

## **The Growth of Broadband Internet Connections in South Korea: Contributing Factors**

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### **Abstract**

*During the past two years, Korea has seen a remarkable development in broadband Internet connections. This paper explores the factors contributing to the development from three viewpoints: government-driven, private sector-driven and social background. The paper first presents the recent broadband Internet trends in Korea, and briefly describes the local loop unbundling process in UK. While the broadband Internet market in Korea is characterized by high competition, the British market lacks competition. It concludes with challenges ahead which policy makers and industry leaders face.*

**Keywords:** *South Korea, Broadband Internet Connections, PC-Bang, Local Loop Unbundling*

### **1. The Last Mile and Broadband Internet Connections**

The last mile is the last segment of the data pipeline which connects a telecommunication provider and end customers, e.g. domestic users. In telephone services, the last mile technology is based on the copper twisted pair, i.e. telephone lines. It has been a nagging problem in telecommunication services. Since services are extended to include data services, the last mile becomes more important to

decide the service quality. Particularly in conjunction with the growth of the Internet, as customers demand faster and more reliable connections, it is often referred to as a major bottleneck that constrains the development of the Internet and further of electronic commerce.

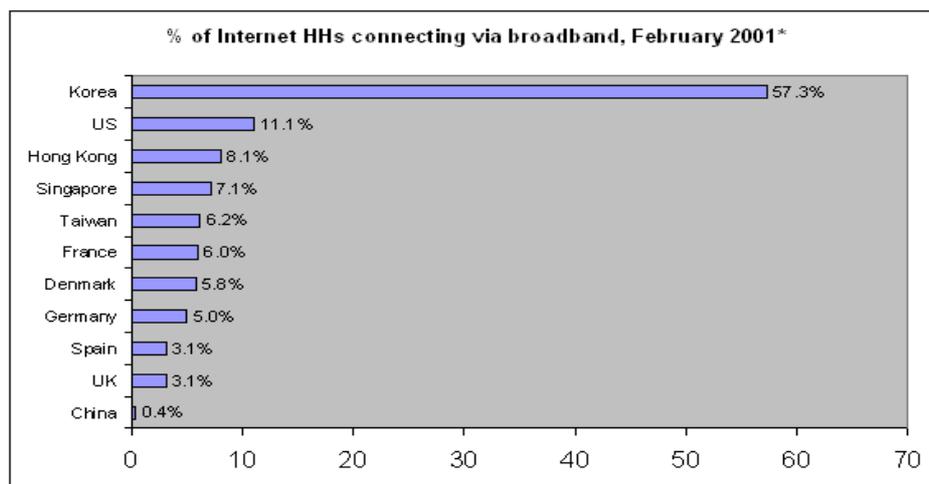
To overcome the last mile problem in the Internet, some technologies which enable broadband Internet connections have recently appeared. ADSL (Asymmetric Digital Subscriber Line) uses existing twisted-copper wire phone lines to provide broadband access. As ADSL uses existing telephone lines, any house with a telephone line (virtually all) can be connected to broadband access. However, it is hampered by the distance problem. It only works within a certain length of distance (about 3.6 km) from the exchange. Cable modems are designed to take advantage of the existing cable infrastructure used to provide cable television and telephone services. One of the drawbacks of dial modem is that the speed is dependent on the amount of traffic and can slow down considerably at peak times. In addition, there are also wireless and satellite connections available. (Fowler, 2000; Goodwins, 2001). As these broadband technologies provide much faster than dial-up modems and 'always-on' connection, they substantially change the patterns of the Internet use and have a potential to make "the Internet a stable, embedded part of our everyday lives" (Goodwins, 2001). They also will become the infrastructure of electronic commerce.

The deployment of broadband Internet connections varies across different countries. A recent OECD survey puts South Korea at the first place out of 30 OECD member countries in the league table of the broadband penetration (Mesure, 2001; Wakefield, 2001). The survey measures how many broadband connections are available per 100 inhabitants. South Koreans have nearly 10 connections per 100, followed by Canadians with 3.9 and US with 2.25. In Korea, approximately 4.3 million houses are connected to the Internet with broadband access (mainly ADSL and cable modems). On the other hand, Britain lags behind with 0.08 lines per 100 inhabitants, the 21<sup>st</sup> in the table.

Bridging the last mile and deploying broadband connections involve not only technology, economics and geography, but also politics and policy (Fowler, 2000). This paper presents the development of broadband Internet connections in Korea focusing on the last two years and investigates its contributing factors. Although there are a few studies on the development of the Internet at the national level (Chia et al., 1998; Petrazzini and Guerrero, 2000), research on broadband connections is rare yet. We have collected data on the broadband Internet from various sources including press, government statistics, etc. We also interviewed four representative figures from major players: government, industry, a research think tank and a related association. This approach runs the risk of being caught up in the optimistic views of the press and the persons involved in the process. But we sought to maintain a sound and balanced position to what we heard and read. We aim to discuss implications for other countries that face the same task of the broadband deployment, particularly UK. We conclude with challenges ahead.

## 2. Broadband Connections and Internet Use in Korea

In addition to the OECD survey, another recent survey by NetValue - a French-based Internet measurement company - reveals a similar, consistent result. It shows that 57.3% of Korean Internet home users enjoy broadband connections, whereas in the second country (US) in the table (Figure 1), only 11.1% Internet users are connected by broadband access (NetValue, 2001). It has been widely reported that South Korea is already the most wired nation in Asia, and by some measures (such as online stock trading and broadband access) it is a world leader (Financial Times, 2000; Business Week, 2000; Time, 2000).



\* 3 month average: Dec/Jan/Feb

**Figure 1:** Internet Households connecting via broadband

In Korea, broadband high-speed Internet connections are available at the rate of less than \$25 per month, even for 24 hours per day connection. The number of Internet users has increased remarkably over the last two years. According to the Korea Network Information Center (KRNIC) - an independent institute for domain administration and Internet statistics - it is estimated that 16.4 million Koreans use the Internet, which is 38.5% of the population (KRNIC, 2000). This number is based on those who use the Internet more than once a month. As there is no agreement yet on how to define the Internet user, it is difficult to measure. However, even when the most conservative method (over the age of 16 and more than once a week) is adopted, a third of the population is counted as the Internet users (Table 1).

The increase in Internet users, as shown in Table 1, is remarkable. However, given the general increase worldwide, it does not show the characteristics of the Korean phenomenon. The NetValue's panel-based comparative study shows the most distinctive characteristics of the Internet use in Korea (NetValue, 2000). The

broadband connection is altering Korean’s surfing behaviour and giving them a much richer online experience.

Time Measure	Internet Usage				Number of Users (10,000)			
	1999. 10	2000. 3	2000. 8	Increase from March 2000	1999. 10	2000. 3	2000. 8	Increase from March 2000
A	22.4%	33.0%	38.5%	16.7%	943	1,393	1,640	247
B	18.6%	30.3%	34.6%	14.2%	786	1,276	1,474	198
C	21.7%	32.2%	35.4%	9.9%	786	1,168	1,299	131
D	18.4%	29.8%	32.1%	7.7%	665	1,080	1,178	98

Measure A: Internet user over the age of 7, using more than once a month  
 Measure B: Internet user over the age of 7, using more than once a week  
 Measure C: Internet user over the age of 16, using more than once a month  
 Measure D: Internet user over the age of 16, using more than once a week

Table 1: The number of Internet users (KRNIC)

Koreans (along with Hong Kong) surf on the Web on average 12 days out of the month, with Singapore and the US 11 days. This is longer than France and the UK where the average user in both countries spends 9 days. In terms of the hours spent surfing per user per month, Koreans take the lead with 15 hours (Figure 2). This is longer than Americans (11 hours) and double longer than British and French (6 hours each).

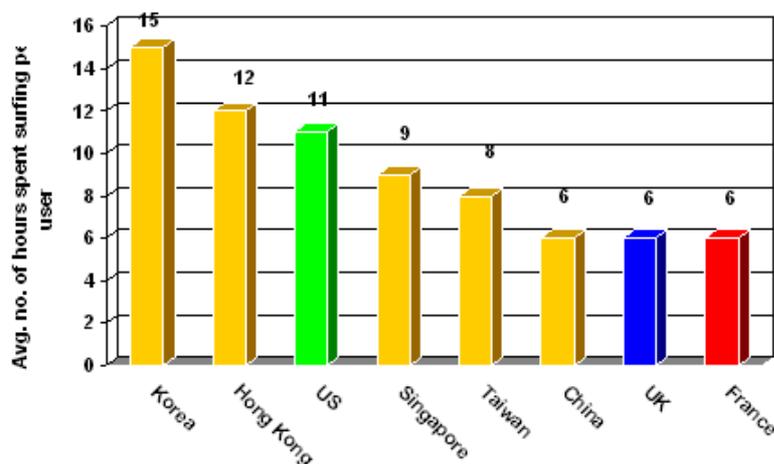
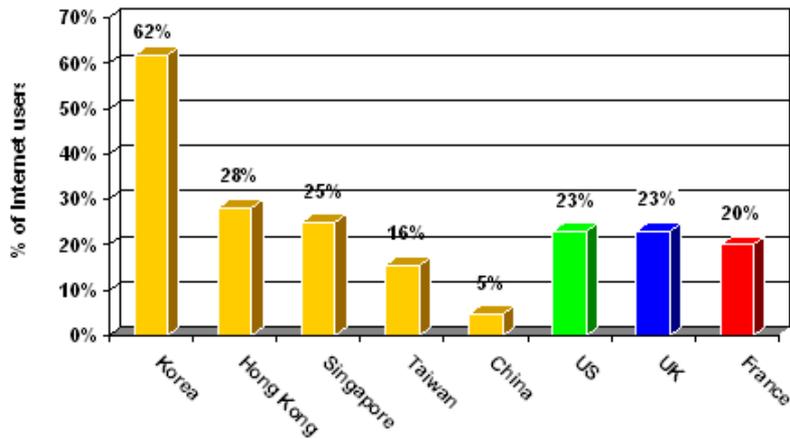


Figure 2: The number of hours surfing (September 2000, from NetValue)

The most astonishing aspect of Internet use in Korea is audio and video usage. Koreans are over three times more engaging in audio and video usage than Americans (Figure 3). The high broadband penetration in Korea accounts for this high audio and video usage.



*Figure 3: Audio and video usage (September 2000, from NetValue)*

More astonishing still is how Koreans have embraced the Internet as a tool for living. For example, online stock trading takes a remarkable portion of the total stock transaction. In June 2000, online trading accounted for 69% of the total stock trading (NCA and MIC, 2000, p. 43). The number of customer accounts for online stock trading takes 24.6% of the total number of accounts for stock trading in November 1999 and 37% in June 2000.

The interviewed all agreed that the rapid growth of Internet population and their changing behavior are attributed to the high penetration of broadband access at an exponential rate within a short period of time. Figure 4 shows the increase of broadband Internet connections by each technology. At the end of 2000, there were more than 4 million broadband subscribers while there were 2 million in August 2000 and 0.87 million in April 2000. Broadband Internet connections mainly consist of ADSL, Cable TV, and LAN Internet. LAN Internet is a unique service in Korea which provides the broadband connections for apartment blocks. Broadband access is perceived as one of life`s necessities among the Korean population.

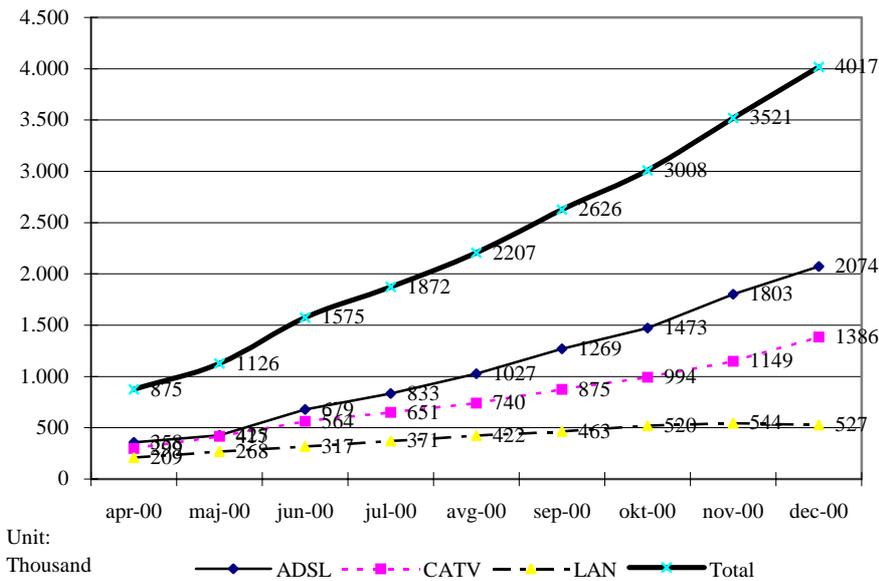


Figure 4: The increase of broadband subscribers by technology (Ministry of Information Communication)

### 3. Contributing Factors

In this section, we examine factors contributing to the rapid penetration of broadband connections in Korea. We trace them from three different angles: government-driven, private sector-driven factors and social background (see Figure 5).

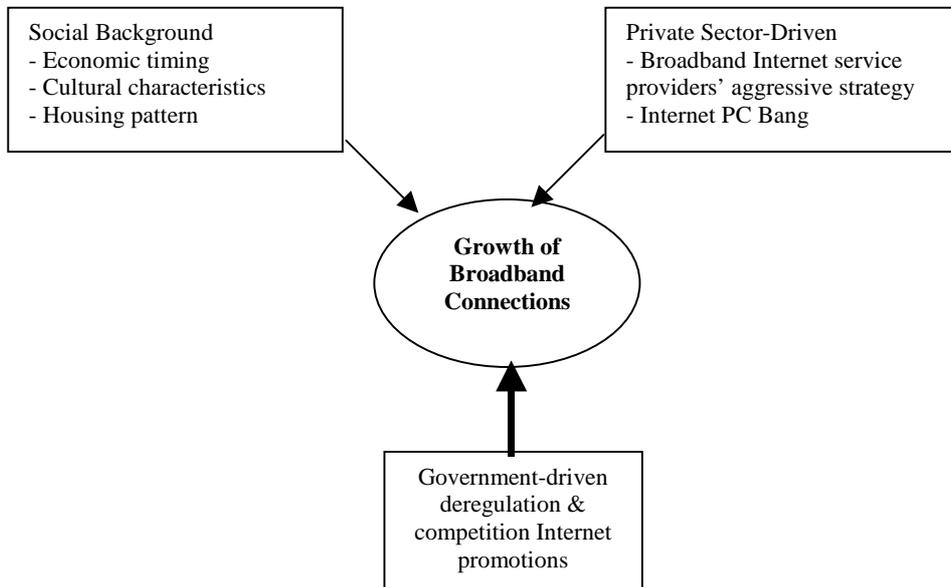
#### 3.1. Government-Driven Factors

##### Deregulation and competition

One of the driving forces is the government's consistent telecommunication policy for competition, based on deregulation and market principle. South Korea is considered as having one of the most liberalized telecommunication sectors in Asia. It also offers an example of a steadily privatised, liberalised and up-to-date market (Singh, 2000). While this liberalisation traces back to the early 1980s, here we only focus on Internet-related areas.

Since the mid 1990s, the Ministry of Information and Communications (MIC) has pushed a strong policy for high-speed telecommunication infrastructure as a foundation to build the knowledge-based society. Through revisions of the Telecommunication Business Act, the government has introduced competition in the local and long distance call sectors and, thereby, promoted high-speed Internet

services. In this process, for instance, the MIC granted Hanaro Telecom Inc. a license for a local call carrier to compete against Korea Telecom, the equivalent of British Telecom (see Section 3.2 for details).



*Figure 5: Contributing factors to the Internet development in Korea*

As for Internet services, there has been virtually no entry regulation, whereas the government has kept the entry regulation for voice telephone services. Anybody who wants to do Internet business through high speed Internet is able to start with simple procedures of registration. This open policy has led to severe competition among broadband network providers of different technologies such as ADSL, Cable modem and LAN Internet, and brought low tariff for high speed Internet access. Over 2 Mbps Internet access is currently offered at an average flat fee of \$25 per month, even if used 24 hours a day. As a result, the number of broadband Internet subscribers has increased exponentially in just less than a year (as shown in Figure 4) and reached over 4 million houses by the end of 2000. The government also ignited service competition by monitoring and announcing the services (e.g., actual connection speed, days taking for installation, etc.) provided by the companies. On the other hand, this deregulated environment has produced too many service providers for the market size. Currently the restructuring of the industry is underway. It is expected that only a couple of companies will survive.

In brief, the government policy has been successful in creating a competitive environment for Internet and led to low fee for broadband Internet access and enhanced service quality by way of service monitoring.

### Internet promotion

The Korean government has also deployed a variety of promotion policies to boost Internet use among its population. They include IT literacy and particularly Internet literacy programmes targeted at excluded social sectors such as farmers, low-income families, the disabled and SMEs. Among them, we present here one of the most peculiar and successful promotion programmes.

While setting up programmes for computer and Internet literacy, MIC set “housewives” as its main target. In 1999, Government subsidies were granted to private IT/Internet training institutes for training housewives. Thereby housewives were able to sit in Internet courses at an affordable price. The programme was a great success and formed an Internet boom among housewives. Many portal sites targeting female users were created and some of them boast of over million subscribers. It was so successful that MIC increased its target number from one million to two million by 2003 and increased the number of training institutes from 769 to 1057 (KRNIC, 2000). The success of this policy and the resulting Internet boom among housewives in Korea are demonstrated by comparing profiles of heavy and light users by occupation among some Asian countries. As seen in Table 2, the ratios of housewife heavy and light users are remarkably high compared with those in other four countries.

	Hong Kong		Taiwan		Singapore		Korea		China	
	Heavy users	Light users								
<b>occupation</b>										
student	30%	6%	31%	13%	25%	7%	51%	13%	14%	7%
<b>housewife</b>	5%	<b>23%</b>	4%	<b>19%</b>	4%	<b>23%</b>	11%	<b>41%</b>	0%	<b>1%</b>
other	65%	72%	64%	66%	69%	71%	37%	44%	85%	91%

\* Base: individuals aged 15+ living in a household connected to the Internet

**Table 2: Heavy and light users by occupation (NetValue)**

This programme for “housewives” is considered a success for the reason that a housewife has actual purchasing power in running her house. Although the access fee for Internet is as low as about \$25, it still requires decision making by a householder, and a computer with a reasonable capacity for such high speed Internet access costs a substantial amount of money. Therefore, policy makers thought that without housewives’ commitment to the Internet, its diffusion among households could be retarded. Most importantly, the programme spotted the shared feeling among housewives of ‘being left behind’ or ‘being ignored by their own children’, particularly in today’s technological trend, and it stimulated housewives’ hidden demand for the Internet. This demand is conspicuous in education in which Koreans are famous for their emphasis and enthusiasm. They want to contribute to their children’s education in any way possible or at least want to understand what

their children are doing. A typical television commercial depicts mothers who are solemnly responding to their kids' shout for high speed Internet access.

In addition, the government has introduced the Cyber Building Certificate system since 1999, under which the authority concerned issued a certificate to a building with high-speed telecommunications capacity. Not only office buildings but also apartment buildings are being built with high-speed communication facilities. This system has worked in the Korean context as seen in 3.3 Social background.

### **3.2. Private Sector-Driven Factors**

In addition to the government initiatives for the Internet use, private sectors played an important role. Here we present two factors which we believe are most directly related to the Internet development for the past two years.

#### **Broadband Internet Service Provision**

As already mentioned, the Broadband Internet Service Provision (B-ISP) business has rapidly grown in Korea since 1999. With more than a quarter of the Korean households subscribing to B-ISP, it has become a significant sector of the Korean telecommunications industry covering both business and residential segments. Korea is also unique as the fastest adopter of broadband Internet in the world. In the year 2000 alone, the number of broadband subscribers has grown from less than 500,000 to around 4 million. Here we present how this happened from the perspective of one of the service providers, Hanaro Telecom Inc.

The company got a license for the second local call carrier in June 1997. Although it was licensed for a local call carrier, the company found it extremely difficult to compete against Korea Telecom in this sector (due to KT's high quality service, low price, the problem of number transferability, etc.) and decided to focus on high-speed Internet access. High-speed Internet commercial service using ADSL technology was launched at the monthly rate of about \$40 in April 1999. Several months later, the rate was reduced down to about \$25 to preempt the market share before KT started the service. At that time, KT responded to Hanaro's ADSL launch with ISDN and planned to launch its own ADSL service later because of high initial investment and estimated low demand. Immediately after Hanaro's launch proved to be a success creating high demand, KT strengthened its ADSL service and became the first market leader one year later in July 2000, exploiting its strong position in the telecommunication industry.

There may be some disagreements depending on the viewpoint. However, Hanaro's aggressive strategy created the market for high-speed Internet access service and contributed to the fast Internet development in Korea.

#### **PC-Bang**

What cannot be missed out in contributing factors to the Internet boom in Korea is Internet PC Bang (meaning 'room' in Korean), similar to Internet cafés in other countries. Their increase in Korea is phenomenal. In December 1998, there were about 2,500 PC Bangs. Nowadays (early 2001) there are at least 20,000 PC Bangs

mushrooming at every corner of the country. They are equipped with high-speed leased lines and multimedia computers, and offer high-speed access to the Web at less than one dollar per hour.

At first, online games brought young generations to Internet PC Bangs to enjoy the games at high speed and low price. Now it has become a place for Internet use among the population across age, region and income to send e-mails, chat, trade stocks on-line, search data, do homework and so on at any time of the day and night.

As high-speed Internet access has become a norm among ordinary households, Internet PC Bangs are losing the attractions (low cost and high speed) that they have had against dial-up access at home and are facing challenges for survival. However, Internet PC Bangs played an important role in starting the national booming of the Internet. Most importantly, most Korean users were first exposed to high-speed access to the Web in PC Bangs. They became so accustomed to using high-speed services that they were not able to return to dial-up methods. This is an important factor that has made the high-speed Internet connection like ADSL a norm among ordinary Korean people, neither a luxury nor an accessory.

### **3.3. Social Background**

#### **Economic timing**

Good timing often plays a role in life or in business, and timing was critical for this Internet phenomenon in Korea. At the end of 1997, the financial crisis hit the Korean economy. In the following years, Koreans suffered unprecedented rates of unemployment and bankruptcies in the recent history of Korean economy that has made a rapid development since the 1970s, though with some fluctuations. This crisis forced the Korean economy to restructure itself and to find a new way for another take-off.

Koreans found two keywords: the Internet and ventures. Since 1998, some 7,700 new companies have started up. The government has encouraged Internet ventures by offering tax benefits and low rate loans. As seen above, telecommunications infrastructure was already laid down. In this way, the mushrooming of new Internet startups has coincided with the surge in Internet development and usage. Interestingly, “the transformation would have been much slower but for the 1998 financial trauma. That event opened the way for radical changes that would had been unthinkable three years ago” (Business Week, 2000, p. 31).

#### **Housing patterns**

Korea’s housing pattern contributed to the deployment of broadband connections. According to the latest population and housing census by the National Statistics Office, apartments account for 49% of the total number of housing. The concentration of high density dwellings in urban areas has made the rolling out of broadband services relatively easy. This is particularly important given that ADSL works only within 3.6 km. Therefore, ‘the last one mile’ which is a chronic and

nagging problem in Internet diffusion among households in other countries, has not been a serious problem in urban areas in Korea. Internet-ready phone lines are standard equipment in new Korean apartment blocks.

#### Cultural characteristics

Part of the rapid Internet development in Korea can be attributed to characteristics of Korean culture. Koreans are susceptible to a social pressure to keep up with their "neighbours". This tendency in Korea's homogeneous society has made another contribution to the swift spread of the Internet based on broadband technology. The kids in the TV commercial mentioned above are shouting, 'Mum, our house, too!?!'. The strong emphasis on education and academic performance, on which Koreans are desperately keen, has also prompted parents to turn to the Internet for educational goods and services.

#### **4. Local Loop Unbundling: A Faltering Project in UK**

As seen by the OECD survey and in Figure 1, broadband internet connections in UK are lagging far behind among the other countries surveyed. This is an embarrassment to the UK government which promised to make UK the best place for broadband in the G7 by 2005. The government sees broadband access for all as the key to its e-commerce strategy (The Economist, 2001).

The UK's low rate of broadband penetration can be attributed to the faltering project of local loop unbundling. It is intended to allow other operators to put their equipment in BT's exchanges and thereby to roll out broadband services using BT's network. The local loop has long been regarded as a natural monopoly for the incumbent telecommunication company like BT. As BT controls the majority of telephone lines into homes and ADSL requires a modem at each end of this wire, local loop unbundling is considered essential for the introduction of competitive high-speed online services such as ADSL. Therefore, BT has been told by the government to open up its exchanges to other operators, so they can install the necessary equipment there to provide ADSL services. In contrast, as Hanaro in Korea was licenced to operate as a local carrier, it was allowed to use the network of the incumbent telecommunication company, Korea Telecom.

However, the unbundling process is being severely delayed. Many companies (28 of the original 35 applicants) pulled out of the bidding process, citing costs and delays (Wakefield, 2001). BT has been accused of delaying the process and only offering access to unattractive exchanges. BT has been in a dominating position in the telecommunications market in the UK and is trying to dominate the broadband market as well. As it is presently generating a considerable amount of revenues from ISDN and dial-up connections, it is unlikely that it will quicken the introduction of high-speed connection services. This is similar the way KT (Korea Telecom) reacted when Hanaro launched ADSL services. KT initially predicted a low demand for the service. However, the success of Hanaro's ADSL service forced KT to start the business.

Oftel, the UK telecommunications regulator, is also accused of its ineffectiveness in using its power to prevent BT from acting in an uncompetitive manner. Some analysts say that BT's reaction is natural as a telecommunication company who is bound not to want to open its exchange to other operators. On the other hand, Oftel is responsible to set up the foundation for competition by facilitating and implementing the process. Others argue that unbundling as a way of introducing competition to the broadband market is fundamentally flawed as it relies on an unwilling incumbent, BT in UK, to get the work done. For this reason, they are not optimistic that Oftel will be successful in ending BT's monopoly of the local loop. They further argue that the government needs to intervene in an active manner.

In summary, the UK broadband market remains unopened. It is characterised by the inability of operators to compete. The price is most expensive and this is a big barrier to users getting broadband in UK. Local loop unbundling was introduced as a way of bringing in competition into the Internet market. However, the withdrawals of the applicants put in doubt BT's original plan to open up 600 of its 6,000 exchanges by the summer of 2001, which will further delay the deployment of broadband Internet connections in Britain.

## **5. Concluding Remarks**

We have examined the contributing factors to the rapid development of broadband Internet connections in Korea. We have also described the local loop unbundling in UK as a way to introducing competition into the Internet market. While the Korean broadband Internet market is characterised by high competition, the British market is lacking competition. Analysing the reasons of the differences in broadband Internet connections across countries, the OECD researcher who conducted the survey says that the exponential deployment in Korea resulted from the fierce competition between providers of cable internet and ADSL. On the other hand, BT is retarding its broadband services and there is not a lot of competition to drive BT to offer services earlier (Wakefield, 2001). This leads to a need to further investigate the government role in the Internet development as a regulator and facilitator of competition. The policies and leadership of the sector ministry and the national regulator played a key role in Argentina's rapid Internet expansion (Petrazzini and Guerrero, 2000).

The Korean case also shows that if the demand for high bandwidth Internet access can be matched with cultural expectations, such as the Korean emphasis on education and knowledge, then diffusion can be fast. Garfield and Watson (1998) suggest that the alignment of technology policy with national culture can play a role in the shaping of National Information Infrastructure (NII). When the MIC set up Internet promotion policies, they shrewdly spotted the cultural demand on the Internet, particularly among housewives. This case of fast Internet diffusion and usage in Korea shows the importance of culture in technology diffusion.

### Challenges ahead

Korean policy makers and industry leaders are now facing a big challenge shared by those of other countries. Korea has the infrastructure from which to take off and the population who are willing and partly able to use the Internet. However, this high usage of the Internet needs to be converted to electronic commerce. It is particularly difficult in Korea as demonstrated by a survey result (NetValue, 2001). Korean users lag behind American and European users when it comes to shopping online. While 73.1% of US users and 74.3% of UK users visit electronic commerce sites, only 48.6% of Korean users do despite their high-speed connections. Most of the Internet-related and dotcom companies in Korea are suffering from weak income sources.

As regards income sources, some of the key challenges they need to address in the current and future include the development of quality contents on the one hand and of the way to charge them. Like users in other countries, Koreans have been accustomed to using 'free' contents and 'free' services available on the Web. Therefore, it will not be easy to change consumers' mind set towards the contents on the Internet.

The digital divide is also perceived as a major problem. Despite the widespread of the Internet, particularly broadband access, the Internet boom remains yet an urban and more or less middle class phenomenon. For example, the provision of high-speed Internet access concentrates on metropolitan areas. Large part of the country and its population is yet excluded from the benefits that the Internet may give. Unless well managed and planned, broadband Internet connections can be another source of digital divide.

There are two keys to the ability of any country to exploit the potential of information and communication technologies (Mansell and Wehn, 1998 from Van Audenhove et al., 1999): the availability of a network infrastructure and the capacity to create and administer an enabling environment. The former is essential for the provision of applications. The latter includes the capacity to develop the applications that exploit the infrastructure in ways that are consistent with need in the local environment. Korea now has an Internet infrastructure whereas the capacity to exploit the infrastructure has to come yet. This will be a main task for Korean policy makers and industry leaders in the current and future.

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