

**Broadband Internet Adoption in Korea:**

**A maverick or a model to follow?**

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## ABSTRACT

Although development and diffusion of information and communication technologies (ICT) have become major policy objectives around the world since the early 1990s, the order, speed, and range of nationwide ICT deployment vary by country. Moreover, in most cases, pre-existing conditions, such as economic development level and geography, have been found to work as major determining factors for this variation. Recently, Korea has succeeded in nationwide adoption of broadband Internet, drawing huge attention across the world. Therefore this study addresses the question of whether the Korean case can offer some valuable lessons and insights to many other countries seeking more effective ICT development. To answer the question, this study attempts to identify and analyze the contributing factors and conditions under which broadband Internet has been adopted successfully in Korea. In so doing, special foci are placed on both the relationship between government and market and the socio-cultural characteristics of Korean Internet users.

As in other studies, level of economic development and high population density in urban area are discussed as important contributing factors for successful broadband Internet adoption. However, these factors alone do not ensure successful development of this technology. A series of policy implementation strategies and campaigns tapping into underlying socio-cultural values (e.g. attitudes toward information technology and education) and the potential demand of traditionally neglected population groups (e.g. housewives) are also identified as other main factors for successful broadband Internet adoption. An exploratory analysis using a limited number of cases confirms the speculation: Although pre-existing economic development levels and basic infrastructure may be critical factors for initial adoption of the Internet, when explaining more advanced broadband uptake, other factors are also operating, which can be broadly entitled as the “socio-cultural value system.”

The Korean success story does offer an effective adoption/diffusion strategy, if not a viable policy model, for more advanced ICT in developing regions. In short, for ICT development and adoption, where speed of change is rapid and delay in response is a critical cause of failure or falling behind, swift actions taken by both government and business are important. Especially for developing countries lacking advanced economies or infrastructures, task-oriented government initiatives and support are even more important. In addition, campaign strategies focusing on public need and demand appear critical for ICT adoption, although the goal of ICT adoption may be to achieve economic development and competitive advantage. Furthermore, for countries with fewer resources, an adoption strategy starting with nationwide infrastructure building may not be effective. Rather, placing the emphasis on application or service provision in critical sectors including government, finance and education using small showcase facilities such as PC-Bang in Korea, may be more effective to increase the potential user base. Only then may expansion into the general public work. Finally, results from an exploratory analysis suggest that more research and cooperation are needed to develop indices and measures that accurately reflect the socio-cultural values factor that facilitates the adoption of ICT in developing countries.

# **Broadband Internet Adoption in Korea<sup>1</sup>: A maverick or a model to follow?**

## **1. Introduction**

Due to their significant social and economic impact on the entire nation, the development and adoption of information and communication technologies (ICT) have become major policy issues around the world since the early 1990s. Indisputably, ICT serves as a powerful agent for both economic and social development. In terms of the economy, ICT can provide an effective opportunity to enhance productivity by reducing unnecessary transaction and coordination costs, which have been a major impediment to economic development for many countries. ICT applications can also promote social development by allowing access to information in various sectors and services, thus uplifting the overall standard of living (Frieden, 2005; Hanna, 1994; Qiang *et al.*, 2003; Sein & Haridranath, 2004).

Adoption of ICT has been considered even more critical for developing countries because ICT may be used as a major means of leapfrogging, which could help these countries skip over some stages of development and hopefully accelerate their entrance into the postindustrial era. However, as we have witnessed in many cases, the order, speed, and range of nationwide ICT development and its adoption rates vary by country. Furthermore, pre-existing conditions such as economy and geography have often been found to limit ICT development.

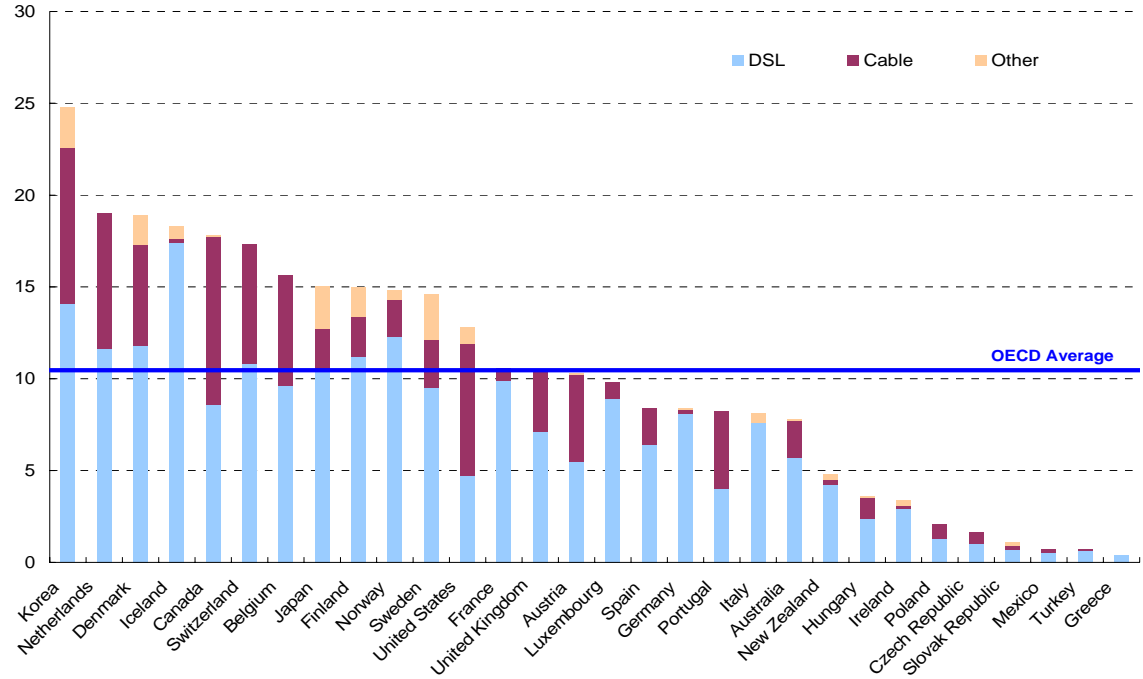
Recently, Korea has succeeded in fast deployment of a nationwide broadband Internet network, with its rate of adoption far exceeding that of other developed countries (Choudrie & Lee, 2004; Y. Lee, 2002; ITU, 2003b; OECD, 2001). According to the International Telecommunication Union (ITU), the five top nations (or administrative regions) that have succeeded in the adoption of broadband Internet are Korea, Hong Kong, the Netherlands,

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<sup>1</sup> Unless stated otherwise, all references to Korea in this research refer to the Republic of Korea, also commonly known as South Korea.

Denmark, and Canada (ITU, 2005). As shown in Figure 1, the Organization for Economic Cooperation and Development (OECD) also reported that among its member nations, Korea ranks the first in broadband Internet penetration, with an average of 25 broadband Internet subscribers per 100 inhabitants (OECD, 2004).

**Figure 1. OECD Broadband subscribers per 100 inhabitants by technology (December 2004)**



\* Source: OECD (2004)

Accordingly, the Korean case has drawn huge attention across the world, raising a series of policy-related questions. Why has broadband Internet caught on in Korea so much faster than in other countries, such as the United States for which it is much better suited in many ways? Has there been any unique relationship between government and market? Was the Korean experience a result of industrial policy? How much of the Korean case has been a result of government subsidy or price strategy? Is the high rate of broadband Internet adoption in Korea an artifact of unique circumstances such as high-rise buildings and a dense urban population? Does the Korean public have a uniquely different attitude or

perception toward broadband Internet? Is the Internet usage pattern in Korea different than that in other countries? How much of this high rate of broadband Internet adoption is actually transferred to other areas of society? Do economic indicators and other indices demonstrate positive effects of nationwide broadband Internet adoption? In short, these questions concern whether the Korean success story could offer some valuable lessons and insights for many other countries seeking more effective ICT development and adoption.

Some research on ICT adoption has reported that socio-economic factors, telecommunication infrastructure, and cultural values have influenced the adoption process, although each to a different extent. (Bagchi & Cervený, 2000; Hargittai, 1999; Maitland & Bauer, 2001; Robison & Crenshaw, 1999). Besides, recent research on Korea and other nations that have been leading the ICT adoption also added the role of government in the list of success factors (Ferguson, 2002; Frieden, 2005; ITU, 2003a; Park, 2000).

Based on the literature, in-depth interviews<sup>2</sup> and statistical data from multiple sources, this study attempts to identify success factors for broadband Internet adoption in Korea and answer the above mentioned questions at various places throughout this paper. In Sections 2 through 5, the contributing factors and conditions are identified and analyzed. In particular, features and roles of three players of the broadband Internet adoption process—government, market and the public—are discussed in relation to each other. Section 6 attempts to quantify the success factors via a regression analysis, and Section 7 discusses the implication of fast adoption of broadband Internet in Korea. Finally, Section 8 provides a brief summary and suggests successful ICT adoption strategies.

## **2. Tradition of Industrial Policy and Proactive Government Involvement**

Since the 1970s, several East Asian countries, initially lacking in natural resources, technology, and capital, have shown dramatic economic growth. Studies on East Asian

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<sup>2</sup> Five in-depth interviews were conducted in Korea during July and August of 2005 with: a senior researcher from Korea Information Strategy Development Institute (KISDI); an official from National Computerization Agency (NCA); a vice president of a major telecommunication company; an economics faculty at one of national universities in Korea; and an official at the Ministry of Information and Communication (MIC).

countries in the 1980s and early 1990s have attributed their economic success to several factors. Mostly, state-led resource mobilization, which is characterized by an unique political system and active role of government in industrial policy, has been considered a prominent feature for East Asian economic development ( Audretsch, 1989; Johnson, 1982; Lim, 2001; Wilks & Wright, 1987; Woo-Cumings, 1999).

With globalization, liberalization, and deregulation movements in the late 1980s through 1990s, many countries with an industrial policy tradition had to change their policy, regulatory system, and even their industry structures, to merge into the international market. However, unlike initial expectations, many East Asian countries were found to have maintained many of their developmental state characteristics, and rather unique forms of governance appeared, in which the active role of government is still an important factor (Chu, 2001, 2002; Deyo, 1987; Hwang, 1993; Jho, 2003; Weiss, 1998).

Since the early 1990s, the Korean government has expressed its intention for centralizing policy coordination and advancing IT industry as the driving force of economic growth. Ministry of Information and Communication (MIC), which is in charge of establishment and enforcement of Korean ICT policies, was established in 1994 after a series of organizational reforms. Before MIC, ICT and telecommunications related government functions have been scattered among several organizations such as Ministry of International Trade and Industry and Ministry of Science and Technology. This reform unified the dispersed the government functions and clearly represented the Korean government's motive (Hong, 1998).

The remnant of strong government influence and overreaching involvement can still be found in the success story of ICT adoption in Korea. One relatively well-known recent example of government influence is the selection of a mobile standard, where the Korean government selected Code-Division Multiple Access (CDMA) over other standards because it was technically superior and thus better suited to achieving the goal of championing mobile technology, setting aside the consideration of its potential in the global market (ITU, 2003; Lee Y., 2000).

Although with some variation, government influence and involvement in relation to the

business sector was also present in the deployment of broadband Internet in Korea. The directives or “official documents asking for cooperation” were still effective ways to influence the private business sector. Although they were not official “orders” with binding authority, the private sector usually tried to follow what the government wanted it to do.<sup>3</sup> Government influence was also present through human networking, which had closely tied the government with private sector during the fast economic development period. While the separation of government and business has been a major target for criticism, former officials have been frequently appointed to major firms as CEOs or directors. A vice president from a major telecommunication company told the researcher how this practice might have influenced the start up of broadband Internet business as follows.

“..If the decision had been made based purely on market concerns, the deployment of the broadband Internet in national scale would not have been possible. [I think] it was pursued because the CEO of that time came from the government and still had the way of thoughts that are characterized by more goal/task-oriented but less economic cost-benefit oriented.”<sup>4</sup>

Park (Park, 2000) listed five factors for the rapid growth of Internet users in Korea: government policy, social factors, technical aspects, business aspects, and competition. However, scrutiny of these factors revealed that his discussion of ‘technical aspects’ and ‘business aspects’ was indeed about government involvement in each area, demonstrating extensive involvement of the government. The tradition of industrial policy and state-led mobilization has been well reflected by the Korean government’s approach of using consecutive five-year plans for ICT development.<sup>5</sup> The five-year-development planning approach has been consistently used for the economic development of Korea in the 1970s

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<sup>3</sup> From interviews with an NCA official and a vice president of a major telecommunication company, July and August 2005.

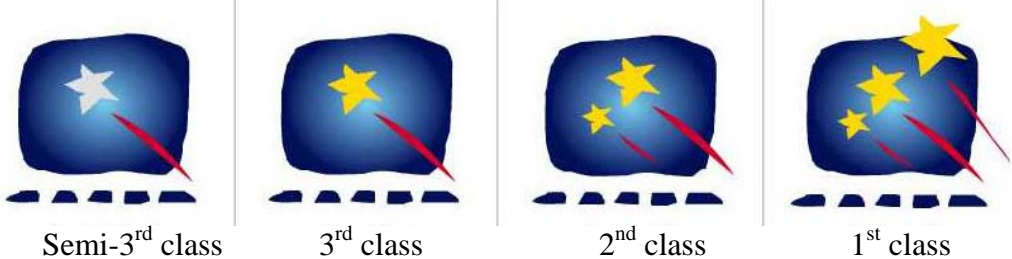
<sup>4</sup> From an interview with a vice president of a major telecommunication company, August 2005.

<sup>5</sup> From an interview with a senior researcher at KISDI, July 2005.

and 1980s and proven efficient. Each five plan is a stepping stone toward a long-term goal, which is to “becoming a leader in ICT infrastructure and information society” in this case. Under each five-year master plan, the Korean government has enumerated different objectives and executive strategies. During the fifth year, achievement is assessed and the short and mid-term goals are revised to establish more realistic five-year plan in the following years.

To achieve the long term goal of ICT development, the Korean government has initiated different types of funding, policies and institutions specialized in various aspects of ICT development (ITU, 2003a; Park, 2000). In addition to becoming an important client of ICT industry and offering test beds for new ICT, the government has established an unusual funding system titled “The Information Promotion Fund.” This fund has been unique in that the money has been used to support ICT projects and industry rather than to benefit other sectors of government as has been the case with most public funds. Another unique strategy to stimulate both private sector and the public has been “The Certification Program for Broadband Buildings.” This program has certified the network availability and speed of connection in new apartments with more than 50 units and buildings bigger than 3,300 m<sup>2</sup>. Under this program, buildings have received 1st, 2nd, 3rd and semi-3<sup>rd</sup> class certificates, depending on whether they provided over 100 Mbps, 10-100Mbps or 10 Mps Internet connections (MIC, 1999). In 2003, premium class was introduced in the system and semi-3<sup>rd</sup> class was removed. As of February 2005, more than 1.5 million apartments and buildings received the certification emblem, with about 23,300 buildings certified with special class (MIC, 2005).

**Figure 2. Emblems for the Certification of Broadband Buildings**



\* Source: Ministry of Information and Communication (MIC,1999)

Another strategy that accelerated the diffusion of broadband Internet was the campaign strategy utilizing the high value that Koreans place on reputation and top-level education. As a way to increase human capital in a nation lacking in other natural resources, the Korean government has consistently emphasized the importance of education through various educational policies and national campaigns. Also influenced by Confucian tradition, in which education was considered to be the crucial means to obtain a high social-political ranking, Koreans have become obsessed with education, for instance, to spend as much as \$16 billion for private education in 2004 (Ham, 2005). Korea's literacy rate of 97.6 has been the highest among the Asian tigers, and Korea has had the highest level of secondary school graduates among all the high-income Asia-Pacific economies (ITU, 2003). In this context, government started offering Internet connections to schools and teachers first. Schools imposed new requirements on teachers to encourage the Internet use among students by giving assignments electronically or communicate with students via email. The Educational Broadcasting System (EBS) began to broadcast its high school education programs, which have been the source of many questions for the University Entrance Exam, via the Internet. As a result, parents were drawn to high-speed Internet for their own children.

At the same time, the government initiated IT literacy programs targeting the traditionally neglected social groups of housewives, the elderly, prisoners, military personnel, and farmers. Most successful were the literacy programs targeted toward housewives, those married women not in employment. The Ministry of Information and Communication (MIC) recognized both the feeling of "being left behind" or "being ignored by their own children" among housewives and also their value for broadband Internet deployment as they were the main purchasing power in a household. In short, the government offered free training programs or subsidized training programs in private IT/Internet institutions so that housewives could take courses free or at a low cost. These practices demonstrated how efforts by national governments could stimulate and actualize potential demand by offering citizens better ways to utilize information technology and access staple information.

### **3. Market Competition and the Business Sector**

In addition to the concerted effort with government, business sector also played an important role in broadband Internet adoption. Facility-based competition has been considered one of the major propellants for the deployment of broadband Internet access in Korea (Ferguson, 2002; KISDI, 2005; N. Lee, 2002). Commercial broadband Internet access became available in 1998 with the launch of a cable modem service by Thrunet, a facility-based service provider (FSP), but the real competition in the broadband market began when Hanaro Telecom started offering broadband Internet access service via ADSL in April 1999. Hanaro Telecom decided to offer ADSL broadband Internet service because it was difficult for them to enter the local telephone market with traditional telephone service. For example, by the time of Hanaro Telecom's proposed entry into the fixed-line market, most Koreans were already subscribing to the incumbent Korea Telecom (KT). In addition, Hanaro was confronted with other obstacles such as no number portability and high switching cost for customers. As a result, Hanaro decided to offer a broadband Internet service using ADSL, which KT was not focusing on due to its initial investment in ISDN. However, as Hanaro successfully entered the market and ADSL broadband Internet service turned out to be profitable, KT quickly followed the newcomer and entered the ADSL market in June 1999. By 2002, there were seven companies providing broadband Internet access service. With the competition among service providers, fast developing broadband technologies had also helped market growth by offering greater choice and lowering price.<sup>6</sup>

The success of broadband Internet access was also aided by the fact that Korea went through the IMF economic crisis from 1997 to 2001, when Koreans came to think that the older economic model did not work for them anymore (Shameen, 2004). As a result, they pushed the development of ICT industry, and subsequently the online business has been perceived as an important alternative and supplementary service among large business

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<sup>6</sup> There are multiple ways of calculating broadband Internet access fee. Although Korea belongs to a group of nations offering broadband Internet access at a low price in absolute dollar values, when the subscription/usage fee is compared relative to GDP, it ranks 28th among 50 countries surveyed. On the other hand, when connection speed is considered, broadband Internet service in Korea is offered at the lowest price (Lee et al, 2004).

players. For small and medium enterprises, new forms of business and services based on the Internet and its application provided new venues. One example was the flourishing of Internet cafés called “PC-bang.”<sup>7</sup> Many Korean Internet users first experienced high-speed access at a PC-bang and subsequently wanted the same speedy connection at home. With the increasing popularity of online games among the younger generation, the number of PC-bangs equipped with high-speed Internet access rapidly increased from 3,000 in 1998 to 22,500 in 2002 (Park, 2000).<sup>8</sup> In fact, the rapid proliferation of PC-bangs has multi-faceted implications since they not only offered business opportunities for small and medium enterprises, but they also expanded the size of the potential market for both broadband Internet connection service and digital games by making sites available for people to test these services and products before subscribing to them personally. According to a survey conducted by Korea Game Development and Promotion Institute (KGDI), as of 2003, each PC-bang was equipped with an average of 49 computers and 96% of them offered Internet connection at 10Mbps speed, with 84% of users playing online games. Even until today when Internet access from home is available from 80% of households, PC-bangs are still a popular gathering place and cultural arena in Korea, especially among younger generations.

#### **4. Advantages of Geography and Demographics**

Two of the frequently mentioned factors affecting adoption of ICT have been the geography and demographics of a nation (Aizu, 2002; ITU, 2003b; Wong, 2003). Recently Frieden (2005) also listed a number of localized characteristics favoring ICT development referring to geography and demographics measured by nation size, population density, per

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<sup>7</sup> ‘Bang’ means room or gathering place in Korean.

<sup>8</sup> Game console, which is the most common way of playing digital games in many countries, is not yet popular in Korea, with the nationwide ownership of game console remaining at a relatively low level. PC-Bang made playing electronic games very popular among younger generations, expanding potential game market. But this was not transferred to video games using game consoles, which occupied only 15% of the game platforms in the Korean game market in 2003, when online games took 49% of the market. In a survey conducted by KGDI, only 4.2% of respondents answered that they prefer video games using game console, whereas 48% responded that they preferred online games (KGDI, 2004).

capita income, percentage of high rise housing, and size of households. It is true that nations and administrative regions with a relatively small territory and highly populated urban areas, such as Korea, Singapore, and Hong Kong, may be able to develop ICT more easily because telecommunications carriers in these nations have fewer lines to install, while more people can be served by the same lines. Also, geographically small nations with high incomes, as can be seen in Europe, may not need to subsidize rural and low-income residential areas nor establish a substantial amount of ICT funding. In addition, if the proportion of young and urban apartment dwellers is high, new services can be more readily introduced with a comparatively higher penetration rates, within a shorter period of time.

As of 2003, 82% of Korean people were living in urban areas and 48% of total housing stock is high-density dwelling units such as apartments (NSO, 2001). Moreover, about 90% of the Korean households are within a radius of 4 km from a local exchange, making “the last/first mile” question a less serious problem for the deployment of ADSL in Korea than in other similar countries.

Nevertheless, Korea has a relatively larger territory with a lower per capita income, compared to many European nations and other East Asian Tigers. Housing patterns and nation size cannot fully explain the rapid adoption of broadband Internet among Koreans.<sup>9</sup> These suggest additional factors other than geography and economy may operate to foster the rapid adoption of broadband Internet. These potential additional factors are reviewed in the following section.

## **5. Public, Consumer and Cultural values**

Although it has been difficult to measure, many scholars have consistently mentioned the importance of ‘mentality’ or ‘culture’ as one of the key factors for the successful adoption of broadband Internet access in Korea.

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<sup>9</sup> In an exploratory analysis on 54 nations, nation size did not correlate with either overall Internet adoption or broadband Internet adoption and was not found statistically significant in a regression analysis.

Several unique cultural patterns are believed to facilitate the adoption of broadband Internet access. First was the so-called Pali-Pali syndrome.<sup>10</sup> Pali-Pali syndrome refers to a tendency to try to get things done in a hasty way. Initially this tendency was deemed a negative byproduct of fast economic growth during the 1970s and 1980s, because when people hastened to get things done, the work quality or level of completion might not have been high, as was evidenced by several structure collapse accidents in the mid 1990s. However, the Pali-Pali spirit has been recently reevaluated to have a rather positive aspect because fast communications and decision-making are preferred in the 21<sup>st</sup> century. The fact that broadband offers a speedy connection to Internet might have been ideally suited to Koreans' inclination for speed.

Keeping up with one's neighbor, or the copycat syndrome, has been regarded as another cultural characteristic that facilitated the diffusion of broadband Internet access in Korea. This syndrome might have originated from the high homogeneity of Korean society. Except for a small number of people with foreign origins, Korea is ethnically homogenous and there is one language, Korean, spoken throughout the nation. The Ethnic and Linguistic Fractionalization index (ELF), used to measure socio-cultural heterogeneity, reported that Korea's score on the index was the lowest, which meant the most homogeneous, among the nations surveyed (Krain, 1997; Roeder).

In essence, the copycat syndrome means that if other people have something, then everyone else also needs to have it, because people in general have a cultural desire not to be different. In the multi-unit-dwelling buildings, it is easy to observe what service one's neighbor is getting. If one household obtains the broadband Internet connection, other households in the neighbor would soon subscribe to the same service "for fear of falling behind or to be equal with others even though they didn't really need the broadband Internet connection or it was out of their budget range."<sup>11</sup> And this tendency may be part of the reason why broadband Internet access could spread most efficiently in the high-rise

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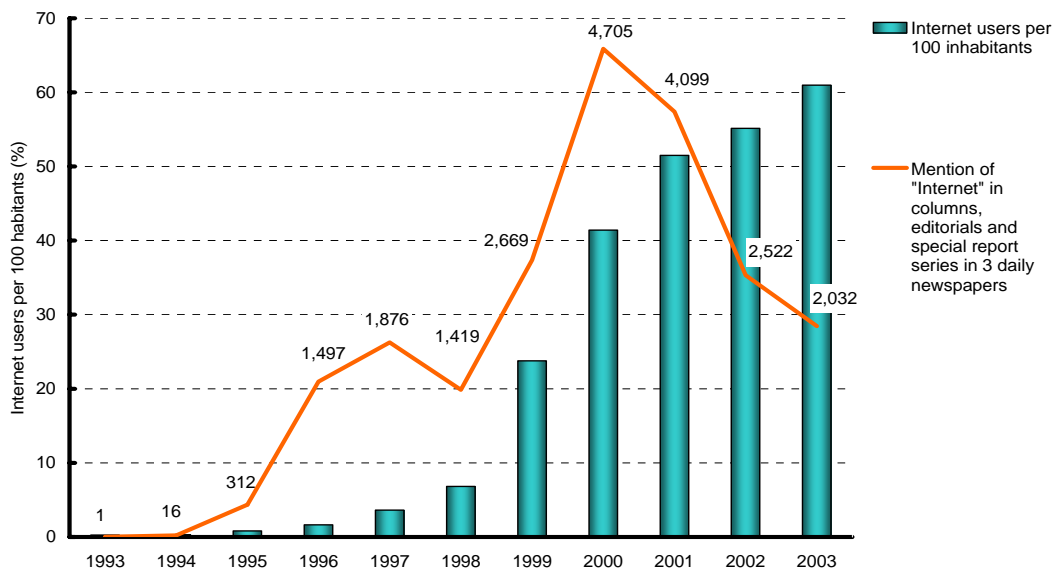
<sup>10</sup> 'Pali-Pali' means 'hurry-up hurry-up' in Korean

<sup>11</sup> Quote by a vice president of a telecommunication company during an interview conducted in August 2005.

apartment buildings.

Additionally, one cannot underestimate the impact of attitudes toward ICT. According to an annual survey conducted by National Internet Development Agency of Korea (NIDA), most Koreans have viewed new information technology as simply a “good thing,” and Internet-literacy has been perceived as a basic skill (NIDA, 2004). Beside the viewpoint of equating education and information related goods with something positive, mass media seemed to have played an important role in setting the overall social atmosphere to view the Internet in a positive light. As one proxy demonstrating this relationship, Figure 3 shows how frequently the word “Internet” has been mentioned in columns and special report series in three major daily newspapers from 1991 to 2003. A further analysis is surely needed to examine rigorously the relationship between mass media content and the growth of Internet users. Yet the volume of news articles indicates that mass media might have at least drawn people’s attention to the Internet until its adoption rate passed the 50% milestone in 2001. Reports in the mass media might also have helped signal that people could be left behind in the drive toward the information society if they were Internet illiterate, which might have led Koreans to be more responsive to anything ICT related.

**Figure 3. Number of reports on the Internet and growth of Internet users**



## 6. Exploratory Quantitative Analysis

In an effort to better understand the relationship between various factors and nationwide adoption of broadband Internet, and the relationship between socio-cultural values and ICT adoption in particular, an exploratory quantitative analysis was conducted on a limited set of data. Data was initially drawn from *World Telecommunication Indicators* (ITU, 2004), *The World Fact Book* (CIA, n.d.), and *The World Bank Education Statistics Database* (World Bank, n.d.). In addition, as a proxy for socio-cultural values, Post Materialism Index scores from *World Value Survey* (Inglehart et al., 2005) and Uncertainty Avoidance Index (UAI) from *Value Survey Module* (Hofstede, 2001) were used in the analysis. Post Materialism Index scores indicate individual orientation, rather than collective orientation, emphasizing individual freedom, self-expression and quality of life including the flexibility of work. UAI scores indicate the extent to which a society feels threatened by uncertainty and tries to avoid it. In general, UAI scores will be negatively related with new ICT or other types of innovation, whereas Post materialism scores will play a positive role in ICT adoption as ICT can increase individual freedom, self expression and work flexibility.

In addition, unlike other studies on ICT adoption, Ethnic-Linguistic Fractionalization Index (ELF), an indicator of diversity of population, was also employed in the analysis and treated as one of cultural factors to represent homogeneity of population. Although data were drawn from multiple sources to best reflect the factors discussed in the previous sections, a couple of factors are still missing in the analysis, such as the active involvement of government and its relationship with other sectors of the country. Since each data source did not have the same list of countries for their inquiry, a total of 54 countries commonly included across all data sources were included in the analysis.<sup>12</sup>

Figure 4 shows the results of regression analysis on Internet adoption. Model 1 only

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<sup>12</sup> Originally, there were multiple variables to represent each factor. For example, for geography factor, nation size, population density and population in the largest city were drawn in addition to urban population. However, due to the small number of cases available, only one or two indicators that appears to best represent the factor

uses urban population, GDP per capita and education level. These factors alone explain about 71% of Internet adoption in a nation. Unlike original expectation, however, urban population was not a significant indicator of Internet adoption 54 countries analyzed in this study. Model 3 incorporates three socio-cultural variables. Although Post materialism was found to be marginally significant, the overall socio-cultural variable block increased  $R^2$  to .88 and the increase in  $R^2$  from the previous model (.82) was statistically significant. ELF is reverse-coded, meaning that if the society is more homogeneous (closer to zero in ELF index), Internet adoption rate will be higher. Negative sign in UAI indicates that the nation with low uncertainty avoidance tendency will more likely have higher Internet adoption rate.

**Figure 4. Regression Analysis on Internet Adoption**

	Model 1		Model 2		Model 3	
	B	Std. Error	B	Std. Error	B	Std. Error
(Constant)	-90.9	15.05	56.86	38.47	68.35*	35.19
Urban Population	0.1	0.13	0.11	0.11	0.14	0.1
GDP/capita	10.3***	1.77	-5.77	4.08	-8.75*	4.56
Education	3.99*	2.24	4.54**	1.86	4.05**	1.64
Teledensity			0.16	0.1	0.16*	0.09
Internet Access Fee			-13.37***	3.93	-11.51***	3.86
ELF					-17.54**	6.72
UAI					-0.17**	0.06
Post Materialism					16.86*	9.711
$R^2$ (Adjusted $R^2$ )	0.71(0.69)		0.82(0.79)		0.88(0.85)	

\* p <.10, \*\* p<.05 \*\*\* p<.01

Figure 5 summarizes the results of regression analysis on broadband Internet adoption. The same variables were introduced in the analysis, except for broadband Internet access fee in place of Internet access Fee. As is shown in the figure, in this case, GDP per capital is no longer significant. Yet the socio-cultural variable variables in the model 3 are all significant, increasing the overall explanatory power of the equation by more than 20%, compared to previous model. Interestingly, signs for the socio-cultural variables' coefficients are opposite in this model, compared to corresponding coefficients in Figure 4.

There may be many reasons for this sign change that requires further research. For example, as was mentioned before, the indicators are not representative of factors discussed, or it may be an indications of existence of other factors or mechanism that uniquely influence broadband Internet adoption.

**Figure 5. Regression Analysis on Broadband Internet Adoption**

	Model 1		Model 2		Model 3	
	B	Std. Error	B	Std. Error	B	Std. Error
(Constant)	-63.62	24.57	-16.71	43.72	-26.53	38.01
Urban Population	0.01	0.2	0.16	0.22	0.05	0.19
GDP/capita	2.55	2.78	-6.32	6.06	-0.18	6.01
Education	13.4***	4.13	13.83**	4.93	9.68**	4.31
Teledensity			0.32	0.25	0.2	0.22
Broadband Internet Access Fee			-2.16	2.41	-1.58	2.02
Internet Adoption Rate			-0.06	0.33	0.63*	0.33
ELF					34.31**	12.92
UAI					0.35**	0.12
Post Materialism					-35.82**	16.54
R <sup>2</sup>	0.39(0.32)		0.46(0.33)		0.68(0.55)	

\* p <.10, \*\* p<.05 \*\*\* p<.01

Given the limitations in the dataset, caution should be exercised when interpreting the results: the number of cases is small and indicators measuring important factors including the relationship between government and business or the level of proactive government involvement are not included in the analysis. These limitations suggest that for a rigorous and more valid quantitative analysis in the future, agreeable indicators for important factors should be developed, and data standardization among different institutions are needed.

Despite the limitations on dataset, however, the exploratory analyses imply that socio-cultural variables may significantly contribute to explaining both types of Internet adoption.

## 7. After the broadband highway is paved

Korea is now well known as a leading country in Internet use and broadband Internet

access. The Korean government boasts of achieving its goal to become a leader in IT industry and to drive the information society. Nevertheless, scrutiny of actual Internet use and the impact of the nationwide broadband Internet access reveals that there is still more work to be done.

The president of the Korea Agency for Digital Opportunity and Promotion (KADO) argues that although ICT infrastructure in Korea is currently at the world's top level, the contribution of using ICT [informatization] in different sectors to economic development has not been as significant as in other industrialized countries. According to figures from the MIC, the ICT industry's contribution to GDP reached 42% in 2003. However, the contribution from informatization to economic growth stayed at a mere 10% that year, far below the levels seen in other developed countries, such as 33% in Japan and 25% in the United States (Kim, 2005).

On user side, this may be due to the uneven Internet usage pattern, which is still limited to passively receiving or consuming specific types of contents, such as tertiary school educational programs, information on assignments, entertainment contents and online gaming, despite its vast Internet population and broadband Internet capacity (NIDA, 2005). It seems that more diverse online activities have yet to occur among average Koreans. Aside from answers to the question asking which online contents they frequently use, when asked to evaluate their own Internet usage skill, homepage (or blog) production, Internet banking and public service received the lowest scores, whereas respondents gave themselves high scores on information search [web surfing], e-mailing, and consumption of music and streaming video files. In other words, Internet use for active content production or online activities of which results may be transferred to other sectors including e-commerce, e-government, different types of e-services, and ultimately socio-political involvement, are not fully developed yet.

Beside online game web sites, most popular websites in Korea are community sites such as *Cyworld* and *iloveshool*, where only the limited functions of posting small pictures and short notes on "guest book" are allowed. Figure 6 is a screen shot from *Cyworld*, where Internet users spend time watching their friends' pictures, checking one or two lines'

personal comments and decorating their avatar and virtual mini room with items the service providing company is offering at a small fee (Figure 6).

Figure 6. Screen shot of a mini homepage in Cyworld



According to the survey of Computer and Internet Usage done on 17,535 Koreans 6 years and older, 78% of Internet users said that ICT made their personal lives easier. However, a majority of respondents said that ICT made worse the problem of infringement on privacy, income gap, alienation, and unemployment, indicating the presence of ambivalent judgment of ICT (NIDA, 2005). It is not sure whether this ambiguity has been caused by inappropriate usage of ICT by users or lack of protective mechanisms by institutions. Yet threat to privacy may be partially responsible for the relatively low level of online commercial interaction. Park & Jun (2002) reported that the level of perceived risk online was higher among Koreans, thus inhibiting the correlation between the amount of time spent online and the frequency of online shopping among Koreans.

On the other hand, the excessive use of online games, particularly among teenagers and people in their early twenties, are becoming a serious social issue as to launch a stream of

research into the problem of alienation amongst young people.

In a way, the current situation that Korea is facing is well summarized by Al Gore's comment at the annual Seoul Digital Forum in 2005 (Kim, 2005).

“..We should not lose ourselves in the fascination over the gadgetry in technologies and its stunning capabilities. We should focus on using the tools for the purposes that we choose.”

## **8. Conclusion**

Reviewing various factors that facilitated the rapid rollout of broadband Internet in Korea sheds light on some key aspects from which other countries might learn. As was often raised in other studies, existing geographical and economic conditions may be important determining factors for the development of broadband Internet. However, if not for other factors including socio- cultural factors, active government policy, cooperation between government and business, and diffusion campaigns, broadband Internet would not have been adopted so fast.

A close examination of the Korean case tells us that the emergence of new governance style has been favorable to the adoption of broadband Internet connection, and may continue to be so in other ICT development. This new governance style reflects the tradition of industrial policy with its focus placed on proactive government involvement and planning. Yet it allows a more interactive relationship between government and business/private sector, and expects increased role of business/private sector.

Furthermore, a policy implementation strategy and diffusion campaigns tapping into the underlying socio-cultural values such as attitudes toward information technology and education, and the potential demand of traditionally neglected population groups (e.g. housewives) are identified as other main factors of the successful broadband Internet adoption in Korea.

The results of an exploratory analysis provides further support for the proposition that although pre-existing conditions such as economic development level and basic

infrastructure may be critical factors for the initial adoption of Internet, in explaining both narrowband and broadband Internet uptake, other factors broadly entitled the “socio-cultural value system,” are also at work.

In conclusion, the Korean success story does provide effective adoption/diffusion strategy, if not a potential policy model, for advanced ICT development. In short, with ICT development and adoption, for which speed of change is rapid and any delay in response is a critical cause of failure or falling behind, swift action by both government and business is critical. For this purpose, especially for developing countries whose economies or infrastructures are relatively less developed, task-oriented government initiatives and support are critical.

Although we cannot strictly apply the traditional industrial policy framework to ICT initiatives, success stories from Korea, and other research on leading ICT countries such as Canada and Japan, apparently signal that there may be a new paradigm appearing in ICT development that emphasizes the role of active government involvement (Frieden, 2005). In the midst of liberalization and globalization movements, developmental countries including Korea have changed the rule and regulation of their IT sectors, sometimes even changing the whole industry structure. Originally they were thought to move from the regulated-government oriented end toward the fully liberalized-market oriented end as in the case of the United States. Yet what we are witnessing in countries succeeded in ICT development is the government actively engaging in the whole process from the planning to the actual implementation stage in coordination with the business sector.

The ICT development process in Korea is in stark contrast to the United States’ model, where government becomes involved for just a brief period of time at the beginning of a new ICT development. Korean case suggests that ICT development can substantially benefit from a combination of mid and long-term plans and government’s active involvement in the whole process. Certainly, this process requires the government to “understand the stakes involved and work conscientiously to establish a transparent, efficient, flexible and positive business environment for the long run” (Frieden, 2005, p.603).

Even when ICT adoption is mainly for economic development and a competitive advantage, a campaign strategy focused on the need and demand of the public may be more effective for encouraging acceptance. Furthermore, for countries with fewer resources, an adoption strategy emphasizing infrastructure building at the national scale may be less effective. Rather, more success will be gained by placing the emphasis on application or service provision in critical sectors, such as government, finance, health and education, using small showcase facilities such as PC-bang in Korea, and then expanding the scope into the general public.

Whether or not a nation succeeds in the deployment of broadband Internet may not become a self-sufficient predictor of overall national success or failure in ICT development. Yet considering the potential impact of broadband network access on many diverse segments of a national economy, it should never be underestimated. In addition, being a pioneer who first stepped into the uncharted territory of broadband nation, Korea's experience will provide valuable insights into future trends.

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