

## TPC(Technology, Policy and Culture) 모델을 이용한 한국의 초고속인터넷 확산 요인 분석

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**요약** 이 연구는 한국에서 초고속인터넷이 빠르게 전파되는데 기여한 요인들을 분석하는데 그 목적이 있다. 여기서는 TPC 모델을 분석틀로 사용하여, 한국에서의 급격한 초고속인터넷의 확산을 유도한 원인들로서 첫째, 한국의 문화적 속성을 고려한 정부의 맞춤형 정책, 둘째, 기업의 경쟁적인 확산노력, 그리고 셋째, 한국의 사회문화적 요인, 그 자체를 결정 요인으로 이해한다. 또한 이 연구는 보편적 서비스로서의 초고속인터넷의 보급과 확산은 정보화 시대가 오면서 불가피하게 발생할 수밖에 없는 정보격차의 문제를 어느 정도 완화시킬 수 있다는 가능성을 보여주고 있다. 초고속인터넷의 확산은 정보격차의 가장 기본적인 문제, 즉 정보에 대한 불평등한 접근성을 완화시킴으로써 보편적 서비스의 제공과 수혜를 가능하게 한다. 끝으로 이 연구는 초고속인터넷의 성공적인 전개와 확대를 위한 몇 가지 정책적 제안을 담고 있다.

주제어: 초고속인터넷 확산, 확산요인, TPC모델, 이론적 모델

## Using TPC Model to Understand Broadband Diffusion in Korea

Heisung Kum

**Abstract** This paper investigates factors that have facilitated the rapid diffusion of broadband in South Korea. It finds that the quick spread of broadband access in South Korea is the result of combining the government's strategic ICT policy considering cultural traits, businesses' competitive efforts, and the timely explosion of domestic demand for IT service. This paper also discusses the impact of broadband diffusion on the digital divide. It finds that although there are still regional and age gaps in broadband access, the Korean government and businesses are working to alleviate these problems through various ways from systemic to physical ones. While the deployment of broadband cannot eliminate every issue of the digital divide, broadband access minimizes the digital divide by lowering the barrier to inequitable access to information. This paper concludes with a number of recommendations that address selected policy issues related to the spread of broadband Internet for its successful implementation.

Keywords: broadband diffusion, diffusion factors, TPC model, theoretical mode

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## I. Introduction

Due to the remarkably rapid diffusion of broadband in South Korea, government policy makers and industry leaders throughout the world have been watching South Korea (hereafter referred to as (Korea). According to an Organization for Economic Co-operation and Development (OECD) portal (2009), as June of 2009, South Korea had over 32.8 connections per 100 inhabitants, followed by Sweden with 31.6 and Canada 29.7. Netherlands ranked 1st place having 38.1 broadband Internet connections per 100 inhabitants and Denmark, Norway, and Switzerland followed with 37.0, 34.5, and 33.8 connections per each (See 2009 OECD Statistics). At present, more than 95 percent of Korean households subscribe to broadband services and these numbers continue to increase.

The significant penetration of broadband in Korea receives enormous attention because the world is confident of the role of broadband in their development. Representing revolutionary Information and Communication Technology (ICT), the Internet brought dramatic changes in almost all aspects of peoples' lives including economic structures and information seeking patterns. It is also a key driving force for further changes and enhancement in economics, politics, and society. Recognizing the power of the Internet and its role in the economic world, governments see increased e-commerce activity as a main step toward a "new economy" or an "information society" and regard proliferated and stable online connections as

a way to foster further development. Therefore, the successful deployment of broadband Internet connectivity, which provides high-speed access and "always-on" connections, is continuously ranked high on the current political agenda in many developed and developing countries (Howell, 2008; OECD, 2009). Therefore, each government exerts effort in building a national broadband network infrastructure as a means of empowering national competitiveness. In the UK, Internet diffusion, e-commerce and increased use of information technology in government are seen as keys to international competitiveness and large investment is funded in broadband infrastructure, content, applications and services. Also, Singapore launched broadband deployment with its national project called Singapore ONEs in 1996 for achieving international competitiveness (Aizu, 2002).

In spite of governments' high interests and financial support, however, present broadband Internet deployment varies greatly across countries. For example, Korea, with its economic level comparatively lower than other highly connected nations, has become the country where broadband has been diffused most widely. The World Bank classifies Korea as an upper-middle income country, one category down from the high-income classification. Therefore, though Korea is not impoverished, it is not among the world's wealthiest nations. Why is broadband more available in Korea than in other countries, even those with higher economic levels, better technological infrastructures and large numbers of Internet

users? Fowler (2000) explains that this is due not only to different levels of information technology and network infrastructure, but also to the fact that each country has a complex set of economic, social, and policy considerations. In this sense, reviewing factors that encouraged and facilitated brisk diffusion of broadband in Korea not only becomes an interesting case study, but also has the potential to inform other countries that are trying to expand broadband in their lands. In spite of much concern and interest, however, there is little theoretical research that investigates how Korea succeeded in broadband deployment. Although there are many studies about Korea's broadband success, most existing studies put excessive emphasis on the government's role in broadband deployment. It, however, only reveals a part of the answer while other aspects remain veiled.

The purpose of this paper is twofold: (1) it examines how Korea could successively expand broadband Internet usage, and (2) it provides a theoretical framework to identify leading factors, including government initiatives and cultural idiosyncrasies, in the successful diffusion of broadband throughout Korea. For these purposes, this paper analyses society, economy, and political conditions of Korea with macroscopic and diachronic views. This paper also investigates the effect that broadband exerts in the digital divide, the gap between information haves and

have-nots, that is a serious problem at present. In the digital information age people who are unable to access the Internet through the application of ICTs are increasingly disadvantaged. The South Korean government attempts to ensure that all citizens have the opportunity to access and effectively use ICTs in order to enable them to participate fully in the education, social, democratic processes, and economic activities.

This paper explores the implications of broadband deployment in pursuing the elimination of digital divide by employing an integrated "model of technology, policy and culture (TPC model)"<sup>1)</sup>. Using the TPC model as an analytic framework, this paper examines the factors that contribute to the rapid development and diffusion of broadband in Korea. By discussing the key policies implemented by the Korean government, this paper suggests that these policies may influence the success of broadband deployment in other countries under similar circumstances.

## II. Research Background

### 1. What is broadband?

High speed Internet is commonly known as broadband. Even though there is no agreed-upon definition of broadband among countries, there are similarities among the various definitions regarding the characteristics of

1) TCP model refers the theoretical framework using a triangulation of technology, cultures and policy to explain the diffusion of information and communication technology. The model was used by Han(2003) to analyze the different shape of broadband deployment between US and Korea.

broadband. These include 2ways (Upstream and Downstream) of loading, persistent (always on connectivity, capability of loading large size of multimedia data, and minimum speed of 256Kbps in worldwide average. Broadband is difficult to define, given the wide variance in the notion of “high speed” both within nations and across nations however (See Table 1). For example, the Federal Communications Commission (FCC) in U.S. upgraded its speed based definition of broadband of “basic” broadband to over 200kbps but less than 768kbps recently (2008). Microsoft has also urged Telecom Regulatory Authority of India (TRAI) to raise the bar for offering broadband services in the country by mandating minimum speeds of 2 Mbps. Officially, however, ISPs in India offer 256Kbps as broadband officially. While some of the countries prefer not to define broadband at all, most of the countries

define broadband speed around 256Kbps/sec following the international standards.

Fast access to needed information can mean increased competitive power in the current digital era. Using a modem to access the Internet through ordinary phone lines often involves slow speeds and frequent disconnections. When people download audio or visual materials in particular, interrupted and slow services can provoke their frustration. In contrast, broadband Internet access increases users’ satisfaction in terms of time needed to access information and in terms of connectivity without difficulty or disconnection. Without high time consumption or connection difficulty, people are able to access and use more information. Table 1 shows the global average download speed of few services based on different technologies.

Owing to its high functionality, broadband now has a central role in enhancing competitive

〈Table 1〉 Broadband Definitions in Countries and International Institutions

Country	Organization	Definition
US	FCC (the Federal Communications Commission, 2008)	1st Generation data: 256~768Kbps Basic Broadband: 768Kbps~1.5 Mbps
Sweden	NLT Enders analysis	8~12 Mbps
Canada	The Canadian National Broadband Task Force (CNBTF)	Minimum 1.5 Mbps
France	ARCEP the Telecom regulator	minimum 512Kbps
S. Africa	ICASA	256Kbps
S. Korea	Media Communication Committee	minimum 10Mbps (MIC, 2009)
UK	Broadband Stakeholder Group	512Kbps
Hungary	Hungarian BISP	256~512Kbps
ITU	Recommendation I.113	1.5~2Mbps
UN	Core Indicator	256 Kbps
OECD	OECD Statistics	256Kbps

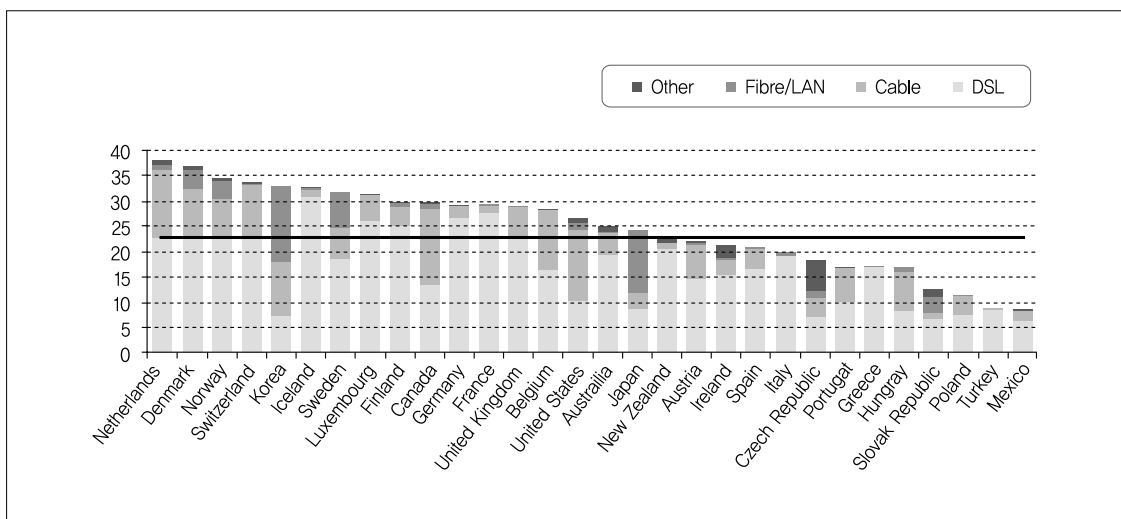
Source: Samarajiva(2009), FCC(2008) restructured.

power in the lives of individuals as well as in economic, political, and cultural exchanges between countries. Studies show that there is a positive relationship between broadband penetration and national communications services spending. According to Czernich, et al. (2009), Canada, which ranked at high level in broadband penetration worldwide, has high levels of consumer e-commerce spending. Broadband access also fuels consumer spending. For example, monthly spending on telecommunications services rose when broadband was easily available (ITU report, 2010). Along with the development of Internet technology, the dot.com business has overtaken a huge portion of the entire world economy. Broadband connections to the Internet expedite these dot.com business booms since people can always be online through a broadband connection and therefore do more personal business and communication online. Increased mobile

businesses based on mobile broadband Internet connections also proliferate economic growth. Most experts predict broadband will enhance efficiency not only within the economy but also within the education, health-care, research and development, and government. Not surprisingly, many countries are trying to accelerate the deployment and usage of broadband networks. For certain, the broader usage of broadband is a driving force that significantly impacts the way of life for individuals, businesses, and entire countries (Kero, 2007).

## 2. Global Broadband Penetration

Broadband penetration is increasing at a great speed on a global scale. By the mid of 2009, more than 445 million people connected to broadband Internet technologies (Point Topic, 2009) and on average 24.8 per 100 inhabitants in OECD countries subscribe to a



Source: OECD, 2009

〈Figure 1〉 OECD Broadband subscribers per 100 inhabitants, by technology, June 2009

broadband connection (OECD, 2009).

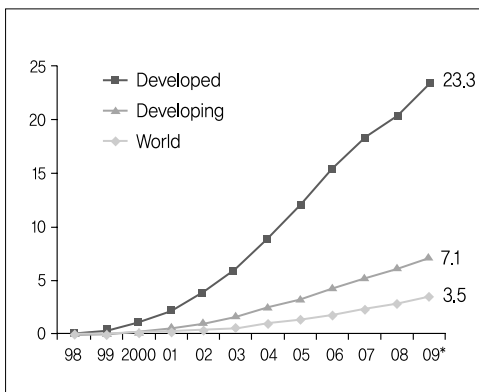
Many of them are using DSL connections to log into the Internet (59%) followed by Cable (29%), Fibre ad LAN (11%). Recently published by the ITU report (2009) posits the rapid growth of mobile broadband subscribers and it is catching up the fixed broadband growth rate. Many economies have enjoyed impressive growth in broadband subscriber numbers during the past ten years, and in some markets broadband is expected to become one of the fastest growing consumer communications services. In fact, 113 out of 200 economies worldwide began commercial broadband service before 2003.

For maximizing economic benefits, minimizing transaction costs and providing people enough time for economic activities is very important. As mentioned earlier, ICTs have led to impressive

changes in economic structures. A great portion of economic activities can now be conducted online, thus reducing transaction costs. Also, since online transactions are possible without time and space limitations (as long as a person can access the Internet), economic activity may be conducted continuously and this continuous economic activity increases the amount of trade beyond what was possible before the Internet. Due to these reasons, governments regard broadband as a way to regain economic strength and are devoting themselves to expanding broadband services (Aizu, 2002).

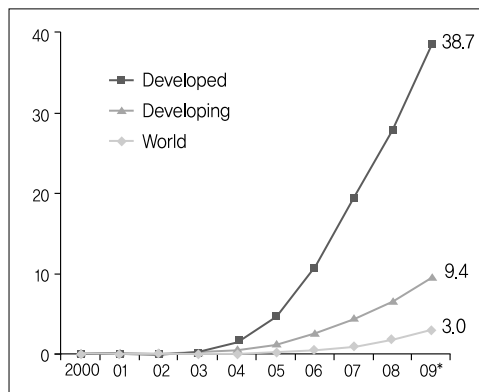
The vast majority of broadband users today, however, are in the developed world. Since broadband is regarded as one of the most advanced technologies, it seems very natural that broadband users are plentiful in developed countries, which can afford to develop and

Chart 1.4 : Fixed broadband subscribers by level of development, 1998–2009



Note : \* Estimates  
Source : ITU World Telecommunication /  
ICT Indications database.

Chart 1.5 : Mobile broadband subscriptions by level of development, 2000–2009



Note : \* Estimates  
Source : ITU World Telecommunication /  
ICT Indications database.

Source: Measuring the Information Society, 2010:3

〈Figure 2〉 Fixed vs. Mobile Broadband Penetration Growth 1998–2009

promote new technologies. According to the latest OECD report (2010), countries in Europe seem to show high broadband deployment although lots of developing countries raise their broadband penetration rate. Among them, Germany, and the United Kingdom demonstrate the highest deployment of broadband. Denmark, Sweden, the Netherlands etc. that leading countries in broadband diffusion are excluded from these new broadband development countries in Europe. The UK in particular is seeking to transform its languishing broadband market into the biggest in Europe by reshaping its regulatory framework (Ofcom, 2008). Although Europe shows higher broadband and Internet penetration than other regions, East Asian countries lead the world in terms of broadband deployment. Korea and Japan provide the fastest speed of broadband Internet with high broadband access and this has drawn worldwide attention.

### 3. Korea Ranks Top in Broadband

As previously noted, Korea is the most wired nation in terms of broadband. The growth of broadband Internet in Korea has been cited as an amazing phenomenon. While countries in Europe adopted broadband access earlier and Korea's broadband adoption began only in 1999, the speed of growth of broadband in Korea was significantly faster than elsewhere. Since only a small percentage of people in Korea such as scholars, researchers, and officers used the Internet regularly before the late in 1990s, Internet usage via telephone lines

did not disadvantage users since there were no alternatives and the speed of Internet access was not a big problem. As the Korean government changed its pattern of core business from traditional manufacturing industries to IT industries after an economic crisis in 1997, however, the use of the Internet also changed. The government targeted the IT industry as the core business to help the rest of the Korean economy recover and underscored the importance of a "knowledge-based society" as a new direction for epochal development by inaugurating the "Cyber Korea 21" program (Lee, et al., 2003). "Cyber Korea 21" is the Korean government's blueprint for building an Information Society by 2002. It aims to create the framework of a knowledge-based society, to boost information technology at the school level, and to increase industrial competitiveness, particularly steel and shipbuilding sectors, through the use of e-commerce as well as to improve the quality of life to the level of advanced nations. As a result of the "Cyber Korea 21" program, broadband was dispersed rapidly and it brought significant results to the economy. According to the KISDI's report (2002), the amount of value added for the IT industry to grow at an average annual rate of 18.9 percent from 1996 to 2000, exceeds the GDP growth rate by a large margin. As a result, the IT industry grew from 8.6 percent of GDP in 1997 to 13 percent in 2000, the highest proportion among OECD countries.

At the end of 1999, there were 300,000 broadband Internet subscribers in Korea. That number leapt to over 4 million in 2000, reached 8 million in 2001, and finally passed 13 million

currently in 2009. The growth in broadband penetration in Korea is set to continue with forecasts suggesting that the advent of the very high bit rate digital subscriber line (VDSL), serving up to 100 Mbps, will induce the rest of the nation to subscribe to broadband Internet services.

#### 4. Theories used in Previous Studies

Since the 1980s, radical development and diffusion of information technologies has attracted substantial attention and research efforts from governments, businesses, and scholars. Although scholars had difficulty in predicting the adoption and diffusion of technology due to so many variables, their research has led to various theories and analytic frameworks for more precise predictions of new technology adoption and diffusion. Among them, the diffusion model has attracted scholars since it was formulated from research on the spread of technological innovations.

In 1962, Rogers first published his innovation diffusion theory, which has come to be widely used to explain information technology (IT) adoption. According to Rogers (1995), the diffusion of innovations can be defined as the process “by which an innovation is communicated through certain channels over time among the members of the social systems (Rogers, 1995: 5).” Focusing on the technology adoption stage, Rogers suggests that looking at the attributes of the innovations being adopted may explain the diffusion process. His diffusion research focuses on describing and explaining the adoption

process at the aggregate level through stages of invention, adoption, innovation, and diffusion.

While Rogers provides guidelines for general innovation, adoption, and diffusion processes, many other scholars and research institutes attempt to use specific predictors for certain innovations or clusters of innovations. Agarwal, et al. (1997) propose that the successful marketing of innovation could be achieved with technical standards, sufficiency of capital, and elimination of legal constraints, brand equity, and horizontal integration.

King, et al. (1994) assert that the invention of a new idea or product depends on its potential economic value. If the invention is determined to have potential economic value, it goes through the process in which it is converted into a useable form. Then as a final stage, the capacity to produce an innovation and its use in practice are diffused. King, et al., also addresses the importance of innovation’s adaptability and reconciliation with socio-cultural contexts where an innovation arises. They also state that innovation is a social phenomenon “tied to social networks of technical knowledge, support, and culture (King, et al., 1994: 160).” Since they regard “institution” as a key player to support and operate “innovation,” they call this as “institutional theory.” Additional research supports this argument and suggests various cross-national factors that may affect IT adoption and its pattern of dissemination (Schwartz, et al., 2000; Dekimpe, et al., 2000; Schwartz, et al., 1997). According to this research, while the technological infrastructure is consistent for all potential users, different



cultures largely impose the usage of technologies.

Based on the previous models, Lin (2002) proposed an integrated model for explaining the general innovation diffusion process. Lin intended to join Rogers' general guidelines with various specific factors for developing a macro model and included six components--system, technology, social, audience, use, and adoption factors. Han (2003) pointed out a problem of complexity in interweaving the elements from Lin's model. He merged the "audience" and the "use" factors into the "user" factor by indicating that those are passive versus active uses of the medium at individual levels, and joined the system, the "technology" and the "social" factors to the "provider" factor by focusing on their characteristics. He then proposed an integrated model (Technology Policy Culture model, hereafter referred to as the TPC model) with new indicators: technology, policy and culture. For this analysis, the TPC model is applied with some revision. While his original TPC model separates "user (consumer)" from "culture (surrounded environment)", the revised TPC model includes "user" into a "socio-cultural" factor, since socio-cultural environment does affect the preference or pattern of behavior of users to a certain degree.

### III. Analytical Framework

A basic assumption of the TPC model is that technology is a part of people's lives and that technology itself is a necessary but insufficient condition for the adoption of a new service, even though it fuels usage of

the new service. It shows the nexus among government (policy provider), business (technology provider) and culture (environment), which affects all of these elements in a specific society:

#### 1. Technology and market factor

Technology can survive when the new service or product has economical value and is well matched with the consumer's preferences (King, et al., 1994). Therefore, new technology should overcome many obstacles including competition, technological setbacks, and legal as well as social constraints. It also provides new functions (Han, 2003).

#### 2. Policy factor

The acceptance or rejection of a new technology is influenced by government policy. The government sets regulations for deviating needless competition and for promoting usage of a new technology/ industry. Because a new technology/industry needs a new technical standard or infrastructure, the government's role in early stages is particularly important (Han, 2003).

#### 3. Cultural factor

People are always influenced by society and culture, so the consumer's preference, the need for a product, and its usage vary in different cultures. Since cultural influences are more persistent than other national factors, the importance of cultural factors should be

appreciated and heavily considered when the pattern of technology is investigated (Mooji, 2000). Due to the strength of cultural influence, some technologies are easily accepted and rapidly absorbed into some cultures, and the same technologies may not be successful in others.

Broadband Internet development can be viewed as an IT innovation process. The primary vehicle for understanding Korea's success in broadband diffusion is the observation and analysis of what makes broadband networks appealing and how culture utilizes these expanding technologies. Since the base for broadband in Korea already existed in a commercially useable form, the study of broadband development in Korea is mainly concerned with diffusion.

## IV. Research Methodology

This study uses a case study methodology to investigate the key determinants of rapid broadband diffusion and its dynamic diffusion process in Korea. Case study methodology is most appropriate when a holistic, in-depth investigation is needed (Feagin, et al., 1991). According to Feagin, et al. (1991) case studies strive towards a holistic understanding of cultural systems of action. Cultural systems of action refer to sets of interrelated activities engaged in by the actors in a social situation. Seeking an appreciation of cultural systems, case studies maintain multi-perspectives analyses, designed to bring out the details from the viewpoint of the participants by using multiple sources of data.

This study used secondary data as the primary methods of data collection. Secondary data in the form of archival documents, government reports and statistics, and articles in newspapers and magazines were also used in this study. The collected secondary data on broadband Internet in Korea is retrieved mainly from various international organizations including the Organization for Economic Co-operation and Development (OECD) and the International Telecommunication Union (ITU), as well as Korean national institutions and organizations such as the Korea Network Information Center (KRNIC) and some Internet sources.

## V. Analysis

This section analyzes the contributing factors to the rapid growth in broadband Internet access in Korea. From the analysis of the volume of secondary data, these contributing factors were categorized into three sectors: the government, business, and socio-cultural sectors.

### 1. Government Factors: Policy Provider

After the economic crisis in 1997, the Korean government changed its regime from a "government-led economy" to a "hands-off" regime that followed neo-liberalism. Neo-liberalism has four main points: the rule of the market, deregulation, privatization, and reducing expenditure for social services. To achieve profits from the market and to run a healthy economy, according to the government's new policy direction, government should not

intervene and should set the market free from regulation (Robbins, 2001). The success of the IT industry in Korea, however, resulted from the harmonization of these two contradictory regimes. Through a series of government investments (Direct Interventionism) and market enabling policy efforts (Hands-off Regime), the Korean government has successfully stimulated the highest broadband penetration rates worldwide.

### 1) Comprehensive National Plan

Pursuing a knowledge-based society, the Korean government set successive policies for its achievement and implemented those policies with legal Acts. After foundation of MIC in 1994, from 1995, the government has started its comprehensive plan, called the Korea Information Infrastructure (Hereafter the KII). KII is composed of KII-Private, KII-Government, KII-Public and the KII-Test bed. KII has been revised thereafter since the initial goals were achieved faster than expected. Although the initial plan was to provide high-speed Internet services to all households in the form of FTTH (Fiber-to-the-home) by 2015, in 2002 the government amended the target to 2005. According to the plan, highly populated urban areas would be equipped with 100-10 Mbps in the form of fiber LAN Ethernet, VDSL, CATV, while sparse rural areas will be covered by ADSL and satellite (Lee, 2002).

In 1999, Cyber Korea21 was implemented and e-Korea Vision 2006 was launched in 2002 to guide the Korea towards an information

society, focused on promoting national informatization, advancing the information infrastructure, and strengthening international cooperation. Strategies of them included building ICT capacity; investing in the public sector; advancing e-commerce; transforming the legal system; ensuring safety and reliability; and promoting the IT industry (MIC, 2002).

In 2004, the Ministry of Information and Communication (MIC) drew up the ICT 839 Strategy that aims to introduce world's first services and products: introducing and promoting eight services, building three infrastructures, and developing nine ICT new growth engines. The IT 839 Strategy is a set of vision statements and also a kind of roadmap for Korea's future ICT development as well. The specific plan for rapid broadband diffusion was also launched with a name of "Broadband IT Korea Vision 2007" in 2003. It aimed at restructuring of administration and innovating of working system as well as increasing the amount of infrastructure. By establishing a comprehensive plan for the IT promotion, Korea has provided the leading example of government-sponsored oligopoly supporting major investment in the broadband area. The government has been active in promoting broadband as a way to accelerate the economy and has fostered an economic and regulatory environment, which are conducive to broadband growth.

### 2) Liberalization, Competition, and Non-Interventionism

The government's policies have contributed to a market that can support a lot of firms

and service providers. The three policies that the Korean government implemented for fostering a knowledge-based society are market liberalization, promoting competition among businesses, and restraint regulation into business sectors (Non-interventionism).

As the first step, the Korean government emphasized market liberalization and privatization in the telecommunications sector. Before 1997, Korea Telecom (Thereafter KT), which is owned by the government, was the sole provider to supply local and long distance services. Based on the belief that monopoly does not help to build a beneficial economy, the government decided to set free the telecommunication sectors and progressively liberalized the telecommunication markets. The purpose of this privatization includes helping the private sector to migrate smoothly to the information society by way of prior experience of the government sectors. As a way to achieve this goal, the government introduced fair competition in the local and long distance sectors previously dominated by KT, by giving licenses to multiple carriers. Another effort by the government to develop a fair competition among ISPs is that the government encourages accounting separation on telecommunication services to secure the impartiality of local phone services, while strengthening the role of the Korea Communication Commission (KCC) as a professional quasi-judicial regulating agency (Cyber Korea 21, 1999). Due to difficulty of competition with KT, Hanaro decided to focus on broadband Internet access rather than local call services

later. In accordance with government's KII plan, Hanaro Telecom anticipated the enormous expected returns from broadband's market value. Bolstered by government support and Hanaro's initiation of broadband Internet access, open competition from KT, Dreamline and Onse Telecom soon followed (NCA, 2002). Korea owes its worldwide first place ranking in part to this serious competition. Severe competition in telecommunication sector continued when mobile broadband market launched. After the invention of "HPI" by ETRI and Samsung, it was adopted as international standard for mobile WiMAX by IEEE in 2005. SK Telecom and KT started providing commercial WiBro (Wireless Broadband) service in June (EE Times, 30 June 2006).

The Korean government's final policy direction is non-interventionism. The government changed its previous attitude and has made considerable progress toward achieving a deregulated telecommunications market by allowing relatively light regulation for Internet services. To promote competition among businesses, the government established a registration system for Internet service providers that want to start up broadband services. The increase of the new operators shows the relative success of the government's deregulation efforts. This government's "hands-off policy" (Park, et al., 2002) has allowed any business that wanted to provide high-speed Internet access to do so with only a simple registration procedure. This deregulated environment represented to report system, however, has produced too many service providers for the market size and caused

overlapping investment.

### 3) Financial support

Another of the government's contributions to the broadband expansion in Korea was its intense investment in the broadband market. For instance, the Korean government subsidized about \$77 million in loans to private networks in 1999, an additional \$77 million in loans in 2000, and \$923 million more by 2005 helping deploy broadband networks around the country (MIC, 2002). The government also set a series of plan to build BcN (Broadband Convergence Network) from 2004~2010. To equip needed infrastructure for faster Internet connections and network stability, the government already provided around \$1500 million and made a plan for \$2400 million more by next five years (BizFinder, 2009).

The government also provided low interest loans and a certification program for builders who would construct apartment complexes with high-speed access. Through a combination of public subsidies and private loans, Seoul has stimulated broadband deployment to the point where the government estimates that over 80 percent of Korea's Internet users log on to broadband networks. Undoubtedly, the positive relationship between government and private sectors is one of the major reasons for Korea's top place in broadband connection. As one business manager with KT commented "It is part of our business culture to listen to the government." The MIC provides guidance and that guidance has been turned into action by the businesses sector. A little government

spending in Korea resulted in many achieved objectives in the telecom market sector.

The Korean government was not only the supporter of IT but also the major purchaser of IT. Korea is known for its sizable e-government initiatives to modernize both internal government operations and to provide improved delivery of public services (Hachigian, et al., 2003). The government's IT purchases were frequently used as a showcase for local suppliers or to promote government policies.

### 4) Education

As a final step, the government deployed a variety of promotion policies and programs to boost Internet use and gave financial aid to Internet education for increasing awareness among the population. The Korean government initiated a 10 million people Internet Education project in June 2000, targeting housewives, the elderly, military personnel, low-income families, the disabled, and prisoners (MIC, 2002). While the construction of an information infrastructure alone did not guarantee that people would actually make use of new ICTs, the provision of training and awareness campaigns helped people to join the information society. Education programs by the government facilitated the public's interests in digital contents and digital awareness so much in early stage of broadband deployment.

## 2. Business Factors—Technology Provider

### 1) Multiple Choices

The relatively small market size and the

large number of operators created fierce competition among them. The competition, however, facilitated the rapid market penetration of Internet services through greater choice and price competition. As the number of high-speed Internet service providers increased, the choice of services increased and prices decreased at the same time. Using a fixed telephone line, DSL is readily available to most Korean households. The 60 percent of Korean homes that do not have cable television have a broadband option beyond the high-speed cable modem. In addition, there are other broadband options such as Local Area Networks (LAN), broadband Wireless Local Loop (WILL) and satellite-delivered solutions. Satellites and LAN are predominantly provided to elementary, middle, and high schools and the military and police also have access to advanced telecommunications services through satellite-connected Internet.

## 2) Fierce Competition among Multiple Service Providers

As a result of government support and competition policy, many new actors entered the high-speed Internet market. In addition to KT, which already existed and dominated the Korean market, Dacom, Onse Telecom, Dreamline Inc., and finally Hanaro Telecom Inc. entered the competition of broadband market sharing. With the launch of DSL, the Korean broadband market continues its tremendous growth (EE Times, Oct. 8, 2003). During last few years, many of these ISPs have disappeared or weighted through M&A

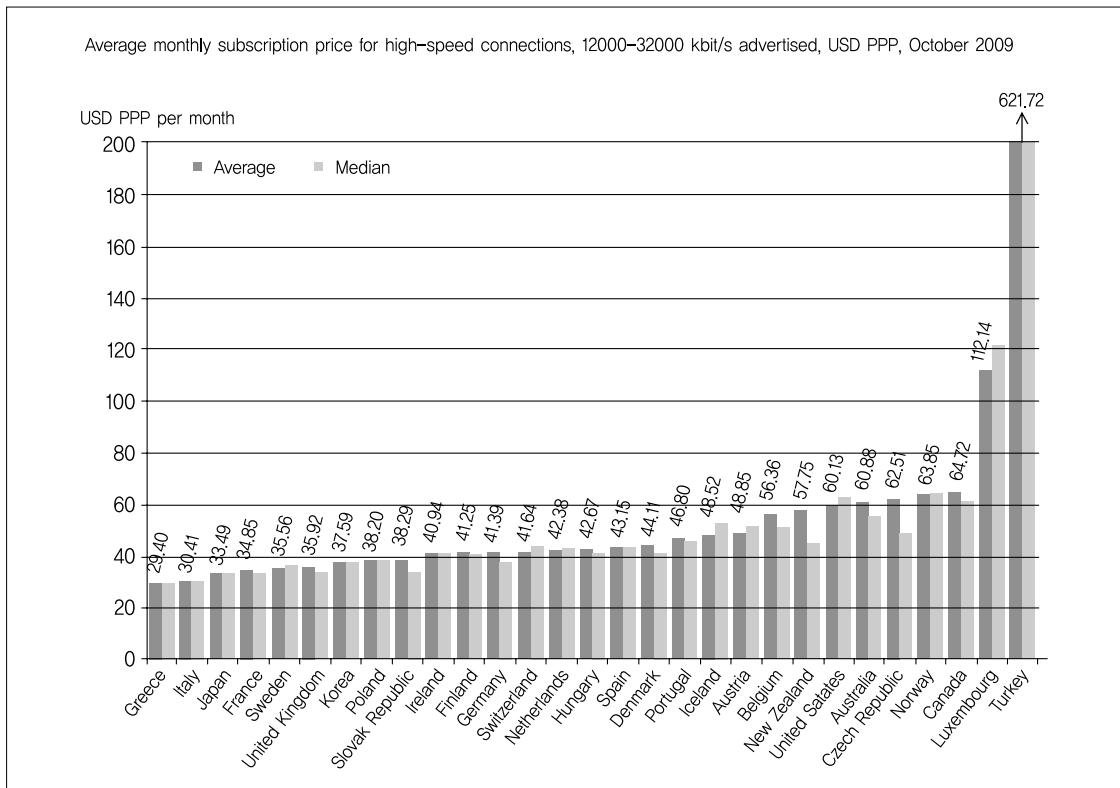
and, now, SK broadband, KT, and LG Telecom, three major carriers dominate the market. KT, as the largest Internet access provider, dominates with 42.9 percent of the broadband market, SK broadband and LG takes each 22.9 percent and 15.6 percent of market share (Inews, July 13, 2010).

Consumer broadband access began with the launch of cable modem service by Thrurnet Co. in 1998. As previously mentioned, Hanaro provided DSL service in April 1999, KT followed two months later, further fuelling the broadband market. Hanaro's aggressive strategy for high-speed Internet deployment exploited KT's unwillingness to enter the DSL market due to its large investment in ISDN and a declining market share. By 2001, there were seven companies providing broadband Internet access service.

## 3) Low Prices

In addition, the service providers had no choice but to respond to the marketplace and deploy aggressive marketing strategies resulting in an increased quality of products and services.

For example, KT launched its Megapass and Qook brand of broadband Internet accesses in 2000 and in 2009 respectively. Based on its substantial infrastructure with high capacity Internet access, KT is able to provide high quality and value-added service to customer such as integrated customer information access and fast installation of new products for customers as well as the lower market prices. As a result of both market and technological competition, Korean carriers offer some of the lowest prices; about \$23 a month for broadband



Source: OECD Broadband Portal, 2009

〈Figure 3〉 Monthly charges for broadband connections subscription 1.2~3.2Mbps, US \$

access through DSL and other networks (See Figure 3). These prices are the lowest among countries with the highest penetration rates throughout the world (OECD, 2010).

### 3. Cultural/Socio-Environmental Factors

#### 1) Housing Pattern & 'Last Mile' Problem

Highly crowded apartment complexes also contributed to the rapid growth in broadband penetration in Korea. 80 percent of Korea's population lives in urban areas, and apartments account for 52 percent of Korea's housing stock, providing dwelling for 20 percent of

its population (Asia Economy, Aug. 5, 2010). This housing pattern and the density of dwellings in urban areas are simplifying broadband access, as development builders can install broadband paraphernalia when constructing a complex. Additionally, access to one apartment building can serve a multitude of individual households without having to install additional infrastructure. One other contributing factor is the proximity of telephone exchanges. Since DSL works best within about four kilometers from a local exchange, Korea's highly crowded apartment complex in concentrated areas is the optimal condition for DSL deployment, as over 90

percent of Korean households are within a the four kilometer radius of a local exchange (ITU, 2001). Because of this demographic situation, “the last mile” has been a less serious problem in Korea than in other, less crowded countries (Lee, et al., 2003).

## 2) Neighboring Effect

Prior research suggests various cross-national factors that may affect IT adoption and diffusion patterns (Dekimpe, et al., 2000; Dwivedi, et al., 2007). According to the report by PCER (1997), Koreans are susceptible to social pressure to keep up with their “neighbors,” and this is further fueled by a competitive enthusiasm for children’s education. “Koreans, especially in the younger generation, feel very uncomfortable if he/she does not have the same things, which most other people have. That explains why most students have mobile phones and high-speed Internet connections at home,” said an analyst in a leading Telecom company. This social phenomenon of everyone wanting what they see their neighbors have is called the “neighboring effect”. This neighboring effect, in combination with a traditional emphasis on education and academic performance, has prompted parents to turn to the Internet for educational goods and services (Lee, et al., 2003; Ovum, 2009).

## 3) Pari Pari Effect

Aizu (2002) reasons that Korea has become a world-leader in broadband penetration because the Korean culture is in a hurry. Despite difficulty of measurement, it is widely agreed that Korean’s

Pari-pari, a mentality that predisposes them not to waste time, is a key factor to the growth in high-speed Internet access. Many Korean Internet users first got a taste of high-speed access at “PC bangs (Internet cafés)” and subsequently wanted the same rapidity of access at home. In response to this, PC bangs competitively serve customers with T1 (1.5M) high-speed digital leased lines. Responses to the demands from individual customers in addition to the aggregate commercial customers, such as PC bang entrepreneurs, in turn, encouraged broadband Internet service providers to develop higher-speed Internet products with lower prices.

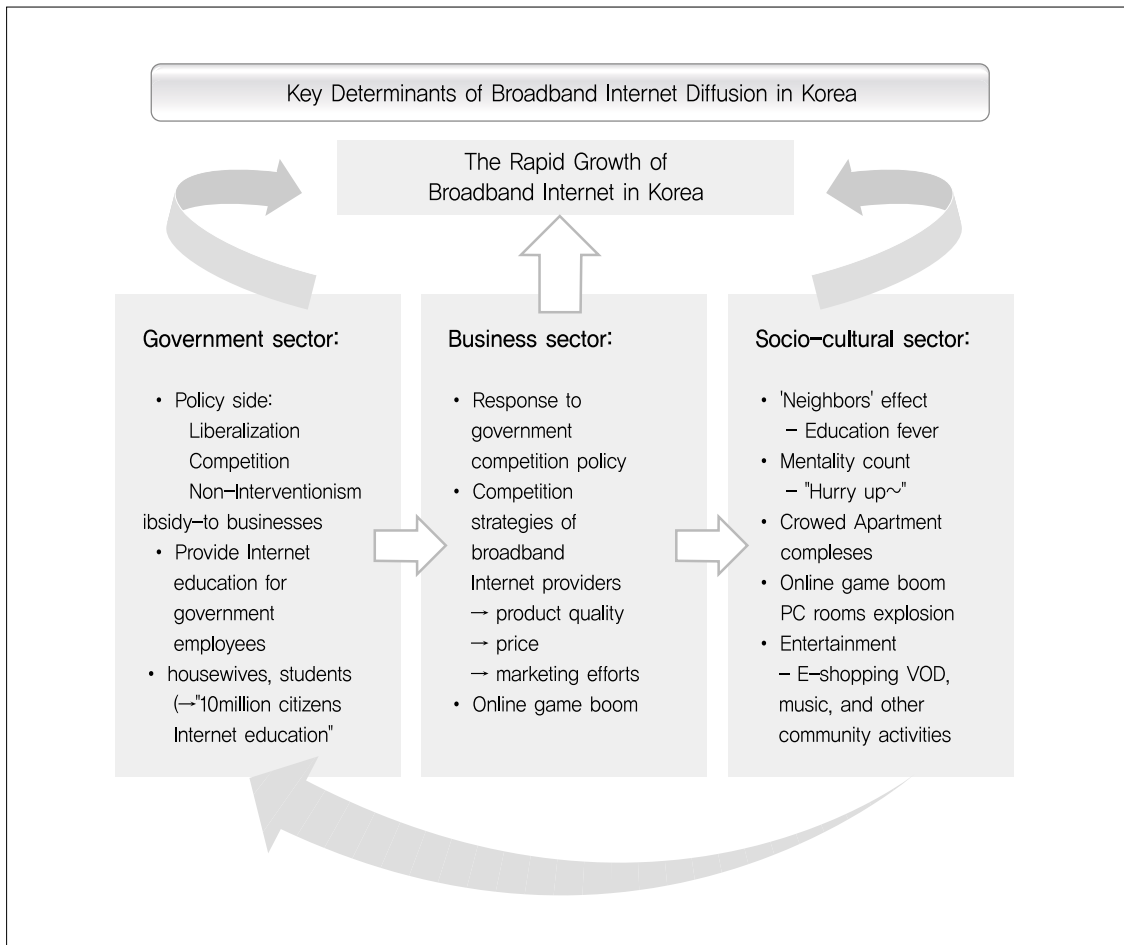
This section analyzed the major factors influencing broadband diffusion in South Korea. The South Korea government and broadband businesses acted as the major stakeholder to diffuse broadband usage and Korea’s unique socio-cultural character also influenced its rapid penetration to all over the country. Figure 4 summarizes the main factors of Korea’s Broadband diffusion (See Figure 4).

# VI. Discussion: Digital Divide

## 1. Current Situation

Despite widespread use of the Internet, the Korean government is concerned with the disparity between those with access to online information and those without this same access: this disparity is called the digital divide. While more people can access the





〈Figure 4〉 Key Determinants of Broadband Internet Diffusion in Korea

Internet via dispersed broadband services, large portions of the nation's population remain excluded from the benefits that the Internet offers. Due to the concentration of installation and provision of high-speed Internet in urban areas, the Internet boom remains restricted to urban areas. Even though a great number of "PC bangs (Internet Café)" that are helping those who live with limited access but want to use Internet, they are concentrated in urban areas and most PC

bangs' users are young generation. Support for physical access the Internet is limited to urban areas and old generation is disinterested in using Internet. While students, office workers, and professional administrative workers show higher usage rates of the Internet, other occupations or the unemployed still show relatively low Internet usage (Korea Internet & Security Agency, 2009). The fact that most offices and schools have broadband access infrastructure explains this in part. Thus,

divides in occupation are not as serious as age and region. Considering the digital divide along with broadband diffusion, therefore, age gap and regional disparity are key factors.

## 2. What is Being Done to Reduce “the Digital Divide”

With the launch of Cyber Korea 21 in 1999, the government declared war on the digital divide. In addition, the Korean government has emphasized the 2002 Act on Closing the Digital Divide. This Act includes the establishment of the Korea Agency for Digital Opportunity and Promotion (KADO) as well as a Digital Divide Committee and a five-year Master Plan. The goals of this master plan are to equip every region in the country with high-speed Internet access and to offer IT training to every interested person according to individual needs. Moving away from the current standardized computer education systems, which focus on basic computer skills such as word processing, new computer literacy education opportunities provide various levels of multimedia technology, computer languages, and in-depth computer skills, computer literacy certification program, and the provision of free Internet access from public places such as post offices, libraries, and Internet Plazas. The MIC is trying to establish Internet plazas in public facilities such as post offices, public libraries, town offices and ward offices to encourage more people to access to the Internet. The government also grants loans to service providers that construct broadband access networks in rural

areas. In addition, the Korean government is the first in the world to provide free high-speed Internet service to 10,000 elementary, junior, and high schools. The deployment of broadband enables all these remedies for “the digital divide”.

## 3. The Role of Broadband for Reducing “the Digital Divide”

As previous studies demonstrate, there are various factors that cause “the digital divide”. Previous studies show that early adopters of new information media such as computer and the Internet are more likely to be male, wealthier, better educated, and younger (Ishii, 2003). The survey results about the diffusion and use of the broadband network by the Ministry of Information and Communication in 2002, however, showed very different characteristics. Owing to the ease of use, education level is not positively correlated to broadband adoption. These results show that broadband use is, comparatively, an easier technology for beginners than is narrowband or other technology use, although basic skill is still required to use broadband services. In other words, the use of the broadband may reduce the “digital divide” by enabling easier access irrespective of a user’s Internet literacy level. Also, since Korean households have a higher degree of economic uniformity in general and ISPs’ competition provides inexpensive broadband usage, an Internet gap based on economic status is not a serious problem in Korea.

The important issues of “the digital divide” in deployment and diffusion of the broadband are based on region and age. There is, currently, a geographical gap in the broadband providers between the densely populated areas and the sparsely populated areas. The government is struggling in various ways to alleviate this regional gap such as by giving loans to ISPs to install broadband infrastructure in rural areas. Series of national plan for IT promotion show the efforts of government to alleviate the digital divide problem. In terms of age gap, the government carries out continuous free Internet education and free supply of computers for older people. The government’s efforts to deploy broadband network service and its diffusion are concentrated on reducing the geographic and age digital divide. While deploying broadband cannot eliminate every issue of digital divide, its value in minimizing “the digital divide,” at least partly, is evident. Since the diffusion of broadband removes the basic barrier of inequitable access to information, the discussion about “the digital divide” will be between ‘have-more’ and ‘have-less’. As broadband is deployed and diffused, most of the policy debates related to broadband access have focused on the “last mile” of the connection between a provider and a customer’s home and business.

Although some people say there is a great risk that the “divide” will grow even larger as the country moves toward broadband technology (Leigh, et al., 2001), According to Leigh, et al. (2001), broadband is concentrated in urban areas and its cost is expensive, disparity between

regions are getting larger. While the digital divide itself is the subject of numerous research and government agendas, however, how deployment of broadband causes digital divide and how digital divide directly affect broadband deployment have not been discussed much yet. general consensus exists for the positive role of broadband Internet diffusion in reducing digital divide (OECD, 2010; ITU, 2009).

## VII. Conclusion

### 1. Summary

As demonstrated in this paper, the Korean government implemented a series of policies that encouraged competition among broadband providers, selective governmental intervention, and investments in broadband businesses and its usage (Education) lead reason to the successful expansion of broadband in Korea. Using existing infrastructure also helped the rapid growth of broadband, as DSL and cable Internet services use existing infrastructures of twisted copper telephone lines and cable connectivity. Without the need for substantial investments by new business and having incentives to use already installed infrastructure, network providers ran into the broadband market and competed fiercely. The resulting competition among broadband services necessarily lowered the market price. Additional contributing factors included cultural issues such as people’s time managing *pari pari* mentality and the “neighboring effect” combined with enthusiasm for children’s education; and social factors such as highly

crowded apartment complexes; and the proliferation of PC Bangs (Internet Café).

These various factors contributed to an increased diffusion of high-speed Internet access at home, in the office, and at a plethora of public or private places including PC Bangs (Internet Café) across the country. This ubiquitous access to Internet has also brought new sources of income to game developers and portal operators, has triggered the demand in equipment and contents industries, and is expected to facilitate related equipment and parts industries in the long term. In order to meet the rising demand for high-capacity multimedia content over the broadband network, Korea already migrates to VDSL. According to Webopedia, it defines that Very High Speed Digital Subscriber Line transmits data in the 13 Mbps – 55 Mbps range over short distances, usually between 1000 and 4500 feet (300 – 1500 meters), of twisted pair copper wire, and is catalyzing faster and more stable connections.

## 2. Implications

This paper presented a number of aspects regarding the diffusion of broadband Internet. All countries, whether rich or poor, may believe and seek the same vision that technology development will stimulate social, cultural, and economic growth. However, due, in part, to the economic inequalities as well as other unique factors in countries, countries are likely to require their own policies that promote successful technology development and the promotion. Nevertheless, the model for

broadband Internet diffusion being developed in South Korea provides important lessons and prescriptions for other countries attempting to promote broadband Internet usage as a national policy.

A number of key issues will require consideration and amendment by policy makers, the telecommunications industry, and various stakeholder groups in each country before it is possible to create policies related to broadband acceleration. These issues include:

### 1) Need a strong leadership and a consistent IT developmental model

The telecommunication industry is a relatively new developing area for countries, so strong leaders who can direct and provide a positive and favorable environment for IT development by establishing a national IT developmental model are necessary. Without the Korean government's strong and unshakable willingness to enhance national technology infrastructures and to provide broadband for residents, there could not have been such a notable achievement in the IT industry. Although governments do not need to be the leaders, they should provide a national model for long-term IT development. For long-term IT development, governments should also build favorable and inducing policy systems and promote consistent initiatives and projects.

### 2) Competition among businesses resulting in innovative pricing and service offerings

Fierce competition among Internet Service Providers yields both a better quality of service

and lower service price. This issue is likely the most important reason for Korea's success. According to the OECD report (2004), Broadband services in Switzerland and France are each 110 times and 100 times more expensive than in Japan, in where the broadband service price is the lowest. Switzerland has only one operator "Swisscom", and France has "France Telecom", which was the former sole provider and still dominates the telecommunications business.

the spread of broadband lags in many European countries where lines are still controlled by former state monopoly providers. Under the control of monopoly providers, there is often little incentive to enhance service quality and provide lower prices. Thus, for better service and reasonable price for people, free competition among service providers is indispensable.

### 3) Identify the benefit of technology usage and provide a favorable environment to adjust it

Various government supports for Internet education contribute to the expansion of broadband usage. The main reason why governments boost broadband usage in public is that governments regard broadband as a necessary condition for providing universal service, so knowing how to access the Internet is an indispensable and prerequisite condition for boosting broadband Internet connectivity. While the construction of information infrastructure alone does not guarantee that people would actually make use of new ICTs, the provision of education and awareness

campaigns can help people to join the information society.

Although these are a few recommendations for setting the favorable environment to develop ICT requiring additional consideration of own national situation, they do show that there are common conditions to understand better policy issues related to developing broadband service and to promote broadband usage.

## 3. Conclusion

After the economic crisis in 1997, the Korean government changed its regime from a "government lead economy" to a "hands-off" regime that followed neo-liberalism. Neo-liberalism has four main points: the rule of the market, deregulation, privatization, and reducing expenditure for social services. To achieve profits from the market and to run a healthy economy, according to the government's new policy direction, government should not intervene and should set the market free from regulation (Robbins, 2001). The success of the IT industry in Korea resulted from the harmonization of these two contradictory regimes. Through a series of government investments (Direct Interventionism) and market enabling policy efforts (Hands-off Regime), the Korean government has successfully stimulated one of the highest broadband penetration rates worldwide. Korea has provided the leading example of government-sponsored oligopoly supporting major investment in the broadband area. As a way

to accelerate the economy, the government has been active in promoting broadband business and has fostered an economic and regulatory environment, which is conducive to broadband growth.

To summarize, it is the provisions of a favorable environment – government level promotion, development of related industries, a social atmosphere encouraging rapid Internet growth, and so on – that are the most indispensable factors for the broadband business success. Broadband promotion is likely to be most effective when various initiatives and projects are integrated and adjusted to contextual and environmental factors, encompassing all stakeholder groups (OECD, 2004). To gain a better understanding of the dynamic issue involving Internet development, one can focus on the explanation of how and why social, cultural, political, and economic factors that are inherently different among countries will affect a broadband policy in an international environment. This may be the main reason why many other countries could not always be successful in the broadband business despite having sufficient capabilities.

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