

# **2008 White Paper**

## **Information and Communications in Japan**

### **“Realization of Dynamic Ubiquitous Network Society”**

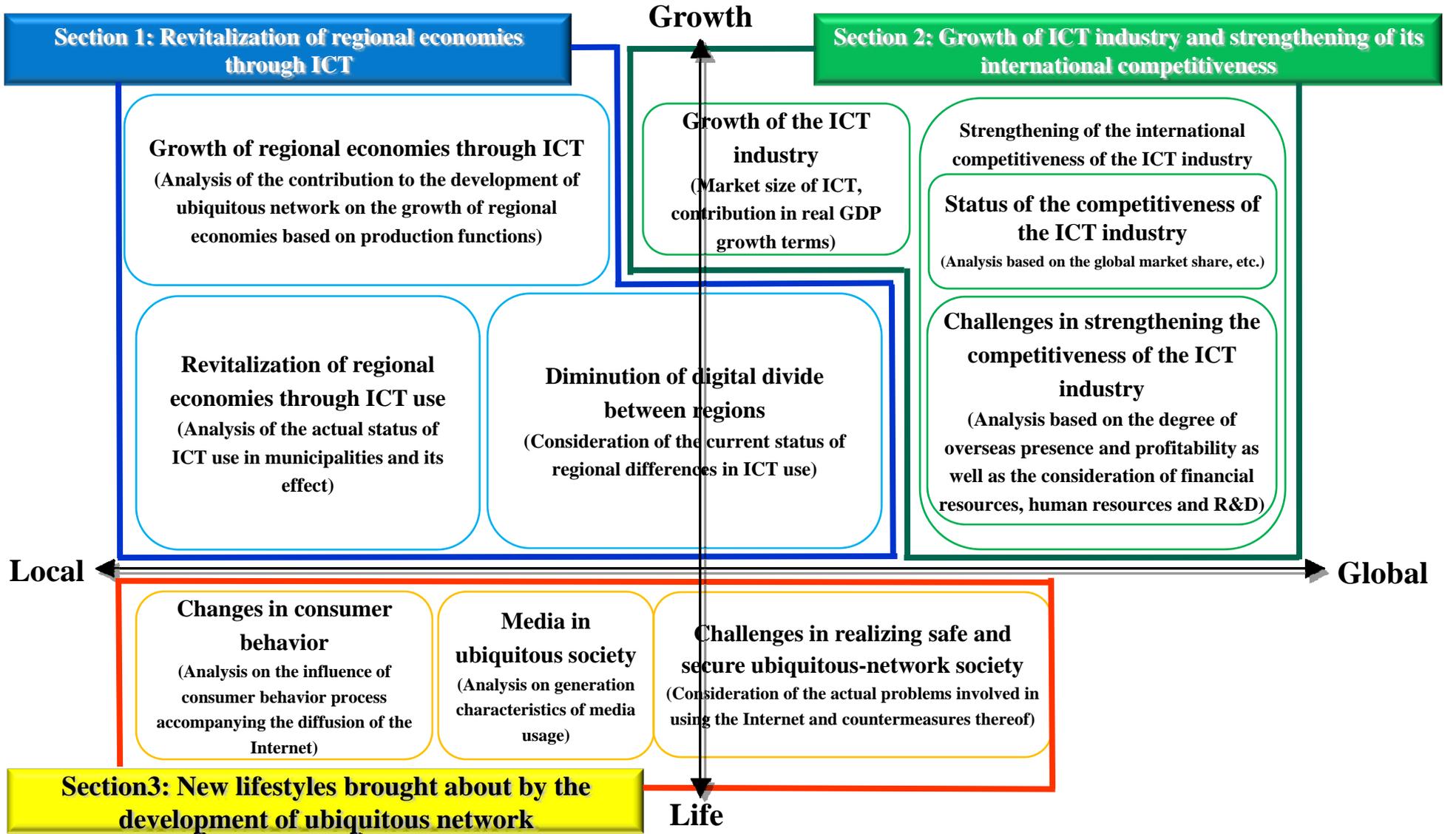
#### **<Outline>**

**July, 2008**

**Ministry of Internal Affairs and Communications, JAPAN**

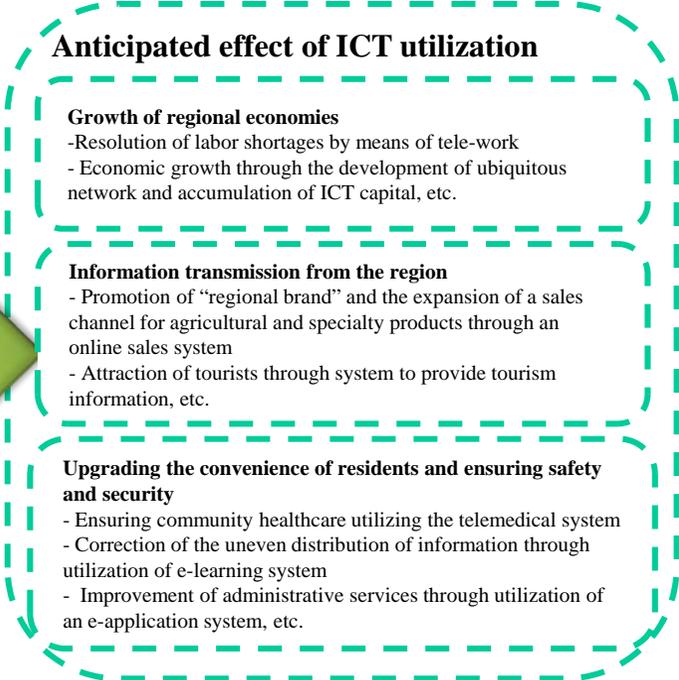
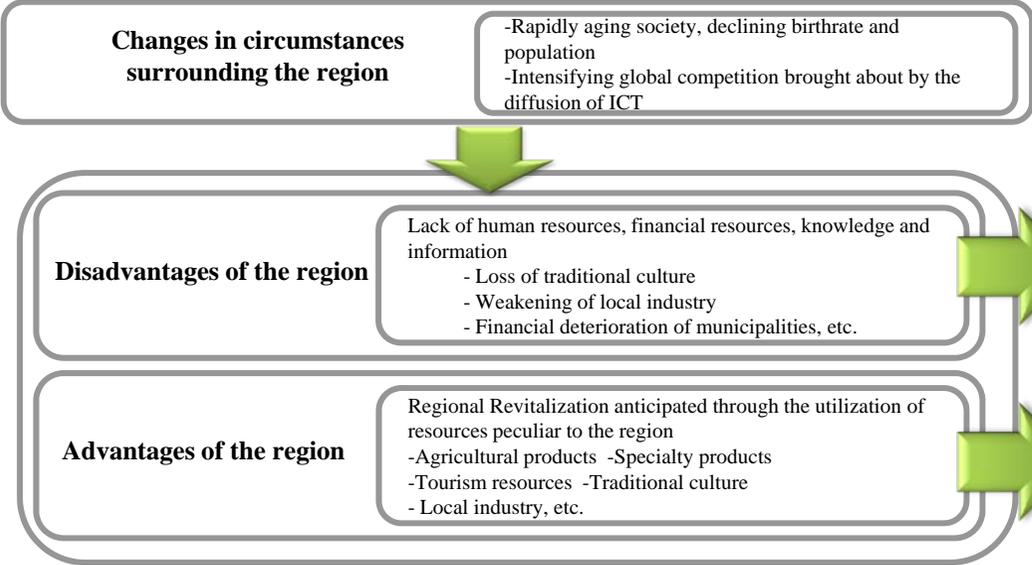
# Feature: “Realization of Dynamic Ubiquitous Network Society”

Research and analysis on the influence that the development of ubiquitous network and the globalization of economic activity have on economic growth, regional economies, business activities and people’s lives



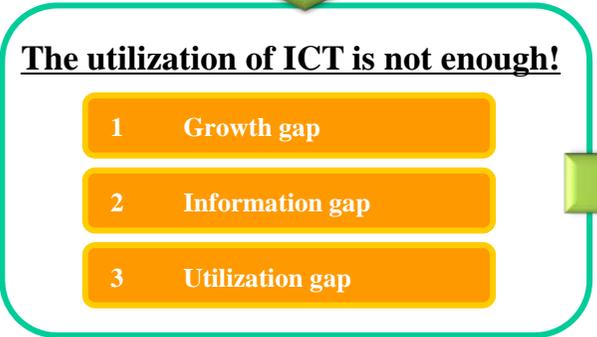
# 1 Revitalization of Regional Economies through ICT(Overall Picture)

## 1. Current status



## 2. Analysis of challenges

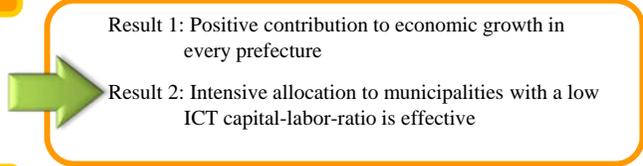
Utilization of ICT is effective in overcoming regional disadvantages and promoting regional advantages.



### Growth of regional economies through ICT (1-(1))

Analysis 1: Influence of ICT capital accumulation and “network economy” on regional economies

Analysis 2: Allocation of ICT capital to efficiently raise the real GDP



### Resolution of the digital divide among regions (1-(2))

Analysis 1: Current status of regional digital divide

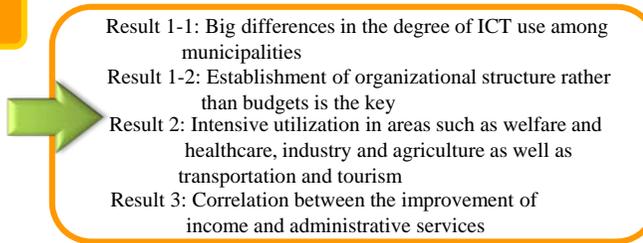


### Revitalization of regional economies through ICT use (1-(3))

Analysis 1: State of the utilization of ICT in municipalities and key factors for utilization

Analysis 2: Utilization of ICT to overcome regional disadvantages (depopulation, aging society)

Analysis 3: Relation between the state of the utilization of ICT and regional revitalization



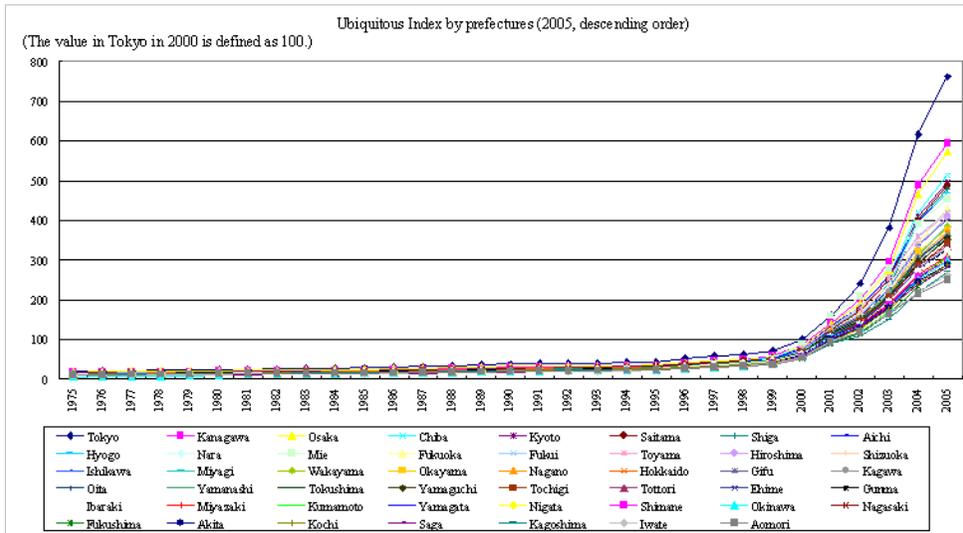
# 1 Revitalization of Regional Economies through ICT

## (1) Growth of Regional Economies through ICT

○If we look at the trends in ubiquitous network development in each prefecture, the index figures for Tokyo have become 7.6 times larger between 2000 and 2005 and that of Aomori which became 4.7 times larger (Fig. 1-1).

○Effect of “network economy” and utilization of ICT capital on the growth of real gross prefectural product shows positive contribution in all prefectures, with the contribution ratio exceeding 50% in 35 prefectures. The contribution ratio is expected to increase further in 2011 (Fig. 1-2, Fig. 1-3).

Fig. 1-1 Trends in Ubiquitous Index of each prefecture



# 1 Revitalization of Regional Economies through ICT

## (1) Growth of Regional Economies through ICT

○ Focusing on the prefectural ICT capital-labor-ratio (\*), it was assumed that the 1% growth in ICT capital used in a prediction on the previous page (Fig. 1-3) was allocated to the top 10, top 20, all 47, lowest 20 and lowest 10 prefectures respectively, and the changes in the real GDP in Japan in 2011 were estimated (Fig. 1-4, Fig. 1-5).

○ As a result, the increase of GDP was largest in the case where the increased capital is allocated to the 10 prefectures where the ICT capital-labor-ratio is the lowest, representing a difference of one trillion yen compared to the case of allocating to the top 10 prefectures. This shows that because the marginal effect is larger when the capital is allocated intensively to municipalities with low ICT capital-labor-ratio, the effect on the increase of real GDP in Japan is stronger (Fig. 1-6).

(\*) ICT capital-labor-ratio is ICT capital stock per employed worker.

Fig. 1-4 Accumulation of ICT capital assumed in a simulation

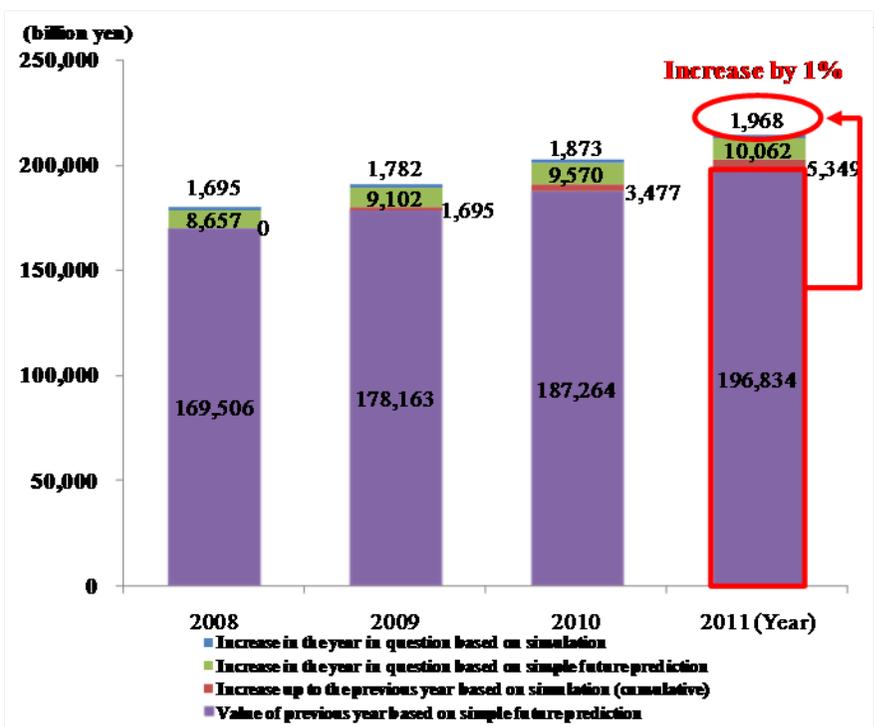


Fig. 1-5 ICT capital-labor-ratio by prefecture (2005)

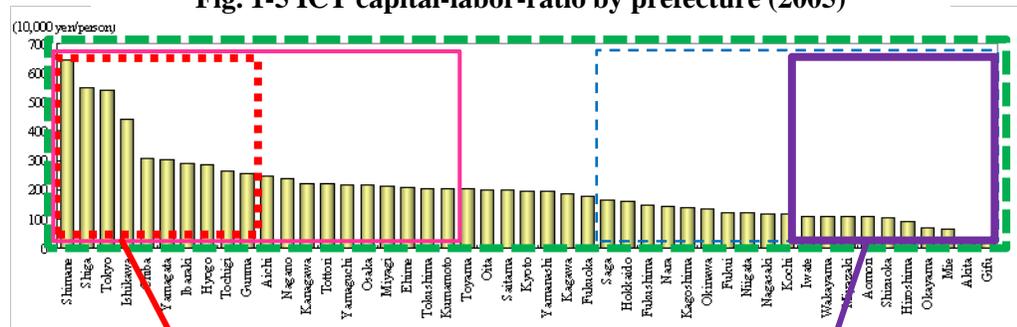
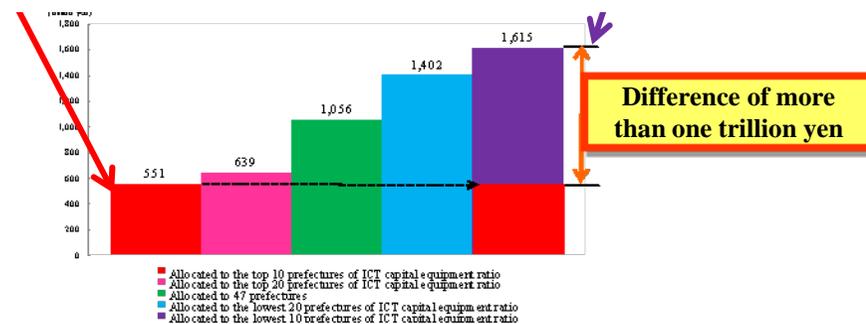


Fig. 1-6 Difference in the increase of GDP in Japan in 2011 when the increased ICT capital is allocated according to ICT capital-labor-ratio with the result of simple prediction



From Fig. 1-4 to Fig. 1-6 (Source): "Survey on Regional Economic Growth Brought about by the Development of Ubiquitous Network"

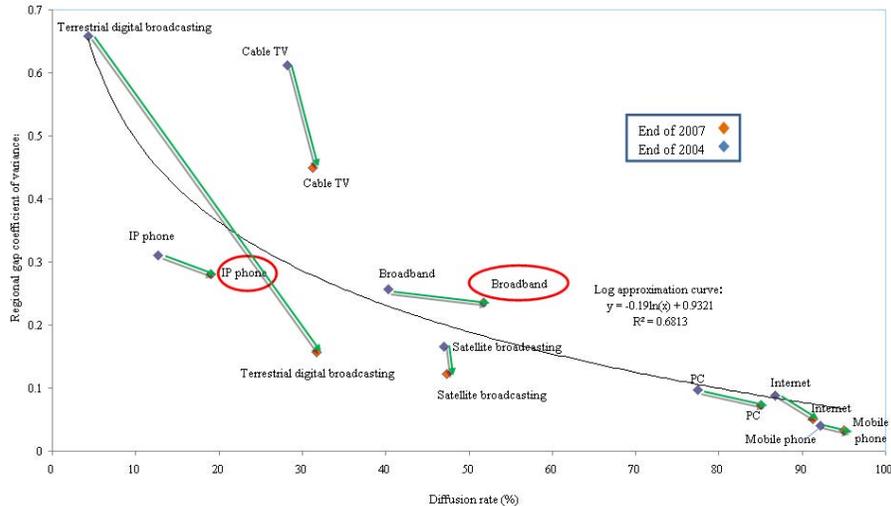
# 1 Revitalization of Regional Economies through ICT

## (2) Dissolution of Digital Divide among Regions

○ In households, the diffusion ratio increased for all items and the regional gap is decreasing. However, the coefficient of variances for broadband and IP phones is unchanged, and the regional gap is not narrowing. Differences in usage rate at the end of 2007 between the region with the highest usage and the region with the lowest usage account for 40.6 points for broadband and 17.9 points for IP phones (Fig. 1-7, Fig. 1-8).

○ Among corporations, regional divide in terms of broadband and the Internet is smaller compared to households. Usage of ASP/SaaS, business blogs, SNS and tele-work is not progressing much and there are also regional gaps (Fig. 1-9).

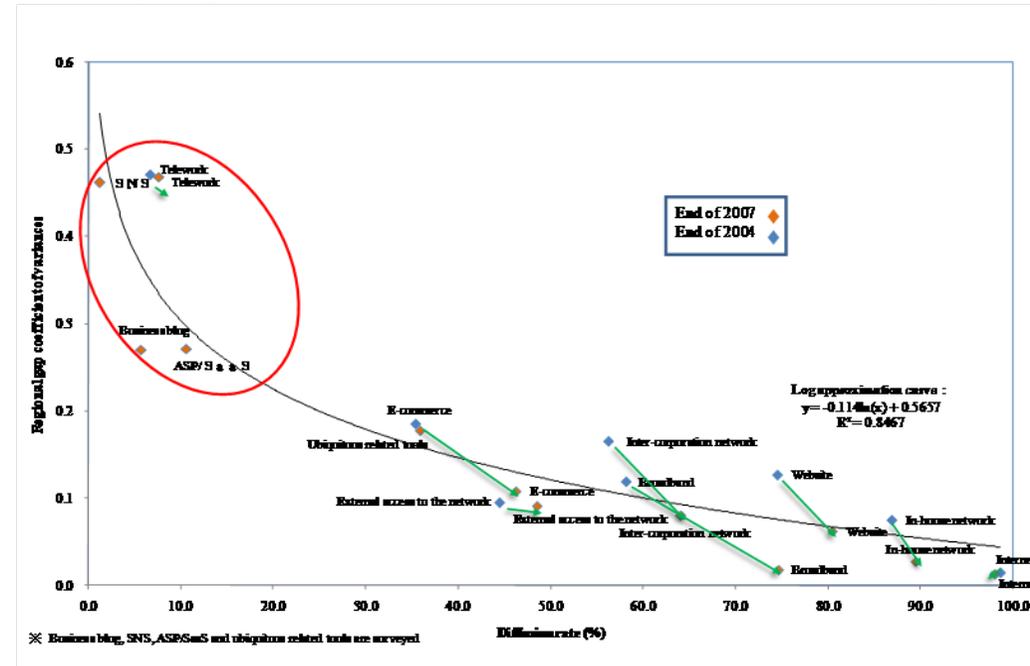
**Fig. 1-7 Usage of ICT in households and regional gap thereof**  
(Comparison of results as of the end of 2004 and the end of 2007)



**Fig. 1-8 Usage of ICT in households by region**  
(As of the end of 2007)

	Mobile phone ownership rate	PC ownership rate	Internet usage rate	Broadband usage rate	IP phone usage rate	Terrestrial digital broadcasting audience rating	Cable TV audience rating	Satellite broadcasting audience rating
Highest region	Hokuriku 99.4%	Hokuriku 94.1%	Hokuriku 96.0%	Hokuriku 73.4%	Kinki 29.2%	Minami Kanto 38.0%	Hokuriku 62.7%	Hokuriku 59.2%
Lowest region	Shikoku 89.8%	Shikoku 72.8%	Shikoku 81.6%	Tohoku	Chugoku 11.3%	Shikoku 20.5%	Tohoku 11.2%	Hokkaido 39.6%
Difference (points)	9.6	21.3	14.4	40.6	17.9	17.5	51.5	19.6

**Fig. 1-9 Usage of ICT in corporations and regional gap thereof**  
(Comparison of results as of the end of 2004 and the end of 2007)



# 1 Revitalization of Regional Economies through ICT

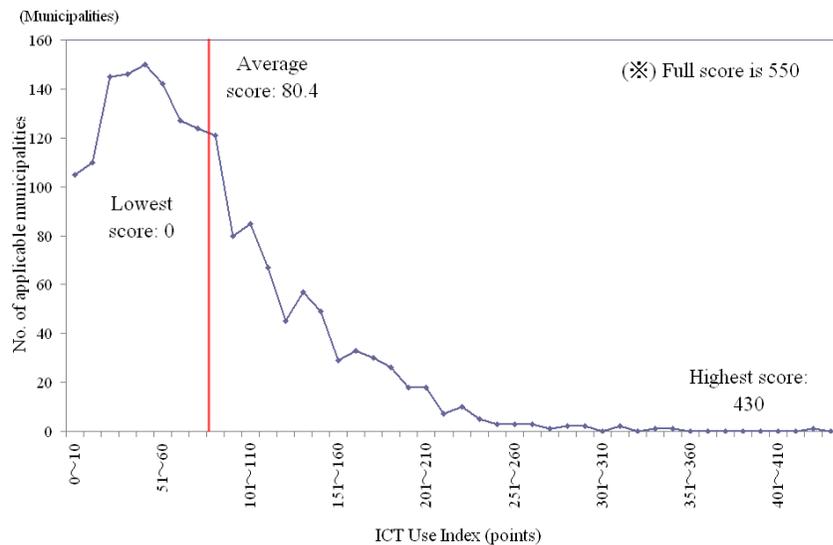
## (3) Regional Revitalization through Regional Informatization (Utilization of ICT)

○“The ICT Comprehensive Use Index” was created based on the utilization of the ICT system in municipalities, by calculating the scores (\*) of system functions of eight administrative fields (seven items for each field except for the transportation/tourism field with six items, 55 items in total) and the timing of introduction in each. Among the 1,748 municipalities, out of 550 the highest score was 430 and the lowest was 0, and the average was 80.4. The result shows that while there are municipalities taking a highly innovative approach, many municipalities are still not able to fully utilize ICT (Fig. 1-10).

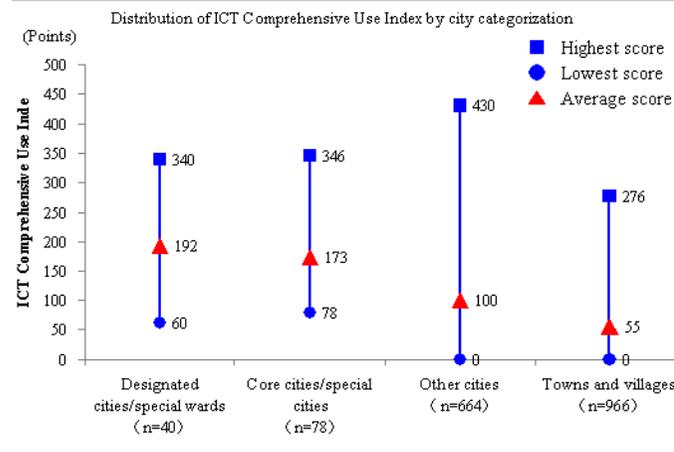
○Viewing the utilization of ICT by city categorization reveals that the average score is higher and the utilization level of ICT is higher among larger municipalities such as designated cities. However, there are also other municipalities scoring higher in terms of the ICT Comprehensive Use Index, which are taking proactive approaches (Fig. 1-11, Fig. 1-12).

(\*) Scores for each ICT system are calculated as 10 for an introduction in 2006 or before, 8 for an introduction in 2007 or after, and 0 for not being introduced.

**Fig. 1-10 Distribution of ICT Comprehensive Use Index**



**Fig. 1-11 Distribution of ICT Comprehensive Use Index by City Categorization**



**Fig. 1-12 Municipalities with high ICT Comprehensive Use Index**

Rank	Municipality	Score
1	Fujisawa City, Kanagawa Pref.	430
2	Hirakata City, Osaka Pref.	346
3	Osaka City, Osaka Pref.	340
4	Hiroshima City, Hiroshima Pref.	318
5	Nishinomiya City, Hyogo Pref.	316
6	Nagoya City, Aichi Pref.	300
7	Miyoshi City, Hiroshima Pref.	292
8	Sukagawa City, Fukushima Pref.	284
8	Kyoto City, Kyoto Pref.	284
10	Naganuma Town, Hokkaido Pref.	276

\* Shaded cities are cities or towns other than designated cities, core cities or special cities.

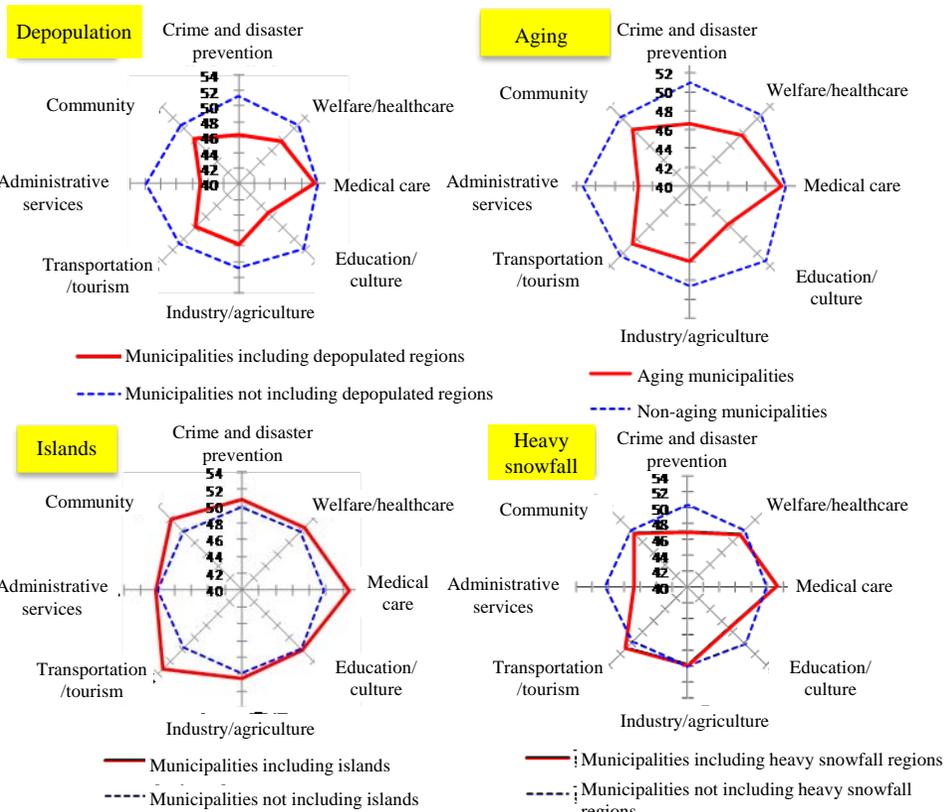
# 1 Revitalization of Regional Economies through ICT

## (3) Regional Revitalization through Regional Informatization (Overcoming Regional Disadvantages and the Utilization of ICT)

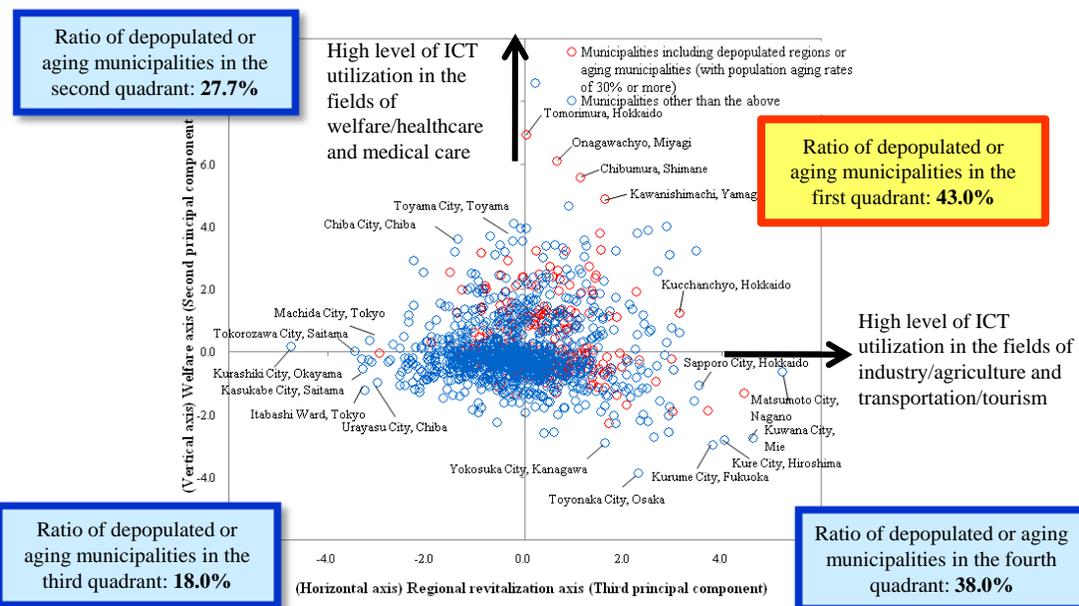
○ There are no major differences in the ICT Utilization Index in fields such as medical care, welfare and healthcare between aging municipalities and municipalities with depopulated areas, and others. However, the difference is greater in fields such as administrative services and education/culture. In municipalities including islands, ICT is utilized more in all fields compared to municipalities that do not utilize ICT (Fig. 1-13).

○ The result of principal component analysis also shows that more than 40% of municipalities utilizing ICT intensively in the welfare/healthcare, medical care, industry/agriculture and transportation/tourism field are depopulated or aging municipalities (Fig. 1-14).

**Fig. 1-13 ICT Utilization Index by Fields, viewed by the attribute of municipalities (converted into deviation score)**



**Fig. 1-14 Categorization of municipalities (“welfare” axis and “regional revitalization” axis)**



(\*) Fig. 1-14 plots 1,748 municipalities throughout Japan as a result of the principal component analysis, by using extracting welfare and regional revitalization axes as a new analysis axis to show the structure, such as the strength of relations between different ICT systems. Municipalities positioned on the upper side of vertical axis (welfare axis) are characteristic of intensive use of ICT in the fields of welfare/healthcare and medical care, while those positioned on the right side of vertical axis (regional revitalization axis) are utilizing ICT intensively in fields such as industry/agriculture and transportation/tourism.

# 1 Revitalization of Regional Economies through ICT

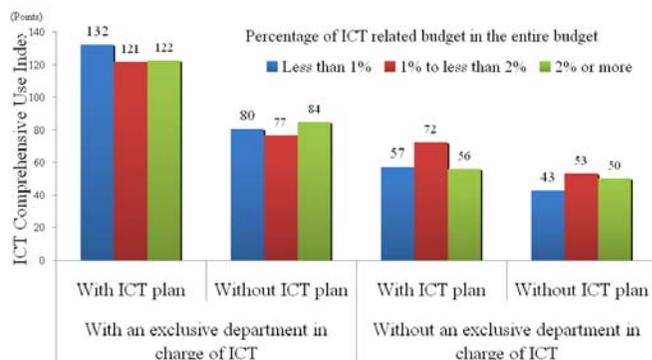
## (3) Regional Revitalization through Regional Informatization (Key Factors of ICT Utilization)

○When municipalities implementing both the establishment of organizational structure, such as the establishment of exclusive departments in charge of ICT, and the formulation of an ICT plan, are compared with municipalities implementing neither of them, the average score of the ICT Use Index differs significantly, with the former scoring more than double the latter. It shows that the establishment of organizational structure and the formulation of an ICT plan result in effective use of ICT (Fig. 1-15).

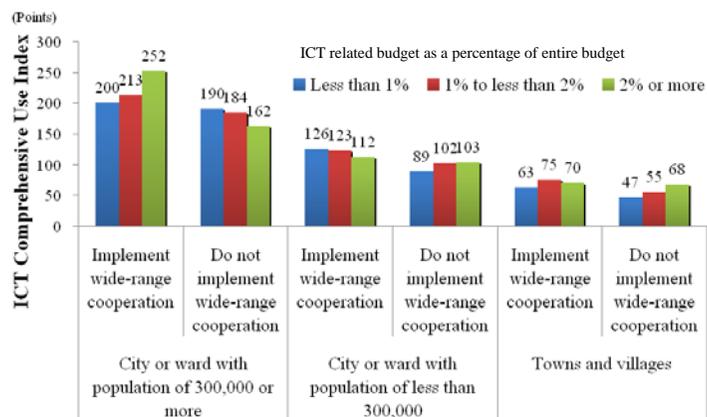
○ICT is utilized effectively in municipalities developing ICT systems based on wide-range cooperation. Therefore, it is considered that the joint development of systems by several municipalities will be the key in promoting efficient use of ICT (Fig. 1-16).

○Supportive measures by the government are effective in promoting the utilization of ICT in municipalities. However, even if the municipalities use such supportive measures, the average score of the ICT Use Index in municipalities with an established organizational structure is about twice as high as that in municipalities without such a system. It is important to establish organizational structure in order to take full advantage of supportive measures (Fig. 1-17).

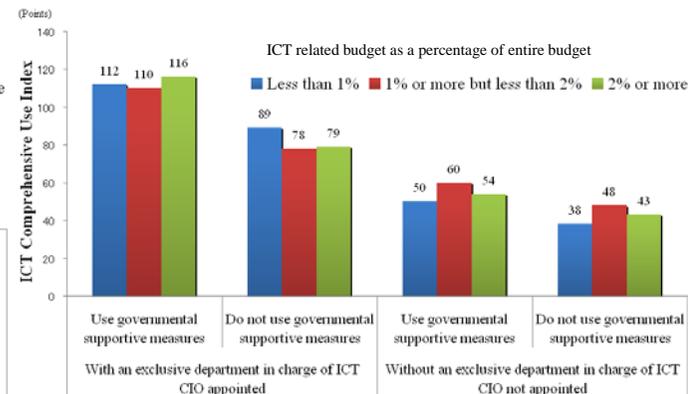
**Fig. 1-15 ICT Comprehensive Use Index (organizational structure, ICT plan, and ICT related budget percentage)**



**Fig. 1-16 ICT Comprehensive Use Index (Population size, wide-range cooperation, and ICT related budget percentage)**



**Fig. 1-17 ICT Comprehensive Use Index (organizational structure, use of governmental supportive measures, and ICT related budget percentage)**



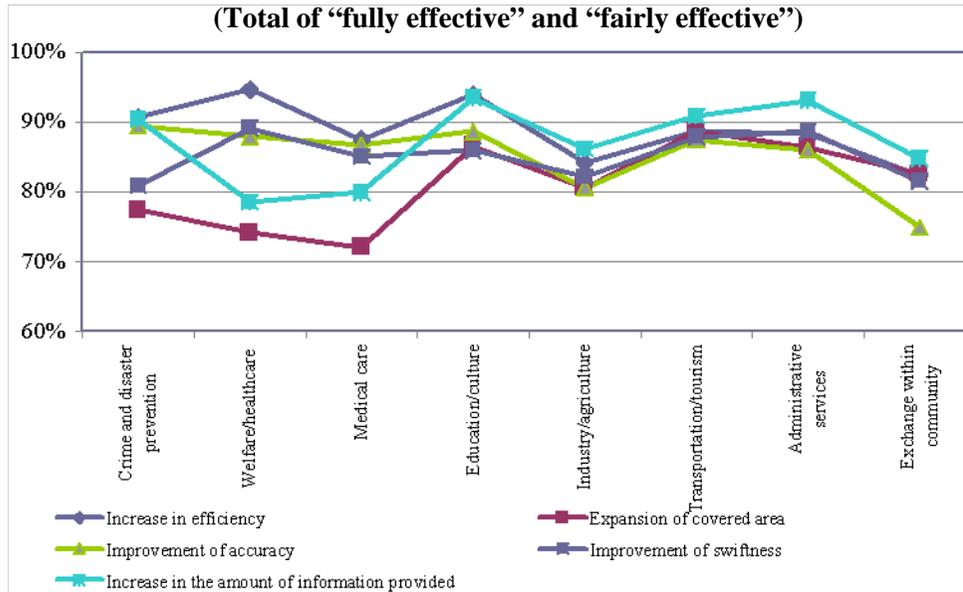
# 1 Revitalization of Regional Economies through ICT

## (3) Regional Revitalization through Regional Informatization (Evaluation by Municipalities on ICT Utilization)

○The results of subjective evaluation on the utilization of ICT by municipalities indicate that more than 70% of municipalities thought it was “effective” in all fields for all items (Fig. 1-18).

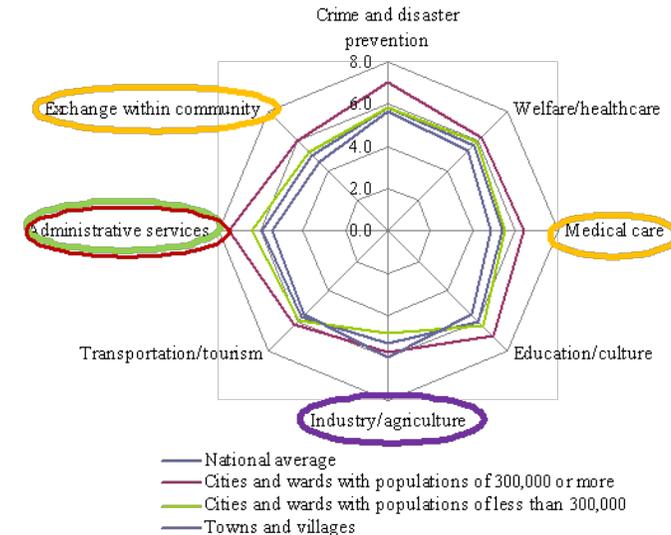
○When the evaluation of the effect of ICT utilization is viewed by population size, the average score is highest and the effect is felt in the administrative services field among cities and wards (both with populations of more than 300,000 and less than 300,000), and in the industry/agriculture field among towns and villages. In contrast, average scores are low and the effect is not felt in the fields of medical care and community fields. This is because the effect is not pronounced just by introducing systems, and separate care in terms of human resources in these fields will be required (Fig. 1-19).

**Fig. 1-18 Effect of ICT utilization in each field (Total of “fully effective” and “fairly effective”)**



(\*) In terms of the effect of ICT utilization, the total of the percentages of “fully effective” and “fairly effective” for five items, namely (i) improvement of the efficiency of administrative cost reduction, (ii) expansion of areas covered such as the offering of new administrative services, (iii) improvement of the accuracy of information and others, (iv) improvement of promptness such as the shortening of times to respond to the needs of residents, and (v) increase in the amount of information provided, has been calculated.

**Fig. 1-19 Effect of ICT utilization in each field by population size**



(\*)In terms of the effect of the utilization of ICT, for five items, namely (i) improvement of the efficiency of administrative cost reduction, (ii) expansion of areas covered such as the offering of new administrative services, (iii) improvement of the accuracy of information and others, (iv) improvement of promptness such as the shortening of times to respond to the needs of residents, and (v) increase in the amount of information provided, “fully effective,” “fairly effective” and other answers were counted with scores of 2, 1 and 0 respectively, and the average scores for the total scores in each field have been calculated.

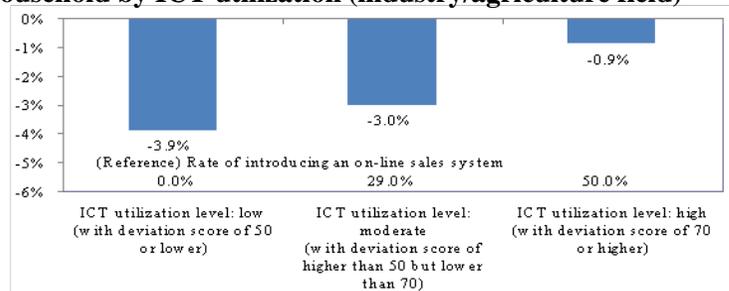
# 1 Revitalization of Regional Economies through ICT

## (3) Regional Revitalization through Regional Informatization (Relation between the Status of ICT Utilization and Regional Revitalization)

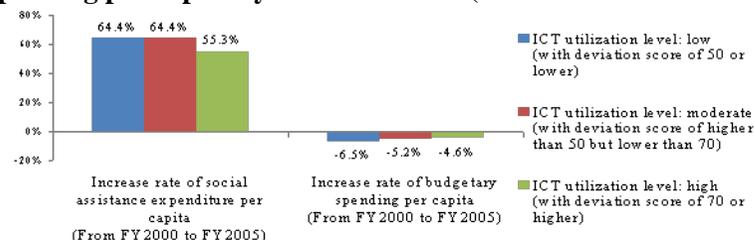
○Here, the relationship between the level of ICT utilization in each field is analyzed by means of various data. For instance, in the industry/agriculture field, the reduction rate of production agricultural earnings differ by 3 points between municipalities that intensively utilize ICT and municipalities that do not utilize ICT much. In the field of welfare/health care, there is a difference of 9.1 points in the increase rate of social assistance expenditure. Thus, a clear correlation was found between the level of ICT utilization and the increase rate in the production of agricultural earnings or the effect of the inhibitory effect on social assistance expenditure (Fig. 1-20, Fig. 1-21).

○In terms of the percentage of municipalities that are undertaking such efforts as the disclosure of administrative information, promotion of participation by residents in administration and improving the efficiency of administrative affairs, municipalities that utilize ICT in the field of administrative services is higher than those that do not. For example, the state of disclosing preliminary drafts during the process of formulating important policies or the state of accepting and issuing various certificates at places other than government offices and branches differ by about twice in the score (Fig. 1-22, Fig. 1-23)

**Fig. 1-20 Increase rate in production agricultural earnings per farming household by ICT utilization (industry/agriculture field)**



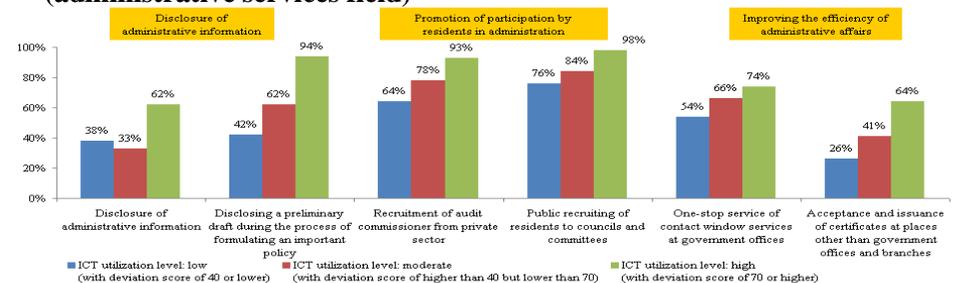
**Fig. 1-21 Increase rate of social assistance expenditure and budgetary spending per capita by ICT utilization (welfare/health care field)**



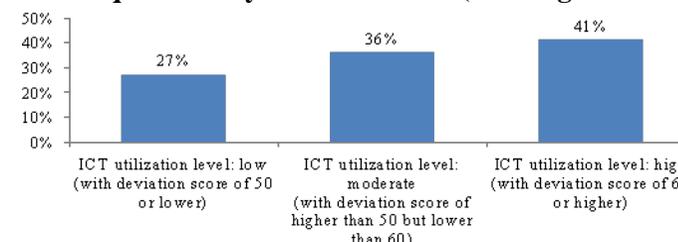
\* The data of the increase rate of social assistance expenditure per capita and the increase rate of budgetary spending per capita are based on the Study on the Settlement of Accounts by Municipalities by MIC.

(\*) Social assistance expenditure includes benefits paid by municipalities based on laws and regulations as a part of the social security system and expenditures related to social benefits offered independently by the municipality (e.g., social welfare costs, elderly welfare costs, child welfare costs)

**Fig. 1-22 Implementation of administrative services by ICT utilization (administrative services field)**



**Fig. 1-23 Current condition of rules that require answers to be provided residents' questions by ICT utilization (exchange within community field)**



\* The data of the state of the establishment of regulation stating answers to residents' opinions as obligatory are based on the Data of the Fifth Comparison Survey on the Administration of Municipalities throughout Japan, 2006 by the Nikkei Institute of Industry and Regional Economy.

(\*) Based on the values of the ICT Utilization Index by Fields converted into deviation scores in each field, 1,175 municipalities in the industry/agriculture field, 1,748 municipalities in the welfare/health care field and 739 cities and wards in the fields of administrative services and exchange within community, are categorized into three groups by the level of ICT utilization.

From Fig. 1-20 to Fig. 1-23 (Source): Investigative Study on Regional Informatization Approaches and Regional Revitalization

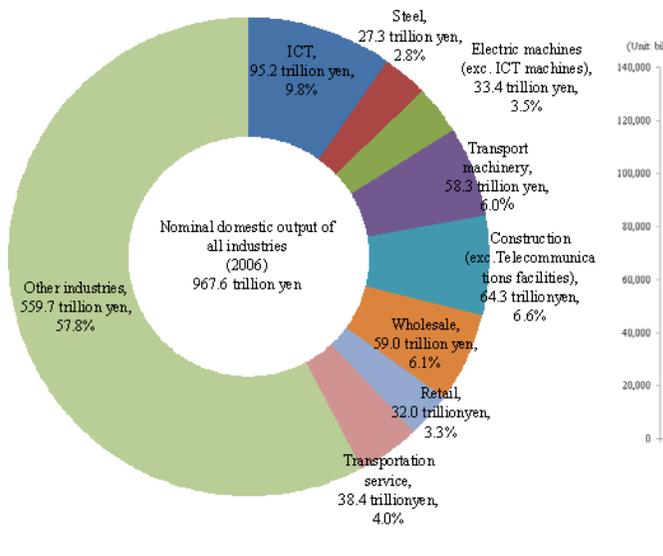
# 2 Growth of ICT industry and Strengthening of its International Competitiveness

## (1) Growth of the ICT Industry

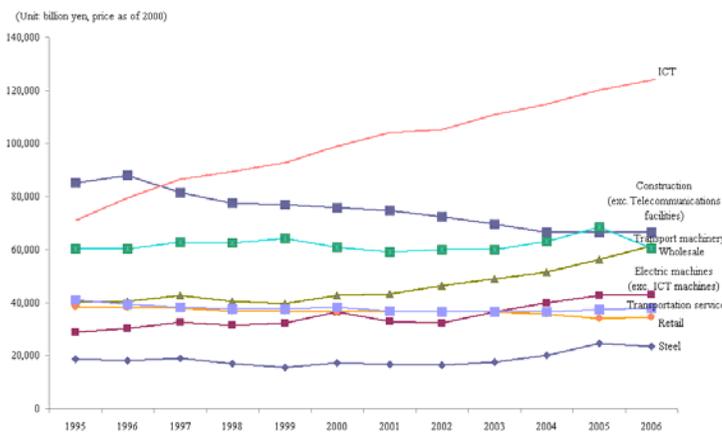
○ While the ICT industry accounts for about 10% of nominal domestic output and is the largest of all industries, its share of the entire industry is slightly decreasing. However, the real domestic output has been growing consistently since 1995, so it can be said that the ICT industry is an industry where price decline is quite notable compared to other industries (Fig. 2-1 to Fig. 2-3).

○ The contribution ratio of the ICT industry to real GDP growth was 37.0% in 2006. Thus, the ICT industry has an impact on economic growth (Fig. 2-4).

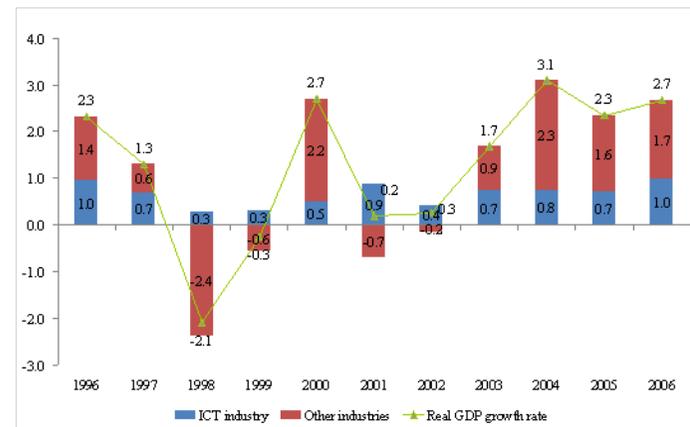
**Fig. 2-1 Nominal domestic output of major industries (2006)**



**Fig. 2-3 Trends in real domestic output of major industries**



**Fig. 2-4 Contribution of ICT industry to real GDP growth rate**



**Fig. 2-2 Trends in nominal domestic output of ICT industry**

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Amount (trillion yen)	93.4	94.2	98.9	98.3	94.8	94.6	94.1	94.3	95.2
Share in the entire industry (%)	9.9	10.1	10.4	10.5	10.4	10.4	10.2	9.9	9.8

(\*) The contribution of the ICT industry is the ratio of the contribution of the ICT industry in the real GDP growth rate. Therefore, the contribution of the ICT industry in the real GDP growth in 2006 is  $1.0/2.7=0.37$ .

## 2 Growth of ICT industry and Strengthening of its International Competitiveness

### (2) Status of the Competitiveness of the ICT Industry (Market Share and Growth Potential)

○The size of the Japanese market related to ICT accounts for about 10% of the global market. It is also a highly mature market and the growth is slowing down (Fig. 2-5).

○It is important to develop businesses in markets in the Asia-Pacific region, the Middle East, Africa, Eastern Europe and Latin America where future growth is anticipated in order to maintain the growth of the ICT industry (Fig. 2-6)

Fig. 2-5 Share of ICT related markets in the world by region (2007)

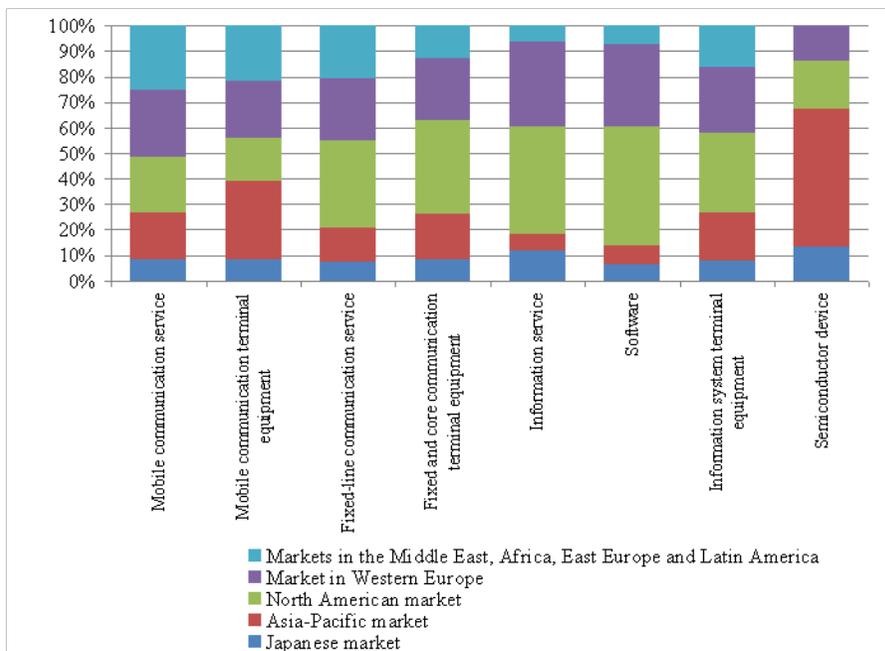
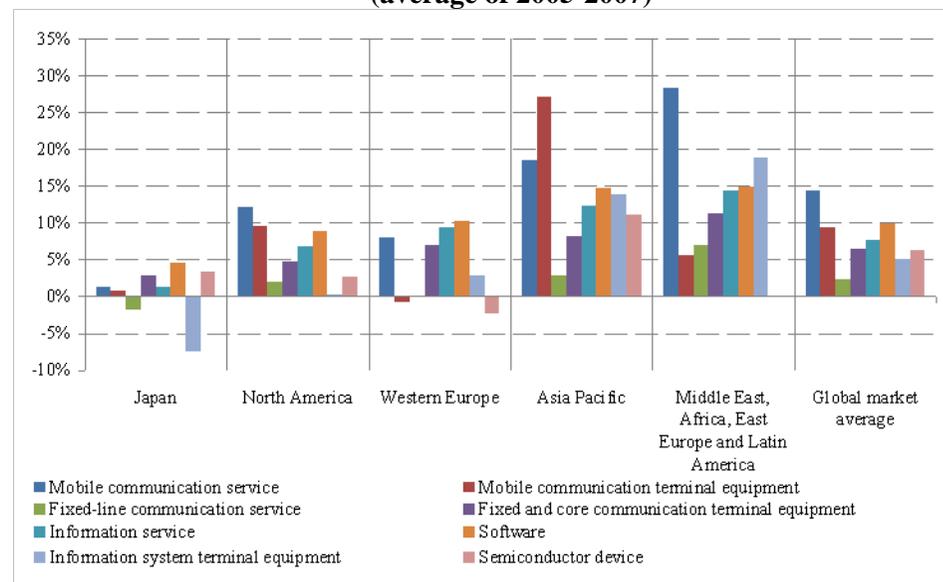


Fig. 2-6 Growth of ICT related markets in the world by region (average of 2005-2007)



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

■ Differences among markets in Latin America, Eastern Europe and the Middle East/Africa are as follows.

- Growth in mobile communication service, mobile communication terminal equipment and fixed-line communication service is higher in the Middle East/Africa than Latin America and Eastern Europe. (Average growth rates in 2005–2007 are as follows: mobile communication service: 39.2% in the Middle East/Africa, 15.0% in Eastern Europe, 26.5% in Latin America; mobile communication terminal equipment: 24.9% in Middle East/Africa, 11.2% in Eastern Europe, 15.7% in Latin America; fixed-line communication service: 9.8% in the Middle East/Africa, 1.7% in Eastern Europe, 6.7% in Latin America)

- Growth of information system terminal equipment is higher in Latin America than Eastern Europe and the Middle East/Africa, and the share is also larger.

(Average growth rates in 2005–2007 are as follows: 10.1% in Middle East/Africa, 21.5% in Eastern Europe, 22.7% in Latin America)

- Compared to markets given above, differences in growth between the Middle East/Africa, Eastern Europe and Latin America are smaller in other markets.

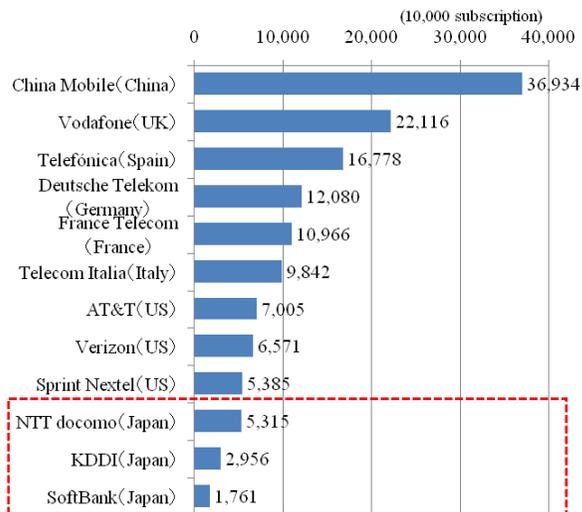
## 2 Growth of ICT industry and Strengthening of its International Competitiveness

### (2) Status of the Competitiveness of the ICT Industry (Presence of Japan (i))

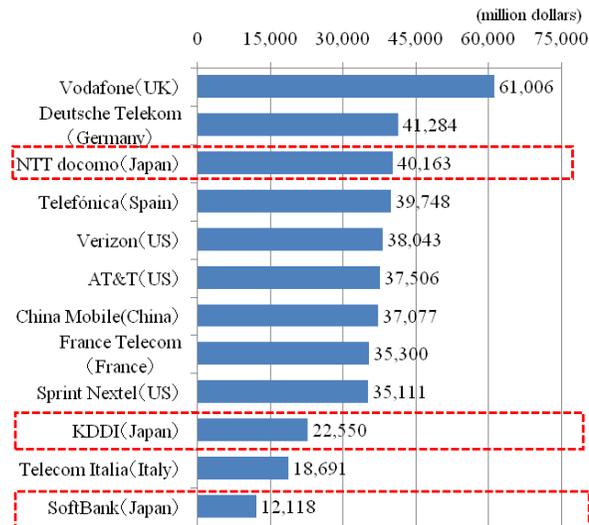
○ While the carrier in China is the world's largest in terms of the number of mobile communication service subscriptions, carriers in Japan, the United States and Europe are highly ranked in terms of sales (Fig. 2-7, Fig. 2-8).

○ As for major portal sites, while the U.S. operates its business globally, there are hardly any users of Japanese sites abroad (Fig. 2-9)

**Fig. 2-7 Number of service subscriptions of the world's major mobile communication carriers (by the end of 2007)**



**Fig. 2-8 Service sales of world's major mobile communication carriers (FY2006)**



**Fig. 2-9 Number of users in Japan, the United States and Europe of major websites in Japan and the United States (January 2008, household users)**

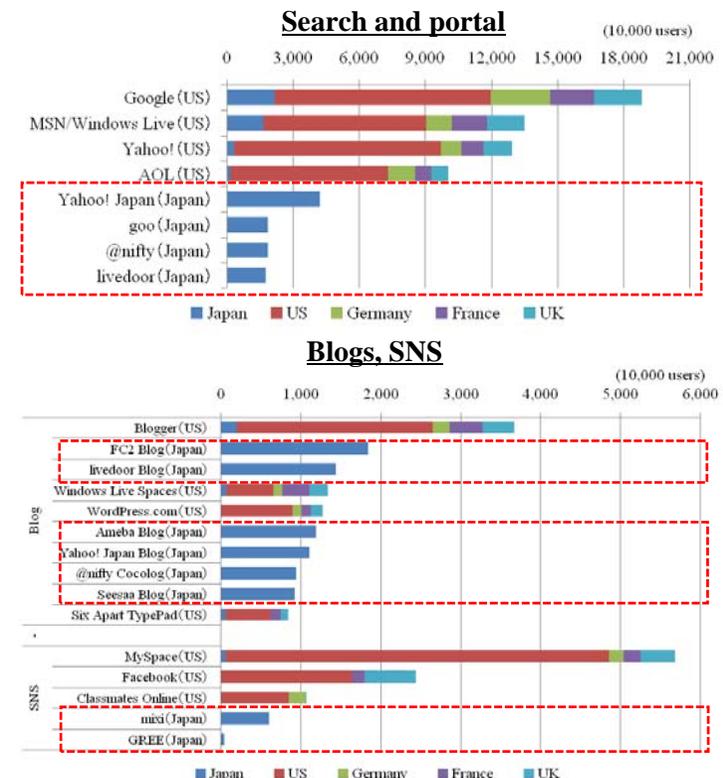


Fig. 2-7 Based on materials released by each company

Fig. 2-8 Based on materials by Thomson Reuters

Fig. 2-9 Based on materials by Nielsen Online

## 2 Growth of ICT industry and Strengthening of its International Competitiveness

### (2) Status of the Competitiveness of the ICT Industry (Presence of Japan (ii))

○ In terms of market share, Japan has advantages in the audiovisual equipment field, such as flat screen TV and DVD recorders, as well as in the fields of photocopiers and optoelectronics devices (sensor, laser, etc.). Europe has advantages in the field of mobile communications and the United States leads in such fields as business-use routers and information systems (Fig. 2-10).

○ China's exports are high for all products, establishing itself as the world's production basis. 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% apart from a few products. In particular, its share does not reach 5% for many terminal equipment products (Fig. 2-11).

Fig. 2-10 Market share by regions in the ICT market

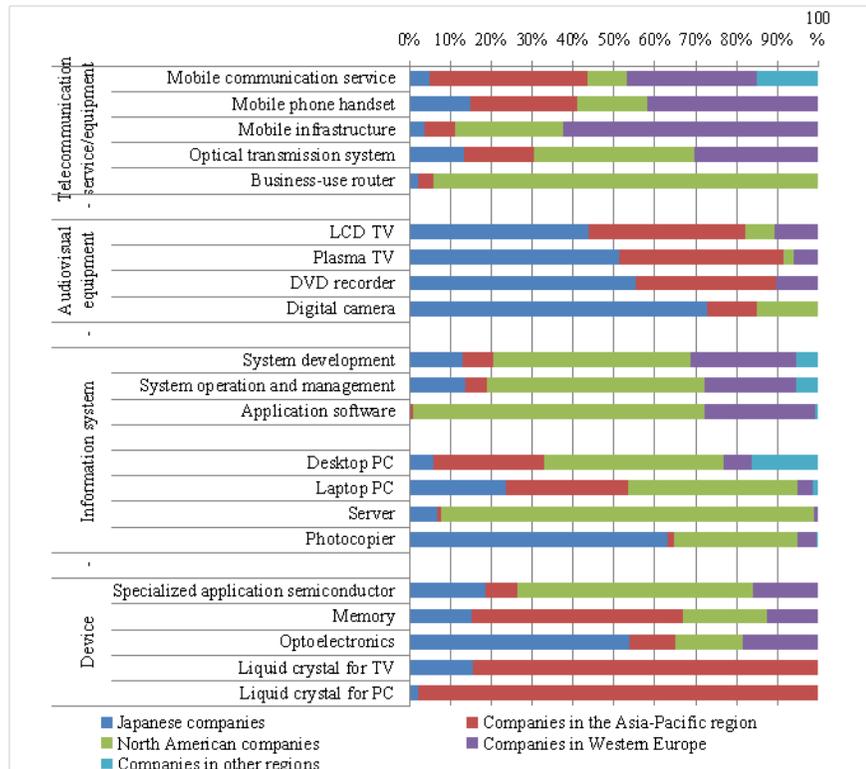
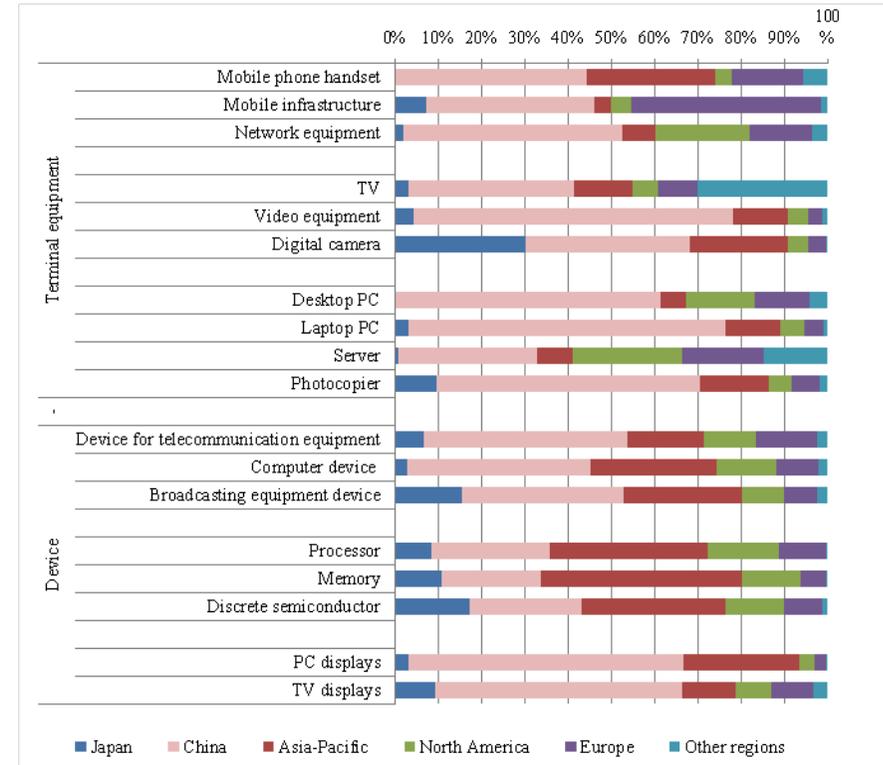


Fig. 2-11 Export by regions in the ICT market (Share)



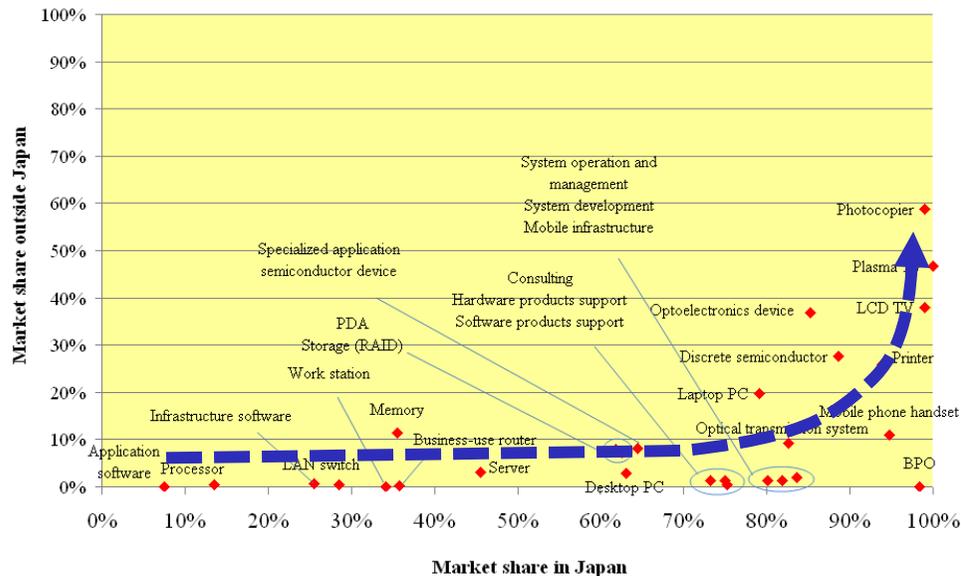
## 2 Growth of ICT industry and Strengthening of its International Competitiveness

### (3) Challenges for Strengthening the Competitiveness of the ICT Industry (Degree of Overseas Presence and Profitability (i) )

○ Japanese companies tend not to 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 business abroad (Fig. 2-12).

○ 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 country. It is suggested that they have in view global business operations from the start (Fig. 2-13).

**Fig. 2-12 Market shares of Japanese companies in their own region and outside**



**Fig. 2-13 Market shares of North American companies in their own region and outside**

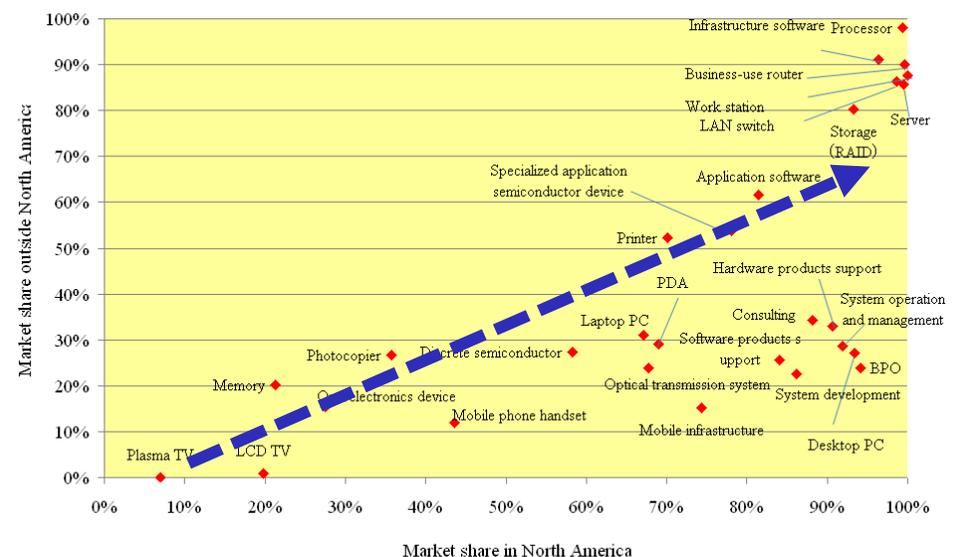


Fig. 2-12, Fig. 2-13 Based on materials by Display Search for LCD TV and Plasma TV, and materials by Gartner for others

## 2 Growth of ICT industry and Strengthening of its International Competitiveness

### (3) Challenges for Strengthening the Competitiveness of the ICT Industry (Degree of Overseas Presence and Profitability (ii))

ICT vendors in Japan are among the world's leaders in terms of sales, but large sales do not result in high business profits (Fig. 2-14).

ICT vendors in the United States are achieving sales and business profit in both domestic and overseas markets in a well-balanced manner, obtaining a high operating income ratio. On the other hand, domestic business takes up about 80% of business profit for ICT vendors in Japan, and their operating income ratio of overseas business is generally low (Fig. 2-15).

Fig. 2-14 World's top ICT vendors in terms of sales and business profits

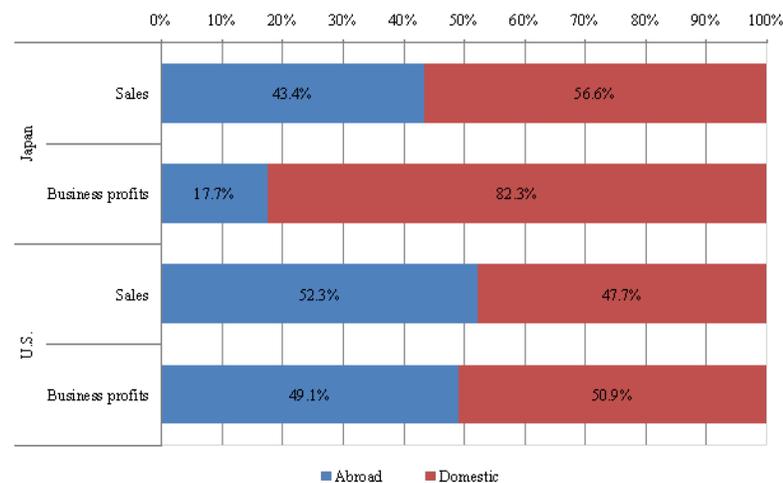
■ Companies with large sales

Rank	Corporate name	Country	Sales (100 million dollar)
1	Siemens	Germany	1059.2
2	Hitachi	Japan	917.3
3	HP	U.S.	916.6
4	IBM	U.S.	914.2
5	Matsushita Electric Industrial	Japan	815.3
6	Sony	Japan	742.6
7	Toshiba	Japan	637.0
8	Dell	U.S.	574.2
9	Nokia	Finland	542.2
10	Microsoft	U.S.	511.2
11	Fujitsu	Japan	456.5
12	Motorola	U.S.	428.8
13	NEC	Japan	416.5
14	Hon Hai	Taiwan	405.2
15	Philips	Germany	355.7
16	Intel	U.S.	353.8
17	Cisco	U.S.	349.2
18	Canon	Japan	348.9
19	Mitsubishi Electric Corporation	Japan	345.1
20	Sharp Corporation	Japan	280.0

■ Companies with large business profits

Rank	Corporate name	Country	Business profits (100 million dollar)
1	Microsoft	U.S.	190.4
2	IBM	U.S.	122.1
3	Cisco	U.S.	87.0
4	Siemens	Germany	80.1
5	Nokia	Finland	73.1
6	HP	U.S.	67.7
7	Intel	U.S.	62.1
8	Oracle	U.S.	61.3
9	Canon	Japan	59.3
10	Apple	U.S.	44.1
11	Motorola	U.S.	41.6
12	Matsushita Electric Industrial	Japan	41.1
13	Ericsson	Sweden	39.9
14	Google	U.S.	35.9
15	Texas Instruments	U.S.	33.7
16	SAP	Germany	33.1
17	Dell	U.S.	31.7
18	Qualcomm	U.S.	28.4
19	Hon Hai	Taiwan	23.1
20	Toshiba	Japan	23.1

Fig. 2-15 domestic/abroad ratio and sales of major ICT vendors in Japan and in the United States



Operating income ratio		
	Domestic	Abroad
Japan	6.4%	1.8%
U.S.	15.6%	13.7%

Fig. 2-14, Fig. 2-15 Based on materials by Thomson Reuters

## 2 Growth of ICT industry and Strengthening of Its International Competitiveness

### (3) Challenges for Strengthening the Competitiveness of the ICT Industry (Business Environment Surrounding ICT Industry (i))

○ While many vendors leading the ICT industry in the United States have been multiplying continuously since the 1960s, Japan hardly saw any ICT vendors with international competitiveness established during the same period (Fig. 2-16).

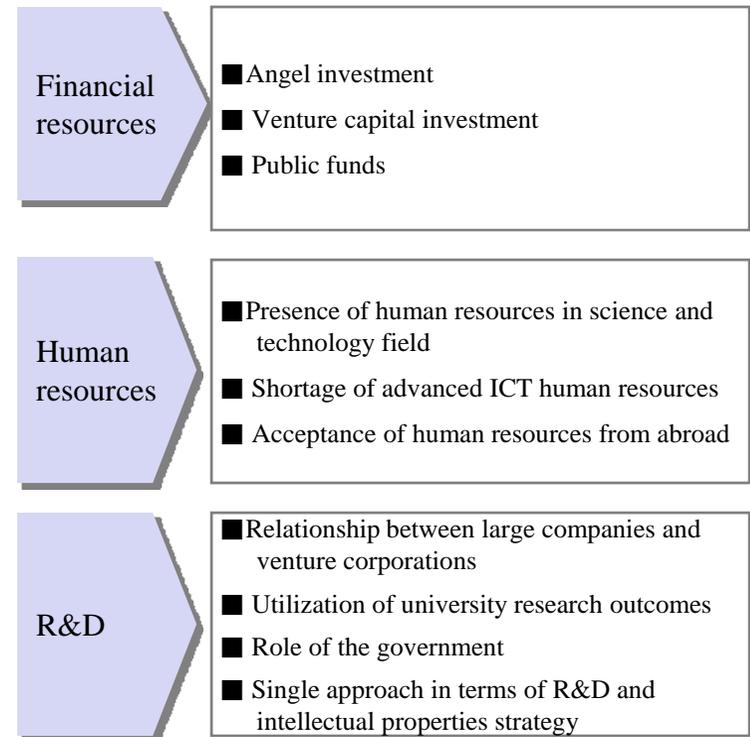
○ In order for companies to be established and to grow one after another, it is important to establish an environment conducive to the required financial resources, human resources and R&D (Fig. 2-17).

**Fig. 2-16 Founding years of major ICT vendors (with sales of one trillion yen or more) in the world**

	Japan		North America		Europe		Asia	
1990~			Google	1998	(Infineon)	1999	(AU Optronics)	2001
1980~	(NTP)	1988	Qualcomm	1985	(STMicroelectronics)	1987	Asustek	1990
			Dell	1984			Quanta	1988
1970~			Cisco	1984			Lenovo	1984
			Sun Microsystems	1982			Compal	1984
			Seagate	1979	SAP	1972	Acer	1976
			EMC	1979			Hon Hai	1974
			Oracle	1977				
1960~			Apple	1976				
			Microsoft	1975				
			SAIC	1969	(Nokia)	1967	Samsung	1969
1950~			Intel	1968	CapGemini	1967		
			EDS	1962				
1930~	Kyocera	1959	CSC	1959			LG	1958
	Sanyo Electric	1950						
1900~	Sony	1946	Tyco Electronics	1941				
	Seiko Epson	1942	HP	1939				
	Canon	1937	Texas Instruments	1930				
	Ricoh	1936						
	Konica Minolta	1936						
	Sharp Corporation	1935						
	Fujitsu	1935						
	Toshiba Electric Indust	1935						
~1900	Fuji film	1934						
1900~	Mitsubishi Electric	1921	Motorola	1928				
	Hitachi	1920	IBM	1914				
	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

**Fig. 2-17 Challenges for business environment in Japan**



## 2 Growth of ICT industry and Strengthening of Its International Competitiveness

### (3) Challenges for Strengthening the Competitiveness of the ICT Industry (Business Environment Surrounding the ICT Industry (ii))

- In ICT companies in the United States, people who major in science and technology are achieving success for excellence in management. Universities in the United States provide training programs through cooperation with external corporations and investors. The development of human resources with skills for both technology and management is important in Japan as well (Fig. 2-18, Fig. 2-19).
- Japan holds 16.6% share of all international patent applications, in the field of technology. However, in the advanced ICT field, the share tends to be lower than the total, and there is also a wide gap between Japan and the United States. In order to reinforce competitiveness in the future, further upgrading of research and development capabilities and reinforcement of intellectual property strategy will be important (Fig. 2-20).

Fig. 2-18 Background of the founders of new ICT companies in the United States

Year founded	Name of founder	Academic background	Major	Academic background	
				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	○
1982	Scott McNealy	Stanford University	Master	Business	○
	Vinod Khosla	Indian Institute of Technology Delhi	Bachelor	Electrical engineering	○
1982	Andy Bechtolsheim	Stanford University	Master	Business	○
	John Warnock	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	-	-	-	-

Fig. 2-20 Share of the number of international patent applications in the ICT field by countries and regions (2002-2007)

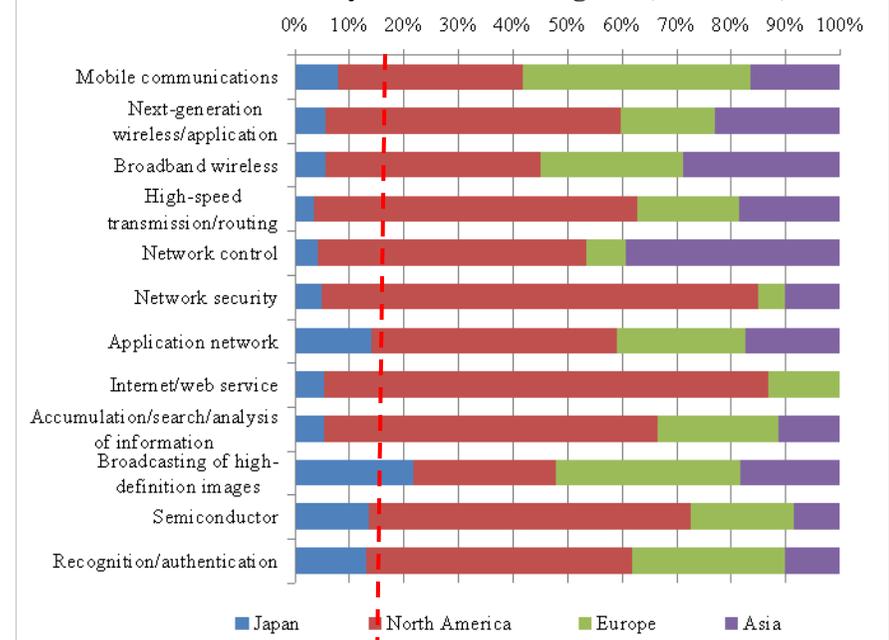


Fig. 2-19 Examples of management education programs provided to human resources in science and technology field in the United States

Measures	Outline
Stanford Technology Ventures Program	<ul style="list-style-type: none"> <li>■ This is an entrepreneur education program established within the School of Engineering in Stanford University and supports the initiation of high-tech businesses.</li> <li>■ It uniformly provides an education and incubation environment through collaboration with a network of students/alumni and funds.</li> <li>■ External corporations and investors also sponsor the program.</li> </ul>
CONNECT USCD	<ul style="list-style-type: none"> <li>■ This is an NPO established as one of the institutes in the University of California at San Diego, which became independent in 2005.</li> <li>■ It provides coaching by experts, holds workshops, offers opportunities for presentation to "business angels" and venture capitals, provides information on subsidy systems, etc.</li> <li>■ It mainly targets entrepreneurs in the high-tech and life science fields.</li> </ul>
NFIB Education Foundation	<ul style="list-style-type: none"> <li>■ This is an education foundation providing scholarship and an internship system to would-be entrepreneurs.</li> </ul>

Japan's share of all international patents (16.6%)

Fig. 2-18 Based on various materials released

Fig. 2-19 (Source): Cross-National Study on Business Environment Surrounding the ICT Industry and System

Fig. 2-20 (Source): Study on the Cross-Country Comparison on R&D in ICT Field

# 3 New Lifestyles brought about by Ubiquitous Network

## (1) Current State of ICT Usage in People's Lives

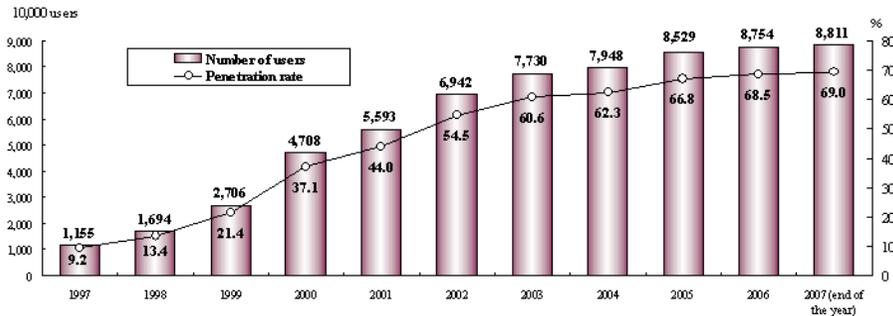
○The number of Internet users in Japan is estimated to be 88.11 million (increased by 0.7% over the previous year), and its penetration rate 69.0% (increased by 0.5 points over the previous year) as of the end of 2007 (Fig. 3-1).

○The share of broadband usage is 40.6% of the entire population above age 6 as of the end of 2007, which accounts for 79.6% of Internet users from households. By age, growth among the young generation is significant compared to the results as of the end of 2004 (Fig. 3-2).

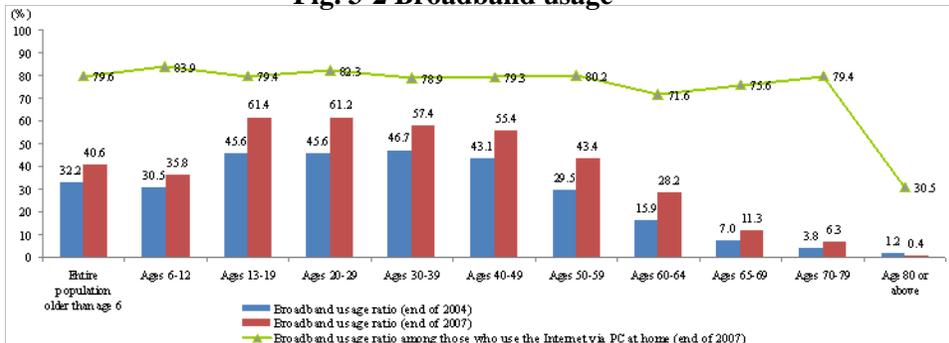
○The ratio of mobile phone Internet usage accounts for 55.4% of the entire population above age 6 as of the end of 2007. Compared to the results as of the end of 2004, growth is significant among those who are age 50 and older (Fig. 3-3).

○As for website usage, while the generation gap is small for shopping, the young generation watches and listens to videos and music three times more than senior citizens do. Therefore, while the usage in terms of shopping is already being established in each generation, usage for videos and music is expected to expand in the future in accordance with the ageing of the young generation (Fig. 3-4).

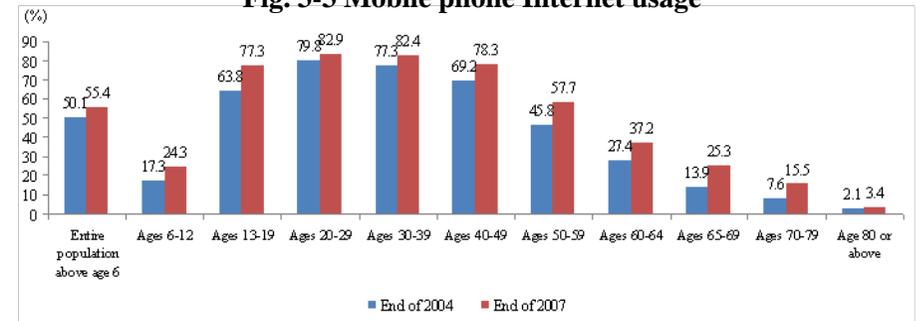
**Fig. 3-1 Trends in the number of Internet users and penetration rate**



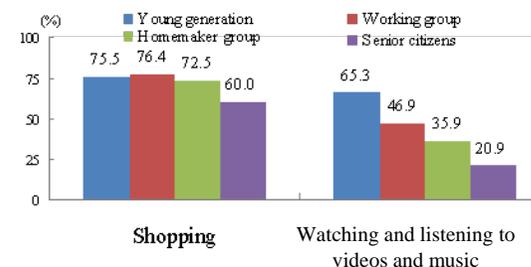
**Fig. 3-2 Broadband usage**



**Fig. 3-3 Mobile phone Internet usage**



**Fig. 3-4 Website services usage by age**



\* Young generation: Students, unemployed or part-time workers in the 20-29 age group  
 Working group: Employees and self-employed people age 20 and older  
 Homemaker group: Housewives ages 20-64 and unemployed or part-time workers ages 30-64  
 Senior citizens: Those aged 65 or older (excluding workers)

From Fig. 3-1 to Fig. 3-3 Based on Communications Usage Trend Survey (MIC)  
 Fig. 3-4 (Source): Investigative Study on Access to Information and Consumer Behavior in the Ubiquitous Network Society

# 3 New Lifestyle brought about by Ubiquitous Network

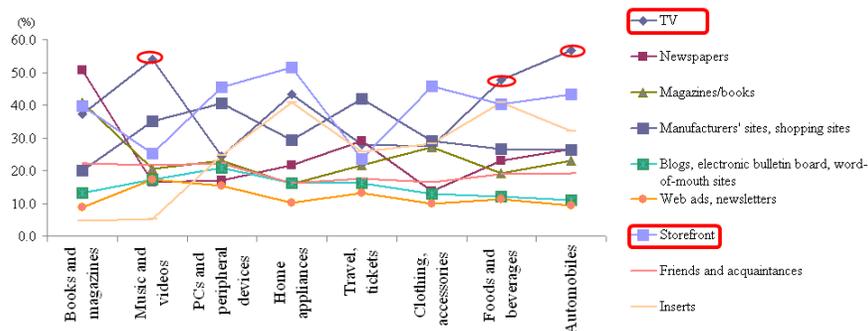
## (2) Changes in Consumer Behavior

○ The diffusion of the Internet is generating a new process of consumer behavior, namely “recognition” → “interest” → “information gathering” → “evaluation of options” → “purchasing” → “sharing.”

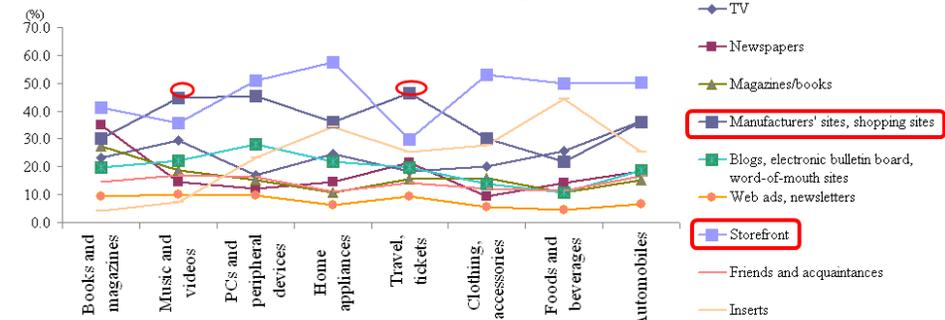
○ The role of television, which used to have an important place in the recognition of products, has diminished at the stages of information gathering and evaluation of options. Instead, the role of the Internet is increasing (Fig. 3-5 to Fig. 3-7).

○ Compared to five years ago, the ratio of those who purchase products via the Internet is increasing rapidly. This trend is especially notable for products with consistent quality and of which the entire process from information gathering to the decision of purchase can be done via the Internet, such as travel/tickets or music/videos. For example, the share of those who make travel/ticket purchases via the Internet already exceeds the share of those who make in-store purchases, and those who purchase music/videos through the Internet accounts for 30% of the total. Online shopping is coming to threaten the position of in-store purchases (Fig. 3-8).

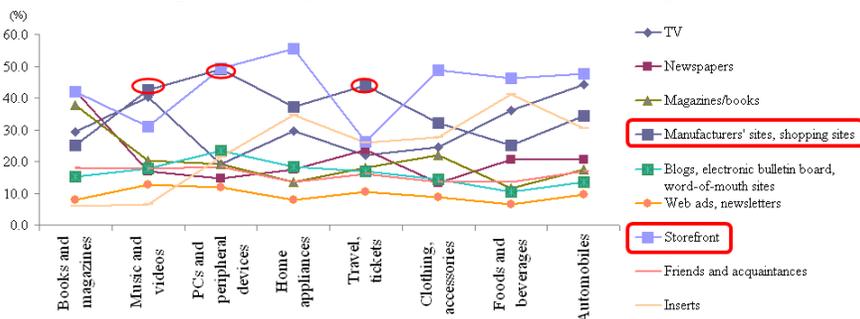
**Fig. 3-5 Information sources that inform of product and increase interest (multiple answers allowed)**



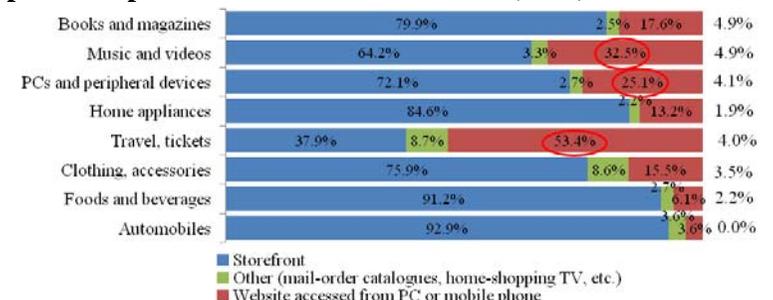
**Fig. 3-7 How people evaluated the functions of products and stores beforehand in the last 12 months (multiple answers allowed)**



**Fig. 3-6 How people gathered information such as details on products and reputation before purchasing in the last 12 months (multiple answers allowed)**



**Fig. 3-8 The most frequently used channel to purchase products in the last 12 months (2007)**



(Reference) Ratio of those who have made at least one purchase via the Internet (2002)

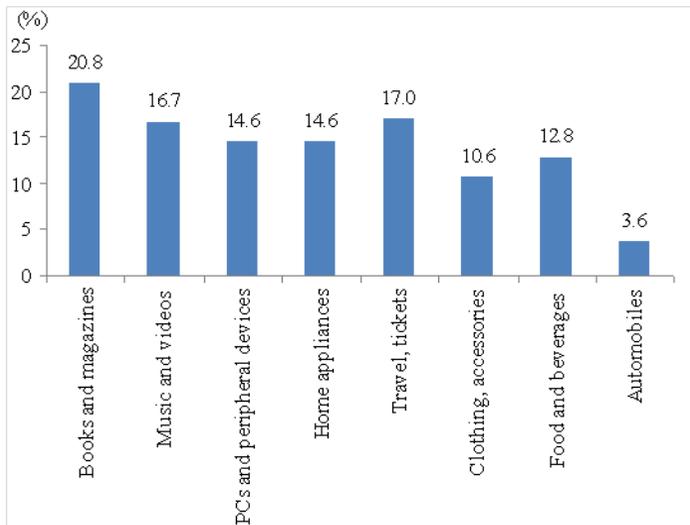
## 3 New Lifestyle brought about by Ubiquitous Network

### (2) Changes in Consumer Behavior

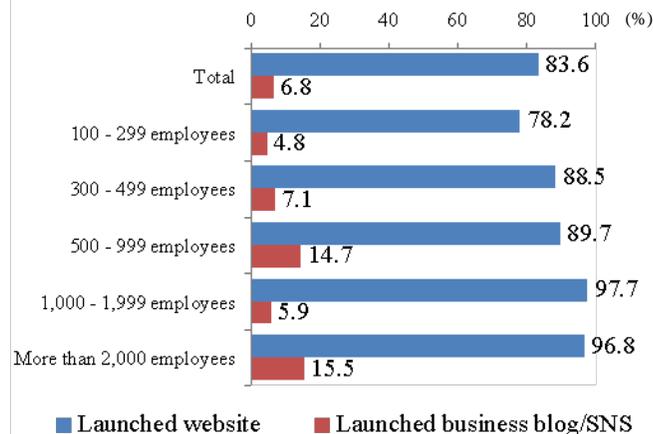
○ It is becoming more and more popular to share purchasing experiences via the Internet, especially among the younger generation. The flow of information related to consumption is changing from a unidirectional one transmitted from companies to consumers to a bidirectional one (Fig. 3-9).

○ Among companies with more than 100 employees, 83.6% have a company website and 6.8% launched business blogs and SNS. Major objectives for doing so are the introduction of products and the regular provision of information. It shows the spreading trend of seeking a new contact point with consumers via the Internet (Fig. 3-10, Fig. 3-11).

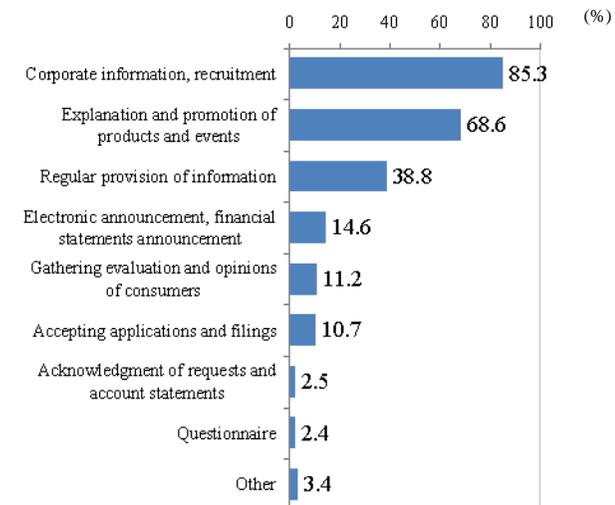
**Fig. 3-9 Percentage of those who had shared their own purchase experiences with others via websites accessed by PC and mobile phone among young generation**



**Fig. 3-10 Percentage of companies that have company websites, business blogs and SNS (by number of employees)**



**Fig. 3-11 Objectives of having company websites, business blogs and SNS (multiple answers allowed)**



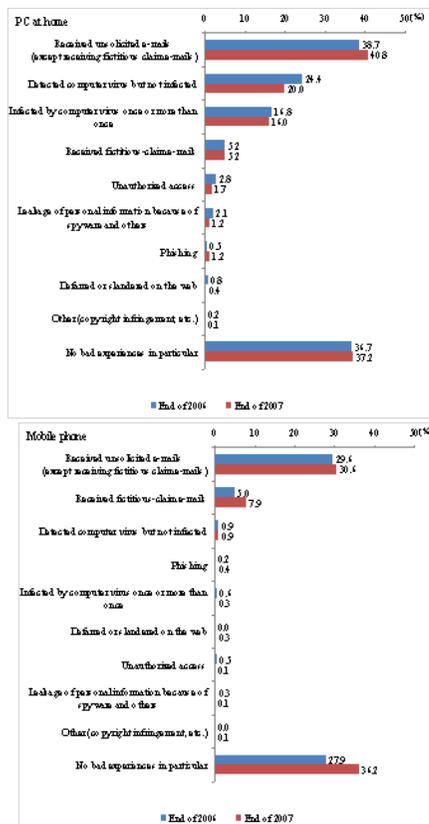
# 3 New Lifestyle brought about by Ubiquitous Network

## (3) Challenges for Realizing Safe and Secure Ubiquitous Network Society

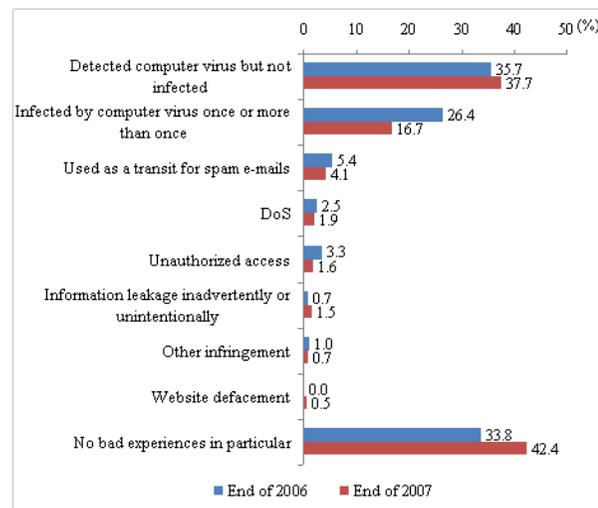
○As for negative experiences accompanying the use of the Internet, “received unsolicited e-mails” was the top answer for both PC and mobile phone users in households, while “computer virus” was the most frequent answer among companies (Fig. 3-12, Fig. 3-13).

○Recognition and usage of filtering software and services have both increased over the previous year. In particular, usage of filtering services for mobile phone users increased significantly by 14.2 points over the previous year to 21.6% (Fig. 3-14, Fig. 3-15).

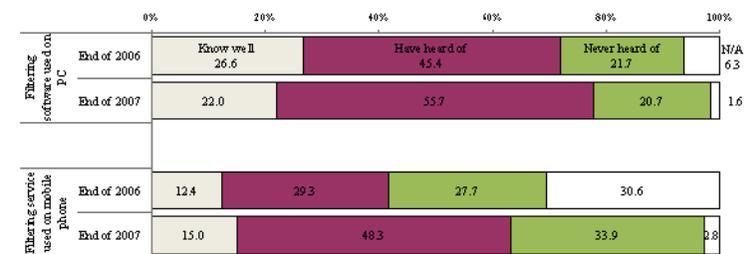
**Fig. 3-12 Bad experiences accompanying the use of the Internet in households**



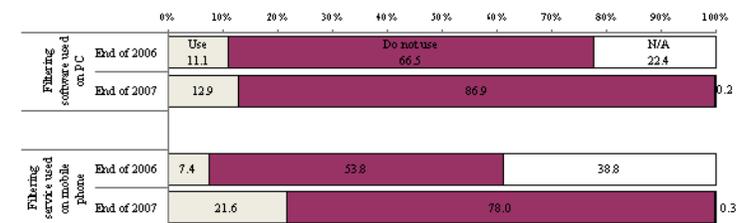
**Fig. 3-13 Bad experiences accompanying the use of ICT networks in companies**



**Fig. 3-14 Awareness of filtering services**



**Fig. 3-15 Filtering services use**



(Asked of households with children age 18 or younger that access the Internet via PC or mobile phone. Values for the end of 2006 are recounted according to the counting conditions used for values of the end of 2007.)