

THE LOCATIONAL DETERMINANTS OF INTERNET USAGE IN ASIA AND NEPAL

A thesis

Presented to

The College of Graduate and Professional Studies

Department of Earth and Environmental Systems

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts in Geography

by

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May 2011

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Keywords: Connectivity, Digital Divide, Internet Penetration Rate, Internet Service Providers,

Internet Usage, Nepal

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ABSTRACT

This study examines the relationship between internet development and various socio-economic factors that are assumed to affect internet infrastructure development decision. The data collected for 35 Asian countries is secondary data collected from various sources. This study tests six hypotheses about the impact of various socio-economic factors and economic freedom indicators on Internet Penetration Rate (IPR) and Internet Service Providers (ISP).

The findings show that the IPR can be statistically explained by one independent variable: GDP (Gross Domestic Product). The study models also include Purchasing Power Parity (PPP), literacy rate, fertility rate, the percentage of urban population, the country's status as a former European Colony, Business Freedom, Freedom from Corruption, and Property Rights.

ACKNOWLEDGEMENTS

Foremost, I owe my deepest gratitude to my advisor Dr. Jay D. Gatrell, for encouragement and continuous support in the process of preparing this thesis. His patience, guidance and immense knowledge have helped me to expand my understanding of the subject. Further, it is a pleasure to thank my thesis committee, Dr. Gregory Bierly and Dr. John Conant, for all of their encouragement and insightful comments throughout this process.

I thank my friends, Robin Van De Veer, Cyril Wilson, Bikram Sharma, Roshni Roychowdhury, and Dr. Prakash Karki for providing me with brainstorming sessions and just being there for me at all the times I needed. I would also like to thank Mr. Ryan G. Wickens, General Planner at Area Planning Department for Vigo County, Indiana for allowing me to use the GIS lab to create maps required for this thesis. And I heartily thank my friends/cousins, Bhaskar Sharma and Alicia Sharma, for the stimulating discussions in the process of formatting my ideas and for always standing by my side during all the ups and downs of my life.

Finally, I would like to express my gratitude to my parents, Vinaya Dhvaj Chand and Helina Chand, my brother, Sourabh Dhvaj Chand and my husband, Bikram Sapkota, for their financial and emotional support and encouragement.

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CHAPTER 1

INTRODUCTION

The internet has become a key component in improving the life of people around the globe. Everything from finding a job, obtaining an education, government information, information on health and society to a recent trend of social networking have been made easier by the internet. The development of the World Wide Web (WWW) has also made a large digital divide between developed countries and underdeveloped countries (Warf 2001). "Digital divide" is a term created to express the inequality between the "haves" and the "have-nots" in the technology revolution (National Telecommunications and Information Administration 2000).

This digital divide limits people without internet access from information that is available to the people that have access. This lack of information on health, education and development negatively affects people who do not have access to the internet. Internet access alone is not the fundamental determinant of the digital divide, but access to the internet and various other Information and Communication Technologies (ICT) and the ability to use them by people of different segments of society creates the digital divide.

In the case of the internet, access is only one aspect. There are other factors, such as low quality or high priced connections, low performance computers, lack of technical assistance and restricted access to subscription-based content, which determine the digital divide. This irregular

development of ICT has created information rich and information poor regions and/or nation-states.

This study examines the observed differences between Asian countries and the rest of the world. According to the data provided by the Internet World Stat website in 2010, the Internet Penetration Rate (IPR)¹ for North America was 77.4 percent, Oceania/Australia was 61.3 percent, Europe was 58.4 percent, Latin America/Caribbean was 34.5 percent, the Middle East was 29.8 percent, Asia was 21.5 percent, and Africa 10.9 percent.

In contrast, the population of internet users is highest for Asia, with 825.1 million users. Europe had 475.1 million users, North America had 266.2 million users, Latin America/Caribbean had 204.7 million users, Africa had 110.9 million users, the Middle East had 63.2 million users, and Oceania/ Australia had 21.3 million users. This shows that Asia, being the region with the highest concentration of internet users, has internet access only higher than Africa. The Internet Penetration Rate of Asia being only 21.5 percent illustrates that there is a large number of population which has no access to internet.

Therefore, this thesis will examine the various aspects of societies that affect technological advancement, particularly in the development of the internet. It will also examine and explain the reason for the digital divide based on the literature available. Further, this thesis will also present a case study on Nepal, which will analyze the history of the internet, development of the internet, and reasons that have been affecting the development of the internet in Nepal.

¹ According to the Internet World Statistics website, IPR is based on "usage information that comes from data published by Nielsen Online, by the International Telecommunications Union, by GfK, local Regulators and other reliable sources." The data are based on surveys of users as well as local provider information and represent a reasonable approximation of total usage based on established sampling methodologies.

The Advanced Research Projects Agency (ARPA), which at present is known as DARPA (Defense Advanced Research Projects Agency), developed computer networking and communications technology. The internet was envisioned as today's interactive communication technology by Dr. J.C.R Licklider in 1962 (Gromov 1995). With the help of Bob Taylor, he laid a foundation for ARPANET, which expanded the technology by moving ARPA's contract from the private sector to universities (Gromov 1995). Later, the National Science Foundation (NSFNET) initiated and funded the internet in the effort of providing a fast and convenient medium through which researchers at various computing centers would be able to stay connected and share ideas (O'Kelly 1999).

Since then, the internet has become a means of communication and the medium of connectivity, regardless of geographic boundaries. The internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location (Leiner et al 1997).

CHAPTER 2

LITERATURE REVIEW

End of Geography

Today, the world has shrunk and people have started measuring the distance between places with time rather than the miles. The internet has played a major role in bringing people close to each other. It is also one of the main components of globalization. Since the internet was developed with the vision of sharing ideas and staying connected, it was thought that the entire world would become one.

It was believed that the development of the internet, was the ‘end of geography’ since it would provide free information flow around the globe (Warf 2001). The internet was thought to be the democratic form of information media, which would be accessible to everyone. Cyberspace promises universal, democratic entree to the electronic highways of the world economy (Warf 2001). Over time there appears to be a stronger connection between internet content and information intensive industries (Zook 2000). This made people predict that the internet will enhance the living standard of people around the world equally.

Regarding today’s economic condition and the social structure, Friedman’s predictions stated in his book *The World is Flat*, “globalization is the newfound power for individuals to collaborate and complete globally” (Friedman 2005) seems to have validity in the present affairs of event in the world. The innovation and the development of internet have eliminated the

disadvantages of distance or space. Actually, the distances between places have disappeared. Everything that we use in our daily life, from candy wraps to technical equipment, are manufactured and distributed from various parts of the world. The information and technologies that are used in the process of producing any goods for societal service is distributed equally around the world. Services around the world can now travel without boundaries. This has been possible only through the internet. With the innovation of the modern technologies we have made our world flat (Friedman 2005).

Advantage of Connectivity

The internet is the ultimate 21st Century Jeffersonian dream come true: an informed public with unlimited information making knowledgeable choices in a connected, 24/7, placeless society where we take what we want, when we want, on demand (Alderman 2009). The advantages of internet connectivity have been specified as economic equality, social mobility, democracy, and economic growth. Access to internet provides economic equality by giving the opportunity for citizens of any country to stay connected to the vital information on people's careers, civic life, safety, etc. Internet also provides the social mobility because today there is so much information online that the computer networks play an important role in the learning process and also in establishing a career.

It has also been recognized that internet access leads to establishment of a democratic society by larger public participation in elections and improved decision making processes. The recent political movement seen among the Arab nations and the North African nation are the result of the leapfrogging of adoption of mobile phones. Internet, specifically social media platforms such as Facebook and Twitter have emerged as the global champions for facilitating the pro-democracy protests across the Middle East, North Africa and now in the Asian

giant China between end of 2010 and early 2011 (Krishnappa 2011). The development of information infrastructure could be beneficial for the economic growth of underdeveloped countries. Communications networks such as the internet are an essential component of urban infrastructure by enabling the coordination of increasingly complex, multi-location, and time-sensitive production systems, as well as fractured social networks (Townsend 2001).

Instead of early thoughts about the internet development's integrity, there is an increasing digital divide in this globalized world. Corporate providers, spurred by deregulation, globalization, and technological changes, have steadily consolidated into a shrinking pool of suppliers that enjoy significant economies of scale and scope. Inequalities in access to the internet internationally, reflect the long-standing bifurcation between the first and third worlds (Warf 2001).

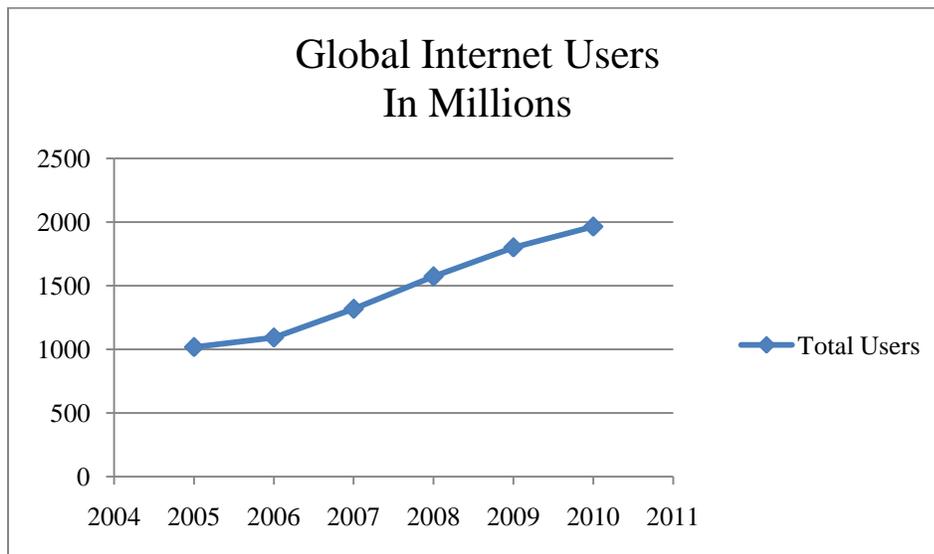
Digital Divide

Internet has brought a massive digital divide. "Digital divide" refers to inequalities in access to the internet, extent of use, knowledge of search strategies, quality of technical connections and social support, ability to evaluate the quality of information, and diversity of uses (DiMaggio et al 2001). There is a disparity between internet penetration and an inequality of effective internet access among continents, countries, and within the continents and eventually individuals living in the countries.

The global city has defined its boundaries to the cities that are in the network; therefore, the vision of the global city has vanished with the division between the new network of networked cities and the cities that are not in the network. Even though it has been argued a lot that the internet connectivity will help in the development of economic condition, debatably, the economic condition of the nation has become a determining factor as to whether they stay

connected in this network of networked cities. Although internet use has diffused most widely in the localities where it was first adopted, commercial applications have moved the largest clusters of activity to major urban business centers (Townsend 2001).

The digital divide at present goes far beyond the access to the internet. There are valuable information sources, indexes, full-text databases and e-journals that are not included in the freely available information on the internet, leaving scientists and researchers of the developing nation excluded from the information that may be vital for agriculture, social, and economic development (Cullen 2001). The reasons for the increasing digital divide among the nations are the Human Development Index (HDI) of the countries around the world. Fig 1 shows that in 2010, the number of internet users in the world was 2 billion whereas the world population is approximately 7 billion. This designates that there are 5 billion people around the world who do not use the internet.



Source: Internetworldstats.com

Figure: 1. Global Internet Users

Barriers to Connectivity

Along with the success of the internet, there has been an explosion of internet enterprises. These companies not only invest money, but also invest intellect in the network. The struggles for control over the domain space and the form of the next generation IP addresses lead us to think about the complications that can arise in the future of the internet and about the advantages of the internet. If the internet stumbles, it will not be because we lack technology, vision, or motivation. It will be because we cannot set a direction and march collectively into the future (Leiner et al 1997).

The economic situation of a country, the education level of its inhabitants, the institutional legal environment governing communication technologies, and the existing communication technology infrastructure are related to internet connectivity (Hargittai 1999). On one hand, it is said that the internet connectivity was first envisioned to increase the HDI, with the free information flow provided to the citizens of the countries, whereas today, low HDI such as GDP, literacy rate, fertility rate etc, are said to be the reason for little or no connectivity in the countries. There are various kinds of barriers such as national wealth, education, and the political instability that are responsible for the unequal distribution and the development of the internet infrastructure in any country.

Economic

Economic factors have a huge influence in the adaptation of new technologies by a country and its citizens. A country's overall economic strength will affect internet diffusion in that the necessary resources are more likely to be present, and capital required for the expansion of the technology is more available, in richer countries (Hargittai 1999).

The development of internet infrastructures is closely associated with access to venture capital investment in today's globalized economy. Venture capital investment is typically associated with high technology industries, such as biotechnology and ICT (Information and Communication Technology). The geographical factors shaping the location of the internet industry include external economies, the ability to create and commercialize new knowledge, and the availability of skilled labor (Zook 2002).

The venture capitalists invest their money in well-urbanized, economically prosperous regions so that they can earn profit, which creates a snowball effect for developed countries. As a result they develop and prosper more. On the other hand, countries that are poor are destined to be poorer. At a broad level, it is no great surprise that there are plenty of internet infrastructures in Manhattan and not in the Mojave Desert (Majumdar et al 2005). The difference keeps on widening everyday between the information rich and information poor. After all, the strongest factors that shape the location of demand for internet services are the density of human settlement and the location of industry (Greenstein 2004).

The Asian countries like Japan, Hong Kong, Singapore, and South Korea have successfully built the network with the rest of the world using their strong economy and well established internet infrastructure. In today's global economy they have set up prosperous trade relations around the globe through internet connectivity. Whereas, the countries like Bhutan, Nepal, Burma, and Afghanistan are left out in global isolation. Even though almost all countries in Asia have internet access, the difference among the nations in virtual accessibility is considerable. Japan has 73 ISPs with 47,249,000 internet hosts whereas North Korea has 1 ISP and 3 internet Hosts.

Legal

Many scholars also suggest that the nation's legal environment has a direct effect on internet connectivity. The institutional legal environment in a country is also relevant to the internet's spread because national policies can enhance or hold back diffusion of technology, depending on their approach to regulating mechanisms, privatization, and free competition (Hargittai 1999).

In a case study done in Chile, Eliza Tanner Hawkins states that Chile is a successful case where changes in government policies dramatically increased internet access from about 2 percent of the population in 1998 to 23.8 percent in 2002. As of 2010, internet access has reached 50 percent. The existing technologies have a direct relation in the diffusion of new technologies. With respect to the internet, existing telecommunication networks play a vital role in connectivity.

The internet penetration for Asia in 2010 is 21.5 percent, with the population of internet users being 42 percent, compared to North America where internet penetration is 77.4 percent for 13.5 percent of users in 2010. Similarly, there is a huge disparity in the Internet Penetration Rate (IPR) among the Asian countries. Countries like Japan, South Korea, Singapore, Brunei, and Malaysia have more than 50 percent IPR, whereas Cambodia, Bangladesh, Myanmar, and Timor-Leste have less than 1percent IPR. The history of internet shows that the government has to play a major role in the development of the information technology, which includes internet.

Education

The population's level of education and its English language proficiency are also relevant to the internet connectivity. In the case of the internet's global spread, countries with better educated population will be more likely to show higher rates of internet diffusion than nations

with less educated citizens (Hargittai 1999). Given the prominence of the English language in the content of the World Wide Web (WWW), level of English proficiency may affect the number of people interested in using the medium (Hargittai 1999). It is very hard for a country like Nepal or Pakistan to reach the Internet Penetration Rate enjoyed by Singapore or Japan when the majority of their adult population is illiterate (Kay et al 2004).

Political Stability

Political instability in Asian countries does not allow any government to hold office for long enough to be able to make any drastic changes in the field of technology. Political stability is an important issue in the sense that governments, which may not stay in power long, are more reluctant to invest in internet development because such investment of time, effort, and resources may not lead to immediate results (Kay et al 2004).

As the internet has become fully integrated into the economic and social life of people, studies have been performed to understand the changing social structure. It is important to understand how existing urban and country hierarchies might be affected by these changes (Zook 2000). The studies done on the use of internet have concluded that it brings a social isolation to the human society (DiMaggio et al 2001).

Therefore, we can conclude that global networks between nations connect that have access to the internet, and the poor countries that lack internet connectivity are left out of the global network. Cities have played an important role in the process of globalization for information exchange. The global structure for the internet reflects a shift in the geography of telecommunications networks and the emergence of a network of network cities (Townsend 2001).

CHAPTER 3

INTERNET CONNECTIVITY AND PENETRATION TRENDS IN ASIA

Asia is the largest continent that extends from the Pacific Ocean in the east to the Ural Mountain range in the west. Further, it extends from the Arctic Ocean in the north to the Caucasus Mountain range, and the Indian Ocean in the south. It is also the most populated continent which consists of China and India that are the two most populated countries in the world. The population of Asia is over 4 billion. There are about 56 countries in Asia, but with the continuous changing political boundaries, most of the previously Asian countries now fall in the Middle East or Europe. For this research 35 countries are taken into consideration excluding the Middle East and Western Europe.

The countries that are used in this study are: Afghanistan, Armenia, Azerbaijan, India, Maldives, Thailand, Indonesia, Timor-Leste, Japan, Myanmar, Turkmenistan, Bangladesh, Kazakhstan, Nepal, Uzbekistan, Bhutan, North Korea, Pakistan, Vietnam, Brunei, South Korea, Philippines, Cambodia, Kyrgyzstan, Singapore, China, Laos, Sri Lanka, Georgia, Macao, Taiwan, Hong Kong, Malaysia, and Tajikistan. This study is focused on these countries specifically because they share similar economic, political, cultural, and social conditions despite the fact that some countries in the list are technologically advanced and economically strong.

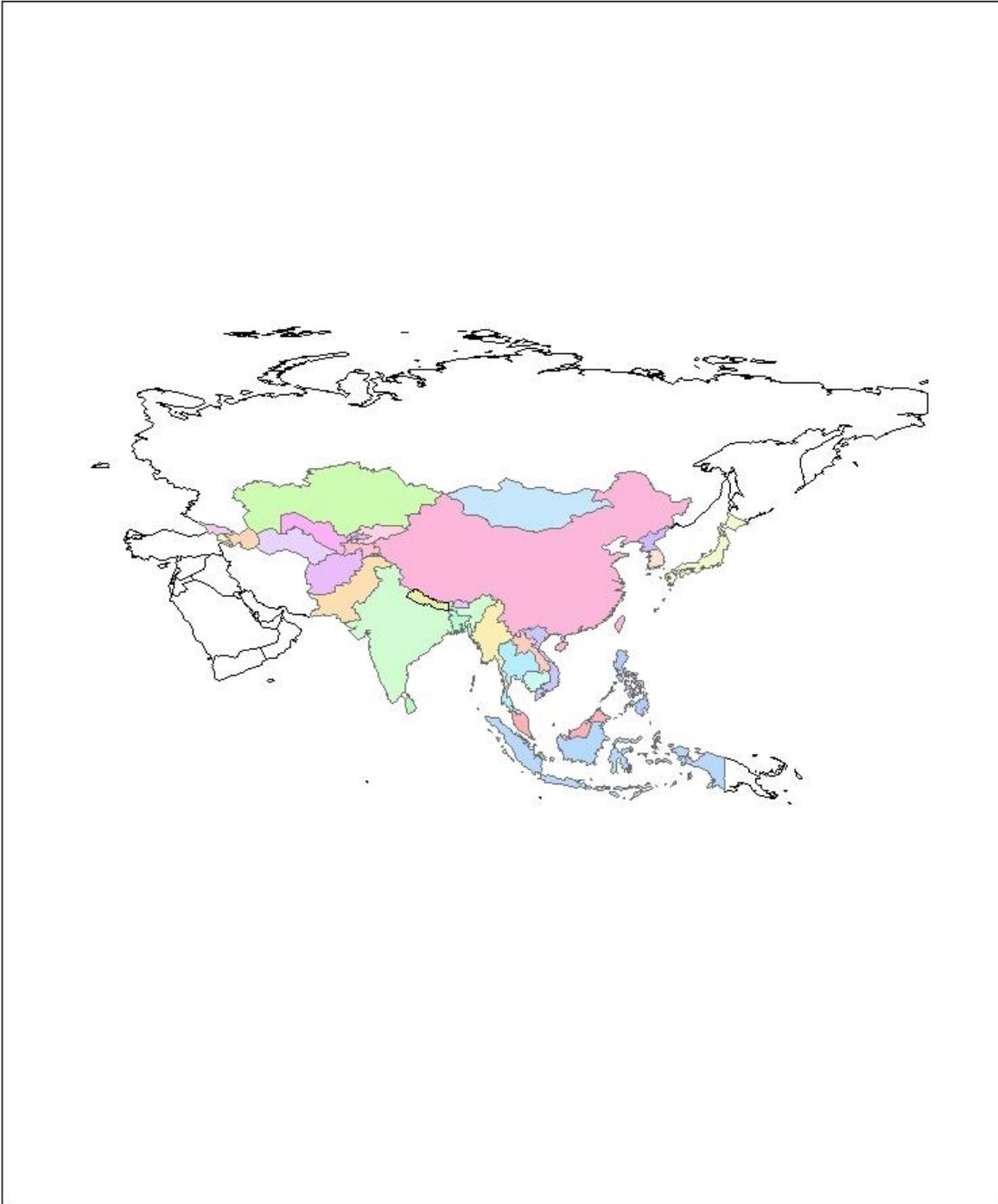


Figure 2. Map of Asia

Table 1

Continent and Internet Users

Countries	Percent of Internet Users	IPR (Internet Penetration Rate)
Asia	42	21.5
Europe	24.2	58.4
North America	13.5	77.4
Latin America/Caribbean	10.4	34.5
Africa	5.6	10.9
Middle East	3.2	29.8
Oceania/Australia	1.1	61.3

Source: *Internet World Stats* – www.internetworldstats.com/stats.htm

Above, Table 1 shows the “percentage of internet users” and the “Internet Penetration Rate”. The Internet Penetration Rate (IPR) is the percentage of the total population of a given country or region that uses the internet. The Percent of internet Users is the total population that uses the internet. Asia has the highest percentage of population that uses the internet, but the IPR for Asia is ranked second lowest with only 21.5. Therefore, we can state that there is a huge disparity between the Asian countries in internet access. There is a large number of the population that has little or no access to the internet. Comparatively, North America is ranked 3rd highest with 13.5 percent internet users, whereas the IPR shows that more than 75 percent of the population in the region has access to the internet.

Table 2 shows that there is an immense digital divide within Asia as well. The IPR among the Asian countries ranges from 81.1 percent in South Korea to 0.2 percent in Timor-Leste and Myanmar. Countries like Japan, South Korea, Singapore, and Hong Kong have easily accessible and reasonably priced means of communications. Due to the accessibility and low price, they are able to connect globally and develop economically and socially.

Table 2

Countries of Asia and IPR

Countries	IPR	Countries	IPR	Countries	IPR	Countries	IPR
Afghanistan	3.4	India	6.9	Maldives	22.2	Thailand	26.3
Armenia	7	Indonesia	12.3	Mongolia	11.3	Timor-Leste	0.2
Azerbaijan	44.4	Japan	78.2	Myanmar	0.2	Turkmenistan	1.6
Bangladesh	0.4	Kazakhstan	34.3	Nepal	2.2	Uzbekistan	16.8
Bhutan	7.1	Korea, North	-----	Pakistan	10.4	Vietnam	27.1
Brunei	80.7	Korea, South	81.1	Philippines	29.7		
Cambodia	0.5	Kyrgyzstan	39.8	Singapore	77.8		
China	31.6	Laos	7.5	Sri Lanka	8.3		
Georgia	28.3	Macao	49.5	Taiwan	70.1		
Hong Kong	68.8	Malaysia	64.6	Tajikistan	9.3		

Source: Internet World Stats – www.internetworldstats.com/stats.htm

Further, the countries like Myanmar, Bhutan, Timor-Leste, Sri Lanka, Nepal, Bangladesh, and Afghanistan are surviving in global isolation, and the digital divide is deepening. The economies of these countries are the major issue in the development of internet, which is also supported by other socio-economic factors like low literacy rate, GDP, and urbanization.

CHAPTER 4

METHODOLOGY

This chapter describes the data collection process, defines the study variables, and the methods of analysis. For this study, data was obtained by accessing on-line resources. There are two dependent and nine independent variables used in this study. To see the impact of socio-economic factors affecting internet access, six hypotheses have been tested; in addition six models were created to test the relationship between the independent and dependent variables. The results were subsequently analyzed with the help of Correlation and Regression.

As mentioned previously, the primary source of data consists of internet penetration metrics, the Human Development Index (HDI), and the Economic Freedom Index, which were accessed online. The data on the internet penetration metrics was obtained from the Internet World Stats' website, while the data on HDI for each country was accessed via the CIA – The World Factbook website, and the data on the Economic Freedom Index was collected from the website of Heritage Foundation. This research has applied the following variables at the nation-state scale to study the determining factors for internet usage:

- Internet Penetration Rate (IPR) in each country
- Internet Service Providers (ISP) per capita
- Purchasing Power Parity (PPP)

- Gross Domestic Product (GDP) per capita
- Literacy rate
- The percentage of urban population
- Fertility rate
- Country's status as a former colony
- Business freedom
- Property rights and
- Freedom from corruption

These variables were selected to serve as proxy data associated with key barriers of the diffusion of the internet and internet usage, specifically economic conditions, legal environment, educational attainment, and political stability.

IPR and ISP per capita are the dependent variables in this study. IPR is the percentage of the total population of a given country or region that uses the internet, while ISP per capita is the average of ISPs that is available per person. These variables are effects that are caused by the independent variables. The Independent Variables are Purchasing Power Parity (PPP), GDP per capita, fertility rate, literacy rate, the percentage of urban population, the country's status as a former colony, business freedom, property rights, and freedom from corruption.

Purchasing Power Parity (PPP) refers to the relative purchasing power of a nation, based on observed GDP and is hence a variation on GDP. It is calculated by bringing demand and supply of a currency into equilibrium for a long period of time. PPP is the exchange rate that equates the price of a basket of identical traded goods and services in two countries (The Economist Newspaper Ltd 1843). It is helpful when comparing living standards in different

countries, as it indicates the appropriate exchange rate to use when expressing incomes and prices in different countries in a common currency (The Economist Newspaper Ltd 1843).

The variable GDP per capita has been selected because GDP is a basic measure of a country's overall economic output. Fertility rate is a key component of the HDI and is associated with both educational attainment and economic conditions. Fertility rate is the average number of children a woman would bear in her lifetime, assuming typical child bearing age from 15 to 44. Literacy rate is another component of the HDI, which is directly associated with the education level of a country. Urban population is related with the economic development of the country. Higher urban population indicates a higher economic growth of a country and its people.

The variable, of whether the country was a former European colony, has been selected because it will help to explain the infrastructure development in the country compared to a country that was not colonized before. The country's status as a former colony is a nominal data, and to convert it to a scale data, answer "Yes" was measured as 1; and "No" was measured as 0. The historical association with a European power has a direct relation to the economic and social development of a country. The variables of business freedom, property rights, and the freedom from corruption are major components of the Economic Freedom Index, which is directly associated with the economic development of the country and is not only related to the legal environment but also to the political stability of the country.

For this study, regression and correlation were used to analyze the data and test the hypothesis. For this reason, the data from 2000 and 2010 were compared. The 2000 data lacks information on countries like Timor-Leste, Afghanistan and Bhutan because of their political situation. Timor-Leste got independence from Indonesia in 2002. The political situation of

Afghanistan is still controversial hence; there is very few information available about the country and its people. Bhutan's political system is constitutional monarchy, which is influenced by its religious background. Bhutan's first step toward modernization was lifting a ban on television and the internet in 1999.

Correlation

Pearson Correlation Coefficient is denoted by r and it is a measure of the correlation between two variables X and Y . It is used in the study to measure the strength of linear dependence between two variables. The Correlation Coefficient ranges from -1 to 1 . If the value is 0 , it implies that there is no linear correlation between the variables. A value below 0 implies that the variables are negatively correlated, where if Y decreases, then X increases. A value above 0 implies that the variables are positively correlated, where if Y increases, then X increases. For each set of data (2000 and 2010), the Correlation is analyzed between the dependent variables and independent variables.

Regression

The regression model includes the techniques for modeling and analyzing several variables at the same time, while the focus of the result remains unchanged. The focus of the regression model is the relationship between a dependent variable and independent variables (one or more). It helps to understand how the value of the dependent variable is influenced by the varied independent variables. The basic regression equation is: $Y = a + bx$, where X is the independent variable that is being used to predict Y .

The dependent variables are IPR in each country and the ISP per capita. The independent variables are PPP, GDP per capita, fertility rate, literacy rate, the percentage of urban population, the country's status as a former colony, business freedom, freedom from corruption, and the

property rights. Multiple regressions were used to learn about the relationship between the independent variables and the dependent variables. The data for these various socio-economic factors were collected for 35 Asian countries for the year 2000 and 2010.

Research Question and Hypothesis

Based on the information collected through a variety of scholarly journals, it has been accepted that there is a close relationship between the socio-economic factors and access to the internet. Therefore, the fundamental research question of this thesis is to recognize the major determinant factors of internet access in Asia and also to identify the distinct case in Nepal.

In the process of understanding the impact on internet access, various socio-economic aspects such as, PPP, GDP per capita, fertility rate, literacy rate, the percentage of urban population, and the country's status as a former colony were taken into consideration. Economic Freedom Index such as business freedom, freedom from corruption, and property rights are also measured to recognize the determinant factors of internet access in Asia. Among all of these factors, GDP is primarily an economic factor; hence the following hypothesis has been tested to see the impact on the internet access:

H₁: Gross domestic product statistically accounts for observed internet penetration.

H₂: Gross domestic product statistically accounts for observed Internet Service Providers per capita.

Further, to understand the specific role of all socio-economic factors in the accessibility to the World Wide Web (WWW), the following hypotheses were tested:

H₃: Gross Domestic Product; literacy rate; the percentage of urban population; fertility rate; the country's status as a former colony; business freedom; property rights; and freedom from corruption statistically accounts for observed internet penetration.

H₄: Gross Domestic Product; literacy rate; the percentage of urban population; fertility rate; the country's status as a former colony; business freedom; property rights; and freedom from corruption statistically accounts for observed Internet Service Providers per capita.

However, if country's income is measured with PPP the effect might be different. Therefore, two more hypotheses are created where, GDP is replaced by PPP and the independent variables such as, fertility rate, property rights, and freedom from corruption are eliminated.

H₅: Purchasing Power Parity statistically accounts for observed internet penetration.

H₆: Purchasing Power Parity; literacy rate; the percentage of urban population; the country's status as a former colony; and business freedom statistically accounts for observed Internet Penetration Rate.

Models

Six models were tested to analyze the observed relationship between independent variables and the response variables IPR and the ISPs per capita.

Model 1: $Y = a + bG$

Where Y represents Internet Penetration Rate, a is a constant and G represents Gross Domestic Product per capita. This model will help test that the GDP is a better predictor of the IPR. Since ISPs provide internet access, it has been anticipated that the GDP predicts the ISPs per capita. Therefore, Model 2 was formed to test the relationship between GDP and ISPs per capita.

Model 2: $Y = a + bG$

Where Y represents Internet Service Providers per capita, a is a constant and G represents Gross Domestic Product per capita. Furthermore, in the process to understand the influence and the role of various socio-economic factors on the internet accessibility another two models have been formed.

Model 3: $Y = a + bG + bL + bUP + bF + bC + bBF + bPR + bFC$

Where Y represents Internet Penetration Rate, a is a constant, G represents Gross Domestic Product per capita, L represents literacy rate, UP represents the percentage of urban population, F represents fertility rate, C represents the country's status as a former colony, BF represents business freedom, PR represents Property Rights and FC represents freedom from corruption. This Model is created to find out, whether the internet access based on observed IPR and GDP; literacy rate; the percentage of urban population; fertility rate; the country's status as a former colony; business freedom; property rights; and freedom from corruption varies cooperatively. The result will indicate the effect of all these variables toward the IPR.

Model 4: $Y = a + bG + bL + bUP + bF + bC + bBF + bPR + bFC$

Where Y represents Internet Service Providers per capita, a is a constant, G represents Gross Domestic Product per capita, L represents literacy rate, UP represents the percentage of urban population, F represents fertility rate, C represents the country's status as a former colony, BF represents business freedom, PR represents Property Rights and FC represents freedom from corruption. This Model is created to find out, whether the internet access based on observed total ISP per capita and GDP; literacy rate; the percentage of urban population; fertility rate; status as a former colony; business freedom; property rights; and freedom from corruption varies cooperatively. The result will signify the effect of all these variables toward the total ISP per capita.

Model 5: $Y = a + bPPP$

Where Y represents Internet Penetration Rate, a is a constant and PPP represents Purchasing Power Parity. This Model is created to determine the changes, if any, in the case that income and prices in different countries are expressed in a common currency. Further, in the

process to understand the influence of PPP and the various socio-economic factors on the internet accessibility model 6 has been created.

$$\textit{Model 6: } Y = a + bPPP + bL + bUP + bC + bBF$$

Where Y represents Internet Penetration Rate, a is a constant, PPP represents Purchasing Power Parity, L represents literacy rate, UP represents the percentage of urban population, C represents the country's status as a former colony, and BF represents business freedom. This Model is created to find out, whether the internet access based on observed total ISP per capita and PPP; literacy rate; the percentage of urban population; status as a former colony; and business freedom varies co-operatively. This will indicate the result of all these variables toward the total ISP per capita.

Over a decade of analysis, it has been noticed that the GDP of a country is the determining factor for the IPR. In addition to the GDP of the country, factors such as literacy rate and the percentage of urban population are also important in determining the development of the internet. The result shows a close association between IPR and all the other factors with GDP remaining the main determining factor.

CHAPTER 5

RESULTS

This chapter presents the results of the correlations between variables and the regression models. The results for both correlations and the models are presented chronologically. The correlation results illustrate a consistent relationship among the variables over the period of time. The regression models showed varied results for Internet Penetration Rate (IPR) and the Internet Service Providers (ISP) per capita over the period of 2000 and 2010.

Correlation

The correlation results for the year 2000 and 2010 were derived to observe the positive or negative relationships between the variables used in this study. The Pearson Correlation (r) in 2000 between IPR and GDP per capita is 0.917, which indicates that there is a positive correlation between IPR and the GDP per capita. The strength of the r value suggests that they are strongly correlated hence; GDP statistically correlates the observed co-variance in IPR. Therefore, an Increase in GDP per capita means an increase in IPR. Similarly, the Pearson Correlation (r) for ISP per capita and GDP per capita is 0.494, which shows a positive correlation. Among all variables, the strongest correlation is between ISP and GDP per capita, as well as the IPR and GDP per capita. Similarly, there is a strong correlation between ISP and the percentage of urban population as well as the IPR and the percentage of the urban population.

In Table 3, the Pearson Correlation (r) for IPR and the percentage of urban population is 0.751, which indicates that the percentage of urban population has a strong correlation with the IPR. The correlation between GDP and the percentage of urban population is, $r = 0.8$. This signifies a strong correlation between these two variables. The correlation between ISP and the percentage of urban population is also seen among the highest compared to the remaining variables. The r value for ISP and the percentage of urban population is 0.476.

Table 3

A listing of Pearson's correlation coefficient (r value) for all the variables in 2000. All the obtained Pearson's (r) value are statistically significant at $\alpha = <0.05$

	IPR	ISP	GDP	L	UP	F	C	BF	PR ²
ISP	.250								
GDP	.917	.494							
L	.284	.228	.311						
UP	.751	.476	.800	.544					
F	-.552	-.143	-.550	-.638	-.679				
C	-.224	.131	-.128	.076	.120	.125			
BF	.265	.065	.368	-.109	.218	.009	-.068		
PR	.133	.097	.281	-.017	.141	.030	-.134	.870	
FC	.267	.021	.372	-.246	.198	.039	-.134	.870	.776

The Economic Freedom Index has a moderate to weak correlation with ISP and IPR, in the year 2000. The correlation between IPR and the various Economic Freedom Indices has a correlation matrix that ranges from 0.1 to 0.2 approximately. There is no significance between ISP and freedom from corruption. Correlation between business freedom and ISP as well as property rights and ISP is very weak. The correlation between GDP and the Economic Freedom Indices are strongly positive and statistically significant.

² IPR = Internet Penetration Rate; ISP = Internet Service Providers per capita; GDP = Gross Domestic Products per capita; L = Literacy rate; UP = the percentage of urban population; F = Fertility rate; C = country's status as former colony; BF = Business freedom; PR = Property rights; and FC = Freedom from Corruption.

The Pearson Correlation (r) between fertility rate and the literacy rate is -0.638, which means that the correlation is strong and negative. The negative correlation indicates that fertility rate decreases if the literacy rate increases and fertility rate increases if the literacy rate decreases. Further, correlation between literacy rate and the percentage of urban population is seen quite significant with positive correlation of 0.544, and this indicates that the literacy rate increases as the urban population increases. This relationship between the literacy rate and the percentage of urban population demonstrates that education is very important for the society as it helps the society to move forward in the direction of development. In 2000, the relationship between the country's status as a former colony and rest of the variables, are either very weak or it is insignificant.

Table 4

A listing of Pearson's correlation coefficient (r value) for all the variables in 2010. All the obtained Pearson's (r) value are statistically significant at $\alpha = <0.05$

	IPR	ISP	GDP	L	UP	F	C	BF	PR ³
ISP	.185								
GDP	.869	.313							
L	.481	.233	.307						
UP	.794	.391	.806	.486					
F	-.567	-.350	-.566	-.681	-.588				
C	-.086	.159	-.023	.031	.133	.188			
BF	.302	-.007	.276	.101	.401	-.142	.040		
PR	.163	-.068	.201	-.181	.129	.140	-.047	.633	
FC	.193	-.048	.196	-.186	.139	.102	-.099	.620	.952

In Table 4, the Pearson Correlation (r) in 2010 between IPR and GDP per capita is 0.869, which indicates that there is a positive correlation between IPR and the GDP per capita. The

³ IPR = Internet Penetration Rate; ISP = Internet Service Providers per capita; GDP = Gross Domestic Products per capita; L = Literacy rate; UP = the percentage of urban population; F = Fertility rate; C = country's status as former colony; BF = Business freedom; PR = Property rights; and FC = Freedom from Corruption.

value of r also suggests that the correlation is strongly significant hence; the Gross Domestic Product statistically correlates with the observed co-variance in IPR. Similarly, the Pearson Correlation (r) between ISP per capita and GDP per capita is 0.313, which indicates a positive correlation. The value of r suggests that the GDP statistically correlates observed co-variance in total ISP per capita.

In 2010, IPR has the strongest correlation with GDP per capita, whereas ISP has a strongest correlation with the percentage of urban population. The Pearson Correlation (r) between ISP and the urban population is 0.391. This indicates a moderate and a positive correlation, which implies that ISP increases, if the percentage of urban population increases. The ISPs are business companies and they are mostly constrained in the urban area compared to the rural area. The correlation between IPR and the percentage of urban population is 0.794, and this indicates a higher significance between these two variables. This correlation demonstrates that the urban area is highly dwelled by the intellectual people with high income source, as well as the high number of ISPs, which increases the IPR of the urban area compared to the rural area.

The trend that was seen in the year 2000 is quite similar in 2010. The correlation between IPR and other variables, such as literacy rate, urban population, and business freedom seem to be positively significant. Fertility Rate is still negatively correlated with most of the variable in 2010 as it was in 2000. The Correlation between Literacy rate and Fertility rate is -0.681, which indicates that the fertility rate increases with a decrease in literacy rate. Unlike in 2000, the Correlation between IPR and business freedom in 2010 is 0.30, which shows the positive significance of these two variables.

The above correlation matrix for 2000 and 2010 indicate the similar pattern of relation between the GDP, literacy rate, the percentage of urban population and IPR. The Pearson

Correlation value for these variables illustrate that the correlation is strong and positive; therefore, if one of these variable increases, other increases as well. Overall, GDP is the major connecting factor for all of the variables in 2000 and 2010. The correlation among each of the variable and GDP is highest in the matrix. GDP has a strong and negative correlation with the fertility rate. But it has also been observed that the correlation is stronger in 2000 compared to 2010. This could be due to the fact that new innovations have filled in the gap of income and class; therefore they do not have as much effect as it used to have 10 years back.

The correlation was also derived for the 2010 data where, PPP (a variation on GDP) was used; and fertility rate, property rights, and corruption were eliminated.

Table 5

A listing of Pearson's correlation coefficient (r value) for IPR, ISP per capita, Purchasing Power Parity (PPP), literacy rate (L), the percentage of urban population (UP), country's status as former colony (C), and business freedom (BF) in 2010. All the obtained Pearson's (r) value are statistically significant at $\alpha = <0.05$

	IPR	ISP	PPP	L	UP	C
ISP	.185					
PPP	.818	.398				
L	.481	.233	.302			
UP	.794	.391	.839	.486		
C	-.086	.159	-.012	.031	.133	
BF	.302	-.007	.337	.101	.401	.040

In Table 5, the Pearson Correlation (r) between IPR and PPP is 0.818, which indicates that there is a positive correlation between IPR and PPP. The value of r also suggests that the correlation is strongly significant hence; the PPP statistically correlates with the observed covariance in IPR. The correlation derived for PPP has a similar result as GDP had in 2010. PPP has strong positive correlation with the percentage of urban population ($r = 0.839$) hence, the

correlation is highly significant. PPP has an insignificant correlation with country's status as a former colony, with a negative value of 0.012. PPP has a moderate correlation with ISP, literacy rate, and business freedom with the value of r being 0.398, 0.302, and 0.337 respectively. Therefore, the correlation here indicates almost no effect on the result when GDP is replaced by the variation of PPP.

The positive correlation between GDP and IPR can be clearly seen among the countries that were studied. The countries like Brunei, Hong Kong, Japan, South Korea, and Singapore whose GDP are approximately US\$ 30,000 – 50, 000 range have the IPR above 50 percent. To the contrast, countries like Nepal, Bangladesh, and Cambodia have the GDP approximately US\$ 1000 – 2000 range, and have the IPR below 5 percent.

Regression

Based on the studies performed by the scholars, economy is observed to be the most influential factor in the development of the internet. Therefore, Model 1 and 2 have been derived to see the effect of GDP on the IPR and ISP per capita. Model 3 and 4 have been derived to measure the collective effect of all independent variable on the dependent variable. Similarly, Model 5 and Model 6 have been derived to see the effect of PPP (variation of GDP) on IPR. The regression results for these models are calculated with the p-value threshold of 0.05. T value measures the statistically significant of an independent variable in explaining the dependent variable.

The regression Model 1 indicates the influence of GDP on IPR. Result presented in Table 6, shows that the model statistically accounts for 84 percent in 2000 and 75.4 percent in 2010. The significance of the model is 0.00, which implies that the model is statistically significant.

Table 6

Regression equation for Model 1, where IPR is the dependent variable. The independent variable and R^2 are statistically significant at $\alpha = <0.05$. T value is provided in parentheses ($t_{26} = 1.705$ for the year 2000; $t_{34} = 1.690$ for the year 2010).

Variables	2000		2010	
	Coefficient	Sig	Coefficient	Sig
GDP per Capita	0.917 (11.235)	0.000	0.869 (9.913)	0.000
R^2	0.840*		0.754*	

*significance obtained for the Model 1 is 0.00 for both years.

GDP is statistically significant in the model thus the internet access based on observed penetration and GDP varies co-operatively. It has been observed that the value of R^2 are very similar in these two years but has decreased over time. This signifies that the use of internet has broadened its area. It has become more affordable hence more people are able to take the benefit of the internet. Compared to the early years of innovations, more people can access it despite of the various economic circumstances.

Table 7

Regression equation for Model 2, where ISP per capita is the dependent variable. The independent variable and R^2 are statistically significant at $\alpha = <0.05$. T value is provided in parentheses ($t_{34} = 1.690$ for the year 2000; $t_{35} = 1.689$ for the year 2010).

Variables	2000		2010	
	Coefficient	Sig	Coefficient	Sig
GDP per Capita	0.494 (3.216)	0.003	0.313 (1.894)	0.067
R^2	0.244*		0.098*	

*significance obtained for the Model 2 is 0.003 in 2000; and 0.067 in 2010.

The regression Model 2 indicates low influence of the GDP on the ISP per capita. In Table 7, the model statistically accounts for 24.4 percent in 2000 and only 9.8 percent in 2010. The significance of the model is 0.03 in 2000 and 0.67 in 2010, which implies that the model is

statistically significant in the prior year but is statistically insignificant in later years. GDP is statistically significant for the year 2000 but is insignificant in 2010, thus the internet access based on observed penetration and GDP varies co-operatively in prior year but not in the later.

The values of R^2 are very low in these two years, which has dropped to 9 percent in 2010, and since the model in 2010, is insignificant the test encompasses that the GDP is not statistically significant in explaining the development of ISP. Based on the model performance, GDP does not account for ISPs. Since ISPs are business it is most likely that there are other factors which would be able to explain the drift but they are not used in this study.

Table 8

Regression equation for Model 3, where IPR is the dependent variable. All the independent variables and R^2 are statistically significant at $\alpha = <0.05$. T values are provided in parentheses ($t_{20} = 1.724$ for the year 2000; $t_{28} = 1.701$ for the year 2010).

Variables	2000		2010	
	Coefficient	Sig	Coefficient	Sig.
GDP per Capita	0.975 (4.771)	0.000	0.765 (3.344)	0.003
Fertility Rate	0.063 (0.474)	0.643	0.225 (1.303)	0.207
Literacy	0.009 (0.071)	0.945	0.316 (2.500)	0.021
Urban Pop.	0.058 (0.304)	0.766	0.123 (0.545)	0.592
Former Colony	-0.030 (-0.278)	0.785	-0.142 (-1.276)	0.216
Business Freedom	-0.029 (-0.116)	0.909	0.062 (0.425)	0.675
Property Rights	-0.085 (-0.430)	0.674	-0.452 (-1.347)	0.192
Freedom From Corruption	0.025 (0.115)	0.911	0.439 (1.374)	0.184
R^2	0.908*		0.805*	

*significance obtained for the Model 3 is 0.00 for both years.

The regression Model 3 indicates the relationship among the various socio-economic factors and IPR in 2000 and 2010. In Table 8, the model statistically accounts for 90.8 percent in 2000 and 80.5 percent in 2010. Therefore, it can be identified that there is a very high influence of predictor variables on IPR. Model 3, is statistically significant because the obtained

significance for the model is 0.00. The result represents that the variables are conducting in a predictable manner. In 2000, GDP is the only variable that is statistically significant in the Model, whereas in 2010, GDP and Literacy rate are statistically significant.

The result for Model 3 also has a similar drift as Model 1. The significant level of the model is high but has decreased over time. In the early years of innovation, the computer was considered to be sophisticated equipment which was used by a small group of highly intellectual people. With computers becoming mainstream, more people were able to use the computer/internet. Slowly it accommodated the rich people along with intellectual people, however, in 2010 the various socio-economic factors has the influence in the development of the IPR but has decreased compared to last decade. This signifies that the use of internet has indeed broadened its area and the mass usage of the internet will come to a stage where all the socio-economic differences will disappear among the nations and its people.

Table 9

Regression equation for Model 4, where ISP per capita is the dependent variable. All the independent variables and R^2 are statistically significant at $\alpha = <0.05$. T values are provided in parentheses ($t_{23} = 1.713$ for the year 2000; $t_{29} = 1.699$ for the year 2010).

Variables	2000		2010	
	Coefficient	Sig	Coefficient	Sig.
GDP per Capita	0.644 (1.884)	0.078	-0.507 (-1.265)	0.219
Fertility Rate	0.646 (2.534)	0.022	-0.683 (-2.148)	0.043
Literacy	0.309 (1.195)	0.249	-0.176 (-0.747)	0.463
Urban Pop.	0.147 (0.396)	0.697	0.439 (1.094)	0.286
Former Colony	0.146 (0.709)	0.488	0.252 (1.231)	0.231
Business Freedom	0.525 (0.986)	0.339	-0.248 (-0.928)	0.364
Property Rights	0.066 (0.176)	0.863	0.184 (0.301)	0.767
Freedom From Corruption	-0.833 (-1.902)	0.075	-0.010 (-0.018)	0.986
R^2	0.532*		0.305*	

*significance obtained for the Model 4 is 0.078 in 2000; and 0.341 in 2010.

In Table 9, the regression Model 4 indicates the relationship among the various socio-economic factors and the ISP per capita in 2000 and in 2010. The Model statistically accounts for 53.2 percent in 2000 and 30.5 percent in 2010. The obtained significance of the model in 2000 is 0.078, and in 2010 is 0.305, which states that the model is insignificant in explaining the relationship between the independent variable and the dependent variable. The relationship between the various socio-economic factors and ISP per capita has a very low statistical significance. Fertility rate is statistically significant in both 2000 and 2010; remaining none other variables are statistically significant in both years. The results indicate that there is a low influence of the variables on the ISP per capita and there could be other factors that have more influence on the ISPs. The other factors could be the government rules and regulations, cyber laws, and more that will continue to affect the ISPs in coming decade.

Table 10

Regression equation for Model 5, where IPR is the dependent variable. The independent variable and R^2 is statistically significant at $\alpha = <0.05$. T value is provided in parentheses ($t_{32} = 1.693$).

	2010	
Variables	Coefficient	Sig
GDP (PPP)	0.818 (7.787)	0.000
R^2	0.669*	

*significance obtained for the Model 5 is 0.00

Table 10 presents the regression result for Model 5 in 2010. It shows that the model statistically accounts for 66.9 percent in 2010. The significance of the model is 0.00, which implies that the model is statistically significant. PPP is statistically significant in the model; thus, the internet access based on observed penetration and PPP varies co-operatively. The result obtained here is quite close to the result obtained with GDP (*see table 6*).

Table 11

Regression equation for Model 6, where IPR is the dependent variable. All the variables and R^2 are statistically significant at $\alpha = <0.05$. T values are provided in parentheses ($t_{30} = 1.697$).

Variables	2010	
	Coefficient	Sig.
GDP (PPP)	0.436 (1.957)	0.062
Literacy rate	0.226 (1.796)	0.085
Urban Pop.	0.305 (1.222)	0.233
Former Colony	-0.160 (-1.411)	0.171
Business Freedom	0.057 (0.493)	0.626
R^2	0.728*	

*significance obtained for the Model 6 is 0.000

In Table 11, the regression Model 6 indicates the relationship among the various socio-economic factors and the IPR in 2010. The Model statistically accounts for 72.8 percent in 2010. The obtained significance is 0.00, which states that the model is significant in explaining the relationship between the independent variables and the dependent variable. The obtained result is quite similar to the result obtained in the Model 3 (*see table 8*). The relationship between the various socio-economic factors and IPR has a strong statistical significance. None of the variables are statistically significant. The Model indicates that individually, variables have low influence on IPR but collectively, there is a significant influence on IPR.

It was mentioned in chapter 4, that Model 5 and Model 6 were created to find the difference, if any, would occur by using the variation of GDP. The results obtained here, have similar experience with PPP and GDP in 2010 which, indicates that the IPR would not be different even if the income and prices in different countries are expressed in a common currency.

Overall, the results of the analysis are reliable with the research expectations and the scholarly literatures that were similar to this subject. Model 1, Model 3, Model 5 and Model 6 support the hypothesis 1, 3, 5 and 6. The factors that influences the IPR are more likely associated with the variables that are used in this study. GDP per capita is the overall income of the country and the economy being a major factor behind the development of internet, the results are reliable. Model 2, model 4, and model 6 showed that the various socio-economic factors do not explain the ISPs; hence, they are irrelevant unfolding the reasons for the development of the internet. In model 5 and 6 GDP was replaced by a variation of GDP (PPP); and the result indicated that the effect of PPP is similar to GDP on IPR. However, IPR is more important than ISPs in explaining the rationale for the development of the internet. As we have observed the results for ISPs and the IPR, the R^2 has comparatively decreased coming to the year 2010. The decrease is very prominent in the case of the ISPs, and this suggests that there is a noticeable drift which has entered into the trend of using the internet over the past decade.

Based on the results, GDP and PPP which is a most statistically significant variable has decreased over the period of time as well. This indicates that the tendency of use of internet has changed its direction. The access to the internet has crossed its barrier of class, income or wealth with the help of new innovations like Smartphone. The Smartphone's have changed the pattern or scale of usage of the internet and also has brought a huge explosion to the IPR. Therefore, with this explosion of newer devices, this study suggests that in future these socio-economic factors might not affect the internet development as it was affecting in past.

The results that were derived for the ISPs are statistically insignificant which points out that the socio-economic factors are unrelated in explaining the growth. Other than GDP and the percentage of urban population, none of the variables were correlated with ISP per capita. By

2010, the correlation among those two variables has diminished as well. Since, there is very little or no correlation, the results were insignificant. In the case of ISP, GDP does have the influence, but since ISP is a business, the study that would use Economic Freedom Index as variable might be more reliable than Human Development Index (HDI). PPP was also not significant explaining ISPs, as was expected. Therefore, we can conclude with an assumption that the income of the country has a very less part in the establishment of the ISPs in the country. In conclusion, this study suggests that the various socioeconomic factors would explain the rate of increment of the ISPs; however, there could be more research done with additional variables to look into the various rates.

CHAPTER 6

THE CASE OF INTERNET CONNECTIVITY AND PENETRATION IN NEPAL

Geography

Nepal lies between 84 degree E longitude and 28 degree N latitude. It is a landlocked country surrounded on the north by Tibet, which is a part of People's Republic of China and India on the east, west, and south. The total area of the country is 147,181 Sq. Km (CIA World Factbook 2006). The east-west length is 885 kilometers and north-south breadth varies from 145 to 241 kilometers (CIA World Factbook 2006). The country can be divided into three main geographic regions:

Mountain Region

The Mountain region is basically constituted the Himalayan range that stretches from east to west of Nepal. The Himalayan region includes the world's tallest mountain, Mt. Everest, and seven out of the world's ten highest peaks. The altitude of this region ranges from 4000 to 8850 meters. With an extreme elevation and climatic condition, the economic activity is almost zero. The basic economic activity is herding and trading. This region is very sparsely populated.

Hill Region

The hilly region constituted the two major hill ranges, the Mahabharat, and the Churia/Siwalik, which stretches from east to west of Nepal. It also includes several inter-mountain valleys, including the capital city Kathmandu. The altitude ranges from 1000 to 4000

meters. The hilly region of Nepal is the most populated region despite less economic activity. The decision-making power is centralized to Kathmandu valley, which makes it the political and cultural center of the entire country. Kathmandu Valley is the most populous and urbanized city in Nepal.

Plain Region

The plain region of Nepal is known as *Terai region* that stretches east to west along the Nepal-India border in the South of Nepal. The altitude ranges from 70 to 300 m above sea level rising up to the foot of the Churia/Siwalik range. The Terai region is known as the bread basket of Nepal because it has the highest economic activity compared to other two regions. The Terai region is full of agricultural land and dense forests, and most of the industries are established in the Terai region because of the easy access for the raw materials from agriculture. The additional benefit is the easy access to India for the people that live in that area, due to the free-border treaty between Nepal and India.

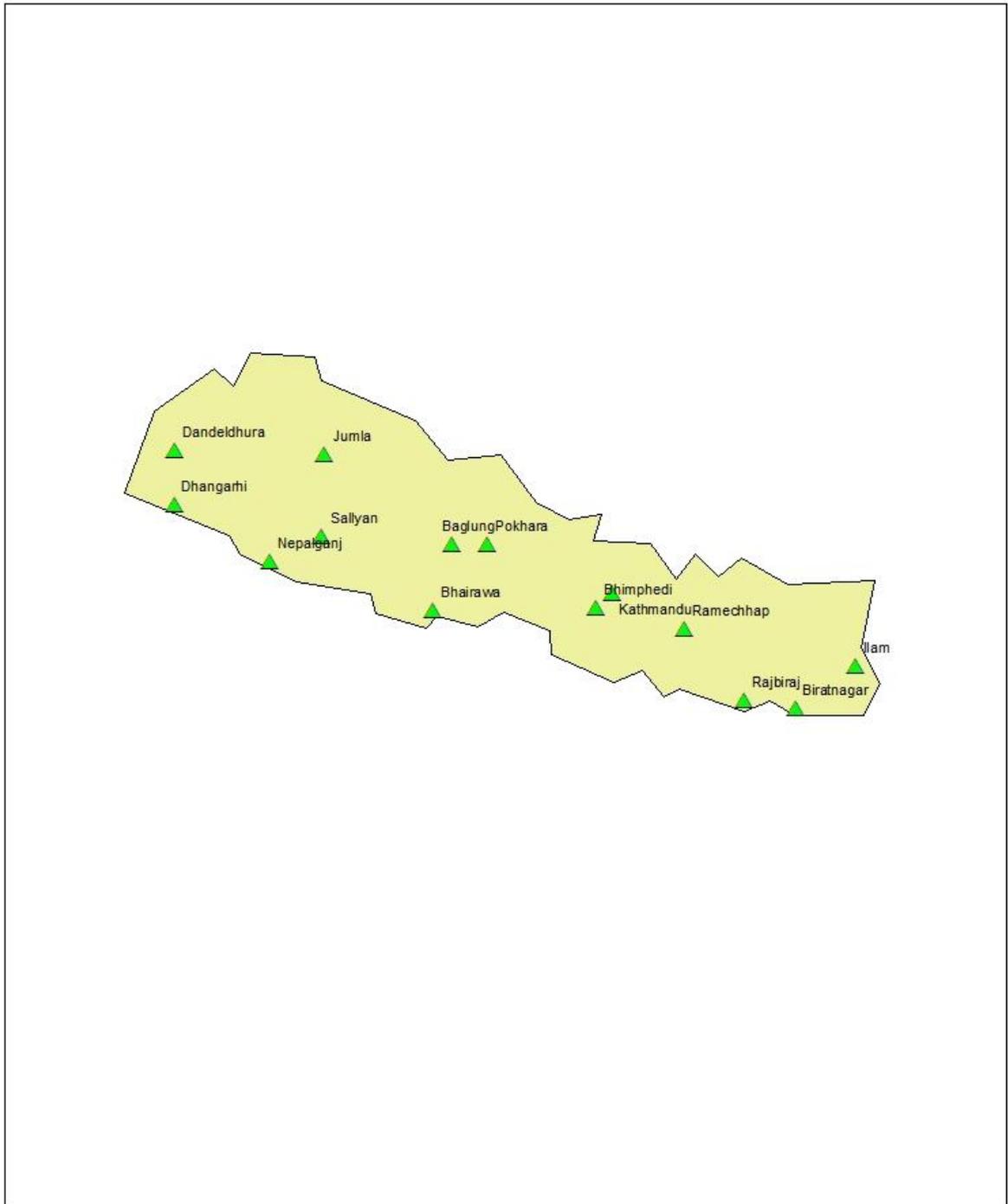


Figure 3. Map of Nepal

History

Nepal was unified in 1768 by King Prithivi Narayan Shah. Before unification, Nepal was a fragment of tiny nations. For 104 years, (1846 to 1950) there was a Rana family oligarchy with the Shah Kings as figureheads. Monarchy was restored in 1951, within the framework of a constitutional monarchy, but it was taken over by King Mahendra in 1960. He ended the multiparty democracy by discharging the elected government, and established a party-less Panchayat System for 30 years.

In 1990, King Birendra established democracy, and reinstalled a constitutional monarchy. Following the constitutional changes, there was an emergence of several political parties like the Nepali Congress (NC), Nepal Communist Party-United Marxist Leninist (NCP-UML), Rastriya Prajatantra Party (RPP), Nepal Sadbhavana Party (NSP), Rastriya Jana Morcha, Nepal Workers & Peasants Party (NWPP), and more. The Communist Party of Nepal (Maoist) launched the 'People's War' on February 13, 1996 with the aim to demolish the existing semi-feudal system. The semi-feudal system came to an end on September 21, 2006, which officially transformed Nepal into a present day Federal Democratic Republic of Nepal.

Internet in Nepal

The Royal Nepal Academy of Science and Technology (RONAST) in a joint project with the Mercantile Office Systems (MOS) introduced the internet in Nepal in 1993 (Montgomery 1995). RONAST set up a system whereby they could connect on a regular basis to Education and Research Network (ERNET) in Bombay, which was a United Nations Development Programme (UNDP), funded internet connection provided to Indian Institute of Technology. The service was only for the use of RONAST's scientific community to transfer e-mail messages. With the end of the ERNET project in 1994, MOS acquired the technology and set up the first commercial e-mail

service with a link to Australia. It also obtained a permanent leased line to Australia and the rights to administer the .np domain name (Montgomery 1995). A similar service was set up through Canada by another company named World Link in 1995. World Link was able to provide service for a lower price because the connection through Canada was comparatively cheaper than the connection through Australia. (Montgomery 1995).

Nepal Telecom or Nepal Telecommunications Corporation also known as Nepal Doorsanchar Company Limited (NDCL) is the leading telecommunication company of Nepal. It was a government company, but on April 14, 2004 it was converted into a Public Limited Company, which means it is partially privately owned. Nepal Telecom was the only provider of basic telephone services in Nepal until 2003. It has branches in 184 locations within the country. It is the only provider of Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN) and Leased-Line services in Nepal. It has a total of 243 telephone exchanges in various parts of the country, serving 559,380 Public Switched Telephone Network (PSTN) lines, more than 2.7 million GSM cellular phones, and 716,000 Code division multiple access (CDMA) phone lines as of May 2009. (Nepal Telecom 2007).

Nepal is ranked 87th in the number of internet hosts with 43,411 hosts, as estimated in 2009 (CIA World Factbook 2006). It is also ranked 108th in the list of internet users. The internet users estimated in 2008 for Nepal is 499,000 (CIA World Factbook 2006). Nepal Telecom has more than 14,000 dial-up customers. In order to meet the ever increasing demand of internet bandwidth, Nepal Telecom is expanding its Internet Gateway Backbone link by connecting with Bharti Airtel. Bharti Enterprises is one of India's leading business groups with interests in telecom, agribusiness, financial services, retail, and manufacturing. (Nepal Telecom 2007). In 2010, there were 43 Internet Service Providers in Nepal. (ISPAN 2000).

Nepal at Present

Nepal is one of the poorest countries in the world. With globalization around the world, Nepal has arrived at a stage where it is unable to maintain an identity. Besides, it has arrived at a plateau in identity development, in which Nepal is most likely introduced as the country that has Mt. Everest. The specific case study is focused on the reason behind the isolation of the country. In general, the geographical features of Nepal have been considered the major reason for isolation. The Himalayas in the North, the rugged foothills, and the valleys of the Himalayas in central Nepal constitute approximately 80 percent of the land and has isolated the country. The mountains and hills that constituted the country are not easily accessible.

However, many countries around the world have various topographic barriers, and it does not explain the barrier to the development of the internet. In today's globalized world, where internet plays a major role in the development of the country, Nepal has other reasons that serve as a major factor in the isolation of the country. Based on the analysis performed in this study and the literature available on similar topics, the development of internet infrastructure is associated with the socio-economic factors, Human development Index (HDI), and the Economic Freedom Index.

Internet was developed with the thought that it would help underdeveloped countries by bringing them closer to developed countries through internet access. The internet would remove physical barriers by helping countries access ideas that are available on the World Wide Web (WWW) for free. However, at present, after observing trends among developed and underdeveloped countries, the concept of the internet opening doors for underdeveloped

countries is not easily attainable, due to the barriers of internet development in the countries with a low HDI and a low Economic Freedom Index.

The developed countries are able to further develop with the internet, but for the countries that are very poor and underdeveloped, it is challenging to access the same information exchange as internet provides to developed countries. In addition, the concerns related to the development of internet are:

- i. The actual effectiveness of free information exchange as a means for countries to grow and develop further.
- ii. The negative consequences for connectivity in underdeveloped countries.

Studies have found various results regarding the improvement or lack thereof in any nation regarding internet development. However, this study looks at the basics of internet development with a focus on Nepal. In other words, will the use of the internet better serve the nation and its citizens by increasing government efficiency, daily public access to information, student achievement, and various other applications that serve a nation in moving forward?

Today's population that lives in Nepal is exposed to the internet and there have been a lot of changes in the society. Citizens of Nepal are exposed to the differences that surround them. In a matter of five years, the younger generations feel more connected with the world and understand much more about other nations and people, whereas other generations viewed the world as completely outside of their daily lives like a fascinating story.

The new generation now has access to the opportunities around the world which were not available to the earlier generation. The internet and media have played an important role for this

development in a very small frame of time. Nepal opened its border to tourism in the 1950s and earlier generations lived through a time in which the world was trying to reach Nepal. With the advent of the internet, it is now the new generation of Nepali people reaching out to the world.

With all these changes coming to the society, the government of Nepal has been trying to change the system and adapt to the new changes that would make it more accessible to the world to locate it. However, there have been barriers that have held back the country in reaching the world. The barriers that are holding back the country are economic condition, legal circumstances, educational attainment, and political stability. The internet has become a core factor for the development of the country. Therefore, the study examines the various HDIs and Economic Freedom Indices that have an effect on the development of the internet.

The variables that were studied are the GDP per capita, literacy rate, fertility rate, the country's status as former colony, the percentage of urban population, business freedom, freedom from corruption, and property rights. Based on these variables, the study shows how these barriers and variables are associated with the underdevelopment of the internet in Nepal. In the table below, we can see a major change in the IPR, literacy rate, and the fertility rate in just a matter of 10 years.

Table 12

Nepal 2000 and 2010

Variables	Nepal 2000	Nepal 2010
Population	24,702,119	28,951,852
Internet Penetration Rate	0.2	2.2
Internet Service Providers per capita	0.000000243	0.000001485
GDP per capita	1100	1200
Fertility Rate	4.68	2.53
Literacy Rate	27.5	48.6
Urban Population	13.39	17
Former colony (Y/N)	N	N
Business Freedom	55	71.7
Freedom from Corruption	27	25
Property Rights	30	30

Barriers to Development

GDP per capita

The GDP per capita of the country was \$1200 in 2010. The economy of Nepal has been affected since 1846. The economic barrier is one of the largest factor that has affected the development of Nepal in all the sectors of the society. Historically, Nepal was a trade center for India and Tibet. From the 1960s to the 1990s, King Mahendra completely shut down the country to the foreigners; hence, the political relationship with India, Nepal's biggest trading partner, was tenuous during those years. After democracy was established in Nepal in 1990, Nepal was opened to the world and the main source of income shifted from agriculture and service to tourism.

The agricultural land in Nepal is not enough to support the entire country; hence, Nepal had to rely on India for its basic necessities. Tourism, which was the biggest income generator, came to a standstill with the Maoist insurgency that began in 1996. At present, the major income source of Nepal is remittance. The GDP of the country is associated with the legal regulations

which are then related to the political stability of the country. Political instability, corruption, and a lack of efficient government regulations block foreign investments or even the interior investment. Any kind of investments are burdensome due to all these reasons.

Fertility rate

Fertility Rate is associated with the economic conditions and educational attainment. This statement has been supported by the result of the study. There is a negative correlation between the fertility rate and GDP, as well as the fertility rate and literacy rate. As we see in the above table, the fertility rate has come down to 2.53 in 2010 from 4.68 in 2000, whereas the literacy rate has increased from 27.5 in 2000 to 48.6 in 2010. The historical and political instability and the historical government decisions that were made during 1846, 1960, and 1990 are the contributing factors for the results that we see in the HDI of 2000.

Literacy rate

Literacy rate is associated with the education barriers, and education barriers leads to the economic, political, and legal situation of the country. The Literacy rate of the country explains a lot about the society itself. The Literacy rate of Nepal in 2000 was 27.5 percent with 54.5 percent male and 25.1 percent female. According to the Census Bureau, the literacy rate includes the population above 15 years that have the ability to read and write.

According to CIA world Fact book, this definition differs in each country, which is very true for Nepal. The literate population in Nepal includes people that know how to write their names. This does not necessarily mean that they have the ability to read and write, aside from their own name. This fact is especially true for the female population. The literacy rate has increased in 2010 and has come up to 48.6 percent, which includes 62.7 percent male and 34.9 percent female.

The society with a literacy rate less than 50 percent has fewer opportunities and possibilities of innovation and development. There is no prospect of development; because, the lack of education and information has created an environment in Nepal where more than half of the population is still learning the basic health and hygiene of everyday life. In such a society, the intellectual population is unable to implement the policies and regulations that could be followed by such a large percentage of illiterate people.

The country's status as a former colony

The country's status as a former colony has some impact on the basic infrastructure development of the country which is a benefit of the country in the present stage. Nepal was never colonized by any foreign powers in history. The British attempted colonization; however, the topography was a major barrier to gaining full control of Nepal. The British soldiers were not able to fight the Nepalese soldiers in the rugged foothills of the Himalayas and returned defeated. Currently, if analyzed just on the basis of development, if the British were not defeated, and it could have been Nepal's benefit in the context of the infrastructure development. The countries that are former colonies were left with the infrastructure that has helped them to further grow. In addition, it also exposes countries to the ideas that come from the people that have been ruling the world. They would have set up the basic foundation for their development in future. Among all the Asian countries that were studied, Japan being an exception, most developed countries are the former colonies of the foreign powers.

Urban population

As the result shows, there is a positive relationship between GDP and urban population; it increases as GDP increases. Therefore, urban population is associated with the economic conditions. In 2000, 13.39 percent of the population lived in the urban area and the rest lived in

the rural area. There is not a large percentage difference between 2000 and 2010. In 2010, only 17 percent lived in urban areas. Therefore, we can say that it's only 17 percent of the population that is actually exposed to the urban environment.

Business freedom

Business freedom is one of the major factors in the Economic Freedom Index. The overall rate of index on Nepal shows that Nepal is 146th with a 50.1 freedom score out of 183 countries. The 50.1 score means that it is mostly not free. As defined by Miller and Kim, business freedom is an individual's right to establish and run the enterprise without the interference from the state (Terry Miller 1973). In the case of Nepal, the political instability and corruption has led to such inefficiency in the government regulations that the economy of Nepal lacks the entrepreneurial enthusiasm.

Property rights

Property rights tend to be very weak as seen in Nepal due to the weak judicial system and very high corruption among government officials. This fact indicates there are legal and political barriers which affect the output of the economy. There has been no improvement regarding the property rights in the last 10 years. There is no development seen in the system that has tried to improve the property rights of the country, which would initiate individuals and corporations to make any investment in the country.

Freedom from corruption

The corruption level was 27 in 2000 and has dropped 2 points in 10 years scoring 25 in 2010. Corruption is a massive challenge associated with the developmental aspect of the country. Corruption in the government sector has made the system very inefficient, which has harmed the development of the country economically. The pressure on government officials and politicians,

due to the unstable political situation, brings along power changes frequently and prevents the effective forming of developmental planning. The inefficient system means less investment from people, which then creates an economic barrier toward the development of the country. Corruption has weakened the judiciary, and therefore, the development of Nepal has become more challenging.

CHAPTER 7

CONCLUSION

The conclusion derived on the basis of the analysis achieved by this study is that among all other factors, the economy is the fundamental factor for the development of the internet. As described in the previous chapters, the focus of research is Asia, and the Human Development Indices (HDI) of Asia was applied to perform the study. Among other HDI, it is believed that the Gross Domestic Product (GDP) is the most influential factor in the Internet Penetration Rate (IPR) of any country. The variables such as IPR, GDP, the percentage of urban population, and literacy rate are interrelated and since, GDP has the highest rate of influence in the growth of IPR; this interrelationship between the HDI and IPR confirms the importance of economic development of the country. There is a similar relationship seen among the Economic Freedom Index and the GDP. GDP influences the growth of business freedom; business freedom influences the growth of property rights, as well as the freedom from corruption. Therefore, if GDP is developed, most of the other factors will develop accordingly.

In Table 10, the countries that were used in the study were placed into four groups with their given IPR. There are 7 countries in the group which has IPR 50 percent and above, 14 countries from 10 percent to 50 percent, 9 countries 1 to 10 percent, and 5 countries below 1 percent. Nepal is among the nine countries that have IPR below 10 percent. The countries that are in other group have the similarities in the GDP or the political situation. The group that

Nepal is in does not have any similarities with each other. In the context of growth of Internet Service Providers (ISP) per capita, the difference is more among all the countries. Japan has the highest ISP with 73, the second highest is Nepal and India with 43.

Table 13

List of Countries with similar IPR

Range of IPR	Countries
Above 50 percent	Brunei, Hong Kong, Japan, Malaysia, Singapore, Taiwan, South Korea
10 percent to 50 percent	Azerbaijan, China, Georgia, Indonesia, Kazakhstan, Kyrgyzstan, Macao, Maldives, Mongolia, Pakistan, Philippines, Thailand, Uzbekistan, Vietnam
1 percent to 10 percent	Afghanistan, Armenia, Bhutan, India, Laos, Nepal, Sri Lanka, Tajikistan, Turkmenistan
Below 1 percent	Bangladesh, Cambodia, Myanmar, North Korea, Timor-Leste

The study of Nepal is a perfect example for the result attained from the analysis. Basically, the results indicate that the GDP, literacy rate, urbanization and business freedom are interrelated for the development of the internet. The case study on Nepal was performed to find out the reason why there is a lack of development of the internet services in Nepal? As the literature stated, the barriers for the development of any country are economic conditions, legal situations, educational attainment and the political instability.

In the context of Nepal, the political environment has never been stable. The political parties have been continuously jockeying for power. Nepal currently is yet to write a new constitution despite several attempts over past 3 years. In this environment of lack of stable policy making, the prosperity of the country cannot be imagined therefore development of the internet has suffered greatly. The cyber law was implemented in 2004 but it failed to address

many problems regarding the cyber related crime hence the law was not as effective. These laws need to be revised and updated with the changing times.

According to the survey performed by the World Economic Forum in Nepal in 2009, the most problematic factor for doing business is stated as the government instability, inadequate supply of infrastructure, corruption and policy instability. All of the situations that are mentioned by the World Economic Forum have a negative effect in the growth of any kind of economic activity in Nepal. On the other hand, the literacy rate of Nepal is 48.6 percent in 2010. With less than 50 percent literate population, the hope toward any innovation and development is minimal and in addition, only 17 percent of the population lives in an urban area. These socio economic factors have directly affected the GDP or the economy of the country, which has affected the development of the internet in Nepal.

The IPR of Nepal was 2.2 in 2010, which was 0.2 in 2000. In spite of several adverse factors of Nepal, the IPR in 2010 is comparatively more than what could be expected. This is mainly due to the usage of internet on cell phones. There has been a huge explosion of cell phone usage in the last 5 years in Nepal. At present, there are 7.618 million cell phone users in Nepal, which is approximately 30 percent of the population (CIA- The World Factbook 2006). The internet on cell phones is comparatively a lot cheaper than the DSL or cable. For a regular internet service, the price could range from US \$ 12 to US \$ 120 per month, depending upon the bandwidth and the package.

The Dial-up internet is the cheapest one available but it requires a phone line, which is a hassle because of the inefficiency in the Nepal Telecom department. Nepal Telecom, the only provider of landline service, has only been able to provide 820,500 lines until 2009. On the other

hand, the internet that is provided by the cell phone companies charges upon per usage, which is not as expensive as DSL or cable. The cost for browsing internet on cell phone is around US\$ 1.2 cents per 5minute, whereas the cyber café, that are considered to be the cheapest place to use the internet, charges US\$ 5 cents per minute. Therefore, IPR has increased with the increase in the usage of cell phone but this is only 30 percent of the population, which indicates that the digital divide within Nepal is growing and the result could be scary in the coming days if the divide keeps on growing in the same manner.

The rate of increase of ISPs has been slower in the recent years compared to the increase in IPR. The pattern of development of ISPs, in the 35 countries that were studied for this research, is very inconsistent and is hard to explain with the variables that were used in the study. Observing the pattern of ISPs, in these 35 countries it could be said that the government policies have implications on the establishment of the ISPs. The government policies for the operation of ISPs in South Korea and Hong Kong are more stringent than in Bangladesh or Nepal. The prior countries definitely have more stable policies in place to allow for healthy growth of ISPs. China, being a communist country, certainly has lot more restriction on the establishment of ISPs or any business than in India.

Therefore, it could be assumed that the government policies and cyber laws have more implication on the growth of ISPs. In the context of Nepal, there are 43 registered ISPs where the total IPR is only 2.2 percent. Most of these ISPs are located in Kathmandu, the capital city. Remaining, some of the ISPs are in Pokhara, which is a second big city of Nepal. Pokhara is also a major tourist destination of Nepal. The higher number of ISPs does not indicate the better service or development of the internet. The result showed that the variables used in the studied

does not have a strong implication on the development of ISPs therefore, from the observation of the situation in Nepal, it could be assumed that the weak government policies explain this situation better.

Since, the internet is a fairly new phenomenon in Nepal, more providers have moved into the ISP business. The licenses for the ISP are issued by Nepal Telecommunication Authority (NTA), and no limit has been imposed on the number of license that can be issued. There are not any specific criteria to meet by an individual or a company to apply for ISP, beside they just need to submit a proposal explaining the marketing, financial, management and technical aspect of the service. A license valid for 5 years can be obtained with fee amount ranging around \$4000-\$5000, which can be renewed in every 5 years (ISPAN 2000).

This study reinforces that the IPR is more reliable in understanding the development of the internet than ISPs. This holds true even for Nepal as well. Therefore in conclusion, with the drift in the usage and availability pattern of the internet, the issues of class, income and wealth might not be as important in the development of internet as geographical isolation. However, more research could be pursued with Economic Freedom Index to look into various other factors that affect the rate of development.

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