and appliances.

The price of crude oil has increased recently and thus electricity rates will be raised. With growing public awareness of environmental problems, demand for "energy-saving household electric appliances" will rise in the future. To increase the domestic production of consumer electric machines and appliances, there will be the need for strategies of encouraging the consumer to buy energy-saving electric appliances to replace old ones.

Fig. 3-1 Trend of domestic production of consumer electric machines and appliances

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric stoves	8,220	292,550	7,620	247,735	3,538	-	-	-	-	-
Electric *kotatsu*	1,362	1,028,589	1,092	1,013,413	-	-	-	-	-	-
Electric blankets	3,447	1,536,982	3,231	1,415,901	-	863,252	-	-	-	-
Electric carpets	14,935	-	13,013	-	7,065	-	-	-	-	-
Microwave ovens	50,116	-	39,066	-	32,977	-	26,936	-	23,644	-
Electric cooking stoves	-	5,136,845	-	4,307,767	-	4,424,291	-	4,354,601	-	4,285,352
Electric rice cookers	59,766	722,372	52,385	546,007	54,519	-	57,432	-	59,167	-
Toasters	2,149	-	1,194	-	-	-	-	-	-	-
Electric ovens	-	850,393	-	465,231	-	285,855	-	-	-	-
Eclectic hot plates	4,375	-	2,034	-	1,329	-	-	-	-	-
Coffee-makers	-	4,309,642	-	3,552,154	-	3,155,076	-	2,666,509	-	1,872,655
Electric pots	23,690	782,832	17,156	945,502	15,837	949,531	13,824	853,646	9,755	822,426
Dish washing and drying machines	38,347	-	42,653	-	45,326	-	38,844	-	34,693	-
Dish drying machines	-	3,316,725	-	2,858,983	-	3,019,604	-	2,821,077	-	2,783,449
Electric refrigerators	324,926	-	280,743	-	315,649	674,872	289,378	801,842	260,774	799,717
Cooking heaters	-	81,910	-	70,909	66,571	46,542	68,238	39,300	70,737	48,903
Freezers	13,863	-	13,163	-	12,803	-	11,391	-	15,074	-
Electric fans	5,531	-	4,843	-	2,391	-	-	-	-	-
Others	-	7,683,817	-	6,875,433	-	6,982,132	-	7,377,453	-	7,117,335
Ventilation fans	100,309	234,099	91,959	235,955	100,626	247,667	119,021	246,422	118,127	243,283
Electric water heaters	37,510	-	43,861	-	51,628	-	41,803	205,793	40,497	279,525
Natural refrigerant heat pump-type water heater	-	290,130	-	272,856	-	272,956	25,212	267,799	31,788	257,555
Household electric well pumps	12,438	-	12,295	-	12,691	1,147,058	12,214	954,844	12,178	1,057,088
Air purifiers	-	234,750	-	192,068	16,679	356,269	12,188	256,470	16,205	206,697
Dehumidifiers	8,447	6,020,750	7,830	5,526,775	10,820	5,586,336	10,121	5,618,384	8,111	5,948,761
Electric washing machines	147,139	-	135,415	-	135,294	-	136,304	1,601,518	145,856	1,498,232
Washing machines (fully automatic, twin-tub)	-	-	-	-	-	-	46,943	1,020,122	45,447	1,059,862
Washing and drying machine	-	3,272,609	-	2,895,099	-	2,631,936	89,361	-	100,409	-
Fully automatic washing machines	141,703	251,793	130,353	237,602	130,670	216,025	-	-	-	-

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Twin-tub washing machines	5,436	185,827	5,062	182,993	4,624	151,011	-	-	-	-
Washing dryers	7,530	1,688,739	7,125	1,612,245	6,213	1,672,017	-	-	-	-
Electric irons	4,657	5,199,540	3,777	4,809,931	3,800	4,654,560	-	4,182,938	-	3,158,561
Vacuum cleaners	70,446	600,530	66,392	269,884	62,441	-	60,096	-	49,771	-
Mini-vacuums	3,104	2,180,361	1,191	2,412,149	-	2,612,570	-	2,404,242	-	2,528,513
Toilet seats with warm water	67,015	-	72,144	-	74,656	-	69,101	-	73,499	-
Electric razors	32,777	476,226	36,443	422,067	33,960	632,024	16,601	363,676	13,749	304,533
Electric massage machines	44,919	1,411,187	44,102	1,541,967	49,173	1,392,806	48,986	-	39,782	-
Hair dryers	4,894	122,184	4,651	103,345	3,985	104,510	-	110,916	-	92,837
Household garbage processors	4,578	19,122,703	3,890	22,673,054	3,427	22,787,937	3,472	-	3,144	-
Other consumer electric machines and appliances	131,333	-	126,406	-	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 and washing and drying machines in 2005.

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

(3) Situation of shipment

Figure 3-2 shows the situation of shipment of consumer electric machines and appliances. The shipment in 2006 stands at ¥1,433.1 billion, a slight increase over the previous year, showing a continued upward trend. Although simple comparison is not possible because the system of classification was partly changed for these products, too, the trend of shipment was similar to that of production: that is, an increase can be seen in the shipment of high value added products, such as cooking heaters and washing and drying machines. The shipment of microwave ovens also grew in amount though it declines a little in quantity; it is thus considered that the shipment of high value added products rose for this product, too. But as most products suffered a decrease both in the quantity and amount of shipment and the shipment of general products roughly leveled off the growth in cooking heaters and washing and drying machines is regarded as being a support for the expansion as a whole. The domestic market of consumer electric machines and appliances has already reached a maturity stage, and almost all of demand is considered to be replacement demand. Thus, there will arise the need for activities for stimulating replacement demand, which may be represented by the case of "energy-saving household electric appliances" as noted above. In addition, it is necessary to closely observe how the products with "safety and security" functions, mainly targeted at the elderly user, will contribute to shipment in the years ahead.

Fig. 3-2 Situation of domestic shipment of consumer electric machines and appliances (number of units, ¥ million)

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric stoves	1,679,078	9,795	1,507,091	8,502	1,269,434	6,706	-	-	-	-
Electric *kotatsu*	459,661	2,507	284,429	1,411	-	-	-	-	-	-
Electric blankets	1,449,751	4,617	1,278,579	4,030	-	-	-	-	-	-
Electric carpets	2,099,038	20,184	1,693,197	15,449	1,081,500	8,913	-	-	-	-
Microwave ovens	3,563,287	67,760	3,524,091	62,924	3,478,751	61,770	3,683,229	70,185	3,644,569	74,485
Electric rice cookers	6,715,953	79,497	6,610,182	80,580	6,719,543	82,358	6,931,240	86,116	6,992,957	87,401
Toasters	3,011,441	8,183	2,630,419	6,737	-	-	-	-	-	-
Eclectic hot plates	1,456,496	8,640	1,499,721	8,719	1,443,668	8,102	-	-	-	-
Electric pots	5,237,894	28,064	5,112,371	25,422	5,088,807	24,633	4,978,875	24,230	4,722,175	23,810
Dish washing and drying machines	766,972	35,633	957,402	43,736	982,418	45,085	921,349	40,313	861,437	35,577
Electric refrigerators	4,197,789	322,953	4,119,358	312,879	4,380,991	336,725	4,389,162	333,109	4,360,060	327,683
Cooking heaters	-	-	-	-	655,615	55,758	745,172	64,727	817,906	72,829
Freezers	112,610	14,706	131,569	16,200	164,374	17,430	176,943	17,484	179,091	18,849
Electric fans	2,080,783	8,229	1,852,169	7,305	1,671,585	5,976	-	-	-	-
Ventilation fans	7,821,748	107,953	7,398,607	105,185	8,029,057	119,111	8,291,015	135,669	8,106,971	133,989
Electric water heaters	234,073	36,879	241,729	45,096	248,778	52,612	241,447	42,713	241,847	42,321
Natural refrigerant heat pump-type water heater	-	-	-	-	-	-	196,428	30,626	267,610	40,413
Household electric well pumps	287,905	12,676	282,582	12,648	281,886	12,947	278,132	12,748	257,271	11,637
Air purifiers	-	-	-		1,748,665	24,635	1,840,079	29,772	1,824,296	27,236
Dehumidifiers	379,315	11,164	361,507	10,468	590,802	13,351	601,023	13,642	641,635	14,108
Electric washing machines	4,080,808	166,565	4,154,281	170,686	4,427,979	190,149	4,488,454	192,213	4,590,398	205,509
Washing machines (fully automatic, twin-tub)	-	-	-	-	-	-	3,384,322	92,077	3,330,816	87,439
Washing and drying machine	-	-	-	-	-	-	1,104,132	100,136	1,259,582	118,070
Fully automatic washing machines	3,670,582	157,845	3,785,957	162,835	4,087,458	182,754	-	-	-	-
Twin-tub washing machines	410,226	8,720	368,324	7,851	340,521	7,395	-	-	-	-
Washing dryers	197,683	8,252	189,700	7,700	149,414	6,171	-	-	-	-
Electric irons	2,556,872	9,794	2,657,478	8,943	2,593,857	8,700	-	-	-	-
Vacuum cleaners	5,701,650	88,501	5,677,131	90,581	5,988,328	93,229	6,072,344	94,062	5,992,551	93,871
Mini-vacuums	1,191,019	5,045	1,822,670	5,966	-	-	-	-	-	-
Toilet seats with warm water	2,482,811	105,139	2,464,822	84,456	2,639,743	78,533	2,617,387	78,139	2,841,989	81,734
Electric razors	8,644,528	36,697	8,814,918	39,045	8,330,457	36,954	8,033,130	35,230	7,552,142	32,610
Electric massage machines	912,274	46,980	872,099	45,841	904,116	50,839	750,218	49,644	701,978	43,033
Hair dryers	8,599,273	25,933	8,796,497	24,496	9,076,641	24,699	-	-	-	-
Household garbage processors	128,594	5,125	88,652	3,368	98,593	3,335	112,659	3,617	92,622	3,114

Note: Same as that for Fig. 3-1.

Source: Same as that for Fig. 3-1.

With the increasing tendency of "reimport" as noted, the overseas production of main products is on a high level. The ratio of overseas production in 2006 was 71.3% for electric refrigerators and electric washing machines, 56.9% for vacuum cleaners and as high as 92.8% for microwave ovens. The domestic shipment of these products has almost leveled off, and their "reimport" is likely to increase more and more. But as described above, as for the relations between the domestic shipment and domestic production of microwave ovens, the domestic shipment has leveled off but the average price has been in an upward trend. There has been the coexistence of two groups of products: the products, as electronic ovens, which are the high value added ones mostly produced in Japan, of which average price often rises, i.e., the products whose users can be divided, and the products almost all imported from abroad. This suggests that the "reimport" strategies are no simple ones.

For domestic shipment, there is also the need to pay attention to how South Korean and Chinese products will come to stay in the Japanese market in the future. Lots of low-priced, mono-function products made by overseas manufacturers can be seen in Japan. It will be necessary hereafter to watch to what level foreign-made products will spread in Japan, too. The domestic market of consumer electric machines and appliances has matured, and the market has reached the stage of price competition due mainly to the positive activities of mass merchandisers of household electric appliances for extending the market. Therefore, the trend of product differentiation is expected to continue growing.

(4) Situation of export and import

Increasing "reimport" has been discussed so far, and the situation of export and import of consumer electric machines and appliances backs up the increase. Figure 3-3 shows the export of these products. The export in 2006 amounted to ¥203.4 billion, a larger figure than ¥180.7 billion in 2005. After hitting the bottom in 2002, the export had been on the increase except in 2005 when it showed a slight fall and rose again in 2006. The export of finished products registered an increase of 123.4% over the previous year. By product category, the export of refrigerators (approx. ¥3.5 billion, up 26%), freezers (approx. ¥3.7 billion, up 16%) and microwave ovens (approx. ¥2.7 billion, up 15%) grew over the previous year. On the other hand, the export of parts was greater than that of finished products, which shows that parts accounted for a large portion of the export of consumer electric machines and appliances in Japan. In other words, the traditional structure has not been changed in which overseas manufacturers procure parts from Japan, assembly the parts in their plants abroad and export the finished products to Japan (and other countries).

Fig. 3-3 Trend of export of consumer electric machines and appliances (number of units, ¥ million)

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric refrigerators, total	63,681	1,954	68,236	1,826	69,440	2,103	71,670	2826	103,163	3,548
Refrigerators/freezers	32,655	1,085	34,654	955	26,189	1,124	23,785	1319	42,958	1,190
Refrigerators (compression type)	30,368	855	32,706	869	42,843	976	46,352	1501	56,875	2,351
Refrigerators (absorption type)	658	14	876	3	408	2	1,533	7	3,330	7
Other refrigerators	9,052	248	6,604	178	7,658	193	4,767	118	2,490	67
Electric freezers, total	6,887	2,351	7,128	2,261	7,965	2,479	8,978	3200	10,629	3,717
Horizontal freezers	1,475	428	1,578	442	1,649	418	1,698	551	2,330	730
Vertical freezers	5,412	1,923	5,550	1,819	6,316	2,061	7,280	2649	8,299	2,987
Refrigerator parts	-	1,532	-	1,183	-	1,372	-	1109	-	2,264
Dish washing machines	960	35	1,863	58	1,164	37,075	597	13	946	36
Electric washing machines, total	115,468	3,029	111,107	2,724	99,059	2,593	106,451	3357	102,041	2,691
Fully automatic washing machines	70,208	2,179	65,143	1,755	65,311	1,884	66,285	2564	56,632	1,864
Other washing machines, total	45,260	850	45,964	968	33,748	709	40,166	793	45,409	828
Twin-tub washing machines	44,130	846	45,860	968	33,550	707	38,261	754	45,240	827
Other washing machines	1,130	3	104	1	198	2	1,905	39	169	1
Washing machine parts	-	152	-	2,409	-	4,284	-	3496	-	2,850
Clothing driers	6,958	259	4,561	168	5,100	163	7,427	244	5,657	201
Vacuum cleaners (with an electric motor; output, 1500W or less)	273,998	2,515	262,775	2,336	295,134	2,690	279,855	2409	260,023	2,260
Floor polishers	-	-	83	1	60	2	32	2	21	1
Fans, total	786,626	1,387	556,422	1,044	565,974	1,070	387,940	826	447,155	954
Hoods for ventilation/circulation	13,850	167	13,575	122	16,848	207	18,892	271	21,984	324
Parts for fans, etc.	-	24,549	-	29,770	-	37,885	-	42749	-	48,792
Kitchen disposers	2,324	31	33	3	7	3	73	6	12	4
Juicer-mixers	337,845	1,854	324,910	1,701	366,301	1,825	347,699	1788	385,987	2,055
Other food mixers, grinders, etc.	177,280	1,329	242,258	1,597	250,453	1,678	252,354	1706	318,415	2,151
Electric razors, total	975,673	2,341	993,306	2,968	1,041,857	2,950	1,132,694	2930	1,100,516	2,881
Battery razors	921,794	2,214	939,385	2,895	970,605	2,810	-	-	-	-
Electric razors	53,879	127	53,921	73	71,252	139	-	-	-	-
Electric hair clippers	790,773	2,315	706,268	2,040	609,453	1,942	582,160	1704	635,380	1,912
Electric hair removers	23,687	60	722	11	231	0	4,301	13	34,161	104
Razor and hair remover parts	-	4,832	-	5,710	-	5,391	-	6016	-	6,122
Household electric appliances with a motor	493,901	996	340,887	924	-	-	144,868	786	161,772	1,045
Appliances with a motor/battery	465,785	601	305,648	474	131,002	198	-	-	-	-
Other electric appliances with a motor	28,116	396	35,239	451	29,079	378	-	-	-	-
Parts for other electric appliances with a motor	-	2,017	-	2,467	-	2,474	-	2002	-	1,558
Electric water heaters	27,909	641	18,169	461	17,295	425	15,117	298	21,522	504
Electric blankets	11,173	21	2,930	7	2,728	8	1,800	4	-	-
Electric heating appliances, etc.	61,793	291	69,097	442	133,817	1,345	130,028	1042	195,062	2,178
Heat storage radiators	16,046	19	6,705	9	2,874	3	260	4	4,186	65
Other electric heating appliances, etc.	45,747	273	62,392	433	130,943	1,342	129,768	1038	190,876	2,113
Hair driers	229,290	550	371,055	834	242,461	540	228,464	561	315,490	832
Other hairdressing appliances	79,531	646	89,901	478	71,152	352	83,942	291	25,297	204
Hand driers	12,201	47	431	32	412	39	966	51	690	57

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric irons	610,097	151	719,900	1,587	811,470	1,644	807,574	1702	831,439	1,899
Microwave ovens	56,562	1,893	45,450	1,630	70,669	2,329	70,854	2392	72,939	2,744
Coffee-/tea-makers	11,365	216	14,688	338	26,686	619	17,004	392	14,897	299
Toasters	17,915	37	8,506	19	5,405	5	-	-	1,100	2
Electric rice cookers	455,551	3,630	319,905	2,510	354,098	2,671	377,682	3007	379,936	3,329
Other ovens, cookers, etc.	51,678	354	42,035	346	25,755	203	29,940	473	11,996	311
Other electrothermal appliances	521,361	2,396	412,747	2,062	536,087	2,208	441,399	2065	846,752	2,458
Electrothermal resistive elements	-	16,018	-	17,655	-	20,890	-	19234	-	27,536
Parts for electrothermal appliances	-	5,877	-	5,228	-	5,906	-	5732	-	5,686

Source: Same as that for Fig. 3-1.

Fig. 3-4 Trend of import of consumer electric machines and appliances (number of units, ¥ million)

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Electric refrigerators, total	1,923,062	29,371	1,827,166	27,269	2,007,878	31,397	2,141,041	36,058	2,135,305	42,157
Refrigerators/freezers	1,460,641	24,461	1,468,978	23,426	1,581,492	27,134	1,705,834	31,383	1,707,629	37,358
Refrigerators (compression type)	425,613	4,547	338,860	3,606	401,259	3,950	420,112	4,400	414,173	4,497
Refrigerators (absorption type)	36,808	363	19,328	237	25,127	314	15,095	275	13,503	302
Other refrigerators	267,961	1,226	235,018	1,088	103,401	819	124,406	1,213	130,606	1,089
Electric freezers, total	275,855	5,276	273,017	4,868	373,028	6,174	353,449	6,296	331,765	6,578
Horizontal freezers	90,176	1,578	74,411	1,383	123,206	2,202	99,439	1,868	112,001	2,120
Vertical freezers (900L or less)	-	-	-	-	-	-	-	-	219,764	4,458
Vertical freezers (400L or less)	185,679	3,698	198,606	3,485	249,822	3,972	254,010	4,427	-	-
Dish washing machines	22,609	947	109,128	2,919	155,040	3,663	128,545	3,508	83,936	2,336
Electric washing machines, total	1,506,752	18,775	1,922,974	25,237	2,630,236	38,908	3,071,522	48,856	3,134,450	53,648
Fully automatic washing machines	993,122	14,118	1,541,143	21,459	2,339,810	36,154	2,815,456	46,357	2,906,627	51,321
Other washing machines, total	513,630	4,657	381,831	3,779	290,426	2,754	256,066	2,499	227,823	2,327
Twin-tub washing machines	379,821	4,174	341,822	3,626	259,667	2,607	237,826	2,431	209,132	2,276
Other washing machines	133,809	483	40,009	153	30,759	147	18,240	68	18,691	51
Washing machine parts	-	4,376	-	5,281	-	5,720	-	5,607	-	9,399
Clothing driers	5,566	204	14,994	295	11,067	201	7,709	155	3,249	160
Vacuum cleaners (with an electric motor; output, 1500W or less)	6,580,082	16,117	7,190,930	19,129	6,813,852	20,596	7,316,534	28,910	7,813,391	35,795
Vacuum cleaners (battery-powered)	2,480,541	3,794	2,328,894	3,860	1,550,707	2,220	1,967,692	3,465	1,971,150	3,737
Vacuum cleaners (electric)	4,099,541	12,323	4,862,036	15,268	5,263,145	18,376	5,348,842	25,445	5,842,241	32,057
Floor polishers	11,457	48	25,809	63	47,711	99	46,720	106	44,437	77
Fans, total	14,193,862	20,458	13,761,082	18,923	11,897,274	15,064	13,971,965	17,452	13,330,862	19,418
Fans	9,237,553	15,563	8,640,012	13,962	7,391,498	10,607	8,413,133	12,486	9,567,564	14,389
Ventilating fans	-	-	-	-	-	-	-	-	896,324	1,388
Other fans	4,956,309	4,895	5,121,070	4,961	4,505,776	4,457	5,558,832	4,966	2,866,974	3,641
Hoods for ventilation/circulation	6,717	210	105,632	896	136,224	1,533	139,527	2,010	116,423	1,917
Parts for fans, etc.	-	2,811	-	3,439	-	4,571	-	5,933	-	6,844
Kitchen disposers	23,486	320	32,382	361	35,186	386	27,789	277	32,815	365

Product	2002		2003		2004		2005		2006	
	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount	Quantity	Amount
Mixers, juicers, etc. for food	3,649,364	5,781	4,677,124	6,443	4,871,717	6,777	3,920,493	6,147	4,277,194	6,816
Electric razors, total	8,272,630	16,475	8,644,022	16,479	8,311,270	13,040	8,950,137	13,122	9,961,760	15,311
Battery razors	7,922,073	16,053	8,273,212	16,011	-	-	-	-	-	-
Electric razors	350,557	422	370,810	468	-	-	-	-	-	-
Electric hair clippers	665,686	906	1,066,604	1,296	1,074,731	1,254	1,284,430	1,336	1,671,011	1,731
Electric hair removers	99,498	466	1,201,743	2,693	784,635	1,711	881,619	1,700	716,020	1,921
Razor and hair remover parts	-	4,610	-	5,025	-	5,265	-	4,365	-	4,478
Other electric appliances with a motor	22,315,369	20,594	24,237,832	20,267	13,508,407	17,639	11,897,504	18,076	15,206,723	27,079
Parts for electric appliances with a motor	-	4,318	-	4,454	-	6,776	-	8,013	-	8,512
Electric hot-water heaters	753,281	2,057	1,101,421	2,858	1,352,442	4,420	1,491,987	4,160	1,479,021	3,265
Electric blankets	729,872	949	1,163,050	1,375	1,314,710	1,374	1,718,179	2,063	2,559,777	3,428
Electric heating appliances, etc.	9,413,696	32,031	10,669,499	33,258	7,489,181	23,648	7,436,379	25,509	9,281,512	34,606
Heat storage radiators	433,244	4,540	248,707	3,819	192,881	3,368	276,110	4,702	427,222	7,120
Other electric heating appliances, etc.	8,980,452	27,491	10,420,792	29,440	7,296,300	20,280	7,160,269	20,807	8,854,290	27,487
Electrothermal hairdressing appliances, total	12,063,731	12,943	12,058,061	12,473	12,560,022	12,093	13,954,524	13,180	14,948,473	15,252
Hair driers	8,247,351	8,865	8,194,507	8,074	7,817,177	7,240	7,876,747	7,451	7,771,250	8,207
Other hairdressing appliances	3,816,380	4,078	3,863,554	4,398	4,742,845	4,853	6,077,777	5,729	7,177,223	7,045
Hand driers	61,107	36	6,308	33	38,819	186	48,425	264	113,027	396
Electric irons	2,548,675	4,049	2,495,377	3,625	3,009,152	4,187	3,506,116	4,684	2,964,848	4,087
Microwave ovens	1,713,622	11,239	2,346,929	15,536	2,606,131	18,631	3,388,159	26,060	3,470,533	30,078
Mono-function microwave ovens	1,160,857	6,275	1,174,668	5,229	1,178,207	5,813	976,134	4,151	963,610	4,283
Other microwave ovens	552,765	4,964	1,172,261	10,308	1,427,924	12,819	2,412,025	21,909	2,506,923	25,796
Coffee-/tea-makers	2,298,073	3,965	2,215,260	3,947	1,851,678	3,192	2,171,207	3,747	2,168,917	4,414
Toasters	4,313,976	5,021	4,212,310	4,555	4,089,985	4,547	4,047,861	4,813	4,132,045	5,400
Other ovens, cookers, etc.	2,830,635	7,885	3,803,862	9,225	3,820,058	8,579	4,339,069	10,151	4,098,652	11,868
Other electrothermal appliances	-	-	-	-	-	-	-	-	-	-
Electric rice cookers	2,792,643	10,485	2,914,054	9,824	2,847,190	9,037	3,049,878	9,567	2,831,444	9,404
Other electrothermal appliances	8,676,331	11,376	8,083,664	10,692	9,008,152	11,943	11,377,250	15,381	14,157,555	20,201
Electrothermal resistive elements	-	8,495	-	9,789	-	10,996	-	11,273	-	13,122
Parts for electrothermal appliances	-	8,247	-	9,025	-	10,380	-	12,428	-	15,912
Air filters or air cleaners (excluding battery-powered ones)	-	-	-	-	17,563,151	18,226	11,538,518	23,995	11,299,112	24,431

Source: Same as that for Fig. 3-1.

The import of consumer electric machines and appliances continued to show an upward trend. The import in 2006 was ¥484.7 billion or an increase of about 20% over the previous year when the figure stood at ¥406.7 billion. According to Figure 3-4 showing the situation of import by product category, the amount of import rose for many products. Specifically, the import of electric washing machines, microwave ovens, and vacuum cleaners were ¥53.6 billion, ¥30.0 billion, and ¥35.8 billion, respectively. Taking washing machines as an example for the situation of "reimport", the domestic production of washing machines in 2006 was 145,846 units, of which the figure for washing and drying machines was 100,409 units. As the production in 2005 was 89,361 units, the increase in the domestic production in 2006 was mostly as a result of the increase in that of washing

and drying machines. On the other hand, the import of electric washing machines in 2006 was 3,131,552 units, of which 2,906,627 units were fully automatic washing machines. In 2005, the import of electric washing machines was 3,071,552 units, including 2,815,456 units of fully automatic ones. From these figures, it can clearly be seen that the imports were mostly fully automatic washing machines and that there has been the deepening of the division of supply sources into two categories: the import of widely used products, such as fully automatic washing machines, and the domestic production of high value added products, such as washing and drying machines.

3.1.2. Future trend

As discussed so far, demand for consumer electric machines and appliances is expected to grow due mainly to anticipated business recovery and possible replacement demand because ten years passed after the raise in the consumption tax. But considering that the "reimport" trend is not likely to change and that the domestic market has matured, the domestic production is not expected to expand greatly. Thus it is considered that the trend of the production, shipment, etc. of consumer electric machines and appliances will be similar to that in the past.

Meanwhile, the issue that has become more serious recently is that of product safety. There occurred several cases where products sold a few decades ago caused problems and had to be recalled, such as the recall of FF-type heating machines by Matsushita Electric Industrial Co. and that of fans by Sanyo Electric Co. These events have been reported by the mass media widely and have become social problems. Many of these cases are concerned with products introduced two to three decades ago and show that manufacturers have to bear corporate responsibility for a long time. In general, manufacturers of machine products have established the system of securing repair parts for ten years or so after the manufacture is ended. But the consumer increasingly tends to buy a new product instead of repairing an old one in recent years, and it is hard to say that manufacturers have recognized the problems as those mentioned above sufficiently. These events have made it necessary to review the concept of product lifecycles and have revealed the need on the part of manufacturers to build the system of product development and safety on the assumption that their products are used for over 30 years. Moreover, manufacturers have not been able to examine all of the situations about very old products. There is still the possibility that some defective products remain unrecalled, and the costs for recall have probably added up. In the future, manufacturers will need to create some system for "traceability," too, and should enhance their awareness of product development, safety, maintenance, repair and other related problems. The costs associated with these activities will increase more, and manufacturers are required to construct a system for these problems, including corporate social responsibility (CSR), urgently. The recall problems also gave manufacturers the opportunity to basically reconsider their stance on product safety.

3.2 Consumer electronic machines and appliances (including cameras)

3.2.1. Supply and demand trend

(1) Outline

The domestic production of consumer electronic appliances in 2006 increased because demand for consumer electronic digital audio-visual (AV) appliances, mainly flat-screen TVs was went up globally, though the price of these products dropped. For consumer electronic digital AV appliances, the production of such video appliances as liquid crystal (or liquid crystal display/LCD) TVs, plasma TVs and digital cameras was high, while that of traditional audio apparatuses continued to be low. The export declined mainly because the overseas production of audio apparatuses grew.

(2) Production (Fig. 3-6)

The domestic production of consumer electronic appliances in 2006 was ¥2,781.3 billion or an increase of +8.7%, continuing to register a growth as in 2005. The factors behind this is the fact that the output of liquid crystal TVs (up +33.4% y/y), plasma TVs (up +11.5% y/y) and digital cameras (up +12.4% y/y) continued to increase, while that of digital versatile disc (DVD)-videos (up +7.3% y/y) turned into a positive growth. The primary cause of continued expansion in domestic production is that global demand for digital AV appliances such as flat-screen TVs with a high value added and a relatively high ratio of domestic production continued a favorable growth.

Figure 3-5 shows the ratios of domestic and overseas production of main consumer electronic appliances by Japanese manufacturers (estimates for 2006). Liquid crystal TVs, plasma TVs and other flat-screen TVs, DVD recorders with a hard disc drive (HDD) and other DVD recorders, car navigation systems and digital cameras still had a high ratio of domestic production, though shifts to overseas manufacture, mainly in China, increased. The domestic production of these products rises not only by increasing domestic demand but also by growing demand abroad.

Fig. 3-5 Ratios of domestic and overseas production of consumer electronic appliances by Japanese manufacturers (estimates for 2006)

(1,000 units)

	Total production by Japanese manufacturers						
		(of which domestic production)		(of which overseas production)		(of which production in China)	
			Ratio		Ratio		Ratio
Color TVs	62,273	7,228	11.6%	55,045	88.4%	6,030	11.0%
Flat-screen TVs	23,500	7,228	30.8%	16,272	69.2%	3,365	20.7%
DVD recorders & players	40,620	1,250	3.1%	39,370	96.9%	28,060	71.3%
Car audio systems	52,240	3,620	6.9%	48,620	93.1%	17,700	36.4%
Car navigation systems	6,050	5,680	93.9%	370	6.1%	200	54.1%
Digital cameras	63,660	31,190	49.0%	32,470	51.0%	22,320	68.7%

Source: Prepared by the authors based on the Japan Electronics and Information Technology Industries Association (JEITA), "Situation of Global Production of Main Electronic Appliances, 2005-2007," March 2007.

By product category, the production of liquid crystal TVs amounted to ¥733.5 billion, attaining

a higher growth rate of +33.4% over the previous year than any other consumer electronic appliances. The production of plasma TVs was ¥192.9 billion or a two-digit increase of +11.5% y/y, but this was far lower growth rate as compared with that of liquid crystal TVs because of falling prices resulting from competition with liquid crystal TVs. That of video cameras was ¥391.8 billion, suffering a negative growth of -10.8% y/y. DVD-videos turned into a positive growth of +7.3% y/y with ¥101.1 billion, mainly because the unit price went up by introducing models with a built-in HDD, those supporting digital terrestrial broadcasting and other new products. Digital cameras also enjoyed a positive growth: its output was ¥731.0 billion, up +12.4% y/y. As Fig.3-5 shows, car navigation systems are one of the products that are mainly made in Japan; the production of these systems was ¥475.8 billion or a decline of -0.3% y/y, the first negative figure after 1996 when the statistics were started to be collected. On the other hand, in the area of audio apparatuses that were mostly made overseas, while car audio systems was ¥114.9 billion, a slight increase of +0.1% y/y, home audio systems (¥7.2 billion, down -44.5% y/y) and portable audio systems (¥3.2 billion, down -80.6% y/y) suffered a lower production in Japan; the domestic production of these systems became very small due to further increase in overseas production.

Fig. 3-6 Trend of production of consumer electronic machines and appliances (in terms of value)

(¥ million)

Production	2004	2005	2006	Growth rate, 2005-2006	Estimate for 2007	Growth rate, 2006-2007
Consumer electronic appliances	2,488,012	2,559,238	2,781,325	8.7%	2,843,690	2.2%
TVs (Note 1)	554,239	-	-	-	-	-
Plasma TVs (Note 2)	-	173,103	192,961	11.5%	191,570	-0.7%
Liquid crystal TVs (Note 3)	373,769	549,670	733,508	33.4%	873,310	19.1%
Other color TVs (Note 4)	-	-	-	-	-	-
DVD-videos	132,793	94,176	101,068	7.3%	85,610	-15.3%
Video cameras (excluding those for broadcasting)	413,529	439,064	391,774	-10.8%	365,950	-6.6%
Digital cameras (Note 5)	712,417	650,386	730,988	12.4%	693,960	-5.1%
Single-lens reflex cameras (changeable lenses)	-	114,704	127,028	10.7%	-	-
Compact-type digital cameras	-	535,682	603,960	12.7%	-	-
Portable audio systems (Note 6)	43,385	16,439	3,181	-80.6%	1,690	-46.9%
Home audio systems (Note 7)	-	12,912	7,161	-44.5%	3,640	-49.2%
Car audio systems (Note 8)	135,436	114,760	114,911	0.1%	113,590	-1.1%
Car navigation systems	415,633	477,514	475,847	-0.3%	499,540	5.0%
Hearing aids	15,887	15,936	14,823	-7.0%	-	-

Notes: 1. This category was subdivided in 2005 and after.
2. This category was separated from “Color receiving apparatuses (including PDP receiving apparatuses)” and stated independently in 2005 and after.
3. This category was renamed in 2005 and after.
4. This category was established in 2005 by separating it from “Plasma TVs.”
5. The categories “Single-lens reflex cameras (changeable lenses)” and “Compact-type digital cameras” were newly established in 2005 as the breakdowns of “Digital cameras.”
6. This category was renamed in 2005.
7. This category was newly established in 2005 by uniting “CD/MD systems with a radio,” “Stereo sets” and “Digital audio disc players.”
8. This category was newly established in 2005 by uniting “Stereos” and “Digital audio disc players.”

Sources: Results in 2004-2006, the Research and Statistics Department, Industrial Policy Bureau, Ministry of Economy, Trade and Industry, “Annual Report of Machinery Statistics;” estimates for 2007, the JEITA, “Outlook of Production of the Electronic Industries in 2007,” December 2006.

The estimated production of consumer electronic appliances in 2007 is ¥2,843.7 billion or an increase of +2.2% over the previous year. Flat-screen TVs have come into wider use at the domestic market and the new establishment and reinforcement of the production capacity of flat-screen TVs have been announced in succession; thus the domestic production will continue growing. In addition, the service area of digital terrestrial broadcasting has been extended, and analog broadcasting will be discontinued in 2011, which will boost replacement demand for DVD recorders and other apparatuses for digital broadcasting. This will also contribute to an increase in the domestic production.

(3) Export and import (Figs. 3-7, 3-8)

The export of consumer electronic appliances in 2006 was ¥1,644.4 billion, which was a negative growth of -2.6% from the previous year. That of video appliances, which accounted for over 90% of the export of consumer electronic appliances, was ¥1,566.1 billion or a fall of -1.2% y/y. The export of still video cameras (e.g., digital cameras), which amounted to about 80% of that of video appliances, was ¥1,211.3 billion, showing a slight growth of +0.3% y/y. The reason that the export, including that of liquid crystal TVs whose domestic production was high, decreased is that shifts to overseas production were reinforced. The export of audio appliances was ¥78.4 billion or a fall of -24.6% y/y, continuing to show a downward trend. Because audio appliances were almost all made overseas, they made no contribution to export.

The import of consumer electronic appliances in 2006 stood at ¥701.0 billion, a decline of -10.3% from the previous year. Video appliances registered ¥396.1 billion or a fall of -14.3% y/y, while the figures for audio appliances were ¥304.9 billion, down -4.4% y/y. By region, because production was shifted mainly to China and the Southeast Asia, the import from Asia accounted for 97% for video appliances and 88% for audio appliances.

Fig. 3-7 Trend of export of consumer electronic appliances (in terms of value)

(¥ million)

Export	2004	2005	2006	Growth rate, 2005-2006
Consumer electronic appliances	1,787,720	1,688,637	1,644,422	-2.6%
Video appliances	1,656,578	1,584,659	1,566,066	-1.2%
Color TV receiving apparatuses	172,190	149,095	126,777	-15.0%
Color TVs (including chassis and kits but excluding liquid crystal TVs, etc.)	6,950	2,752	2,884	4.8%
Liquid crystal TVs, etc. (color)	165,240	146,343	123,893	-15.3%
Video recording and playback appliances	94,558	62,773	59,941	-4.5%
Video recording and playback appliances (VTRs)	41,109	38,006	38,021	0.0%
VTRs with camera	30,656	27,736	38,801	39.9%
Still video cameras/other video and digital cameras	1,191,132	1,207,735	1,211,335	0.3%
Video projectors	168,042	137,320	129,214	-5.9%
Audio appliances	131,142	103,977	78,356	-24.6%
Tape recorders (including stereo sets)	14,738	11,019	7,292	-33.8%
Tape recorders with a radio (including stereo sets)	10,061	7,372	5,267	-28.6%
Sets	10,061	7,372	5,267	-28.6%
Other tape recorders (including headphone stereos, etc.)	3,734	2,814	1,783	-36.6%
Those with recording function	2,549	1,670	923	-44.8%
Cassette type	1,980	1,451	794	-45.2%
Stereo components	52,674	31,465	24,018	-23.7%
Other audio appliances	63,730	61,493	47,045	-23.5%
General radios	2,129	1,665	2,223	33.5%
For automobile	42,611	45,015	35,435	-21.3%
Car stereos (with a radio)	29,894	36,239	26,402	-27.1%
Car radios	10,606	5,776	6,544	13.3%
Others	18,990	14,813	9,388	-36.6%
Hearing aids	182	177	201	13.2%

Source: Prepared by the authors based on the Ministry of Finance, “International Trade Statistics.”

Fig. 3-8 Trend of import of consumer electronic appliances (in terms of value)

(¥ million)

Import	2004	2005	2006	Growth rate, 2005-2006
Consumer electronic appliances	676,736	781,157	700,992	-10.3%
Video appliances	439,023	462,253	396,133	-14.3%
TV receiving apparatuses	116,302	156,261	112,773	-27.8%
Color TVs	116,191	156,195	112,754	-27.8%
Liquid crystal TVs	0	69,362	70,470	1.6%
Plasma TVs	0	2,158	1,918	-11.1%
Video recording and playback appliances	142,087	157,884	128,886	-18.4%
Video recording and playback appliances (VTRs)	15,825	8,426	4,155	-50.7%
Still video cameras/other video and digital cameras	170,716	135,785	136,814	0.8%
Video projectors	9,918	12,323	17,660	43.3%
Audio appliances	237,713	318,905	304,858	-4.4%
Tape recorders	86,277	103,305	81,431	-21.2%
Tape recorders with a radio (including headphone stereos, stereo sets, etc.)	39,398	62,596	47,239	-24.5%
Other tape recorders (including headphone stereos, etc.)	46,879	40,709	34,192	-16.0%
Those with recording function	3,048	2,364	2,038	-13.8%
Record decks	399	354	413	16.8%
Other audio appliances	107,159	171,363	174,952	2.1%
General radios	6,350	10,167	8,331	-18.1%
For automobile	58,536	67,033	77,916	16.2%
Car stereos (with a radio)	51,975	58,360	71,710	22.9%
Car radios	6,561	8,673	6,206	-28.4%
Others	42,273	94,163	88,705	-5.8%
Hearing aids	8,074	8,653	9,614	11.1%

Source: Prepared by the authors based on the Ministry of Finance, “International Trade Statistics.”

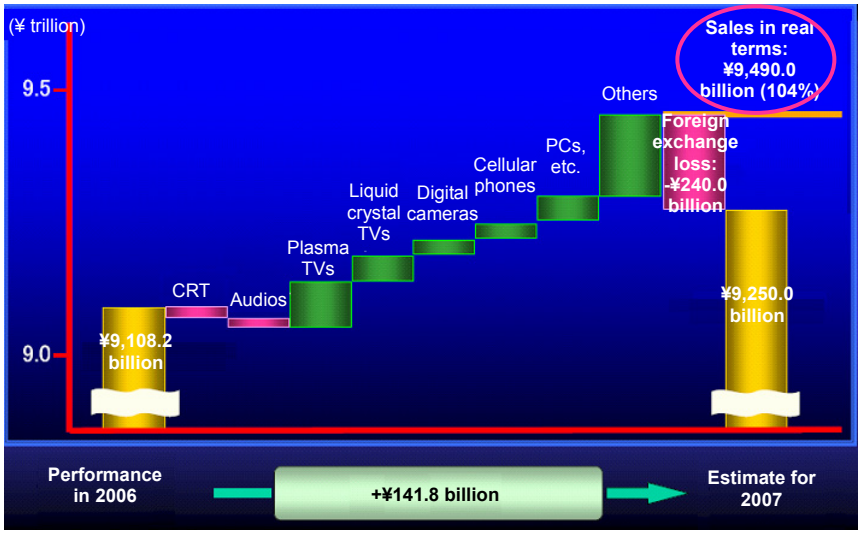
3.2.2. Results of operations and the trend of the consumer electronic appliance industry

(1) Trend of management

Figure 3-13 shows the total amount of sales and operating profit (on a consolidated basis) by segment or product category of the seven major manufacturers of consumer electronic appliances.

The sales of the digital AVC network segment of Matsushita Electric Industrial Co. in 2006 were ¥4,047.2 billion or an increase of +15% over the previous year. Of this segment, the video and audio appliance section achieved a growth of +6% y/y due to increased sales of plasma TVs, digital cameras and other digital AV products (Fig. 3-9). The company's sales by product category in 2006 were ¥122.5 billion (down -26% y/y) for videos, ¥200.7 billion (up +55% y/y) for digital cameras, ¥547.8 billion (up +30% y/y) for plasma TVs, ¥220.3 billion (up +25% y/y) for liquid crystal TVs and ¥113.5 billion (up +4% y/y) for DVD recorders.

Fig. 3-9 Analysis of sales by product category of Matsushita Electric Industrial (2006 vs. 2007)



Source: Matsushita Electric Industrial Co., April 27, 2007.

The electronics segment of Sony Corp. achieved sales of ¥6,050.5 billion or a growth of +16.9% over the previous year. By product category, liquid crystal TVs that sold well both in Japan and abroad, notebook computers that enjoyed good sales in foreign markets and digital cameras that registered greater domestic and overseas sales served as a propelling force for the increased sales. But the company's sales of cathode-ray tube (CRT) TVs declined because consumer demand shifted to flat-screen TVs.

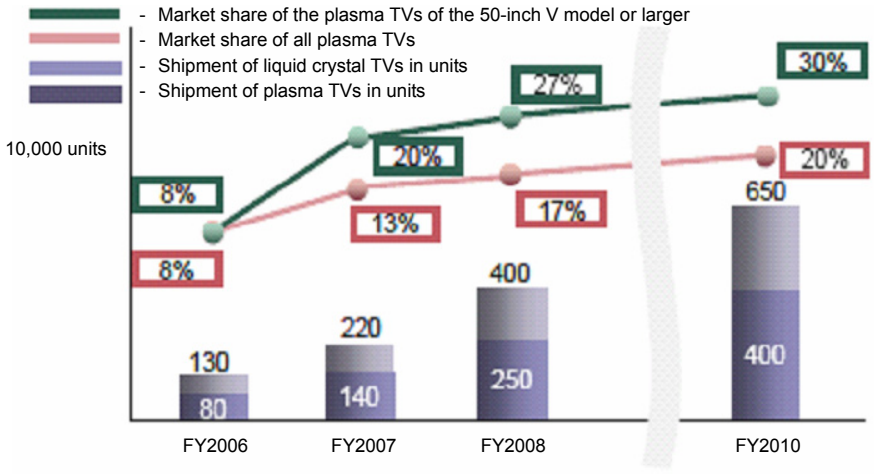
Fig. 3-10 Sales and shipment by product category of Sony (on a consolidated basis; 10,000 units)

	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006		Estimate for FY2007
							January 2007	Year-end performance	
Portable audios with built-in HDD and flash memory	-	-	-	-	85	450	550	450	500
Video cameras	550	540	575	660	735	760	770	745	750
Digital cameras	260	340	560	1,000	1,400	1,350	1,700	1,700	2,000
DVD video players	400	500	700	850	930	800	770	790	700
DVD recorders	-	-	2	65	170	200	180	185	170
LCD TVs	-	-	-	43	100	280	600	630	1,000
Liquid crystal rear projection TVs	-	-	-	25	65	105	110	110	70
Cathode-ray tube TVs	1,130	1,000	1,000	940	950	680	470	470	280
PC "VAIO"	250	350	310	320	330	370	420	400	460
Overseas	110	180	180	210	230	270	310	310	-
Domestic	140	170	130	110	100	100	110	90	-

Source: Sony Corp., May 16, 2007.

The sales of the digital media and consumer appliance segment of Hitachi, Ltd. in 2006 increased by +15% over the previous year to ¥1,506.1 billion. The factor attributed to this is the greater sales of plasma TVs and other flat-screen TVs, DVD cameras and high value added white goods. The company's shipment of flat-screen TVs was 770,000 units in 2006 and is estimated at 1.4 million units in 2007 for plasma TVs, and was 510,000 units in 2006 and is estimated at 800,000 units in 2007 for liquid crystal TVs. But the operating profit suffered a higher deficit of -¥58.4 billion from the previous year. The reason for this includes the effects of falling prices of flat-screen TVs, DVD recorders, etc.

Fig. 3-11 Hitachi's sales goals of flat-screen TVs



Source: Hitachi, Ltd., May 28, 2007.

In the briefing session about "Management of Cooperative Value Creation and Profit" on May 28, 2007, Hitachi reported the progress of improvement in its flat-screen TV business. According to the report, the company intends to stabilize revenue from its flat-screen TV segment by building up an optimum mix of products and regions, laying emphasis on plasma TVs. More specifically, the company aims at securing a 20% share of the global plasma TV market by 2010, mainly through the creation of a global operation system, where concentrated investment in large-screen products of 50-inch or larger models and the production base of panels will be located in Japan, while assembling bases will be placed in five regions in the world (Fig. 3-11).

The AV/communications equipment segment of Sharp Corp. achieved a substantial growth in sales thanks to the good condition of large-sized liquid crystal TVs: ¥1,381.1 billion or up +26.6% over the previous year. The operating profit also increased by 24.1% year on year on year to ¥44.4 billion. In the liquid crystal TV business, the company plans to increase its sales from 6 million units in 2006 (estimate) to 9 million units (3.2 million units in Japan; 5.8 million units overseas) in 2007.

Fig. 3-12 lists the actual and planned shipment of main digital camera manufacturers in Japan and abroad. This figure shows that all manufacturers plan a high production increase in anticipation of greater demand. In addition, Japanese manufacturers made an upward revision of their shipment plan. For example, Canon Inc. increased its planned shipment from 24 million units to 25 million units, and Sony, from 20 million units to 22 million units. Demand is expected to continue increasing for some time because of new demand in the emerging market and replacement demand in the matured market. However, if competition among manufacturers is intensified and the price falls continue long, gaps in earnings among them are highly likely to widen in the competition for greater market shares.

Fig. 3-12 Actual and planned shipment of main digital camera manufacturers in Japan and abroad

(10,000 units)

Year / Manufacturer	2004		2005		2006		2007 (planned)	
Canon	1,400	(130)	1,900	(190)	2,110	(250)	2,400	(300)
Sony Ericson	1,400		1,350		1,740	(40)	2,000	(unpublished)
Sanyo	1,100		1,150		1,000		1,300	
Olympus	890	(10)	840	(25)	960	(25)	1,180	(50)
Nikon	661	(105)	845	(134)	801	(209)	1,030	(260)
Panasonic Mobile	200		400		700		900	
Fuji Film	610		620		660		800 or more	
Casio	370		460		600		750	
Pentax	210	(6.6)	280	(12)	300	(30)	300	(50)
Total	**5,980**		**6,477**		**7,898**		**9,361**	

Note: Figures in parentheses are those for single-lens digital cameras included in those for the total digital cameras; figures for Canon are on a calendar year basis.

Source: "The Handotai Sangyo Shimbun (Semiconductor Industry Newspaper)," November 2, 2007.

Fig. 3-13 Consolidated settlement of accounts of seven consumer electronic appliance manufacturers (actual and estimated figures) (as of the most recent announcement)

(On a consolidated basis, ¥100 million; fractions less than ¥100 million rounded off)

	Actual figures for 2004		Actual figures for 2005		Estimated figures for 2006	
	Sales	Operating profit	Sales	Operating profit	Sales	Operating profit
Matsushita Electric Industrial	Note: Internal sales between segments are included.					
AVC Networks	39,861	1,909	40,472	2,196	41,800	2,500
Panasonic AVC Networks	15,181	576	18,287	909	19,400	1,160
Sony	Note: Internal sales between segments are included.					
Electronics	51,764	69	60,505	1,567	-	-
Videos: sales to outside customers	10,213	-	11,431	-	-	-
TVs: sales to outside customers	9,278	-	12,270	-	-	-
Mitsubishi Electric	Note: Internal sales between segments are included.					
Household electric appliances	8,964	149	9,219	366	9,500	320
Hitachi	Note: Internal sales between segments are included.					
Digital media/consumer appliances	13,057	-358	15,061	-584	16,300	-150
Toshiba	Note: Internal sales between segments are included.					
Digital products	25,365	209	28,055	158	29,700	350
Sanyo Electric	Note: Internal sales between segments are included.					
Consumer segment	11,544	-99	10,177	-17	-	-
AV/information and communications equipment	8,945	106	7,635	22	-	-
Liquid crystal projectors: sales by product category	542	-	558	-	585	-
TVs: sales by product category	1,102	-	1,050	-	954	-
Digital cameras: sales by product category	1,853	-	1,265	-	1,741	-
Sharp	Note: Internal sales between segments are included.					
Electronics appliances	17,428	623	20,675	817	23,090	895
AV/communications equipment	-	-	13,815	444	16,100	520

Note: Sanyo Electric: internal sales excluded for the sales figures for liquid crystal projectors, TVs and digital cameras.
Source: Prepared by the authors based on the quick report, etc. on the website of the manufacturers.

(2) Technological innovation and the business environment

a) Ranking of shares of the world and Japanese market by product category

Figure 3-14 is excerpts from the "Survey on the Market Shares of Main Products and Services" for 2006 conducted by Nihon Keizai Shimbun, Inc.

In the ranking of shares of the world market, Sony (+2.9 points) won the first place in liquid crystal TVs for the first time. Samsung Electronics (+4.7 points) enjoying increased sales in North America and Europe ranked second. Sharp (-6.1 points) was at the top in 2005 and strengthened its sales activities overseas, but the growth of the Sony-Samsung alliance, which founded a joint venture for panels by their joint investment, surpassed. In plasma TVs, Matsushita Electric (+3.8 points) reinforced its dominant position. In DVD recording and playback machines, the share of Matsushita (-5.7 points), the leader, was reduced as a result of the offensive of late comer manufacturers. Toshiba Corp. (+3.1 points), which ranked fourth in 2005, rose to the second place. Japanese manufacturers led in digital cameras: Canon won the first place and Sony took second. But Samsung Techwin, a late comer, went on the offensive, intensifying competition for a greater share among manufacturers. Japanese manufacturers have overwhelming market shares in video cameras:

Sony (+1.2 points) and other three Japanese companies took the first four places.

For the ranking of shares of the Japanese market, Sharp (-3.3 points) maintained its hold on first place with a far large share but its share was cut. The second-ranking Sony (+0.7 points) and the third-ranking Matsushita Electric (+0.8 points) are working to undermine Sharp's commanding lead. In plasma TVs, Matsushita (+1.3 points) held an established position as the leader. The second-ranking Hitachi (+3.6 points) increased its share, whereas the share of the third-ranking Pioneer Electronics Corp. (-3.6 points) was reduced, overwhelmed by the sales blitz of competitors. Competition for a greater market share was fierce in digital cameras, and the ranking of the manufacturers was changed from that in 2005 except Canon (+1.5 points) that held the top position.

Fig. 3-14 Ranking of market shares by product category (2006)

[Ranking of shares of the world market]

	Video cameras (In terms of shipment volume)		DVD recording/playback machines (In terms of shipment volume)		Digital cameras (In terms of shipment volume)	
	Manufacturer	Share	Manufacturer	Share	Manufacturer	Share
1st	Sony	40.2	Matsushita	19.0	Canon	21.5
2nd	Victor of Japan	20.9	Toshiba	13.2	Sony	17.3
3rd	Matsushita	17.8	Sony	12.0	Eastman Kodak	10.7
4th	Canon	13.1	Samsung Electronics	8.1	Olympus	9.3
5th	Samsung Electronics	6.0	Phillips	7.8	Samsung Techwin	8.6

	PDP TVs (In terms of shipment volume)		Liquid crystal TVs (In terms of shipment volume)	
	Manufacturer	Share	Manufacturer	Share
1st	Matsushita	29.5	Sony	16.2
2nd	LG Electronics	15.8	Samsung Electronics	15.1
3rd	Samsung Electronics	14.1	Sharp	11.5
4th	Phillips	9.8	Phillips	10.8
5th	Hitachi	7.9	LG Electronics	6.8

[Ranking of shares of the Japanese market]

	Video cameras (In terms of shipment volume)		DVD recording/playback machines (In terms of shipment volume)		Digital cameras (In terms of shipment volume)	
	Manufacturer	Share	Manufacturer	Share	Manufacturer	Share
1st	Sony	31.8	Matsushita	28.0	Canon	21.8
2nd	Victor of Japan	21.3	Sharp	20.1	Matsushita	15.1
3rd	Matsushita	21.2	Sony	18.0	Fiji Photo Film	14.8
4th	Canon	12.9	Toshiba	17.5	Casio Computer	13.7
5th	Hitachi	11.2	Pioneer	8.0	Sony	13.6

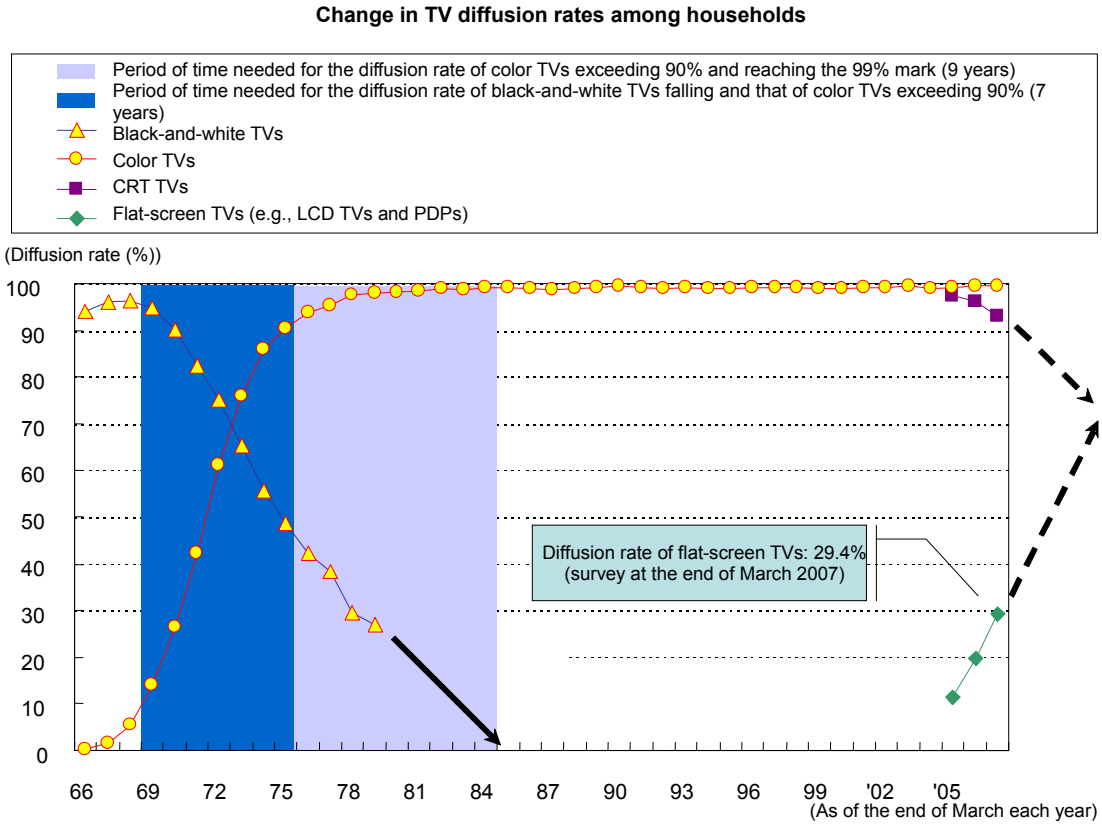
	Portable music players (In terms of shipment volume)		PDP TVs (In terms of shipment volume)		Liquid crystal TVs (In terms of shipment volume)	
	Manufacturer	Share	Manufacturer	Share	Manufacturer	Share
1st	Apple Japan	49.4	Matsushita	66.5	Sharp	43.9
2nd	Sony	20.7	Hitachi	28.5	Sony	18.0
3rd	Matsushita	8.6	Pioneer	5.0	Matsushita	17.0
4th					Toshiba	8.5
5th					Victor of Japan	4.3

Source: Prepared by the authors based on "The Nihon Keizai Shimbun," August 2, 2007.

b) A Flat-screen TVs: Demand forecast from the consumer side

This section discusses the demand forecast of flat-screen TVs, including liquid crystal TVs, from the consumer side (especially the diffusion rate) using the data of the "Consumption Trend Survey" conducted by the Cabinet Office. The survey published the diffusion rate (for general households) obtained from the outcome of the survey in 2005. The data published by the Cabinet Office on April 17, 2007 revealed the tendency of rapid diffusion of flat-screen TVs among households. The diffusion rate of flat-screen TVs, such as liquid crystal TVs and plasma TVs, as of March 2007 was 29.4%, an increase of 9.6 points over the figure as of March 2006, i.e., 19.8%. By contrast, the ownership of CRT TVs declined by 3.3 points to 92.9% (Fig. 3-15). The figure for flat-screen TVs in March 2007 is on a similar level to that as of February 1970, five years after the diffusion rate of color TVs was included in the statistics, which was 26.3%. The diffusion rate of color TVs rapidly rose to the 90% mark in the subsequent five years (90.3% as of February 1975), while the ownership of black-and-white TVs greatly fell to less than 50% (48.7% as of February 1975). During the three years after color TV statistics started to be collected, the diffusion rate of black-and-white TVs increased, too. Therefore, it is considered that color TVs were in the new demand period for the three years after their statistics were begun to be prepared. Then in the fourth year, the diffusion rate of color TVs started to rise, whereas that of black-and-white TVs began to drop. This suggests that color TVs entered the period of switchover demand in the fourth year. This roughly agrees with E.M. Rogers' "16% diffusion rate theory."

Fig. 3-15 Change in TV diffusion rates



Source: Prepared by the authors based on the Cabinet Office, "Consumption Trend Survey."

Considering the situation of switchover from black-and-white TVs to color TVs in the past, it can be supposed that the change from CRT TVs into flat-screen TVs entered the phase of "switchover demand" in the fourth year. The period of time needed for changeover from black-and-white TVs to color TVs was about seven years, and the change from CRT TVs into flat-screen TVs will also have a replacement period of seven years or so because the broadcasting system will be switched to digital terrestrial one soon. The domestic market for flat-screen TVs thus far may be regarded as the one at the stage of new demand when a flat-screen TV was bought in addition to the existing CRT TV in the general households. Then will come the stage of switchover demand, or it may be said that we have already entered this phase. In view of the switchover from black-and-white TVs to color TVs, switchover demand for flat-screen TVs is expected to rapidly grow for seven years until 2012 supposing 2005 to be the first year.

When the switchover demand from CRT TVs to flat-screen TVs takes a round, the "replacement demand" from a flat-screen TV to a new flat-screen TV will gradually begin to increase. According to the "Survey on the Consumers' Considerations and Years for Replacement of New Digital Household Electric Appliances" by Nihon Keizai Shimbun, Inc., "Lower prices" was the point the respondents regarded as the most important when buying a flat-screen TV (mentioned by 56.0% of them), surpassing "High performance" and "Energy-saving economy" (Fig. 3-16).

Fig. 3-16 Years for replacement of digital household electric appliances and main important considerations at the same time (Multiple answers allowed; %)

Product category	Years for replacement (average years)	User friendliness	Energy-saving economy	High performance	Lower prices	Good design
Flat-screen TVs	7.6	38.9	45.7	52.8	56.0	30.7
Video cameras	5.8	64.4	8.7	53.1	46.2	19.5
DVD recorders/players	5.2	58.8	12.9	50.6	43.5	12.1
Personal computers	4.6	52.6	18.9	59.5	47.6	18.4
Digital cameras	4.4	65.3	11.1	60.0	43.8	27.2
Portable music players	3.4	56.3	9.1	39.8	32.2	30.8
Cellular phones	2.7	67.9	10.1	32.5	42.5	39.7

Source: "The Nikkei Sangyo Shimbun," September 7, 2007.

The most important factor mentioned by the respondents was "User friendliness" (67.9%) for cellular phones and "High performance" (59.5%) for personal computers. The important reasons after "Lower prices" for buying a new flat-screen TV to replace an old one were "High performance" (52.8%) and "Energy-saving economy" (45.7%). The years for replacement were the longest for flat-screen TVs (7.6 years on average) and the shortest for cellular phones (2.7 years), and were 4.6 years for personal computers.

(3) Future prospects and problems

a) Prospects for world shipment of digital cameras

In January 2007, the Camera & Imaging Products Association (CIPA) announced the prospects

for world shipment of digital cameras (Fig.3-17).

Fig. 3-17 Prospects for world shipment of digital still cameras (DSCs)

	2006 (Actual shipment)	2007 (Estimated shipment)	2008 (Actual shipment)	2009 (Estimated shipment)
Total shipment	78,981	84,870	88,532	90,705
Year-on-year growth rate	21.9%	7.5%	4.3%	2.5%
Single-lens reflex cameras with changeable lenses	5,264	5,994	6,528	6,888
Year-on-year growth rate	38.9%	13.9%	8.9%	5.5%
Built-in lens cameras	73,717	78,876	82,004	83,817
Year-on-year growth rate	20.9%	7.0%	4.0%	2.2%
Domestic shipment	9,424	9,417	9,346	9,269
Single-lens reflex cameras with changeable lenses	717	789	832	861
Built-in lens cameras	8,707	8,628	8,514	8,408
Export	69,557	75,453	79,186	81,436
Single-lens reflex cameras with changeable lenses	4,547	5,205	5,696	6,027
Built-in lens cameras	65,010	70,248	73,490	75,409

Source: Prepared by the authors based on the CIPA data published in January 2007.

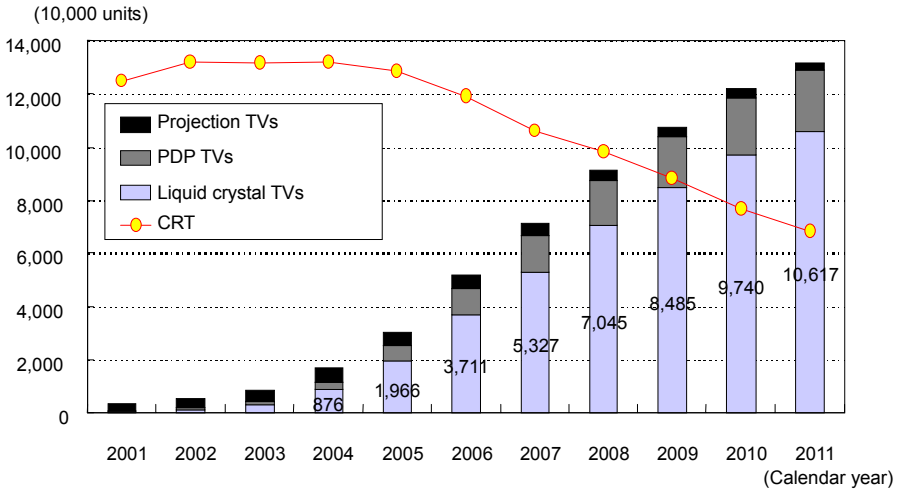
According to the announcement, the total shipment of all types of digital cameras in 2006 was about 78.98 million units (+21.9% y/y) mainly because the function improvement and diversification of built-in lens cameras and new models and lower prices of single-lens reflex cameras with changeable lenses. In 2007, too, the shipment is expected to continue increasing, though the growth rate will decline, and will reach 84.87 million units (+7.5% y/y). The total shipment of digital cameras in 2008 and 2009 is estimated at 88.53 million units (+4.3% y/y) and 90.71 million units (+2.5% y/y), respectively, on the assumption that growth will be steady in the regions other than Japan, Europe and the U.S. By product category, it is forecast that as in 2007, single-lens reflex cameras with changeable lenses will have a higher growth rate than built-in lens cameras.

b) Estimated world demand for flat-screen TVs

In February 2007, the Japan Electronics and Information Technology Industries Association (JEITA) published the "Estimated World Demand for Main AV Products: Prospects Until 2011." This report forecast that global demand for flat-screen TVs, the total of liquid crystal TVs (10-inch and larger) and plasma TVs, will exceed demand for CRT TVs and reach 104.0 million by 2009 and then 128.94 million by 2011 (Fig. 3-18). The JEITA publishes its demand forecast every year, and just as done in 2006, made a substantially higher estimate of demand for flat-screen TVs in 2007 as compared with the estimate in the previous year. The growth rate of demand for liquid crystal TVs was estimated at far higher levels: the estimated average compound annual growth rate (CAGR) in the 2006-2012 period was +23.4%. As a result, it is forecast that demand for liquid crystal TVs will exceed the 100 million-unit mark in 2012. PDP TVs have a high growth rate at present but tend to be losing out to the power of liquid crystal TVs. Already in 2006, the sales of large-screen liquid crystal TVs on the 40-inch mark were equal to those of PDP TVs, and it has been pointed out that the gaps between liquid crystal TVs and PDP TVs might widen further.

Fig. 3-18 Estimated world demand for flat-screen TVs

(2006: estimated results; 2007-2011: forecasts; in terms of quantity)



Source: Prepared by the authors based on the data published in February 2007 by the JEITA.

3.3 Electronic devices

3.3.1. Supply and demand trend

(1) Outline

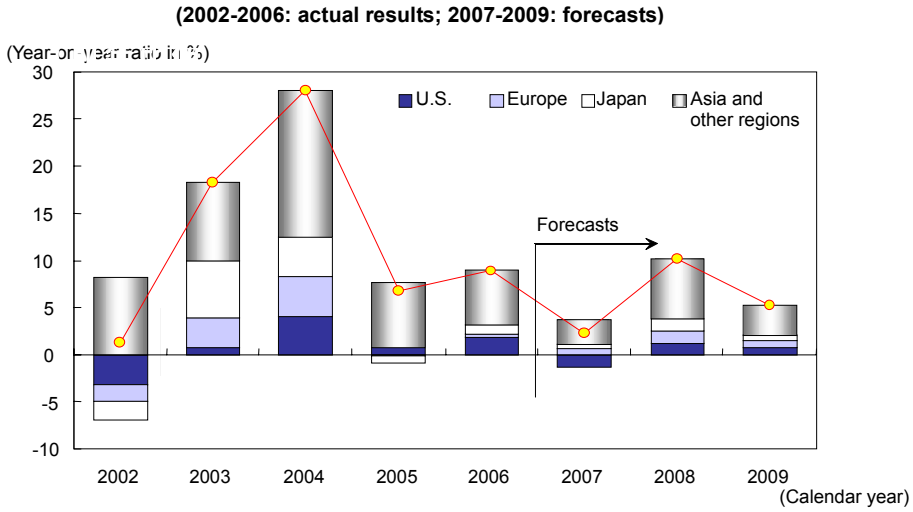
The production of electronic devices in 2006 recorded a positive growth. Growing world demand for digital products, including personal computers (PCs), cellular phone units, flat-screen TVs and digital cameras, contributed to the growth in the domestic production of electronic devices.

(2) Orders received

According to the "WSTS Semiconductor Market Forecast Spring 2007" published on May 30, 2007 by the World Semiconductor Trade Statistics Inc. (WSTS), the world semiconductor market in 2006 attained a growth of +8.9% over the previous year thanks to increasing demand for semiconductors for PCs, cellular phone units, portable audio players, etc. Because the semiconductor market is expected to continue growing in the future, mainly in the area of semiconductors for PCs, cellular phone units and digital household electric appliances, it is predicted that the world semiconductor market in 2007 will increase to $253.5 billion, a new historic high, though the growth rate will decline to +2.3% y/y. The market is expected to grow by +10.2% y/y in 2008 and by +5.2% y/y in 2009.

By region, the WSTS forecast that the Asian and Pacific market will expand at a yearly rate of +8.2% in 2006 and after, a higher figure than the overall average (+5.8%). It estimated the annual average growth rate of the Japanese market in the 2006-2009 period at +5.1% (Fig. 3-19).

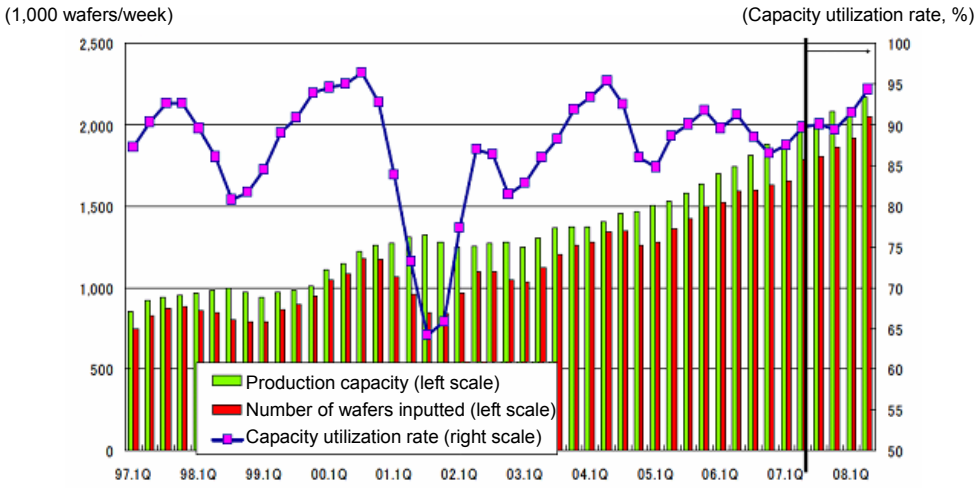
Fig. 3-19 Forecast for the World Semiconductor Market and Regional Contribution



Source: Prepared by the authors based on the WSTS, "WSTS Semiconductor Market Forecast Spring 2007."

The "Semiconductor International Capacity Statistics" compiled by 40 major semiconductor manufacturers in the world show that the capacity utilization rate of semiconductor production facilities in April to June 2007 (for all ICs) increased by 2.2 points as compared with in January to March 2007 to 89.7%. The capacity utilization improved for two consecutive quarters, and this was probably due to the recovery in demand for semiconductors for digital household electric appliances and PCs in the U.S. in the sales campaigns for the new semester and the year end (Fig. 3-20).

Fig. 3-20 Capacity utilization rate of semiconductor production facilities in the world



Note: All data are in terms of 8-inch wafers.
Source: Prepared by the Nomura Research Institute of Financing and Economics based on the SICAS.

(3) Production (Fig. 3-21)

The production of electronic devices in 2006 amounted to ¥7,017.6 billion or a positive growth of +8.7% over the previous year. By product category, the output of electron tubes, semiconductor devices, integrated circuits (ICs), liquid crystal (LC) elements, and solar battery modules were ¥391.9 billion (+28.9% y/y), ¥1,127.4 billion (+6.5% y/y), ¥3,632.4 billion (+10.6% y/y), ¥1,675.1 billion (+5.0% y/y), and 190.8 billion (-11.6% y/y), respectively. The main reason for the positive growth except solar battery modules was the active demand for PCs, where a new operation system (OS) was introduced, cellular phone units, where performance was improved and new functions were added, and digital AV appliances, such as flat-screen TVs and digital cameras.

For electron tubes, the production of cathode-ray tubes, including those for color TVs and electronic computers, in 2006 suffered a decrease due to falling demand resulting in expansion in flat panel displays for PDP TVs, liquid crystal TVs, etc. and increasing shift to overseas production. By contrast, PDP modules enjoyed a substantial growth in production, being ¥326.1 billlion, an increase rate of +42.0% over the previous year. The output of semiconductor devices was ¥1,127.4 billion, a positive growth of +6.5% y/y. Until 2005, the production of silicon transistors had been on the decline partly because of integration into ICs. But in 2006, the output of silicon transistors, 1W or more, grew by +22.6% y/y, and the total production was ¥132.3 billion, turning to an increase of +12.5% y/y. The production of photoelectric transducers was ¥547.7 billion, a positive growth of +5.3%. The output of light emitting diodes, included in photoelectric transducers, achieved a two-digit growth in terms of quantity because of good demand for those for cellular phone units, but had a negative growth of -1.2% from the previous year in terms of value. Laser diodes suffered a decrease of -8.0% y/y in production mainly because demand for laser pickups fell as the DVD player market had reached a limit and the output of CD players was cut and also because the price came down. But the production of all types of photoelectric transducers registered a positive growth of +5.3% y/y backed up by demand for other types of photoelectric transducers and from industrial applications.

The production of ICs was ¥3,632.4 billion, achieving a two-digit growth of +10.6% over the previous year. Semiconductor ICs were favorable ¥339,2.5 billion and +11.4% y/y due to expanding market for cellular phone units, PCs and digital AV appliances, which did well globally. Linear circuits also enjoyed a growth of +3.9% y/y, supported by good demand for those for both consumer and industrial applications. Microcomputers achieved a positive growth of +11.5% y/y because their market was brisk not only in digital AV appliances and cellular phone units but also in the automobile sector. Logic devices registered ¥1,234.4 billion or up +9.2% y/y mainly because demand for large-scale integrations (LSIs) was on an upward trend as the functions and performance of digital household electric appliances and other electronic machines were improved. Supported by brisk demand, memories attained a substantial growth of +25.0% y/y in production, which amounted to ¥661.0 billion. In particular, DRAMs (+61.6% y/y) and SRAMs (+29.2% y/y) recorded a marked increase because PC manufacturers tried to take demand in advance with the introduction of a new OS near at hand. Flash memories also had a substantial growth of +27.3% y/y, with a production of ¥590.0 billion, thanks to growing demand from the cellular phone unit and PC sectors as well as

from the digital camera sector. Although the price has been down, Charge Coupled Devices (CCDs), a type of MOS ICs, recorded ¥276.1 billion or an increase of +7.3% y/y, supported by expanding market of cellular phone units with a camera and automotive sensors and growing demand from the digital camera sector.

The production of LC elements in 2006 attained a positive growth both in terms of quantity and value because demand for small- and medium-sized LC devices was active throughout the year and also because large-sized LC devices also had a steady demand. The domestic production amounted to ¥1,675.1 billion or a growth of +5.0% over the previous year. By product category, the output of active large-type LC elements increased by +8.0% y/y to ¥639.6 billion due to continued increase in demand from the liquid crystal TVs sector and also due to the enlarging of these TVs. Active and medium/small-type LC elements recorded ¥946.0 billion or a growth of +5.9% y/y because of solid improvement in demand for digital cameras for export, cellular phone units, new game units, etc. Passive-type LC elements suffered a negative growth of -17.9% y/y with a production of ¥92.2 billion because demand continued to decline as a result of intensified competition among the domestic and foreign manufacturers of active medium/small-type LC elements, which led to an increase in active-type main panels for cellular phone units, etc.

The domestic production of electronic devices in 2007 is estimated at ¥7,291.6 billion or an increase of +3.9% over the previous year because the growth rate is expected to be positive though slow. Electron tubes will attain a substantial growth of ¥495.3 billion or an increase of +26.4% y/y because then output of PDP modules is likely to continue rising (up +31.8% y/y). The higher production of PDP modules is expected to lead to greater demand for plasma TVs with high-quality pictures as a result of the enlarging of the screen, the full-scale high-definition digital broadcasting all over the world and the diffusion of high-quality picture DVDs. Semiconductor devices will have ¥1,192.0 billion or an increase of +5.8% y/y; because demand for electronic appliances, such as PCs and digital AV appliances is expected to grow, a positive growth is forecast for chip production. ICs will register ¥3,858.2 billion or a growth of +6.2% y/y; semiconductor ICs being ¥3,608.6 billion, up +6.4% y/y. LC elements are expected to record ¥1,746.2 billion or an increase of +4.2% y/y; demand for active large-type LC elements will continue to show an positive growth because demand will be steady mainly in the liquid crystal TVs sector and also because in the supply side, the construction of new production lines for new-generation products is planned. Active medium/small-type LC elements will also achieve a positive growth due to good demand from the cellular phone unit sector.

Fig. 3-21 Trend of production of electronic devices (in terms of value)

(¥ million)

Production	2004	2005	2006	Growth rate for 2005/2006	Estimate for 2007	Estimated growth rate for 2006/2007
Electron tubes, semiconductor devices and ICs	6,818,703	6,458,399	7,017,555	8.7%	7,291,596	3.9%
Electron tubes	327,368	304,031	391,878	28.9%	495,256	26.4%
PDP modules	215,239	229,582	326,050	42.0%	429,892	31.8%
Semiconductor devices	1,072,516	1,059,100	1,127,415	6.5%	1,191,981	5.7%
Silicon diodes	62,838	52,346	54,222	3.6%	56,770	4.7%
Rectifying devices (100mA and up)	79,458	77,637	83,362	7.4%	87,228	4.6%
Transistors	305,424	295,033	322,591	9.3%	342,122	6.1%
Photoelectric transducers	518,866	519,984	547,729	5.3%	583,144	6.5%
Other semiconductor devices	37,457	43,610	44,597	2.3%	99,170	122.4%
ICs	3,619,050	3,284,289	3,632,404	10.6%	3,858,196	6.2%
Semiconductor ICs	3,337,883	3,046,167	3,392,542	11.4%	3,608,602	6.4%
Linear circuits	476,264	422,085	438,391	3.9%	441,284	0.7%
Counter circuits	2,861,619	2,624,082	2,954,151	12.6%	3,167,318	7.2%
Bipolar-type	47,480	35,418	33,868	-4.4%	32,609	-3.7%
MOS-type	2,814,139	2,588,664	2,920,283	12.8%	3,134,709	7.3%
Microcomputers	679,917	638,410	712,024	11.5%	740,565	4.0%
MPU	41,184	55,331	40,641	-26.5%	-	-
MCU	638,733	583,079	671,383	15.1%	-	-
Logic devices	1,225,989	1,130,167	1,234,438	9.2%	1,337,692	8.4%
Standard logic devices	125,924	113,741	127,576	12.2%	-	-
Semi-customized logic devices	397,159	402,583	483,178	20.0%	-	-
Display drivers	273,601	233,539	219,826	-5.9%	-	-
Memories	605,364	528,661	660,994	25.0%	718,114	8.6%
DRAM	39,626	16,551	26,751	61.6%	-	-
SRAM	36,463	23,381	30,206	29.2%	-	-
Flash memories	487,100	463,475	589,953	27.3%	-	-
Other MOS-type	302,869	291,426	312,827	7.3%	338,339	8.2%
CCD	282,166	256,575	276,106	7.6%	-	-
Hybrid ICs	281,167	238,122	239,862	0.7%	249,594	4.1%
LC elements	1,799,769	1,595,254	1,675,062	5.0%	1,746,164	4.2%
Active-type	1,640,500	1,482,950	1,582,875	6.7%	1,669,710	5.5%
Large type	697,486	589,593	636,923	8.0%	-	-
Medium/small type	943,014	893,357	945,952	5.9%	-	-
Passive-type	159,269	112,304	92,187	-17.9%	76,454	-17.1%
LC modules	116,691	75,406	58,834	-22.0%	-	-
LC panels	42,578	36,898	33,353	-9.6%	-	-
Solar battery modules	-	215,725	190,796	-11.6%	-	-

Sources: Results in 2004-2006: the Research and Statistics Department, Industrial Policy Bureau, Ministry of Economy, Trade and Industry, “Annual Report of Machinery Statistics;” estimates for 2007, the JEITA, “Outlook of Production of the Electronic Industries in 2007,” December 2006.

Fig. 3-22 Trend of export of electronic devices (in terms of value)

(¥ million)

Export	2004	2005	2006	Growth rate for 2005/2006
Electronic devices	3,840,442	3,849,798	4,205,550	9.2%
Electron tubes	81,419	99,270	57,307	-42.3%
Cathode-ray tubes for TVs	30,336	5,099	3,763	-26.2%
Microwave tubes	4,202	5,805	5,050	-13.0%
Fluorescent character display tubes	11,227	12,257	17,962	46.6%
Semiconductor devices	831,115	850,246	968,351	13.9%
Diodes	103,591	96,236	108,658	12.9%
Transistors	199,530	199,430	229,596	15.1%
Thyristors, diac and triac	9,774	10,686	11,567	8.2%
Photosensitive semiconductor devices	500,476	529,294	604,874	14.3%
ICs	2,927,909	2,900,283	3,179,892	9.6%
Smart cards (cards with built-in ICs)	10,612	11,924	7,961	-33.2%
Monolithic ICs	2,798,690	2,779,549	3,085,706	11.0%
Digital	2,176,354	2,210,746	2,518,104	13.9%
MOS-type	2,051,357	2,104,621	2,366,127	12.4%
Non-packaged	572,241	700,485	814,001	16.2%
Others	1,479,116	1,404,136	1,552,126	10.5%
Memory elements	286,134	303,098	394,336	30.1%
DRAM	85,120	85,318	140,356	64.5%
SRAM	27,711	25,355	29,096	14.8%
ROM	173,303	192,425	224,884	16.9%
Microcomputers	386,021	333,238	365,745	9.8%
MPU	101,751	82,142	134,297	63.5%
MCU	274,517	242,369	227,009	-6.3%
Bipolar-type	48,832	38,807	41,859	7.9%
Others (BICMOS)	76,166	67,318	110,118	63.6%
Other ICs	622,336	568,803	567,602	-0.2%
Hybrid ICs	118,607	108,810	86,225	-20.8%

Source: Prepared by the authors based on the Ministry of Finance, “International Trade Statistics.”

(4) Export and import (Figs. 3-22, 3-23)

The export of electronic devices in 2006 was ¥4,205.6 billion, a substantial increase of +9.2% over the previous year. By product category, the export of electron tubes amounted to ¥53.7 billion (-42.3% y/y), semiconductor devices, ¥968.4 billion (+13.9% y/y), and ICs, ¥3,179.9 billion (+9.6% y/y). The positive growth in the export of ICs was supported by the globally active sales of cellular phone units, PCs and digital AV appliances and also by the solid growth in the automobile sector. The main importers of ICs were Asian nations; the export to this region totaled to ¥2,729.6 billion, accounting for 85.8% of all the export, of which the export to China amounted to ¥649.6 billion or 20.4% of all the IC export. These figures indicate that the shift of IC export to Asia where a large quantity of ICs were consumed for the production of electronic appliances, especially to China, continued. The IC import from Asia was ¥1,852.9 billion or about 70% of all the import. But the import from China accounted for only 7.0%.

The import of electronic devices in 2006 was ¥2,721.0 billion or an increase of +20.0% over the previous year. By product category, electron tubes had ¥13.8 billion (+0.3% y/y), semiconductor devices, ¥256.0 billion (+16.3% y/y) and ICs, ¥2,451.2 billion (+20.5% y/y). The positive growth in

the import of semiconductor devices was due to the "reimport" of those made by the overseas subsidiaries of Japanese manufacturers and continued increase in the import of foreign manufacturers' products. As in the case of export, the import from Asia had the highest ratio: ¥203.6 billion or 79.5% of all the import.

Fig. 3-23 Trend of import of electronic devices (in terms of value)

(¥ million)

Import	2004	2005	2006	Growth rate for 2005/2006
Electronic devices	2,195,927	2,268,133	2,720,994	20.0%
Electron tubes	15,226	13,716	13,763	0.3%
Cathode-ray tubes for TVs	2,702	1,736	663	-61.8%
Semiconductor devices	204,121	220,211	256,027	16.3%
Diodes	34,645	35,099	36,275	3.4%
Transistors	44,869	44,399	59,383	33.7%
Thyristors, diac and triac	3,860	3,808	4,026	5.7%
ICs	1,976,580	2,034,206	2,451,204	20.5%
Smart cards (cards with built-in ICs)	26,715	8,813	10,486	19.0%
Monolithic ICs	1,877,575	1,938,160	2,384,490	23.0%
Digital	1,567,733	1,621,578	1,888,214	16.4%
MOS-type	1,487,237	1,500,549	1,799,734	19.9%
Non-packaged	248,387	205,652	220,237	7.1%
Others	1,238,850	1,294,897	1,579,496	22.0%
Memory elements	468,287	494,239	568,638	15.1%
DRAM	251,907	256,028	403,934	57.8%
SRAM	19,802	15,674	21,300	35.9%
ROM	196,578	222,537	143,404	-35.6%
Microcomputers	323,247	321,993	375,932	16.8%
MPU	246,551	240,384	288,834	20.2%
MCU	58,945	63,422	68,958	8.7%
Bipolar-type	44,186	29,396	21,166	-28.0%
Others (BICMOS)	36,310	91,634	67,315	-26.5%
Other ICs	309,842	316,582	496,276	56.8%
Hybrid ICs	72,290	87,233	56,228	-35.5%

Source: Prepared by the authors based on the Ministry of Finance, "International Trade Statistics."

3.3.2. Results of operation and the trend of the electronic device industry

(1) Trend of management

Figure 3-27 shows the sales and operating profit by sector and product category (on a consolidated basis) of 12 electronic device manufacturers.

The sales of the electron device segment of NEC Corp. in fiscal 2006 were ¥861.0 billion or an increase of +5.5% over the previous year. The semiconductor segment (NEC Electronics Corp.) recorded sales of ¥692.3 billion, up +7.2% y/y. The increased sales were due mainly to the greater sales of electronic devices for game machines and general-purpose micro-controllers. The sales of electronic parts and others declined by -0.7% from the previous year to ¥168.7 billion because of fallen sales of small-sized LC displays.

Fig. 3-24 Progress of NEC Electronics' new management policy (published on February 22, 2007)

Item	Main steps taken	State of progress
Strengthen product competitiveness by narrowing down business areas	Cut technology outsourcing by an equivalent to about 600 employees	Completed
	Transfer in-house development resources equivalent to about 400 employees	About a half completed (the transfer of all 400 employees to be completed by the end of FY2007)
Cost reduction by redrawing the production map	Compose a detailed schedule for redrawing the production map	Completed
	Prepare for getting customer approvals	Started
	Prepare for securing related equipment	Started
Business organizations and systems for reinforcing the profitability management	Regard SoC/MCU/individual semiconductors as responsibility centers and make them independent business units reduce the number of divisions by 18 (59→41) and increase the mobility and efficiency of human resources	Reorganization completed
Reduce fixed costs to return to a surplus by the year ending in March 2008	Cut the expenses for technology outsourcing	Completed (As noted above)
	Trim fixed production costs by, for example, controlling capital investment	Planned to reduce capital investment drawn up
	Cut salaries and bonuses for employees	In progress

Note: The state of progress is as of May 14, 2007.
Source: NEC, "Briefing Session on the Management Policy," July 10, 2007.

After registering deficits in fiscal 2006, NEC Electronics, NEC's semiconductor affiliate, published a new management policy entitled "Toward Revival of NEC Electronics" on February 22, 2007. The new policy aims at, among others, "Achieving surpluses in business by steadily carrying out the plan to cut fixed costs by ¥20.0 billion as compared with the previous year." According to the NEC's briefing session on the management policy, the steps included in the new policy seem to have been taken more than had planned (Fig. 3-24).

The device solution segment of Fujitsu Ltd. recorded sales of ¥762.7 billion and an operating profit of ¥19.0 billion in fiscal 2006, having increased earnings and lower profits. Although the tone of market rapidly worsened in the second half of fiscal 2006, mainly in the digital household electric appliance sector, the higher earnings were driven due to, among others, the full-scale operation of the first 300mm wafer factory at the Mie Plant. The profit decline was the result of increased depreciation and construction costs of the Mie Plant, though the increased production capacity at the plant had the effect of increasing the earnings.

The electronic device segment of Toshiba Corp. had sales of ¥1,657.3 billion in fiscal 2006, higher earnings than in the previous year, thanks to the good performance of memories, mainly NAND flash memories in semiconductor business and also the growth in export in liquid crystal displays. The electronic device segment suffered a lower operating profit of ¥119.7 billion, a decrease of ¥3.6 billion from the previous year, because the semiconductor business had difficulty affected by the sharp reduction in the price of NAND flash memories, though the liquid crystal business was in good form due to brisk sales of high value added products and all-out cost-saving efforts. Toshiba is focusing its energies on NAND flash memories. In the world market, the company ranks second with sales of $3.23 billion (share: 26.1%), far less than the leading Samsung Electronics that had sales of $5.61 billion (45.4%) (results in 2006 reported by iSuppli Corp. of the U.S.). But while Samsung Electronics reduced its share by 8.0 percentage points, Toshiba's share increased by 4.0 points due to the effect of higher production by large-scale investment. In the

briefing session on April 12, 2007, Toshiba published its management policies: (1) Reinforce the production capacity of NAND flash memories by the steady increase of the production capacity of 300mm wafers (Fig. 3-25); and (2) Strengthen the profitability of NAND flash memories by drastic cost-saving steps (Fig. 3-26).

Fig. 3-25 Toshiba's measures to reinforce NAND production capacity

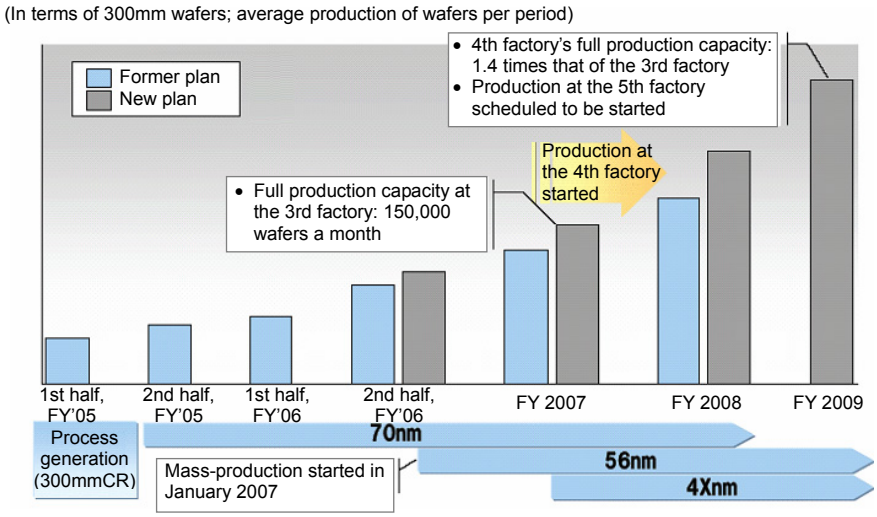


Fig. 3-26 Toshiba's drastic cost-saving steps

*** Accelerating miniaturization/commercialization before other manufacturers**

⇒ 70nm → 56nm → 4Xnm → 3Xnm * 56nm: mass-production started in January 2007.

⇒ Move up the plan to start the production of 56nm (former plan: over 50% in the 3rd q., FY2007 → over 50% in the 2nd q., FY2007, over 85% in the 4th q., FY2007) and accelerate the time for starting 4Xnm production

*** Promote the development of super-multivalence technology**

⇒ Establish the 3bit/cell and 4bit/cell technology and create the market

*** Further improve the throughput of the 300mm clean room**

⇒ 3rd factory: 150,000 wafers/month
4th factory: operation started in the 3rd q., FY2007; full capacity: 1.4 times the output of the 3rd factory
5th factory: decision made within FY2007, giving top priority to the maximization of the output of the 3rd and 4th factories

Source: Toshiba Corp., "Briefing Session on the Management Policy," April 12, 2007.

The liquid crystal segment of Sharp Corp. reinforced its production capacity of liquid crystal panels as the Second Kameyama Plant, where the eighth-generation mother glass was adopted first in the world, started operation and the second-term production line was introduced to that plant. Liquid crystal panels for cellular phone units and other mobile appliances did well, too. Thanks to these factors, the sales of the liquid crystal segment recorded a substantial increase of +21.6% y/y in sales: ¥1,042.3 billion, attaining the ¥1 trillion mark. Sharp set its sales goal of its liquid crystal segment for FY2007 at ¥1,200.0 billion or a growth of +17% over the previous year. The company also reinforced the system for solar battery business; for example, it expanded the production capacity of the Katsuragi Plant. The solar battery segment registered sales of ¥151.4 billion in FY2006, and the company aims at realizing sales of ¥160.0 billion or up +5.7% y/y in FY2007.

Fig. 3-27 Consolidated settlement of accounts of 12 electronic device manufacturers (actual and estimated figures) (as of the most recent announcement)

(On a consolidated basis, ¥100 million; fractions less than ¥100 million rounded off)

	Actual figures for 2004		Actual figures for 2005		Estimated figures for 2006	
	Sales	Operating profit	Sales	Operating profit	Sales	Operating profit
NEC	Note: Internal sales between segments are included.					
Electron device segment	8,159	-308	8,610	-230	8,700	30
Semiconductors	6,460	-	6,923	-	-	-
Electronic parts, etc.	1,699	-	1,687	-	-	-
Reference: NEC Electronics	Note: Sales to outside customers (including NEC)					
Total	6,460	-357	6,923	-286	6,900	0
Semiconductor segment, total	6,191	-	6,597	-	6,700	-
Communications equipment	1,080	-	996	-	-	-
Computers and peripherals	1,266	-	1,237	-	-	-
Consumer electronic appliances	1,026	-	1,208	-	-	-
Automobile and industrial appliances	1,038	-	1,061	-	-	-
Multi-purpose/multi-use ICs	694	-	890	-	-	-
Discrete/optical/microwave	1,087	-	1,206	-	-	-
Fujitsu	Note: Internal sales between segments are included.					
Device solution	7,075	295	7,627	190	8,200	-
LSI	4,601	-	4,735	-	5,300	-
Toshiba	Note: Internal sales between segments are included.					
Electronic devices	13,881	1,233	16,573	1,198	17,500	1,150
Semiconductors	10,370	1,340	12,981	1,283	13,500	1,100
Discrete components	2,217	-	2,608	-	2,700	-
System LSIs	4,585	-	5,460	-	5,400	-
Memories	3,568	-	4,913	-	5,400	-
LC elements	2,997	40	3,091	65	3,600	100
Hitachi	Note: Internal sales between segments are included.					
Electronic devices	12,044	204	12,875	458	12,350	430
Displays	1,916	-228	2,003	5	2,000	20
Liquid crystal displays	-	-	1,770	-	1,760	-
Mitsubishi Electric	Note: Internal sales between segments are included.					
Electronic devices	1,704	135	1,859	121	1,900	100
Matsushita Electric Industrial	Note 1: Internal sales between segments are included. 2: Figures for semiconductors stated on a production basis.					
Devices	13,683	811	13,777	999	13,900	1,050
Semiconductors	-	-	4,382	-	4,750	-
Panasonic Electronic Devices	-	-	4,875	373	5,087	391
Sony	Note: Internal sales between segments are included.					
Semiconductors	4,900	-	7,800	-	8,400	-
LC elements	1,300	-	1,400	-	1,300	-
Sanyo Electric	Note: Internal sales between segments are included.					
Component segment	9,484	116	9,007	676	-	-
Electronic devices	3,783	-286	3,397	183	-	-
Batteries	4,192	358	4,144	413	-	-
Semiconductors * sales by product category	1,936	-	1,813	-	1,834	-
Solar batteries * sales by product category	476	-	612	-	624	-
Sharp	Note: Internal sales between segments are included.					
Electronic parts, etc.	13,581	1,019	15,617	1,055	17,480	1,025
LSIs	-	-	1,907	64	2,000	30
LC elements	-	-	10,423	781	12,000	785
Flash memories * sales by product category	-	-	472	-	390	-
CCDs/CMOS imagers * sales by product category	-	-	976	-	1,100	-
Solar batteries * sales by product category	-	-	1,514	-	1,600	-
Renesas Technology	Note: Internal sales between segments are included.					
Total sales	-	-	9,526	-	-	-
Elpida Memory						
Total sales	2,416	1	4,900	684	-	-
PCs	683	-	2,352	-	-	-
Premium DRAMs	1,534	-	2,379	-	-	-
Digital household electric appliances/mobile equipment	1,157	-	1,823	-	-	-
Servers	377	-	556	-	-	-

Source: Prepared based on the quick report, etc. on the website of the manufacturers.

(2) Technological innovation and the business environment

Figure 3-28 shows the ranking of the share of the world semiconductor market in 2006.

Fig. 3-28 Ranking of the share in the world semiconductor market in 2006 (final values)

(US$ million, %)

2006 Ranking	2005 Ranking	Manufacturer	Results in 2006	Share	Growth rate
1	1	Intel (U.S.)	31,542	12.1	-11.1
2	2	Samsung Electronics (South Korea)	19,842	7.6	12.0
3	3	Texas Instruments (U.S.)	12,600	4.8	17.3
4	4	Toshiba	10,141	3.9	11.7
5	5	ST Microelectronics (Italy, France)	9,854	3.8	11.0
6	7	Renesas Technology	7,900	3.0	-2.6
7	11	Hynix Semiconductor (South Korea)	7,865	3.0	41.5
8	15	Advanced Micro Devices (AMD, U.S.)	7,506	2.9	91.6
9	10	Freescale Semiconductor (U.S.)	5,988	2.3	7.0
10	9	NXP Semiconductors (Netherlands)	5,874	2.3	4.0
11	8	NEC Electronics	5,679	2.2	-0.5
12	-	Qimonda (Germany)	5,413	2.1	-
13	12	Micron Technology (U.S.)	5,210	2.0	9.1
14	6	Infineon Technologies (Germany)	5,119	2.0	-38.3
15	13	Sony	4,852	1.9	6.1
16	16	Qualcomm (U.S.)	4,529	1.7	31.0
17	14	Matsushita Electric	4,022	1.5	-2.6
18	20	Broadcom (U.S.)	3,668	1.4	37.3
19	24	Elpida Memory	3,527	1.4	98.6
20	17	Sharp	3,341	1.3	2.3
21	19	IBM Microelectronics (U.S.)	3,172	1.2	13.6
22	18	Rohm	2,882	1.1	-0.9
23	21	Analog Devices (U.S.)	2,603	1.0	7.2
24	23	Spansion (U.S.)	2,579	1.0	25.6
25	22	NVIDIA (U.S.)	2,574	1.0	24.4
		Others	81,912	31.5	7.3
		Total	**260,194**	**100.0**	**9.3**

Note: The total sum of the figures for the manufacturers does not agree with the figure in then total column.
Original data: iSuppli Corp., U.S., March 2007.
Source: "The Nikkei Market Access," June 2007.

In March 2007, iSuppli Corp., a U.S. research firm, published the ranking of electronic device manufacturers by sales (final values) in 2006. According to the report, the top five manufacturers were the same as those listed in the ranking for 2005, but Renesas Technology moved up to the 6th from the 7th in 2005, Hynix Semiconductor of South Korea, to the 7th from the 11th, and AMD of the U.S., to the 8th from the 15th. Hynix Semiconductor achieved greater sales due to stabilized DRAM prices and increased production of NAND flash memories. Intel of the U.S., the top manufacturer, experienced a decrease in share by 2.9 points to 12.1% because of sluggish business of CPUs and flash memories for PCs. As a result, the difference in share between Intel and Samsung Electronics of South Korea dwindled to 4.5 points from 7.7 points in 2005. Of Japanese manufacturers, Elpida Memory increased its sales by +98.6%, y/y, almost twice the level in 2005, making its ranking higher. The factors behind this are probably increased production of DRAMs by

positive investment and the stabilized DRAM prices in 2006.

(3) Future prospects and problems

Figure 3-29 shows the actual and estimated figures of capital investment of 12 major semiconductor manufacturers based on the data of "The Handotai Sangyo Shimbun (Semiconductor Industry Newspaper)." The total investment of the 12 manufacturers in 2006 was ¥1,184.5 billion or an increase of +8.3% over the previous year. The planned investment for 2007 is ¥1,104.5 billion, down 6.8% from 2005. Toshiba and Elpida Memory plan to input ¥331.0 billion and ¥210.0 billion into NAND flash memories and DRAMs, respectively. But the planed investment of major foreign manufacturers is about ¥630.0 billion for Intel, the industry leader, about ¥460.0 billion for Micron Technology, about ¥700.0 billion for Samsung Electronics and about ¥570.0 billion for Hynix Semiconductor. As compared with that of these overseas manufacturers, the size of investment of Japanese counterparts is much smaller.

Fig. 3-29 Capital investment of 12 main semiconductor manufacturers

(¥ 10 million)

	Results in 2005	Y/y ratio (%)	Results in 2006	Y/y ratio (%)	Plan for FY2007	Y/y ratio (%)
Toshiba	2,890	42.3	3,550	22.8	3,310	-6.8
Renesas Technology	800	-11.1	800	0.0	700	-12.5
Sony	1,400	-6.7	1,500	7.1	1,300	-13.3
NEC Electronics	830	-49.1	1,059	27.6	700	-33.9
Elpida Memory	1,894	52.1	1,550	-18.2	2,100	35.5
Fujitsu	930	106.7	1,250	34.4	1,000	-20.0
Matsushita Electric	730	-9.9	691	-5.3	620	-10.3
Rohm	686	2.2	537	21.7	553	3.0
Sharp (only in LSIs)	131	-27.2	170	29.8	90	-47.1
Sanyo Semiconductor Manufacturing	73	-65.6	78	6.8	112	43.6
Nichia	288	-27.5	305	5.9	300	-1.6
Oki Electric Industry	177	-23.4	221	24.9	140	-36.7
Mitsubishi Electric	110	-3.5	134	21.8	120	-10.4
Total	10,939	5.5	11,845	8.3	11,045	-6.8

Note: The figures for Nichia Corp. are those of the company's total investment.
Source: Prepared by the authors based on "The Handotai Sangyo Shimbun," July 11, 2007.