THE DIGITAL DIVIDE:
AN ANALYSIS OF KOREA’S INTERNET DIFFUSION

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THE DIGITAL DIVIDE:
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ABSTRACT

Technology diffusion creates gaps among categories of adopters.¹ As Networked Information Computer Technology (NICT) diffuses in society, this gap is called the digital divide. Using the case of Korea, this study explores whether there is such a divide in Korea with respect to Internet usage, as Rogers’ theory would suggest. This study also questions how the situation is changing. Analysis of data shows that differences in Internet penetration exist in Korea, based on age, education, income level, region, and gender. Research also shows that not in all cases is the divide increasing; it is decreasing among groups within educational settings, and between different gender groups. These findings suggest that specific government policies, which were adopted to deal with the digital divide in Korea, are in fact resulting in a reduction in some gaps in access. This is especially the case in schools and rural areas of the country.

¹ Rogers (1995)
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Chapter I
Introduction

The term ‘digital divide’ gained mass media attention when it was used as part of the title of the second National Telecommunications and Information Administration (NTIA) survey (United States Department of Commerce, 1998). Simply put, the digital divide refers to “the perceived gap between those who have access to the latest information technologies and those who do not” (Compaine, 2001). The recent discussion produced debate over whether digital divides really exist or not. This question subsequently yielded debate over what should be measured in determining a digital divide, and whether or not there is a need for collective action to close it.

This study looks at parameters of the digital divide in Korea, and finds that a multi-dimension digital divide has opened up, characterized by differences in Internet penetration based on age, education, income level, region, and gender. However, concerted government policy to address this issue seems to be having the effect of mitigating some of these divides, offering hope that, in the long run, Korean society will approach the idea of wide-spread and equal access to advanced networking technology regardless of one’s status as a Korean.

This study demonstrates that one needs to understand the digital divide as a multidimensional phenomenon. A number of studies have come to this conclusion. For example, Norris (2001) identifies three aspects for consideration in Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide. According to Norris, “the global divide refers to the divergence of Internet access between industrialized and developing societies. The social divide concerns the gap between information rich and poor in each nation.
The democratic divide signifies the difference between those who do, and do not, use the panoply of digital resources to engage, mobilize, and participate in public life” (p. 4).

Do these divides exist in reality? If so, how do they occur and why do they matter? And what should we do about them? This study starts with these questions.

Why and how the digital divide occurs can be understood in terms of the theory of diffusion of innovations, as advanced by Rogers (1995). Citing the examples of different innovation’s diffusion, Rogers suggests that most innovations have an S-shaped rate of adoption. Adopter categories include innovators, early adopters, early majority, late majority, and laggards. The digital divide opens up, so Roger’s theory suggests, because different kinds of people have different propensities to adopt an innovation.

Does this gap matter? If so, why does it matter? Theories and opinions have been suggested in favor of the need to take actions to close the digital divide. A school of scholars argue that communication technology has a significant impact on people’s economic productivity. Loader (1998) discusses how communication technologies make it easier for firms to relocate and how information technologies create flexible jobs. However, not all scholars share this view. Others insist that studies fail to find a direct link between information technology and productivity, leading to the identification of a “productivity paradox” (Brynjolfsson and Yang, 1996). Strassman (1997) suggests that there is no direct relation between spending on computers, profits or productivity. Regarding the policy implication of new technology diffusion, Compaine (1998) argues that even though technology – adoption divide may exist, there is no need to act precipitously, because society needs time to see how some technologies move towards their natural markets and costs.

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1 See Appendix 1.
Gaps in rates of adoption of communication technologies are not new. A study by NTIA in 1999 entitled “Falling Through the Net: Defining the Digital Divide” reveals that the disparities or the gaps exist - certain groups of people are getting connected more quickly while others are lagging behind.

This concern is not only an issue for the U.S. There are inter-national and intra-national digital divides as well. Due to the lack of sophisticated communication infrastructure and economic support, developing countries have their own problems when adopting new technologies. Arunachalam (1999) argues that in developing countries, without adequate policy interventions, information technology not only widens the digital divide but also deepens the “racial ravine.” Regarding this issue, the United Nations states that,

We are profoundly concerned at the deepening maldistribution of access, resources and opportunities in the information and communication field. The information technology gap and related inequities between industrialized and developing nations are widening: a new type of poverty - information poverty - looms. Most developing countries, especially the Least Developed Countries (LDCs), are not sharing in the communication revolution, since they lack:

- affordable access to core information resources, cutting edge technology and to sophisticated telecommunication systems and infrastructure;
- the capacity to build, operate, manage, and service the technologies involved;
- policies that promote equitable public participation in the information society as both producers and consumers of information and knowledge; and
- a work force trained to develop, maintain and provide the value-added products and services required by the information economy.

We therefore commit the organization of the United Nations to assist developing countries in redressing the present alarming trends.

What about the situation particularly in Asian countries? This study examines the current situation of Asian countries in Chapter II, and then puts its focus onto one country, Korea. Korea is an interesting country at which to look at the issue of digital divide; despite rapid economic growth since 1962, Korea has often been cited as an example of a country that has many social and economic divides. Among those domestic divides, the unbalanced development between rural and urban areas has been particularly significant. Korea is an interesting country in which to look at the diffusion of the Internet; in terms of broadband use, Korea had the highest penetration rate among Asian countries by the end of 2001 (Barlett, 2002).²

The innovative technology focused in this thesis is the Internet; in Korea, this started to diffuse around 1995. Based on the literature review on the theories and current discussions on the digital divide, this study examines the following research questions:

Rogers (1994) suggested that when new technology diffuses, innovators and early adopters are more likely to be cosmopolitan, young, educated, and well off. First, in Korea, is there a divide with respect to Internet access, as suggested by Roger’s work? Second, if there is an Internet-access divide among regions in Korea, what might be its significance? Third, if a divide exists, how is it changing? Is it increasing, decreasing, or what? Fourth, does Korea have a digital divide with respect to gender, and if so, how might this gap be changing? In analyzing the data to answer these questions, the researcher hypothesizes that the following dynamics occur:

² Bartlett further reports that Korea also has the highest number of broadband users as a percentage of all Internet users. He reports that, “At present, 60 percent of Korean Internet users have broadband access, and this is forecast to reach over 90 percent by 2004. By that time, 41.8 percent of Japanese Internet users will have broadband access.”
The digital divide exists in Korea, at the individual level, in the following manners:

Hypothesis 1.1: Younger people have greater Internet connectivity than older people.

Hypothesis 1.2: Better educated people have greater Internet connectivity than lesser educated people.

Hypothesis 1.3: Higher income persons have greater Internet connectivity than lower income persons.

The digital divide exists in Korea, at the regional level, in the following manners:

Hypothesis 2.1: Urban regions have greater Internet connectivity than rural regions.

Hypothesis 2.2: Urban regions have greater economic growth as a result of the greater Internet connectivity.

Hypothesis 3: The digital divide, as envisioned in hypotheses 1 and 2, increases over time.

Hypothesis 4.1: Men have greater access to the Internet than do women.

Hypothesis 4.2: The digital divide between men and women increases in the short term.

These hypotheses will be tested by addressing the predicted gaps over time.
Many reports show how the Internet usage and number of Internet users has changed in Korea since 1990. However, little academic effort has been made to show what impact technology gap could bring about into Korean society. This thesis attempts to show what implications a digital technology gap has for Korean society.

Chapter II, the literature review, consists of three sections. In the first section, the researcher will introduce commonly used definitions of the digital divide and explain why the divide occurs. In the second section, the researcher will explore the significance of the problem by addressing the theories underlying the discussion of digital divide. In the third section, the researcher will discuss the current issues on the digital divide and analyze different views of dealing with the problem.

Chapter III explains the methodology. The researcher will perform an interpretive, inferential analysis of the quantitative data. Data used in this analysis mainly come from three sources – Korea Internet White Paper (Annual Report) published by National Computerization Agency, A survey on the number of Internet users and Internet Behavior published by Korea Network Information Center, and Statistics on Economic Indicators published by National Statistical Office. Chapter IV will present conclusions of the analytic findings.
Chapter II

Literature Review

1. Understanding the digital divide

As mentioned above, Compaine (1998) defined digital divide as “the perceived gap between those who have access to the latest information technologies and those who do not.” Many scholars of various fields have explained the term in slightly different ways and it will be helpful to address these ways to understand the concept - digital divide - better. The most commonly used definitions and explanations include,

- the gap between those who can effectively use new information and communication tools, such as the Internet, and those who cannot
- the concept that the society should not be separated into “information haves” and “information have-nots”
- a description of the existing gaps in access to information services and technologies
- Common to all of these definitions is the notion of the gap that exists between the information haves and have-nots. Whether or not the gap is widening or narrowing, there is an existing gap among groups of a society in terms of access to information or information technologies.

The term “information gap” is defined as “the access individuals have to information or the ability of individuals to have the tools- intellectual or at tangible – to manipulate, analyze, and synthesize information.”

Does such a gap really exist? Norris points out that technological opportunities are often unevenly distributed, even in the most developed countries. The NTIA’s survey from
1998-2001 shows that there is a gap and it is changing. If there is a gap, why does it occur and how can it be measured? If there is a gap, among what groups is the gap broadening or narrowing the most? Will the Internet reinforce the divide? What other issues are involved in discussing digital divide? How much does it matter? And, ultimately, what will be the impact on a society? These are the questions that will be answered in the following section.

**Why does it occur?**

Rogers defines technology as an instrumental action that reduces uncertainty. When a technology is diffused, the diffusion usually brings uncertainties. Using the word “technology” and “innovation” as synonyms, Rogers (1994), in *Diffusion of Innovations*, defines uncertainty as “the degree to which a number of alternatives are perceived with respect to the occurrence of an event and the relative probability of the alternatives.” Uncertainty implies a lack of predictability, of structure, of information. Rogers also points out that interestingly, there is a paradoxical relationship between innovativeness and the need for benefits of an innovation; the individuals who most need the benefits of an innovation are generally the last to adopt an innovation. The result is that a wider socioeconomic gap between the higher and lower socioeconomic individuals are created in a social system. Scholars identify this Innovative-need paradox as one of the reasons for the digital divide.

Another helpful hypothesis in understanding digital divide is the “knowledge gap hypothesis”. Tichenor (1970), in *Mass Media Flow and Differential Growth in Knowledge*, described a knowledge-gap hypothesis that presupposes that as the infusion of mass media information into a social system increases, segments of the population with higher socioeconomic status tend to acquire this information at a faster rate than the lower statues
segments, so that the gap in knowledge between these segments tends to increase rather than
decrease. This hypothesis therefore explains the failure of mass publicity to inform the public at
large. Tichenor tests the “knowledge-gap hypothesis”. Most of the data Tichenor collected are
consistent with the hypothesis. Correlations are shown between education and publicity level.
Tichenor concludes by addressing the influence of “mass” impact of the media: reinforcing or
increasing existing inequities.

What causes the knowledge gap? Severin and Tankard (1992), in Communication
Theories: Origins, Methods, and Uses in the Mass Media, found five major reasons for a
knowledge gap.

1. Communication Skills - People of higher socioeconomic status (SES) generally have
better communication skills which are used in "basic information-processing tasks such
as reading, comprehending, and remembering".

2. Previously Acquired Knowledge - There is a difference in the amount of stored
information between people of high and low SES which affects their abilities to acquire
and retain new information.

3. Relevant Social Contact - People of higher SES might be more likely to be in contact
with people who know about, are interested in and discuss public affairs and/or science
news.

4. Efficacy - People of lower SES might have lower self-efficacy, meaning that they are
less able and have a worse opinion of their ability to gain new knowledge.

5. Nature of Mass Media - Public affairs and science news often appears in the print
media, which "are oriented towards the interests and tastes of high status persons."
Rubinyi (1989) tests how community interest groups and non-profits use and take advantage of the new technology when they have limited resources. Research shows that organizations that have relatively more resources are more successful than the resource-poor organizations. Interestingly, the research shows that computer communication networking works well when there is a well-defined need for it and a close relationship between network goals and organizational goals.

These hypotheses sound plausible but have their weakness as well. Some of them lack empirical evidence, as Rubinyi admits.

Rogers stated that technology diffusion occurs within a given social system. At this point, questions arise: Is it the technology that influences the society or is it the existing social system that causes the uneven diffusion of technology? Or, is there something else going on? A number of theories will explain how new communication technologies – for this study, especially the Internet - diffuse and influence the society.

2. Theories underlying the Discussion of Digital Divide

It would be helpful to have a comprehensive definition of information at this point; core to the notion of digital divide is the importance of getting the latest information.

What is information? Toffler (1990) defines information as “data that have been fitted into categories and classification schemes or other pattern” (p. 18). Buckland (1991) offers a more practical explanation. Understanding “information as thing,” he states that information comes as:

1. data – records that can be stored on a computer
Since this thesis focuses on the Internet, the researcher will mainly look at the diffusion of the Internet, keeping these definitions in mind. Internet is a revolutionary information and communication technology because on the Internet, people can send data, text, voices and photo all together at once. This new way of transmitting information makes the Internet revolutionary and different from previous technologies.

What social implications does the Internet have? Some theorists have suggested that the Internet creates social capital. Others view the Internet as an electronic public sphere. More scholars emphasize the communication technology’s economic impacts.

**Creation of Social Capital**

Social capital refers to “features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions” (Putnam, 1993. p. 167). Voluntary cooperation is easier in a community that has inherited a substantial stock of social capital, in the form of norms of reciprocity and networks of civic engagement.

DiMaggio et al. (2001) found that the use of the Internet may enhance social capital under some circumstances and that the Internet builds social capital by enhancing the
effectiveness of community-level voluntary associations. They add that Internet use tends to intensify already existing inclinations toward sociability or community involvement, rather than creating them.

An example of Internet usage as an inexpensive and effective means of organizing oppositional social movement is China’s Falun Gong organization, described by Lin (2001). The organization used the Internet to establish a powerful, hierarchical religious movement under the noses of an authoritarian regime.

Goslee’s report (1998) suggests that a number of civic activists believe that modern communications networks are an important tool for fostering civic engagement. Civic engagement, according to Putnam, can facilitate coordination and communication, foster the emergence of leaders who can help generate collective action, and reduce incentives for people to act solely in their own self-interest.

The World Bank states that information technology, by directly lessening the costs associated with imperfect information, has the potential to increase social capital – and in particular bridging social capital which connects actors to resources, relationships and information beyond their immediate environment. The World Bank Group, in its web site titled “Social Capital and Information Technology,” lists the potential development benefits of information technology and social capital in the following four domains: individuals and micro projects, artisan cooperatives, private sector development, civic participation. Information technology’s potential ability to create social capital is important because creation of social capital could bring positive social change, as implied in Putnam’s work.

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Internet as an electronic Public Sphere

The Internet is seen as an electronic public sphere by many scholars. The public sphere is a part of social life where citizens can exchange views on matters of importance to the common good, so that public opinion can be formed (Habermas, 1989). DiMaggio et al argue that it is clear that the Internet significantly lowers entry barriers and other cost factors for participation in the electronic public sphere. Bimber (2000) states that virtual political space has its place as a significant supplement to, if not replacement for, the face-to-face discussion of Habermas’ idealized nineteenth century salon. These lowered barriers, accordingly, open up a space for minorities, information have-nots and other various groups, which brings more participants into the electronic public sphere.

Communication Technology’s Economic impact

More theoretical discussion has been made among scholars of communication studies, business, and information studies. While a school of scholars insists that information and communication technologies do not have direct economic impact, others insist that there is a link between communication technology and economic development.

Strassmann questioned whether computers have the potential ability to create productivity. In The Business Value of Computers (1990), Strassmann argues that computers add value only if surrounded by appropriate policy, strategy, methods for monitoring results, talented and committed people, sound relationships and well-designed information systems. In Expecting Too Much of Knowledge (2000), Strassmann warns that “the euphoric visionaries of the information-based new economy ought to recognize that behind their dreams of economic gains is a downside.” Based on data he collected from a random selection of 114 U.S.
companies, he suggests that knowledge-based firms are inherently riskier than organizations for which financial assets remain the basis of success, and that the so-called “cyber-utopian view” is illusory (p.1) and that there is no direct relationship between the costs of information management and profitability.

The “productivity paradox” is often quoted in favor of this view. Productivity paradox refers to the massive investment in computers with seemingly little payoff. However, Brynjolfsson and other scholars show that in fact there is a link between information technology and productivity. (Brynjolfsson and Hitt, 1994; Greenan and Mairesse 1996) Brynjolfsson and Hitt (1994) show that spending on information systems or particular information technology capital makes a substantial and statistically significant contribution to firm output, based on the firm-based data they collected. They conclude that the "productivity paradox" disappeared by 1991, at least in their sample of firms. These studies, combined with improved aggregate productivity performance, have led some to speculate that productivity is no longer a paradox (Anonymous 1999).

Loader (1998), in Cyberspace Divide, suggests that Information and Communication Technology (ICT) ensures a geographical flexibility to job seekers and makes relocation easier, which ultimately reduces costs and speeds up production. He mentions the advantages of teleworking come from its attractiveness to employers, as an additional mechanism for achieving reduced overheads, flexibility of labor and relocation or downsizing of offices.

3. Issues in discussing the digital divide

There has been constant debate over the following questions: Is there a digital divide? Or, is a digital divide merely a manifestation of other social gaps in different socioeconomic
setting?  If it exists, does it matter?  If so, how much does it matter?  My research suggests that the digital divide matters, and that action to mitigate this divide can produce at least the potential for significant social benefits.  In this literature review, however, both this argument and the counterargument will be presented for a better understanding of the nature of the digital divide.

3.1 Digital divide is a myth

Compaine (1998), in *Information Gaps: Myth or Reality*, suggests that there are all sorts of “gaps” in and among societies and many are related to the state of an economy. He says that the issue is not one of information or knowledge gaps, any more than it is one of the protein gap or transportation gap. He adds, “if there is an issue, it is: what priorities should a society have in making decisions on what are necessities, what are frills, and what falls in a debatable middle ground?” Another question is: what mechanisms can be implemented to address any problems?

In recent article titled *Re-examining the Digital Divide*, Compaine (2001), asks whether there is really an issue here at all and provides a supporting argument for his ideas presented above. He points out that any new and expensive technologies have to start somewhere and almost variably with two groups: those who find it undeniably useful and those who can simply afford it. The early adopters thus pay higher per unit cost. However, once fixed cost of the network has been paid, additional users can be accommodated at little cost, but network externalities actually make their services of greater value to current and new customers. Compaine concludes that the digital divide at its outset is much the same as many gaps that have and continue to persist in a capitalistic society as described above.
Gabel and Kwan (2001) ask if it is reasonable to push the debate over universal access to the Internet beyond basic access in their article Accessibility of Broadband Telecommunications Services by Various Segment of the American Population. They ask if there is a need for an entitlement to high-speed access when the basic access is still dial-up service with a modem. Compaine and Greenstein (2001), commenting on this article, ask, “Is the entitlement to high-speed access different from an analogy of providing basic dial tone to creating subsidies to provide call waiting, call ID, and voice mail on a universal basis as well?”

Compaine (1998) claims that even though there is such a gap between information haves and have-nots, a society does not have to take precipitous action to reduce the problems in the earlier stage of its diffusion because the gap will close as time goes by. He adds that even when a government action is needed, the type of action is not consistent or obvious across technologies.

3.2 Digital divide exists and matters

Digital divides exist globally and within individual countries. The researcher will address the issue of global divide divides and digital divides within countries. The researcher expects the same type of digital divide in the U.S., where the Internet diffused earlier than any other country, will occur in other countries, including Korea. The researcher lists point of comparisons between the U.S. and Korea, which is the focus of this thesis.

3.2.1 Global digital divide

By the late 1990s, the Internet was still very much a communication medium for the industrialized world. Almost 99 percent of all Internet connections were in North America,
Western Europe and Japan, with 1 percent being shared among the 4 billion people who made up the rest of the world’s population (Slevin, 2000). However, the rate of growth of users in other areas is very fast.

As Norris pointed out, there is a digital divide between the industrialized and developing countries. Since new communication technologies require heavy investments, they could widen the socioeconomic gap and the information gap between developed and developing countries.

### 3.2.2 In the U.S.

In the U.S., a group of scholars and non-profit organizations insist that there is a clear, prior need for action to close the digital divide. One Economy, a Washington-based non-profit organization, suggests that the Internet, as a revolutionary communication technology, has a potential to help low-income people raise their standard of living, and that low-income people have the ability to move out of poverty if they have greater access to information.

Many non-profit organizations and policy institutions strongly argue that the digital divide is in fact broadening, based on their own surveys and data collection. The NTIA’s 1999 survey entitled *Falling Through the Net: Defining the Digital Divide* reveals that the disparities or the gaps do, indeed exist - certain groups of people are getting connected more quickly while others are lagging behind. Data shows that:

- “Urban households with incomes of $75,000 and higher are more than twenty times more likely to have access to the Internet than rural households at the lowest income levels, and more than nine times as likely to have a computer at home.”
“Whites are more likely to have access to the Internet from home than Blacks or Hispanics have from any location.”

“Blacks and Hispanic households are approximately one-third as likely to have home Internet access as households of Asian/Pacific Islander descent, and roughly two-fifths as likely as White households.”

“Regardless of income level, Americans living in rural areas are lagging behind in Internet access. Indeed, at the lowest income levels, those in urban areas are more than twice as likely to have Internet access than house earning the same income in rural areas.”

This reports further claims, “the digital divide has widened as the information haves outpaces the have-nots in gaining access to electronic resources,” and provides data:

- “The gaps between White and Hispanic households, and between White and Black households, are now approximately five percentage points larger than they were in 1997.”
- “The digital divides based on education and income level have also increased in the last year alone. Between 1997 and 1998, the divide between those at the highest and lowest education levels increased 25 percent, and the divide between those at the highest and lowest income levels grew 25 percent.”

Benton Foundation performed an extensive research and presented a paper Losing Ground Bit by Bit. In this report, Goslee (1998) notes that there are worrisome trends, that low, poor, rural, communities are already isolated. Most importantly, the paper points out that
the technology gap may also slow efforts by low-income communities to help themselves. Goslee also points out that people with relatively poor access to computers suffer disadvantages that stretch beyond the labor market and suggests that unless there is intervention, “fewer and fewer Americans will be able to fully participate in our nation’s economic, social, civic, and government life.”

A recent report made by Pew Internet and American Life Project shows that the situation is not getting better. Finding of the report, Who’s Not Online: 57% of those without Internet access say they do not plan to log on (2001) include,

- “57% of those without Internet access say they do not plan to log on.”
- “Half the adults in America (those 18 and over) do not have Internet access.”
- “Just 31% of those who live in households earning less than $30,000 have Internet access.”
- “Non-users are less likely to be employed than Internet users: Some 42% of those not online have full-time jobs and 9% have part-time jobs, compared to 66% employed full time and 14% part time for Internet users.”
- “Whites are notably more likely to have Internet access than those in other racial and ethnic groups: Some 50% of whites have access to the Internet, compared to 36% of blacks, and 44% of Hispanics. 68% of whites in households earning less than $30,000 are not online, while 75% of blacks in similar income households are not online, and 74% of Hispanics in similar income households are not online.”
It is worth noting what the factors that caused this situation, at this point. According to this report,

There are other influences at play in the offline population. First, age is a major factor. The older a person is, the more likely it is that she does not have Internet access. Second, non-users have a variety of concerns about the Internet that extend beyond the expense of purchasing a computer and paying for online service. Those concerns center on the online environment. Generally, non-users believe the online world is not very useful or hospitable. They are also concerned about the dangers that lurk on the Web, and about their ability to maintain their privacy online. Third, the type of community where a person lives – rural, urban, or suburban– is a major indicator of whether she has Internet access.

Another report by Pew Internet and American Life Project reveals the digital divide by education levels. In Internet Election News Audience Seeks Convenience, Familiar Names: Youth Vote Influenced By Online Information, it is reported that college educated citizens are more than three times as likely to get election news online than are people with no more than a high school degree. In particular, in 1996, 9% of college graduates got campaign news online, a figure that has risen to 33% today. The comparable increase among those with a high school degree or less is far smaller in absolute terms, from 2% in 1996 to 8% today. Similarly, members of higher-income households have dramatically increased their use of the web for campaign news, up from 6% to 30% in households earning over $50,000 per year. The comparable rise among those earning under $30,000 is from only 2% in 1996 to 10% today.
In the U.S., however, signs of narrowing the divide appeared in 2000. NTIA report of 2000 shows that the overall level of U.S. digital inclusion is rapidly increasing with following data:

- “The share of households with Internet access soared by 58%, rising from 26.2% in December 1998 to 41.5% in August 2000.”
- “More than half of all households (51.0%) have computers, up from 42.1% in December 1998.”
- “The share of individuals using the Internet rose by a third, from 32.7% in December 1998 to 44.4% in August 2000. If growth continues at that rate, more than half of all Americans will be using the Internet by the middle of 2001.”

3.2.3 In Asia

In Asia, countries are facing their own problems as they get more countrywide access of the Internet lately. In Cyberpath to Development in Asia (2002), the authors explain how the Internet is diffusing in most Asian countries. The Internet is rapidly diffusing in Asia through public access such as computer centers and cybercafes. Rogers explains that the Internet has diffused so rapidly because it is an innovation that is faster, cheaper, and quicker. The diffusion of the Internet in Asia helps promote economic and political ideologies in capitalism, privatization, and consumerism (p. xiv). Raol and Panol (1999) insist that there are various factors that have promoted the growth of the Internet. These factors include knowledge of the English language, high level of diffusion of home computers, higher standards of living, and a good telecommunications infrastructure. Rao (2002) suggests that the Internet is providing
many Asian countries an opportunity to establish more equal links of communication with the rest of the world.

There have been innovative ways of closing this gap through public access of the Internet and other information technologies, such as Malaysia and India’s use of information kiosks. Bohlin et al. (1999) suggest that in Asia, generally speaking, there are indications that the growth of the Internet has just entered the middle of the S-shaped diffusion curve; this development will contribute toward the sustainable development of Asia.

Today, however, the diffusion of the Internet in Asia and other developing countries is creating more questions and drawbacks than it is answering. Arunachalam (1999) argues that new technologies are too sophisticated and costly for the third world, particularly for the least developed countries, to use in the foreseeable future. He states that “most developing countries do not yet have the necessary infrastructure” (p. 471). Abbott (2001) argues that in certain Asian countries, former colonial telecommunication infrastructure functions as another barrier for the Internet diffusion (p. 108). Bhalla (1984) suggests that for developing countries, it is necessary to examine the implications of these new developments - their potentials as well as limitations - for their socio-economic structures. He further states that these countries may actually have a potential for software development even though they have no comparative advantage in the development of hardware (p. 324).

James (2002) suggests that if the digital divide is to be diminished, a wide range of complementary low-cost versions of information technologies will be needed.
3.2.4. In Korea

In order to address this question of digital divide, the researcher will look into one specific country: Korea. In examining Korea’s digital divide, the researcher hypothesizes that the U.S. is a country where the new communication and information technology’s diffusion occurred earlier than in any other countries, and expects that same patterns of digital divides will occur in other countries as well, including Korea. Before the analysis, a few points of comparisons between Korea and the U.S. are suggested to draw parallels between the two countries.

Recent Economic Affairs

The economy of Korea before 1997, the year when a major economic crisis hit the economy, is characterized by a government-led macroeconomic planning policy. After 1963, Korea experienced rapid economic growth, and by 1996 had become the world’s 11th largest economy. In 1997, however, several major business conglomerates collapsed, the won depreciated substantially against the US dollar and foreign-exchange reserves were almost depleted, causing an economic crisis necessitating extensive IMF assistance for Korea. The Korean government formulated a three-year program, which stipulated the implementation of stringent economic and financial liberalization measures. By the end of 1999 the economy appeared to have made a remarkable recovery, as indicated by a stabilization of the currency, a marked reduction in unemployment and growth in all sectors. In December 2000, the IMF ended its rescue program. However, economic difficulties, mainly resulting from incomplete reform of the banking sector and the business conglomerates, persisted.
The US economy grew strongly throughout the 1990s, despite the persistence of many of the factors that had inhibited growth in the previous decade. The Federal Government’s level of foreign debt continued to increase until 1998, its reduction being a priority of the second Clinton administration. The deficits in trade and on the current account of the balance of payments increased throughout the decade.

Telecommunications Policies

The Korean government launched a national plan called “Cyber Korea 21” in March 1999. Under this plan, the government initiated policies encouraging a wider adoption of the Internet by financially supporting the Internet service providers: The government funded 150 billion won to Internet service providers through a special account for financial loans in 2001. Policies were made to develop the KOSDAQ market as a major market that will supply capital for the start-ups in the area of Internet business: The government funded 150 billion won to Internet service providers through a special account for financial loans in 2001. The Ministry of Information and Communication supported fast-speed Internet service providers: The ministry planned to invest $ 32 billion in XDSL, CATV between 1997 and 2010. As part of a policy to close the digital divide, the government planned to collect 820, 000 secondhand PCs from 2001 to 2005 and distribute them to citizens. For those who still do not have personal computers, the government also plans to establish 71 local information centers, 1000 Internet plazas in post offices where free Internet access is available (Korea Internet White Paper 2001, p. 17).

In the U.S., the Clinton administration acknowledged the importance of information technology as the engine of economic growth and initiated the National Information Infrastructure.  

The National Telecommunications and Information Administration (NTIA) is the executive branch agency principally responsible for domestic and international telecommunications and information policy issues. The Federal Communications Commission (FCC) is an independent United States government agency, directly responsible to Congress. The FCC was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable. A notable federal policy is the E-rate. The E-rate is short for the Education Rate established by the Telecommunications Act of 1996. The E-rate is a discounted rate on telecommunications services, Internet access, and internal connections needed to bring the Internet into the public libraries and all K-12 classrooms in the country. The discounts rage from 29 to 90%, depending upon the relative wealth and rurality of a library or school.

**Education**

Education in Korea, available free of charge, is compulsory between the age of 6 and 15. Primary education begins at 6 years of age and lasts for 6 years. Expenditure on education by the central government totaled 17,779,200 won in 1998, which represents 15.8% of total spending.

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5 The National Information Infrastructure consists of (1) thousands of interconnected, interoperable telecommunications, (2) computer systems, televisions, fax machines, telephones, and other “information appliances,” (3) software, information services, and information database (e.g. “digital libraries”), and (4) trained people who can build, maintain, and operate these systems. In the future, the National Information Infrastructure will enable all Americans to get the information they need, when they need it and where they need it, for an affordable price.

<http://www.cpsr.org/cpsr/work/disability/umd/Upcoming/superhighway-bbs>
Education in the U.S. is primarily the responsibility of state and local governments. Public education is available free in every state from elementary school through high school. Federal government expenditure on education (excluding training and employment programs) totaled approximately 31,600 Million dollars in 1999/2000. The U.S. Department of Education’s Office of Educational Technology (OET) develops national educational technology policy and implements this policy through Department-wide educational technology programs. The OET states that, “the administration believes schools should use technology as a tool to improve academic achievement, and that using the latest technology in the classroom should not be an end unto itself.”

**Domestic social divides**

Korea is a traditional society based on Confucianism. In regard to gender, there are distinctive gender roles, as an old saying describes: “Man is the sky, women is the ground.” This gender role divides the social lives of Koreans. Men are given more chances to get a job than women with equal education. Gender attitudes are slowly changing but they are still prevalent both at home and in the workplace. In such a traditional society as Korea, the likelihood of women using the Internet is lower than men using the Internet.

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6 To know more about specific programs and projects, refer to <http://www.ed.gov/Technology/digdiv_projects.html>

7 The National Educational Technology Policy goals are: (1) All students and teachers will have access to information technology in their classrooms, schools, communities and homes. (2) All teachers will use technology effectively to help students achieve high academic standards. (3) All students will have technology and information literacy skills. (4) Research and evaluation will improve the next generation of technology applications for teaching and learning. (5) Digital content and networked applications will transform teaching and learning. <http://www.ed.gov/Technology/elearning/index.html>
In the U.S., there is a lessened gender divide, in contrast to Korea. Instead, ethnic divides exist, since various ethnic groups exist in the U.S. This ethnic divide results in a digital divide by ethnicity, as described in 3.2.2: Whites are notably more likely to have Internet access than those in other racial and ethnic groups.

<Research Questions and Hypothesis>

Based on the theories and discussions described above, the researcher asks the following research questions. First, Rogers suggested that early adopters and innovators are more likely to be young, educated, well-off and cosmopolitan. Based on these theories, the researcher asks,

**Question 1: Is there a digital divide with respect to Internet access in Korea, as suggested by Rogers’ work?**

This research question results in the following hypotheses. The digital divide exists in Korea, at the individual level, in the following manners:

**Hypothesis 1.1: Younger people have greater Internet connectivity than older people.**

**Hypothesis 1.2: Better educated people have greater Internet connectivity than lesser educated people.**

**Hypothesis 1.3: Higher income persons have greater Internet connectivity than lower income persons.**

Second, in regard to the implications of the digital divide, Brynjolfsson and other scholars suggested (Brynjolfsson and Hitt, 1996; Loader, 1998; Greenan, N. and J. Mairesse, 1996) that
the diffusion of new information and communication technology has a significant economic impact. These theories lead to the second research question:

**Question 2:** If there is an Internet-access divide among regions in Korea, what might be its significance?

The researcher hypothesizes that the digital divide exists in Korea, at the regional level, in the following manners:

- **Hypothesis 2.1:** Urban regions have greater Internet connectivity than rural regions.
- **Hypothesis 2.2:** Urban regions have greater economic growth as a result of the greater Internet connectivity.

Third, Compaine and other scholars suggest different views how the digital divide will change. Compaine argues that the digital divide is much the same as many gaps that have to persist in a capitalistic society, and the divide will narrow as time goes by. In contrast, other scholars and non-profit organizations insist that, based on the statistical data, the digital divide will broaden unless action is taken to close it. They argue that the digital divide matters globally and within individual countries. Based on these theories, the researcher asks a question:

**Question 3:** If a divide exists, how is it changing? Is it increasing, decreasing, or what?

This research question results in the following hypothesis:

- **Hypothesis 3:** The digital divide, as envisioned in hypotheses 1 and 2, increases over time.

This hypothesis will be tested by addressing the predicted gaps over time.
Fourth, in the U.S., there is a digital divide between different ethnic groups, as shown in the statistics. As described in 3.2.4, the researcher expects that in Korea, while there is no ethnic divide, there is a digital divide by gender. The researcher asks,

?Question 4: Does Korea have a digital divide by gender? If there is, how is it changing?

The researcher hypothesizes:

?Hypothesis 4.1: Men have greater access to the Internet than do women.

?Hypothesis 4.2: The digital divide between men and women will increase in the short term.
Chapter III
Data Analysis

As described above, this study analyzes data to answer the following research questions. First, in Korea, is there a divide with respect to Internet access, as suggested by Roger’s work? Second, if there is an Internet-access divide among regions in Korea, what might be its significance? Third, if a divide exists, how is it changing? Is it increasing, decreasing, or what? Fourth, does Korea have a digital divide with respect to gender, and if so, how might this gap be changing?

The researcher will present and analyze data showing the Internet usage and economic indicators of Korea. In analyzing the data, the researcher hypothesizes that the following:

- **Hypothesis 1.1:** Younger people have greater Internet connectivity than older people.
- **Hypothesis 1.2:** Better educated people have greater Internet connectivity than lesser educated people.
- **Hypothesis 1.3:** Higher income persons have greater Internet connectivity than lower income persons.
- **Hypothesis 2.1:** Urban regions have greater Internet connectivity than rural regions.
- **Hypothesis 2.2:** Urban regions have greater economic growth as a result of the greater Internet connectivity.
Hypothesis 3: The digital divide, as envisioned in hypotheses 1 and 2, increases over time.

Hypothesis 4.1: Men have greater access to the Internet than do women.

Hypothesis 4.2: The digital divide between men and women will increase in the short term.

The researcher presents data as a figure or table. Discussion consists of an explanation, interpretation and inferences. For the cases in which analysis or interpretation is difficult to draw, the researcher performs a statistical analysis (Independent samples T –Test).


Overview of the number of Internet users in Korea

The first Internet connection in Korea was introduced in 1982 and the first International connection was made in 1990. The number of Internet users started to increase since 1994. According to Korea Network Information center’s statistics (1999), the number of Internet users was 130,000 in 1994. For the survey, an Internet user is defined as someone who uses the Internet at least once a month. (All subjects are more than 7 years old.) By the end of 2001, it is reported that 24,380,000 people (56.6% of total population) use the Internet at least once a month. Figure 1 shows that there is a substantial increase of the Internet users between 1998 and 1999 – The number of users increased from 3,103,000 to 10,860,000.
Figure 1. Number of Internet Users in Korea

Source: Korea Network Information Center
1. Divide by Age

Figure 2 shows how the Internet penetration rate has changed among different age groups.
Figure 2. Internet Penetration Rate by Age

![Graph showing internet penetration rate by age from 1995 to 2001. The x-axis represents the years 1995 to 2001, and the y-axis represents the rate from 0 to 100. Lines represent different age groups: Age 7-19 (Blue), Age 20-30 (Purple), Age 31-40 (Yellow), Age 41-50 (Teal), and Over 50 (Orange).]
As shown in Figure 2, there is a growing digital divide in Korea between younger people and older people’s usage of the Internet: the Internet penetration rate of the ages 7 to 19 increased substantially between 1999 and 2001. In contrast, the penetration rate of the ages over 50 increased slightly during the same period. The difference in percentage between the ages 7 to 9 and the ages over 50 was 40 in 1999, 70 in 2000, and 84 in 2001.

Ages 20 to 30 had the highest rate in 1999 and 2000, but the ages 7 to 19 overtook the former group in 2001.

Figure 2 indicates that in Korea, the digital divide between the young and the old is increasing, except that the gap between ages 7 to 19 and the ages 20 to 30 is not always increasing: the difference in percentage decreased between 1999 and 2000 and increased between 2000 and 2001.

The researcher expects that there will be a high correlation between the age group 7 to 13 and the age group 30 to 40. This is because people in their thirties are expected to have children who are about 7 to 13 years old, considered that the average age of Korean people ranges from 26 to 34. If the parents have computers at home and use the Internet, the children of those parents are more likely to use have access to the Internet at home. The changes of the Internet penetration rate of the two age groups – ages 7 to 19 which include ages 7 to 13 and the age group 31 to 40 – show that they increased together, showing a similar increase rate each year.

What could be the reasons for this development of the gap in Internet penetration rate by age? Looking at the reasons for Internet usage by age may offer an answer (Figure 3).
Figure 3. Reasons for Internet Usage (by age)

- Information Search
- Email
- Shopping/Reservation
- Chatting
- Game
- Internet Phone
- Internet Banking
- Educational Purpose
- Recreation
- On-line Community
- Newspaper, Magazine
- Other Purposes

Legend:
- Age 7-19
- Age 20-30
- Age 31-40
- Age 41-50
- Over 50
In Figure 3, it is distinct that the ages 7 to 19 use the Internet more for games than for any other reason. Compared to other age groups’ percentage for games, this is a huge difference, as seen in the figure. Also prominent is the Internet usage rate of people over 50. More than twenty percent of the ages over 50 use the Internet for Internet banking. Even though people over 50 use the Internet for other reasons such as information search, email, newspaper and magazine – this usage rate for Internet banking is still notable. Their percentage of the Internet usage for newspaper and magazine (29.3%) is noticeable as well. One could assume that people over 50 are interested in online banking because they are the people who are economically well-off, compared to other age groups. High percentage of the Internet usage for newspapers and magazine is interesting to see because it suggests that people over fifty are not indifferent in learning new ways to get information. The ages 20 to 30 have a higher tendency to use online newspaper and magazine than ages 31 to 40. Ages 41 to 50 show higher usage rate of online newspaper than ages 31 to 40.

The fact that the usage for chatting shows such a high percentage (15%) within the ages 7 to 19 partly answers the question why the penetration rate of Group 1 in Figure 4 overtook the rate of Groups 2.
Figure 4. Internet Penetration Rate within Educational Setting
One can infer that concerted government policy to introduce the Internet in schools, as described in Chapter II, was successful. One can also infer that the impact of government policy in Korea is notable.

Do different age groups have different reasons for not using the Internet? Figure 5 shows that they do.
Figure 5. Reasons for Not Using the Internet (by age)
The older the people get, the less they feel the need for Internet usage: 12.1% of the age group 20-30 feel no need for the Internet. In contrast, 61.3% of the people over 60 feel need to use the Internet. The difference in percentage between the age group over 60 and the age group 7 to 30 is large and the ratio is about 5:1. The ratio of the age group 41-50 over that of the age group 20-30 is almost 3:1, which is also notable.

From ages 20 to 60, the older one is, the less likely they know how to use the Internet: 11.3% of ages 20-30 answered that they do not know how to use the Internet. In contrast, 27.3% of the ages 51 to 60 responded that they do not know how to use the Internet. After 60, the likelihood of not knowing how to use the Internet decreases slightly. Among the ages 7 to 50, the rate of the reason “have no computer and equipment” shows an opposite pattern to that of the previous two reasons - the older they are, the more likely they have computer: 32.7% of the ages 20-30 have no computer and equipment. In contrast, only 5% of the ages 41-50 have no computer and equipment. These findings suggest that people with better financial ability, the older people, are more likely to have their own computers than younger people do, even though they do not use them in the same way as younger people do.

Also interesting is that the ages 20 to 30, which is the ages of most active Internet users, shows the highest rate of the reason “do not have time.” People in their twenties are supposed to be busy. One can assume that therefore, they do not use the Internet unless their work requires them to use it. Among the age 20 to 60, likelihood of having “no time” decreases: 38.6% of the ages 20 to 30 does not have time for using the Internet. In contrast, 3.5% of the age group over 60 does not have time for the Internet.

Figure 6 shows the location of Internet usage by age group.
Figure 6. Location of Internet Usage (by Age)
Among the ages from 13 on and up to 50, the likelihood to use the Internet at home increases as the ages increases: 62.1% of the age group 13 to 19 uses the Internet at home. In contrast, 84.6% of the age group 41 to 50 uses the Internet at home. The rate increases incrementally.

Among the ages from 7 on and up to 30, the older people are, the more likely they use the Internet at school: 4.6% of the age group 7 to 12 uses the Internet at schools. In contrast, 18.8% of the age group 20 to 30 uses it at school.

Among the ages from 7 on and up to 30, the older people are, the more likely they use the Internet at PC cafés: 12.6% of the age group 7 to 12 uses the Internet at PC cafés. In contrast, 43.3% of the age group 20 to 30 uses the Internet at PC cafés.

The usage rate at PC cafés is worth noting, especially among the ages 7 on. Each of the three groups uses the Internet more often at PC cafés than at school. The reason why PC cafés are more popular among the age group 7 to 30 could vary. However, one may infer that young people prefer PC cafés in order to use the Internet to do games, chatting and other kinds of recreation. One could infer that the reason for this preference for the PC café comes from the cheap prices, relaxed atmosphere of the PC cafés.

Young Internet users prefer to be in PC cafés. PC cafés are common in Korea. The rate is, in most cases, 1,000 won per hour (0.76 US dollar). In terms of the speed of connection, most PC cafés use the XDSL and therefore the speed of connection is much faster than when one uses a modem at home. This cheap price must be an important factor that brings more people into the PC cafés. (The current rate of DSL home service is about 30,000-35,000 won (23 – 27 US dollars).) This could be why people who do not need to use the Internet at home a lot prefer to use it at PC cafés. Another noticeable thing about the feature of PC cafés is that in most cases, they are open 24 hours. All kinds of Internet related activities are performed in PC
cafés, but games are most popular among the young people who are in their 20s and from 10-20. The free atmosphere of the PC cafés can be another important factor that attracts young people.

2. Divide by Education

Figure 7 shows the Internet penetration rate within educational setting and Figure 8 shows the Internet penetration rate among people who are not students, by educational background.
Figure 7. Internet Penetration Rate within Educational Setting
Figure 8. Internet Penetration Rate by Educational Background

(Among people who are not students)
As shown in Figure 7, within educational setting, middle school students have the highest percentage of Internet usage at the end of 2001. However, there is no substantial gap between Internet users among the four groups in 2001. It is worth noting that there is a clear tendency of decline of the gap between Group 2 and Group 3, and between Group 3 and Group 4: The difference in percentage between Group 2 and Group 3 in 1999 was 8.4. However, the gap narrowed down to 0.8 in 2001. The difference between Group 3 and Group 4 was 25 in 1999. In contrast, the gap was 0.3 in 2001. The most outstanding phenomenon in this figure, however, is the penetration growth rate of Group 1, which is the lowest education group: The Internet penetration rate of Group 1 was 13.2% in 1999. However, it was 88.4% in 2001. Overall, the gaps between groups decreased: The biggest difference among the four groups in 1999 existed between of Group 1 and Group 4, which was 68.9. The biggest difference in 2001, however, is 11.4, which is the difference between Group 1 and Group 2. One can also infer that the government policy to close the digital divide in schools, as described in Chapter II, is successful and the schools are being wired as a result of the policy.

The usage rate of people who are not students shows that there are gaps between groups with different educational background. In Figure 8, Group C shows a distinct penetration rate. The gap between Group C and Group B even increased between 1999 and 2000 and between 2000 and 2001: the difference in percentage was 27.8 in 1999, 36.3 in 2000, and 39.7 in 2001. Moreover, the gap between Group A and Group B has also increased: the difference in percentage was 8.8 in 1999. However, it increased up to 25 in 2001. The gap between Group A and Group C, accordingly, has greatly increased: the difference was 36.6 in 1999. In contrast, the gap was 64.7 in 2001.
From Figure 7 and Figure 8, one may infer that young students who are currently in the educational setting are fast in accepting the new technology and therefore the penetration rate of teenagers increase rapidly, as seen in Figure 4. Group 1, the youngest group in Figure 7 even shows the highest Internet penetration rate at the end of 2001. However, findings also suggest that there is a gap and the gap is growing, among people who are not in the educational system and who have low educational background – mostly those who are the old generation and are at work now - do not use the Internet very much: it is harder for them to adopt a new technology. Older but higher – educated adults seem to adopt the technology more easily.

3. Divide by Income Level

As of December 2001, there is a notable gap between the income group over 2.5 million won and the income group less than 1.5 million won: Figure 9 shows that 70.4% of the people with an income over 2.5 million won per month are Internet users, whereas only 36.8% of the people with an income less than 1.5 millions won are Internet users.
Figure 9. Internet Usage Rate by Income Level

<table>
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<th>Year</th>
<th>Less than 1.5 million won</th>
<th>1.5-2.5 million won</th>
<th>Over 2.5 million won</th>
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The usage of people with an income less than 1.5 million won has not increased much and this rate is leveling out, which causes a bigger gap between income group 1.5-2.5 and the former group: the difference between income group from 1.5-2.5 million won and income group less than 1.5 million won was 8.1 in 1999. However, this difference increased to 24.2 in 2001.

4. Regional Divide

Figure 10 shows the Internet usage rate in different regions. The regions in this Figure are divided by Korea’s 16 administrative units, containing big cities and provinces.
Figure 10. Internet Usage Rate (All Regions)
Generally speaking, the Internet usage increased in most of the areas except in Ulsan, where there was a clear decrease between 1999 and 2000. For a more efficient analysis, the researcher divides all regions by three groups.

Common criteria exist to classify regions. In urban economics, areas are classified as:

1. An urban area is defined as “an area with a relatively high population density” (O’Sullivan, 1996, p. 6).
2. A municipality or city is defined as an area over which a municipal corporation provides local government services such as sewerage, crime protection and fire protection.
3. An urbanized area includes at least one large central city and the surrounding area with population density exceeding 1,000 people per acre. To be an urbanized area, the total population of the area much be at least 50,000 (p. 7).
4. A metropolitan area is defined as the area containing a large population nucleus and the nearby communities that are integrated, in an economic sense, with the nucleus. To be designated as a metropolitan area, the area must have either a central city with population greater than 50,000 or a total population of at least 100, 000 (p. 8).

The U.S. census bureau delineates urban and urbanized areas differently:

An “urban” consists of territory, persons, and housing units in:

- Places of 2,500 or more persons incorporated as cities, villages, boroughs (except in Alaska and New York), and towns (except in the six New England States, New York, and Wisconsin), but excluding the rural portions of "extended cities."
• Census designated places of 2,500 or more persons.
• Other territory, incorporated or unincorporated, included in urbanized areas.

The researcher found out that these classification criteria are made mainly from the U.S. standards and are not very appropriate to be applied to classify Korean regions. However, after examining these criteria and referring to O’Sullivan’s first definition of an urban area, the researcher devised criteria that will categorize the Korean regions by three groups.

Figure 11 shows the population density of 16 Korean region and shows that the regions can be divided by three groups. They are:

1. Regions with population density over 10,000 persons/km²
2. Regions with population density between 1000 and 10,000 persons/km²
3. Regions with population density less than 1000 persons/km² (In this study, between 100 and 1000)
Figure 11. Population Density

(Derived from resident registration. Including foreigners. Persons/km²)
For the ease of analysis, the researcher uses the terms Megapolis, Metropolitan, and Non-metropolitan. Megapolis refers to an area with population density over 10,000 persons/km². Metropolitan refers to an area with population density between 1000 and 10,000 persons/km². Non-metropolitan refers to an area with population density less than 1000 persons/km².

According to these criteria, Seoul is the only Megapolis in Korea. Metropolitan areas include, Pusan, Taegu, Inchen, Kwangu, Daejeon. All other cities and provinces are under the category of Non-metropolitan.

Figure 12 shows how the Internet usage has changed over time in the different regions.
Figure 12. Internet Usage Rate (Three Regions)
In 1999, there was little gap between the Seoul Megapolis and the other areas. However, the difference in percentage between Megapolis and other areas broadened between 1999 and 2000. As described in the previous chapters, the unbalanced development between Seoul and other areas of Korea is still significant. One may infer that this unbalance is reflected in these findings as well; the same concern exists in the diffusion of the Internet, too.

The difference between Metropolitan and Non-metropolitan, however, decreased over time.

The researcher believes that there are various factors that cause this different Internet penetration rate at the regional level. The researcher questions whether or not people in different regions have different reasons for using the Internet. Figure 13 shows the reasons for Internet usage in different regions.
Figure 13. Reasons for Internet Usage (by Region)
People in the Non-metropolitan areas show the highest usage rate for game (55%). One may infer that the people in the areas of lower population density are more likely to use the Internet for gaming purposes.

The differences in percentage between regions for other purposes, despite the slight gaps, do not appear significant – for example, people in Megapolis show 78.4% of usage rate for Information search, Metropolitan shows 78.2%, Non-metropolitan shows 77.1%. These findings are a good comparison to those of Figure 3, in which there were noticeable differences between different age groups, in their reasons for the Internet usage. One may conclude that the reasons for Internet usage do not differ significantly across the regions.

Figure 14 shows the reasons for not using the Internet by regions.
Figure 14. Reasons for Not Using the Internet (by Region)
Among the three regions shown in this figure, the rate of Metropolitan is the most interesting. People in the Metropolitan area show the lowest rate for Internet usage because of the reasons, “no need” (42.6%) and “don’t know how to use” (22.9%) and the highest rate because of reason “don’t have computer and equipment” (12%) and “don’t have time (20%).”

The researcher questions whether the access methods have influences on the different Internet penetration rate in different regions. The Internet access methods are classified by regions in Figure 15.
Figure 15. Internet Access Methods (by Region)
The differences in percentage among different methods, except XDSL and CATV, do not seem to be significant between different regions. The usage rate of XDSL is high in Non-metropolitan area and the rate of CATV is high in Megapolis. A possible reason could be the availability: XDSL is more available in Non-metropolitan area and CATV is more easily available in Megapolis. CATV was introduced only in 1995 in Seoul but did not become widely used until 1997 (Kang 1997). These findings indicate that the government policies to spread the fast-speed Internet connection, as described in Chapter II, was been greatly influential in most regions in Korea.

**Statistical significance:** Since the differences in the figure do not seem to be meaningful, a statistical test will help. The researcher performed an Independent samples T-test and sets the level of statistical significant at p< .1. Appendix 3 shows that the difference in means is statistically significant between Megapolis and Non-metropolitan regions (p < .1), in the usage of CATV and in the usage of XSDL. As shown in Appendix 4, the difference in means between Metropolitan and non-metropolitan in the usage of XDSL (p< .1) and wireless Internet (p< .1) is also significant. Appendix 2 shows that there is no statistical significance in difference in means between Megapolis and Non-metropolitan areas. From this result, one may infer that CATV and XDSL promoted the penetration of the Internet in Megapolis. As a result, the Internet penetration gap between Megapolis and Non-metropolitan area became significant. One may also infer that between Metropolitan and Non-metropolitan areas, the usages of XDSL and wireless Internet was one of the important factors that brought about the significant differences to the Internet penetration rate.
Correlation between the regional divide and economic factors

As described above, Brynjolfsson (1995), Loader (1998) and other scholars argue that new communication and information technologies have a positive economic impact. Loader suggests that information and communication technologies ensure a geographical flexibility to job seekers and makes their relocation easier, which ultimately reduces costs and speeds up production (Loader 1998). Brynjolfsson demonstrated that there is a link between information technology and productivity (Brynjolfsson 1995). To examine whether or not these theories can be applied to the Internet diffusion in Korea, this study examines four economic indicators and find out any correlations between economic factors and the Internet usage rate.

Is there a correlation between the increase/decrease of the number of Internet users in different regions (Figure 10 and 11) and any economic factors? In other words, has a rural-urban divide brought about any differential economic impact or has it been influenced by the regional economy? If so, what is its significance? The researcher will present five types of economic data to examine this issue. Before going to the analysis, it has to be mentioned that in Korea there was a huge economic crisis between 1997 and 1998 and therefore, all the economic indicators presented here reflect the influences of that crisis. For example, as seen in Figure 16, the number of economically active population has fallen down substantially between 1997 and 1998. Between 1998 and 1999 was the period when the economy started to recover again.
Figure 16. Economically Active Population
million in June 1998. The changes in the number of high school graduates reflect this impact. Between June 1997 and June 1998, the number of people with high school diplomas increased drastically both in terms of absolute numbers and shares: The increase rate was 300%. The number of 2-4 year college graduates increased substantially as well: The increase rate between June 1997 and June 1998 was 206.7%. One may infer that the difficulty in getting a job led young people to pursue education.

Concurrently, this unemployment resulted in lowered income levels for many households, broadening the previously existing income inequality and creating more poverty. Na and Moon (1999) also point out that the economic crisis substantially increased income disparity between skilled and unskilled labor, between the less educated and the more educated, and between men and women, severely affecting the poor and increasing the income of the wealthiest.\(^9\)

What impact does the Internet have on the recovery of the economy? Our ability to know for certain is limited because of the newness of the Internet and the complicated nature of the economic change. However, a few reports and articles suggest a promising view: In a report made by Daewoo Economic Research Institute titled *Is a New Economy Possible in Korea?*, the authors argue that a new U.S. style economy is conceivable owing to the enhancement of the corporate business environment from the proliferation of the Internet. This report further argues that the enhancement of the infocommunication sector’s productivity is connected to the increased productivity of other industrial sectors (Kim, 2000).

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\(^9\) The Gini coefficient rose by 7% between the first quarter of 1997 and the first quarter of 1998.
Explosive increase of the Internet population in Korea

Since 1994, the number of Internet users increased and the increase rate was explosive after 1996. The major factors for the proliferation of users include the startup of high-speed Internet services and more. Other reasons include companies’ use of the Internet as a marketing tool and the corporate sectors’ use of the Internet.

Analysis of economic factors and the Internet usage increase

First, does a correlation exist between the changes of the number of economically active population and the number of Internet users? As described above, the employment condition in Korea greatly worsened between 1997 and 1998, which is reflected in Figure 17. Figure 17 also shows how the economically active population and Internet usage rate has changed by region between 1999 and 2001.
Figure 17. Economically Active Population and Internet Usage Rate (by Region)
Since 1998, there was a steady but modest growth in the size of economically active population in all three regions. Specifically, the size of the economically active population increased between 2001 and 2001 in Metropolitan and Non-metropolitan areas. Between 2000 and 2001, there is a decrease in the rate of EAP from rural areas while the other areas hold steady. The Internet usage rate, in contrast, increased substantially in all three areas.

These findings demonstrate that there is not apparent relationship between the size of economically active population and the number of Internet users, which rejects the hypothesis 2.2: Urban regions have greater economic growth as a result of the greater Internet connectivity.

What about the possible correlation between the Internet usage rate and unemployment? Figure 18 shows unemployment rate and the Internet usage rate in three regions. Figure 19 shows the unemployment rate only since 1990.
Figure 18. Unemployment Rate and Internet Usage Rate (by Region)

[Graph showing unemployment rate and internet usage rate by region over the years 1999 to 2001.]
Figure 19. Unemployment rate (by Region)
As shown in Figure 19, unemployment in Korea increased drastically between 1997 and 1998 and started to decrease since from the year 1990. Figure 18 shows a possible correlation, which is negative: In all three regions, even though there are differences in the degree of changes, Internet usage rate went up when the unemployment rate went down. Note, this relationship could be a statistical artifact, as correlation does not prove causality. In other words, while the data could suggest that many people adopted the Internet in the last few years as they regained employment, one cannot infer that Internet adoption drove this apparent increase in economic well-being. In fact, one would expect a time lag between the adoption of this technology and its economic effect on adopters’ lives.

Figure 20 shows that in all three regions, there is a negative correlation between Growth Regional Domestic Product (GRDP) and the Internet usage rate.
Figure 20. Growth Regional Domestic Product and Internet Usage Rate (by Region)
The findings in Figure 20 counters the argument that there maybe a positive correlation between the economy and the Internet usage, which is suggested in hypothesis 2.2: Urban regions have greater economic growth as a result of the greater Internet connectivity: In all three regions, GRDP decreased while the Internet usage rate increased and there are no notable differences in these rates between regions.

One cannot draw firm conclusions about the relationship between the Internet and the economy based on the data available to this study. The inference problem is compounded by the effects of the severe economic crisis of 1997-98.

Research also suffered because the recent economic indicators are heavily influenced by the economic crisis that happened in 1997. As well, the diffusion of the Internet maybe too new a phenomenon in Korean society for adequate understanding of its regional socio-economic impact on Korean society.

5. Divide by Gender

Is there a digital divide by gender, in Korea? Figure 21 shows the Internet usage rate by gender.
Figure 21. Internet Usage Rate (by Gender)
Figure 21 demonstrates that, men have been using the Internet more than women, as the researcher expected. The gap stayed and did not increase or decreased significantly since 1999. The difference in percentage between male and female users was 15.2% in 1999, 12.3% in 2000, and 12.8% in 2001.

For what reasons does each gender group use the Internet? Figure 22 shows the reasons for Internet usage by gender.
Figure 22. Reasons for Internet Usage (by Gender)
Men show higher rate of usage for information search and women shows higher rate for email but these differences do not seem to be as big as those for shopping/reservation and game. For the purposes of shopping and reservation, women show nearly three times greater Internet usage than men. For the purpose of games, men’s usage shows a percentage of 55% and women’s usage is 38%. This is also a noticeable difference: the ratio of men/women is 1.44:1. It is inferred that the higher percentage of women’s Internet usage at home, shown in Figure 23, is one of the primary reasons for this. Women, who uses the Internet at home and not very much for work related purposes, may be more likely to use it for shopping and reservation, and recreation – women show higher usage rate for recreation (17.4%) than that of men (12.3%).
Figure 23. Location of Internet Usage (by Gender)
The differences in reasons for not using the Internet between different gender groups are shown in Figure 24.
Figure 24. Reasons for Not Using the Internet (by Gender)
Women are more likely to feel “no need” to use the Internet than men: however, the difference here is not large. Women are more likely not to know how to use the Internet than men; again, the difference is slight. It is notable that men are more likely not to have time for Internet usage than women. The difference in percentage for this reason is big: the ratio is about 4:3.

As shown in Figure 23, one may infer that different preferences for location might partly explain the reason for these differences. Women are more likely to use the Internet at home and at school and men are more likely to use it at work and at PC cafés. The difference between men and women at work is notable. Men’s likelihood to use the Internet at work is more than twice higher than that of women.

6. Analysis

The researcher attempted to test the hypotheses through an analysis and interpretation of statistical data. Data show that in terms of the Internet diffusion, digital divides exist between different age groups, educational groups, income groups, and between different regions. However, the divides do not increase in all cases. The hypotheses and results are:

Divide by Age

- *Hypothesis 1.1: Younger people have greater Internet connectivity than older people.*

This hypothesis is supported by data. Data show that there is a growing gap in percentage of Internet penetration between ages 7 to 20 and ages over 50.
An exception is that between the ages 7 to 19 and the ages 20 to 30, here the gap decreased in 2000 and increased in 2001.

**Divide by Education**

- *Hypothesis 1.2: Better educated people have greater Internet connectivity than lesser educated people.*

  This hypothesis is supported by data. Among people who are not students, a significant divide exists.

**Divide by Income level**

- *Hypothesis 1.3: Higher income persons have greater Internet connectivity than lower income persons.*

  This hypothesis is supported. A divide exists between the wealthiest group and the other groups.

**Regional Divide and Its Economic Impact**

- *Hypothesis 2.1: Urban regions have greater Internet connectivity than rural regions.*

  This hypothesis is supported. A divide exists between the Seoul Megapolis and the other two areas.

  - *Hypothesis 2.2: Urban regions have greater economic growth as a result of the greater Internet connectivity.*
The researcher performed an analysis of Internet usage rate and three different economic indicators: economically active population, unemployment rate, and growth regional domestic product. The findings are:

- **Finding 2.2.1:** Urban regions have greater economic growth as a result of the greater Internet connectivity.
  - This hypothesis is unsupported. No correlation between the Internet usage and the size of economically active population appears.

- **Finding 2.2.2:** Urban regions have greater economic growth as a result of the greater Internet connectivity.
  - This hypothesis is supported. There is a negative correlation between the Internet usage and unemployment rate.

- **Finding 2.2.3:** Urban regions have greater economic growth as a result of the greater Internet connectivity.
  - This hypothesis is unsupported. There is a negative correlation between the Internet usage and growth regional domestic products.

**How is it changing?**

The tests resulted in the following findings:

- **Finding 3.1:** The digital divide between younger people and older people increases over time.
  - This hypothesis is supported. Between younger and older people, the gap is increasing.
Finding 3.2.1: *The digital divide between better educated people and lesser educated people increases over time.*

- This hypothesis is rejected. Among people who are within educational setting, the gap is decreasing.

Finding 3.2.2: *The digital divide between better educated people and lesser educated people increases over time.*

- This hypothesis is supported. Among people who are not students, the gap is increasing.

Finding 3.3: *The digital divide between higher income persons and lower income persons, increases over time.*

- This hypothesis is supported. Between higher income persons and lower income persons, the gap is increasing.

Finding 3.4: *The digital divide between urban regions and rural regions increases over time.*

- This hypothesis is supported. Between the urban regions and the rural regions, the gap is increasing.

**Gender**

- *Hypothesis 4.1: Men have greater access to the Internet than do women.*

This hypothesis is supported. A divide exists between different men and women.

- *Hypothesis 4.2: The digital divide between men and women increases in the short term.*
- This hypothesis is unsupported. The gap between men and women is not increasing when men’s usage rate is not leveling out yet.
Chapter IV

Conclusion

This study examines the theories and the current discussions on the digital divide. The importance of addressing the digital divide – the perceived gap between information haves and have-nots – comes from the multidimensional nature of the problem, which entails significant potential social, economic, and political implications.

There are debates over whether or not various aspects of the digital divides exist. This study demonstrates that the digital divide is real and multidimensional. Moreover, this study provides suggestive evidence that government telecommunication and education policy can have real impacts on the digital divide, closing the gap and bringing the advantages of access to advanced information technology to previously underserved populations.

Rogers, in his theory of technology diffusion (1995), described a pattern of technology diffusion using an S-shaped curve. Rogers suggested that technology gap occurs between different adopter categories and finds that early adopters and innovators are likely to be young, educated, well-off and cosmopolitan. The researcher uses this framework to describe the diffusion of the Internet in Korea.

Findings and analysis of data show that the digital divides exist in Korea between different groups but not in all cases is the divide increasing. For example, the digital divide is decreasing among groups within educational setting whereas the gap is increasing among the people who are not students. The regional divides are increasing between the Seoul Megapolis and the rest of the regions. However, when one looks at Metropolitan and Non-Metropolitan regions only, one finds that the digital divide between these two regions is decreasing.
According to the analysis, the economic impact of the diffusion of the Internet cannot be
determined with the data available. In terms of the gender divides, digital divides exist by
gender, as the researcher expected. Another interesting finding is that in Korea, the impact of
government policy is huge. The governmental efforts to wire schools and to spread fast-speed
Internet connections to areas outside Seoul have been effective, as shown in data: within
educational setting, the Internet penetration gap between different groups is decreasing. The
usage rate of DSL is exceptionally higher than any other methods in all regions in Korea. These
data show that the concerted policy of the Korean government to address the digital divide issue
has borne significant fruit. The Korean experience can be viewed as a reference for other
countries to make better technology policies.

Some people predict that, eventually, the divide of whatever kind of technology will
disappear. The researcher agrees to this anticipation. However, in the short term, there will
remain significant gaps in access, such that certain classes of people will lag behind. The have-
nots will include those who are older, those who are less educated, and people who have lesser
income in the rural areas, as indicated in this study. Or, there might be new kind of information
have-nots. If benefits of digital technology are to be widely shared, concerted action among
government, education, and industry will be necessary to deal with the multidimensional digital
divide in all its forms.

Though government policies do appear to have been effective in reducing some aspects
of the digital divide in Korea, there is still much to be done. Efforts to narrow this gap should
be made at various levels. At an academic level, scholars in Korea have not made enough
academic efforts on this issue. Little more than a few working papers on professor’s web sites
are available. The researcher found out that this topic – digital divide – is generally being
discussed by many people in different areas but there are few academic departments of institutions that study this issues at a deeper level. At a governmental level, the researcher found out that the government documents are not easily available to researchers. Many web sites are under construction or do not contain the designated data. The documents should be available to those people who do more research on this issue. To create private resource center such as the Korea Network Information center, from which the researcher referred to for this study, is desirable.

Today, having a communication technology is a necessity for day-to-day work. What’s expected more from the Internet and digital technology is that it will allow us to do more creative works, which will improve people’s lives in an unexpected way, which we wish to be positive. If the opportunities are given to more people, the effect will be more beneficial to society.
Appendix 1. S-Shaped Curve
Appendix 2. T test (Difference in means between Megapolis and Metropolitan area)

### Group Statistics

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### Independent Samples Test

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Appendix 3. T-test (Difference in means between Megapolis and Non-metropolitan)

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### Appendix 4. T test (between Metropolitan and Non-metropolitan area)

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#### Independent Samples Test

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