# Status Quo of ICT Industries and Economies in the T5 Countries

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# 1. The ICT Industries

The industries related to information and communication technology, the ICT industries, are attracting attention as a growth area, especially in industrialized countries where economic growth has slowed down. These industries are growing so fast that it is difficult to see the entire picture and their growth varies considerably from country to country. This chapter highlights the recent status and changes in the ICT industries in the T5 countries. After defining the scope of the ICT industries and the various component sectors, we examine their scale and growth as well as the position of ICT in the national economies of the T5 countries.

## 1.1. Definition and Classification of the ICT industries

Our definition of the ICT industries is based on the utilization of electronic equipment (equipment with built-in processors for digital information). From this perspective our core definition of ICT includes the telecommunications and broadcasting industry, which uses electronic equipment to transmit information, and the data processing industry, which uses electronic equipment to process data efficiently. We include both the service sector and the related equipment manufacturing sector of each of these industries.

The service sector of the telecommunications and broadcasting industry consists of telecommunications that conventionally center on telephone and telegraph and broadcasting that centers on TV and radio. The supporting equipment manufacturing sector includes manufacturing such communications equipment as telephone handsets, facsimile machines, and broadcasting devices. Electronic parts, such as semiconductors that are traded as parts, are excluded to avoid duplication in counting the size of the industries.

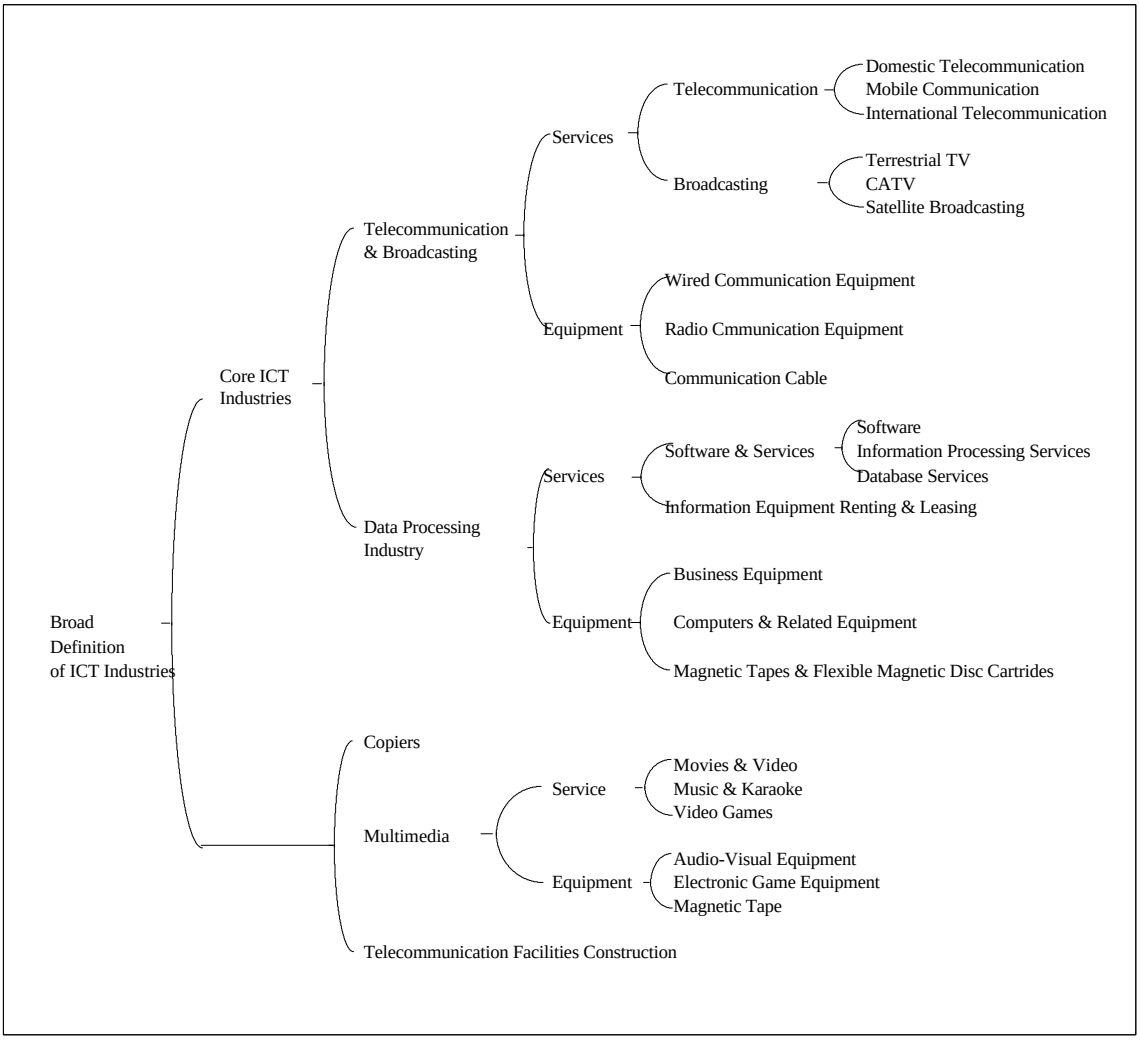
The data processing industry include both an information service sector that engages in database and software development and lease of information-related equipment and a manufacturing sector that makes computers, peripheral devices, and business equipment.

The definition of the information and communications industry by the Japanese Ministry of Posts and Telecommunications is somewhat broader than this definition. On the one hand, the Ministry includes conventional information sectors that do not depend mainly on electronic equipment, such as postal service, printing and publishing, and advertising. We excluded advertising because its sales related to ICT industries are already counted in the broadcasting industry; we excluded theater performances for the same reason. Research activities are not always dependent on electronic equipment, and so are excluded from our definition, although the research results form intellectual assets that generate income such as patent royalties and drive the information economy. We assume that each industry sector in our definition includes a research component.

In addition, the Ministry of Posts and Telecommunications includes the copier, multimedia, and telecommunication construction industries in its definition of ICT industries. We did not include copiers in our core definition of ICT industries because they are based on paper and they do not use electronic equipment to process data. Nevertheless, our broad

definition of ICT industries includes copiers, multimedia, and telecommunications construction along with the two core industries telecommunications and broadcasting and data processing. As with the two core industries, multimedia can be divided into a service and a manufacturing sector. Multimedia services include: production of movies, videos, and music, development of game software, and the sale of these products through movie theaters, "karaoke boxes," and game centers. The multimedia equipment manufacturing sector includes audio-visual equipment, electronic game equipment, magnetic tapes, and optical disks.

**Fig. 1 Classification of the ICT Industries**




Source : Ministry of Post and Telecommunications "The Communications White Paper for 1997". Compiled by NRI.

## 1.2. Comparison of the ICT Industries in Japan and the United States

We have compared the scale and growth of the core ICT industries as defined above (in the narrow sense) in Japan and the United States. As of 1996, the Japanese domestic market stood at $309.5 billion, about 40% the size of the United States market ($794.8 billion).[1] The core ICT industries accounted for 6.7% of GDP in Japan and 10.5% of GDP in the United States in the same year.[2] In 1980, the figures were 3.7% for Japan and 7.5% for the US. This shows that the Japanese ICT industries have lagged behind the US for more than 15 years in terms of the share of GDP. By the broad definition, the market size of the ICT industries in Japan stands at 433.4 billion dollars in 1996, accounting for 9.4% of the GDP. Japanese domestic production in the supporting equipment manufacturing industry stood at $313.9 billion or 6.8% of GDP.

By business category, computers and related equipment account for 15.8% of the ICT industries in Japan (17.4% in terms of domestic market size) compared with 27.0% in the United States. The United States leads Japan in the share of the information service industry, 22.4%, compared with 18.8%. On the other hand, Japan leads the United States in the share of telecommunications, 30.4%, versus 24.6%. Other services account for 14.6% of the core ICT industries in Japan, about ten times their share in the United States (1.2%).

Japan and the United States have shown contrasting trends in the growth of the ICT industries in the 1990s. On a local currency basis the industry grew at about the same rate in Japan and the United States during the 1980s. However, between 1990 and 1995 the average annual growth rate for the U.S. industry was 6.4% compared with only 2.8% for Japan. This difference is due to the fact that sales of support equipment and data processing services stagnated in Japan in the 1990s. In particular, the growth rate of data processing services in Japan has been 10% lower than in the United States.

Behind these trends lies a difference in the market environment of ICT-related investment by Japanese companies and their American counterparts. During the 1991-94 period, Japan was in a long-term recession due the collapse of the bubble economy, and expenditures including investment in ICTs were curtailed. On the other hand, the United States emerged from a recession in 1991 and has been on a recovery track since then. U.S. companies, which continue to streamline themselves through out-sourcing and other measures, have invested heavily in ICTs as part of such measures. Even while the United States experienced a long recession in the later half of the 1980s, it saw an average 8.5% rise in sales of data processing support equipment with a 18.2% increase in data processing services delivered during the same period. In contrast, Japan saw a 15.0% drop in sales of the same equipment between 1992 and 1993 with a 7.4% decrease in data processing services delivered in the 1993-94 period following the bursting of its economic bubble. It should be noted, however, that the decline in sales of computers and related equipment in Japan was due not only to a decrease in the number of units but also to a drop in the price of such equipment. Reduced prices of computers and related equipment in the United States in 1992 and 1993 prompted prices to fall in Japan as well.

In the United States, only the information processing services industry continues double-digit growth, pushing up the growth rate of the ICT industries as a whole by 2%, while the growth rate of other ICT industries has fallen by around 5%. On the other hand, Japan saw rapid growth of the telecommunications industry. Since the collapse of the bubble economy, only the amount of telecommunications services delivered is maintaining fast growth, while sales of computer-related industries including services and support equipment manufacturing as well as sales of telecommunications equipment have plateaued. The Japanese ICT industries picked up in 1995 after a recession, and the growth of the telecommunications industry, mainly due to the spread of cellar phones, has played a major role. Sales of telecommunications services rose by 20.6% in 1996, accounting for

[1] Domestic market size = Production - Exports + Imports.
[2] The average exchange rate for was 1996: 108.78 yen to the dollar

6.1% of the 16.2% growth of the ICT industries as a whole (Fig 2).

## Fig. 2 ICT Industries Revenue: Japan

(tril. yen, bil $)

| (CY) | ICT Industry | Share in Nominal GDP | Telecommunication & Broadcasting | | | | | Data Processing Industry | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Equip-ment | Services | | | | Equipment | | | Services | | |
| | | | | | | Telecom-munication | Broad casting | | | Computers & Related Equipment | Business Equipment | | Software & Services | Lease & Rental |
| 80 | 8.9 | 3.7% | 6.1 | 0.8 | 5.2 | 4.0 | 1.3 | 2.8 | 1.3 | 1.2 | 0.1 | 1.5 | 0.6 | 0.9 |
| 85 | 14.2 | 4.4% | 8.1 | 1.3 | 6.8 | 5.1 | 1.7 | 6.1 | 2.7 | 2.5 | 0.2 | 3.4 | 1.4 | 2.0 |
| 90 | 25.3 | 5.9% | 11.2 | 2.4 | 8.8 | 6.3 | 2.5 | 14.1 | 4.9 | 4.5 | 0.4 | 9.3 | 5.1 | 4.1 |
| 91 | 27.7 | 6.0% | 11.6 | 2.4 | 9.2 | 6.6 | 2.6 | 16.0 | 5.1 | 4.7 | 0.4 | 10.9 | 6.2 | 4.8 |
| 92 | 26.5 | 5.6% | 11.5 | 2.1 | 9.5 | 6.9 | 2.5 | 15.0 | 4.2 | 3.8 | 0.4 | 10.8 | 6.2 | 4.6 |
| 93 | 25.7 | 5.4% | 12.1 | 2.2 | 9.9 | 7.3 | 2.5 | 13.7 | 3.7 | 3.4 | 0.3 | 9.9 | 5.6 | 4.3 |
| 94 | 26.4 | 5.5% | 12.8 | 2.3 | 10.5 | 7.8 | 2.7 | 13.6 | 4.3 | 4.0 | 0.3 | 9.3 | 5.2 | 4.1 |
| 95 | 29.0 | 6.0% | 14.5 | 2.8 | 11.7 | 8.8 | 2.8 | 14.5 | 4.8 | 4.6 | 0.3 | 9.7 | 5.4 | 4.2 |
| 96 | 33.7 | 6.7% | 17.7 | 4.0 | 13.7 | 10.6 | 3.1 | 16.0 | 5.8 | 5.6 | 0.2 | 10.2 | 6.2 | 4.0 |
| Share in 1996 | | | 49.9% | 9.7% | 40.2% | 30.4% | 9.8% | 50.1% | 16.7% | 15.8% | 0.9% | 33.4% | 18.8% | 14.6% |
| Expressed in US$ | | | | | | | | | | | | | | |
| 80 | 39.1 | | 26.8 | 3.6 | 23.1 | 17.6 | 5.5 | 12.3 | 5.6 | 5.4 | 0.2 | 6.7 | 2.6 | 4.1 |
| 85 | 59.5 | | 33.9 | 5.4 | 28.5 | 21.6 | 6.9 | 25.5 | 11.2 | 10.4 | 0.8 | 14.3 | 5.9 | 8.4 |
| 90 | 174.7 | | 77.1 | 16.3 | 60.8 | 43.6 | 17.1 | 97.5 | 33.6 | 30.9 | 2.6 | 64.0 | 35.5 | 28.4 |
| 91 | 205.6 | | 86.4 | 18.0 | 68.4 | 49.1 | 19.4 | 119.1 | 37.9 | 34.8 | 3.1 | 81.3 | 45.9 | 35.3 |
| 92 | 209.6 | | 90.9 | 16.2 | 74.7 | 54.6 | 20.1 | 118.7 | 33.1 | 30.2 | 2.9 | 85.6 | 49.1 | 36.5 |
| 93 | 231.2 | | 108.4 | 19.6 | 88.8 | 65.9 | 22.9 | 122.8 | 33.5 | 30.4 | 3.1 | 89.3 | 50.6 | 38.7 |
| 94 | 258.5 | | 125.1 | 22.2 | 102.9 | 76.6 | 26.3 | 133.5 | 42.4 | 39.6 | 2.8 | 91.0 | 51.1 | 39.9 |
| 95 | 308.1 | | 153.8 | 29.9 | 123.9 | 93.7 | 30.2 | 154.2 | 51.3 | 48.5 | 2.8 | 102.9 | 57.8 | 45.1 |
| 96 | 309.5 | | 162.8 | 36.7 | 126.1 | 97.7 | 28.5 | 146.7 | 53.3 | 51.4 | 1.9 | 93.4 | 56.8 | 36.6 |

Growth Rate

(Y-O-Y)

| (CY) | ICT industry | Telecommunication & Broadcasting | | | | Data Processing Industry | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Equip-ment | Services | | | Equipment | | | Services | |
| | | | | | Telecom-munication | Broad casting | | | Computers & Related Equipment | Business Equipment | | Software & Services | Lease & Rental |
| 90 | 12.5% | 10.7% | 25.2% | 7.4% | 6.0% | 11.1% | 14.0% | -0.7% | 0.3% | -10.9% | 23.5% | 34.1% | 12.4% |
| 91 | 9.5% | 4.3% | 2.5% | 4.7% | 4.6% | 5.1% | 13.6% | 4.9% | 4.6% | 8.4% | 18.2% | 20.3% | 15.5% |
| 92 | -4.1% | -1.1% | -15.3% | 2.6% | 4.7% | -2.6% | -6.3% | -17.9% | -18.5% | -10.3% | -0.9% | 0.5% | -2.8% |
| 93 | -3.1% | 4.7% | 6.2% | 4.4% | 5.9% | 0.3% | -9.2% | -11.1% | -11.6% | -5.7% | -8.4% | -9.6% | -6.9% |
| 94 | 2.8% | 6.0% | 3.9% | 6.5% | 6.8% | 5.6% | -0.1% | 16.4% | 19.9% | -16.6% | -6.3% | -7.1% | -5.2% |
| 95 | 9.7% | 13.2% | 24.4% | 10.8% | 12.5% | 5.6% | 6.3% | 11.3% | 12.8% | -9.8% | 4.0% | 4.1% | 4.0% |
| 96 | 16.2% | 22.4% | 41.6% | 17.7% | 20.6% | 8.9% | 10.0% | 20.1% | 22.4% | -19.4% | 5.0% | 13.5% | -6.0% |
| CAGR | | | | | | | | | | | | | |
| 80-85 | 9.9% | 5.9% | 9.5% | 5.3% | 5.2% | 5.7% | 16.9% | 16.1% | 15.3% | 29.4% | 17.5% | 18.6% | 16.9% |
| 85-90 | 12.3% | 6.6% | 12.9% | 5.3% | 4.2% | 8.4% | 18.3% | 12.7% | 12.4% | 15.3% | 22.1% | 29.8% | 15.4% |
| 90-95 | 2.8% | 5.3% | 3.6% | 5.8% | 6.9% | 2.8% | 0.5% | -0.1% | 0.4% | -7.2% | 0.9% | 1.1% | 0.6% |

Note: CAGR denotes Compound Annual Growth Rate.

Source: Ministry of Post and Telecommunications *Telecommunication Statistics*, MITI *Yearbook of Machinery Statistics*, MOF *Foreign Trade Statistics*. Compiled by NRI.

## Fig. 3 Broad Definition of ICT Industries* Revenue: Japan

(tril. yen, bil $)

| (CY) | Core ICT Industry | Share in Nominal GDP | Broad Definition of ICT Industry | Share in Nominal GDP | Copiers | Multimedia | Equipment | Services | Telecom-munication Facilities Construction | Electronic Integrated Circuits |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | 8.9 | 3.7% | 15.6 | 6.5% | 0.1 | 5.9 | 3.0 | 2.9 | 0.7 | 0.5 |
| 85 | 14.2 | 4.4% | 24.9 | 7.8% | 0.1 | 9.7 | 5.2 | 4.6 | 0.8 | 1.4 |
| 90 | 25.3 | 5.9% | 38.7 | 9.0% | 0.2 | 11.6 | 5.0 | 6.6 | 1.6 | 2.1 |
| 91 | 27.7 | 6.0% | 42.1 | 9.2% | 0.2 | 12.4 | 5.3 | 7.1 | 1.8 | 2.3 |
| 92 | 26.5 | 5.6% | 40.7 | 8.6% | 0.2 | 11.9 | 4.4 | 7.5 | 2.0 | 1.8 |
| 93 | 25.7 | 5.4% | 39.9 | 8.4% | 0.2 | 12.0 | 4.1 | 7.9 | 2.0 | 1.8 |
| 94 | 26.4 | 5.5% | 40.1 | 8.4% | 0.2 | 11.6 | 3.6 | 8.0 | 1.8 | 1.9 |
| 95 | 29.0 | 6.0% | 42.5 | 8.8% | 0.3 | 11.4 | 3.1 | 8.3 | 1.8 | 2.2 |
| 96 | 33.7 | 6.7% | 47.1 | 9.4% | 0.3 | 11.4 | 3.0 | 8.4 | 1.8 | 2.5 |
| Share in 1996 | | | | | 0.9% | 39.3% | 10.8% | 28.5% | 6.3% | 7.7% |
| Expressed in US$ | | | | | | | | | | |
| 80 | 39.1 | | 68.8 | | 0.5 | 26.0 | 13.4 | 12.6 | 3.2 | 2.2 |
| 85 | 59.5 | | 104.3 | | 0.6 | 40.8 | 21.7 | 19.1 | 3.5 | 6.0 |
| 90 | 174.7 | | 267.1 | | 1.2 | 80.4 | 34.6 | 45.8 | 10.8 | 14.3 |
| 91 | 205.6 | | 312.5 | | 1.5 | 91.8 | 39.1 | 52.7 | 13.7 | 17.1 |
| 92 | 209.6 | | 321.1 | | 1.6 | 94.3 | 35.0 | 59.4 | 15.5 | 13.9 |
| 93 | 231.2 | | 358.7 | | 1.9 | 108.0 | 37.0 | 71.0 | 17.6 | 15.8 |
| 94 | 258.5 | | 392.3 | | 2.3 | 113.5 | 34.9 | 78.6 | 18.0 | 18.3 |
| 95 | 308.1 | | 451.3 | | 2.8 | 121.0 | 33.2 | 87.8 | 19.5 | 23.8 |
| 96 | 309.5 | | 433.4 | | 2.4 | 104.6 | 27.2 | 77.4 | 16.9 | 23.0 |

Growth Rate

(Y-O-Y)

| (CY) | Core ICT Industry | Broad Definition of ICT Industry | Copiers | Multimedia | Equipment | Services | Telecom-munication Facilities Construction | Electronic Integrated Circuits |
|---|---|---|---|---|---|---|---|---|
| 90 | 12.5% | 12.0% | -0.5% | 5.8% | 5.8% | 5.9% | 75.7% | 4.0% |
| 91 | 9.5% | 8.9% | 13.7% | 6.2% | 5.1% | 7.1% | 17.7% | 11.5% |
| 92 | -4.1% | -3.4% | 3.3% | -3.4% | -15.8% | 5.9% | 6.4% | -23.8% |
| 93 | -3.1% | -1.9% | -0.2% | 0.5% | -7.1% | 5.1% | -0.3% | -0.2% |
| 94 | 2.8% | 0.5% | 14.9% | -3.4% | -13.3% | 1.7% | -6.2% | 6.5% |
| 95 | 9.7% | 5.9% | 9.8% | -1.9% | -12.5% | 2.8% | 0.0% | 19.6% |
| 96 | 16.2% | 11.0% | 0.8% | 0.0% | -5.3% | 1.9% | 0.0% | 11.8% |
| CAGR | | | | | | | | |
| 80-85 | 9.9% | 9.8% | 2.6% | 10.6% | 11.3% | 9.8% | 2.8% | 23.4% |
| 85-90 | 12.3% | 9.2% | 5.0% | 3.6% | -0.7% | 7.8% | 13.4% | 7.7% |
| 90-95 | 2.8% | 1.9% | 8.1% | -0.4% | -9.0% | 4.5% | 3.2% | 1.6% |

Note : Multimedia Services include Cinema, Theater, Amusement Arcades, Karaoke Houses, CD and Videos, and Game and Packaged Software. Multimedia Equipment includes Audio Visual Equipment and Electronic Game Equipment.
Telecommunication Facilities Construction is Fiscal Year

Source : Fig 2 and MITI *Yearbook of Merchandise Statistics*, Ministry of Construction, *Construction Executed Report*, Leisure Development Center *Leisure and Recreational Activities in Japan*. Compiled by NRI.

**Fig. 4 ICT Industries' Revenue: United States**

(bil $)

| (CY) | ICT Industry | Share in Nominal GDP | Telecommunication & Broadcasting | Equip - ment | Services | Telecom- munication | Broad casting | Data Processing Industry | Equipment | Computers & Related Equipment | Business Equipment | Services | Software & Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80 | 203 | 7.5% | 116 | 36 | 80 | 76 | 3 | 87 | 69 | 55 | 14 | 18 | 18 |
| 85 | 341 | 8.5% | 177 | 49 | 127 | 117 | 10 | 165 | 124 | 101 | 23 | 41 | 41 |
| 90 | 546 | 9.2% | 265 | 62 | 203 | 151 | 52 | 281 | 187 | 155 | 32 | 94 | 94 |
| 91 | 577 | 9.7% | 272 | 66 | 206 | 156 | 50 | 305 | 197 | 164 | 34 | 107 | 107 |
| 92 | 614 | 9.8% | 288 | 70 | 219 | 161 | 57 | 326 | 207 | 172 | 35 | 118 | 118 |
| 93 | 652 | 9.9% | 301 | 73 | 228 | 169 | 59 | 351 | 220 | 182 | 37 | 131 | 131 |
| 94 E | 700 | 10.1% | 320 | 78 | 241 | 178 | 63 | 380 | 233 | 193 | 40 | 147 | 147 |
| 95 P | 745 | 10.3% | 337 | 83 | 254 | 187 | 68 | 408 | 247 | 205 | 42 | 161 | 161 |
| 96 P | 795 | 10.5% | 355 | 87 | 268 | 195.8 | 72.3 | 440 | 261 | 217 | 44 | 178 | 178 |
| Share in 1996 | | | 44.7% | 11.0% | 33.7% | 24.6% | 9.1% | 55.3% | 32.9% | 27.3% | 5.5% | 22.4% | 22.4% |

Growth Rate

(Y-O-Y)

| (CY) | ICT Industry | Telecommunication & Broadcasting | Equip - ment | Services | Telecommu- nication | Broad casting | Data Processing Industry | Equipment | Computers & Related Equipment | Business Equipment | Services | Software & Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **81** | **12.8%** | **13.0%** | **6.3%** | **16.0%** | **15.1%** | **37.9%** | **12.6%** | **11.5%** | **12.2%** | **8.9%** | **16.7%** | **16.7%** |
| **85** | **7.8%** | **4.9%** | **4.8%** | **4.9%** | **4.2%** | **13.2%** | **11.1%** | **9.7%** | **10.0%** | **8.2%** | **15.5%** | **15.5%** |
| **90** | **8.6%** | **5.7%** | **6.5%** | **5.4%** | **3.9%** | **10.3%** | **11.5%** | **8.5%** | **9.0%** | **6.3%** | **17.8%** | **17.8%** |
| **91** | **5.7%** | **2.8%** | **5.9%** | **1.8%** | **3.3%** | **-2.6%** | **8.4%** | **5.7%** | **5.8%** | **5.0%** | **13.9%** | **13.9%** |
| **92** | **6.4%** | **5.8%** | **5.5%** | **6.0%** | **3.4%** | **13.9%** | **7.0%** | **5.1%** | **5.0%** | **5.4%** | **10.5%** | **10.5%** |
| **93** | **6.2%** | **4.6%** | **5.5%** | **4.3%** | **4.6%** | **3.5%** | **7.6%** | **5.9%** | **5.9%** | **5.9%** | **10.6%** | **10.6%** |
| **94** | **7.3%** | **6.1%** | **6.8%** | **5.9%** | **5.5%** | **6.8%** | **8.4%** | **6.0%** | **6.1%** | **5.6%** | **12.4%** | **12.4%** |
| **95** | **6.5%** | **5.5%** | **5.5%** | **5.5%** | **5.0%** | **6.8%** | **7.3%** | **5.9%** | **6.0%** | **5.5%** | **9.5%** | **9.5%** |
| **96** | **6.7%** | **5.4%** | **5.5%** | **5.3%** | **4.8%** | **6.8%** | **7.8%** | **5.9%** | **6.0%** | **5.5%** | **10.6%** | **10.6%** |
| CAGR | | | | | | | | | | | | |
| 80-85 | 11.0% | **8.8%** | **6.2%** | **9.9%** | **9.0%** | **25.3%** | **13.7%** | **12.6%** | **12.9%** | **11.3%** | **17.7%** | **17.7%** |
| 85-90 | 9.8% | **8.4%** | **4.8%** | **9.7%** | **5.1%** | **38.8%** | **11.3%** | **8.5%** | **8.9%** | **6.7%** | **18.2%** | **18.2%** |
| 90-95 | 6.4% | **4.9%** | **5.8%** | **4.7%** | **4.4%** | **5.5%** | **7.7%** | **5.7%** | **5.8%** | **5.5%** | **11.4%** | **11.4%** |

Note: E denotes estimate and P denotes planned.
Source: Information Technology Industry Council *ITI Industry Statistics Programs*. Compiled by NRI.

## 1.3. Comparison of the ICT Industries in the T5 economies

We have been able to compare only the fields of telecommunications, broadcasting, and the database portion of the data processing industry among the T5 economies. Sufficient information on the other sectors was not available for the UK, Germany, and France at the time of data compilation.

### 1.3.1. Telecommunications

In 1995, U.S. revenues from the telecommunications industry were largest of the five countries, standing at $191 billion. In all five countries, telecommunications revenues accounted for only about 2% of GDP. The German telecommunications industry experienced the most rapid growth at a rate of 11.4% during the 1990s.

The share of international telecommunications revenues against GDP was highest in the UK at 0.3%, followed by the United States and Germany with at 0.2% each. Japan lagged far behind with a 0.07% share. The UK share is high partly because the British telecommunications industry is highly competitive as the result of deregulatory measures that were taken at an early stage.

Japan is ahead of the United States in terms of proceeds of mobile telecommunications as a share of GDP and Japan's 0.5% share far surpasses that of the other three countries. This is mainly due to the fact that revenues for Japan include proceeds of PHS (personal handy phone system) service, which was launched on a full scale in 1995. The low share of 0.06% in France is because delayed introduction of the principle of competition has kept charges relatively high and the market small.

The share of the telecommunications industry in total investment is almost the same in all five countries, standing at around 2.5%. The share of the telecommunications industry in total employment in Japan is roughly half the share in the other four countries.

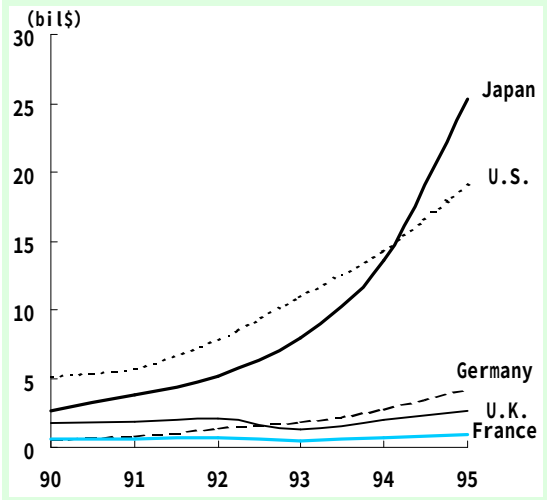
**Fig. 5 Telecommunication Services**

(bil $, thousands person)

| | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|
| Revenue | | 1995 | 106.6 | 191.0 | 28.4 | 48.7 | 26.6 |
| | International | | 3.7 | 14.9 | 3.7 | 5.9 | 2.2 |
| | Cellular Mobile | | 25.3 | 19.1 | 2.6 | 4.2 | 1.0 |
| | CAGR | 1985-1990 | 5.5% | 5.6% | 11.5% | 3.8% | 5.5% |
| | | 1990-1995 | 8.4% | 5.5% | 4.5% | 11.4% | 5.3% |
| | Share in Nominal GDP | 1995 | 2.1% | 2.6% | 2.6% | 2.0% | 1.7% |
| | International | | 0.07% | 0.21% | 0.34% | 0.25% | 0.14% |
| | Cellular Mobile | | 0.49% | 0.3% | 0.2% | 0.2% | 0.06% |
| Investment | | 1986-1988 | 21.3 | 23.8 | 4.3 | 13.6 | 6.8 |
| | | 1989-1991 | 24.1 | 24.1 | 4.6 | 15.3 | 6.2 |
| | | 1992-1994 | 27.1 | 28.1 | 3.6 | 17.6 | 6.6 |
| | | 1995 | 35.1 | 32.7 | 4.1 | 12.4 | 5.7 |
| | Share in GFCF | 1995 | 2.4% | 2.6% | 2.5% | 2.4% | 2.1% |
| Employment | | 1984 | 321 | 953 | 242 | 208 | 167 |
| | | 1995 | 219 | 915 | 153 | 227 | 150 |
| | Share in Labour force | 1995 | 0.34% | 0.73% | 0.60% | 0.63% | 0.67% |

Note: Investment values are deflated using OECD GFCF price indices. at constant 1995 prices.
GFCF denotes Gross Fixed Capital Formation.
Source : OECD *Communications Outlook*. Compiled by NRI.

**Fig. 6 Mobile Communication Service Revenues**




Source: OECD *Communications Outlook*. Compiled by NRI.

### 1.3.2. Broadcasting industry

Among the T5 countries broadcasting industry sales are largest in the United States and Japan. Broadcasting accounts for 0.5% of GDP in Japan and 0.4% in the UK, the US, and France but only 0.3% in Germany. The share for the United States is much higher, 0.9% of GDP, if sales of CATV are counted.

The fastest growing broadcasting industry was in the UK where the growth rate stood at 15.7% on a local currency basis. Contributing to this rapid growth is the satellite broadcaster, B sky B Co., Ltd., which grew at an average annual rate of 50% between 1993 and 1995 with sales standing at $122.7 billion. In Japan, JSB Inc., which is engaged in satellite broadcasting, is growing rapidly, leading the growth of the entire broadcasting industry.

**Fig. 7 Broadcasting Service Revenues**

(bil $)

| | Japan | U.S. | U.K. | Germany | France | U.S. (including CATV) |
|---|---|---|---|---|---|---|
| 92 | 18.1 | 29.0 | 3.6 | 7.0 | 4.9 | 574 |
| 93 | 20.2 | 28.3 | 3.8 | 7.0 | 4.8 | 594 |
| 94 | 23.0 | 31.1 | 4.3 | 7.1 | 5.3 | 634 |
| 95 | 26.4 | -- | 5.0 | 8.2 | 6.2 | -- |
| Growth of revenues in US$ | 13.5% | 8.1% | 11.5% | 5.3% | 8.8% | 8.1% |
| Growth of revenues in Local Currency | 2.8% | 8.1% | 15.7% | 2.1% | 6.4% | 8.1% |
| Share in Nominal GDP :1995 | 0.52% | 0.43% | 0.46% | 0.34% | 0.40% | 8.74% |

Note: Growth of revenues is compound annual growth rate (CAGR). Includes revenue from private and public broadcasting services. Excludes revenue from CATV.

Source: OECD *Communications Outlook*, U.S. Bureau of Census *Annual Statistical Abstract of the U.S.*, Ministry of Post and Telecommunications *Telecommunication Statistics*. Compiled by NRI.

### 1.3.3. On-line services

On-line services, which we classified as part the data processing industry, consists of businesses that provide financial and credit information, news, and public information for companies, along with personal computer communications services for consumers.[3] According to the Gale Directory, in 1995 database search services owned by major database service companies in the United States totaled $724 million, up 16% from the previous year. Search services have been increasing by $10 million every year since 1990.

Total sales in the on-line services industry worldwide stood at $17.7 billion in 1995. Growth has averaged about 15% per year since 1991. Leading this growth are financial information providers and personal computer communication services. The latter in particular has had great impact, achieving a more than 60% annual growth rate on average with $1.2 billion sales in 1995.

However, it is unlikely that personal computer communication services will maintain such rapid growth. The emergence of the World Wide Web is a threat to them. Their role as intermediaries, that is, arrangers of content is beginning to fade. In the U.S. market, according to a survey conducted by Simba Information Inc., on-line services for consumers with the exception of AOL Inc. have shifted out of their own networks and reorganized their services based on the Internet.

The SIMBA survey cites financial information services, news/financial data services, and services for special markets as the promising business categories. The on-line service market is estimated to reach 30.9 million dollars by year 2000.

[3] The following discussion is based on a survey for the Database Promotion Center of Japan carried out by SIMBA Information Inc. and Gale Directory of Database by Gale Inc.

The United States far surpasses other countries in terms of sales of on-line services. Germany has seen 21% growth while Japan had only 10% growth. The rapid growth of German on-line services is due partly to financial assistance by the government. Also, in 1995, Germany saw negative growth as the result of a drop in financial assistance as part of government deficit reduction measures. Sales in the British on-line services industry, whose share of GDP is exceptionally high compared with other countries, account for about 50% of the industry's total European sales. London's position as a world financial center explains why financial-related information services account for 85% of the sales of the on-line services industry in Britain. In addition, about 75% of such services are provided for foreign customers. Some critics point out that future expansion of the British on-line market will be limited because it depends too heavily on financial information services.

**Fig. 8 On-line Service Revenues**

(bil $)

| | World | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|
| 91 | 10.3 | 0.5 | 6.2 | 1.7 | 0.4 | 0.5 |
| 92 | 11.4 | 0.6 | 6.5 | 1.8 | 0.4 | 0.5 |
| 93 | 13.0 | 0.8 | 7.4 | 2.1 | 0.5 | 0.7 |
| 94 | 15.2 | 0.8 | 9.0 | 2.3 | 0.8 | 0.6 |
| 95 | 17.7 | 0.8 | 11.3 | 2.7 | 0.7 | 0.8 |
| CAGR : 1992-1995 | 14.5% | 10.8% | 16.7% | 12.2% | 21.4% | 14.5% |
| Share in Nominal GDP :1995 | 0.07% | 0.02% | 0.16% | 0.24% | 0.03% | 0.05% |

Source: MITI *Database White Paper*, *Survey of Selected Service Industries: Information Service*. Compiled by NRI.

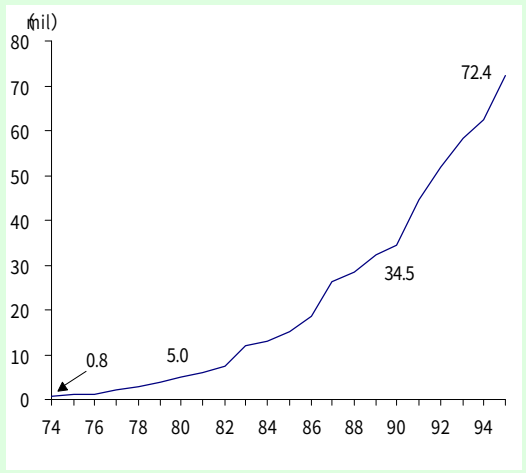
**Fig. 9 On-line Service Revenues: World**

(100mil $)

| | 94 | 95 | 96 →Forecast | 97 | 98 | 99 | 2000 |
|---|---|---|---|---|---|---|---|
| On-line | 152.1 | 176.7 | 204.8 | 232.5 | 258.7 | 284.5 | 308.7 |
| Business Services | 144.9 | 164.6 | 185.5 | 207.2 | 229.2 | 250.9 | 272.3 |
| Brokerage Information | 63.3 | 74.0 | 85.0 | 96.4 | 107.8 | 118.6 | 128.3 |
| Credit | 24.5 | 26.1 | 27.9 | 29.8 | 31.8 | 33.7 | 36.0 |
| Financial News & Research | 23.1 | 25.9 | 28.9 | 32.0 | 35.2 | 38.6 | 42.3 |
| Marketing | 14.4 | 16.6 | 19.3 | 22.1 | 24.8 | 27.4 | 29.8 |
| Professional | 11.1 | 12.9 | 14.6 | 16.5 | 18.5 | 20.6 | 22.9 |
| Legal,Tax,And Public Record | 8.4 | 9.1 | 9.8 | 10.5 | 11.2 | 12.0 | 12.9 |
| Consumer Services | 7.2 | 12.1 | 19.4 | 25.3 | 29.5 | 33.6 | 36.4 |

Source: Japan Information Processing Development Center *Informatization White Paper*. Compiled by NRI.

**Fig. 10 On-line Searches of Databases on Major U.S. Vendors of World-Oriented Databases**




Source: Gale, Inc. *Gale Directory of Databases*. Compiled by NRI.

## 2. Development of the Infrastructure of the ICT industries

In this section we compare the development of infrastructure in the ICT industries in the T5 countries.[4]

### 2.1. Telecommunications

Across all T5 nations, the traditional infrastructure of subscriber telephone services stands at a ratio of one line per two persons, with virtually all households connected to the telephone network.

Mobile telecommunications became prevalent in the T5 nations at the start of the 1990s. Japan was slow to catch on with 0.7% of the population owning a mobile telephone in 1990 and 9.3% in 1995. By 1996, however, the arrival of the PHS on the market expanded that ratio to 16.3%. Mobile telephones are now commonplace in Japan, the United States, and Britain. France is lagging behind mainly due to delays in liberalizing the market and introducing competitive principles.

Similar trends are apparent in the market for pagers and payphones. The widespread use of pagers in Japan (9.3% in 1995) was largely the result of their popularity among teenage girls who use the pagers to communicate and exchange information with their friends. Germany is conspicuous for its low ratio of public pay phones: two phones per one thousand persons. In Britain the number of public pay phones is also on the wane, but this can be traced to a decline in the number of pay phones leased to the private sector.

**Fig. 11 Density of Telecommunications**

(mil)

| | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|
| Local Telephone Lines | Subscribers | 1995 | 60.7 | 165.0 | 29.4 | 42.0 | 32.7 |
| | Density : per Person | 1985 | 37.1% | 49.6% | 37.0% | 33.0% | 41.7% |
| | | 1995 | 48.3% | 62.7% | 50.2% | 51.4% | 56.3% |
| | Density : per Households | 1985 | 120.5% | 136.3% | 100.1% | 99.5% | 112.5% |
| | | 1995 | 148.9% | 167.5% | 125.7% | 113.7% | 144.0% |
| Cellular Mobile Telephone | Subscribers | 1995 | 11.7 | 33.8 | 5.7 | 3.8 | 1.3 |
| | Density : per Person | 1985 | 0.7% | 2.1% | 2.0% | 0.5% | 0.5% |
| | | 1995 | 9.3% | 12.8% | 9.7% | 4.6% | 2.2% |
| | Density : per Households | 1985 | 2.2% | 5.7% | 5.2% | 1.3% | 1.3% |
| | | 1995 | 28.7% | 34.3% | 24.2% | 10.2% | 5.7% |
| Radio paging | Subscribers | 1995 | 10.7 | 34.1 | 0.8 | 0.8 | 0.4 |
| | Density : per Person | | 8.5% | 13.0% | 1.3% | 1.0% | 0.7% |
| | Density : per Households | | 26.3% | 34.6% | 3.4% | 2.2% | 1.7% |
| Public Phones | Thousands | 1995 | 801.1 | 1850.0 | 285.5 | 160.0 | 208.0 |
| | Density : Number/1000 persons | 1985 | 7.5 | 7.2 | 6.6 | 2.1 | 3.2 |
| | | 1995 | 6.4 | 7.0 | 4.9 | 2.0 | 3.6 |

Source: OECD *Communications Outlook*. Compiled by NRI.

### 2.2. Broadcasting

In the broadcasting industry, digitalization and multi-channel broadcasting are developing apace. The widespread availability of the principal players of CATV and satellite broadcasting

[4] This section is based largely on the OECD's *Communications Outlook 1997* .

is noteworthy.

CATV is most prevalent in the United States. In 1995, 63.9% of U.S. households had access to CATV. Growth of CATV availability is swiftest in Germany where the share of households doubled from 23.8% in 1990 to 42.8% by 1995. In 1996, 16.7 million German households (45.2%) had access to CATV. Availability of CATV did not exceed 6% in Japan, Britain, or France in 1995. CATV will probably grow more common in Britain in the future. According to the EITO (European Information Technology Observatory), the number of CATV subscribers in Britain will increase by 30% every three years and reach six million by the year 2000 (the base household ratio in 1995 was 25.6%). The reason is that Britain already allows CATV operators to use their own lines to provide telephone services. As the EITO points out, CATV was not prevalent in Europe because of the low earnings ratio for operators, but CATV corporations need high-earnings markets. From 1995 to 2000 the average growth rate is expected to be low in Germany (1.6%) and the United States (4.8%), compared to Japan (10.4%) and France (13.8%).

The ratio of households subscribing to satellite broadcasting is increasing in Germany and Japan. In 1994, 22.7% of German households and 20.0% of Japanese households subscribed to satellite broadcasting. By 1996 the industry had expanded to 27.0% in Japan. In the United States, satellite broadcasting is growing slowly because the average household has access to multi-channel distribution through CATV, while direct reception through large antennas (known as "backyard dishes" in the United States) is limited to households outside CATV service areas. In 1996, two new companies entered the U.S. satellite broadcasting market and the number of subscribers is increasing. However, the satellite broadcasting industry faces such problems as the need to install an antenna to receive ground waves when subscribers switch from CATV and viewing interference caused by high-rise buildings.

Looking at the number of geo-stationary satellites, generally accepted as the communications infrastructure of the future, the most striking characteristic is the lack of satellites planned for Japan. While the United States is putting 144 satellites into orbit and Britain 58, Japan is planning to send up a mere nine satellites.

**Fig. 12 Broadcasting Services**

(mil)

| | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|
| CATV | Subscribers | 1995 | 3.6 | 63.0 | 1.4 | 15.8 | 1.5 |
| | Density : per Person | 1990 | 0.8% | 20.2% | 0.3% | 10.2% | 1.2% |
| | | 1995 | 2.9% | 23.9% | 2.4% | 19.4% | 2.6% |
| | Density : per Households | 1990 | 2.5% | 54.1% | 0.7% | 23.7% | 3.1% |
| | | 1995 | 8.9% | 63.9% | 6.1% | 42.8% | 6.6% |
| Home Satelite Antennas | Subscribers | 1994 | 8.4 | 3.8 | 3.4 | 8.3 | 1.0 |
| | Density : per Person | | 6.7% | 1.5% | 5.8% | 10.2% | 1.7% |
| | Density : per Households | | 20.0% | 3.9% | 14.7% | 22.7% | 4.5% |
| Synchronous Satellites | Number | 1996 | 21 | 205 | 64 | 14 | 54 |
| | Registered | | 12 | 61 | 6 | 2 | 19 |
| | Planned | | 9 | 144 | 58 | 12 | 35 |

Note: CATV data for Japan are broadcasts of self-edited programs.
Data include INTELSAT for U.S., EUTELSAT for France, and INMARSAT for U.K.
Source: OECD *Communications Outlook*, Ministry of Post and Telecommunications *White Paper 1997*. Compiled by NRI.

## 2.3. Data Processing

The Internet is a conspicuous factor in the data processing industry. In all five countries the number of Internet hosts has doubled every year for the past five years. In February 1997, the United States numbered 10.1 million Internet hosts, far ahead of the other four nations. On a per household basis, the other nations had one host per one hundred households, whereas the United States had one host per ten households. The rate of Internet expansion in Japan is also noteworthy. In 1992, Japan had 16,000 hosts, the lowest number of all five countries, but by 1997 Japan had moved into second place behind the United States.

In the field of PC communications, discrepancies between the five nations were great. As in the case of the Internet, the United States held an overwhelming lead. In France, the Minitel, which offers a wide variety of services such as directory services, timetable information, airplane ticket reservations, and home banking, is provided free to all France Telecom subscribers (6 million units and 17 million users for a penetration ratio of 44%). Thus, the incentive to subscribe to PC communication networks is low compared to other countries. In Britain, services are mainly focused on financial businesses while general entertainment services are lagging behind, which explains the lack of attraction to subscribers.

The United States also holds the lead in the prevalence of personal computers. The 80% ratio of personal computers per household in the United States is at least double the 30 to 40% ratio in the other four nations. If we view computer access among white collar workers as an index of competitive strength, the United States industry appears much stronger than the other four nations, particularly Japan. The figure for the United States is 104%, roughly one machine per person, while in Japan it is only 24% , one machine per four people. Among the European nations, the ratio is 76% for Germany, 74% for Britain and 62% for France.

**Fig. 13 Data Processing Services**

| | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|
| Internet | Thousand Hosts | Feb.97 | 734 | 10,111 | 592 | 722 | 246 |
| | Density : per Person | 1992 | 0.0% | 0.3% | 0.1% | 0.1% | 0.0% |
| | | 1997 | 0.6% | 3.8% | 1.0% | 0.9% | 0.4% |
| | Density : per Household | 1992 | 0.0% | 0.8% | 0.2% | 0.1% | 0.1% |
| | | 1997 | 1.8% | 10.3% | 2.5% | 2.0% | 1.1% |
| E-mail box | Million | 1996 | 4 | 62 | | | |
| | Density : per Person | 1994 | 1.0% | 12.1% | | | |
| | | 1996 | 3.4% | 23.6% | | | |
| | Density : per Household | 1994 | 2.9% | 32.4% | | | |
| | | 1996 | 10.5% | 63.0% | | | |
| On-line Service | Thousand Users | 1995 | 3,689 | 12,178 | 265 | 965 | 40 |
| | Density : per Person | | 2.9% | 4.6% | 0.5% | 1.2% | 0.1% |
| | Density : per Household | | 9.0% | 12.4% | 1.1% | 2.6% | 0.2% |
| Personal Computer | Million | 1994 | 15.0 | 77.5 | 8.8 | 11.7 | 8.1 |
| | Density : per Person | | 12.0% | 29.7% | 15.1% | 14.3% | 13.9% |
| | Density : per Household | | 35.7% | 79.8% | 38.3% | 31.7% | 35.6% |

Note: On-line service in France excludes Teltel users. The number of Teltel users was 6.5million in 1994. French density including Teltel users is 11.2 per person, 28.8 per household.

Source: OECD *Communications Outlook*, Ministry of Post and Telecommunications *White Paper 1997*, Japan Information Processing Development Center I*nformatization White Paper*. Compiled by NRI.

## 3. Competitive Policies to Accelerate Progress in the ICT industries

So far we have looked at the scale and growth of the ICT industries and communications infrastructure. It is apparent that lower prices through competition and deregulation are important elements for the growth of the industry and for advanced infrastructure development. We have surveyed changes and policy trends and compared the cost of the information service industry in the five major industrial nations.

### 3.1.Trends in the Cost of ICT services

In countries where new corporations have entered the market as a result of deregulation, there is vigorous price competition in the ICT industries and prices have been falling drastically. Recent technological progress has also helped to increase the pressure of price competition between different types of industries.

#### 3.1.1.Telecommunications Rates

##### 3.1.1.1.Domestic Calling Rates

There has been a remarkable drop in prices charged to businesses for domestic phone calls in all the OECD countries. As competition increased for both business and residential telephone services, the meter rate has declined. The reason is that the traditional telephone monopolies are lowering prices because of competition from newcomers, and as the volume of communication increases, there is a corresponding increase in user leverage to negotiate prices with the telecommunications industry. New providers entering the market are offering substantial discounts on user fees for a second dedicated line, thereby exerting pressure on the traditional companies to cut prices.[5]

**Fig. 14 Local Telephone Charges**

| | | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|---|
| Local Telephone | Jan.96 | Business | Total | 100 | 57.2 | 47.1 | 70.2 | 55.6 |
| | | | Fixed | 100 | 59.2 | 66.4 | 49.1 | 27.3 |
| | | | Usage | 100 | 56.7 | 42.0 | 75.7 | 63.1 |
| | | Residential | Total | 100 | 57.7 | 51.4 | 80.1 | 70.1 |
| | | | Fixed | 100 | 57.3 | 55.2 | 79.6 | 65.3 |
| | | | Usage | 100 | 58.3 | 45.2 | 81.0 | 77.8 |

Note: Usage charge includes the cost of 1,114 residential calls and 2991business calls converted from the local currency to U.S$ at the exchange rate for 1995.
Source: OECD *Communications Outlook*. Compiled by NRI.

##### 3.1.1.2. International Calling Rates

During the five years between 1991 and 1996, international calling rates in all T5 nations fell substantially. Although U.S. rates are still among the lowest in the 5 countries, in the United States prices are rising and in Britain the decline in rates is tapering off. This is because both countries liberalized their telecommunications sectors ahead of other countries, and the resulting substantial rate declines have already been completed. In the United States

[5] OECD p. 106-8.

prices went down in the late 1980s. Since the beginning of the 1990s the competitive focus has shifted to discounts to high-volume users. The OECD points out that these discounts are one-half to one-third of standard usage rates.

While Japan's international calling rates have fallen dramatically when measured on a yen base, in dollar terms they are more than three times as high as the rates in the other T5 nations. International calling rates are vulnerable to fluctuations in the exchange rate because of the existence of callback services. The drop in U.S. prices due to competition is also exerting pressure on other countries to lower their calling rates. This kind of price revision mechanism does not appear to be functioning adequately in Japan.

**Fig. 15 International Comparison of Tariff Trends**

| | ($/minute) | | | | | | CAGR (1991～1996) | |
|---|---|---|---|---|---|---|---|---|
| | 91 | 92 | 93 | 94 | 95 | 96 | US$ | Local Currency |
| Japan | 2.19 | 2.36 | 2.51 | 2.85 | 2.77 | 2.16 | -2% | -39% |
| U.S. | 0.54 | 0.53 | 0.53 | 0.56 | 0.57 | 0.63 | 17% | |
| U.K. | 0.89 | 0.79 | 0.78 | 0.66 | 0.59 | 0.61 | -31% | -19% |
| Germany | 1.00 | 0.97 | 0.97 | 0.91 | 0.93 | 0.65 | -35% | -32% |
| France | 1.14 | 1.13 | 1.02 | 0.88 | 0.81 | 0.89 | -22% | -26% |

Note: Average one minute tariff based on (1 initial minute + 3 additional minutes ) / 4.
Japan (KDD), U.K (BT, U.S. (AT&T).
U.S. data are deflated to reflect the discounts pointed out by OECD.
Source: OECD *Communications Outlook*. Compiled by NRI.

### 3.1.1.3. Mobile Communications

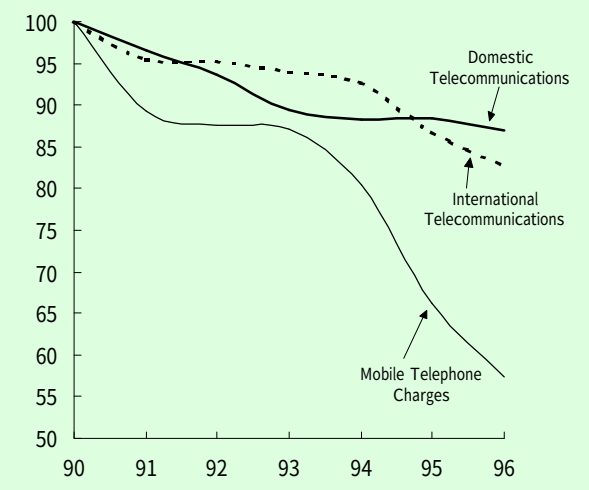
Since 1993 the T5 nations have introduced full-fledged competitive policies for mobile communications, and the number of operators is increasing. As competition heats up, prices are dropping and several price structures are in evidence. Since 1993 the rates for mobile communications have dropped by 35% in Japan. Compared to other countries, rates in Britain are low. In Germany, there is a contrast between low fixed prices for subscription fees and basic rates and high meter rates. In France, where competitive principles are slowly being introduced, a third operator launched mobile communications services in May 1996. Consequently, the state of mobile communications is lagging and rates are still high.

**Fig. 16 Mobile Telecommunication Charges**

| | | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|---|
| Mobile telecommunications | Analogue | Jan.96 | Total Fee | 100 | 131.2 | 102.3 | 94.2 | 159.1 |
| | | | Fixed Fee | 100 | 95.1 | 102.6 | 62.0 | 174.7 |
| | | | Usage Fee | 100 | 156.3 | 102.2 | 116.5 | 148.3 |
| | Digital | Jan.96 | Subscription Fee | 100 | 44.1 | 33.7 | 29.6 | |
| | | | Monthly Basic Fee | 100 | 28.0 | 35.7 | 52.2 | |
| | | | Charge per 91sec. | 100 | 94.3 | 78.3 | 196.9 | |
| | | | Charge per 3 min. | 100 | 77.8 | 85.0 | 216.2 | |

Note: Analogue data includes a basket of 679 calls at different times of the day.
Digital data :Japan (NTT DoCoMo), U.S. (NYNEX MOBILE), U.K. (VODAFONE), Germany (Berlin DT).
Source: OECD *Communications Outlook*, Japan Information Processing Development Center *Informatization White Paper*. Compiled by NRI.

**Fig. 17 Trend in Telecommunications Tariffs: Japan**




Source: BOJ *Corporate Service Price*. Compiled by NRI.

### 3.1.2. Broadcast Fees

There are substantial differences in CATV rates from country to country. In the United States and Germany, monthly fees are low compared to other nations, which explains why cable TV is more prevalent in both countries. According to the OECD, the existence of different contract (or subscriber) formats for single homes and for multiple dwellings and the fact that services and the number of channels differ from country to country make it difficult to compare CATV rates internationally.

Technological progress is heating up competition with other industries, and the industry will face more severe conditions in the future. As fiber optics become more widespread, as the broadcasting capacity of circuits increases, and as unit prices for communications keep falling, it will become feasible to send and receive moving images over the Internet.

**Fig. 18 CATV Tariffs**

($)

| | | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|---|
| CATV | 1995 | Connection Fee | | 285.0 | 27.0 | 0.0 | 31.2 | 107.0 |
| | | Monthly Charge | Basic | 22.0 | 10.7 | 18.7 | 7.4 | 22.8 |
| | | | Premium | 14.2 | 24.8 | 32.8 | | 27.9/38.0 |

Note: Premium charge is for extra channel. Number of channels for premium: Japan (1), U.S. (51), U.K. (3), France (30-31).
Source: OECD *Communications Outlook*. Compiled by NRI.

### 3.1.3. Data Processing

According to an OECD survey, Internet access rates in August 1996 averaged $19.07 among the OECD nations, a significant drop from the previous year average rate of $67.35. New providers have entered the market in droves, and there is price pressure from CATV and other industries. CATV offers Internet access through its dedicated lines. Access fees are either paid to the provider or to regional telecommunications operators, but if CATV delivers on its promise, it will enter into competition with the regional telecommunications operators for line usage fees. Compared to access rates in other countries, the rates in the United States are

extremely low. Comparing the amounts paid to providers and to telephone companies in the five countries, it is apparent that the difference between the United States and the other four countries is due to the lower fees that U.S. telephone companies charge for using their circuits. In Japan the basic fee for a telephone line is $33, more than twice the $14 basic fee in the United States.[6]

**Fig. 19 ICT-Related Charges**

| | | | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|---|---|
| Internet access | Aug.96 | Peak | | 100 | 57.9 | 130.9 | 149.8 | 104.8 |
| | | | PSTN | 100 | 41.9 | 160.5 | 174.0 | 130.0 |
| | | | IAP | 100 | 90.2 | 71.3 | 101.0 | 54.4 |
| | | Off-Peak | | 100 | 57.9 | 87.6 | 112.9 | 80.1 |
| | | | PSTN | 100 | 41.9 | 95.8 | 118.8 | 93.0 |
| | | | IAP | 100 | 90.2 | 71.3 | 101.0 | 54.4 |
| Packet Switched Data Communication | Jan.96 | | Total | 100 | | 98.2 | 178.1 | 55.4 |
| | | | Fixed | 100 | | 331.5 | 144.2 | 164.9 |
| | | | Usage | 100 | | 56.5 | 184.1 | 35.9 |
| Digital Leased Lines | Mar.96 | 64Kbps | 15km | 100 | 89.0 | 77.7 | 114.0 | 137.6 |
| | | | 100km | 100 | 29.2 | 30.0 | 73.5 | 79.1 |
| | | | 500km | 100 | 27.3 | 44.1 | 113.0 | 97.0 |
| | | 1.5Mbps | 15km | 100 | 91.9 | 34.6 | 90.4 | 85.0 |
| | | | 100km | 100 | 36.6 | 31.5 | 66.1 | 81.7 |
| | | | 500km | 100 | 26.7 | 68.7 | 73.5 | 97.9 |
| Leased line | Jan.96 | 9.6kbit/s | | 100 | 103.9 | 68.4 | 71.2 | 83.5 |
| | | 64kbit/s | | 100 | 139.5 | 72.0 | 64.8 | 102.2 |
| | | 1.5/2.0Mbit/s | | 100 | 113.4 | 48.1 | 64.0 | 93.9 |

Note: Internet access: 20 hours / month; Packet Switched Data Communication: 1,191 calls / day, Japan (NTT), U.K. (BT), U.S. (Nynex). Digital Leased Lines: monthly charge. Access fee + Basic fee + Distance fee. Japan (NTT), U.S. (64K:ATT; 1.5M:MCI), U.K. (BT), Germany (DBPT Telekom), France (France Telecom); Leased Lines: 100 lines / year. Japan (NTT), U.K. (BT), U.S. (Nynex); PSTN (Public Switched Telecommunication Networks), IAP (Internet Access Provider).
Source: OECD C*ommunications Outlook*, InfoCom Research, Inc. *Telecommunication Handbook*. Compiled by NRI.

[6] OECD *Communications Outlook* p. 115.

### 3.2. Policy Trends

The ICT industries have a pattern of falling prices, expanding demand, and continuing growth. The following tables depict some of the policies countries are putting in place to introduce the market mechanisms that will bring prices down in the telecommunication market.

**Fig. 20 Telecommunication Market Status, January 1997**

(Number of Licensed Operator)

| | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|
| Local PSTN | 4 | 1,330 | 150 | 1 | 1 |
| National PSTN | 7 | 500 | 150 | 1 | 1 |
| International PSTN | 3 | 202 | 2 | 1 | 1 |
| Leased line | 26 | 505 | 150 | C | -- |
| Analogue Cellular Mobile | 18 | 1,444 | 2 | 1 | 2 |
| Digital Cellular Mobile | 30 | -- | 2 | 3 | 3 |
| Other Mobile Communication | 38 | 2,120 | 2 | -- | 3 |
| Radio Paging | 40 | 600 | 6 | C | 3 |
| Payphones | 5 | -- | -- | -- | 1 |
| CATV | 224 | 1,500 | 130 | -- | -- |
| Data Communication | 4,232 | -- | -- | -- | -- |
| Internet access | 1,403 | Over 3,000 | Numerous - not recorded | -- | -- |

Note: C denotes competitive. U.S. Digital Cellular Mobile included in Analogue Cellular Mobile.
Source: OECD *Communications Outlook*. Compiled by NRI.

**Fig. 21 Telecommunication Market Policies in the T5 Countries**

| | | Japan | U.S. | U.K. | Germany | France |
|---|---|---|---|---|---|---|
| Legal framework | Laws | • Telecommunications Business Law (1984)<br>• NTT Law (1984)<br>• KDD Law (1952) | • (Federal) Communications Act (1934)<br>• Telecommunications Act (1996)<br>• (State) Public Service Act of each state | • Telecommunications Act (1984) | • Deutsche Telekom Privatization Act (1994)<br>• Telecommunications Act (1996) | • Telecommunications Regulation Act (1996)<br>• France Telecom (FT) Privatization Act (1996) |
| | Policy making by: | • Ministry of Posts and Telecommunications | • (Federal/state) Congress/state legislature | • Department of Trade and Industry (DTI) | • Ministry of Telecommunications (until the end of 1997)<br>• Ministry of Finance (during and after 1998) | • Ministry of Telecommunications and Space |
| | Regulated by | • Ministry of Posts and Telecommunications | • (Federal) Federal Communications Commission (FCC)<br>• (State) State Public Service Commission | • Office of Telecommunications (OFTEL) | • Independent regulatory body (planned) | • Independent regulatory body (planned) |
| Characteristics | | • Managed directly by the government→Public corporation (1957) → Privatized (1985)<br>• Monopoly→Introduction of the principle of competition in every sector (1985)<br>• Domestic and international services have been separated<br>• Many kinds of NCC (new common carrier) entered the market in 1989, intensifying competition | • As the country where telecommunications/ telephones originated, the US leads the world in every aspect: telephone use, business administration, services/charges, technology, liberalization/deregulation, and transition to the multimedia age.<br>• Dynamic development accelerated by participation of main players such as local and long-distance telephone companies, resale businesses, and cable TV companies. | • Privately managed → Nationalized (managed directly by the government) (1911)→Public Corporation (1969)→Posts and tele-communications separated (1981)→Privatized (1984)<br>• Monopoly→Multi-domination (1984)→The end of multi-domination intensified competition (1991)<br>• OFTEL, an independent regulatory body, has been promoting smooth transition from the stage of competitive principle introduction to the stage of full-fledged competition. | • Regulated and managed on the federal level (broadcasting on the state level)<br>• Directly managed by the government→Public corporation (1990) → Privatized (1995)→25% of stock sold (1996)<br>• Transmission and basic telephone services monopolized by DT will be fully liberalized in January 1998. | • Directly managed by the government→Public corporation (1991) → Privatized (1996)→Partial stock sales (1997)<br>• Basic networks and basic telephone services monopolized by FT will be fully liberalized January 1998. |
| Management | | • NTT privatized (1985) | • AT & T divided (1984) | • BT privatized (1984) | | |
| Regulation of charges | | • Fair return method (charge rates in a certain range)<br>Discount rate for charges by NCC will be reduced from 20% to 10% to about 5%. | • Dominant carriers: deregulated<br>Non-dominant carriers: from a fair return method to simplification of regulations on the charge ceiling | • BT: regulations on the charge ceiling<br>Mercury and other new carriers: no regulations on charges | | |