THE IT REVOLUTION IN KOREA

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Information technology (IT) is transforming the economy, the growth and structure of output, occupations and employment, and how people use their time. IT is exp ected to enhance productivity and efficiency at the corporate, industrial, and national levels . The Internet now makes it possible for anyone, whether a student, a researcher, or a concerned citizen, to readily obtain information that previously was available only to those with physical access to a sophisticated research library.

For a ny country today, strategic choices made in the near future may have a dramatic impact on its place in the new global economy and on the opportunities grasped from the emerging face of IT. Korean industry and government have been quick to recognize the importance of the information technology revolution. Like many other Asian countries, Korea hopes to move forward into a leadership role in IT, where G7 countries are currently dominant. The rapid growth of the IT industry in Korea signals positive prospects for an IT revolution in Korea.

The remainder of this paper will sketch a picture of recent growth of the IT industry in Korea, the status of IT infrastructure, government initiatives to promote IT revolution in Korea, and the future prospects and challenges.

1. Recent Growth of the IT Industry

The share of IT industry in GDP increased from 4.2 percent in 1993 to 6.3 percent in 1998. During the same period, the software and computer -related service industry grew at an annual rate of 28.8 percent, the IT equipment industry by 25.3 percent, and the communication service industry by 14.1 percent, while the annual growth rate of nominal GDP recorded 10.1 percent.

IT industry exports increased from 14.4 billion dollars in 1993 to 30.5 billion dollars in 1998. The annual growth rate of the IT industry during the same period was 16.2 percent, which was higher than the growth of total exports. Furthermore, the share of IT industry in total exports increased from 17.5 percent in 1993 to 23.1 percent in 1998.

Labor productivity in the IT industry increased 18.4 percent annually between 1990 and 1995, while that of overall industry grew at annual rate of 13.7 percent. The manufacturing sector of the IT industry showed a particularly high 27.2 percent growth rate o f labor productivity during the same period. This is partly due to the knowledge -intensive characteristics of the computer and semiconductor industry included in the IT manufacturing sector.

Labor productivity growth of IT-using industries was rather insignificant in Korea. IT-using industries are defined as the ten industries that showed the highest IT investment per worker. The communication service industry was the most IT-intensive industry among the IT-using industries , but its annual labor productivity growth rate reached only 5 percent between 1990 and 1995, which was much lower than that of overall industry.

IT-using industries employed 3.64 million workers in 1997 and represented 27 percent of total employment. Employment in IT was 548,000 in 1997 and 507,000 in 1998. Employment in the IT industry posted an annual growth rate of 13.3 percent between 1991 and 1998.

Electronic commerce (e-commerce) in Korea is not yet significant in terms of absolute size. In the second half of 1999, the total online purchasing by consumers (business-to-consumers, B-to-C) in Korea amounted to US$0.18 million, a figure that is dwarfed by the US$178 million of online purchases in the U.S. This means that commercial transactions through the Internet have yet to be fully set in motion in Korea.

The market size of business-to-business (B-to-B) e-commerce is thought to be larger than that of business-to-consumer (B-to-C) in Korea. Since direct data for the scale of B-to-B is not available, we may use the sales of EDI (Electronic Data Exchange) service, which is a major format of B-to-B transactions. In 1997, sales of EDI service in Korea posted 34.5 billion won and were estimated to represent less than 2 percent of the worldwide sales in EDI service. Compared to the share of the Korean IT industry in the total global IT industry, the B-to-B market

in Korea is relatively underdeveloped.

2.   Current Status of IT Infrastructure
In 1980, telephone penetration in Korea stood at 7.3 lines per 100 people.   By 1997, Korea's telephone penetration rate had reached 44.4 lines per 100 people, surpassing the OECD average penetration rate.   However, it is still lower than that of the United States, Japan, Singapore, and Hong Kong (Table 1).

Table 1.
Telephone Lines per 100 People

	1993	1994	1995	1996	1997	1998
Korea (Rep. of)	37.4	39.3	41.2	43.0	44.4	43.3
United States	57.4	58.9	60.7	62.2	64.4	66.1
Japan	47.1	47.9	48.7	50.2	50.3	50.3
Singapore	43.3	45.4	47.8	51.3	54.3	56.2
Hong Kong	50.7	52.2	53.2	54.7	56.1	55.8
China	1.4	2.3	3.3	4.4	5.6	7.0
Taiwan	38.0	40.2	43.1	46.5	50.0	52.4
Malaysia	12.5	14.6	16.6	17.8	19.5	19.8
Asia Avg.	4.6	5.0	5.6	6.3	7.0	7.6
Europe Avg.	30.7	31.8	33.1	34.5	36.2	37.1
N. America Avg.	45.6	46.9	48.2	49.2	50.9	52.4

Source: ITU World Telecom Indicators (1999.11).

The number of Internet hosts is also increasing rapidly (Table 2).   In 1994, there were less than 14,000 Internet hosts in Korea , but this figure had grown to 460,000 by August 1999.   This represents an expansion of more than 33 times over a 6-year period.   However, this growth performance is less astounding when viewed in the perspective of the global revolution in Internet provision.   In 1999, the number of hosts in Korea was less than one-hundredth of the worldwide number (Table 3).

Table 2.
Internet Hosts and Domains in Korea

	1994	1995	1996	1997	1998	1999
Hosts						
Number	13,856	36,644	73,191	131,005	202,510	460,974
Growth rate		164%	100%	79%	55%	128%
Domains						
Number	192	579	2,664	8,045	26,166	207,023
Growth rate	215%	202%	360%	202%	225%	691%
Internet Users						
Number	146,000	386,000	731,000	1,634,000	3,103,000	10,860,000
Growth rate	92%	164%	89%	124%	90%	250%

Note: Number of hosts for 1999 is as of the end of August 1999
Source: Korea Network Information Center

Table 3.
Internet Hosts and Domains Worldwide

	1994. 1	1995. 1	1996. 1	1997. 7	1998. 7	1999. 7
Hosts						
Number	2,217,000	4,852,000	9,472,000	19,540,000	36,739,151	56,218,000
Growth rate		119%	95%	106%	88%	53%
Domains						
Number	30,000	71,000	240,000	1,301,000	13,062,628	17,299,119
Growth rate		137%	238%	442%	904%	32%

Source: Network Wizard (http://www.nw.com)

Korea's digital infrastructure as measured by the number of PC's per person is not as strong as IT leaders such as the United States, Japan, Singapore, and Hong Kong (Table 4). The number PC's per capita is much lower in Korea than in those nations. Recent growth of PCs per capita in Korea has not been as fast as that in Japan, Singapore, or Hong Kong.

Table 4.
Number of Personal Computers per 100 People

	1993	1994	1995	1996	1997	1998
Korea (Rep. of)	6.84	8.64	10.77	13.17	15.07	15.68
United States	27.20	29.74	32.81	36.39	40.69	45.86
Japan	7.77	9.19	12.03	16.21	20.21	23.72
Singapore	12.18	17.06	23.43	31.21	39.95	45.83
Hong Kong	10.00	12.43	15.43	19.01	23.07	25.42
China	0.12	0.17	0.23	0.36	0.60	0.89
Taiwan	6.68	8.05	9.86	10.27	12.70	15.86
Malaysia	2.60	3.26	3.73	4.16	4.61	5.86
Asia Avg.	0.75	0.94	1.20	1.52	1.88	2.21
Europe Avg.	5.74	6.71	8.30	9.58	11.11	13.29
N. America Avg.	20.26	22.30	24.61	27.35	30.68	34.90

Source: ITU World Telecom Indicators (1999.11)

The number of Internet users in Korea is increasing dramatically. From 1994 to 1999, the number of Internet users grew at an annual rate of 134 percent (Table 2). As of August 1999, more than 10 million people, almost a quarter of Korea's population, used the Internet for various purposes.

Public access to the Internet is common in Korea. A recent survey of web users worldwide found that Korea had one of the highest percentages of access from schools (29 percent of respondents) among OECD countries. (The figure for Japan was 7 percent). Access from kiosks, libraries, and cyber-cafes also accounted for over 20 percent of users, compared to less than 10 percent in Japan.

A large pool of Internet users is important because they represent potential customers and business people in the digital economy. Fifty-six percent of Korean Internet users in a recent survey had purchased goods over the Internet from home (compared to a high of 72 percent in the US, 37 percent in Spain, 29 percent in Chile, and just 25 percent in India).

The global rush to invest in Korean Internet companies has also increased since 1998, when web giants began to forge strategic ties with Korean companies. Amazon.com, one of the largest U.S. online music and book retailers, formed a partnership with Samsung Corp., which recently announced that it would transform itself into an Internet-oriented firm through a strategic alliance with America Online. Microsoft launched a Korean version of msn.com, its Web search and content aggregation service, while Lycos Inc. opened a Korean-language portal though a joint venture with Mirae Corp. These foreign investors are expected to bring talent and expertise needed to advance Internet service provision in Korea.

3.   Government Initiatives to Ensure Information Infrastructure

The Korean government has tried to formulate a strategy to ensure that the country moves ahead in its quest to reap all possible benefits from the IT revolution. The white paper "Cyber Korea 21" in March 1999 notes that levels of information and the size of the knowledge gap greatly influence the productivity of individuals, businesses, and economies as a whole. "Cyber Korea 21" and related initiatives including President Kim's New Year Policy Speech lay out an ambitious set of targets to be met by 2002 that are designed to ensure that Korea becomes one of the top ten nations in terms of information infrastructure and industry.

These targets include creating 1 million jobs and 118 trillion won worth of new production, increasing the bandwidth of universal service to 2Mbps, nurturing over 5,000 venture enterprises while doubling the proportion of Korean parts in IT equipment from today's 40 percent, and

increasing the number of Internet users to 10 million by 2001.

The report also emphasized the primary role of the government in creating a dynamic information infrastructure and ensuring that the market conditions and incentives are in place to allow for private sector competition and investment. According to the report, the government will improve the legal and institutional environment to build trust in the cyber market. The necessity of trust in e-commerce markets was also highly recognized in the report. The government will also play a leading role to promote e-commerce by enlarging demand. It will encourage domestic industries to apply business-to-business electronic commerce and to enhance their competitiveness. Additionally, the government will expand digital infrastructure such as networks, skilled workers, and technology.

"Cyber Korea 21" suggests the importance that the country's leaders should place on information infrastructure. The government has striven for the early construction of information infrastructure and the creation of new information and knowledge-related businesses and jobs. The government's efforts have also assisted Koreans to become acquainted with the digital environment. The continuing support of the government is helping to set the foundation for the IT revolution in Korea

4.   Future Prospects and Challenges of the IT revolution in Korea
Korea is quickly improving its digital capacity. Firms have started to realize that e-commerce is not just an option, but a necessity in remaining competitive. Because of this awareness, Korean firms have recently shown heightened interest in business-to-business as well as business-to-consumer e-commerce.

Not only venture companies but also big business groups have recently established plans to strengthen their e-commerce activities. Strategic alliances are also booming among Korea companies of all sizes to improve their competitiveness in e-business. For example, Korea's leading companies including Hyundai Motors, Samsung Electronics and LG Telecom recently agreed to launch a giant Internet website for joint marketing and promotion.

In addition, the government is actively supporting digitalization and creating a regulatory framework so that the Korean economy can adjust at an even faster pace. The passage of the Electronic Signature Law in July 1999 was a step in right direction for e-commerce in Korea.

The strong desire of Koreans for information and knowledge is partly explained by the country's educational enthusiasm. Those desires are expected to increase the frequency of Internet use, which will in turn influence the frequency of online purchases.

According to a survey, it is estimated that the size of the ecommerce market will increase three-fold from last year. For example, online stock trading recently accounted for close to 50 percent of total trading on the Korean stock market, up from 29 percent in August 1999. This dramatic growth also suggests that Korea's e-commerce still has high growth potential.

While Korea has performed impressively, rolling out IT in areas such as mobile telecommunications, and while it has a well-educated workforce, a strong IT manufacturing sector and a number of other advantages, it also faces some bottlenecks to further development of the sector. The need for continued restructuring in the education sector is one of the broad factors that might hold back the country. More narrowly, Korea needs to move toward a more efficient model of IT provision and services.

A broad survey of laws governing commerce still needs to be conducted. Those laws that would unintentionally or unnecessarily restrict e-commerce should be amended so that Internet firms can do business freely and that foreign standards on e-commerce transactions are mutually recognized, while simultaneously protecting domestic consumers.

Another possible concern in Korea's digitalization process is imbalance among firms, regions, and social classes. In particular, there is a serious gap between Seoul and other regions of the country in the extent of digitalization, and such an issue should be resolved in order to realize greater benefits from the digital economy.

Korea will exert continuous effort to meet the increasing demand for constant, ubiquitous access

to information networks.   We need to ensure that the Internet fulfills its promise as an opportunity, not a barrier, for all.   However, many challenges remain as the IT revolution is still unfolding.