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THE CHALLENGES OF E-GOVERNANCE IMPLEMENTATION IN NEPAL

Master's thesis

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E-RIIGI LAHENDUSTE JUURUTAMINE NEPALIS

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Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

E-Governance, as an effective means of governance in Nepal was already conceptualized with the implementation of the first IT Policy in the year 2000. However, the implementation of e-Governance has not been largely successful. With failure to effectively implement e-Governance and the persisting digital divide, it has become necessary to find an alternative strategy for e-Governance implementation in the country. Socio-economic and cultural changes have created a huge growth in the telecom market in Nepal. Even still, policy makers and experts in the field have not yet set focus on m-Governance which could take advantage of the growth in the telecom sector and enable the country to implement an effective form of e-Governance using mobile technologies. The issues with e-Governance implementation observed in Nepal and the possibility of using a sustainable m-Governance framework for overcoming digital divide is researched.

This thesis is written in English and is 68 pages long, including 7 chapters, 5 figures and 4 tables.

Annotatsioon

E-riigi lahenduste juurutamine Nepalis

E-valitsemisest kui tõhusast avaliku halduse arendamise meetodist saab Nepali puhul rääkida juba alates 2000. aastast, mil riigis rakendati esimene Info- ja Kommunikatsioonitehnoloogia strateegia. Seni ei ole aga E-valitsemise rakendamine olnud kuigi edukas, mille ebaõnnestumiste ning püsiva digitaalse lõhe tulemusena on tekkinud vajadus uue, alternatiivse strateegia väljaarendamise järele, mis võimaldaks edukat üleminekut E-valitsemisele. Nepalis toimuvad sotsiaalmajanduslikud ning kultuurilised muudatused on endaga kaasa toonud telekommunikatsiooni sektori hüppelise kasvu, mis võimaldaks riigil arendada efektiivset E-valitsemise vormi, kasutades selleks mobiilseid tehnoloogiaid. Praeguseks ei ole aga poliitikakujundajad ning valdkonna eksperdid M-valitsemise arendamisele suuremat tähelepanu pööranud. Käesolev töö uurib Nepali E-valitsemise arendamisega seotud probleeme ning võimalusi kasutamaks M-valitsemise raamistikku valitseva digitaalse lõhe ületamiseks.

Lõputöö on kirjutatud inglisekeeles ning sisaldab teksti 68 leheküljel, 7 peatükki, 5 joonist, 4 tabelit.

List of abbreviations and terms

CSR	Corporate Social Responsibility
eGMP	E-Governance Master Plan
GIDC	Government Integrated Data Center
HCI	Human Computer Interface
HLCIT	High Level Commission for Information Technology
KIPA	Korea Information Technology Promotion Agency
LDCs	Least Developed Countries
MDB	Multilateral Development Bank
NEA	Nepal Electricity Authority
NT	Nepal Telecom
NTA	Nepal Telecommunication Authority
PPP	Public-Private Partnership
RTDF	Rural Telecommunication Development Fund
SDG	Sustainable Development Goals

Table of contents

List of figures

List of tables

1 Introduction

This thesis deals with the topic of e-Governance implementation in Nepal. The attempts at E-Governance implementation in Nepal have not been largely successful. Being a developing country, Nepal has major problems such as lack of infrastructure, illiteracy and political instability among others. E-Governance based on mobile technologies also termed as m-Governance has become a focus for many developing countries for sustainable development. But, there have not been many initiatives towards m-Governance in Nepal. While there is a need for rapid development, it is necessary that the development is sustainable in consideration towards environmental, socio-cultural and environmental dimensions. The thesis discusses on the challenges and studies possibilities of sustainable m-governance in the context of Nepal.

1.1 Background

Federal Democratic Republic of Nepal, which used to be a Democratic monarchy not long ago, is a nation that is nestled between Tibetan Autonomous region of China and India. It is a country of around 27 million people as per the census of 2011(Central Bureau of Statistics, 2014). It is a country of diverse cultures and geography. The country is struggling with development and its economy. Over 25% of those living in Nepal are considered impoverished, per World Bank (Uematsu, Rizal, & Tiwari, 2016). Nepal is a one of the Least Developed Countries or the LDCs as listed by United Nations. In 2016, the country was among the 48 countries that were listed as LDCs by the United Nations. The country has been enlisted as an LDC by the UN since 1971. Nepal also has a history of political instability. There have been major regime changes in the past four decades and even now it is in a state of transition. The new constitution of the country that was promulgated in 2015, is in process of implementation with major changes in governance structure (“President promulgates Constitution of Nepal,” 2015).

E-Governance in Nepal is lagging even when comparing to neighbors like Bhutan and Bangladesh with the E-government Development Index of only 0.3458 as per the United Nations report of 2016 compared to 0.3799 and 0.3506 of Bangladesh and Bhutan respectively (United Nations Department of Economic and Social Affairs, 2016). The core problem with e-Governance implementation is the political instability within the country. The Communist Party of Nepal – Maoists (CPN-M) started militant struggles in 1996 and it lasted a decade until 2006. The war took the lives of 13000 people (Do & Iyer, 2010). Since then the country has been in a lengthy process of political transition. This has caused development works to move in a sluggish rate.

Except for the political situation, another challenge for the establishment of e-Governance in Nepal is the economy and difficulty building infrastructure due to the geography (Kharel & Shakya, 2012). The weak economy and large population being under the poverty line means that many people in the country do not have access to proper education and computers (Ganesh Prasad Adhikari, 2010; Harris, Jacquemin, Ponthagunta, Sah, & Shrestha, 2003). Added to this, the geography of the country in most parts is extremely difficult and building infrastructure is a big challenge (Prennushi, 1999; Uematsu et al., 2016). Thus, many villages still do not have electricity, connection to internet or telephone network (Central Bureau of Statistics, 2015).

Some positive steps towards development of e-Governance in Nepal are evident. The government has recognized ICT as a sector of primary importance (HLCIT NEPAL, 2010; *IT Policy 2000*, 2000). There have been clear efforts on establishing a level of e-Governance in the country. Some landmark progresses have also been achieved such as the establishment of Government Integrated Data Center (GIDC), establishment of standardization document, establishment of Public Key Infrastructure and few others. The wireless communication infrastructure of Nepal has also improved greatly with mobile telephone access reaching all 75 districts of the country and 4G LTE network becoming available in January of 2017 (“Nepal Telecom launches 4G service,” 2017). As a result of the progresses being made Nepal graduated from Low-EGDI to Middle-EGDI in 2016 (United Nations Department of Economic and Social Affairs, 2016).

Even though Nepal does appear to have recognized the important of ICT sector and e-Governance, implementation of e-Governance in Nepal is lagging (Ganesh Prasad Adhikari, 2012; Dhakal & Istiaq Jamil, 2010; Kharel & Shakya, 2012; Sharma, 2014). Issues such as poor execution of e-Governance projects, lack of infrastructure and long term sustainability of projects have proved to be major roadblocks in implementation of e-Governance in Nepal (Ganesh Prasad Adhikari, 2010; Poudel, 2010). Multiple projects such as the National Telecentre Pilot Project (Harris et al., 2003) and the One Laptop Per Child (OLPC) project (Kraemer, Dedrick, & Sharma, 2009) that were aimed at reducing digital divide for implementation of e-Governance have deemed to be a failure (Lee & Sparks, 2014).

Mobile phones have been considered as the key towards sustainable development (Fuchs, 2008; Henning, Janowski, & Estevez, 2014; UNDP, 2012; United Nations Department of Economic and Social Affairs, 2016). Mobile devices provide the opportunity towards achieving UN's Sustainable Development Goals covering education, poverty alleviations and maternity health (Henning et al., 2014; WorldBank, 2012). Access to mobile phones have increased to such an extent that more people have access to mobile phones compared to justice or legal system (UNDP, 2012). Similar trend has been noticed in Nepal as well (NTA, 2016a). Considering the scenario, m-Governance may be the solution to the issues with sustainable development that has been faced by Nepal.

1.2 Problem statement

Bringing about progressive changes in a country with a struggling economy is challenging. While introduction of technology for developing countries is supported by many scholars and organizations, there are evidences that bringing about progressive change through technology alone might not always be successful (Danish, 2006; Heeks, 2006; Helbig, Gil-garcía, & Ferro, 2009). There are numerous factors affecting success of projects that introduces changes like new technology, processes, legal framework, human resource, availability of funds etc. Even though the government of Nepal had already acknowledged the fact that e-Governance is a means that can drive the country towards realizing socio-economic development, major challenges have caused progress

to be minimal (Dhami & Futó, 2010; Kharel & Shakya, 2012). Some of these challenges are low literacy rate, low per capita income, poor infrastructure, lack of human resources, political instability, lack of leadership commitment/coordination, limited financial resources and lack of awareness/training(Kharel & Shakya, 2012). So far the government has not been able to overcome these challenges to implement e-Governance in a more holistic way. Digital divide both at individual and institutional level is evident in Nepal (Sharma, 2014). Holistic implementation of e-Governance is not possible largely due to persistence of digital divide (Lazovic & Durickovic, 2012). One approach to overcome digital divide in Nepal has been use of "telecenters" which typically offers public access to computers, the Internet, and other communication technologies (Gopakumar, 2007; Lee & Sparks, 2014; E. M. Rogers & Shukla, 2001). Even though rural telecenters were being promoted as a means of narrowing the digital divide, the approach has not been successful at a satisfactory level. Most of the existing telecenters are not working properly due to sustainability problems (Dhami & Futó, 2010). The telecenters were started with the funds provided by the government. But, the fund provided was sourced mostly through aid and telecenters were funded only for 2 years. It appears most of the telecenters closed down after the funds were stopped (Lee & Sparks, 2014).

While the problem in achieving significant success in implementation of e-governance in Nepal has been a challenge in many ways, some literature discusses using of mobile technology for sustainable development in developing countries(Henning et al., 2014; ITU & OECD, 2011; UNDP, 2012; WorldBank, 2012). Based on available literatures, it is fair to consider that perhaps focusing more on mobile technology for e-governance in a developing country like Nepal might be the right way to go. Understanding the progress in e-Governance implementation, the socio-cultural and political environment and economic viability is important for designing an e-Governance framework that is best suited for a country and its context (Bwalya & Mutula, 2015; Stockdale & Standing, 2006). Nepal has considered sustainable development as an important agenda (International Development Research Centre, 2003; *IT Policy 2000*, 2000, "Panel directs ministry not to dissolve HLCIT," 2011; Ministry of Information and Communication, 2015). Sustainable development has been a key guiding principle for the United Nations(Sachs, 2012; Steer, 2008). Sustainability is an integrative concept

which considers environmental, social, and economic aspects as three fundamental dimensions (Hansmann et al., 2012). Mobile e-Governance or m-Governance is taken as a means for sustainable development (Henning et al., 2014; ITU & OECD, 2011; Pardeshi, 2014). Considering the importance of sustainability in context of developing nations, implementation framework for m-Governance in a country like Nepal should perhaps consider sustainability principles. Whether focusing on mobile technologies for e-Governance implementation helps towards achieving sustainability goals or not is something that needs to be studied while developing a framework.

1.3 Research Questions

As discussed in the section above, Nepal's implementation of e-Governance has not been largely successful. Reason behind failure of implementation of e-Governance has been greatly attributed to the failure to overcome digital divide (Dhakal & Istiaq Jamil, 2010; Sharma, 2014). Later developments in the telecom sector, however, shows that there is significant demand in the telecom sector in Nepal and a degree of realization for possibilities of mobile technology for e-services ("1.5m use mobile banking services," 2016, "Mobile phones third most traded commodity in Nepal," 2016, "NRB recognises mobile payment portals," 2017; NTA, 2016b; Sherpa, 2015). The mobile penetration rate in Nepal is already over 120% (NTA, 2017). Through this research, attempts to study the possibility of taking advantage of the high demand in mobile communication sector in Nepal for implementation of m-Governance is attempted to be studied and following research questions will be answered:

- What are the problems and progresses being observed in e-Governance implementation in Nepal?
- How can sustainability be defined in the context of e-governance in Nepal?
    - How can a sustainable m-governance implementation framework be designed for the context of Nepal that can overcome the persisting digital divide?

The first research question deals with the current e-Governance implementation scenario and the context of Nepal. The concept of e-Governance and use of ICT to optimize governance in Nepal was already envisioned with the first IT Policy of the Government of Nepal (*IT Policy 2000*, 2000) and implementation of e-Governance was already started with formation of NITC and HLCIT in 2002 and 2003 respectively (International Development Research Centre, 2003; Workshop, Management, & Shanghai, 2008). But, coming to 2017, still e-Governance implementation is lagging. The scenario and the context have however changed to great extent. The first research question of the thesis deals with the exploration of the issues with e-Governance implementation. It also deals with changing socio-economic and cultural context in Nepal since the drafting of e-Governance master plan of 2006.

The second question is a two-part question. The first part deals with the concept of sustainability in context of e-governance in Nepal. The concept of sustainability has evolved greatly and has become much more than just environmental protection. For any successful long term ICT project, the concept of sustainability is highly relevant (Dyllick, Hockerts, & Thomas Dyllick, 2002; Hilty, Lohmann, & Huang, 2011; Pargman, 2014). However, sustainability is a vague topic and often considered more of a buzz word(Palmer, Cooper, & Vorst, 1997). Thus, it is important to define what sustainability is and maintain a set of goals for sustainability. There have been several interpretations of sustainability in the field of ICT and Human Computer Interface (HCI) since the WECD report of 1987 (Dyllick et al., 2002; Heinberg, 2010; Hilty et al., 2011; Mingay, 2007). As suggested by Pedell and Sterling, definition of sustainability is dependent on the perspective of the stakeholders. Thus, first part of the second research question will try to find the most suitable definition of sustainability in context of e-Governance in Nepal.

Much of the e-Governance projects in Nepal are progressing as per the e-Governance Master Plan (eGMP) of 2006 prepared by Korea Information Technology Promotion Agency (KIPA). While the eGMP does consider use of mobile technologies, since the master plan has not been updated since it was drafted in 2006, much of the plans probably would have become outdated. A new approach for m-Governance implementation will probably be required. For the sub-question of the second question,

a hypothesis is also made that "*digital divide is the major reason behind ineffectiveness of e-Governance implementation in Nepal and implementation of a sustainable m-Governance model can overcome the issue of digital divide*". The second question deals with relevant factors concerning mobile communication infrastructure and technologies available in Nepal. An effort to analyze the plan and suggest improvements will be necessary. The question also acknowledges the surge in number of mobile users in Nepal that started in the late 2000s. This event has brought about a changed scenario in mobile communication industry in Nepal and has also opened a wide array of possibilities. The high penetration rate of more than 120% (NTA, 2017) might now mean that use of mobile technologies for e-governance may make it possible to overcome the digital divide that existed and prevented holistic implementation of e-governance.

1.4 Structure of thesis

The thesis is divided into 7 chapters. The first chapter is the introduction. Chapter 2 discusses about the case study research that we have used for this thesis. Also, the different activities that were conducted for the research will be discussed here.

The Chapter 3 is literature review. This chapter studies the available literature regarding m-governance in general and e-Governance in Nepal. Due to limited availability of literature related to e-Governance in Nepal, the approach has been taken to discuss the policy papers and plans of Nepal, as per which the e-Governance in Nepal has been implemented. Literatures that have been written related to these policy and plans are discussed as well. Most literatures about e-Governance in Nepal tend to discuss the challenges. These challenges have been analyzed. Some topics relevant to m-governance in developing countries are discussed as novel initiatives in m-Governance.

Chapter 4 discusses the different theoretical standpoints considered in this thesis. Different theoretical topics that are related to the thesis such as modernization, international development, sustainability, regional development and connected governance are discussed on this chapter.

The fifth chapter of this thesis discusses the results of the research conducted under multiple headings. Chapter 6 will further discuss the implications of the outcome of the results linking them to the research questions with the goal of answering the research questions. Further, the chapter will also go on to deduce a suggestive framework for implementation of sustainable m-Governance in context of Nepal.

The seventh chapter will produce an overall conclusion to the thesis and discuss the potential future research that can be done.

1.5 Conclusion

This chapter introduced the topic of the thesis and provided the background of the thesis. A brief introductory background of Nepal as a country and the e-Governance in the country was provided. The problem statement for the thesis was also discussed. The reasoning for the conduction of the work and the research questions were also discussed. Two research questions are asked with the second question being a two-part question with a main question and a sub-question. The fourth section of this chapter also discusses the structure of this thesis.

2 Case study research methodology

Case study research methodology is used for this thesis. Case study research methodology is one of the more often used research methodologies in the fields such as social sciences, psychology and political science among others (Runeson, Host, Rainer, & Regnell, 2012). Case study research method is considered a robust research method that is helpful when a holistic, in-depth investigation is required (Zaina, 2007).

According to Yin, case study methodology can be used for all three purposes of a research – exploratory, descriptive and explanatory (Yin, 2009). Yin emphasizes that case study research is most useful when the research question asked are "how" and "why" questions. Zucker suggests 3 stages of case study analysis – describing experience, describing meaning, and focus of the analysis (Zucker, 2009). Runeson describes two ways of doing a case study research – Inductive and Deductive (Runeson et al., 2012). In an inductive approach the theory is induced from the observation. In a deductive approach, however the research starts with existing theory, sets out a hypothesis and finally observation is made.

Ranging from topography and political instability to poverty massive challenges exist for implementation of e-Governance in Nepal (Kharel & Shakya, 2012). The challenges have been discussed in the literature review section of this thesis. Due to the existing challenges and the definitive interest in implementation of e-Governance noticeable in the country despite the challenges (Shah, 2010), it can be said that Nepal is an interesting country for the study related to e-Governance. Being a LDC, the case of Nepal was appropriate for studying how e-Governance may be helpful for speeding the development process in countries where development has been lagging. With the emphasis on e-Governance by organizations like ABD, UN, OECD and ITU for developing regions, Nepal has also seen lots of funds coming in for implementation of e-Governance. However, the progress so far with implementation of e-Governance has been slow. Thus, a study about m-Governance in Nepal, which is taken by many as a

natural next step in e-Governance (ITU & OECD, 2011; Pardeshi, 2014), seemed to be very significant.

For this thesis, more of an explanatory approach of case study methodology was used. Yin explains that "how and why questions are more explanatory and likely to lead to the use of case studies, histories, and experiments as the preferred research methods" (Yin, 2009). Study was conducted as a single case study of e-Governance implementation in Nepal to understand the issues with the e-Governance implementation process. The recent surge in mobile penetration rate in Nepal was also studied and explaining of the socio-cultural and economic aspects was attempted. How the contextual scenario in Nepal can provide an insight for broader implementation of mobile governance in Nepal was also studied. Case studies need to be explanatory case study when it is required to explain the phenomena in the data by examining the data both at a surface level and also in a deep level (Zaina, 2007). The case study uses deductive method towards making a case study.

Existing literature is discussed and theoretical overview is done as well at first. Preliminary data used in this thesis comes mostly from Government sources, reports from NGOs and previous studies. An attempt is made to understand the status of e-Governance implementation in the country. In additional to study of available literature and study of available data from various sources, field visits and expert interviews are used to understand the causes of ineffectiveness in e-Governance implementation. The phenomenon of surge in use of mobile communication has been studied. Data concerning the mobile communication such as penetration rate, coverage, service providers etc. have been taken from Management Information System (MIS) reports of Nepal Telecom Authority (NTA). Year-end MIS reports from 2006 when the e-Governance Master Plan was drafted to 2016 has been considered for study. To relate the socio-cultural aspects that could be related to the data related to the Mobile Communication, various data from Government sources, NGOs and material available online were collected. These data have been carefully analyzed to make clear sense of the scenario the data represented.

Further collection and validating of the data was also done using interviews. Total of nine interviews with key personnel involved in the sector from government agencies,

private companies and citizen representatives were conducted. Their opinions were tested against the different observations that were possible from the data. The attempt was to get opinions from representatives from different stakeholders. Of the nine interviewees, two were from Government agencies, two were community representatives, two were from the telecom industry, two were from the software and e-commerce industry and one was from the academic background. Expertise of some of the personnel overlapped multiple sectors as well. Of the nine interviewees eight were from Nepal and one from Estonia. The list of interviews from each stakeholder sector is given in Table 1 and list of interviewees with their background information and date of interview conducted is given in Appendix 1.

Table 1: Expert Interviews for case study

Sector	**Interviews**	**Goal of interviews**
Government Agencies	2	• Receive information and data verification • Understand government's view point of e-governance implementation • Enquire about status of projects
Community representative	2	• Understand issues and requirements from the perspective of the community • Investigate issues with telecenters
Telecom Industry	2	• Understand about the market demand and profitability of the telecom sector • Enquire about competencies and the technological capabilities • Find out views towards sustainability and CSR
Software/e-commerce	2	• Understand about consumer perceptions towards e-payment, e-commerce and other private sector usability of m-governance services. • Understand public-private partnerships and private sector's view about government's willingness to use ICT.

		• Understand more about private sector competencies
Academic/advisor to the government	1	• Enquire about ICT education, human resource • Enquire about overall interpretation of the government policies, plans and implementation strategies in ICT

In addition to the interviews, field visits was also done. Field visits to *Bungamati* community telecenter in *Bungamati* village of *Lalitpur* district was done to understand the scenario of telecenter and the accessibility of technology with the community in less central areas of the country. Visit of Government Integrated Data Center (GIDC) was also done to understand the organization better. Casual enquiries and informal conversations with staff and appropriate people available in the sites were also done.

2.1 Limitations

There may be some inherent limitations from the choice of the research methodology. There are several criticisms of case study analysis that there is sometimes lack of robustness and rigor as a research tool (Yin, 2009; Zaina, 2007). It is also argued that case study researches and qualitative research in general are mostly narrow and that their findings cannot be extended to wider populations (Atieno, 2009). The criticism is further more strong in case of single case study for the lack of generalizability (Donmoyer, 2000).

Another limitation that needs to be mentioned about is the issues with conducting research in developing countries. There is often weak or non-existing institutional accountability in developing countries (Litewka, 2011). Information is relatively hard to find and the problem with available information is that they are sometimes not verifiable. Accessibility to information or communication with the personnel with the information is difficult and often there are delays in responses or absence of any response at all.

The expert interviewees that were taken interview with were more approachable with use of local language and there may be slight linguistic nuances with translating from the local language to English. Even though the interviews were recorded, and transcriptions of the interviews were prepared in English, there may be some slight deviations. Several documents that were available in local language were not possible to be cited due to lack of official translations.

3 Literature Overview

This chapter discusses the existing literature concerning e-Governance in Nepal. E-governance is not too well researched topic in Nepal. There are limited literatures concerning e-Governance in Nepal. Concerning m-Governance, there are hardly any literatures that have focused specifically on m-Governance. Literature concerning e-Governance in Nepal has been discussed here and the policy papers and government plan documents have been analyzed. M-Governance has been taken as a sub-field of e-Governance and in some literature using of mobile devices for e-Governance has been discussed even if the term m-Governance is missing. Of the available literature, most are about the challenges and issues regarding e-Governance implementation and some about aspects of e-Governance such as telemedicine and e-Education. There are several policy papers and reports from government agencies and NGOs in relation to e-Governance in Nepal. These available literatures are discussed here. Definition and interpretation of E-governance and m-governance from perspective of available Nepali literature are also discussed. In additional to literature about e-Governance in Nepal, literatures regarding some novel initiatives in field of m-Governance from the prospective of developing counties are also discussed in this chapter.

3.1 E-governance and m-governance

Concepts of E-Governance have been discussed since several years in literatures concerned with ICT sector in Nepal. The IT policy of 2000 mentions using information technology to assist in e-Governance. A case study report from International Development Research Center published in 2003 mentions the Ministry of Science and Technology starting to discuss e-Governance (International Development Research Centre, 2003). Shakya and Rauniar (Shakya & Rauniar, 2002) mentions IT as a tool for improving governance in their article about IT education in Nepal. Similar view have been put forward by Harris as well writing about rural development through ICT in Nepal (Harris et al., 2003). The e-Governance Master Plan (eGMP) 2006 lists out

definition of e-Governance from organizations like World Bank, United Nations, and OECD (KIPA, 2006). There weren't any attempts to define e-Governance for the context of Nepal in literatures. However, considering other literatures which gives definition of e-Governance (Layne & Lee, 2001; Palvia & Sharma, 2007; United Nations, 2008) and analyzing the general gist of the Nepali literatures, an interpretation of the definition of e-Governance for the context of Nepal can be made. The definition of e-Governance used in this thesis is "inclusion of ICT in operations of the government with a motive of making them better".

M-Governance or mobile governance is an added layer to e-Governance that uses mobile-enabled devices and technologies (ITU & OECD, 2011; Pardeshi, 2014). In regards to m-Governance, there are many articles coming from or discussing Nepal and having focused on m-Governance. However, the idea of using mobile phone in topics such as e-Governance, e-Education, e-Health, e-Banking etc. have been discussed in government papers and other articles (KIPA, 2006; Paudel & Kafle, 2016; Sujan Shrestha, 2016). There are definitions of m-Governance that suggest it as a sub-domain of e-Governance that is concerned with use of mobile and wireless communication technologies and devices that have mobility ("About Mobile Seva," n.d., "Time for m-governance," 2012; ITU & OECD, 2011).

3.2 Evolution of ICT Policies of Nepal

Since the initial IT policy of the government of Nepal that was drafted in 2000, Nepal has been working towards slow but steady progress in ICT and e-Governance. There are a few available resources that have discussed the ICT and e-Governance policies in Nepal (Chapagain, 2006; International Development Research Centre, 2003; Martin Chautari, 2014). The initial progress of e-Governance in Nepal was slow. Volatile political situation due to the ongoing armed revolution from the Maoist Party of Nepal took a toll on development work as Maoists began with widespread destruction of development infrastructures (Lawoti, 2003). The economy took a hard hit. The real GDP growth rate of Nepal was 6.44% in 1990–91, which came down to 4.9% in 2000–01 (Upreti, 2006). Also the then centralized polity of Nepal has also caused lot of regions and minority groups in Nepal to be left out from progress (Lawoti, 2003).

Even if the IT policy of 2000 was the first IT policy in Nepal, the then His Majesty's Government of Nepal did come up with National Communication Policy in 1992 which was followed by The Telecommunications Act and Regulations in 1997(Chapagain, 2006; "Nepal Telecommunication Act," n.d.). These helped to lay the foundation of ICT framework in Nepal. However, a more comprehensive IT policy in Nepal was drafted in the year 2000(International Development Research Centre, 2003; Shields, 2009). Coming from the IT policy of 2000 to the Policy of 2015 lot of progress has been made in the ICT policy development in Nepal. The evolution of ICT policy in Nepal is further discussed.

3.2.1 Telecommunications Act and Regulations (1997)

The Telecommunications Act and Regulations in 1997, which was enacted after formulation of the National Communication Policy in 1992 was the first act that liberalized the telecom sector and allowed private sector and foreign direct investment (FDI) in providing telecommunication services (Chapagain, 2006; Martin Chautari, 2014). This also marked the formation of the Legal and institutional framework for the regulation of ICT sector. Nepal Telecommunications Authority as an autonomous regulatory body was also established in 1998 under this Act (Chapagain, 2006; NTA, 2004). This was a monumental change in the ICT sector in Nepal. Without this step, ICT sector would not have removed the state monopoly in the ICT sector and the sector would not have become competitive (Chapagain, 2006). Also, an important provision as per the provision of Telecommunications Act 1997 was the creation of Rural Telecommunication Development Fund. As per this telecom Licensee required to deposit 2 percent of their annual income every year on this fund to be used for development of IT infrastructure in rural areas(Silva & Tuladhar, 2005).

3.2.2 IT Policy 2000

The policy was developed under the Research and Development (R&D) Grants Program initiated by International Development Research Centre's Pan Asia Networking (PAN) program(International Development Research Centre, 2003). The Nepal IT Policy proposal was submitted to the committee by the National Planning Commission (NPC) in 1999. The policy was overly optimistic with the vision statement being "To place

Nepal on the Global Map of Information Technology within the next five years." (*IT Policy 2000*, 2000, p. 1). The main objective of IT Policy 2000 is considered to be promote knowledge-based society and knowledge-based industries (Chapagain, 2006; Dhami & Futó, 2010).The Government at the time did not possess the political will and sufficient resources to take actions as per the policy (International Development Research Centre, 2003). Still the policy development did mark the beginning of efforts towards e-Governance in Nepal and has been considered a crucial step by several literatures (Chapagain, 2006; Dhami & Futó, 2010; International Development Research Centre, 2003).

The major problem with implementation of IT policy of 2000 largely political and social instability (International Development Research Centre, 2003; Lawoti, 2003). But, there were many positives of the policy. The IT education did improve significantly (Shakya & Rauniar, 2002) and the need for legislature and institutional arrangements was highlighted. As a result a central body to guide the Government and implement e-Governance, The National Information Technology Center NITC was established in 2002(Martin Chautari, 2014).

Soon after that A High Level Commission for IT (HLCIT) was formed in 2003 under the chair of the Prime Minister to provide crucial policy and strategic direction to the Nepali IT sector (Ganesh Prasad Adhikari, 2012). The HLCIT had the Chief Secretaries of Ministry of Science and Technology, and Ministry of Information and Communications as vice chair. The president of the Computer Association of Nepal was also a member and representing the private sector. All in all, it was a highly authoritative body and at the time, establishment of the committee was seen very positive (Maharjan, 2015). The institutional structure of HLCIT is given in Figure 1. Crucial legislatures were introduced to support e-Governance as well after the formation of HLCIT. The Electronic Transactions Act, 2008, was a major achievement in IT legislation in Nepal that was crucial for implementation of e-Governance (Blythe, 2008; The Electronic Transactions Act, 2008). Other legislation like the Right to Information Act, 2007 also supports implementation of e-Governance (Karki, 2007). In terms of project implementation as well, there were some signification progress as a result of the IT policy. IT policy envisaged establishment of Government Integrated Data Centre (GIDC) under NITC that would serve as the government data center(Martin Chautari,

2014). The project was successfully implemented with the support of Korea International Cooperation Agency (KOICA) (Dhami & Futó, 2010). The construction of IT Park, intended for concentrated industrial activities for ICT sector in *Banepa* near the capital was also done as per this policy even though its use has not be as effective as intended (Dhami & Futó, 2010; International Development Research Centre, 2003; Martin Chautari, 2014; Paudel & Kafle, 2016).

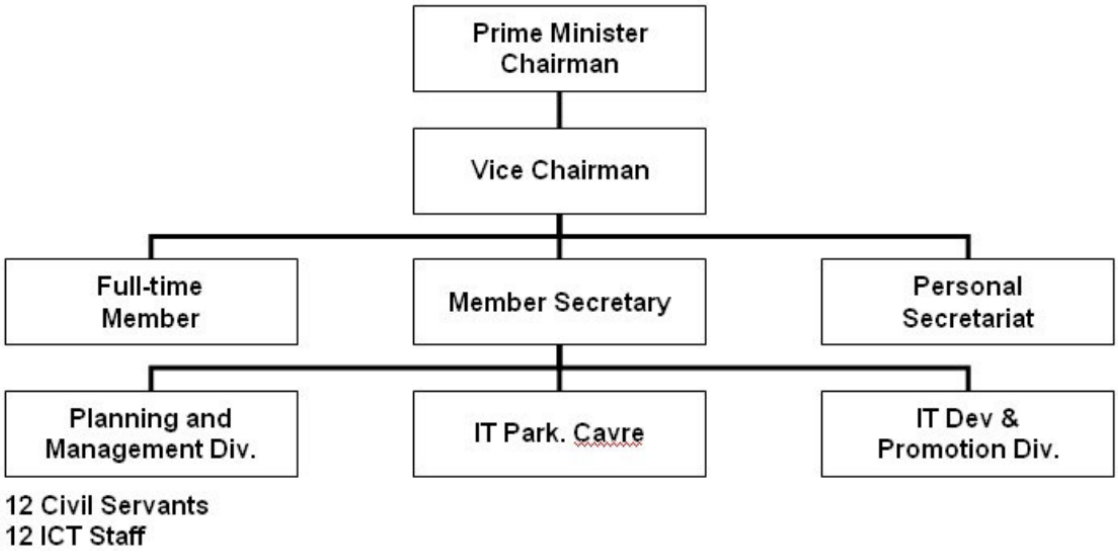

Figure 1: High Level Commission for Information Technology (Source: e-Gov Master Plan 2006)

3.2.3 IT Policy 2004 (Draft)

To overcome the incompleteness and inadequacies in the IT policy in 2000 a new IT policy was drafted in 2004 again. The revised policy had highlights such as strengthening the capacity of HLCIT and other institutional entities and establishing multi-media community telecenters at Village Development Committee (VDC) level (Chapagain, 2006). The concept of telecenters was seen a viable means for overcoming the digital divide (Harris et al., 2003). However, the telecenter project has not gone well since then and most of the telecenters have closed due to inability to self-sustain(Lee & Sparks, 2014). As Lee and Spark (2014) explain, the government's policy was to provide funds for establishing the telecenters and for operating it for 2 years. Then after,

the operators were expected to self-sustain the telecenters. With a lack of a proper plan on how to achieve this, most the telecenters eventually closed. The vision as per the IT policy draft of 2004 was “Transform Nepal into a knowledge based society by 2015 to become fully capable of harnessing information and communication technologies. Thereby, achieve the goals of good governance, poverty reduction and social and economic development.” (KIPA, 2006, p. 15). The draft never passed in time. It was only in 2010 that a new IT policy was passed.

3.2.4 Telecommunication Policy 2004

The Telecommunication Policy, 2004 proposed telecommunication as the “basic prerequisite of the development.” (Martin Chautari, 2014). The state owned Nepal Telecom Corporation (NTC) was privatized and it became known as Nepal Telecom (NT) which was as per the draft policy (Gautam, 2016; Shields, 2009). The main objective mentioned in the policy was to create favorable environment to make the telecommunication service reliable and accessible to all people at the reasonable cost throughout the nation in collaboration with the private sector. The policy realized the importance of ICT in development of a country and focused on universal access to Telecommunication services and liberalization of the Telecommunication Sector. The policy introduced increased transparency in licensing, more private sector participation, and reduced import duties on telecommunications equipment for deployment in rural areas (Shields, 2009). The policy included concepts like technology neutrality and open licensing regime. This policy was instrumental for the development of infrastructure in Nepal especially in the rural areas as it provided a base to exempt license fee and annual fee to rural telecommunication providers with certain limit of annual income (KIPA, 2006).

3.2.5 IT Policy 2010

The IT policy of 2010 was a much-needed revised IT policy after the failure to formally enact the IT policy of 2004. It took 10 years for the country’s second IT policy to pass. Focus was provided to the public private partnership (PPP) in the policy (Martin Chautari, 2014). The vision and the mission statements reiterated the sentiments from the Policy from 2000. But the policy this time discussed key points such as e-

Certification, Information Security and Data Protection, Intellectual Property Rights, Standardization and so on. The IT Policy 2010 has also stressed on ICT Education (Martin Chautari, 2014; Ministry of Education, 2013).

3.2.6 National Information and Communication Technology Policy, 2015

The IT Policy of 2015 is so far the latest ITC policy paper for Nepal. This policy states to be "intended to create foundation groundwork for an overarching vision of Digital Nepal" (Ministry of Information and Communication, 2015, p. 7). It focuses on concept of Public-Private Partnership (PPP), sustainable development, net neutrality, environmental impact and climate change. Goals such as 100% access to internet in Nepal by 2020, 80% government services to be available through digital means are also mentioned on the policy. Not many writers seem to have reviewed the policy paper yet. However, news articles related to laying of east-west 96 core fiber-optic cable in the mid-hill region as per the policy shows that progress of implementing policy is being made ("NTA, NT sign agreement to lay optical fibre," 2016). It has been criticized by as well for not acknowledging freedom of expression in ICT (Freedom Forum, 2016).

3.3 E-Governance implementation strategies and plans in Nepal

With the e-Governance Master Plan 2006, Wireless Broadband Master Plan 2012 and ICT in the Education Master Plan 2013–2017, there certainly are few strategic plans for implementation of e-Governance that have been used in Nepal (ITU, 2012; KIPA, 2006; Martin Chautari, 2014; Ministry of Education, 2013; D. Shrestha, 2015). Lot of literatures discusses the e-Governance implementation strategy in Nepal. Some articles that are available review the plans that have been formulated by the Government (Martin Chautari, 2014; Pariyar, 2007) while other further discuss about the issues and challenges in implementing these plans (Ganesh Prasad Adhikari, 2012; Dhakal & Istiaq Jamil, 2010; Pokharel & Park, 2009; Sharma, Bao, & Peng, 2014; D. Shrestha, 2015). There also are some additional literatures that have discussed new dimension that need to be added to e-Governance implementation plans (Paudel & Kafle, 2016; Shah, 2010; Shikha Shrestha, 2007).

3.3.1 E-Governance Master Plan 2006

The e-Governance Master Plan of 2006 (eGMP) is the basis for the e-Governance framework that is in process of being implemented in Nepal even though the plan is only a consultation report and not a formal document published by the Government of Nepal. The eGMP was initiated by HLCIT, NITC, Ministry of Environment Science and Technology (MoEST), Ministry of Information and Communication (MoIC), Ministry of General Administration (MoGA) and Ministry of Finance (MoF). The report was prepared by Korea IT Industry Promotion Agency (KIPA) which now has been renamed as National IT Industry Promotion Agency (NIPA) (D. Shrestha, 2015). For the implementation of the eGMP, a project termed the "ICT Development Project" was started through an ADB technical assistance project (Shah, 2010). Asian Development Bank (ADB) supported the "modernization" program and provided a Project Preparatory Technical Assistance (PPTA) to the Government of Nepal which identified 23 program components which included national ID, driving license, land record management, telecentres, government networks, and rural e-community (Dhami & Futó, 2010; Martin Chautari, 2014). The main goal of the e-GMP was as follows (KIPA, 2006):

- Establishing the vision, strategy and framework
- Selecting major projects and drawing the roadmap
- Defining direction of the execution organization
- Defining direction of restructuring legal framework

The project team for the development of e-government master plan consisted of E-government Working Committee in Nepal and E-government Task Force respectively from Nepal and Korea. Korea was also one of the countries that were used for benchmarking along with the USA. During the time both the countries were amongst the top in the e-Government readiness index (KIPA, 2006; United Nations, 2005). The eGMP identified 21 implications of the Critical Customer Requirement (CCR). A strategy was devised based on the 21 implications and 29 key projects were identified divided in to four groups Government to Business (G2B), Government to Citizen

(G2C), Government to Government (G2G) and infrastructure. Table 2 provides the list of these projects:

Table 2. e-governance implementation projects identified in categories(KIPA, 2006)

G2C	**G2B**	**G2G**	**Infrastructure**
1. National-ID System 2. Government Representative Portal 3. Passport registration System 4. E-Health Portal 5. E-Vehicle portal 6. E-Driving license 7. E-Agriculture 8. E-Post 9. E-Election	10. E-Customs 11. E-Procurement 12. Business Registration and Approval Management System 13. E-Commerce 14. E-Patent 15. E-Tourism	16. E-Tax 17. Immigration Management System 18. E-Education 19. E-Land 20. E-Authentication 21. Groupware 22. Management Information System 23. E-Pollution 24. Knowledge management system 25. Geographical Information System	26. Enterprise Architecture 27. Communication Network 28. Government Integrated Data Center 29. Public Key Infrastructure

The eGMP also provided a clear action plan and suggestions for other dimensions of e-Governance implementation such as legal framework, HRD and Infrastructure development, and organizational and budget planning (Ganesh Prasad Adhikari, 2012; KIPA, 2006). For the legal framework, six types of laws are suggested to be reviewed as pre-requisite laws. These include laws in Law on Informatization Promotion, Law on e-Transaction, Law on e-Government, Law on Protection of Personal Information, Law on E-Signature and Law on Disclosing Administrative Information(KIPA, 2006). For the organizational structure, a new TO-BE model was suggested which is shown in Figure 2. The strategy on budget planning showed heavy dependency on grants and loans while using of innovative taxation system is also mentioned.

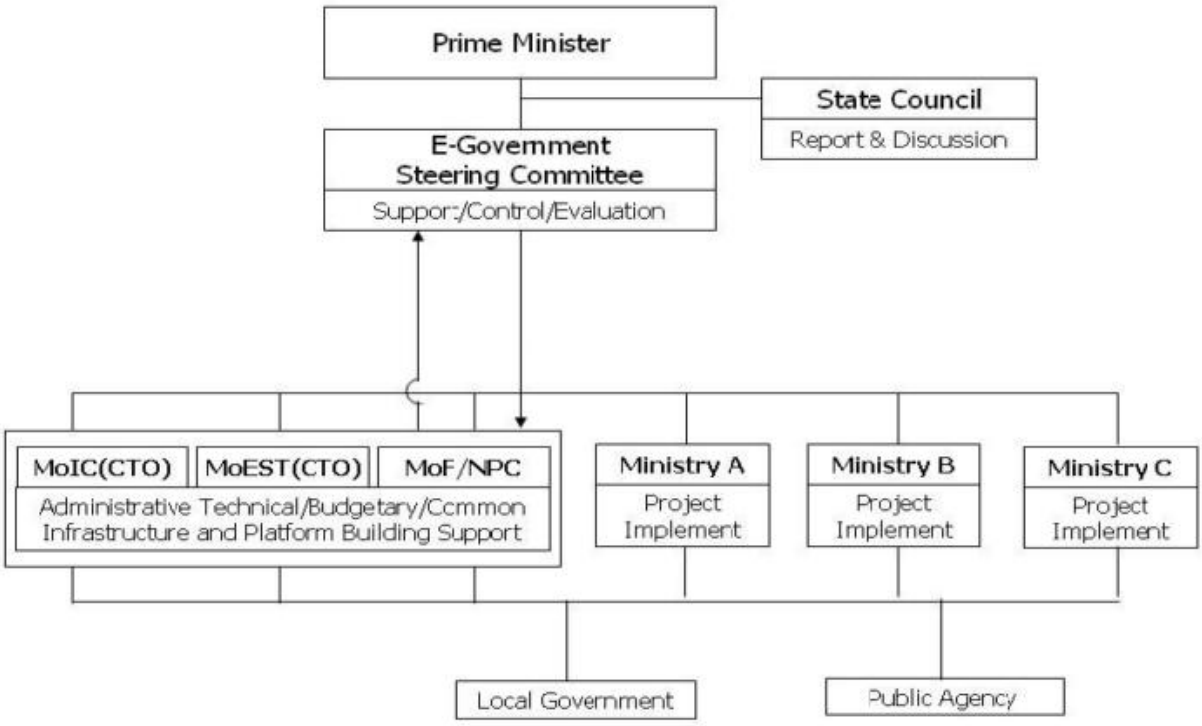

Figure 2: To-Be model for organizational structure (E-Gov Master Plan 2006)

3.3.2 Wireless Broadband Master Plan 2012 (draft)

In addition to the eGMP, the draft of the Wirelesss Broadband Master Plan 2012 prepared by The International Telecommunication Union (ITU) for the effective use of broadband technology in Nepal is also an important paper available for strategic planning of e-Governance in Nepal (ITU, 2012; Martin Chautari, 2014). However, a lack of literature discussing the wireless broadband master plan was observed. The Wireless Broadband Master Plan for Nepal was prepared by International Telecommunication Union (ITU) in conjunction with Korean Communication Commission (KCC) in 2012 (ITU, 2012). The report considers the SAARC "Plan of Action" for telecommunication services through the conferences of 1998 to 2008 for the regional context and discusses topics such as spectrum utilization, regulatory framework etc. The report also describes the key challenges for wireless broadband in Nepal and recommendations.

Table 3: Key recommended actions in Broadband master plan 2012

Date	Action
Q2 2012	• Undertake spectrum pricing benchmark study • Seek to migrate existing licenses into unified license structure • Motivate amendments to the Radio Act 1957 for new national telecommunication license (will assist future spectrum allocations)
Q3 2012	• Announce auction for new national cellular mobile telecommunication license • Commence pre-qualification phase • Commence re-farming of 900 MHz band and maximizing efficiency of use of the band
Q4 2012	• Release bidding document for new cellular mobile telecommunication license • Auction of new telecoms license with 900 / 1800 MHz allocations • Announce auction of 700 MHz band (assuming legislative changes)
Q2 2013	• Auction of first tranche of 700 MHz spectrum
Q3 2013	• New third national operator commences retail services
2014	• Consider auctioning additional tranches of 700 MHz band
2015	• Broadband access goals met • Conduct review of necessary adoption targets for 2020 • Consider auctioning additional spectrum
2018	• Consider allocating the 2300 MHz and 2.6 GHz bands (if not allocated earlier)
2020	• Adoption targets for 2020 met

3.3.3 ICT in Education Master Plan 2013–2017

The ICT in Education Master Plan was presented at the Asia-Pacific Ministerial Forum in Bangkok in 2012 and finally published in 2013 by the Ministry of Education(Ministry of Education, 2013; “Nepal presents ICT in Education Master Plan at Asia-Pacific Ministerial Forum in Bangkok,” 2012). The master plan has been prepared with the technical support from UNESCO. The plan considers the use of ICT in education as one of the strategies to achieve the broader goals of education (Sujan Shrestha, 2016). The main goals of ICT in Education Master Plan 2013 - 2017 are 1) to

expand equitable access to education; 2) to enhance the quality of education; 3) to reduce the digital divide; and 4) to improve the service delivery (Ministry of Education, 2013; Sujan Shrestha, 2016). The plan has sought to fulfill the gap in availability of any modality for application of ICT in education that had been stressed by IT Policy in 2000 and its revision in 2010 (Martin Chautari, 2014). While the plan from Ministry of Education is progressive in putting technologies as a key component of its drive for improving access to, and quality of, education, the progress in implementation of the plan is questionable except for a few Nepali non-profit organizations developing digital educational resources (Sujan Shrestha, 2016). However, the necessity for ensuring effective implementation of the plan has been mentioned in the National Information and Communication Technology Policy of 2015 (Ministry of Information and Communication, 2015).

Table 4: Policy and plans with year and overview

Policy and Year	Overview
Telecommunications Act and Regulations 1997	• Liberalized the telecom sector and allowed private sector and FDI • NTA as an autonomous regulatory body was established • Rural Telecommunication Development Fund established
IT Policy 2000	• Objective was to promote knowledge-based society and industries • Overly ambitious but lacked political will and sufficient resources to take actions as per the policy • Political instability was the biggest hurdle with ongoing civil war • NITC and HLCIT formed • It paved way for Electronic Transaction Act 2008
IT Policy 2004 (Draft)	• Was not enacted • Introduced the concept of using telecenters as means to overcome digital divide
Telecommunication Policy 2004	• Proposed telecommunication "as the basic prerequisite of the development." • Changed state owned Telecom Corporation to a partly

	privately owned company • Universal access to Telecommunication services and liberalization of the Telecommunication Sector was focused • Included concepts like technology neutrality and open licensing regime • Instrumental for the development of infrastructure in Nepal especially in the rural areas
E-Governance Master Plan 2006	• Initiated by HLCIT, NITC, MoEST, MoIC, MoGA and MoF • Report was prepared by KIPA • Identified 21 implications of Critical Customer Requirement and suggested 29 key e-Gov projects under taxonomy of G2B, G2C, G2G and Infrastructure • Suggested institutional and legal framework for implementation of e-Governance as well
IT Policy 2010	• Focus on PPP model for development of ICT • Critical topics such as e-Certification, Information Security and Data Protection, Intellectual Property Rights and Standardization were also covered
Wireless Broadband Master Plan 2012	• Prepared by ITU and KCC for the Government of Nepal • Was not enacted • Topics such as spectrum utilization and regulatory framework was focused on
ICT in Education Master Plan 2013-2017	• Prepared with technical support from UNESCO • Goals - 1) to expand equitable access to education; 2) to enhance the quality of education; 3) to reduce the digital divide; and 4) to improve the service delivery
National Information and Communication Technology Policy 2015	• Focus on PPP, sustainable development, net neutrality, environmental impact and climate change • Goals mentioned - 100% access to internet in Nepal by 2020, 80% government services to be available through digital means

3.4 Challenges in implementation

The most volume of literature available in regards to e-Governance implementation in Nepal discuss about the different challenges in implementation in e-Governance in Nepal (Dhakal & Istiaq Jamil, 2010; Dhami & Futó, 2010; Kharel & Shakya, 2012; Sharma, 2014). Most writers seem to have similar opinion about e-Governance in Nepal having lots of challenges. A holistic implementation of e-Governance does not only involve willingness from the government, but participation from citizen level too (Espinosa & Al-Maimani, n.d.; Ndou, 2004). Considering a country which has high illiteracy rate, low per capita income, political instability, and difficult geography, it is expected that e-Governance implementation in Nepal has major challenges to overcome. Most writers seem to share the same views (G P Adhikari, 2007; Dhami & Futó, 2010; Kharel & Shakya, 2012). The major challenges in implementation of e-Governance that have been mentioned in various literatures have been discussed further.

3.4.1 Low literacy rate

Nepal is one of the countries that have the lowest literacy rate in the world. The literacy rate in Nepal as of 2015 is only around 64.66% ("Nepal | UNESCO UIS," n.d.). Data regarding computer literacy was difficult to be found but is assumed to be low. There is also the issue with language. Computers and applications are not always available in local languages and not everyone knows English or even the National language Nepali. Thus a need for using local languages was felt (Chapagain, 2006; D. Shrestha, 2015). Further problem with literacy rate that has been discussed is that there is a huge gender imbalance in literacy rate and regional imbalance. Far less female population are literate and far less population in remote areas are literate (International Development Research Centre, 2003; Rai, 2004; Shikha Shrestha, 2007). Illiteracy is considered one of the causing factors for the persisting digital divide in the country.

3.4.2 Poverty

The Gross Domestic Product per capita in Nepal was last recorded at 689.50 US dollars in 2015 ("Nepal GDP per capita," n.d.). This is less than neighbors like Bhutan and Bangladesh. 25.2% of the population in Nepal lives below national poverty line

("Poverty in Nepal | Asian Development Bank," n.d.). This problem seem in implementation of e-Governance in Nepal has been discussed by a majority of writers on the topic (Sharma et al., 2014; Sherpa, 2015; Thapa & Sein, 2010). Struggling economy and widespread poverty means that implementations of development projects like that concerning e-Governance are difficult to fund and the people often do not have the means to buy computers (Poudel, 2010; Sherpa, 2015).

3.4.3 Poor Infrastructure

Most available literature discusses the infrastructure availability in Nepal being poor (Kharel & Shakya, 2012; D. Shrestha, 2015). While latest information shows lot of improvement in infrastructure ("NTA, NT sign agreement to lay optical fibre," 2016; NTA, 2017), there are still questions of quality and distribution. While there is access to telecommunication in all the 75 districts in the country, the question "how they are distributing in the districts?" is necessary to be asked (Kharel & Shakya, 2012). The problem with infrastructure is not just with communication infrastructure but also with other basic physical infrastructure such as roads, electricity, water supply etc. (Chapagain, 2006; Poudel, 2010; Sharma et al., 2014). The major problem with development of infrastructure in most part of Nepal has always been discussed as the topography and the lack of funds (Chapagain, 2006; ITU, 2012; Rai, 2004). To establish communication infrastructure through cables throughout the hilly and mountainous terrains is excruciatingly costly (Rai, 2004). With wireless, there is the issue of reduced availability of bandwidth compared to fiber optic cables. Lack of roads in several regions also means that maintenance is difficult and quality is poor (Kharel & Shakya, 2012).

3.4.4 Lack of human resources

IT education in Nepal started very early(Shakya & Rauniar, 2002). Computer science as an optional subject in secondary level school curriculum was already available during the 90s and the ICT Policy of 2000 already focused on ICT education (*IT Policy 2000*, 2000; Shields, 2009). But, a standalone ICT Education plan was only published on 2013 (UNESCO, 2015). There already were 4 universities that were providing ICT education in Nepal in 2002 (Shakya & Rauniar, 2002). Still, there is an issue with older generation

not having any ICT skills. There is also a “brain drain” which is seeing IT students opting for foreign education and jobs (Bhattarai, 2009). These issues with shortage of human resources in field of ICT in Nepal have been acknowledged by several writers (Dhami & Futó, 2010; Kharel & Shakya, 2012; Sharma et al., 2014).

Policy papers and government plans stress on the need for ICT human resource development and also seem to layout strategies for it (HLCIT NEPAL, 2010; KIPA, 2006; Ministry of Education, 2013). Some writers have written positively regarding ICT human resource in Nepal (D. Shrestha, 2015). Shrestha writes that surveys showed fair number of employees in the Ministries having knowledge of E-governance practices and human resource is slightly above average in the use of ICT systems and almost none of the employees are reluctant towards use of technology.

3.4.5 Political Instability

Political instability could be considered by far the biggest challenge in implementing e-Governance in Nepal as per most writers (Ganesh Prasad Adhikari, 2010; Dhami & Futó, 2010; Kharel & Shakya, 2012). Democracy in Nepal is still in its infant state and in the short time of democracy, the country has seen multiple regime changes, civil war from 1996 to 2006 and the Royal massacre of 2001 (Do & Iyer, 2010; Sujan Shrestha, 2016; Upreti, 2006). Most governments are short term and with frequent change of governments, continued efforts on policy implementations are lacking. In several cases IT Policy has slipped from the Government’s priority list (International Development Research Centre, 2003). Inability to conduct local elections since 1997 has also obstructed local development (Gellner, 2014).Ground level implementation of e-Governance is lacking due to this.

3.4.6 Lack of Leadership and Commitment/Coordination

The lack of leadership and commitment/coordination is a big challenged as explained by Kharel and Shakya (Kharel & Shakya, 2012). Implementation of e-Governance requires organizational and procedural changes in the way governance mechanism is structured. E-Government is a complex process, accompanied by high costs, risks and challenges, public organizations are generally resistant to the initiation of change (Ndou, 2004). Without a strong leadership, implementation of e-Governance is not possible. Writers

like Sharma, Kharel, Adhikari have pointed out the lack of strong leadership affecting ICT implementation in Nepal (G P Adhikari, 2007; Kharel & Shakya, 2012; Sharma, 2014). A lack of strong leadership means there is no commitment towards set goals and there is an overall failure in coordination of government bodies in implementing e-Governance.

3.5 Novel initiatives in m-Governance in Developing countries

M-governance being a topic that has been discussed by development agencies, governments and academics as a driver for development (ITU & OECD, 2011; Sundar & Garg, 2005; WorldBank, 2012). International Organizations have been focusing on m-Governance as a means for rapid development for developing countries. As per OECD m-government services through cheaper and ready-to-use devices are reducing existing barriers and empowering citizens to use a variety of government services in fields like health, education and finance among others (ITU & OECD, 2011). This section discusses some of the novel initiatives in m-Governance in Developing countries using available work in the related field.

3.5.1 Mobile ID

As per the e-Estonia portal, Mobile ID is a service that allows a client to use a mobile phone as a form of secure electronic ID ("Mobile-ID - e-Estonia," n.d.). Since mobile SIM can be identified to an owner of the SIM, loading RSA key-pairs into these cards and issuing public keys binding them with the user can serve as a secure authentication method. The user inputs PIN code using the key pad of the phone and the SIM card computes the signature on behalf of the user (Laud & Roos, 2009). While Estonia is the pioneer in applying Mobile ID, the technology has been copied of transferred to other countries as well including many developing countries. Azerbaijan's mobile-ID system - Asan-Imza, for the development of which Estonia or Estonian companies were also involved is a perfect example of how the technology and concept has been accepted by other developing countries (Krimpe, 2014). Mobile-ID is a lot more convenient technology compared to any other technology used for authentication. In the present context when mobile phones have become a must-have electronic device, the ability to

use mobile phone itself as an identity device puts forward a huge possibility. This possibility through mobile-ID is being acknowledged worldwide with also significant interest from developing countries like India and Nigeria ("Mobile ID gaining traction in India DATAQUEST," 2014).

3.5.2 Telemedicine

Telemedicine is an IT-based innovation that has the potential to support and enhance physicians' patient care as well as to improve health-care organizations' competitiveness (Hu, Chau, Liu Sheng, & Tam, 1999). Telemedicine is part of a wider process or chain of care which utilizes various technologies rather than being a single technology (Roine, Ohinmaa, & Hailey, 2001). While telemedicine is not entirely related to mobile communication or technology, it can be said that mobile technology is a major facilitator of telemedicine and telemedicine can be a major area of operation for mobile governance. Most literature strongly suggests telemedicine to be the future for medicine in developing countries that will enable accessibility of healthcare for rural areas.

Multiple initiatives in telemedicine have been effectively implemented worldwide to achieve positive outcome such as the "WebScope" initiative by the Thai Ministry of Public Health and the "Danish Briefcase" in Denmark (United Nations Department of Economic and Social Affairs, 2016). The two initiatives are of highly different nature with one aiming for poorest people in remote border areas in Thailand and the other was a pilot program that aimed at improving quality from the patient's point of view in Europe. But, both initiatives prove the benefits of the telemedicine in different ways. While some studies suggest that there is not yet a fully qualified Technology Acceptance Model (TAM) using acceptance of telemedicine technologies by Physicians, there have been increasingly positive results of studies of acceptance models (Hu et al., 1999).

A lot of articles discuss telemedicine with positive light in Nepal and the South Asian Region and there are several projects that are going on in regards to telemedicine in Nepal as well. In 2011, as per an article by Morrison, 25 hospitals in Nepal had a telemedicine facility, 20 with a reported expansion to five more districts in 2012(Morrison, Shrestha, Hayes, & Zimmerman, 2013). Research conducted at these

hospitals showed that there is potential to use technology to address human resources for health issues in low-income countries like Nepal itself.

3.5.3 E-Education

Education is undoubtedly one of the key drivers of development. Quality education is also one of the goals of sustainable development set by the United Nations. Most intergovernmental or non-government organizations consider quality education as a highest priority agenda for development. With introduction of ICT into the education sector, e-Education has been a popular discussion in topics such as regional development, IT and e-Governance.

E-Education is often misunderstood to be interchangeable term to distance education. However it is important to understand that though e-education and distance education do overlap to certain degree, these two terms are different in many aspects (Guri-Rosenblit, 2005). Keegan has defined the quasi-permanent separation of the teacher and the learner throughout the length of the learning process, as well as the quasi-permanent absence of a learning group throughout the length of the learning process, as two of the major characteristics of distance education (Keegan, 1986). However, both these are not necessarily the characteristics belonging to e-education. A fully ‘e’ education system would have three features - make learning materials available to students in electronic form, teach and support students online, provide online administrative services, e.g. enrolment, billing, information and advice (Rumble, 2001).

While interactive electronic medium and technology does seem to provide a new dimension to education, it is debatable if e-education does cut costs for providing education as explained by Rumble (2001). As per the author, the technology and business practices involved in e-education place additional costs on the learner and often, it is the population in developing countries which will be left out. It can be erroneous to assume that advantages of the ICT are self-evident in case of delivery of education. While ICT tools possess great potential, a proper strategy for implementing e-education for the benefit of the general population in the developing world is required. The challenge for many if not most teachers, particularly in developing countries, is changing their practice of teaching in ways that accommodate the use of technology

(Olson et al., 2011). There have been progresses with experimentation of e-education in Nepal like suggested by Poudel in a case study (Poudel, 2010). Other countries have bought into the idea of using e-education too. India can be an example for this. India's *Janmitra* e-platform that was implemented in the *Jhalawar* district in Rajasthan was successful and has been replicated in the state of *Uttaranchal* (Gorla, 2009).

3.5.4 M-Banking

Banking being one of the major activities in our daily functions in business or private life, cannot be left untouched by the influence of ICT. Like any other major aspects of our life, banking sector also has been using ICT for efficiency and effectiveness of their service delivery. There has been a general understanding that digitizing banking is the future and countries in the developing world have also pursued this path as far as banking is concerned. Recent demonetization of certain banknotes in India is a clear example of governments in the developing world pushing digitization of banking sector in hopes to curtail the shadow economy and crack down on the use of illicit and counterfeit cash (Shirley, 2016).

M-banking can be called a type of e-banking. Multiple variations of technologies related to m-banking have been introduced worldwide and are in use. Most literatures seem to focus on the convenience of using m-governance as it provides access to the service regardless of time and place, privacy and savings in time and effort (Suoranta, 2003). Despite the advantages the use of the mobile phone in banking actions has remained small up to recent times. Major issue with mobile banking that has so far been an inhibitor towards use of mobile banking is small screen with small amount of information which often makes operations difficult and takes away from the user experience (Laukkanen, 2007). However, with popularity of smart phones what usually have much larger screen compared to traditional mobile phones, there should be far less effect of the screen size and keyboard issues on user experience in mobile banking. This would certainly mean that with emergence of Smartphone as a common electronic device used by many, mobile banking would probably be more used as well.

M-banking has also been used in Nepal (Sherpa, 2015). E-banking is already popular in Nepal and m-banking has been seen as a convenient form of e-banking as well ("1.5m

use mobile banking services," 2016; Banstola, 2008). With increase in accessibility of mobile communication, it is possible that mobile-banking can become widely used across Nepal.

3.6 Conclusion

The topic of E-Governance is not as new to Nepal as it may seem. Ever since the implementation of the first IT policy of 2000, e-Governance has been emphasized by the government and policy makers. ICT has been realized as a driver for development and progress in the country and there are multiple policy papers and plans that the government has focused ICT in. The attempt to make a policy or plan for a framework of e-Governance was only done with the e-Governance Master Plan in 2006. But, reforms of the ICT sector were already taking pace with IT policy 2000, Telecommunication Policy 2004 and IT policy of 2004. The implementation of these policies has not been successful mostly due to political instability. Literature review of ICT and e-Governance related topics concerning Nepal suggest that while there is a steady progress in policy development process for ICT sector in Nepal, there are critical challenges that make implementation difficult.

The lack of focus on m-Governance shows that using mobile technologies as a form of e-Governance implementation has not been discussed much. For this reason, the novel initiatives in m-Governance such as e-Education, telemedicine, m-banking and mobile-ID from the perspective of developing countries were focused on. While not many literatures on these topics coming from or related to Nepal were found, there were few literatures that discussed few of these initiatives being used in Nepal at least in smaller scale. Concerning these technologies and initiatives like mobile-ID, telemedicine, e-education, developing countries like Azerbaijan and India seem to have been more successful. It is possible to take examples from these countries and related to these from the perspective of Nepal.

4 Theoretical Background

The topic of this thesis concerns with concepts that needs to involve discussions of several theoretical approaches. This chapter provides the theoretical background narrative for the thesis. Theoretical concepts that are relevant to the topic and the research are discussed further. In this section, concentration is provided on discussions about the core theoretical principles as per which the idea of development is based on in this thesis. The theoretical assumptions made for the research in the thesis are articulated here.

4.1 Approaches to development – what does modernization mean?

One of the earliest theories that seem to have been studied in the conglomeration of theories related to development is modernization theory which originated from Max Weber and Talcott Parsons (Kreutzmann, 1998). As per the modernization theory in the 50s and 60s,it is assumed that the development in the successful regions will trickle down to other regions given certain conditions and policies (Kingsbury, Remenyi, McKay, & Hunt, 2004). Thus, it was assumed that the poorer countries would follow the same pattern of development and reach the level of other countries in a later time. As per Bernstein (1971), the principal assumptions of Modernization theory are that 1) Modernization is a total social process associated with (or subsuming) economic development in terms of preconditions, concomitants, and consequence of the later and 2) that this process constitutes a 'universal pattern'. According to the modernization theorists there should be a fundamental change of traditional attitudes, habits of mind and patterns and institutions of authority (Vassilev, 1999). Since the 60s coming through the course of the maturation of the topic, modernization theory has been criticized by many commentators, especially by globalization theorists, dependency theorists(Santos, 1970) and world-systems theorists (Wallerstein, 1990). However many commentators feel that it became relevant again in the late 80s even though the theory was considered outdated already by the seventies (Ian Roxborough, 1988).

Literature about Modernization sometimes is also overlapped to some extent by another term, which is "Westernization". In many cases the European-North-American experience is portrayed as the blue-print model for modernization for all societies (Kreutzmann, 1998). Often modernization and globalization is diagnosed as processes that generates westernization of the developing world (Heath, 2004). For this reason, it is necessary to carefully distinguish between westernization and modernization. Heath (2004, p. 667) describes modernization as "set of changes in a system of values needed to establish compatibility with science and technology, along with the functional demands of a (western) capitalist economy." As per the author, many elements of so-called western values are themselves simply a product of modernization and liberalization and not traditional western values.

4.2 International development

International development is a wide concept that came into light after the emergence of the Modernization theory in the mainstream. The agenda of international development has been pushed forward more by international and multilateral development agencies. Available literature also suggests that after the fall of colonial era, to avoid the third world from leaning towards Communism, the West saw the need to push forward the agenda of International Development (Kilby, 2015). Kennedy enacted the US Act for International Development in 1961 from which the first of the development agencies such as Peace Corps, the Alliance for Progress, and Food for Peace emerged (Kilby, 2015). Importance towards international development can be looked through different perspective on the basis of other theories such as Weber and Parsons' Modernization theory (Kreutzmann, 1998), Dependency theory (Santos, 1970) and World Systems theory (Wallerstein, 1990).

Coming through decades of mainstream emphasis on international development, the concept of international development in most cases has become in tune with International Aids in form of grants and soft loans. The international Aids related to the concept of International development seem to be more long-term goals oriented compared to disaster relief aid and other short-term aid. In general, the idea is

developing or least developed countries (LDCs) should be supported with an objective of helping their economy to grow. In addition, in the last generation there also is an emphasis on the complementarities between private sector and development which has given rise to trends such as transnational corporations, foreign direct investment, corporate social responsibility, philanthro-capitalism (Black & O'Bright, 2016; R. Rogers, 2011).

International development is a relevant field of study in the bigger picture as it can be seen as the key towards solving the issues like terrorism, climate change, poverty and other contemporary issues ("The Role of International Development in a Changing World," 2007). It is necessary to perceive everything in the world as a large unit of society that is interconnected. Migration rate is at highest level and people are global citizens first. With developing world constituting the largest portion of population growth in the world, it is necessary to understand that the developing world cannot be ignored.

4.3 Dependency as a theory

Dependency theory has appeared as an alternative to theories such as Modernization theory and International Development theory. The most popular definition of dependency comes from the Brazilian author Dos Santos(Santos, 1970, p. 231), who states dependence to be:

> "*a situation in which the economy of certain countries is conditioned by the development and expansion of another economy to which the former is subjected. The relation of inter-dependency between two or more economies, and between these and world trade, assumes the form of dependency when some countries (the dominant ones) can expand and can be self-sustaining, while other countries (the dependent ones) can do this only as a reflection of that expansion, which can have either a positive or a negative effect on their immediate development*".

Most scholars who follow the dependency theory like Santos and Frank (Frank, 1989) seem to harshly differ towards those who follow the older theories that support Higgin's

dualistic theory (Higgins, 1956) who believe that the main obstacle to development is the internal socio-cultural condition of the traditional "backward" sectors of underdeveloped countries which lack the characteristics of the "modern" capitalist economies (Namkoong, 1999). As per Namkoong, the general belief related to the theory is that under-development is related to unequal terms of trade, which is disadvantaged to peripheral countries in the world market.

Dependency theory has come under fire to a great extent in the 80s after the failure from dependency theorists to explain economic achievements of the newly industrializing countries (Shie & Meer, 2010). Countries such as Taiwan, Singapore, China, and India have been so successful that the classic dependency theory has been suggested to be obsolete. However, with advancement in industrialization, there is a shift in the form of dependency but not entirely removal of dependency. The modern world has "technological dependency" as per the third type of dependency as per Dos Santos's three forms of dependency (Santos, 1970). The gap between the technological advancement between the developed and the developing countries are increasing as per Meer (Shie & Meer, 2010). Developed countries are not willing to consider technology transfer to developing countries. With the world in race for technological advancement to stay on top dependency theory does seem to be relevant still in the present context. There is also another form of dependency especially in LDCs which is the dependency on aid agencies (Castel-Branco, 2008).

4.4 Regional development

Development in virtually all cases is spatial. That is, process of development depends on the different factors that are spatial in nature. Studies related to regional development have become subject to growing interest due to the recognition that processes driving innovation and national economic growth are fundamentally spatial in nature (Dawkins, 2003). Regions have been defined differently by theorists ranging from Fox (Fox & Kumar, 2005), Hoover (Hoover & Giarratani, 1984) to Richardson (Richardson, 1975). The most recent definitions seem to support the idea of regions being spatially interdependent labor market. This approach is also termed as nodal approach in some cases. According to Hoover and Giarratani (1985), Nodal regions are regions where the

character of functional integration is such that a single specialized urban nucleus can be identified. Another concept in defining what a region is comes from Karl Fox (Fox & Kumar, 2005) who uses the concept of "*functional economic area*" (Dawkins, 2003). Fox's definition is a variation of the nodal approach. A functional economic area is an area that covers a relatively contained and cohesive network of trade (Robison, 1997). According to Dawkins, the functional economic area concept explicitly incorporates space and spatial integration among economic units into the definition of a region (Dawkins, 2003).

4.5 M-Governance as a means for Connected Governance

Connected governance is a terminology that has been promoted by UN, OECD and few other multilateral organizations as a form of e-Governance. As the report from UN (United Nations, 2008, p. 5) explains "The focus on strengthening the inter linkages between e-Government and connected government is forming the underpinnings of the new e-Government strategies in many developed countries. In many countries, the cornerstone of the e-government strategy is becoming service innovation achieved by moving to multichannel service delivery and a better use of back-end processes and systems. This is creating a drive towards more collaborative models of service delivery that can be referred to as connected government or networked government." Yih-jeou Wang from OECD explains, the organization does not look at e-Government or e-Governance as a technological notion or from a technological point of view (Wang, 2005). Wang claims that OECD is moving away from distinguishing between service delivery channels and seeing service provision as one integrated concept supported by technology.

Very strong voices supporting concept of Connected Governance in favor of general form of Electronic Governance specially in countries like India and Singapore exist (Bhattacharya, 2015; Saha, 2009). Saha defines Connected Governance as "a more sophisticated e-government model – one that links the citizens, businesses, organizations and other government entities in a seamless network of assets, capabilities, resources and infrastructure". Connected governance calls for governance system to be chain-oriented rather than system-oriented.

M-governance or Mobile-Governance is as the term suggests governance mechanism that uses wireless and mobile technologies. “Enabled mobility” offers lots of new opportunity towards improving public services and governance mechanism in a state (ITU & OECD, 2011). Mobile governance is not seen as a separate area of study compared to e-Governance. It is rather seen as a subset of e-Governance or an evolution in the field of study in e-Governance. M-governance does have lots of potential towards achieving what e-Governance has failed to achieve in case of developing countries (Abdelghaffar & Magdy, 2012; Danish, 2006; United Nations, 2008).

4.6 Sustainability

Even though some consider it as just a buzzword, sustainability in almost always mentioned alongside international and regional development related literature (ActionAid, n.d.; Black & O’Bright, 2016; Woolcock & Narayan, 2000). Within the different disciplines related to computer science as well, sustainability has lately become an important theme. For these reasons sustainability becomes an extremely important topic of discussion when considering e-governance or m-governance for development.

4.6.1 Defining sustainable development

The most widely accepted definition of sustainability comes from the Brundtland Report from the United Nations’ World Commission on Environment and Development (1987) which defines sustainable development as development as “meets the needs of the present generation without compromising the ability of future generations to meet their own needs.” However this definitions does has been criticized by many as well for its vagueness (Pargman, 2014). Another concept of sustainability is given by Heinberg’s five axioms (Heinberg, 2010) which are as follows:

- Any society that continues to use critical resources unsustainably will collapse.
- Population growth and/or growth in the rates of consumption of resources cannot be sustained.
- To be sustainable, the use of renewable resources must proceed at a rate that is less than or equal to the rate of natural replenishment.

- To be sustainable, the use of non-renewable resources must proceed at a rate that is declining, and the rate of decline must be greater than or equal to the rate of depletion.
- Sustainability requires that substances introduced into the environment from human activities be minimized and rendered harmless to biosphere functions.

One of the foundations of modern thinking about sustainability is the work on steady-state economics by Herman E. Daly (Daly, 1974). Daly's work suggests that "Our economy is a subsystem of the earth, and the earth is apparently a steady-state open system. The subsystem cannot grow beyond the frontiers of the total system and, if it is not to disrupt the functioning of the latter, must at some much earlier point conform to the steady-state mode". While modern economics is largely concerned about growth, it is necessary to understand that growth through an indefinite time is not possible. Regardless of the advancement of technology exponential growth will not be possible through advancement of the technology.

In addition to the ecological perspective of sustainability there is also the social sustainability (Pargman, 2014). Issues such as human rights, equity and equality among others are also vital factors for an overall sustainability. For this reason, social aspects constitute one of the three pillars of sustainability which are environmental, economic and social aspects. The same theme also is reiterated by the triple bottom lines as defined by Elkington (1998). There are also newer literature that concerns concepts of corporate social responsibility as a part of social sustainability (Black & O'Bright, 2016). Concepts of integrated development also focuses on the social aspects of development for sustainable development (Runde, 2016). It is in the interest of developing countries that social aspects are tackled in any strategies of development along with environmental and economic aspects.

4.6.2 UN's Sustainable Development Goals

UN's sustainable development goals or SDGs officially known as "Transforming our world: the 2030 Agenda for Sustainable Development" is a set of 17 goals. The Sustainable Development Goals are a successor to the Millennium Development Goals that consisted of 8 goals that were established following the Millennium summit of the

United Nations in the year 2000 (Singh, 2016). The 17 SDGs can be briefly summarized as, 1) no poverty; 2) zero hunger; 3) good health and well-being; 4) quality education; 5) gender equality; 6) clean water and sanitation; 7) affordable and clean energy; 8) decent work and economic growth; 9) industry, innovation and infrastructure; 10) reduced inequalities; 11) sustainable cities and communities; 12) responsible consumption and production; 13) climate action; 14) life below water; 15) life on land; 16) peace, justice and strong institutions; and 17) partnerships for the goals.

The sustainable development goals that adheres to the idea of Elkington's the triple bottom line (Elkington, 1998) have been globally accepted and have gained grounds quickly. Societies across the world have started to acknowledge that they aim for a combination of economic development, environmental sustainability and social inclusion (Sachs, 2012). Progressing from millennium development goals to SDGs, goals have not only been targeted for developing countries but for all countries equally. The SDGs is not about what the rich should do for the poor, but what all countries together should do for the global wellbeing of this generation and those to come (Sachs, 2012). However, the UN SDGs have been criticized as well. Singh (Singh, 2016) argues that SDGs are easy to state but hard to achieve due to some inherent inadequacies in the understanding and adoption of the concept of sustainable development.

4.6.3 Sustainability in ICT

ICT has always been seen as a means for sustainable development by several authors like Heeks (Heeks, 2008) and Thompson (Thompson, 2008). However there has not been as much political focus on "ICT for sustainable development" issue yet (Hilty et al., 2011). Concepts such as "smart homes" and "smart cities" have been seen to combine the concept of sustainable development with ICT technologies. Another concept which links ICT with Sustainability, is Green IT/ICT which is explained by Mingay (2007). Most of the studies related to Green IT/ICT focus on impacts of ICT on the environment or the possibility of energy conservation using ICT solutions. Further literature available also discusses the concept of Sustainable Human Computer Interaction or HCI. The concept of Sustainable HCI is presented by Blevis (2007) where the term Sustainable Interaction Design was explained as a concept that sustainability should be considered in design of technology. Hilty explains that "SID considers not

only the material aspects of a system's design, but also the interaction throughout the life cycle of the system, taking into account how a system might be designed to encourage longer use, transfer of ownership, and responsible disposal at the end of life" (Hilty et al., 2011).

There are some thoughts regarding sustainability coming from the literature concerned with agent-oriented modeling as well. According to Pedell and Sterling, "motivations for being sustainable are different", so a socio-technical system needs to consider the context, and also represent facts and goals in a understandable manner (Pedell & Sterling, 2011). They argue that using agent-oriented model enables to include every stakeholder's perspective.

Further on coming to the specific topic of mobile governance, there are some studies available in the topic related to sustainability and sustainable development through mobile governance. A study from Henning (Henning et al., 2014) shows that problem definition of most of the studies could be divided into the primary domain which were Mobile ICT, Governance and Development while the secondary domain were Mobile Governance, Mobile ICT for development and also Mobile-Governance for Sustainable Development. Also because of the focus on Sustainability that has been seen in the mainstream literature concerning governance, most literature concerning ICT for development seem to have inclusion of the sustainability issues discussed in them too. Multiple reports from UN, ITU, OECD in field of mobile governance or "connected governance" focus on sustainable development as well (ITU & OECD, 2011; ITU OECD, 2011; UNDP, 2012; United Nations, 2008).

4.7 Conclusion

Discussing on m-governance and ICT implementation for sustainable development in Nepal requires several theoretical approaches to be considered. Terms like development, sustainability and dependency are very broad concepts which may be interpreted in many ways depending on the approach. This chapter discussed the different theoretical approaches that are concerning international and regional development, dependency, connected governance and sustainability. Development can be a very vague term if not properly defined. There are different concepts within the broader concept of

development which include international development, regional development, modernization and dependency theory among others. Consideration of m-Governance or e-Governance for development needs to consider these concepts of development.

While sustainability is often considered a buzzword, as discussed in this chapter, it can be a very important part of discussion for e-Governance for development. The focus on sustainability by UN through Millennium Development Goals and Sustainable Development Goals are relevant. Several concepts have emerged towards sustainability for ICT as well. The concepts of sustainability within ICT have also been translated to more specific fields of e-Governance and m-Governance.

5 Results and findings

The results of the single case study research done are discussed in this chapter. As discussed in the chapter 2, the case study was done through study of available literature and semi-structured expert interviews. As discussed on the literature overview section (chapter 3), most available literature discusses the challenges in implementation of e-Governance. Other literatures discussed were the different policies and plans of the government and reviews of those. From the literature review the findings we can get that while there is an adequately positive progress in policy development and planning, multiple challenges seem to have created a situation of digital divide and inefficiency of implementation of e-Governance. The analysis of data from government sources also gave a better insight at the pattern of growth of the mobile industry in Nepal and the socio-cultural and economic aspects affecting it. In addition to this, results could also be drawn from the expert interviews that provided results that were similar to the results drawn from the literature overview. However, there are also additional or differing results that can be generated from the interviews. The results from the literature overview and the results from the expert interviews with some cross references to the theoretical background are presented further.

5.1 Progresses, roadblocks and possibilities – results from the literature overview

Since the enforcement of the IT Policy of 2000 by the Government of Nepal, there has been significant progress towards development and use of ICT in Nepal. Even though ICT was at a primitive stage in Nepal at the time, having a formal policy was an achievement. Major problem that existed were illiteracy, poverty, lack of infrastructure, lack of trained human resources, political instability and lack of leadership and commitment or coordination (Dhakal & Istiaq Jamil, 2010; Dhami & Futó, 2010; Kharel & Shakya, 2012; D. Shrestha, 2015). In addition to that there was the ongoing civil war that was led by the Maoist rebels which lasted until 2006 (Hachhethu, 2009; Lawoti,

2003). Coming from the year 2006 when the Comprehensive Pease Accord was signed (Hachhethu, 2009; United Nations, 2006) and the decade long civil war ended, there has been slow but significant progress in several aspects of e-Governance. Some issues have proved to be the major roadblocks.

5.1.1 Progresses towards e-Governance implementation

The achievements in policy development and development of strategic plans are evident. There have been steady updates in policies related to ICT and e-Governance. IT Policy 2000, Telecommunication Policy 2004 and IT policy 2010 have been instrumental for lot of positive changes and progress in field of ICT in Nepal. Focus on ICT education from these policies, E-Governance Master Plan 2006 and ICT in Education Master Plan have paved way for satisfactory availability of ICT education in Nepal. Not long after the first IT Policy was implemented in year 2000, there already were four Universities in Nepal that were providing ICT education (Shakya & Rauniar, 2002). There has been largely significant participation from international organizations, foreign agencies and multi-lateral banks in the progress of ICT implementation in Nepal (Ganesh Prasad Adhikari, 2009; International Development Research Centre, 2003; Martin Chautari, 2014). ADB, KIPA, KCC and ITU among other organizations have actively participated in development of ICT and e-Governance in the country.

The improvement of the institutional framework for implementation of e-Governance is also an important progress. The formation of institutional units such as HLCIT, NITC, IT Council, HLCIT, and the Department of IT (under Ministry of Science and Technology) provided a good institutional framework. Even though HLCIT was eventually dissolved (Maharjan, 2015; “Panel directs ministry not to dissolve HLCIT,” 2011), the institutional framework still is sound and capable of steering the progress of e-Governance implementation. There are significant improvement in the infrastructure. The completion of GIDC, construction of “IT Park” in *Banepa* near Kathmandu and the start of the mid-hill fiber-optic cable project clearly are important achievements.

Use of some novel initiatives like telemedicine and e-education and m-banking are also observed through the review of the available literature (Banstola, 2008; Morrison et al., 2013; Roine et al., 2001). The ICT in Education Master Plan specifically tends to focus

on concepts of e-Education. There has been success with e-Education in Nepal to some degrees. M-banking has also been slowly accepted by Nepal's population with already 1.5 million users using m-banking services provided by private banks ("1.5m use mobile banking services," 2016). Telemedicine has also already been experimented in Nepal with 25 hospitals already having telemedicine facility(Morrison et al., 2013).

5.1.2 Roadblocks in e-Governance implementation

There are several critical roadblocks to e-Governance implementation that have been recognized through the review of the literature available as well. Lack of clear vision and also the political will towards implementation are the biggest problem that progress of e-Governance faces in Nepal (Dhakal & Istiaq Jamil, 2010; Dhami & Futó, 2010; Paudel & Kafle, 2016). Multiple regime changes, civil war from 1996 to 2006, the Royal massacre of 2001 and failure of conducting local elections for a lengthy period have badly affected the progress of e-Governance implementation(Do & Iyer, 2010; Sujan Shrestha, 2016; Upreti, 2006). The political climate has not improved still and issues of instability remains. Lack of vision and political will have caused e-Governance implementation to slip down the priority list and even important institutional units like the HLCIT has been dissolved (Maharjan, 2015; "Panel directs ministry not to dissolve HLCIT," 2011). An overall vision in the leadership for implementation of e-Governance in Nepal is largely lacking as well. The leadership in Nepal does not seem to possess the vision and understanding required for e-Governance implementation (G P Adhikari, 2007). With the vision lacking the leadership's inability to commit to the case is apparent.

Persistence of digital divide at a larger level does still seem to suggest a failure in e-Governance implementation and the strategy to overcome digital divide. The government's strategy to use telecenters have not worked well with these telecenters not being able to sustain (Lee & Sparks, 2014). While the main issue can be analyzed to have been the lack of plans for revenue generation for the telecenter operators, broader issue related to concepts of sustainability have not been considered as well. Rapid advancement of technology and lifecycle of products and technology has not been considered. Alternative strategy has not yet been formulated. While the strategy to fulfil

the need for communication infrastructure has been addressed there will still be probably last mile issue without a proper strategy.

5.1.3 Possibilities

There are several possibilities that can be analyzed through the review of literature as well. Harris has discussed about possibilities of rural development through ICT (Harris et al., 2003). Shrestha has discussed about possibilities of using of mobile technologies in education (Sujan Shrestha, 2016). Shah has discussed about using of social media to increase e-Governance adoption (Shah, 2010). There is also sufficient evidence that m-banking becoming well accepted in the country ("1.5m use mobile banking services," 2016). There is an optimistic development in field such as e-education, m-banking and telemedicine, which have been proved to be extremely successful regionally and in other developing countries similar to Nepal (Morrison et al., 2013). There is also improvement in communication infrastructure and an east-west fiber-optic cable network has been started in the mid-hill region to add to the one already existing in the southern region along the east-west highway("NTA, NT sign agreement to lay optical fibre," 2016). Successes in implementation of mobile e-Governance platforms in countries like India and Azerbaijan definitely provides for the possibility in implementation in Nepal too. The success in other countries can be replicated in Nepal too.

5.2 Increase in mobile penetration rate – Analysis of available data

Available data from Central Bureau of Statistics, NTA and other reports have been analyzed to understand the phenomenon of increase in mobile penetration in Nepal. The mobile penetration rate in Nepal was already 118.34% by the end of 2016 (NTA, 2016b). Considering the mobile penetration rate was only 4.03% in end of 2006 (NTA, 2007), it can be said that the increase in the penetration rate was remarkable for Nepal which is a LDC. Through available statistical data related to the demography it was observed that along with the surge in demand for mobile communication there was a major shift the social-economic aspect of the population of Nepal in the last decade. While the census of 2001 showed that 59.61% of the GDP was contributed by

agriculture (Satyal, 2010), by the fiscal year 2012/2013, it was only 33.40% (Central Bureau of Statistics, 2014). 2001 census shows that 65.7% of the population was generally active in agriculture but only 59.6% claimed agriculture as their usually active occupation (Satyal, 2010). The 2008 Labour Force Survey showed that 69.7 percent of workers were working outside agriculture as well (ILO, 2014). While the primary occupation of the people was in decline, there was sharp increase in the remittance. From fiscal year 2010/11 to the fiscal year 2013/14, remittance doubled from 253551.6 million to 543294.1 million (Central Bureau of Statistics, 2014). The labor migration abroad has been sharply increasing till 2013/14. Only in fiscal year 2013/14, the total number of labor permits issued was 519,638, which was more than double of the fiscal year 2008/09. It is also important to note that not all people going abroad to work obtained permit from the labor department. For instance, people going for work in India did not needed to obtain any permit and accurate data of how many people went to work in India is not available. However, it was recorded in the census of 1991 that around 89.2% total absents population in Nepal was contributed by migration to India (Bhattrai, 2007). While the ratio might have changed in recent years, it can be assumed that the absent population is far greater than that which is documented by the labor permit data. The full detail of increase in labor permits issued is given in figure 3.

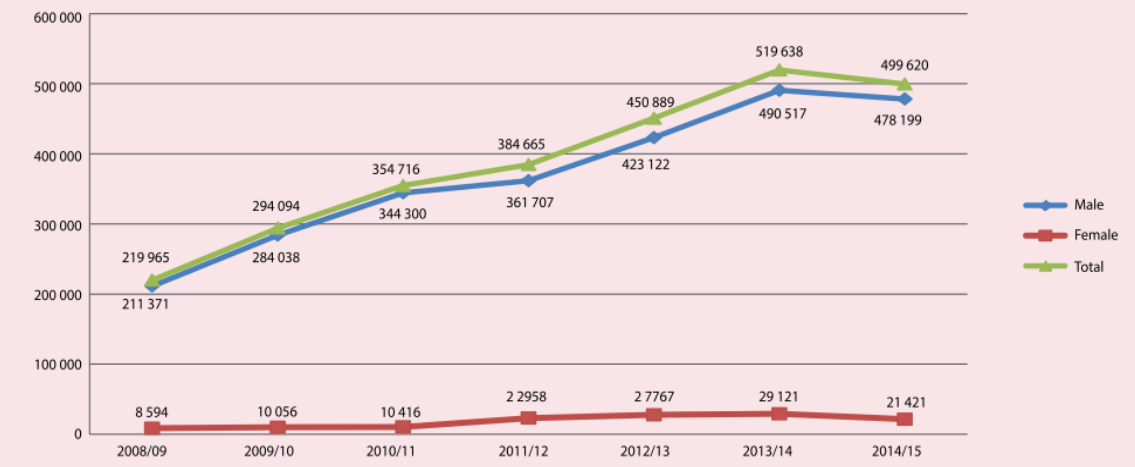

Figure 3: Trend in labor permits issued from fiscal year 2008/09 to 2014/15 (Ministry of Labour and Employment, 2015)

Nepal is considered to be one of the countries with fastest urbanization in the world (Bakrania, 2015). While dependency in agriculture had kept, the population rooted to

their locality of origin and near to family and friends, the work-abroad culture and the developing culture to find temporary work in urban areas created movement of larger portion of the population away from location of origin and often away from family. The trend to go abroad to study also increased immensely ("Year Ender 2016: Greener Pastures," 2016). Relative lack of need for communication that existed in Nepal in the 90s ultimately changed through this social phenomenon by the late 2000s. The demand soared in the communication industry (Gautam, 2016). Analyzing the increase in mobile penetration rate, in comparison to the increase in issue of work abroad permits, trend to study abroad, increase in floating population in urban areas etc. it can be clearly seen that Nepal was experiencing a major social-economic and cultural shift.

The key decision from the government of Nepal to privatize Telecommunication sector in Nepal was instrumental in allowing free competition in the telecommunication sector as well (International Development Research Centre, 2003). This allowed private companies to compete in the telecom sector as well. Seeing the potential growth in telecom sector in Nepal, the Swedish company Telia entered the Nepalese market and Ncell – its subsidiary, eventually became the biggest telecom company in the country. The availability of the market and the competition between NT and Ncell to get larger share of the market induced affordable market prices and also investment from the private sector in development of infrastructure (Gautam, 2016; ITU, 2012). Shown in Figure 4 is the trend in mobile penetration rate in Nepal with year-end data available from NTA plotted on a graph. The graph shows that the mobile penetration rate sharply increased starting from 2007. Increasing from below 10%, it has reached above 120% as of end of 2016. In only a decade the penetration rate increased more than 100%.

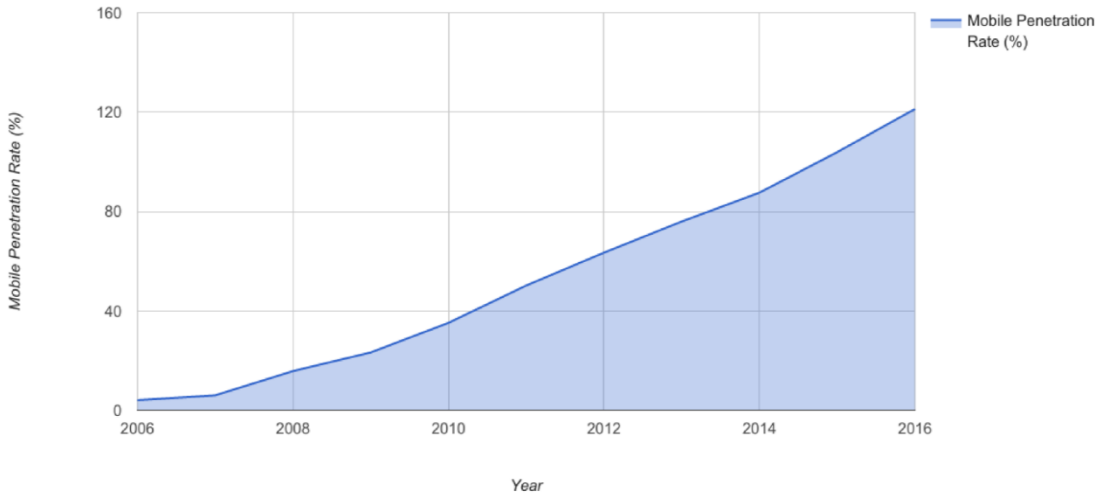

Figure 4: Trend for mobile penetration rate in Nepal

The socio-economic and cultural shift seen in the country also saw the demand in the VoIP market and also caused criticism of the government regulation on VoIP (Shields, 2009; Xue-jeng & Hong-tao, n.d.). Apps like Skype and Viber saw great increase in users within Nepal. With 4.5 million users in 2016, the Nepal market for Viber was among the top ten when looking at the user volume in per-capita basis ("In terms of popularity, Nepali Viber users make it to top 10 in the world," 2016). The demand for mobile communication in Nepal was high enough to make Mobile phones the third most traded commodity in Nepal in 2016 ("Mobile phones third most traded commodity in Nepal," 2016).

It can be understood that the demand for mobile communication has been induced by a socio-economic and cultural phenomenon, which has benefitted the mobile communication sector a lot. The progress in mobile communication in Nepal was purely demand driven as the increase in penetration rate started soon after privatization of the telecom sector and presence of competition in the market (Gautam, 2016). The demand also caused the increase investment in infrastructure. Both Ncell and NT who were the biggest telecom providers invested on making their own infrastructure while the government was also able to invest more on infrastructure (Gautam, 2016; Minehane, 2012; "NTA, NT sign agreement to lay optical fibre," 2016). The increase in demand in telecommunication had deep-rooted relationship with the socio-economic change in the

country. The demand was fueled by the genuine need for communication. Communication is considered a basic need for the general population of Nepal (Karki, 2007). In this case the need created the demand and the demand with availability of a degree of spending capacity created the development of the telecom industry and infrastructure.

5.3 Analysis of outcome of interviews and site visits

As mentioned in chapter 2, there were 9 expert interviews conducted with personnel from different sectors such as private sector, government agencies, community representatives and academic sector. The results from the findings can be divided into 6 different headings. The results are discussed further.

5.3.1 Status of e-Governance and ICT infrastructure

Reflecting back on the results from the literature review, it was seen that e-Governance implementation has been slow but still there have been lot of achievements. In regards to ICT infrastructure particularly the prospects looked very optimistic. The conducted interview showed similar results as well. Subarna Shakya, from Institute of Engineering in Kathmandu and formerly from NITC, seemed to be optimistic about the e-Governance implementation process (S. Shakya, personal communication, March 12, 2017). Shakya mentioned that most important e-Governance projects were either completed or in progress and nearing completion. Shakya gave examples of projects such as Government Integrated Data Center (GIDC), e-Vehicle registration and smart driving license projects that have been successfully implemented. As per him, project like e-Passport, Public Key Infrastructure, National Smart-ID card and few others among the 21 priority projects identified by the government were in progress.

There has also been significant progress in the communication infrastructure. The National ICT Policy 2015 seemed to set the goal to achieve universal access to mobile communication by 2020 (Martin Chautari, 2014; Ministry of Information and Communication, 2015). Purushottam Khanal (P. Khanal, personal communication, March 19, 2017) from NTA asserts the confidence on the part of NTA about achieving its goal. As per information provided by him existing fiber-optic cable backbone

network along the east-west highway and the new mid-hill east-west 96-core fiber-optic backbone network will be providing the much-needed infrastructure backbone. In addition to that a 48-core network to the district headquarters and a 24-core connection to all municipalities are also in progress. Broadband wireless connections to all schools, Village Development Committee (VDC) offices, health centers and other government offices are planned and the progress has already been started as well.

The major problem with e-Governance implementation currently, is the lack of available government service applications (S. Shakya, personal communication, March 12, 2017). Shakya explains that with local elections failing to be conducted since 1997 (Gellner, 2014), local government bodies are unable to start e-Government services and major changes in the government service delivery methods are not proving to be possible. Another problem that is apparent is the unavailability of skilled human resource. Pokharel from NITC mentions that this issue will be resolved soon. As per him the government has been continuously conducting trainings for government officials. There also is a new policy introduced to have at least one ICT officer in each government office to help and train other staff so that there is increase human resource with ICT skills (R. Pokharel, personal communication, March 17, 2017). Also, availability of expertise in ICT sector in has been improving greatly. Pokharel claims NITC is capable of running large scale cloud architectures for providing services to the government. Basnet from *Metrotarkari* and Joshi from *Rooster Logic* seem to suggest that the private sector competency in Nepal for the IT sector is concerned is sound (A. Basnet, personal communication, April 18, 2017; P. Joshi, personal communication, March 17, 2017). Nepal had already started ICT education in the 90s as per Shakya (S. Shakya, personal communication, March 12, 2017). As per Joshi the software industry in Nepal has matured a lot. Khanal from NTA also suggests that the technological capability of Nepal in ICT is not too far behind

5.3.2 Attitude of the government and leadershiptowards e-Governance

The slow progress in e-Governance implementation is largely due to political instability. Shakya, Khanal, Joshi and Pokharel seemed to agree on the issues related to political instability and the over politicization affecting development in ICT and e-Governance (P. Joshi, personal communication, March 17, 2017; P. Khanal, personal

communication, March 19, 2017; S. Shakya, personal communication, March 12, 2017; R. Pokhrel, personal communication, March 19, 2017). As per Khanal, while there is capable leadership, the priority of e-Governance and ICT has slipped as result of continuing political tussle and regime changes. Shakya was of the same view as well. As per both Shakya and Khanal dissolving of HLCIT was wrong and a highly authoritative body led by the Prime Minister, and merging of Ministry of Science and Technology and Ministry of Information and Communication was necessary. However political developments have seen wrong steps taken. Pokharel also mentioned political tussles causing issues with e-Governance implementation.

There also is a large role of development agencies in how the government and leadership are being influenced. Most ICT and e-Governance projects are found to be funded or partnered by Asian Development Bank (ADB), United Nations Development Programme (UNDP), Korea International Cooperation Agency (KOICA), ITU and similar organizations. Shakya suggests that the previous government led by K.P. Sharma Oli formed the IT Council as requirement for ADB's "Information and Communications Technology (ICT) Development Project" without a proper definition of the council's functions, it has not been effectively functioning (S. Shakya, personal communication, March 12, 2017). Joshi suggest a "push" approach from international agencies to implement projects is also not enabling a better vision and understanding towards the matter to be developed more organically. So, most of the policies and projects are "off-the-self" and is not contextualized thus making them ineffective.

5.3.3 Digital divide

The government's initial strategy to overcome the digital divide was by using telecenters. However, as suggested by Joshi, Shakya and Tuladhar and through observations made by visiting telecenter in Bungamati, it can be only said that the telecenter project was an entire failure (S. Shakya, personal communication, March 12, 2017; P. Joshi, personal communication, March 17, 2017; J. Tuladhar, personal communication, March 17, 2017). As per Shakya and Tuladhar, of the 200 telecenters that were established under UNDP's "ICT for development" project, most have ceased to operate. The *Bungamati* Community Telecenter operated by Tuladhar's organization only succeeded to survive due to being part of a larger umbrella organization that also

runs a school. Also, the telecenter was fortunate to receive donations from KOICA volunteers and Australian Lions Club as well. Shakya questioned the sustainability of projects like the telecenter project for they cannot be economically and socially viable. Tuladhar explained how maintenance was expensive and the usable life of computers was short compared to the prices required to purchase.

With the emergence of smartphones and the decreasing price tags on these phones, the trend shows increasing use of these. Opinions from Khanal, Joshi, Shakya and Tuladhar all seem to imply that on mobile phones being largely common already and that people not having access to technology being not true (S. Shakya, personal communication, March 12, 2017; P. Joshi, personal communication, March 17, 2017; J. Tuladhar, personal communication, March 17, 2017). However, with lack of available service applications, and lack of focus on the possibility to use m-Governance, it can be understood that possibility of mobile phones has not been realized. Khanal explains that the leadership in the country does acknowledge the possibility to use m-Governance, but the political situation has caused progress to lag. Joshi explains that digital divide which often is mentioned is just a lack of awareness and lack of need. If the need can be generated people will start using technology if they can afford it. For instance with increase in the number of foreign workers and their need to communicate back home, the telecom industry boomed.

5.3.4 Demand in telecommunication industry

The analysis of the surge in the penetration rate of mobile phones suggests, the demand for telecommunication in Nepal has soared. As per Khanal from NTA, the increase is a direct result of the increase in foreign workers and the increase in demand has particularly changes in the rural areas. Shailaza Bista from Ncell explains that when Ncell was rebranded after being purchased by Telia, Nepal was a “green field” with very less competition but high potential (S. Bista, personal communication, April 19, 2017). She states that so far Nepalese economy is supporting growth and high return in telecom service business through help of migrant worker needing to make international calls back home. As per Holger Haljand from Telia Estonia, Telia was confident on the potential market in Asian region and Nepal (H. Haljand, personal communication, February 6, 2017). As per him Nepal was one of the markets where Telia saw the

biggest growth even though Telia eventually sold the company in 2016. Haljand also explained that it was not issues with profitability but the strategic direction intended by the parent company that saw the company being sold off.

As per Khanal the global trend shows the future of telecommunications industry is in data. Even though Nepal is lagging, Khanal mentions the market for voice will only last 4 or 5 more years in Nepal too (P. Khanal, personal communication, March 19, 2017). Bista claims that most people are opting to use smart phones and use data (S. Bista, personal communication, April 19, 2017). She explains that like the global trend the shift is towards using more data in Nepal as well and for this reason Ncell started its "Internet for All" campaign to provide affordable rates for mobile data. Interest of Viber, a VoIP application company towards Nepal also reasserts the claim that mobile data market in Nepal is on the rise as well ("In terms of popularity, Nepali Viber users make it to top 10 in the world," 2016).

5.3.5 E-Commerce, e-banking and emerging trends

There also seem to be emerging trend that supports idea of usability of mobile devices for governance. As per as per Anil Basnet, from *Metrotarkari,* which is a leading e-commerce startup in Nepal, E-Commerce market is emerging up in Nepal (A. Basnet, personal communication, April 18, 2017). There are several e-commerce businesses that are emerging and also payment apps for e-commerce such as *ipay, paybill, arthanepal* and *e-sewa*. Basnet claims that users tend to use these sorts of e-wallets or mobile wallets in negligible proportion for purchasing online but for paying for utility bills and buying cinema tickets these are popular. Basnet also suggests that the trend shows that more people are using their websites through mobile phones than through computers. Khanal from NTA also informed that NTA and central bank is working together on a technological model and policy for standardizing mobile banking in Nepal (P. Khanal, personal communication, March 19, 2017). Khanal claims that after completion of the development of this technical model, payments over mobile network will be standardized and will be under the regulations of the state and thus more widely accepted.

5.4 Conclusion

The results and findings for the research activities undertaken were discussed in this chapter. The different research activities undertaken were literature review, analysis of available and expert interviews. The findings of the literature review were in three parts – progresses, problems (roadblocks) and possibilities. While there has been progress in e-Governance implementation, the progress is slow. This finding is supported by the findings from expert interview. The major problem is with the political instability and the lack of implementation of policy due to the political instability. There appears to be major influence from the donor agencies in implementation of e-Governance with mixed effect from that. The literature review mostly suggested that digital divide was a major issue. But, the analysis of available data concerning mobile penetration rate showed that through mobile devices the digital divide could be overcome. The expert interviews support the findings and even suggest that the old concept of digital divide as a major challenge may not be relevant. There is increasing trends towards use of mobile services such as mobile payment, e-commerce, telemedicine and e-education, which suggests acceptability of m-governance in the country.

6 Discussions

This chapter relates the results and findings of the research with the objective of the study and the research questions. The discussions are done on the basis of the theoretical background. The chapter has two sections. First section discusses the findings in line with the theoretical background while the second part will discuss a suggestive framework for sustainable m-Governance in Nepal.

6.1 Discussion of findings

The objective of this thesis was to analyze the situation of e-Governance in Nepal and dissect the problems observed with the e-Governance implementation while looking towards a possibility of implementing a sustainable m-Governance as a viable alternative to go forward. Two research questions were presented. The first research question was:

- *What are the problems and progresses being observed in e-Governance implementation in Nepal?*

The findings of the research showed that that the main problem with the e-Governance implementation in Nepal was the lack of political will as also suggested by some previous authors (Kharel & Shakya, 2012; Paudel & Kafle, 2016; Sharma et al., 2014). Political instability has caused the e-Governance implementation process to slip down the priority and diminish the sustained political will to implement e-Governance projects. Dissolving of HLCIT and failure to merge of Ministry of Science and Technology and Ministry of Information and Communication have caused issues with decision making and coordination that was required (Maharjan, 2015; “Panel directs ministry not to dissolve HLCIT,” 2011; P. Khanal, personal communication, March 19, 2017). Most literature also discussed issues such as lack of ICT education and human resources, poor infrastructure, and low literacy rate (G P Adhikari, 2007; Dhakal & Istiaq Jamil, 2010; Kharel & Shakya, 2012; D. Shrestha, 2015). While literacy rate has

seen some improvements, there has been immense progress in infrastructure development. Some significant development of ICT human resource and education has been observed too (S. Shakya, personal communication, March 12, 2017; P. Joshi, personal communication, March 17, 2017). E-Governance implementation in Nepal has been greatly influenced by Multi-lateral banks and international development agencies. ADB, UNDP, ITU, KOICA, IDRC and KIPA are only some of the organizations that have had direct involvement in e-Governance implementation in Nepal (P. Joshi, personal communication, March 17, 2017; J. Tuladhar, personal communication, March 17, 2017;Ganesh Prasad Adhikari, 2009; International Development Research Centre, 2003; Martin Chautari, 2014). This has caused the use of "off-the-shelf" projects in many cases for implementation of e-Governance. This further cases projects to lose contextual relevance and become ineffective. Telecenter project is a good example of such a project (Lee & Sparks, 2014). There is a tendency for e-Governance implementation in Nepal to become aid dependent (Castel-Branco, 2008) and dependent on technology which the country does not have the skilled human resource to manufacture or maintain. Also, the short life span of technology has caused expenses to be too high. These issues are proving e-Governance implementation to not be economically viable.

While efforts to develop e-Governance have failed in many respects, there has been progress as well. GIDC, PKI and few other e-Governance projects have been successfully implemented. The mobile infrastructure in Nepal has improved greatly and the penetration rate has reached more than 120% (NTA, 2017). The regional development strategy for improving rural areas in Nepal using the Rural Telecommunication Development Fund has been fruitful while the socio-cultural and economic change related to foreign labor and urbanization has brought in a natural demand for telecommunication. This paved way for a development of communication infrastructure that is demand-driven and economically viable. New opportunities for obtaining sustainable development through e-Education, telemedicine, e-banking have been presented as well.

The second research question is a two-part question with a main and a sub-question that asks about sustainability in the context of e-Governance in Nepal and about high penetration and using it to overcome the digital divide. The question asked is as below:

- *How can sustainability be defined in the context of e-governance in Nepal?*
    - *How can a sustainable m-governance implementation framework be designed for the context of Nepal that can overcome the persisting digital divide?*

The various definitions of sustainability available in ICT field are applicable to e-Governance as e-Governance is a discipline related to ICT. The need for ICT projects to be implemented from stakeholders' perspective and using of agent-oriented modelling as suggested by Pedell and Sterling (Pedell & Sterling, 2011) is extremely relevant to the context of Nepal. Nepal having issues with electricity supply (Nepal & Jamasb, 2015), the Green IT concept to reduce energy consumption using ICT (Mingay, 2007) is relevant as well. Nepal has adhered to the UN Millennium Development Goals and the Sustainable Development Goals with most of the policy papers mentioning the Millenium Development Goals. It is crucial that e-Governance projects are economically viable with possibility for projects to self-sustain without continued use of international aid. Also, product life cycle and lifecycle of the technology used needs to be long enough so that replacement of products and technology is not economically straining. The e-Governance implementation should be from the stakeholders' perspective with consideration of the context. It should be demand-driven and socially relevant with optimal use of private sector competencies.

Defining what sustainability means in context of e-Governance in Nepal makes it possible to answer the second part of the second research question. As observed in the findings from the review of available literature, it is evident that the e-Governance implementation process in Nepal has not been fully successful even though there are some significant progresses (G P Adhikari, 2007; D. Shrestha, 2015). Findings from interviews seem to suggest the same (S. Shakya, personal communication, March 12, 2017; P. Joshi, personal communication, March 17, 2017). There is a common theme in most literature that there is persisting digital divide that is the main challenge towards implementation of e-Governance (Dhami & Futó, 2010; Lee & Sparks, 2014).

For the second question a hypothesis was also made that "*digital divide is the major reason behind ineffectiveness of e-Governance implementation in Nepal and implementation of a sustainable m-Governance model can overcome the issue of digital*

divide". As discussed the literature review supports the hypothesis that digital divide is the major reason behind ineffectiveness of e-Governance implementation in Nepal (Dhakal & Istiaq Jamil, 2010; Sharma et al., 2014). However, with the progress in mobile infrastructure development and increasing demand in mobile communication the digital divide is diminishing. Starting from late 2000s the surge in the usage of mobile technology has brought in disruptive paradigm shifts. While the literature review suggests mostly poor infrastructure and lack of access to technology, mobile penetration rate of 120%, however, reflects upon a different theme. Data such as mobile phones being the third most traded commodity in Nepal and 1.5 million people already using mobile banking without the government even having a clear policy on mobile banking makes the case even more interesting ("1.5m use mobile banking services," 2016, "Mobile phones third most traded commodity in Nepal," 2016). The findings of interview also are that there is a high level of accessibility of mobile phones in the country (P. Joshi, personal communication, March 17, 2017; P. Khanal, personal communication, March 19, 2017).

The reason behind the developments in the mobile communication sector can be analyzed to be the socio-economic and cultural changes brought in by the increasing trend to go work abroad or urban areas. This not only increased the need for communication but also increased the spending capacity of the population. So, a natural demand was experienced as the demand is created through genuine basic need for communication. If the government can realize the opportunity presented by the phenomenon, with correct policy implementation, a sustainable m-governance implementation framework can be designed. The primary necessity is the will and vision of the leadership towards it and a strategy towards proper implementation. The digital divide can be overcome by use of sustainable m-Governance model as per our hypothesis. In fact, the issue of digital divide is not as relevant as a major challenge as it was before with access to mobile devices and communication highly increased. Correct policy and plan of action from the leadership can make the progress sustainable and capable of implementing e-Governance in a holistic way. So, the second statement of the hypothesis that "*implementation of a sustainable m-Governance model can overcome the issue of digital divide*" should be considered correct as well.

6.2 Suggestive framework for implementation of sustainable m-Governance for Nepal

For scenario in Nepal, with suitable policy framework and strategic implementation plans, digital divide can be overcome and successful implementation of e-Governance can be achieved. As per the finding and the discussions, this section will discuss the key considerations for a sustainable m-Governance for Nepal. There are already available framework that have been discussed by writers for implementation of sustainable e-Governance and m-Governance (Bwalya & Mutula, 2015; Sundar & Garg, 2005). Here, the implementation framework has been discussed loosely based on the framework proposed by Henning. This has been chosen for its simplicity and suitability to the context of Nepal. Four dimensions are discussed based on Henning's "MGOV4SD Conceptual Framework" (Henning et al., 2014). The four dimensions considered are 1) Institution, 2) Innovation System, 3) Infrastructure 4) Services and applications.

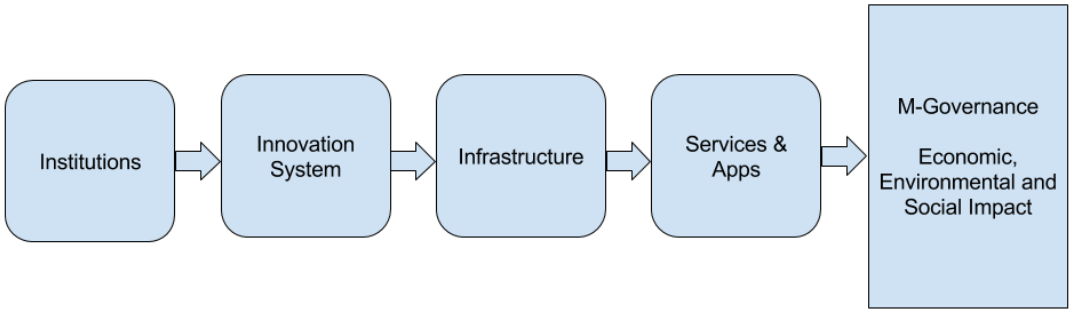

Figure 5: Conceptual framework for implementation of sustainable m-governance

6.2.1 Institutions

The institution dimension describes the institutional foundation required for sustainable m-Governance (Henning et al., 2014). The institutional framework required for promoting any innovative system needs to be both in National and also in local level (Chavez, 2012). The first clear requirement in case of Nepal in the institutional dimension is a strong and stable leadership that is aware of necessity of m-Governance and its possibilities and benefits. NITC needs to take more of an advisory role than the reduced role of a service provider that it is currently taking. Ministry of Science and Technology and the Ministry of Information and Communication needs to be combined

so that the decision and policy making is more coordinated. IT Council under the PM's office also needs to be changed into a more proactive institutional unit that can take active role in policy making role with possibility of overseeing overall policy development for implementation of m-Governance.

Local elections and selection of local representative with authority to make required changed in the local level government service delivery is necessary. The Ministry of General Administration should also have better collaboration with NITC for designing of service delivery channels. For service delivery on a local level, a wholesome government process re-engineering will be required base on based on feasibility, opportunity and priority (Dhami & Futó, 2010).

A mechanism for developing human capacity is also necessary (Dhami & Futó, 2010; Henning et al., 2014) to be improved for development a sustainable m-Governance. The institutional mechanism for developing human resource capacity should overcome resistance to change (Harris et al., 2003; Peterson, 2004; Saxena, 2005; Sharma et al., 2014). There should be a sense of security for existing civil servants so that they are confident of their value to the institution regardless of the changing technology and requirement. Concepts of "Infomobilisation" can be used to develop human capacity within the institution so that a collaborative and participatory approach with community involvement in human resource capacity development can be achieved as well (Harris et al., 2003). Retention of ICT human resource is also extremely important as tendency for skilled resourced to be discouraged to work for the government or private sector within the country may heavily reduce the human capacity of the institutional structures (Dhami & Futó, 2010).

6.2.2 Innovation System

Innovation is largely dependent on government policies and also private sector competencies (Kalvet, 2014). It is important that a private-public partnership synergy is present for a successful innovation system. Development of m-Governance framework needs to have interaction with non-governmental stakeholders as well, for instance private-sector partners, education/research institutions, civil society, aid agencies and Multilateral Banks (Henning et al., 2014). Key private sector will include the Software

industry and the telecom industry. A partnership with educational and research institutes will be necessary as well.

There is necessity of creating an environment that is favorable for growth of private sector as well as FDI should also be encouraged. Markets within the country that are seeing promising growth should be leveraged on. For instance, the e-Commerce sector is growing in a satisfactory way (A. Basnet, personal communication, April 18, 2017). These sectors of potential growth should be targeted for inducing sector wise innovation. As it was learnt from the telecom industry, if there is a need for a service, it organically develops while benefitting other related fields as well. With development of fields such as e-Commerce, the need for authentication and also better online payment systems will also be generated.

6.2.3 Infrastructure

Communication networks, electricity grid, bandwidth availability, servers and equipment and several other factors make up for a combined availability of infrastructure for m-Governance (Henning et al., 2014). As discussed in Chapter 5 as well, significant improvement in infrastructure has been noticed in Nepal in the past decade. With significant improvement in communication infrastructure, completion of GIDC, better management of electricity grid etc. the country is already progressing.

A few key infrastructures related projects are essential for implementing a sustainable m-Governance. A strong back office infrastructure is required for connected governance (United Nations, 2008). The groupware project as per the master plan will also provide significant advantage towards infrastructure development in Nepal as far as e-Governance in concerned (KIPA, 2006). In addition to these, the issue with lack of basic infrastructure that is still being experienced in the remote areas of the country should be addressed.

An important service essential for m-Governance that is yet missing in Nepal is a form of e-Signature that can be used by a mobile phone without use of any additional devices like Mobile-ID used in Estonia and Azerbaijan. Changes in legislature that will allow the provision of mobile specific ID is still required (Blythe, 2008).

6.2.4 Services and Applications

Lack of application or the quality of the available application is the major issue with e-Governance in Nepal (S. Shakya, personal communication, March 12, 2017). NITC claims that government institutions already require following Government Enterprise Architecture documents which requires services to be mobile compatible already (R. Pokharel, personal communication, March 19, 2017). However, there does not yet seem to be focus on mobile devices for service delivery channel and government mobile apps seem to be missing. With lack of Mobile-ID as well as Smart National-ID card that would allow doing contracts, any services or applications that will be available will be limited too. However catalogue level or the first level of e-Governance as per Layne & Lee (Layne & Lee, 2001) can be achieved still and these sort of catalogue level services should be made available on mobile platforms. The contextual consideration for service delivery method to suit Nepal's problem with high illiteracy rate is important as well. Focus on voice and graphics should be important to make services and application usable for users with low reading and writing ability.

6.3 Conclusion

This chapter discussed the results of the research in line with the research question and the theoretical background. Theoretical backgrounds including international development theory, dependence theory and sustainability in ICT were considered for the theoretical background of the research. Discussion of the findings in line with the research question was done to provide for the answers to the questions. In addition, a framework that can be used in context of Nepal for development of a sustainable m-Governance for overcoming digital divide was also discussed.

7 Conclusion and future research

Nepal is one of the Least Developed Countries in the world with a struggling economy. With a history of political instability and difficult geography, development has been slow in e-Governance implementation. E-Governance is lagging far behind in Nepal even when comparing to neighbors like Bhutan and Bangladesh (United Nations Department of Economic and Social Affairs, 2016). While there are some positive steps towards development of e-governance, overall success has been not possible.

With a global trend of increase in mobile phone usage, Nepal has also seen lot of positive changes in the mobile communication sector. In the end of 2016 the mobile penetration rate in Nepal was already above 120%. On one hand, there is highly increased penetration rate and on the other, most literatures mentioning digital divide as a major challenge for implementation of e-Governance. This discrepancy made the backdrop for a case study to analyze the challenges and the status of e-Governance in the country and to find ways to overcome the problems that would be found. With the rapid increase in mobile penetration rate and the global trends in the developing world to view mobile technology as means to sustainable development following research questions were considered:

- What are the problems and progresses being observed in e-Governance implementation in Nepal?
- How can sustainability be defined in the context of e-governance in Nepal?
    - How can a sustainable m-governance implementation framework be designed for the context of Nepal that can overcome the persisting digital divide?

A single case study research in the context of Nepal was done. The approach of studying the available literature was adopted as the first step. Since there is relative lack of literature concerning e-Governance or m-Governance in Nepal, policy papers and

government plans for the sectors were also reviewed with study of other available literature. The available data concerning the mobile penetration rate and other statistical data that could be used to relate to the socio-economic and cultural aspects of the increase in mobile communication seen was analysed. Data for mobile penetration was collected from NTA and data statistical data were collected from the Central Bureau of Statistics. In addition, some data from the department of labour was also used. To further support the research expert interviews were also conducted with key personnel form different stakeholder sectors. Semi-structured interviews with personnel from the government agencies, telecom industry, community representatives and academic sector were taken. An effort was to get a clear observation from each of the stakeholders' point of view on the issues related to e-Governance implementation in Nepal. Site visits to the GIDC and a community telecentre in *Bungamati* village in Nepal was done. The site visits also provided for a clear understanding of the situation from the ground level. The experiences from the site visit and the outcome of the interviews were carefully analysed and compared with the outcome of the literature review and analysis of the data available from the government sources.

The results and findings shows some significant progress in e-governance implementation and the factors affecting it while the main roadblock was seen to be the political instability and the lack of political will towards e-governance implementation caused by it. While the digital divide stressed on by most literature as a major challenge, further analysis of results from available data and expert interview showed that digital divide was not a major challenge anymore due to the accessibility of mobile communication and devices.

Another issue with projects was that developments happening so far was driven by aid and were unsustainable in most parts. Telecenter project is the best example for this. Use technology that was expensive to maintain or replace and getting outdated soon was not proving to be sustainable. It was studied that the increase in mobile communication usage was a direct result of the need for communication that was generated by the socio-economic and cultural paradigm shift triggered by the trend towards foreign labour and urbanization. Since the increase in mobile communication was a result of demand generated by a genuine basic need for communication, the growth of the

telecom industry would be sustainable in the long term. Thus, building a framework for e-Governance implementation based upon mobile technologies would result in a sustainable m-Governance that would be successful to overcome digital divide.

7.1 Future research

The research done for this thesis provides the insight into the challenges in e-Governance implementation in Nepal and touches upon the possibility of implementation of sustainable m-governance in Nepal to overcome those challenges. There is need to analyze the broader impact of m-Governance in the development process of the country. “What aspects of the development process in a country can be impacted the most by introduction of m-Governance?” should be researched as well to provide sector-wise priority for introduction of m-Governance. Sector-wise in-depth research for use of m-Governance for sectors like education, health, banking and finance etc. needs to be done.

More detailed research into model for service delivery is needed to be done as well. Services and application is the key area where e-Governance in Nepal has been lagging. Designing of a model for service delivery through mobile devices that can overcome the issue of low literacy is seen to be important.

Technical aspects of mobile authentication system that can be built upon the current available infrastructure in Nepal needs to be researched into as well. Factors affecting effectiveness of such an authentication system such as security, technology availability within the country and the issues of cost-effectiveness should also be analyzed.

A research with a more concentrated approach towards the rural population needs to be important given the context of Nepal where still a huge percentage of the population is living in rural areas.

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Appendix 1 – List of interviewees

Holger Haljand

Mr. Holger Haljand is the VP of Consumer & Marketing at Telia Eesti AS. He had served as the Director of Business to Operators (B2O), International Operations, and New Business Areas at Telia Eesti AS. Previous he also has served as Head of Mobile Applications Area at AS EMT as well.

Interview date: 6th February 2017

Subarna Shakya

Prof. Dr.is Advisor of Information Technology committee, Government of Nepal and Professor of Computer Engineering at Department of Electronics and Computer Engineering, Institute of Engineering, Tribhuwan University, Nepal. He was also Assistant Dean at the Institute Of Engineering , Tribhuvan University and Executive Director at National Information Technology Center (NITC), Government of Nepal

Interview date:12th March 2017

Pravin Raj Joshi

Mr. Pravin Raj Joshi is the founder and data analyst at Rooster Logic which is a data analysis and visualization company in Nepal which is also a service provider for multiple organizations under the Government of Nepal. He is also a ICT Entrepreneur and director at Brihaspati Vidhya Sadan School in Kathmandu Nepal. He was also previously a lecturer at Ace Institute of Management in Kathmandu Nepal and involved in Free/Open Source Software Community Nepal (FOSS Nepal).

Interview Date: 17th March 2017

Janak Raj Tuladhar

Mr. Janak Raj Tuladhar is the chairman of the Bungamati Cooperative Society which runs the Bungamati Community Telecenter in Bungamati Village Development Committee in Lalitpur District of Nepal. The Bungamati Cooperative Society also runs homestay, school and other non-profit operations in the village. Mr. Janak Raj Tuladhar has also been the chief lab instructor at the Department of Electronics Institute of Engineering, Tribhuwan University, Kathmnadu,Nepal

Interview Date: 17th March 2017

Prem Bhakta Maharjan

Mr. Prem Bhakta Maharjan is the former VDC chairman of Bhungamati Village Development Committee. He is working in the social service sector in Bhungamati Village currently.

Interview Date: 17th March 2017

Ramesh Prasad Pokharel

Mr. Ramesh Prasad Pokharel is the Information Officer and System Administrator at Nepal Information Technology Center, NITC.

Interview Date: 19th March 2017

Purusottam Khanal

Mr. Purusottam Khanal is director and Information Officer at Nepal Telecommunications Authority (NTA). NTA is the governing body for telecommunications in Nepal.

Interview Date: 19th March 2017

Shailaza Bista

Ms. Shailaza Bista is the Unit Head (Service Platform) at Ncell. Ncell is one of the leading telecom companies in Nepal which was formally owned by Telia Company AB, Sweden.

Interview Date: 19th April 2017

Anil Basnet

Mr. Anil Basnet is founder and CEO at Metrotarkari Pvt. Ltd. – an emerging e-commerce startup company in Nepal.

Interview Date: 18th April 2017

Appendix 2 - NTA service penetration data (2007 to 2017)

Service penetration rate (%) February 2007	
Service	**Penetration Rate (%)**
Fixed + Mobile	6.48
Fixed Telephone	2.46
Mobile Service	4.03
Internet (subscribers only)	0.19

Service penetration rate (%) October 2007	
Service	**Penetration Rate (%)**
Fixed + Mobile	8.84
Fixed Telephone	2.89
Mobile Service	5.95
Internet (subscribers only)	0.24

Service penetration rate (%) March 2010	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	27.15
Fixed Telephone	2.98
Mobile Service	23.22
Data/Internet Services	2.66

Service penetration rate (%) March 2011	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	40.30
Fixed Telephone	2.95
Mobile Service	35.13
Data/Internet Services	7.93

Service penetration rate (%) January 2012	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	56.46
Fixed Telephone	3.17

Mobile Service	50.16
Data/Internet Services	14.55

Service penetration rate (%) March 2013	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	71.51
Fixed Telephone	3.14
Mobile Service	63.39
Data/Internet Services	21.91

Service penetration rate (%) January 2014	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	85.86
Fixed Telephone	3.21
Mobile Service	75.93
Data/Internet Services	29.78

Service penetration rate (%) March 2015	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	98.35
Fixed Telephone	3.17
Mobile Service	87.55
Data/Internet Services	38.78

Service penetration rate (%) March 2016	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	110.25
Fixed Telephone	3.19
Mobile Service	103.86
Data/Internet Services	46.64

Service penetration rate (%) March 2017	
Service	**Penetration Rate (%)**
Fixed + Mobile + Others (LimitedMobility, GMPCS etc.)	127.67
Fixed Telephone	3.24
Mobile Service	121.23

Data/Internet Services	55.03