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South Korea

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Total population	48,846,823 (CIA July 2006)
GDP per capita	USD 16,291
Key economic sectors	Services
Computers per 100 inhabitants	53.2
Fixed-line telephones per 100 inhabitants	57 (2004)
Mobile phone subscribers per 100 inhabitants	79.4 (ITU 2005)
Internet users per 100 inhabitants	74.8 (NIDA December 2006)
Domain names registered under '.kr'	784,199 (NIDA March 2007)
Broadband subscribers per 100 inhabitants	26.4 (OECD June 2006)

Technology infrastructure

In the early 1980s, South Korea (referred to as Korea in this chapter) was a developing nation at best. For example, the wire phone penetration ratio was a mere 7.2 per cent in 1980 (MIC 2003). To upgrade its telecommunication infrastructure, the Korean government imported electronic switches from overseas as a transitional alternative, but embarked on a local electronic switch (TDX-1) development project in 1981. Five years later, Korea became the 10th electronic switch-producing nation and finally succeeded in improving the phone penetration ratio to an average of one phone per household in 1987.

As Internet connection service debuted in 1994 and broadband network service became commercially available in earnest in 1998, the number of Internet users increased exponentially from 3 million persons in 1998 to 33.01 million persons by the end of 2005, corresponding to 72.8 per cent of the population.

All primary, middle and high schools now have access to broadband connection and all cities in Korea are connected by fibre optic cable. Broadband network has now penetrated even to rural villages. More than KRW 8,000 billion (around USD 8.6 billion) of public funds has been invested in the nationwide broadband implementation project that went on for 11 years (1995–2005). As a result, broadband communication infrastructure now connects 144 coverage areas across the country with up-to-date fibre optic cable. There are five Internet eXchanges (IX) in Korea and KIX (www.kix.ne.kr) of the National Information Society Agency (NIA) serves as a gateway for non-commercial networks of government authorities and public institutions. In addition, 79 service providers offer commercial Internet access services.

International submarine fibre optic cable connects different countries across national boundaries to enable mass data transfer over a long distance at dozens of Tbps. Submarine cable switching stations are located in seven areas (Busan, Geoje, Goheung, Namhae, Hosan, Wooleung and Taeahn) and the country is now connected to 10 international submarine fibre optic cables (APCN, APCN-2, CUCN, C2C, EAC, FEA, etc.) whose aggregate capacity equals around 19 Tbps.

Thanks to a series of advances in the evolution and penetration of IT network services, Korea is now at a critical juncture toward active utilization of ubiquitous IT technologies. The Korean government is giving priority to the implementation of a Broadband Convergence Network (BcN), which is a service integration network that enables customers to use multimedia services converging voice, wire, wireless communication and broadcasting services anywhere and anytime based on an open API platform that allows service providers to deliver diverse services with ease. The government has invested around KRW 500 billion (about USD 539.34 million) in pilot BcN projects, core technology development initiatives and standardization efforts in Phase 1 (2004–05). Phase 2 of the programme will focus on developing such service models as BCS (Broadband Convergence Service), u-Work, u-Learning and u-City, and support commercialization of the services identified in Phase 1 in an effort to promote BcN service utilization from the customer's perspective.

An address shortage problem is foreseen with the current reliance on Internet protocol 4 (IPv4). Although the number of Internet users is increasing at a much slower pace since it exceeded 30 million, demands for IPTV addresses are increasing

continuously with projects involving new technologies such as BcN, home network, portable Internet and RFID. The Ministry of Information and Telecommunication is trying to resolve the Internet address shortage by launching a next-generation Internet programme focusing on the promotion of IPv6, which provides almost limitless Internet address resources.

Key institutions dealing with ICT

The Korean government overhauled the Ministry of Posts and Telecommunications into the Ministry of Information and Telecommunication (MIC) in 1994, bringing together government functions relating to ICT and the broadcasting sectors in the Ministry of Commerce, Industry and Energy, the Ministry of Science and Technology, and the Public Information Agency.

Government policies relating to information and communication are developed and implemented through deliberation and coordination by and between the Informatization Promotion Committee (IPC), the Special Committee on e-Government (under the Presidential Committee on Government Innovation and Decentralization), the Ministry of Information and Communication (MIC) and other central government authorities, local municipalities and public organizations, including the NIA.

To implement and integrate ICT policies across different government authorities, the IPC was formed in June 1996 under the Basic Act on Informatization Promotion (BAIP). The committee is a top-level decision-making authority headed by the Prime Minister. It has 24 Ministerial-level representatives, the Minister of Finance and Economy as Vice-Chairman and the Chief Assistant to the Prime Minister as Secretary. It is mandated to develop, coordinate and assess policies, plans and programmes to promote the penetration of ICT within the nation. It is also tasked to foster the implementation and utilization of broadband ICT platforms and to determine operational guidelines for funds for facilitating informatization.

Each central government authority has an internal function responsible for planning and implementing information and communication initiatives within the bounds of its competence. In most central government authorities, this function belongs to a department (or an individual officer) of the planning and management office. However, some authorities, such as the Ministry of Education and Human Resources Development, the Ministry of National Defence, the Ministry of Government Administration and Home Affairs and the National Tax Service, operate permanent IT organizations headed by directors-general.

In addition, to effectively oversee and coordinate information and communication initiatives within each government authority and to promote utilization of ICT in government administration

and public service, the government in 1997 required each government authority to appoint an IT professional as a CIO (chief information officer).

The following agencies render in-depth assistance in policy planning and implementation to the MIC:

- The NIA drafts government policies on information and communication and provides support for the development and enforcement of the informatization promotion master plan and implementation plans thereto.
- The Korea Agency for Digital Opportunity and Promotion (KADO), which was established under Article 6 of the Act on Closing the Digital Divide, performs various research and assists with policy development to close the digital divide within the nation.
- The Korea Information Security Agency (KISA) is responsible for improving information security, promoting information security awareness, responding to information security violations, safeguarding the IT infrastructure, assessing information security product quality and developing information security technologies.

Digital content initiatives

Access to online information is almost universal in both the public and private sectors and a wide variety of digital content on various subjects, including economy, society, welfare and culture, is now available in Korea. The following are just a few of the most representative examples of content digitization in the Korean public sector.

National knowledge contents digitization strategy

To foster the digitization of national knowledge content in a systematic manner, the Korean government enacted the Knowledge and Information Resource Management Act in 2002 and kicked off the Public Knowledge and Information Resource Management Project. Knowledge databases storing information resources in five key strategic sectors—science and technology, education and academics, culture, history, information and communications—as well as content in such domains as industrial economy, construction technology, and maritime affairs and fisheries, have been built for use by the general public.

Because of the high cost of comprehensive digitization programmes, the Korean government has developed an automatic knowledge and information resource registration system to turn knowledge and information into online digital format

immediately upon creation. Two hundred and one automatic knowledge and information resource registration system sites were deployed in 2004. A year later, an additional 100 sites were in place.

Public service information database

As e-government services expanded and government information publication services began to take root, public demand for government information increased dramatically. Thus, in his administrative policy address to the National Assembly (on 25 October 2004), President Roh Moo-hyun stressed the need for a major investment in IT infrastructure and underlined the importance of ‘migrating national databases in the public sector onto a next-generation network platform’. In November 2004, the IT Sector Investment Enhancement Strategy was announced during the joint policy workshop involving the Presidential House, the government and the ruling party; it mandated MIC and the Ministry of Government Administration and Home Affairs (MOGAHA) to launch in 2005 the Year 1 projects envisioned by the strategy.

The government information database implementation project aims to migrate public service information from administrative authorities to databases. The project is designed to prevent duplication in IT infrastructure investment by the government and to maximize returns on investment by incorporating interfaces with other IT implementation projects already launched by other government agencies and the e-government initiatives.

In 2005, eight projects for improving administrative efficiency, 14 projects for improving the quality of public service, and 11 projects for preserving government documents and artefacts were implemented. A total of 1,383,402 person hours was spent on digitizing 91,024,674 information items throughout the year, which also contributed to easing unemployment among the youth. In March 2006, the Database Standardization Guideline was issued to replace the different database standards among government agencies, to encourage them to leverage their databases more and to ensure interoperability among different government databases.

Korea knowledge portal

In November 2001, KADO opened a national knowledge portal (Korea Knowledge Portal, www.knowledge.go.kr) that as of late 2005 consisted of more than 25 million records stored in databases owned by 908 public organizations. The portal offers a comprehensive information search service encompassing a

variety of fields integrating five comprehensive information centres and more than 900 in-depth information repositories.

To complement the national knowledge portal service, key government ministries, including the Ministry of Science and Technology, the Ministry of Education and Human Resources Development, and the Ministry of Culture and Tourism, have joined hands to designate and operate comprehensive information centres that would deliver in-depth knowledge content in the five strategic areas of science and technology, education and academics, culture, history, and information and communication.

Online job information services

Several hundreds of public and private online recruitment websites connecting potential employers and job seekers are now operating in Korea. The most representative online employment information service portal in the public sector is Work-Net run by the Korea Employment Information Service (KEIS). KEIS recently launched a mobile version of Work-Net to provide through a mobile platform (for example, a mobile phone or PDA) information on job openings, tips for finding jobs and employment-related news articles.

Art, culture and history content online

With increased interest in arts and culture in cyber space among the general public, the government needed to promote opportunities to appreciate art and culture online and develop an efficient management framework for knowledge and information resources relating to art and culture. Thus, the Ministry of Culture and Tourism runs an art and culture information portal (Art Way, www.art.go.kr) that classifies and presents a wide variety of digitized information from art and culture institutions and organizations. Art Way provides access to more than 1.76 million records of art and culture-specific information, 430,000 art and culture images and 3,562 video clips showing performances at the National Theater of Korea and the National Centre for Korean Traditional Performing Arts (Korea Culture Information Service 2005).

A comprehensive cultural properties information service portal (Korean National Heritage Online, www.heritage.go.kr) provides a single point of integration and management for information relating to cultural properties, national treasures and historical sites across the country. Managed by the Korean National Heritage Online, the portal provides access to 630,000 pieces of information on Korean cultural heritage from 105 institutions, including the Cultural Heritage Administration,

the National Museum of Korea and the War Memorial. The information was collected through six project phases from 2000 to 2005. The e-Museum (www.emuseum.go.kr) service has added a search and theme function to the comprehensive museum information service. The online museum portal also offers an opportunity for a 3D immersion experience with its cyber museum service that shows more than 4,500 major cultural artefacts on exhibit in 72 museums across Korea.

Other cultural content services online are: tourism information (www.visitkorea.or.kr), KOLIS-NET or the Korea Library Information System Network (www.nl.go.kr/kolisnet), and Q-NET, which provides job certification and license information.

ICT and ICT-related industries

The backbone of the Korean economy in the 1960s was the light industry. In the 1970s, it was the heavy and chemical industry, and in the 1980s to 1990s the electronic appliance and automobile industries. In the 21st century this distinction belongs to the ICT industry. In 2004, the ICT industry accounted for 48.15 per cent of real GDP in Korea (MIC 2005).

Recently, the aggregate growth has slowed down a little as the market has matured. However, because some sectors, such as the mobile data service sector, are still growing by leaps and bounds and new services are debuting one after another, the ICT industry will remain a key growth engine for the national economy in the future.

The volume of aggregate exports by industrial sector in Korea reached USD 284.4 billion in 2005. But the export growth rate slipped somewhat to 12 per cent. On the other hand, the aggregate industry import volume rose by 16.4 per cent from the previous year to USD 261.2 billion, which resulted in an international trade surplus of USD 23.2 billion.

The export growth rate of the ICT industry fell to 9.25 per cent and the industry posted USD 48.4 billion in trade surplus. However, this figure accounted for 209 per cent or more than twice the aggregate trade surplus of USD 23.2 billion in the industrial sector as a whole in 2005, which indicates that the ICT industry makes up for the trade deficits suffered by the other industries.

The ICT appliance industry posted USD 43.88 billion in trade surplus in 2005, up by 10.1 per cent from USD 43.93 billion in 2004 and showing a steady stream of trade surplus. Notably, mobile communication devices accounted for a sizable portion of the positive trade balance. The trade surplus from the sale of digital TV, semiconductors and display panes is also increasing.

Enabling policies and programmes

The Korean government embarked on building the information infrastructure in 1987 through the National Backbone Information Network Project, which sought to enhance public sector efficiency and lay the ground for the advancement of the information and communication industry in five key strategic areas, including government administration, finance, education, national defence and law enforcement. The government then kicked off the Government Administration Information Service Project which implemented an online network connecting all government administration authorities.

In the mid-1990s, with a strong commitment to staying ahead of others in the information revolution, the Korean government launched a government-wide information and communication programme. In March 1999, to get over the Asian financial crisis and prepare for the emergence of the knowledge-based economy, the government developed a policy blueprint called Cyber Korea 21. In 2002, e-Korea Vision 2006 was launched with the goal of positioning Korea as a global IT leader.

In 2003, new changes and challenges, including the inauguration of the new administration, major online security violation scandals and an economic slump, made it necessary for the Korean government to formulate a new vision for information and communication in Korea. Accordingly, the government announced Broadband IT Korea Vision 2007.

The successor to Vision 2007 that now underpins government projects is the u-Korea Master Plan, which seeks to build the first ubiquitous society (u-society) where people can access information anywhere, anytime using the best ubiquitous communication infrastructure (u-Infrastructure). Under the Plan, the government intends to achieve the five key visions of Friendly Government, Intelligent Land, Regenerative Economy, Secure and Safe Social Environment and Tailored u-Life Services. It also intends to optimize four major engines: Balanced Global Leadership, Ecological Industrial Infrastructure, Streamlined Social Infrastructure and Transparent Technological Infrastructure.

By leveraging information and telecommunication technologies to satisfy emerging socio-economic demands, and by repositioning Korea as the leading IT superpower in the world, the u-Korea Master Plan (2006–10) provides a vision to 'Build the 1st u-Society on the BEST u-Infrastructure'. Specifically, the government is targeting advancements in five domains—public administration, national land, economy, society, and personal life—and the optimization of four engines encompassing globalization, industrial infrastructure, social institution and framework, and technology development.

As the IT industry evolves further, conventional barriers between different industries and products are fading away and

a new momentum for new industries is in the making. To turn such a momentum into a new national growth engine, MIC is pressing ahead with the 'IT839 Strategy' to introduce innovative services and premium infrastructure that are the first and best of their kinds in the world, and to develop top-notch products to contribute to the growth of the national economy. The IT839 Strategy, which was released in February 2005, refers to a strategy to stimulate the advancement of the IT industry by promoting eight new services to attract investment in three key wire/wireless communication and broadcasting infrastructure and to induce the growth of nine state-of-the-art device, terminal and software content industries.

The eight services are: WiBro, DMB, Home NW, telematics, RFID-based, W-CDMA, terrestrial DTV and Internet telephony. The three key infrastructures are broadband convergence network, ubiquitous sensor network and next-generation Internet protocol (IPv6). The nine industries are: mobile telecommunications handset and equipment, digital TV and broadcasting devices, home network devices, IT system-on-chip, next-generation PC, embedded software, digital content and software solutions, telematics devices and intelligent service robots.

As the IT839 Strategy progressed from the initial market formation phase to the commercialization phase, it evolved into the u-IT839 strategy and the strategic items were readjusted to strengthen the interfaces between the eight services, three infrastructures and nine new growth engines, and to enhance the focus on software policies.

Legal and regulatory environment for ICTs

The legal framework for information and communication in Korea is founded on the Framework Act on Informatization Promotion, which consists of legislation pertaining to three areas: promotion of informatization across society, development of the ICT industry and advancement of ICT infrastructure. The Framework Act enabled the government to integrate or coordinate functions relating to information and communication across different government organizations to form a basis for more efficiency and consistency in information and communication projects at the national level.

More recently, refinements in Korea's legal and regulatory environment for information and communication are expected to create more value and enhance efficiency and productivity. For example, in line with the penetration of e-banking services and the advent of new payment instruments such as e-cash, the government is planning to enact the 'e-Financial Transaction Act' to clarify the rights and obligations of the parties to online financial transactions in consideration of the characteristics of

such transactions. In addition, as violations of personal privacy become a serious social issue in the wake of rapid development of IT, the government intends to enact the 'Act on Security of Personal Information Processed by Computers in IT Networks'. The objective is to protect the privacy of individuals from potential violations resulting from the increase in online use of personal information, and to overhaul relevant legal and regulatory arrangements to prepare for privacy violations that may occur as convergence and advancement of new technologies such as RFID proceeds and 'the intelligence-based society emerges' (MIC 2005).

Education and capacity building

The government tried to improve the information and communication capability of the general public in 2000 through the 'IT Education and Training Plan for 10 Million Persons'. Ten government authorities, including MIC, jointly launched the training programme. By 2002, 13.8 million had joined the IT education and training courses offered. Later, the government sought to transform the public into creative e-Koreans and 12 government organizations, including MIC, kicked off Phase 2 of the National IT Education and Training Programme.

However, in spite of the programme, the digital divide between the majority and segments of the national population with little access to information and communication services, including the elderly, the physically challenged, the poor, farmers and fisher folk, became a social issue (MIC 2005). In response, the government developed the 'Mid- to Long-Term Plan for Reducing the Digital Divide' in 2004. Its goals were to ensure equal access to information and communication services and to educate and train 5 million persons deprived of information and communication services by 2008. A total of 1.2 million and 1.3 million elderly, persons with disabilities, low-income earners, and farmers and fisher folk were trained in 2004 and 2005, respectively.

Open source initiatives

The government is spearheading the distribution and promotion of open source software (OSS) by developing the Korean OSS standard platform named Booyo, launching open code software pilot projects, and operating technical assistance centres. It also recommends a preview process prior to adoption of OSS.

In the case of embedded software, corporate buyers are favouring foreign vendors due to the small number of Korean embedded software vendors and concerns about engineering support. In addition, the embedded software vendors are having

difficulty recruiting new engineers. MIC is trying to develop and distribute standard embedded software platforms that are applicable universally to a variety of ICT devices by focusing on the promotion of the embedded software industry and operating the Embedded Software Technology Support Centre. The latter aims to provide an integrated test environment for small embedded software vendors and help them meet technological challenges.

Research and development

The government will invest approximately KRW 960 billion (about USD 1 billion) to improve the competitive edge of the Korean IT industry in 2007. The allotment is 12 per cent more than the 2006 allotment of KRW 860.4 billion. Specifically, investments in technology development will increase from KRW 633.7 billion to 707.6 billion, in human capital development from KRW 107.8 billion to 114.5 billion, in infrastructure deployment from KRW 88.7 billion to 107.8 billion, and in standardization from KRW 30.2 billion to KRW 33.5 billion. Technology development will focus on convergence among information technology, broadband technology, network technology, critical hardware parts, materials and software. Human capital development will underscore better IT education infrastructure in colleges and education programmes that focus more on practical and field experience. In terms of standardization, the government will enhance partnerships among Korea, China and Japan, and beef up the clout of Korea as a global IT standard setter. In infrastructure, the government will focus on establishing a u-IT hub and expanding common services for small and medium IT venture firms.

The IT Industry Competitiveness Promotion Programme was launched by MIC in 1999 to sponsor industrial technology development proposals of small and medium IT venture firms in recognition of their technological value and industrial innovations. Until 2005, the policy initiative made a tremendous contribution to promoting technology-innovating IT venture firms by extending a total of KRW 240 billion (about USD 258.7 million) in support of more than 1,200 technology development programmes. In 2006, MIC approved 59 out of 138 proposals by IT venture firms, including the 'Mobile Wi-MAX Terminal Chipset Development Programme', and extended KRW 15 billion in sponsorship funds.

Challenges

From the early days of the ICT revolution in Korea, the government established a government-wide implementation apparatus involving the legislature and the judiciary, with IPC as the

steering body. The government also built a consensus on the need for ICT services across the entire spectrum of government agencies. In addition, the enforcement of the Framework Act on Informatization Promotion in 1995, the establishment of the Informatization Implementation Committee and Informatization Promotion in 1996, and the organization of the Informatization Strategy Forum in 1998 were significant milestones towards a single nationwide apparatus for ICT promotion. Notably, the establishment of MIC in December 1994 as a single government agency responsible for planning ICT promotion strategy, developing the ICT industry and regulating communications service industry had no precedence in any other country.

The ability to put forward a vision for ICT in society in response to various changes was also one of the factors that ensured the success of the ICT revolution and national development in Korea. By providing a comprehensive and systematic long-term vision for the nation from the early days of nationwide ICT transition, the government created demand for ICT adoption and generated ICT investment in the private sector as a pioneer of transition to ICT in Korea.

ICT development in Korea is the product of a virtuous cycle involving the ICT promotion drive of the government, the ICT industry and the communications service infrastructure. The government deserves credit for facilitating the transition to ICT adoption by creating demand for ICT and leveraging this demand to encourage growth in the ICT manufacturing sector.

Lastly, aggressive initiatives in advancing ICT adoption in consideration of the national and cultural disposition seem to have worked. The unusually high receptiveness of Koreans to the latest technologies and the 'education fever' has turned Korea into a global ICT superpower in just 20 years. The Internet cafés all over Korea have had a tremendous influence on the prompt penetration of the broadband network. In addition, government commitment to ICT training programmes such as the 'ICT Training Programme for 10 Million Koreans' prepared the public to be able to access and utilize digital knowledge and information in various ways.

However, in spite of the successful track record of ICT promotion to date, there are issues awaiting resolution if Korea is to sustain its ICT-leveraged development in the future. First, while Korea has succeeded in implementing a world-class network infrastructure ahead of other nations, it lacks a policy and strategies for protecting IT users and reducing the digital divide. This policy gap must be filled especially given the rise of ubiquitous technologies and the campaign for u-Korea (MIC 2006).

Second, while the IT industry in Korea has achieved breakthroughs in hardware (devices), large businesses and systems, the imbalance between hardware and software, between large corporations and small businesses, and between systems

and parts persists, and the global competition with China and other competitors is intensifying as the growth of the global IT market slows down.

Third, a proactive policy focus on market competition has resulted in an investment boom in the telecommunications industry and in IT industry development. However, the market outlook remains unclear due to a falling growth rate in the maturing market and uncertainty in the legal framework for convergence between communication and broadcasting services.

Fourth, the IT industry has emerged as the key export driver of Korea, thanks to aggressive global marketing. However, advances into promising emerging markets have been relatively insufficient.

Moving beyond the previous milestones of communication infrastructure development and ICT adoption and utilization,

Korea is now bracing itself for the advent of the era of ubiquitous ICT. As the dispersal of the broadband network brought about tremendous opportunities several years ago, the arrival of ubiquitous ICT is likely to create the momentum for further growth and development. The Korean government needs to define strategic responses to sustain industrial growth and expand the market, and to resolve outstanding social issues, in the ubiquitous ICT environment.

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