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Korean Experience of Overcoming Economic Crisis through ICT Development

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Information and Communications Technology and
Disaster Risk Reduction Division

Korean Experience of Overcoming Economic Crisis through ICT Development

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Abstract

The world is experiencing an enormous shock from the financial crisis and recession that began in the United States in 2007. All the governments in the world are making utmost efforts to overcome this unprecedented economic crisis. The Republic of Korea experienced serious economic crisis in a decade ago and ICT development contributed greatly to overcoming Korean economic crisis. Korea's experience shows how information and communications technology can be used for overcoming global economic crisis. This paper "Korean Experience of Overcoming Economic Crisis through ICT Development" explains the background factors that made a considerable achievement in ICT development in the era of economic crisis. The paper is organized as follows: 1) the 1997 Economic Crisis and the role of ICT, 2) the result of ICT development right after economic crisis, 3) major tools to develop the ICT sector, 4) background of successful government ICT initiatives, and 5) implications from Korean experience.

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The world is experiencing an enormous shock from the financial crisis and recession that began in the United States in 2007. According to IMF, the world economy will shrink by 1.3 per cent this year, its worst performance in more than 60 years. All the governments in the world are making utmost efforts to overcome this unprecedented economic crisis. The Republic of Korea experienced serious economic crisis in a decade ago and ICT development contributed greatly to overcoming Korean economic crisis. The Republic of Korea's experience shows how information and communications technology can be used for overcoming global economic crisis. The purpose of this paper is to explain the background factors that made a considerable achievement in ICT development in the era of economic crisis. The findings of this paper could help other countries to think of a similar policy approach to achieve WSIS goals in the future.

The paper is organized as follows: 1) the 1997 Economic Crisis and the role of ICT, 2) the result of ICT development right after economic crisis, 3) major tools to develop the ICT sector, 4) background of successful government ICT initiatives and 5) implications from Korean experience.

A. 1997 Economic Crisis and the role of ICT

1. Economic growth called by the name of "The Miracle of Han River"

The Republic of Korea is a unique case, having developed from one of the poorest countries to one of the big economic powers in contemporary world history. In 1962, devastated and underdeveloped by Korean War and poverty, the Republic of Korea had only US$ 110 of GNI per capita[1], equivalent to that of Ghana at that time. But the figure dramatically rose to US$ 10,770 in 1995, just before the financial crisis in 1996, and as of 2007 GNI per capita reached US$ 19,730, almost 180 times that of 45 years ago. The Republic of Korea is now the twelfth largest world's trading partner and one of the major manufacturers in the areas of semi-conductor, LCD, digital TV, mobile phone, shipbuilding, automobile and steel. Among others, active interventions of government and close government-business relations have been cited as the most important factors for success.

2. 1997 Economic Crisis

In 1997, the Korean economy was struck and devastated by a financial crisis, failing to adapt itself to the changing economic environment at that time and to reform the old

[1] GNI per capita of this paper is based on World Bank Data & Statistics by Atlas method. The World Bank's official estimates of the size of economies are based on GNI converted to current US dollars using the Atlas method. <http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS>.

economic system. In the aftermath of the crisis, GNI per capita sharply dropped from US$ 10,770 in 1995 to US$ 9,200 in 1998. Economic growth rate dropped from 9.2 per cent in 1995, 7.0 per cent in 1996 to 4.7 per cent in 1997, -6.9 per cent in 1998[2]. It demonstrates that for a sustained economic growth, the Korean model, which had seemed successful until then and was explained by an input-driven growth strategy, had limitations and needed a substantial reform. The input-driven growth is mainly achieved through the increase in factors of production, such as land, labor and capital that are subjected to diminishing returns and are not sustainable in the long term.

3. The role of ICT in the course of economic recovery

Another implication of the Korean experience is derived from its experience of crisis management and reform, which has made a rapid recovery from the crisis possible. Faced with economic crisis, the Republic of Korea carried out extensive reforms in corporate, financial, and public sectors, rebuilding its whole economic system[3]. Most importantly, the ICT industry has played a very important role in the process of recovery from the economic crisis and of moving forward to a new phase of development. The ICT portion to GDP rose from 7.7 per cent in 1997 to 15.3 per cent in 2000[4]. The ICT contribution to GDP growth amounted to 34 per cent in 1999 and 46 per cent in 2000[5]. International comparison of knowledge economy indicators developed by the World Bank shows that the Republic of Korea belongs to the most rapidly and successfully changing economies and this can be primarily attributed to extraordinary high scores in IT-related indicators[6]. For the 1995-2006 period ICT manufacturing sector's share of value added of total manufacturing value added has grown by 5.1 per cent from 16 per cent to 21.1 per cent. It is the third highest growth among OECD countries. The average share for 23 OECD countries was just 0.3 per cent.[7]

Table 1: Share of ICT manufacturing in total manufacturing value added (Year 2006)

	ICT manufacturing	Percentage point change 1995-2006
Australia	2.8	-0.3
Austria	5.6	-1.6
Belgium	3.5	-0.6
Canada	4.6	-1.6
Czech Republic	5.0	2.2
Denmark	4.8	0.4
Finland	20.1	11.4
France	5.2	-1.1

[2] Yearly GDP growth data by Bank of Korea.
[3] Ministry of Finance and Economy, *Accomplishments and Challenges of 4 Years After IMF Crisis* (2001), p. 5.
[4] Ministry of Finance and Economy, *Accomplishments and Challenges of 4 Years After IMF Crisis* (2001), p. 12.
[5] Ministry of Information and Communication , *Korean Informatization Policy* (July, 2006), p. 5.
[6] *IMD World Competitiveness Yearbook 2005.*
[7] *OECD Science, Technology and Industry Scoreboard 2007*, p. 173.

Germany	5.6	1.0
Greece	3.0	1.2
Hungary	12.6	7.8
Ireland	11.5	-2.7
Italy	4.2	-
Japan	12.8	0.2
Republic of Korea	21.1	5.1
Mexico	5.6	0.4
Netherlands	3.8	-2.4
Norway	4.6	0.2
Portugal	2.8	-1.0
Spain	2.3	-1.5
Sweden	9.3	1.7
United Kingdom	6.0	-2.3
United States	7.7	-2.6
OECD average	7.2	0.3

Source: *Science, Technology and Industry Scoreboard 2007* (OECD).

B. The result of ICT development right after the Economic Crisis

1. Change in leading industries of the Republic of Korea

The composition of Korean leading manufacturing industries has changed over a period of time to reflect different stages of economic development. Table 2 shows the changes in manufacturing decomposed into the top 10 leading industries. Each period is marked with leading industries, which changed from labor intensive light industries including food and beverage and textiles to capital-intensive heavy and chemical industries and recently to high-technology industries such as the ICT sector. Until the early 1980s, the food and beverage and textile and apparel sectors led in the manufacturing share, with about half of manufacturing, but the share of these two sectors shrank over the years. Electrical and electronic products including ICT products have had the leading role since the 1990s and the share of them has leapt greatly from 14.6 per cent to about 25 per cent since 2000[8].

Table 2: Top 10 leading industries in the Republic of Korea's manufacturing sectors[9]

Rank	1970	1980	1990	2000	2005
	Industries	Industries	Industries	Industries	Industries
	Share	Share	Share	Share	Share
1	Food & beverage	Textile & apparel	Electrical & electronic products	Electrical & electronic products	Electrical & electronic products
	28.6%	19.2%	14.6%	25.2%	24.7%

[8] KDI and World Bank, *Korea as a Knowledge Economy* (2007), p. 36.
[9] Per cent of total manufacturing value added.

Rank	1970	1980	1990	2000	2005
	Industries	**Industries**	**Industries**	**Industries**	**Industries**
	Share	**Share**	**Share**	**Share**	**Share**
2	Textile & apparel	Food & beverage	Automobile	Chemicals	Chemicals
	20.4%	19.0%	13.2%	13.9%	15.2%
3	Chemicals	Chemicals	Food & beverage	Automobile	Automobile
	11.5%	13.1%	12.9%	11.3%	12.2%
4	Automobile	Electrical & electronic products	Chemicals	Basic metal	Basic metal
	9.1%	10.4%	12.9%	8.0%	11.3%
5	Paper & printing	Basic metal	Textile & apparel	Food & beverage	Machinery
	5.5%	6.7%	11.5%	6.9%	7.0%
6	Nonmetallic mineral products	Automobile	Basic metal	Machinery	Food & beverage
	3.7%	6.1%	9.0%	6.9%	6.1%
7	Coal & petroleum refinery	Coal & petroleum refinery	Nonmetallic mineral products	Textile & apparel	Coal & petroleum refinery
	4.2%	5.5%	5.6%	6.9%	5.4%
8	Electrical & electronic products	Nonmetallic mineral products	Machinery	Fabricated metal products	Fabricated metal products
	3.7%	5.3%	5.5%	4.8%	4.5%
9	Machinery	Paper & printing	Paper & printing	Paper & printing	Textile & apparel
	2.3%	3.9%	4.6%	4.3%	3.6%
10	Basic metal	Machinery	Fabricated metal products	Coal & petroleum refinery	Paper & printing
	1.5%	3.7%	3.8%	4.2%	3.5%

Source: *National Accounts and Statistical Yearbook* (Bank of Korea, reported years)..

2. Telecommunications sector

In parallel to the development of the electrical and electronics industry into a leading manufacturing sector, the development of advanced telecommunication infrastructure has helped transform the economy into one of the most ICT integrated in the world. The Republic of Korea ranked 4th (29.9 per cent) among the OECD countries in terms of the number of broadband subscribers per 100 inhabitants in 2007[10]. According to a survey over 76 per cent of Koreans are now utilizing the Internet in their everyday lives[11]. And 93 per cent of total households are connected to the broadband Internet service[12].

[10] *OECD broadband statistics* (June 2007).

[11] Nielsen Online, *Internet Usage in Asia* (December 2008) <http://www.internetworldstats.com>.

[12] Ministry of Information and Communication, *White Paper 2004* , p. 119.

Broadband Internet service is becoming a universal service to its people. These facts will allow the Republic of Korea to be recognized as one of the countries that have reached the highest level of informatization: the Republic of Korea was ranked 4th in the Digital Access Index survey conducted by the ITU in 2003; the Republic of Korea has the second most advanced technological infrastructure, the highest broadband subscription rate, and the second lowest broadband cost in the world, according to the IMD World Competitive Yearbook 2005.

Table 3. Status of Korean ICT

Technological Infrastructure			Broadband Subscribers			Broadband Cost		
Country/ Territory	**%**	**Rank**	**Country/ Territory**		**Rank**	**Country/ Territory**	**US$**	**Rank**
United States	68.93	1	**Republic of Korea**	**233.3**	**1**	Japan	0.09	1
Republic of Korea	**63.35**	**2**	Hong Kong, China	180.9	2	**Republic of Korea**	**0.25**	**2**
Singapore	62.72	3	Canada	146.9	3	Belgium	1.15	3
Hong Kong, China	61.18	4	Taiwan Province of China	134.6	4	Hong Kong, China	1.27	4
Taiwan Province of China	60.45	5	Denmark	133.3	5	Singapore	2.21	5
			Number of subscribers per 1,000 inhabitants			US$ per 100 kbps per month		

Source: *World Competitiveness Yearbook 2005* (Institute for Management Development (IMD)).

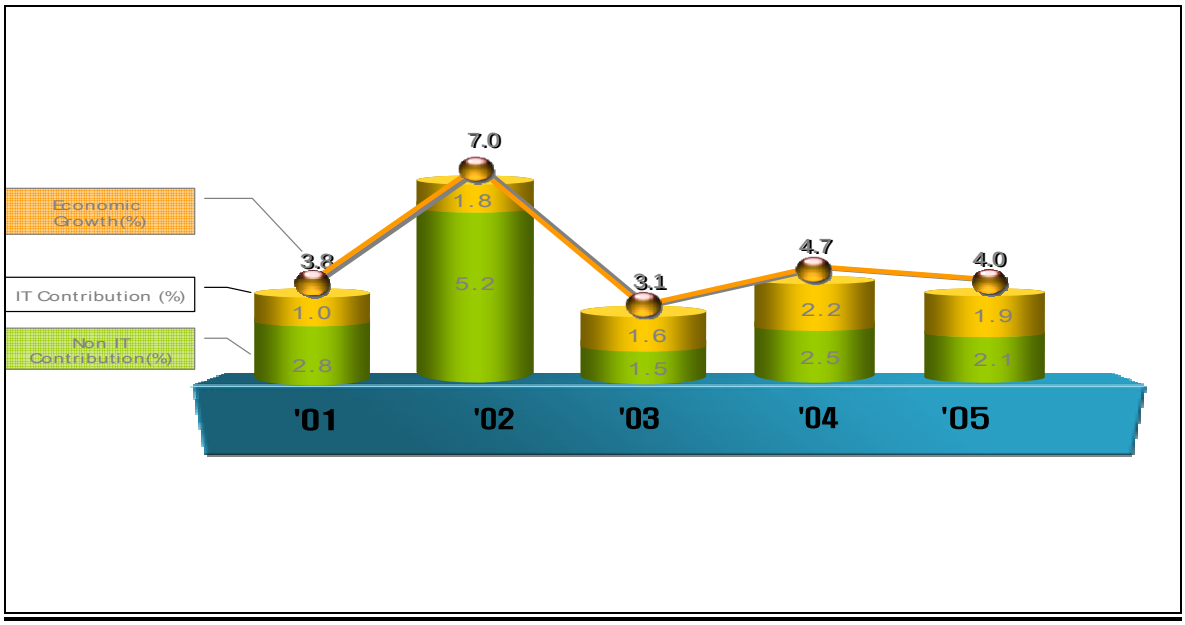
Since the successful and world's first commercialization of the CDMA[13] technology, 95 per cent of the total population, or 46 million people, have subscribed to the mobile service in 2008[14]. The Republic of Korea is a leading country in CDMA mobile communications, starting the 3rd generation mobile communication service as one of the first countries in the world, with over 26 million mobile Internet subscribers using the 3G services.

3. ICT manufacturing sector

Against this background, the ICT sector has emerged as the single most important economic growth engine. The ICT industry in Korea contributed 26.3 per cent in 2001, 25.7 per cent in 2002, 51.6 per cent in 2003, 46.8 per cent in 2004 and 47.5 per cent in 2005 to total economic growth[15]. Average IT contribution to economic growth for 5 years since 2001 is as high as 39.6 per cent. ICT portion in total exports has been growing continuously since the 1990's. In 2004, IT exports amounted to US$ 93.7 billion, or 36.9 per cent of total exports[16]. Based on broadband networks and information technologies, the country is leading the world particularly in hardware - semi-conductor, mobile phones, TFT-LCD, and digital TV. Its global competitiveness has also expanded to some of the software sector, most prominently in the online game industry.

[13] Code Division Multiple Access.
[14] Korean Communications Commission, *Telecommunication Market Data* (December 2008).
[15] Ministry of Information and Communication, *Korean Information Policy* (July, 2006), p. 6.
[16] Ministry of Information and Communication ,*IT 839 Strategy*, p. 3.

Figure 1. Contribution of ICT to Korean Economy



Source: Bank of Korea, Yearly Report of MIC.

4. Innovating government services based on ICT

IT applications are increasingly integrated into government services and the Republic of Korea's e-government initiative has made steps forward. It was ranked 5th in the United Nations Global E-Government Readiness Report 2004, as the only nation among top 10 countries, which neither uses English as mother tongue nor belongs to the Nordic countries. Among others, the Republic of Korea's e-Procurement service (G2B) qualified the country as one of the few countries that had a full-fledged e-government procurement system in place, receiving the First Public Service Award sponsored by the United Nations in 2003. Currently, more than 400 government forms can be requested over the Internet and the use of mobile phone payment system has exceeded 20 per cent of the total payment in 2004[17]. The United Nations E-Government Survey 2008 continued to cite progress made by the country, in particular in the area of e-consultation, which demonstrates success in sustained efforts until today.

5. People's online life

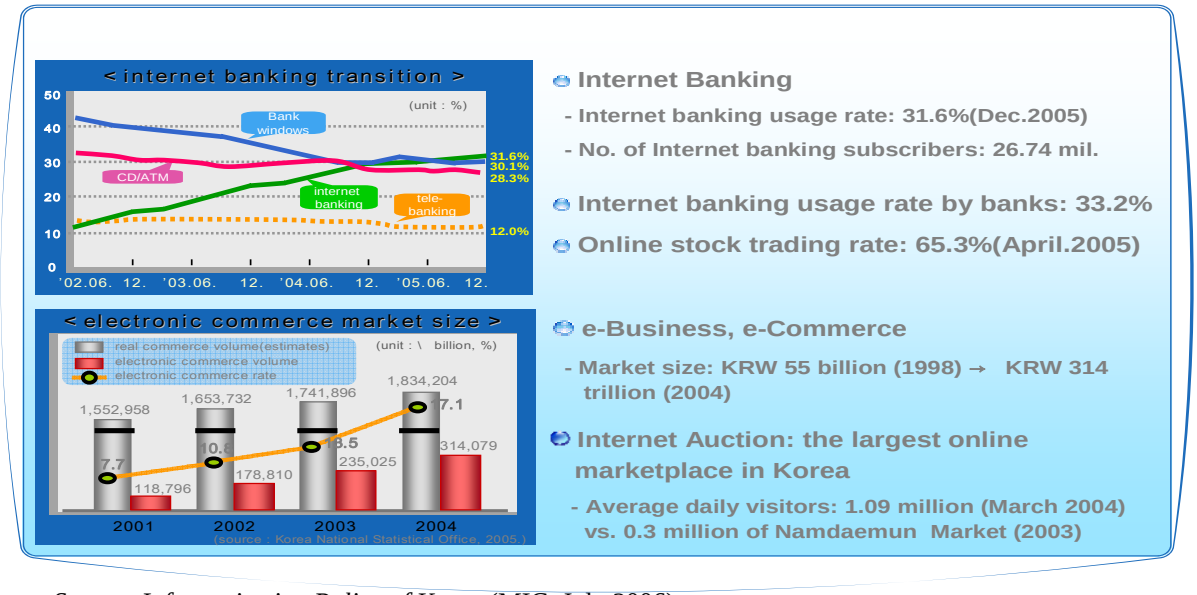
Thanks to the world's best IT infrastructure, the Republic of Korea has made significant progress with many forms of digital technology. In 2004, OECD declared the country's national e-commerce system needed 'no further action required' and suggested the Republic of Korea's example as a benchmark for other governments. Up to 100,000 students can use high-speed Internet connections simultaneously to take free tutorials for the national aptitude test, which can determine college admissions.

The number of individuals using ICT-related services is also constantly on the rise: the number of subscribers to Internet banking services reached 26.7 million in 2005; Internet trade accounted for 66 per cent of the total trading as of 2003; market value of e-

[17] Ministry of Information and Communication ,*Informatization Policy of Korea* (July 2006).

commerce has rapidly increased from 50 billion KRW in 1998 to 314 trillion in 2004, accounting for 25 per cent of total business transactions.

Figure 2. Online Financial Activity of the Republic of Korea



Source: *Informatization Policy of Korea* (MIC, July 2006).

C. Major tools to develop ICT

1. Three ambitious mid-term ICT development plans

The success in development of the ICT sector and infrastructure could partly be attributed to policies and initiatives the Republic of Korea developed before and after the 1997 Economic Crisis. Since the mid 1990s, the Korean government has established three master plans for the development of the information society: 1) the Informatization Promotion Act (1995) followed by the First Master Plan for Informatization Promotion (1996), 2) CYBER KOREA 21(1998) and 3) e-KOREA VISION 2007(2003). In particular, CYBER KOREA 21 was one of the most important policies to cope with the changing environment as a result of the Asian financial crisis. Through these plans, the Republic of Korea came one step closer to a knowledge-based society with the construction of an advanced information infrastructure, the introduction of various information systems in public services and in the private sector, as well as growth in the overall IT industry[18].

2. Government reorganization to give strong power to ICT development plans

[18] IDRC, *Digital Review of Asia Pacific 2007-2008*, pp. 289-292 and Lee N., "Broadband Internet service: Korea's experience" in Ministry of Information and Communication, *Broadband Internet in Korea* (2002), pp. 6-10.

The Republic of Korea has restructured government organizations responsible for the informatization strategy: the Informatization Promotion Committee (1996) chaired by the Prime Minister, and the Informatization Strategy Meeting (1998) chaired by the President. This allowed different agencies and ministries to coordinate their respective informatization policies. The establishment of the Ministry of Information and Communication (1994) and strengthening of the National Computerization Agency under the MIC's umbrella has a huge implication in terms of institution building, as both have played a pivotal role in designing, implementing and coordinating national ICT policies and e-government initiatives.

3. Unique funding mechanism

It is also notable that the ICT Promotion Fund (1996) created the system of making the profits from ICT fields be re-invented into the ICT sector and enabled focused investment in ICT. Furthermore, new financing methods – 'invest first, settle later', and matching deposits – attracted private sector investments, utilizing government resources as seed money. This can be interpreted as a PPP-based funding mechanism, even though other forms of PPP model, such as privately-funded e-government projects, are hard to find in the country. In summary, the Republic of Korea was able to be equipped with the necessary laws, fund, organizations and programs for a jump-start in ICT.

4. Construction of Korea Information Highway

The 10-year, 3-stage Korea Information Highway Plan was established in 1995, lifting up the Republic of Korea to one of the most advanced countries in the world in terms of ICT infrastructure. By 2000, fiber optic networks in 144 regions nationwide were completed, and 1,400 rural areas had access to broadband networks. The Korean government has invested US$ 620 million in building the Korean Information Infrastructure (KII) test-bed and the KII-G (Government), which amounts to 3.6 per cent of the total investment in the KII from private and public sectors altogether. This paved a physical infrastructure for the e-government projects in the early 2000s. Currently, a total of 31,632 governmental organizations, such as central and local administrative offices, educational- and research institutes and medical institutions, use KII-G network at a discounted price.

It needs to be mentioned that the Republic of Korea has a geographic and demographic advantage in jump-starting a broadband powerhouse: the high degree in population density and urbanization combined with the unique housing patterns - apartment complexes and community housing account for 60 per cent all housing in the country – are conducive to economies of scale and thereby the deployment of more cost effective ICT infrastructure[19].

5. Enhancing telecommunications service market competition

A textbook approach taken by the Korean government to the broadband market made it possible to offer extremely fast services to a large number of people. Korean government has opened the broadband Internet service market without regulation or

[19] KISDI, *Information Society and Informatization Policy* (2005).

controls over licensing and pricing. This *laissez-faire* approach with minimal regulatory measures in the market has encouraged facility-based competition among service providers. Increased competition put downward pressure on tariffs, which in turn, created more demand[20].

6. Lifting up ICT demand by ICT training and low price PC

One of the most remarkable characteristics of the Republic of Korea's ICT policy is the extensive role of the government in creating demand through diverse measures. From 2000 to 2002, the government ambitiously offered Internet and computer literacy programs targeting 10 million people, 21 per cent of the population, including stay-at-home wives, military personnel, the disabled citizens and even prison inmates. Low price computers were distributed to allow more people to gain access to the Internet and over 4,000 free-of-charge information facilities were set up across the country. All schools were connected with the Internet for free or at discounted rates. This effort has a significant meaning in that it created not only a huge demand and market for the ICT industry but also the vital human capacity[21].

7. Providing major government services through online

Taking full advantage of the advanced networks and enhanced awareness of citizens, the Korean government has made enormous efforts to provide public services through the Internet. The Government for Citizens (G4C) system has been established to interconnect the database networks – such as resident registration, real estate, vehicle registration, etc. - residing in many government agencies and to streamline government processes in the delivery of services to citizens. Up to 97 per cent of government documents were reported to have dealt with the e-approval system in the government agencies in 2003, compared to a paltry 21.2 per cent in 1998. For instance, the Home Tax Service (HTS) through the Internet allows taxpayers to file tax returns, receive e-Bills, and process e-Payments from their homes via the Internet. With the establishment of the Government e-Procurement Service (GePS), procurement processes involving bidding, contract agreements, and payment for services or supplies take place online in real-time. Some 47,000 public institutions and 138,000 private businesses have used this e-procurement system since 2004 and achieved savings of US$ 4.5 billion. And the National Finance Information System (NAFIS) offers real-time financial information to high-level government employees by interconnecting the independent financial systems of each public agency. The database networks for health insurance, pension insurance, industrial accident compensation insurance, and unemployment insurance policies which are the four major social insurance systems in the Republic of Korea have been integrated into a seamless network[22].

[20] KISDI, *Information Society and Informatization Policy* (2005).
[21] KISDI, *Information Society and Informatization Policy* (2005).
[22] KISDI, *Information Society and Informatization Policy* (2005).

D. Background of successful government ICT initiatives

1. Common recognition on the motto of 'Even though we are late in industrialization, let's go ahead in informatization'

In the 1990s, there was a common understanding in Korean society and government that although the country was late in industrialization, it would not allow itself to lag behind again in informatization. Based on this fervent determination, the Korean government selected ICT as the new engine for economic growth and made focused investments. An all-out effort has been made to nurture the ICT sector and to digitize the nation, with the confidence that the early establishment of broadband infrastructure is the most important step in transition to a knowledge-based economy.

2. Active role of Government side

An irony in the Economic Crisis of the late 1990s might be the fact that the Korean government assumed a new role to overcome the legacy of a government-controlled economy. It is often said that one of the key factors behind the Republic of Korea's success in the ICT sector was robust government initiatives. In the whole process of planning and implementing national projects, the Korean government effectively used various policy tools, ranging from master plans to legal framework and regulation and to funds and organizations. A distinctive characteristic of the interventions from that of the past is that the government played a complementary role as supporter or enabler of the ICT development, not any more as replacement for the private sector, inducing infrastructure/ R&D investments and establishing ICT-friendly environment. This massive, but sophisticated intervention is regarded, in large, successful and effective.

3. Successful combination effect of government initiative and market competition

The positive effects of robust government policies were combined with the benefits of a free market economy. A primary driver for the rapid rollout of broadband Internet services was the creation of a free competition market environment spurred by deregulation. The government worked closely with the private sector, encouraging investment and formulating development strategies that deeply relied on competition. Due to this competitive market environment, service providers had to maintain low tariff, and as low tariff created even more demand, a virtuous cycle in the broadband Internet service was formed.

4. Consideration of supply side and demand side at the same time

A simultaneous consideration of supply-push and demand-pull was also a key factor. While trying to expand the supply in ICT through building ICT infrastructure nationwide and developing high-end technologies, the government also came up with strategies for the other side of broadband equation - demand creation. The ambitious plan of "ICT training for 10 million people" is one of the most notable initiatives among others.

5. High rate of literacy and early adoption of new technology

Thanks to the traditional emphasis on education, the Republic of Korea has had a high rate of literacy and school enrollment, which are essential prerequisites for the

widespread adoption of ICT. Moreover, a large consumer base of technology-savvy Koreans actually helped the rapid deployment of Internet and various new digital services.

E. Implications from Korean Experience

As explained in the above, the success story of Korean ICT development could be summarized as follows. First, there has been a strong and sustained political commitment to the informatization and development of the ICT sector from the highest echelon of the government: the President called for a strong initiative for nation-wide informatization supported by a comprehensive policy strategy by the Ministry of Information and Communication. The second factor was public informatization training programs in order to bridge the digital divide and at the same time boost the self sustaining demand among a large segment of the population. The third initiative was the creation of a competitive environment for telecom service providers. The fourth government initiative to a successful ICT industry was the development of basic ICT technologies.

Behind these four success factors, there were unique and very powerful tools to make the above mentioned four factors work smoothly. One of them was the ICT Promotion Fund established in 1996. The fund was created by government budget contribution, telecommunications service operators' contribution (certain amount of yearly revenue prescribed by their license) and auction price for radio wave frequency, a dividend from Korea Telecom when it was government owned company. The size of this fund had risen up to several billions US$ in early 2000. By this funding mechanism, Korean government could drive the implementation of its ICT master plans very vigorously. The government invested from minimum US$ 0.7 billion to maximum US$ 1.5 billion yearly in ICT R&D, developing ICT human resources, standardization, R&D environment creation and loan to ICT ventures. This fund was created right before 1997 Korean Economic Crisis and could operate smoothly in spite of the financial turmoil experienced during the Crisis.

There exist many differences between Korean ICT promotion strategy and other countries'. But the most important factor behind the difference lies in the funding mechanism for the implementation of the ICT master plans, which provided sustainable sources of funding to the development of the ICT products, services and infrastructure throughout the country. Therefore, one of the most important and indispensable lessons from the Korean case is the unique funding mechanism to make ICT master plans work in a sustained and coordinated manner. Thus, it could be concluded that in developing ICT industry any country which wishes to make ICT as a new growth engine for their economy need to highlight the role of a funding mechanism which could operate even in times of economic crisis in developing the ICT industry.

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