



Section 2

Growth and International Competitiveness of ICT Industry

1. Growth of the ICT industry

(1) Domestic output

Nominal domestic output of the ICT industry in 2006 is 95.2 trillion yen and the ICT industry is the largest industry among all industries, accounting for 9.8%. Looking at the trend, it declined from 2000 to 2004, but has turned to an increase since 2005 (Figure 1-22).

On the other hand, real domestic output of the ICT industry in 2006 is 123.8 trillion yen, up by 3.0% from the previous year. Real domestic production has been increased consistently since 1995, recording an average growth rate of 5.2% from 1995 to 2004. Since the growth of nominal growth output is smaller than that of real output, the ICT industry can be identified as an industry with a noticeable reduction in prices compared with other industries (Figure 1-23).

(2) Gross Domestic Product (GDP)

Real GDP of the ICT industry has grown consistently since 1995, and the average growth rate from 1995 to 2006 is 7.1%. Looking at the real GDP of major industries from 1995 to 2006, the average growth rate of 7.1% for the ICT industry is the highest, followed by electrical machinery (annual average growth rate 6.8%) and transportation

machinery (3.5%). On the other hand, the industries recording negative growth are iron and steel (-2.3%), retail (-1.3%), construction (-1.2%), and transportation (-1.1%) (Figure 1-24).

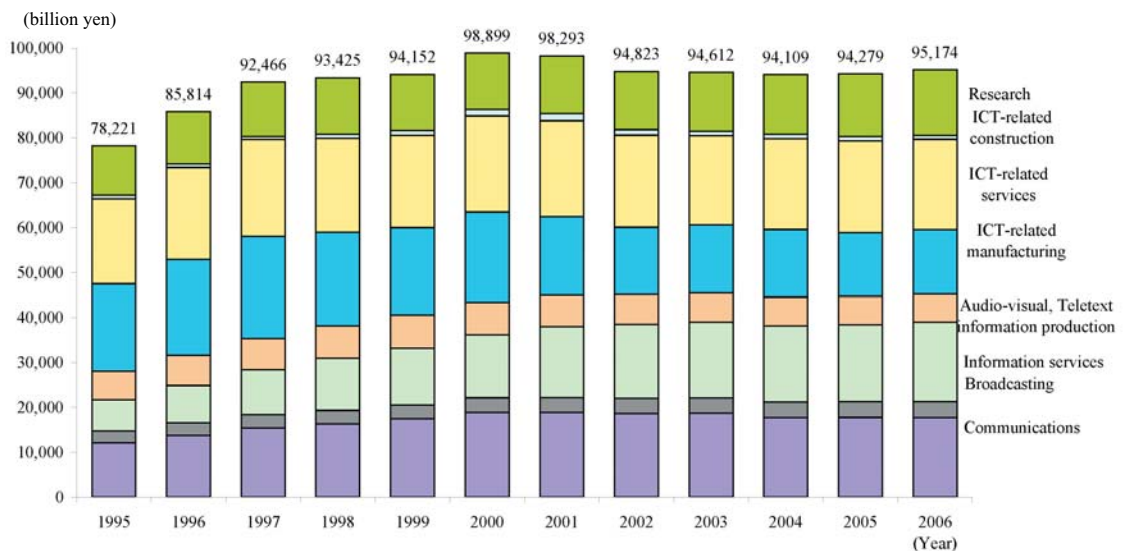
(3) Contribution to Japan's economic growth

The ICT industry has consistently contributed to the real GDP growth of Japan since 1996. In 2006, the degree of contribution of the ICT industry to the real GDP growth rate of 2.7% was 1.0%, with a contribution rate of 37.0%. It is therefore fair to say that the ICT industry has always been a driving force in the economic growth of Japan (Figure 1-25).

(4) Number of employees

The number of employees in the ICT industry in 2006 was 3.853 million people (up by 1.9% over the previous year), accounting for 6.8% of all industries. When compared with 2005, while the number of employees increased in information services (up by 5.1%), research (up by 2.5%) and ICT-related services (up by 2.1%), there was a decline in the number of employees in the ICT-related construction industry (down by 13.7%) and ICT-related manufacturing (down by 2.1%) (Figure 1-26).

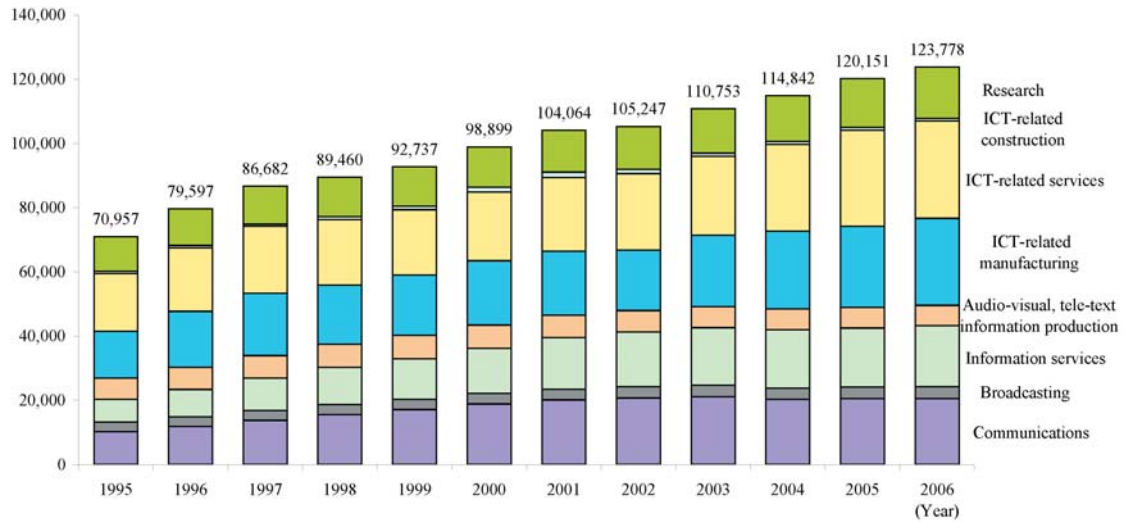
Fig. 1-22 Trends in nominal domestic output of ICT industry



(Source) "Survey on Economic Analysis of ICT"

Fig. 1-23 Trends of real domestic output of ICT industry

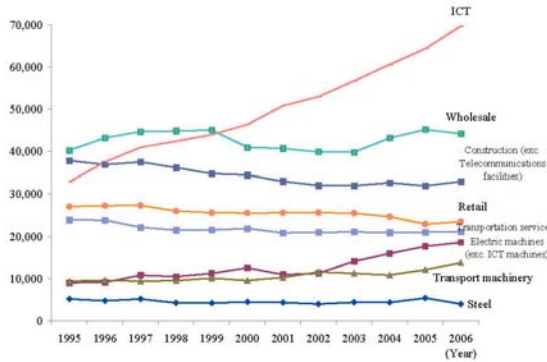
(billion yen: price of 2000)



(Source) "Survey on Economic Analysis of ICT"

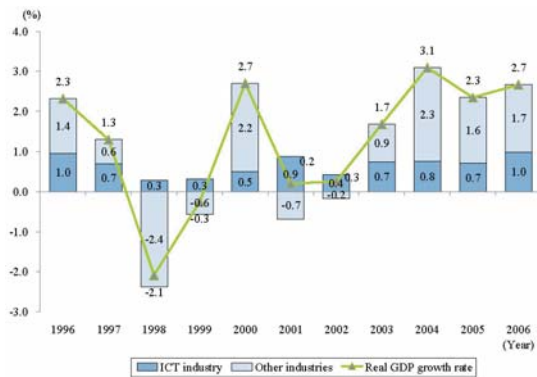
Fig. 1-24 Trends in real GDP of major industries

(billion yen, price of 2000)



(Source) "Survey on Economic Analysis of ICT"

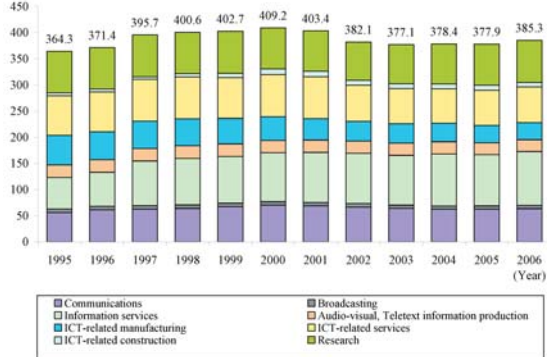
Fig. 1-25 Contribution of ICT industry to real GDP growth rate



(Source) "Survey on Economic Analysis of ICT"

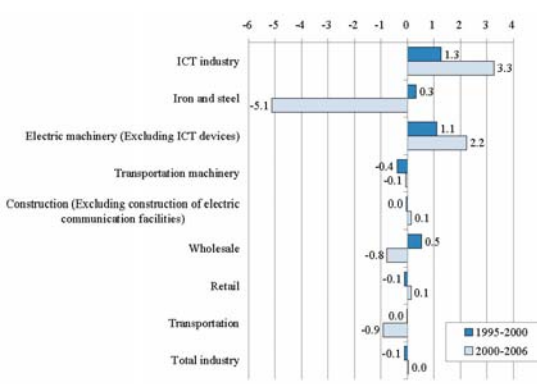
Fig. 1-26 Trends in the number of employees of ICT industry

(10,000 people)



(Source) "Survey on Economic Analysis of ICT"

Fig. 1-27 Contribution of TFP growth to domestic output growth by industry



(Source) "Survey on Economic Analysis of ICT"

(5) Growth rate of Total Factor Productivity (TFP)

Looking at the degree of the contribution of TFP growth rate to the domestic output of major industries, the ICT industry and electrical/machinery have made a great contribution from 2000 to 2006, with 3.3% and 2.2%, respectively (Figure 1-27).

2. Status of the competitiveness of the ICT industry

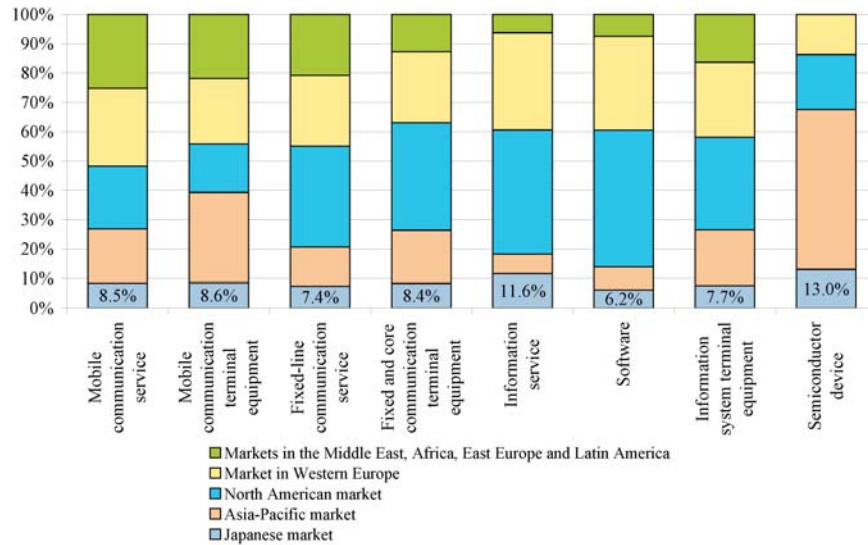
(1) ICT-related global market

Looking at the proportion of the size of the ICT

market by region, the size of the Japanese market accounts for around 10% of the global market in every sector. Semiconductor devices account for the largest proportion, but still at a low level of 13.0% (Figure 1-28).

When looking at the annual average growth rate of the market from 2005 to 2007, the growth rate of the Japanese market is less than 5% in every sector, remaining at a low level compared with the average worldwide market. Markets in Asia-Pacific, the Middle-East, Africa, Eastern Europe and Central and South America are growing faster than the global

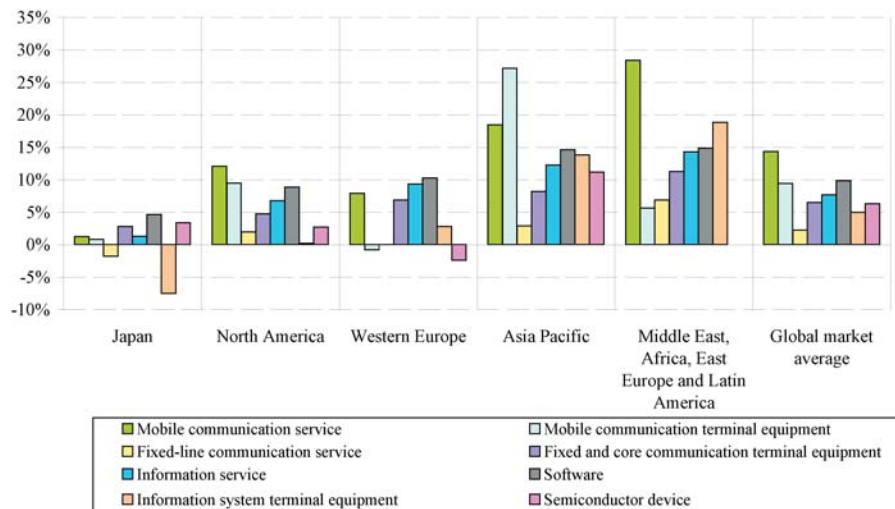
Fig. 1-28 Share of ICT related market by region (2007)



* For semiconductor devices, the Middle East, Africa and Eastern Europe are included in “Western Europe” and Latin America is included in “North America.”

Based on the materials by Gartner

Fig. 1-29 Growth of ICT related market in the world by region (average of 2005-2007)



* For semiconductor devices, the Middle East, Africa and Eastern Europe are included in “Western Europe” and Latin America is included in “North America.”

Based on the materials by Gartner

average, leading the global markets (Figure 1-29). In order for the ICT corporations of Japan to continue to grow, it would seem to be important for them to expand their presence in the rapidly growing markets in Asia-Pacific, the Middle East, Africa, Eastern Europe and Central and South America.

(2) Presence of Japanese corporations in the ICT markets of the world

A. Communication-related markets

Out of communication services, mobile communication services are the most used in the world and global competition is intensifying. In terms of the number of subscribers of major mobile communica-

tion carriers, China Mobile of China is ranked top of the world. Major carriers in Europe have gained more subscriptions than major carriers in the U.S. and Japan by active overseas promotion. On the other hand, sales of major carriers in Japan, the U.S. and Europe together are higher than China Mobile of China (Figure 1-30).

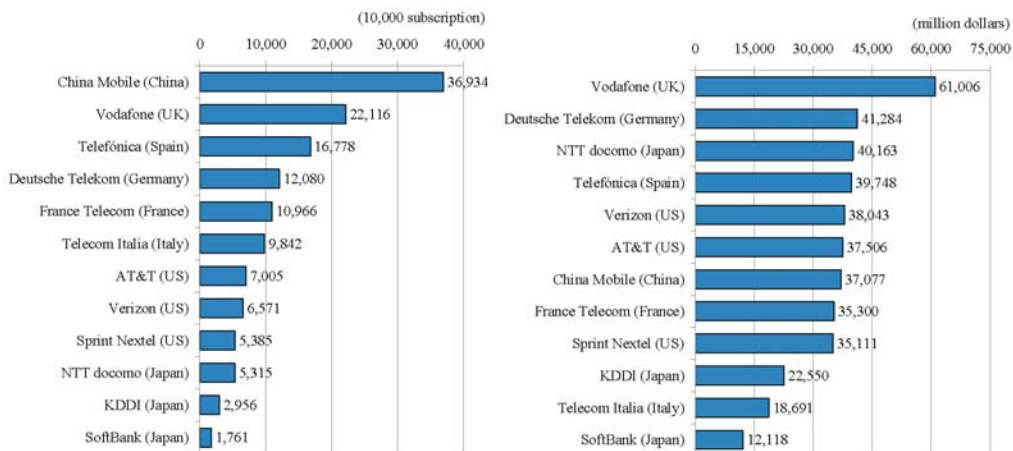
Looking at the market share of companies in the communication terminal and device market by region, the market share of Japanese corporations in mobile communication, PDAs, mobile infrastructure, optical transmission systems, LAN switches and routers for business use are 14.9%, 9.0%, 3.9%, 13.4%, 2.0% and 2.6%, respectively.

The largest share in the mobile phone device and

Fig. 1-30 Number of service subscribers and sales of the world's mobile communication carriers

Number of service subscribers (End of 2007)

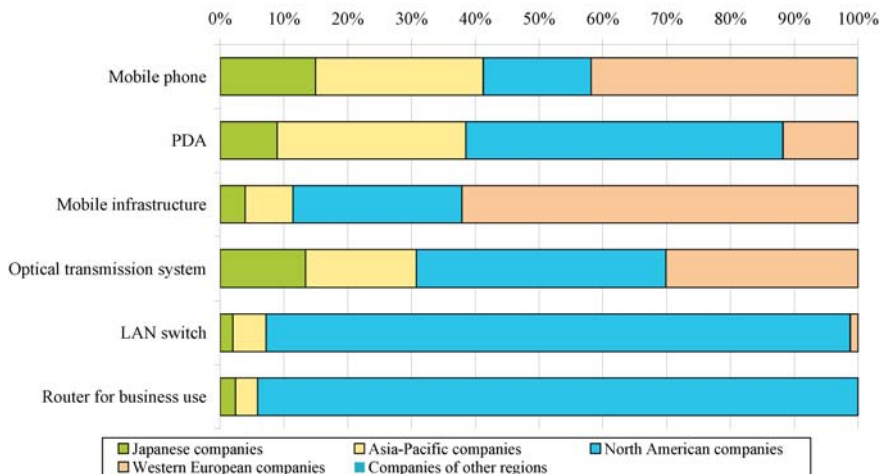
Sales (FY2006)



Based on the materials released by each company

Based on the materials by Thomson Reuters

Fig. 1-31 Vendor share by region in communication terminal/device markets in the world



* Data for mobile phones are for 2007, data for PDAs, LAN switches, routers for business use are for the first half of 2007, and data for mobile infrastructure and optical transmission systems are for 2006.

Based on the materials by Gartner

mobile infrastructure markets is accorded to European companies, at 41.8% and 62.1% respectively. The markets for PDAs, optical transmission systems, LAN switches and routers for business use are dominated by North American companies, with 49.7%, 39.2%, 91.6% and 94.1%, respectively (Figure 1-31).

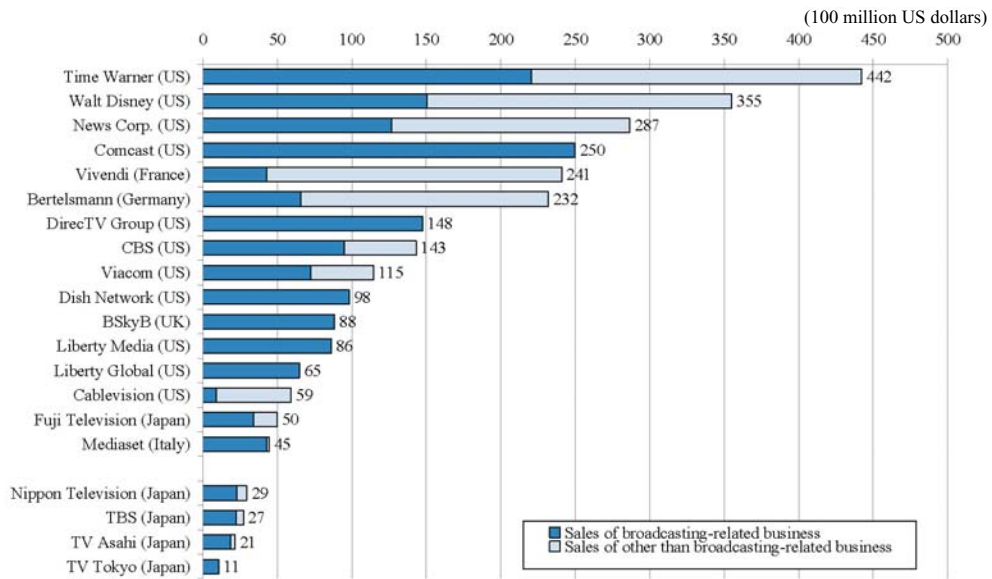
B. Broadcasting/media-related markets

Comparison of sales from major broadcasting/media companies of the world shows that conglomerate-type media companies in the western world dom-

inate sales of the world (Figure 1-32). Global competition for media services is assumed to be centered on the content, such as movies and TV programs; however, top U.S. companies are actively involved in global businesses through investment in overseas broadcasters.

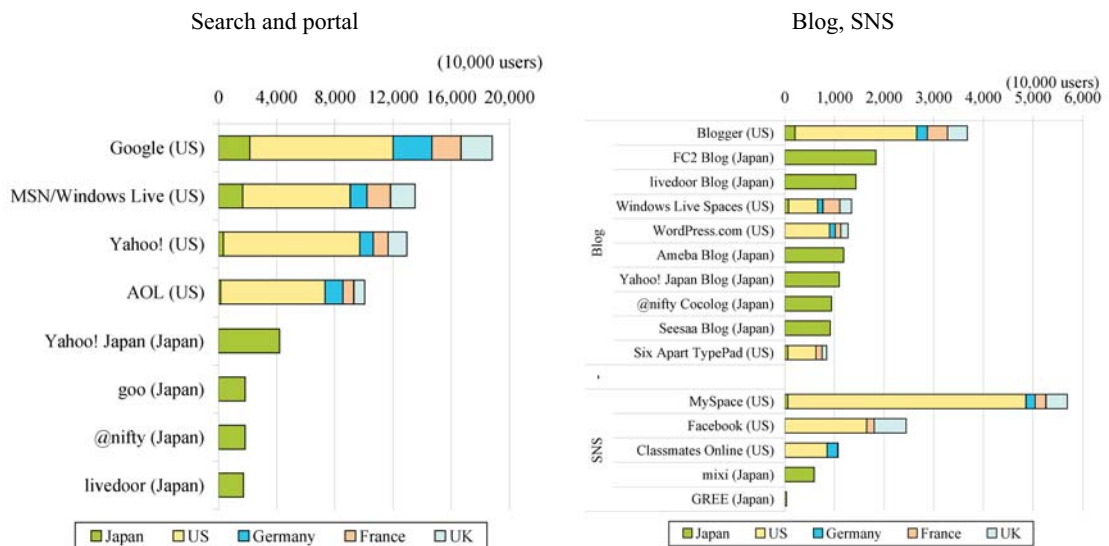
As the Internet becomes an increasingly important in the field of media and broadcasting, the presence of companies which operate Internet businesses on a global scale is growing in the world. While top U.S. companies are actively involved in international busi-

Fig. 1-32 Sales of major broadcasting/media companies of the world (FY2006)



Based on the materials released by each company and Thomson Reuters

Fig. 1-33 Number of users of major websites by Japan and the U.S. in Japan, the U.S. and Europe (January 2008)



Based on the materials by Nielsen Online

Based on the materials by Nielsen Online

ness operations by establishing websites in many languages for overseas users, Japanese companies have yet to develop such overseas businesses (Figure 1-33).

When looking at corporate market share in the broadcasting/media-related terminal and device markets, Japanese companies have a relatively higher share than companies in any other regions of the LCD TV, Plasma TV, DVD recorder and digital camera markets, at 43.9%, 51.3%, 55.4% and 72.9%, respectively. In addition to Japanese companies, Asia-Pacific corporations have a high level of market share (Figure 1-34).

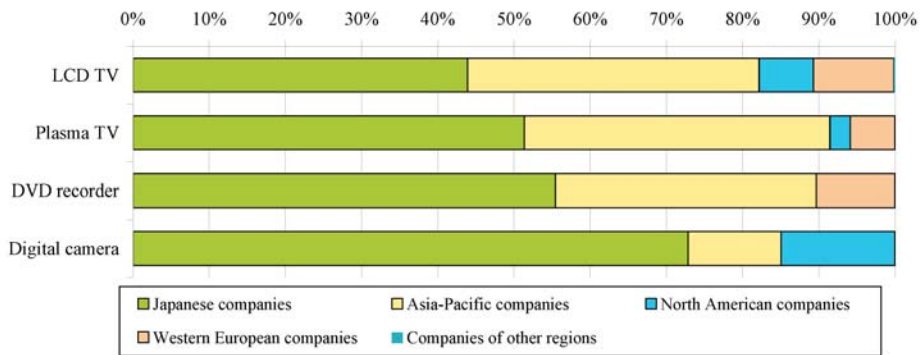
C. Information system/service-related markets

Looking at corporate market share in the information services markets of the world in 2006, Japanese

companies accounted for more than 10% in the system development and system management/control sectors, with 13.3% and 13.8%, respectively, but for less than 10% in the consulting, BPO, hardware product support, and software product support sectors, with 7.5%, 8.5%, 9.5%, and 7.3%, respectively. In all these markets, the highest share was achieved by U.S. companies. In the software market, U.S. market share is also extremely high, while the share of Japanese companies is 0.4% for application software and 2.5% for infrastructure software, both below 3% (Figure 1-35).

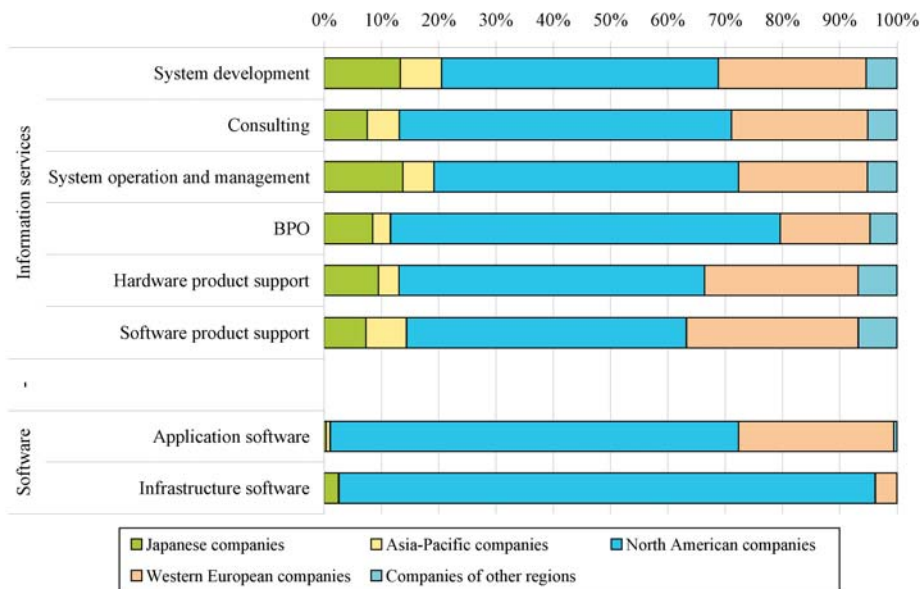
When looking at corporate market share in the major information system-related terminal/device markets in the world, Japanese companies have a dominant market share in the copier market of 63.3%. Also, in the notebook PC and printer market Japan has a

Fig. 1-34 Vendor share by region in broadcasting/media-related terminal/device markets in the world (2007)



*Data for digital cameras are for 2006
Based on the materials by Display Search for LCD TVs and Plasma TVs; the materials by Fuji Chimera Research Institute for DVD recorder and digital camera

Fig. 1-35 Vendor share by region in information services and software markets in the world (2006)



Based on the materials by Gartner

market share of 23.8% and 32.1%, respectively. On the other hand, the Japanese share of the desktop PC, workstation and server market is 6.1%, 3.6% and 6.8%, respectively: all less than 10%. In the storage market, Japan has a 13.0% market share (**Figure 1-36**).

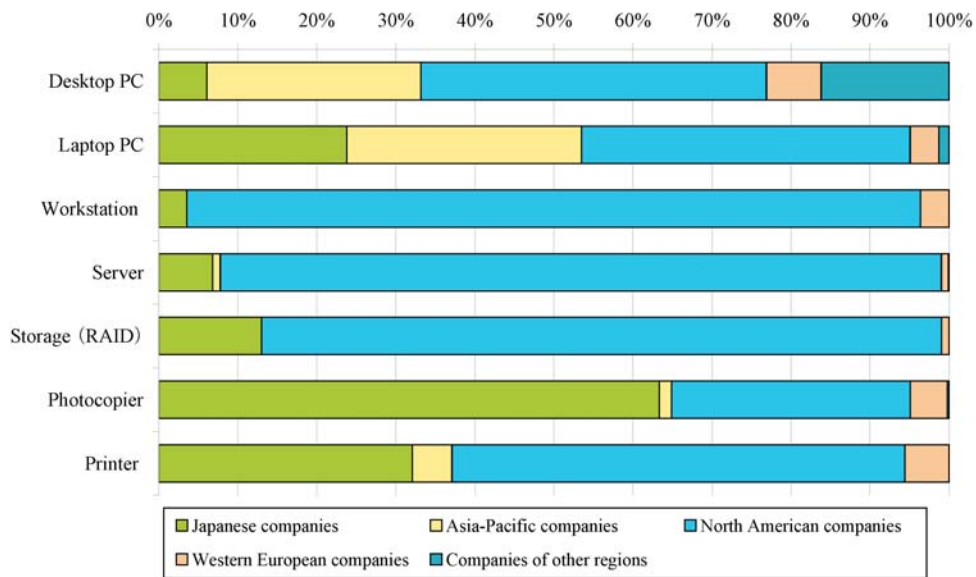
D. Device-related markets

Looking at corporate market share by region in the semiconductor device markets of the world, Japanese corporations have a relatively high market share compared with corporations in other regions in the market

for optoelectronics devices used for visual/image-related equipment, etc., and in the market for discrete semiconductors, which are electronic circuit elements including transistor diodes, etc., at 18.9% and 15.3%, respectively. Application Specific semiconductor devices and memories have a market share of 18.9% and 15.3%, respectively, but processors account only for 1.6%. (**Figure 1-37**).

Japanese companies and Asia-Pacific companies dominate the display device market. In the markets for LC devices for mobile phones and plasma displays, Japanese corporations have a market share of 51.1%

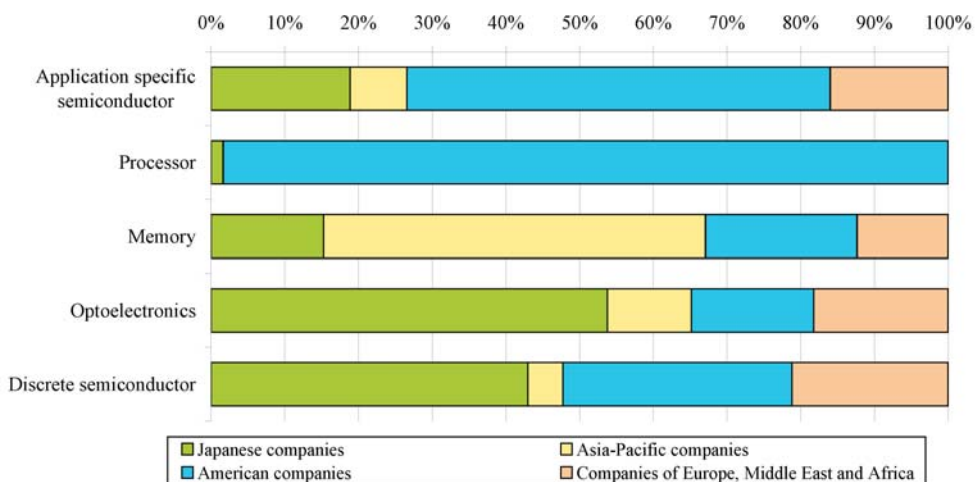
Fig. 1-36 Vendor share by region in information system-related terminal/device markets in the world (2007)



* Data for storage (RAID) are of 2006

Based on the materials by Gartner

Fig. 1-37 Vendor share by region in semiconductor device markets in the world (2006)



Based on the materials by Gartner

and 49.8%, respectively, sharing the markets with Asia-Pacific corporations. However, the market share of Japanese companies in the LC devices for TVs and PCs, which is the volume zone, is 15.7% and 2.3%, respectively, as those markets are dominated by Asia-Pacific companies (Table 1-38).

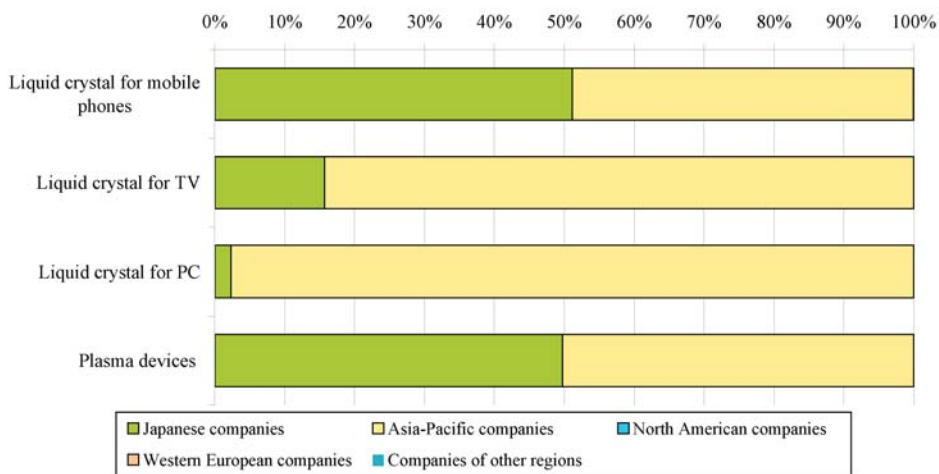
(3) Presence of Japan in ICT-related exports in the world

Looking at the market share by region of ICT-related exports in the world, China's export value market share is high for all products, establishing itself

as the world's production base. However, countries in the Asia-Pacific region such as South Korea and Taiwan hold large shares for semiconductor devices.

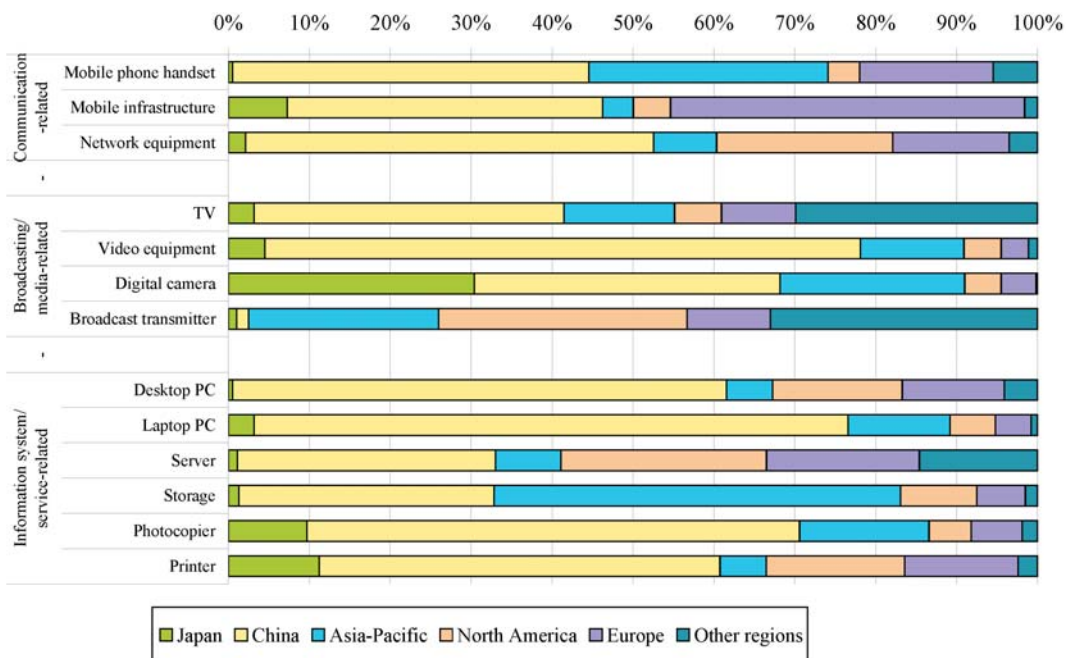
Japan's share is less than 10% except for only a few products. In particular, its share does not reach 5% for many terminal equipment products. In North America, there are many products with a high corporate market share but there are not many products with an export share as high as the corporate market share, which indicates that many production factories have been transferred overseas, such as to China (Figure 1-39 and Figure 1-40).

Fig. 1-38 Vendor share by region in display device markets in the world (2007)



Based on the materials by Display Search

Fig. 1-39 Export value share by region of ICT-related terminals and devices in the world (2007)



Based on the materials by World Trade Atlas

3. Challenges for strengthening the competitiveness of the ICT industry

(1) Degree of overseas presence of ICT companies and their profitability

Japanese companies tend to not go out into markets abroad unless they hold large domestic market shares. This is because the domestic market is highly competitive, which keeps the business size per company small, and they cannot enjoy economies of scale to start businesses abroad (Fig. 1-41).

On the other hand, North American companies tend to increase their shares abroad even if they do not hold large market shares in their own countries. It is suggested that they have in view global business operations from the start (Fig. 1-42).

Looking at business profits, ICT vendors in Japan are the world's top-class performers in terms of sales, but strong sales do not result in large operating income (Figure 1-43).

ICT vendors in the United States are achieving sales and operating income in both domestic and overseas markets in a well-balanced manner, obtaining large operating income ratio. On the other hand, domestic business takes up about 80% of operating income for ICT vendors in Japan, and their operating income ratio of overseas business is generally low (Fig. 1-44 and 1-45).

(2) Business environment surrounding ICT industry

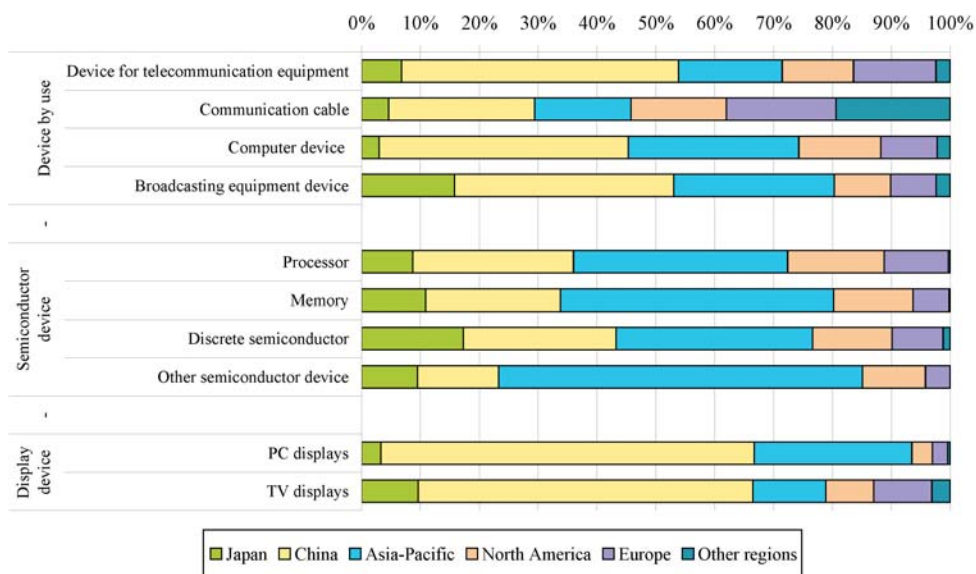
Looking at the year when the major ICT vendors

were established, the majority were firms of long-standing in Japan, established in the pre-War period or right after the War. However, in North America, new corporations are being established continuously, growing into big businesses. In Japan, it would seem to be important to develop an environment that will generate new companies continuously and also grow into big businesses (Figure 1-46).

Many of the founders of major newly emerging ICT companies in the U.S. have majored in engineering, such as computer science, etc. On the other hand, many of the founders of newly emerging ICT companies in Japan have majored in humanities, such as economic and business administration, etc. Since universities, etc. in the U.S. are providing human resource development programs in cooperation with outside companies and investors, it would seem to be crucial for Japan to develop human resources with knowledge of both business and technology (Figure 1-47).

Looking at the number of patent applications submitted to WIPO in the field of advanced ICT, Japan's share is less than 10% in many sectors. Japan's share of the number of patents in all fields including those other than ICT is 16.6%. When compared with this figure, the number of patent applications in the ICT field is generally at a low level. It would seem to be necessary to further enhance an intellectual property strategy (Figure 1-48).

Fig. 1-40 Export value share by region of ICT-related devices in the world (2007)



Based on the materials by World Trade Atlas

Fig. 1-41 Market shares of Japanese companies in their own region and outside

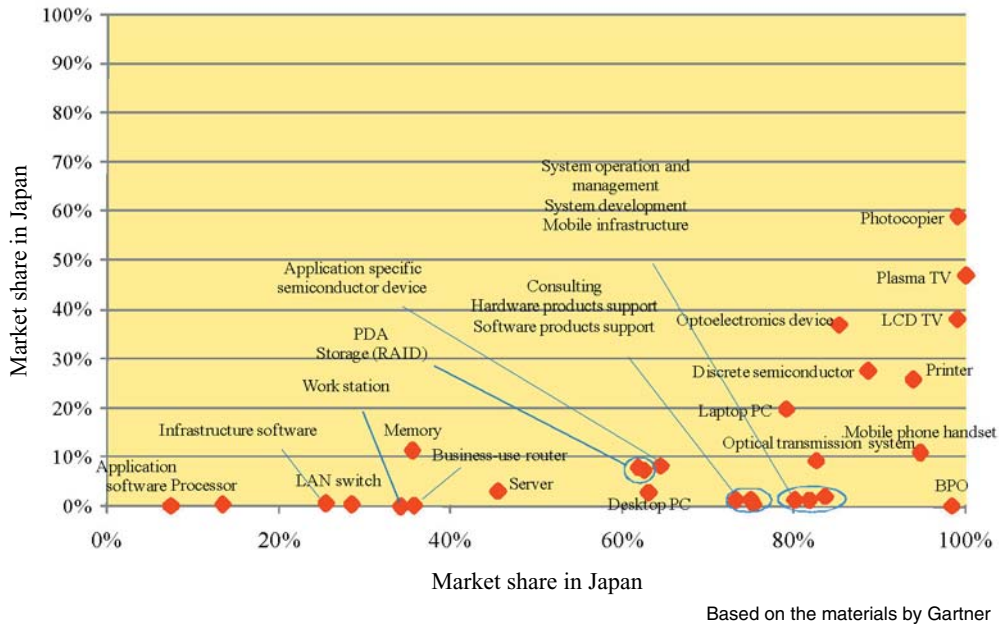


Fig. 1-42 Market shares of North American companies in their own region and outside

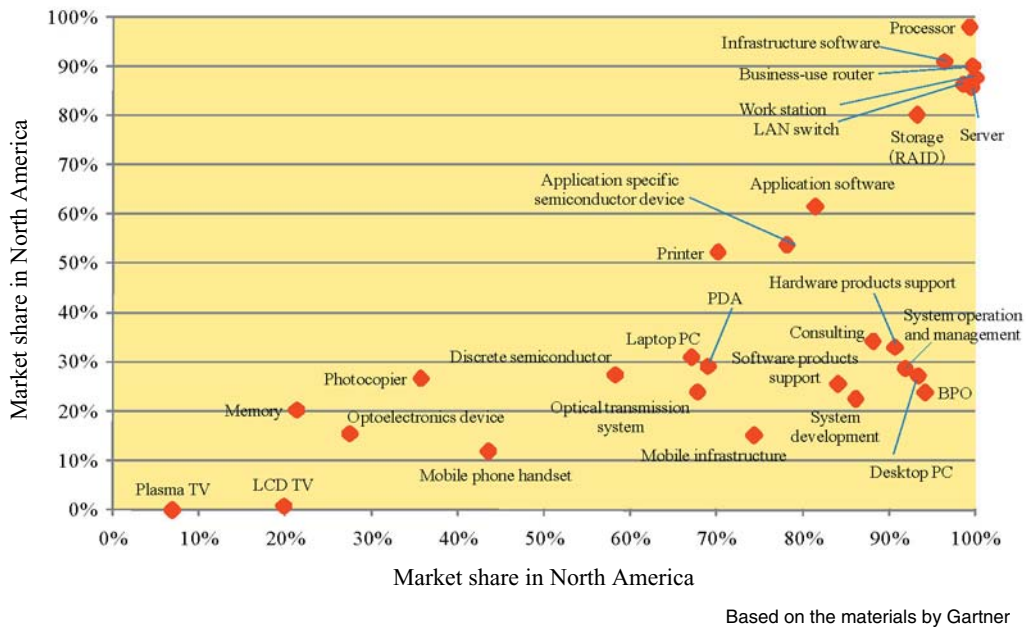
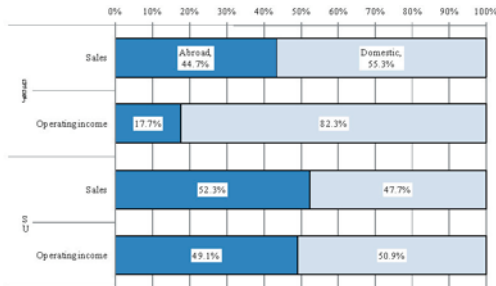


Fig. 1-43 World's top ICT vendors in terms of sales and business profits

■ Companies with large sales				■ Companies with large operating income			
Rank	Corporate name	Country	Sales (100 million dollar)	Rank	Corporate name	Country	Operating income (100 million dollar)
1	Siemens	Germany	1059.2	1	Microsoft	U.S.	190.4
2	Samsung Electronics	South Korea	918.6	2	IBM	U.S.	122.1
3	Hitachi	Japan	917.3	3	Samsung Electronics	South Korea	96.9
4	HP	U.S.	916.6	4	Cisco	U.S.	87.0
5	IBM	U.S.	914.2	5	Nokia	Finland	68.0
6	Matsushita Electric Industrial	Japan	815.3	6	HP	U.S.	67.7
7	Sony	Japan	742.6	7	Siemens	Germany	67.6
8	Toshiba	Japan	637.0	8	Intel	U.S.	62.1
9	Dell	U.S.	574.2	9	Oracle	U.S.	61.3
10	Nokia	Finland	542.2	10	Canon	Japan	59.3
11	Microsoft	U.S.	511.2	11	Apple	U.S.	44.1
12	LG Electronics	South Korea	498.3	12	Motorola	U.S.	41.6
13	Fujitsu	Japan	456.5	13	Matsushita Electric Industrial	Japan	41.1
14	Motorola	U.S.	428.8	14	Ericsson	Sweden	39.9
15	NEC	Japan	416.5	15	Google	U.S.	35.9
16	Hon Hai	Taiwan	405.2	16	Texas Instruments	U.S.	33.7
17	Philips	Germany	355.7	17	SAP	Germany	33.7
18	Intel	U.S.	353.8	18	Dell	U.S.	31.7
19	Cisco	U.S.	349.2	19	Qualcomm	U.S.	28.4
20	Canon	Japan	348.9	20	Hon Hai	Taiwan	23.6

* Data are of ICT vendors with consolidated sales in FY2006 of 1 trillion yen for Japanese companies and 8 billion US dollars for overseas companies. Based on the materials by Thomson Reuters

Fig. 1-44 Regional comparison of sales and operating income for major ICT vendors of Japan and the U.S. (FY2006)



Based on the materials by Thomson Reuters

Fig. 1-45 Domestic operating income ratio and overseas operating income ratio of major ICT vendors of Japan and the U.S.

	Domestic	Abroad
Japan	6.4%	1.8%
U.S.	15.6%	13.7%

Based on the materials by Thomson Reuters

Fig. 1-46 Founded years of major ICT vendors in the world

	Japan	North America	Europe	Asia
1990~		Google 1998	(Infineon) 1999	(AU Opticonics) 2001
1980~	(NTT Data) 1988	Qualcomm 1985	(STMicroelectronics) 1987	Asustek 1990
		Dell 1984		Quanta 1988
1970~		Cisco 1984		Lenovo 1984
		Sun Microsystems 1982		Compal 1984
1960~		Seagate 1979	SAP 1972	Acer 1976
		EMC 1979		Hon Hai 1974
1950~		Oracle 1977		
		Apple 1976		
1930~		Microsoft 1975		
		SAIC 1969	(Nokia) 1967	Samsung 1969
1900~		Intel 1968	CapGemini 1967	
		EDS 1962		
~1900	Kyocera 1959	CSC 1959		LG 1958
1900~	Sanyo Electric 1950			
	Sony 1946	Tyco Electronics 1941		
1900~	Seiko Epson 1942	HP 1939		
	Canon 1937	Texas Instruments 1930		
1900~	Ricoh 1936			
	Konica Minolta 1936			
1900~	Sharp Corporation 1935			
	Fujitsu 1935			
1900~	Matsushita Electric Indust 1935			
	FujiFilm 1934			
1900~	Mitsubishi Electric 1921	Motorola 1928		
	Hitachi 1920	IBM 1914		
1900~	Olympus 1919	Xerox 1906		
	Toshiba 1904			
~1900	NEC 1899	Nortel 1895	Alcatel-Lucent 1898	
		Eastman Kodak 1880	Philips 1891	
			Ericsson 1876	
			Siemens 1847	

* () shows companies founded as a spin-off from an existing company or through business integration

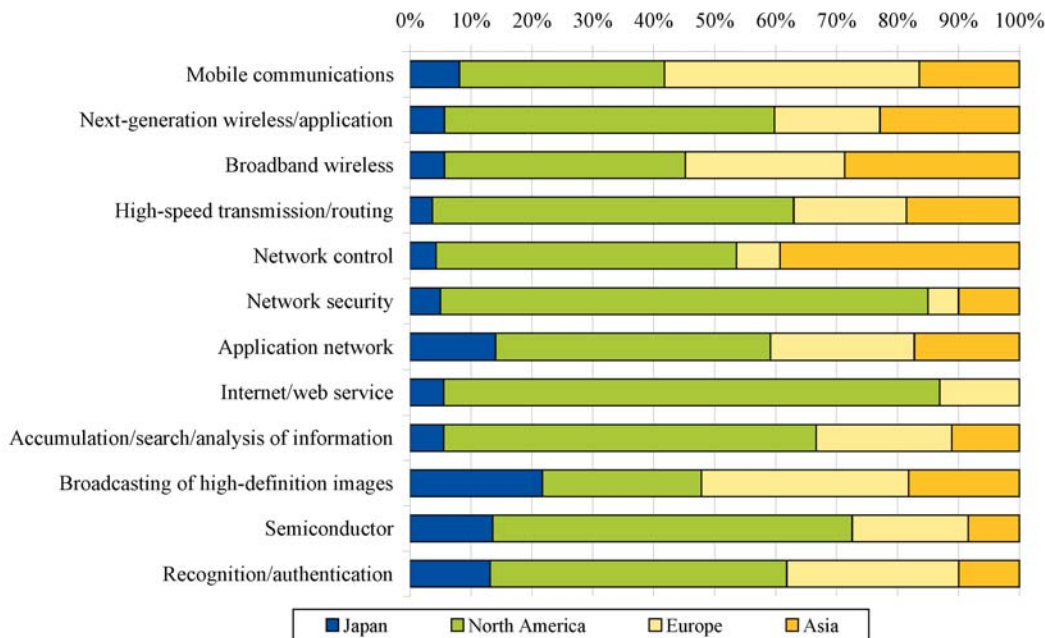
Based on the materials released by each company

Fig. 1-47 Background of the founders of new ICT companies in the United States

Year founded	Name of founder	Academic background		Major	Major	
					Humanities	Science and technology
1998	Sergey Brin	Stanford University	Master	Computer science		○
	Larry Page	Stanford University	Master	Computer science		○
1995	David Filo	Stanford University	Master	Electrical engineering		○
	Jerry Yang	Stanford University	Master	Electrical engineering		○
1995	Pierre Omidyar	Tufts University	Bachelor	Computer science		○
1985	Irwin Jacobs	Massachusetts Institute of Technology	Doctor	Computer science, Electrical engineering		○
	Andrew Viterbi	University of Southern California	Doctor	Communication engineering		○
1984	Len Bosack	Stanford University	Master	Computer science		○
	Sandy Lerner	Stanford University	Master	Computer science		○
	Scott McNealy	Stanford University	Master	Business	○	
1982	Vinod Khosla	Indian Institute of Technology Delhi	Bachelor	Electrical engineering		○
		Stanford University	Master	Business	○	
	Andy Bechtolsheim	Stanford University	Doctor	Computer science, Electrical engineering		○
1982	John Warnock	University of Utah	Doctor	Computer science		○
	Charles Geschke	—	—	—		
1979	Richard Egan	Northeastern University	Bachelor	Electrical engineering		○
	Roger Marino	—	—	—		
1975	Bill Gates	Harvard University	Bachelor	Computer science		○
	Paul Allen	—	—	—		

Based on the materials released by each company

Fig. 1-48 Share of the number of ICT-related patent applications to WIPO by region (2002-2007)



(Source) “Study on the Cross-Country Comparison on R&D in ICT Field”

4. Improvement of corporate productivity through the use of ICT

(I) Comparison of U.S.-Japanese investment for informatization

Real investment for informatization in 2006 in Japan was recorded at 19.2 trillion yen, or with an increase of 7.1% over the previous year and the percentage of investment for informatization among private investment is 22.2%. On the other hand, real

investment for informatization in 2006 in the U.S. recorded 448.6 billion US dollars, up by 11.9% from the previous year, and the percentage of investment for informatization among private investment is 34.0%.

When the change in real investment for informatization is compared between Japan and the U.S., while the investment for informatization in Japan in 2006 grew by 1.88, that in U.S. grew by 3.73. The growth rate of the U.S. is about twice that of Japan (Figure 1-49).

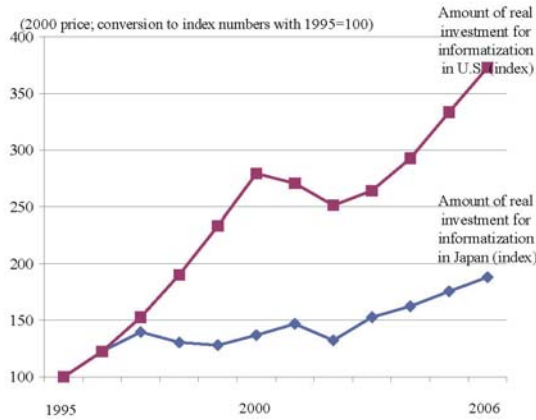
(2) Comparison of ICT capital stock between Japan and the U.S.

Japan's ICT capital stock in 2006 increased by 6.6% from the previous year to 42.2 trillion yen and the ratio of ICT capital stock to private capital stock is 3.6%. ICT capital stock for the U.S. in 2006 grew by 9.9% from the previous year to 976.9 billion US dollars, and the ratio of ICT capital stock to private capital stock was 8.3%. When a change in ICT stock is compared between Japan and the U.S., while Japan's ICT capital stock grew by 1.99, that of the U.S. grew by 3.77 from 1995 to 2006. The growth rate of the U.S. is nearly twice that of Japan (Figure 1-50).

(3) TFP growth and improvement of labor productivity

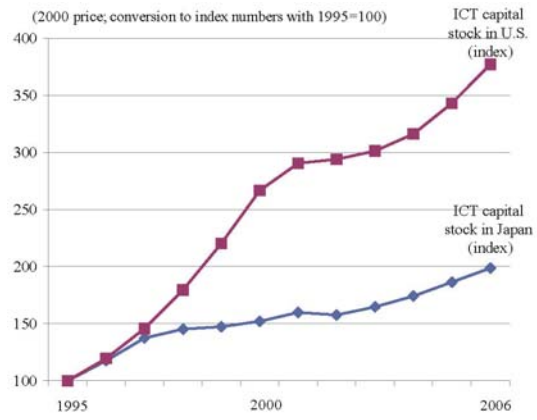
Labor productivity in the U.S. has been improving consistently since 1990, with a growth rate of 2.7% from 2000 to 2006. On the other hand, labor productivity in Japan has remained virtually unchanged, and the growth rate from the same period is lower than that of the U.S. at 2.1%. When factors contributing to labor productivity growth are compared, it is observed that the growth of labor productivity in the U.S. is largely attributed to TFP growth, whereas labor productivity growth in Japan is largely dependent on capital deepening (Figure 1-51).

Fig. 1-49 Comparison of Japan-U.S. change in real investment for informatization



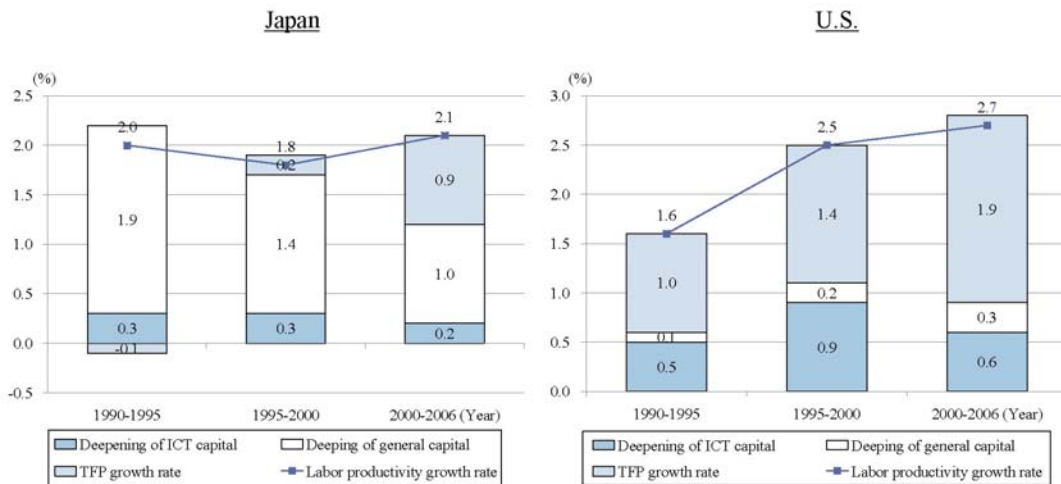
(Source) "Survey on Economic Analysis of ICT"

Fig. 1-50 Comparison of Japan-U.S. change in ICT capital stock



(Source) "Survey on Economic Analysis of ICT"

Fig.1-51 Contribution of TFP growth to the growth of labor productivity



(Source) "Survey on Economic Analysis of ICT"