FREE FLOAT INTERNET POLICIES OF NEPAL

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Introduction

Information and communication technology (ICT) in general, and the broadband Internet in particular, have been seen as a significant contributor to the national gross domestic product (GDP). Enthusiasts and promoters claim that the technologies, as a platform that is fair and equal to all, provide ways out of poverty and exclusion for a significant population. They also point to the intrinsic ability of the technologies to overcome social and geographical disparities. Accordingly, the Nepali vision, policy and roadmap documents on the ICTs, prepared by the government agencies, lobbying associations and technology think-tanks set very progressive targets. Yet they do not have strong empirical footing. Fundamental concerns, such as the appropriate input device and contents for a majority of rural women and the lack of initiatives to encourage inclusion of people with disabilities, remain by and large obscure in these documents. Contexts of emerging federal structures and democratic participation in governance make these issues more pertinent than ever. Large-scale studies related to the access and use of digital technologies could have made such issues clearer.

The problem is not that the policy drafters will only have the satisfaction of accomplishing some targets over none or that these will be entirely unachievable. The crucial miss is the opportunity to frame more workable policies to improve the prevailing disparate conditions of access and use of the ICTs in Nepal. For instance, the recent acceleration in the Internet diffusion in Nepal is clearly due to the mobile broadband, yet the factors influencing its growth have not been ascertained. An evident lack of empirical knowledge about the access, beyond the number of mobile phone sets and subscriber identity modules (SIMs) sold, also leads to the opacity in the policies as to whether mobile broadband should be seen as a complement or a substitute (say, for rural Nepal) for the fixed broadband Internet. Not everyone therefore agrees with the assumption in these guiding documents that next socio-economic revolutions would emerge from the use of digital

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technology in Nepal. Digital Nepal is not a distant dream for a skeptic but impossibility.

This article is an attempt to engage with the technological possibilities in the light of a grounded knowledge about the prevalent conditions of access and use. We make twofold argument in this article. First, the household penetration of fixed broadband Internet is more critical than the individual Internet diffusion in order to realize the development goals set in the ICT vision, policy and roadmap documents. Hence, census or large-scale empirical exercises *at the household level* are needed to determine the socio-economic movers and barriers to broadband (both mobile and fixed) diffusion and adoption. Only such data should form the basis for information technology (IT) policy actions. Meanwhile, and this is our second argument, opportunities opened up through mobile phones and mobile Internet should be explored more vigorously given the rapid expansion in the telecommunication sector in Nepal. Particularly, government-to-citizen (G2C) communications should be strengthened on the platform as this will not directly depend upon household-level information. Mobile Internet should complement the core government service delivery through fixed broadband Internet.

This essay is an outcome of the quantitative analysis of the household surveys conducted to understand the access and use of the Internet technologies, including the fixed and mobile broadband. The other components of the field research include in-depth interviews, focus group discussions, case-studies and ethnography of the institutions and actors involved in the Internet construction, maintenance and use. Beside the field assessment, the research looked at policy reviews, stakeholder interviews, technological surveys and historical analysis of the Internet-based technologies.

The section to follow summarizes the position of Nepali IT penetration and adoption using publicly available statistics. Inadequate local studies mean that the present IT policy goals and guiding principles have to rely exclusively on global averages and targets.[1] This has led to a miss in the crucial opportunity to deploy mobile phone-based experiments on

[1] For instance, "The role and significance of ICT industries and services (including telecom services) will increase in the Nepali economy with ICT value added (including digital content and service industry) 7.5 percent of the GDP" (MoIC 2015: 8, point 6.4). According to the World Bank database the ICT sector accounts for up to 7.5 percent of GDP worldwide (Intel 2009: 1).

development, accountability and governance. Third section discusses seven questions on the patterns of use, non-use, access and the lack thereof and the answers we found from the analysis of the survey data. There are a few surprises here. The main reason for the non-use of the Internet is not, as the commonplace wisdom goes, the lack of awareness but the absence of any compelling advantage it offers in use. We argue that even access and basic competence on the part of the users will not be sufficient to overcome the non-use given the evolving character of the proverbial digital divide. We conclude with a critical discussion on concepts, ideas and policy ambitions since these aspirations could shape the future IT policy for a "knowledge and information based" Nepali society. We have taken a hard look on the ideology behind the aims.

ICTs in Numbers

The number of Internet users worldwide is around 3.2 billion at the end of 2015 (ITU 2015). However, two-third population in the developing countries still remains offline. Thirty-four percent households in the developing countries are expected to have Internet access in contrast to 80 percent households in the developed countries by 2015. The Internet penetration in the least developed countries (LDCs) is expected to reach only 9.5 percent of the population. In terms of the household access, the figure drops to seven percent compared with the world average of 46 percent. The worldwide estimate for mobile phone penetration is expected to reach 95 per 100 people by the end of 2015. The mobile penetration had already reached 76.5 per 100 people in Asia and the Pacific, and 117.9 in Europe by 2011. By 2013, it increased to 86.7 and 120.1 respectively. ITU's per 100 people subscription statistics of countries such as Hong Kong (239.3), Kuwait (218.43) and Maldives (189.38) in 2015 exceeds the 100 percent mark indicating multiple SIM subscriptions per person on average. Globally, the Internet use from mobile phones was expected to be around 47.2 per 100 people and the overall Internet use will be at 43.4 per 100 people by 2015 (ITU 2015: 2).

Internet growth indicators in Nepal exhibit the similar lead by the mobile Internet. The August-September 2015 report published by the Nepal Telecommunications Authority (NTA) shows over 101 percent penetration in the individual mobile subscriptions in Nepal (NTA-MIS 2015a: 2). To compare, the percentage of households with computers (8.2%) and televisions (39%) has increased far less dramatically compared to mobile phones (SIMs,

to be specific).[2] The Internet penetration stands at 44.37 percent in 2015 where the number is contributed exclusively by the mobile Internet users. For about 44 percent of Nepalis might have access to Internet through their mobile phones, supposing one person per SIM-card and the accuracy of the figures, it does not reveal the variations across household access in the country (NTA-MIS 2015a). In 2011, 64 percent household penetration of mobile phones was equated with 40.6 percent of mobile subscribers and around 10.5 percent mobile Internet penetration (NTA-MIS 2015b: 2). The same year, household Internet subscription per 100 people was at 1.12 percent. In 2015, less than 300 thousand Nepali households have Internet connection which totals to only 5.4 percent.[3] While the mobile phone penetration has increased rapidly across the country, it may be said that the household level connectivity is dismal in Nepal. For instance, the popular ADSL[4] Internet service constitutes only 1.3 percent of the total Internet subscription. The cable Internet numbers are less than one percent.

ICT has received significant attention since it was posited as a key instrument for achieving the millennium development goals (MDGs). Specifically, the MDG goal 8 (to develop a global partnership for development) and its target 8.F asks governments to increase the availability of new technologies such as the Internet, personal computer and mobile phones (UN 2008). More recently, increasing access to ICT and Internet is set as a direct target of goal 9 in the sustainable development goals (SDGs). ICT is generally endorsed by the United Nations (UN) as crucial and appears as a key subject for higher education (goal 4), a platform for women empowerment initiatives (goal 5) and an enabling technology for global partnership (UN 2015). The ICT sector, specifically the telecommunications sector through agencies such as International Telecommunication Union (ITU), were quick to point out that economic development, social inclusion

[2] World Bank ICT indicators: Television (2005–2013) 39%, Computer (2014) 8.2% (The World Bank n.d.); 2011 National Census: Television 36.45% (urban 60.67%, rural 30.66%), Computer 7.28% (urban 23.66%, rural 3.37%) [CBS 2012a: 2].

[3] The total number of households has been taken as 5,423,297 from the 2011 national population and housing census (CBS 2012a). The State of Broadband 2015 report by the UN calculates it to be 5.6 percent and rank Nepal 109th in the world (Broadband Commission 2015: 91).

[4] Asymmetric digital subscriber line (ADSL) is a technology to deliver faster Internet over telephone lines.

and environmental protection is simply not possible without the involvement of ICT, thereby lobbying for its crucial role in achieving all 17 goals.[5]

Globally, the Internet and related ICTs such as the communication infrastructure and personal devices are seen as having a direct impact on how the citizen, business and the state interact in sectors such as education, health, agriculture, tourism, trade and governance. Internet, and more recently broadband Internet, has been bestowed with an absolute faith in its capability to (i) accelerate national development that is presently limited by the geographical adversities; (ii) increase growth and employment by the virtue of making itself accessible; (iii) develop an economic environment where the developed nations will have to support developing countries to their own benefit; (iv) step-up traditional industries to participate in a global competition and build new knowledge-based industries; and (v) transform governance and public engagement through fair, trustworthy and accountable Internet based technological interventions such as e-government and e-governance.[6] The hypothesis behind this strong faith is that countries lagging behind in ICTs will have economic conditions far different than other countries where the technologies are used as a core component of the business and public service infrastructures. ICTs are posited to encourage innovation, contribute to productivity and growth, and attract foreign investments (HLCIT 2067 v.s.).

Toying along this belief, IT is advertised as a critical component in Nepal also for a guaranteed accelerated development with no unmanageable side-effects. Awareness, education and training will, so the narrative goes, prevent and mitigate whatever risks ICTs might have on Nepali society. Therefore, access to the Internet (specifically, the broadband Internet) has

[5] See ITU 2016 for examples of how ICT is advocated as a crucial tool by the telecommunications industry (here, ITU) for all 17 SDGs. And Sachs *et al.* (2015) on how ICT is rooted in all public sector services in Ericsson collaborated recommendations.

[6] The 2009 World Bank Information and Communications for Development econometric analysis reported that "for every 10-percentage-point increase in the penetration of broadband services, there is an increase in economic growth of 1.3 percentage points…is significant and stronger in developing countries than in developed economies." A large tendency, by policy shapers, has been to take this for granted and produce unrealistic expectations without deep understanding of local socio-economic conditions of access and use. For an instance of the "absolute faith," see Bughin and Manyika 2012, specifically the first chapter. Their work is an example of many (developed nations) reports out of which the fantastic expectation, like the five we have listed, from the Internet is seen on policy papers of developing nations.

been seen as indispensable in achieving the objectives set in the Nepali policy documents.[7] This is despite the empirical evidence that copying ICT narratives such as regulatory strategies, investment priorities and policy frameworks from developed nations' book do not work. On the contrary, the actions might have to go in an opposite direction (Yates, Gulati and Weiss 2011; Gulati and Yates 2012).

The strong faith in the ICTs in Nepal, which underlies most digital-future narratives, springs from the phenomenal mobile technology diffusion and its ready acceptance among the Nepalis. Countries with poor resources find the affordability of the handsets, small and personal infrastructure requirement and pay-as-you-use model as attractive features of the mobile services. Technology enthusiasts in the government and other advocates see the penetration of this particular service, especially in the rural areas, as an opportunity to leap into an imagined scenario of universal communication connectivity. Garnering the resources from the expanding mobile telecommunication services, the state regulator NTA has set up the Rural Telecommunication Development Fund (RTDF) arguably for developing, extending and operating the telecommunications services in the rural area. The fund is created by the two percent contribution from Nepal's telecommunication licensee. The fund is said to be directed towards the District Level Optical Fiber Program initiative in a bid to develop the nationwide broadband infrastructure. Similarly, the fund is also thought to support several related programs such as the Connect a School, Connect a Community which could provide community access to a fixed broadband Internet through the use of computers (NTA 2015). The RTDF has now more than Rs. 10 billion but remains to be utilized (Bhuju 2015). The use of the fund for improving existing government-business-citizen interactions in general, and government-citizen in particular, has not been attended. Unfortunately, the transformation from the universal communication connectivity in this particular mode does not lead to universal broadband Internet connectivity in a straight forward manner as is believed by the RTDF managers. There is clearly a mismatch between the nature of gains and the future imagined.

The success of IT policies of Nepal depends on several factors. The access to fixed broadband delivered through public spaces such as community telecenters, libraries, schools and government premises is one. Low individual ownership of computer and Internet penetration has been linked

[7] For a review of the Nepali IT policy regimes, see Martin Chautari 2014.

to starting such initiatives in rural parts around the world. The worldwide penetration rate of fixed broadband Internet is around one percent in LDCs and seven percent in developing countries (ITU 2015). It is widely reported that the reason for the lack of uptake is the high price of fixed broadband Internet and that it has remained constant (or increased slightly) in LDCs. Nepal is not an exception in this trend. This is where the IT policies needs to take advantage of the wedespread diffusion of mobile phones. Mobile Internet should be explored more vigourously, as a first step towards complete Internet access, to direct, shape and fine-tune existing policies. Nepal's IT policies need to frame ways to integrate users' everyday experience of mobile phones in to the drive towards universal connectivity. These would have been a far cheaper initiative and given precious information about who the users are and how technology situates itself in Nepali society. Access through public-spaces would then have a much better understanding of the expectations it is supposed to meet. We argue in this paper that mobile connectivity will remain the best bet towards reaching anywhere near the universal connectivity and should therefore be used to establish the culture of digital governance before the investments in the broadband Internet infrastructure are made. Similar aim is seen in case of the national e-governance plan of India which was envisaged to set-up 250,000 telecenters/common-service-centers (CSCs) across 600,000 villages in rural areas to offer government-to-citizen (G2C) and business-to-consumer (B2C) services.[8] There are technological considerations which would limit the access to range of public services through a mobile phone and warrant at least occasional visit to telecenters. While mobile phones can be used for registration by sending messages (SMS) and tracking of documents, services require filling/reading out long forms and issuance of documents require full sized printers and scanners.

The other is the household penetration. Curiously, this is not often talked about while discussing Internet access and use in Nepal. While presenting the status of IT and Internet in Nepal, we exclusively painted the mobile telecommunication landscape in numbers as above, and not in terms of household access. The household IT statistics are simply not available. The

[8] Financial sustainability has been an issue since the very start with many of them closing down and those operational offering peripheral services such as mobile recharge and music downloads. Lack of connectivity and low range of G2C and G2G (government-to-government) services available to the citizens are linked to the eventual closing or low visits. For a detailed reporting, see Dass and Bhattacherjee 2011.

latest related statistics can be found in the 2011 national census, but the basic data is only useful to indicate, and not measure, the dismal IT reach in Nepali households. The broadband commission set up in joint effort of ITU and UN Educational, Scientific and Cultural Organization (UNESCO) to help meet the UN millennium development goals had set a target of household broadband Internet in developing countries at 40 percent by 2015. The reason for the emphasis on household broadband Internet is its inclusive characteristics. As the commission points out, from household broadband, "At home, all household members can have access – no matter whether they have jobs, go to school, are male or female, children, adults or elderly." One of the key concerns in this online era is the protection of children from online predators. The broadband commission's report echoes research findings that have shown "children with Internet access at home to perform better in school. And children using the Internet at home are usually under parental guidance and therefore better protected against online dangers" (Broadband Commission 2011: 2).

Different scenarios appear through the mobile Internet penetration and household (fixed) Internet penetration. A mobile subscription reflects individual end users. Research and policy recommendations on the mobile Internet therefore will have goals to improve access of the individual users and to deliver contents that are person-specific. Prior to the mobile revolution, Internet was first available as a dial-up service and later through cables accessed from (non-mobile) desktop computers. The government conventionally equaled an Internet connection to connecting five citizens on average in a Nepali household. The convention seemed to hold as the desktop and the Internet connection was shared in a household. The reason for the absence of issues about household penetration rate from the promoters of Internet connected society is therefore clear. If all the government services were to go online today, about 95 percent of the households will not be able to access them. Besides quick exchanges such as notices, notifications and payments, a mobile phone is not an appropriate alternative to a computer. A mobile phone does not offer confidentiality and privacy required for such transactions.

There is another reason for not attending to the poor household connectivity in Nepal. Relative to the major trends in the metropolitan commercial hubs, plans for the fund to develop backbone-infrastructure (District Optical Fiber Network) to connect every district throughout the country are pale. Telecommunication industry in Nepal is primarily a voice-communication industry, with a small number of data subscribers

and shares the infrastructure (e.g., same tower, same network) to deliver wireless Internet services. Big players like Ncell offer only wireless Internet (through their mobile SIMs) while Nepal Telecom in addition also offers ADSL Internet through their already laid out copper telephone lines. But with ADSL Internet only the household with a landline can be connected which at the moment connects less than three percent. The number of individual Internet subscribers was more than 28 million in July 2015 (NTA-MIS 2015a: 2; NTA-MIS 2015c: 2) which is far bigger than the household number. Hence wireless access through their mobile phone infrastructure is the priority for these major players in the industry to provide voice and Internet. It is therefore perfectly clear why big telecoms do not talk about universal household Internet connectivity. At the moment, it simply does not make business sense specifically building a large infrastructure to provide high speed Internet let alone connect the rural household.

Research Introduction

The field research, which forms the basis of this essay, was conducted in five locations selected to accommodate various nature of the settlements, including geographic, ethnic, linguistic and educational diversity (Table 1). The village of Tangting, situated 24 km north-east of Pokhara, is predominantly a Gurung village (72%) with a rich history of employment in the army, home and abroad. Changunarayan, located 19.1 km north-east from the Kathmandu city, exhibits mixed ethnic and occupational diversity. It consists of 28.3 percent Tamangs, 24 percent Newars, and 18.1 percent Brahman (hill). The settlement is largely agricultural. The Tamang families account for 58.8 percent of households in another agriculture dependent village of Dapcha Chhatrebanjh (hereafter Dapcha) which lies along the BP Highway (Banepa-Sindhuli-Bardibas road). Due to difficult terrains, Tangting has not seen adequate communication infrastructure whereas Pragatinagar, the fourth research sites, allows for a better quality mobile reception and have access to nearby Internet service providers (ISPs) by being near to the core of the Kathmandu city. However, Pragatinagar started as a squatter settlement in 2061/62 v.s. and has a population of around 4,500 from all over Nepal with significant religious diversity (chiefly Hindus, Buddhists and Christians). The settlers are largely dependent on non-agricultural wages and the support from the family members in foreign employment. Panauti municipality exhibits mixture of ethnicities but the city-core has largely a

majority of the Newar households. Agriculture and related businesses are seen as the major sources of income for its residents.

Table 1: Location of Research Sites

Research Site	Ward	VDC/Municipality	District
Pragatinagar	16	Madhyapur Thimi Municipality	Bhaktapur
Panauti	6	Panauti Municipality	Kavrepalanchok
Dapcha	7	Dapcha Chhatrebanjh VDC*	Kavrepalanchok
Changunarayan	3,5	Changunaryan Municipality	Bhaktapur
Tangting	1,2,3,4,5	Namarjung VDC	Kaski

** At the start of the project Dapcha Chhatrebanjh was a VDC. It became a constituent of the Kashikhanda Municipality at the end of 2014.*

For our research, we decided to perform a ward level census.[9] The sample wards were chosen in consultation with the local partners based on the research design requirement to accommodate ethnic and linguistic diversities. In Pragatinagar, we employed simple random sampling since the number of households was larger for the field research to complete on time. This field research was preceded by policy reviews and stakeholders interviews.[10] Insights from these proceeding research support have been incorporated in some elements in the policy discussions below.

Issue of Non-Use and No Access

Unequal Internet access has been a topic of huge interest since the mid-nineties. This was when researchers and policymakers in advanced economies began observing that a more intensive use of the Internet seem

[9] A ward is the smallest administrative unit in Nepal. On average, nine wards make up a village development committee (VDC), while the number of wards varies in municipalities. The VDCs make districts; districts make zones; and zones make up the country. This model has changed since the adoption of the new constitution, almost while we were in the midway through the project. The new federal structure with seven provinces, 565 local units (tentative) of governance without zonal or district administrative units in between, is in the making.

[10] See, Martin Chautari 2014, 2015.

to enable some people to advance their socio-economic position as they possess greater access to services and resources (DiMaggio *et al.* 2004). Thus, the idea of "digital divide" was born to refer to the inequality between people with the Internet access and the others without. A common way to explore the issue of the divide has been by analyzing the information and communication device ownership. However, the present survey shows that despite a big spread in the mobile phone ownership, the divide has remained unchanged at the household level since the 2011 census. We use another idea of "information poverty" to understand this lack of progress. We argue that too much emphasis on the digital devices and access leads to a misconception that existing information flows and access is limiting for the underprivileged or marginalized. Those who do not have more digital access are not necessarily information poor. Thus, the main reason for the non-use has been a lack of compelling need or advantage for adopting the new technology, and not everyone with access to mobiles for instance use the Internet. Others who could have access to the broadband Internet (in certain locality) chose rather to use only mobile Internet. The misplaced focus on digital device ownership and not on the quality and nature of the needed information has led to a wrong set of interventions, for instance, on increasing awareness and creating demand by promoting IT education or training. We have not found a reliable link between formal education and the Internet use in the survey sites, the way it has been observed in technologically mature and economically advance countries. We suggest that such relationship is a complex problem requiring a long-term study devoted to its understanding. Nepal's IT policy documents should aim at improving and diversifying digital information so as to meet the need of the Nepali households.

Digital Divide and Information Poverty

"Digital divide" is an idea that gained popularity with the availability of personal computers. It refers to the gap between the underprivileged population (such as poor, rural, elderly and persons with disability) that do not have access to a computer and the Internet and the people in urban areas that do. However, evidences from more mature (in technology access) countries such as South Korea calls for a need to redefine the idea from having/not-having access to degree of skills/usage and creative production. That is to say, there have to be levels in the idea to account for the difference in skills

(Hargittai 2002; Hawkins and Oblinge 2006).[11] In a situation of increasing Internet diffusion rates, DiMaggio and Hargittai (2001) suggest moving from the idea of a *digital divide* to that of *digital inequality*. From their perspective, *digital inequality* encompasses five main dimensions: technical means (viz. inequality of bandwidth); autonomy (whether users access the web from home or at work, monitored or unmonitored, during limited times or at will); skill (viz. knowledge of how to search for or download information); social support (viz. access to advice from more experienced users); and purpose (whether they use the Internet for increasing skill enhancement and education, or for improving political or social capital by gathering the information relevant to electoral decision-making, or consumption of entertainment). Concerns about digital divide (in some form) has amplified as the people that are disadvantaged in terms of economic, social and individual wellbeing, are observed to be the ones that are least likely to engage with the ICTs (Van Dijk 2005). Those who view the divide chiefly in economic terms prescribe removing market constraints and creating opportunities for economic growth and development. Others have argued that social justice principles have to underpin the production and dissemination of information to address the issue of information poverty so as to become a fair information society (Britz 2004). In short, at the heart of the most debates on the divide is a puzzle to reconcile the goals of economic growth and social justice.

The dominant practice in Nepal has been to leave out such definitional conundrum, and simply assume that it exists (and, for some, will always exist). One may rationalize such position as supporting a view that the self-regulating market for ICTs and information would decide who gets what in a knowledge and information based society. The Nepali ICT sector, so far, can be seen as following the American idea of "hands-off" policy where the actors have largely been given the control to pave the technological direction of the Internet with minimal government regulation (Martin Chautari 2014). The usual argument for self-regulation is that it is a necessary tool for governing rapidly changing businesses in a knowledge economy. The Nepali ICT policy draft thus ends with a clumsy warning that "lack of oversight giving rise to skewed, purely market driven expansion of ICT services resulting in exclusion of the communities outside urban areas resulting in widening digital divide" is a potential risk (MoIC 2015: 33). The Nepali census data

[11] For a definition that includes autonomy and freedom of access among others, see Hawkins and Oblinge 2006.

clearly show the technological disparities with the ownership and access as highly skewed against the rural households. In 2011, 24 percent of urban households owned a computer and 12 percent had Internet access, in sharp contrast to the rural households where the ownership was three percent and access was at one percent approximately. Similar pattern characterized our research sites (Table 2). Information technologies had not reached Tangting and Dapcha. Communication technologies, specifically mobile phones, have rapidly penetrated in all areas chiefly due to the migration for work and education. However, the information technology divide picture in 2015 is the same (Table 3).[12]

Table 2: Household ICT Penetration of Research Sites (in %)

Research Site	Computer	Internet	Mobile
Kathmandu	40.5	23.7	91.9
Madhyapur Thimi	37.1	19.0	91.3
Dapcha	1.9	0.3	69.8
Changunarayan	13.4	4.1	77.3
Panauti	16.5	5.0	85.9
Tangting	0.0	1.1	70.8

Source: National Population and Housing Census of 2011(CBS 2012a). Kathmandu statistics is shown for a better intuitive comparison.

Table 3: Household ICT Penetration of Research Sites from MC Household Survey (in %)

Research Site	Desktop	Laptop	Tablet	Broadband
Pragatinagar	7.1	15.1	6.2	7.1
Changunarayan	8.8	10.5	2.0	2.8
Panauti	41.8	34.1	2.9	28.8
Dapcha	0.6	1.7	0.0	0.0
Tangting	1.6	6.5	2.4	0.8

[12] The 2011 Census excludes mobile Internet from its Internet statistics, hence is comparable to fixed broadband Internet.

The broadband Internet penetration has not made much progress in the last five years compared to the mobile telecommunication. Multiple reasons exist for the slow uptake. The cost of fixed broadband Internet is high relative to the household income. In our survey, almost half (45%) of the broadband Internet users found the Internet unaffordable. Many households share the Internet or are using the low-end (such as 192 Kbps ADSL Internet) of Internet speeds that offers basic browsing only. Mobile Internet users also share same perception. Families have an average income of around Rs. 20,000 per month in the research sites. A 318 Kbps ADSL Internet costs around Rs. 1,700 per month. Given that the family is already spending an average of Rs. 1,320 (per month) on mobile phones, the information and communications costs rise to 15 percent of their income. This does not include the cost of associated devices, electricity bills and repair and maintenance regime. There is a strong economic factor for non-adoption.

Table 4: Sources Used by the Respondents for Information (in %)*

	Changu-narayan	Dapcha	Pragati-nagar	Panauti	Tangting
Newspapers/ Magazines	45.43	10.18	44.89	76.21	35.48
Radio	86.29	59.88	55.11	70.39	57.29
Television	85.43	36.53	69.78	94.17	35.48
Mobile	66.29	32.93	59.56	60.68	83.87
Internet	28.86	4.19	30.67	58.74	10.48
Friends/Locality	96.0	94.61	80.44	80.58	98.39
Notice Board/ Poster	64.29	23.35	23.11	50.49	42.74

** The total percent exceeds hundred in this and some other tables used in this paper as the respondents could choose more than one answer.*

Behind the strong push for porting content and services to the digital platform lies the assumption that lack of access to digital information would lead to information poverty. This presumes that "important, valuable and useful" information exists only in the digital form and is accessible through the Internet. One should ask if the available digital information is

what people (from a variety of economic and social background) need or are looking for in everyday life (Hersberger 2003). Indeed, Nepal's low Internet use may be attributed to the fact that Nepali society in general is not information poor. It has been utilizing friends, neighborhood and the conventional audio-visual media for meeting its information needs. Table 4 shows some local variations though. Tangting's high percentage of use of mobile phones is due to its large out migration. Dapcha has a low computing and communication device penetration (less than 3% of the households have a computer or a laptop) for its inhabitants overwhelmingly use local and traditional sources of information. Against the rich information background, we need to understand the respondents' non-requirement of the Internet services. The issue of access cannot be simply stripped down to the indicators of the ICT penetration alone. It has to be assessed against the conventional information pathways and use.

Non-Use

The ability to use the Internet is increasingly being portrayed as a prerequisite for a social transformation particularly in education, government-citizen engagement, employment and entertainment. This can be seen in the digital narrative in the advanced economies where there is clear impetus for universal access to Internet.[13] The ICT policies of Nepal have wholeheartedly bought into such narratives but the discourse is almost exclusively limited to reproduction of ideological labels such as knowledge/information-rich/poor. There is a lack of academic understanding about who is making less or no use of the Internet. In our survey sites, only 8.22 percent of the household have installed a broadband Internet connection. On the individual level, only 13 percent of the respondents use broadband Internet. This is in contrast to mobile Internet use by 54.89 percent of the respondents. The delineation of "information poor" (or rich as simply) someone without Internet access is coarse at best as it does not even address the question of access to what. Furthermore it does not make much sense to claim that, with the crossing of 100 percent mark in mobile phone penetrations, every citizen now have effective and meaningful access to the Internet. A comparison between people with access from a public library and

[13] Research have found that the Internet accounted for 3.4 percent of GDP in 13 countries and 21 percent of GDP growth in the five years preceding 2011 in mature (most developed) countries. Although the precise numbers could be debated, the opportunities offered by the Internet are largely accepted (Rausas *et al.* 2011).

those who use it in their work and/or at home can also be unfair. And as we have seen in the developed nations, where Internet is a mature technology, the hierarchy amongst the people with access throws similar challenges. Therefore, to understand the non-use of the Internet requires a sociological rigor from the academic world and the acknowledgement that these categories exhibit hierarchy and their definition evolve.[14]

Helsper and Reisdorf (2013) found that interest, access and cost are all important reasons for Internet non-use. Contrary to the claim that engagement with the technology would eventually generate interest, they found non-users citing a lack of interest or a limited usefulness as the main reason for not using the Internet. They interpret that the non-users were making a "choice" to disengage with the Internet whereas access and costs were more prominent for ex-users. The result was strong and similar for both women and men of all levels of educational background. Similarly, choice seems to be exercised in the United Kingdom (UK) where the diffusion of social media seems to have stabilized at around the two-thirds of the Internet users (Dutton, Blank and Groselj 2013). The UK study argues that it is no longer reasonable to attribute non-use to the lack of awareness. A significant portion of the population can decide to not use the Internet by choice. There will be evaders and drop-outs. There will also be those who prefer to be non-users and take the help of family members or friends to access the services on the Internet (such as Internet calls). Several members may remain offline in a household that has an Internet connection. Equating non-use with lack of awareness/knowledge is, therefore, an oversimplification. Programs designed to increase access could have a more realistic agenda by acknowledging that a portion of non-use can stem from choice.

Non-Use of Mobile Internet

The survey shows that 72.36 percent of the respondents had a mobile phone handset of their own. But only 54.89 percent had used the Internet from their phones. The site-wise breakdown is given below (Table 5).

First, Tangting and Pragatinagar have a clear lead in the ownership of mobile phones. Pragatinagar is a recent settlement of migrants. Tangting has a history of out migration to nearby city Pokhara, and a longer tradition of employment in the army in India and the UK. For the survey period, the mobile

[14] For instance, users of ICT have been classified into core, peripheral and excluded groups. See, Selwyn 2003.

penetration reported by the NTA was at 87.55 percent (NTA-MIS 2015d: 2). The number crossed cent percent by August-September. Non-availability of the details prevents us from stating the exact figures. It is fair to say that the NTA numbers are likely to be SIM card counts and present an overestimate for the penetration. An individual having a dual-SIM card phone, a tablet and a mobile Internet data card, for instance, will be counted as four subscribers. Promoters' statistics often give a wrong picture of access and use.

Table 5: Mobile Phone Owners not Using Internet (in %)

Research Site	Mobile Phone Owners	Owners with Internet Non-Use
Changunarayan	66.10	34.05
Dapcha	61.63	63.20
Pragatinagar	78.22	40.34
Panauti	68.75	34.26
Tangting	87.09	53.70

Second, the non-use number varies significantly more than the ownership numbers across the five sites. A large percentage of mobile users in Dapcha do not use Internet. Although Tangting has a significantly larger penetration of smart phones compared to Dapcha, it has a large number of non-users. The top reasons in all five survey sites are the lack of the requisite skill-sets and poor quality of service (Table 6a and 6b).

Table 6a: Mobile Internet Non-Use (Average)

Reason for Non-Use of Internet	Percent	Rank
Does not work	24.69	3
Very slow	3.70	5
Expensive	5.25	4
Don't know how to use Internet	67.28	1
Don't know about it	32.72	2

Table 6b: Problematic Issues Faced by Mobile Internet Users (Average)

Problem Faced	Total (%)
Network problems	80.49
Expensive	50.95
Battery charging issues	27.65

Third, the rank of the reasons for non-use is consistent across all the five sites, yet there are different concerns (Table 7). In Pragatinagar, 80 percent of the mobile phones are basic sets (Nokia handsets with small monochrome display and GPRS[15]), unlike in Panauti and Tangting, where around 46 and 30 percents of the handsets are smart phones respectively. The Dapcha people are discouraged from using the Internet by the device.

Table 7: Reasons for not Using the Internet (in %)

Reason for Non-Use of Internet	Changu-narayan	Dapcha	Pragati-nagar	Panauti	Tangting
Does not work	29.11	25.37	43.66	8.16	8.62
Very Slow	3.80	1.49	5.63	8.16	0.00
Expensive	5.06	2.99	8.45	6.12	3.45
Don't know how to use Internet	65.82	53.73	67.61	73.47	79.31
Don't know about it	35.44	34.33	26.76	10.20	53.45

A gender perspective allows another variation in the Internet non-use. While female outweighs the male non-users in Dapcha, the situation is reverse in Tangting, where the female population possesses more mobile phones. For the remaining three sites, the difference is not as pronounced. The access to a mobile phone and the Internet use does not seem evenly distributed across gender (Table 8).

[15] General packet radio service (GPRS) is a method used to transfer data over wireless networks using mobile devices.

Table 8: Gender Ownership and Internet Non-Use

Research Site	Mobile Owners (% of Gender)		% Mobile Owners with Internet Non-Use	
	Male	*Female*	*Male*	*Female*
Changunarayan	72.00	34.48	33.96	35.00
Dapcha	65.71	43.75	60.87	78.57
Pragatinagar	85.39	72.99	35.52	44.00
Panauti	76.83	38.63	34.92	29.41
Tangting	79.48	90.58	61.29	50.56

Non-Use of Fixed Broadband Internet

In 2015, the total Nepali household with Internet was at 5.4 percent.[16] The State of Broadband 2015 report by the UN calculates it to be 5.6 percent occupying a rank of 109 in the world (Broadband Commission 2015). In our survey sites, only Panauti and Pragatinagar had households with more fixed broadband penetration than the unflattering national average (Table 9).

Table 9: Household Penetration of the Broadband Internet

Research Site	Household with Broadband (%)
Changunarayan	2.87
Dapcha	0.00
Pragatinagar	7.58
Panauti	29.41
Tangting	0.81

These numbers are way below the UN-MDGs target at 40 percent of household broadband in developing countries by 2015. On the individual level as well, only 13 percent of the respondents said they use broadband Internet. With these numbers, it is difficult to see how goal 6.11 penned in the following 2015 ICT policy draft can be met:

> Broadband access will be expanded across the country with the goal of achieving a broadband Internet user penetration rate of 30% at a minimum of 512 Kbps and making available at least 10 Mbps download speed on demand in urban areas by 2018. (MoIC 2015: 9)

[16] The total non-mobile Internet connection was obtained from the August-September 2015 NTA report (NTA-MIS 2015a).

The fixed broadband numbers also enable us to understand why the goal chooses to focus on increasing the user penetration rate and not household penetration. A broadband defined purely in technical terms of download speed and bandwidth could be delivered through a mobile phone connection as well. Nevertheless, the proposition ignores the inclusive broadband Internet argument advocated by the broadband commission where due to household broadband, "all household members can have access – no matter whether they have jobs, go to school, are male or female, children, adults or elderly" (Broadband Commission 2011: 2).

Only eight percent of the households in the survey had a broadband Internet connection. Lower income and lower education attainment (no member past the higher secondary level) characterized the households without connectivity.[17] Interestingly, lower education was a better indicator of broadband adoption than the household income. Having some family member abroad did not show increase in home Internet adoption. Having higher number of members proficient in English was positively (but insignificantly) associated with Internet households. Other factors such as male to female ratio, percentage of youth/children/adult in the household and family members currently attending formal education were not able to characterize the households. This is not a surprising finding considering the country has less than six percent broadband penetration in 2015. Pragatinagar households have the location advantage and Panauti households have the favourable terrain advantage which translates into better numbers. Absence of statistically significant relationship between socio-economic and demographic factors and household Internet connectivity is also an indication of being in the early stage of Internet adoption. We find affordability and perceived usefulness to offer better explanation for such non adoption figures.

Interestingly, over two-third of the people in the survey said home Internet was "not required" (Table 10a). In the survey sites, the average cost of the service paid by a household of users was around Rs. 1,000 per month. The

[17] The results are based on the analysis of decision trees (conditional inference trees) for households with and without Internet connection as the two classes. Household income, expense, male and female numbers, children, youth and adult numbers, abroad numbers, proficiency in the English language, and computer education were taken as the descriptors of a household. Most of the misclassifications belong to the households with connectivity indicating weak associations between the descriptors and Internet adoption. Overall, the best model achieved only 80 percent accuracy in a 10 fold cross-validation. On a test set, it achieved 73 percent accuracy for households with Internet and 89 percent on without.

household can only get the base option at this price.[18] The 192 Kbps speed is only suitable for basic browsing. No wonder 70 percent of the users find it to be slow and expensive for the very little they can do with it.[19] Associated expenses such as those for the batteries (for back-up during the frequent power cuts or "load-shedding" as the Nepali usage goes) and for the repair and maintenance (of laptops, printers and routers) make it expensive for a large number of Nepali households.

Table 10a: Broadband Internet Non-Use (Average)

Reason for Broadband Internet Non-Use	Users (%)
Not required	72.17
Expensive	1.74
Don't know how to use Internet	46.09
Lack of education	2.61
Language of the content	13.04
Place of use is very far	1.74
No computer/laptop at home	6.96
Cyber cafes not suitable (privacy concern)	5.22

Table 10b: Problematic Issues Faced by Broadband Internet Users (Average)

Problem Faced	Users (%)
Expensive	45.0
Don't know how to use	12.0
Slow	69.0
No computer	8.22
No electricity	23.41

[18] The government owned Nepal Telecom offers 192 Kbps (kilo-bits per second) ADSL Internet at monthly cost of Rs. 900 (Nepal Telecom 2070 v.s.).

[19] According to the World Bank the Nepali international Internet bandwidth was one of the lowest even in the South Asia region while being the costliest when compared with GDP per capita in 2013 (The World Bank n.d.).

But the main reason for non-use is the absence of any compelling need for such technology (Table 10b). The lack of knowledge on how to use it also stems from the same reason. What does the Internet offer more to a family who can get all the important information they need through the existing technologies such as word of mouth/phone conversation, notices posted in municipality or VDC offices, radio and television is a question often ignored by the proponents for the digital intervention.

Further, lack of Internet adoption is not just centered at the household income. People increasingly adopt the Internet with the availability of the accessible language interface, especially the mother tongue. Very few mobile apps and website provide content in Nepali, and rarely seek to interact in languages other than Nepali. The existing languages of media in education, Nepali and/or English, make some people adept in the Internet communication. But while favorable educational background increases the likelihood for mobile Internet adoption, the language factor remains hidden. A policy to increase meaningful Internet adoption based largely on fostering an educated society is effective insofar as the new users were created despite the mother tongue and not because of the expanding access in the medium language. In the case of the broadband Internet, the two key discouraging factors are therefore redundancy and the language.

The lack of use of available technology is another interesting finding. Only 12 percent of the total Internet users have used the Internet or mobile-apps for private or government electronic-services (e-services). These numbers are mainly for mobile recharge and downloading government forms. Only 27 percent of the respondents say they have ever used Internet for obtaining government information. Clearly, the problem here is of the dismal efforts by the government and businesses alike to engage the general public on the Internet platform and not the technological availability per se. Promoters of ICTs have adverted to a better quality of life with guaranteed income path through online activities and meaningful participation in the system of governance. But the non-adoption numbers show that people have not bought their claims and have continued to follow fine-tuned knowledge and local expertise accreted in generations.

Experience of the mobile users about the network services was bad. Four out of five respondents, including the broadband Internet users, complained about regular "network problems." NTA has prepared a quality-of-service (QoS) benchmark in 2007. A draft QoS regulation prepared with assistance

from ITU has also been available since 2013 (NTA 2013). The overwhelming dissatisfaction of the users of mobile and Internet networks in the sites point to the failures of the telecoms and ISPs in some key QoS indicators,[20] when the "customer perception regarding the service" sets the pass marks at beyond 90 percent. Our technological assessment has demonstrated that it was almost impossible to get a signal (let alone decent signal) in Changunarayan.[21] The regulatory NTA have stated that they do not have spectrum analyzers and drive test equipments to test the QoS parameters. The delay is said due to the two years vacant chair position and the lack of engineers (The Himalayan Times 2015). Interestingly, the reinstated Chairman of the NTA has recently speculated, "Nepal Telecom's (NT's) Internet service availability is impressive. But there are some issues with speed. The speed should be 512 Kbps, but I doubt if it is more than 180 Kbps" (Giri 2015). The ISPs and telecoms meanwhile are going on making claims that starkly contradict users' experience.[22]

Implications

The notion of digital divide generally highlights the social consequences that results from the separation of information haves and have-nots. The present survey shows that access to the Internet in Nepal is not perceived as a need at this time. Although economic poverty might mean low device ownership, we also find that non-access or low-quality home broadband and lack of access to digital information do not substantially affect the daily lives of economically disadvantaged. A scenario where access to digital information could be critical to the everyday life is when more and more computer (and Internet)-literate children go below the poverty line (Hersberger 2003). Insights from the ground suggest that economically poor Nepalis are not information poor. Thus, adoption of the Internet for getting digital information is a poor argument especially when there is a scarce investment on developing useful and relevant content in mother tongue.

[20] Readers should refer NTA 2007a for Internet QoS and NTA 2007b for mobile QoS.

[21] Report of our technical assessment of QoS of mobile-networks and Internet is in the draft stage.

[22] The managing director (MD) of Nepal Telecom in his message, for instance, claims, "In the present competitive scenario, Nepal Telecom is the only service provider that has been providing rich and quality network services at affordable price throughout the country" (Acharya n.d.) but the QoS numbers are nowhere to be found.

As a matter of fact, it should not come as a surprise that the users find the content in their own language and relevant to the communities in which they live and work as more important. It seems also obvious that the local content, Internet infrastructure and affordability are closely related. The difficulty lies in understanding their interrelations. For instance, it can be argued that development of Internet infrastructure accompanied by cheap access prices might be indicative of the increase in local content. The relation is neither causal nor universal though. The findings from this field research show that adoption decisions are primarily need-driven and based on cost-effectiveness of the investment. Farmers are likely to revert to existing information channels if Internet cannot offer content tailored to their information requests. In this regard, Nepal could do well to learn from unsuccessful attempts in neighboring countries. The adoption itself can be shown to have increased by one-time investment in the hardware. But sustainability can only be ensured if Internet can justify its cost-effectiveness. It is the post-adoption costs, such as access fees and maintenance costs, which determine the outcome of the affordability concerns. The sustainability issue becomes crucial when the diffusion strategy is aimed at collectives, and not at individual users, especially in the rural and low-income communities. Which approaches could be more successful in sustaining non-commercial forms of collective access such as school networks, libraries, and non-profit telecenters in Nepal, is not certain so far. We can, however, say that the Internet, as it is located in Nepal, is hardly compatible with the development needs of the rural communities.

Another popular intervention for increasing adoption has been IT education and training. Many believe that awareness about the advantages of the Internet for enriching the way-of-life and opening up new possibilities is a key. By integrating the technological skill set in the formal curriculum, one then hopes to produce an Internet-adept generation. This awareness argument sits on the thesis that people generally fear the introduction of a new technology thereby resist any change in their everyday communication. It is worthwhile to test the cultural thesis. In the survey sites, we find an overwhelming positivity towards the potential of the Internet. The rate of adoption is low not because they do not understand the benefits behind the idea or have a negative perception, but because they do not find compelling reasons to adopt such technological solutions. For instance, the Internet hardly offers anything more to a farmer family who can get the required information by the word of mouth/phone conversation, notice boards in

municipality/VDC offices, and radio and television broadcasts. To blame the non-use on lack of awareness is, as argued above, rather naïve. The correlation between technological awareness and formal education with the use of modern technologies, as assured in the policy documents, is dubious. Having a higher education and proficiency in English could help determine if a person is likely to adopt the Internet. But as the survey shows, that does not offer a reliable explanation for the kind of use they would find for the Internet. There was not a noticeable increase in the tendency to use the Internet for non-recreational activities like education and employment in household with educated and English proficient members. When respondents were divided into three categories (exclusive mobile Internet users, mobile and broadband Internet users; and non-users of the Internet), the non-user households are found to be among the poorest. The non-user households also exhibited a lower level of formal education, and a higher illiteracy. But the relationship between education and home Internet adoption was not strong.

The statistics on non-use and its weak correlation with socio-demographic variables presents a bottleneck for policies that simply assume such correlation to exist positively and, based on global tendencies, apply the same policy prescription across communities, localities, geographies and socio-political inequalities. The IT policy documents will do better if they accept that the outcome of a technological intervention depends on the use people find for the technology. There is no denying that the relationships among the digital divide, poverty and education are enormously complex, particularly when, for instance, the difference in relative and absolute poverty will make available studies about the relationship questionable. The complexity also becomes obvious when policy interventions could frame questions of the divide variously as problems of access, or skill, or content. Nepal's policy has viewed it as the first, resulting in the recommendations for public-private partnerships (PPPs). This orientation has alienated community based initiatives.[23] Clearly, the complex problem is unlikely to be solved by a one-time investment of fund (chiefly RTDF) for a short-term (five or ten years), but require a long-term, well thought out and multi-faceted approach.

[23] The 2015 ICT policy (MoIC 2015) and the 2010 IT policy (HLCIT 2067 v.s.) emphasize that the implementation will be "Government-led and Private Sector driven." The communities are expected to participate in the various programs and support the initiative but not expected to come up with solutions (tradition or non-traditional).

Use and Access of the Internet

In this section, we examine the socio-economic (such as education, income and occupation) and socio-demographic (such as gender, age and ethnicity) factors to understand the variations in the use of the Internet. Such variations in use, along with the barriers to access, are presented as critical in the narratives of "digital divide" in IT/ICT and broadband policy documents of Nepal.[24] However, these documents lack the empirical basis in explaining the relationship between such variables and IT/ICT adoption and use in Nepal. For instance, the geographical terrain could be responsible for the differences in the use of digital technology. The disparity in ICT device penetration across the mountain, hill and tarai is clearly laid out in the 2011 census.[25] The select survey sites of Tangting (a mountainous village), Changunarayan (hill) and Panauti (valley) could further yield an insight into how different state of ICT infrastructure (such as line-of-sight issues)[26] and business practices (such as number of service providers) relate. Given the variation in household ICT penetration throughout Nepal, options for access ought to be different in villages, municipalities and tarai/mountain/hill. It was revealed during the consultations with service providers. Their issues of licensing, exclusive infrastructure and business models mean that a large part of Nepal would remain without access or choices (Martin Chautari 2015). Access thus became the central research question and location (terrain, VDC/municipality) an important criterion for selecting the survey sites.

Till 2013, the activity of government (in the education, for instance) and IT related private associations was focused largely on distribution of computers and related devices and offering basic computer training in the rural schools.[27] The NTA reports were the only documents that provided

[24] For examples, see HLCIT 2067 v.s.; MoIC 2071 v.s., 2072 v.s.

[25] Household numbers from the 2011 Nepal Census (CBS 2012a: 32): Mountain (Computer 1.4%, Internet 0.5%, Mobile Phone 46.9%), Hill (Computer 10.9%, Internet 5.5%, Mobile Phone 67.4%) and Tarai (Computer 4.5%, Internet 1.6%, Mobile Phone 64.4%).

[26] We have conducted a separate research on the technical assessment of quality-of-service of communication signals and devices as part of this project. The full length paper and a research brief are in the finishing stage as we write this paper.

[27] Internet Service Providers Association Nepal (ISPAN), Federation of Computer Association of Nepal (CAN Federation, previously CAN) and ICT-association of Nepal are three major IT/ICT associations with large membership of the industry. The master plan document prepared by the Department of Education provides the past-history of their activities (MoE 2013). The ICT-Association of Nepal had been running the "donate computers" program then.

regular snapshots (subscriber numbers) of Nepal's ICT landscape. However, data on its use was largely absent. Some insights into the factors influencing the adoption/use of digital-technology were available in small scale impressions. A study has found insignificant relationship between income levels and desktop computer and Internet use, but a positive relation between age and commercial use of computers in rural kiosks of Nepal (Zhou, Singh and Kaushik 2011). Similar positive association with age was found for electronic-banking in another study (Banstola 2007). The literature on use of the Internet are not conclusive as associations were found to vary in strength (strong to weak) and direction (causal and non-causal) across regions (developed and developing) and between countries. Also, most studies seemed to have a consensus that uses of the Internet for other than recreation, specifically movement of information, were somehow a more "legitimate" use of the Internet but some are more sympathetic to its status, who, in an "it is not always bad" sentiment point to its utilization to build confidence in the Internet (Livingstone and Helsper 2007). This is important for Nepal as the notion of "effective use" of the digital-technology is vaguely scattered in the policy documents. This section does not express our opinion on this matter but we do see if socio-demographic variables translate to other uses than entertainment. Hence, our focus is on access and use of the Internet. We now look at variations in Internet use in general and user perception on mobile Internet in particular. This is because we see very low penetration of household Internet (around 8% households have connectivity and 13% of respondents have used it) in our research sites which does not always lend well for a detailed analysis of its use and user experience. In contrast, approximately 55 percent of the respondents are mobile Internet users, a disparity reflected in the NTA reports also.[28] We analyze and explicitly mention broadband Internet whenever it is appropriate to do so.

Variations in Mobile Internet Use

Based on popularity, we proposed eight types of usages, namely, communication, e-mail, social media platforms, entertainment (audio and video), news, education, employment and buy/sell items for the Internet. We divided the respondents according to their gender, age and education.

[28] The 2015 NTA report shows three percent of household Internet penetration. Total Internet penetration is at 44.89 percent out of which 95.7 percent are mobile Internet users (NTA-MIS 2015e).

We only considered mobile or broadband users of the Internet. In our sites, 60 percent households had at least one user of mobile Internet; 24 percent respondents stated that they had broadband Internet facility in their locality. Only 12 percent of the respondents had used broadband Internet. Similarly, the respondents had equal female to male mobile Internet users.

Both sex categories reported identical uses of the mobile or broadband Internet. Social media, communication with friends and family, and entertainment are the three top-most uses of the mobile Internet. A tiny number reported using the Internet to buy/sell items (male 4%, female 2%) and for employment related activities (male 15%, female 10%). The largest percentage difference between the groups was in the use of Internet for education. Here, users' educational background mattered. The male population (38%) is using the Internet, mainly the mobile Internet, for education more than the female population (25%). In this particular usage, we found high correlation for groups with low (less than School Leaving Certificate, SLC), middle (SLC to intermediate level) and high (bachelors and above) education.[29] Put alternatively, people with higher education did not exhibit a tendency to use the Internet for education and employment activities any more than the others. Age categories (16–29, 30–49, 50–64 and 65+) show similar pattern in use. Some elderly (65+ years), if they have access to broadband Internet, are using it for educational purposes. The Internet use is not a youthful phenomenon: Elders are using the Internet for education when they have access to the broadband and they use mobile phones. The finding is significant. It indicates that education could lead to an increase in the uptake of the Internet. But that did not necessarily translate into use in areas other than entertainment. Lack of content specifically for the mobile platform and in local languages may be offered as partial explanations for the limited range of use in Nepal. Access is a necessary but not sufficient condition for its widespread or productive use as it is laid out in IT for development narratives.

The relationship of income with the use of mobile Internet is generally positive. When we divided the respondents into four income categories (based on quartile calculation on the annual household income), the percentage of mobile Internet users increased with the household income in our survey areas (Table 11). The same is true for ICT devices such as desktop computers and

[29] The SLC is a nationally administered and monitored high school matriculation examinations in Nepal.

laptops. The non-user column, where households with large annual income have significant number of non-users, is puzzling.

Table 11: Income and Mobile Internet Use

Household Income Bracket (Annual Income in Rs.)	Mobile Internet User (%)	Mobile Internet Non-User (%)
Less than 80,000	22	78
Between 80,001 and 180,000	45	55
Between 180,001 and 250,000	62	38
More than 250,001	83	17

Regarding use, we see similar increasing tendency in all categories as shown by respondent counts in the column. Not the number, but the pattern of increase and decrease in the numbers are more important (Table 12).

We have to read these results cautiously. It may be said that richer households are using mobile Internet for education more and therefore educational use is conditioned on the income. More income would translate to better access to education and therefore an increase in use. Our study does not support the contention. While the use of mobile Internet for education does have a positive association with income but so do a lot of other uses. The less wealthy households have similar explanation for the relation between employment activities and income. Again, similar association can be seen for lower scores and income in other uses as well.

We have to read these results cautiously. It may be said that richer households are using mobile Internet for education more and therefore, educational use is conditioned on the income. That is to say, more income would translate to better access to education and therefore show an increase in educational use of the Internet. But it was not the case that higher education levels translated into use other than for entertainment and communication. While the use of mobile Internet for education does have a positive association with income but so do almost all the other uses. In short, those with higher-incomes engage in most online activities more frequently. The internet users in higher-income households are more likely than others to go online multiple times a day, both at home and at work, for productive and non-productive use. The less wealthy households have similar explanation for the relation between employment activities and income. Again, similar association can be seen for lower scores and income in other uses as well.

This tendency is better understood by ranking the activity by the percentage of users.[30] If we look at the rank sub-column under each income group, the activities are similarly numbered in all the groups. The top four uses are exactly the same, i.e., Facebook, news, songs/videos and Skype/Viber. Similar is true for bottom activities. It shows that the income groups are indistinguishable in their use of mobile Internet. In fact, the particular use of the mobile Internet does not correlate with income alone. Educational background, which can be shown to have a causal relationship with household income, might also not be a sufficient indicator for mobile Internet use on its own. Predicting mobile Internet use on the basis of socio-economic and socio-demographic variables is therefore complex.

Table 12: Income and Internet Use Ranking (Ordered by Average Rank)

Income in Rs. → / **Use of Mobile Internet ↓**	**Less than 80,000**		**Between 80,001 and 180,000**		**Between 180,001 and 250,000**		**More than 250,001**	
	%	***Rank***	***%***	***Rank***	***%***	***Rank***	***%***	***Rank***
Facebook	89	1	94	1	89	1	91	1
News	54	2	52	2	58	2	64	2
Songs/Videos	36	3	38	3	38	3	48	3
Viber/Skype	25	4	26	4	35	4	47	4
Education	18	7	23	5	28	5	39	5
E-mail	21	5	13	6	17	6	28	6
Employment	21	5	11	7	11	7	16	7
Buy/Sell	0	8	1	8	2	8	5	8

Variation in the ICT Access

Mobile phone may be considered as the only ubiquitous ICT device in Nepal. It is usually taken as a significant component for addressing concerns about universal access of information and resources. The pay-as-you-use model of mobile services could thus offer a view into the relationship between socio-economic affordability for greater access and use (Table 13).

[30] Spearman's rank correlation coefficient (rho) for the rank of activities is greater than 0.9 (and highly significant) for all pairs of income households.

Table 13: Variation in Mobile Phone Services Expenditure (in Rs.)

	Changu-narayan	Dapcha	Panauti	Pragati-nagar	Tangting
Average mobile phone ownership (per household)	2	1	3	2	2
Average mobile expense (per household/month)	1,224	445	1,387	2,068	1,488
Average mobile phone bills (Per person/month)	255	92	241	449	288
Average monthly household income	20,697	10,950	17,202	21,474	19,927
Average monthly savings	4,420	1,960	5,903	5,806	5,952

The recent spread in the telecommunication infrastructure has allowed a large majority of the population the access to mobile communication. Predictably, the average expenditure on the phone bills seems to correlate positively with the socio-economic status of a household (Table 14). A majority in the Dapcha households cite agriculture as the main source of the family income. Most Tangting households have someone outside the locality for employment opportunities, thus allowing them both the reason and resources for spending on communication. Many in the Pragatinagar's squatter settlement rely on daily wages and a large number of households have someone abroad for employment as well. Agriculture and related businesses are seen as the major sources of income for the Panauti residents. There is a positive association between income and mobile phone adoption, the income alone does not offer a complete explanation though. The nature of the source of income seems also to influence adoption. The households largely depending on agriculture and other non-monetized sectors do not have enough cash to spare for the Internet as in Dapcha. When households have fairly regular and constant source of cash such as wage- or salary-based employment and businesses, they seem to adopt the new technology rather quickly. Combined with the location advantage, strong remittance has led many in Pragatinagar to spend on mobile phone bills and even broadband Internet.

Table 14: ICT Penetration in the Households

Research Site	Household with ICT Device (%)	Broadband Internet at Home (%)	People Outside Locality (%)	People Abroad (%)	Chief Source of Income (Household %)	Average Income Per Month Per Person (Rs.)
Changunarayan	17.0	2.9	6.3	3.9	Agriculture (89) Employment (34.58) Foreign employment (16.14)	4,458
Dapcha	2.3	0.0	26.3	4.9	Agriculture (85.8) Business (21.89) Foreign employment (18.34)	2,413
Pragatinagar	20.4	7.5	3.4	9.0	Wages non-agriculture (42.22) Employment (21.33) Foreign employment (30.22)	4,726
Panauti	59.1	29.6	3.3	3.0	Agriculture (71.98) Business (37.68) Employment (36.71) Foreign Employment (8.21)	3,041
Tangting	6.5	0.8	15.9	12.8	Agriculture (75.81) Pension (20.97) Foreign employment (58.87)	4,247

Table 14 also shows interesting variations in the ICT penetration. The penetration of ICT devices (desktop, laptop and tablet) is very low in all sites except in Panauti. The Panauti data (59% households having at least one device) is in the "higher" penetration bracket as tabulated in the 2011 census report (CBS 2012b: 20).[31] Pragatinagar has the access to broadband Internet by the virtue of its proximity to Kathmandu, the capital, and Thimi, another municipality in the east. Inaccessible locations such as Tangting at the higher altitude, Changunarayan at the peripheral hills and Dapcha at the off-road location do not attract business interests of the commercial broadband Internet providers. The copper wires laid by Nepal Telecom could have been used to carry the standard ADSL broadband but the quality of the Internet connection suffers over long lines. The further a location is from the exchange, the poorer the broadband is. Fiber wires could serve as an alternative but they are not yet commercially viable. These places therefore remain cut-off. Even in closer places, a provider will extend its connecting infrastructure only when a significant number of households are willing to subscribe its services. Tangting, Changunarayan and Dapcha therefore suffer similar fate irrespective of their socio-economic background. The non-fiber based Internet is always playing catch-up with slow-speed and unreliable connections. Unless challenging terrains also have access to fiber-based broadband Internet, the gap leads to a new kind of digital divide.

Table 15 shows the results for examining the ethnicity-Internet link. Listed are the only ethnic populations that are large enough to allow meaningful averages. Tangting is almost exclusively a Gurung village. Survey sites in Panauti mainly consist of Newar households. Within a specific settlement, the ICT penetration and ownership of devices seem to reinforce the socio-economic exclusion. Across the sites, however, people belonging to the single ethnic group have varied access levels of ownership such as the Newars in Dapcha and Panauti. In a mixed settlement of Pragatinagar, the Tamang households seem to have better ICT capabilities than their ethnic kin in Changunarayan. Interestingly, the Tamang households in Changunarayan are a majority and reported higher monthly income. The Pragatinagar households have the location advantage. Non-users across the

[31] Panauti had the third highest household ownership percentage of computer in the 90 VDC/municipality of the Kavrepalanchowk district and much better than the national average (Panauti 16%; Nepal 7%). It is only slightly behind Dhulikhel in terms of both computer and Internet penetration in the district which is led by Banepa municipality.

Table 15: Snapshot of ICT in a Household Grouped by Ethnicity

Ethnicity	Average Mobile Sets Per Family	Mobile Bill Per Household Per Month (Rs.)	Household Income Per Month (Rs.)	Broadband Household (%)	Mobile Internet Household (%)	ICT Devices Household (%)
			Changunarayan			
Tamang	2.00	1,092	21,805	0.00	54	6.89
Chhetri	3.40	1,856	17,293	6.25	56	12.12
Brahman	3.22	1,603	23,833	12.76	83	43.75
Newar	3.00	1,120	21,250	2.97	65	23.68
Gurung	2.70	1,209	20,940	0.00	62	14.28
			Pragatinagar			
Chhetri	3.05	2,087	17,071	8.57	71	18.42
Brahman	3.37	2,503	22,692	6.25	63	23.52
Tamang	2.28	1,738	19,779	12.82	48	23.91
Newar	2.52	3,257	22,153	5.26	53	10.00
Rai	3.30	3,861	38,328	5.55	61	33.33
Limbu	2.42	2,750	30,694	0.00	42	25.00
			Dapcha			
Tamang	1.66	471	10,825	0.00	24	2.04
Newar	1.85	459	11,250	0.00	36	4.00
			Tangting			
Gurung	3.12	1,779	22,359	1.00	71	6.73
			Panauti			
Newar	3.89	1,431	17,772	30.00	81	59.00

ethnic lines reported that the overwhelming reason for not installing a fixed broadband connection in their households was the lack of its everyday use.

Variation in History of Mobile Phone Use

The median duration of mobile phone ownership was seven years on average with Changunarayan (7 years), Dapcha (5 years), Pragatinagar (5 years), Panauti (7 years) and Tangting (4 years). Users who had been using mobile phones less than the median duration are described as "short-duration users" and the other half as "long-duration users." On average, 67 percent of long-duration users are mobile Internet users. This number is slightly lower in the short-duration category which stands at 58 percent. The mobile service (GSM) was introduced in 1999 by Nepal Telecom. The mobile Internet was brought to its users in 2007 with the adoption of technologies such as GPRS and third-generation (3G) [Nepal Telecom n.d.]. For long-duration users, then, the technology to access the mobile Internet was a later addition.

Table 16: Long- and Short-duration Mobile Internet Users

	Changu-narayan	Dapcha	Pragati-nagar	Panauti	Tangting
Mobile owners (% of respondents)	69	68	86	70	94
Mobile Internet users (% of mobile owners)	63	31	60	83	68

These numbers compare poorly with those provided by NTA, specifically because the authority made critical errors. First, NTA has taken the present national population to be at 26.5 million (the 2009 figure) whereas the current estimate stands at 28.3 million.[32] Second, for some strange reason, they took the population to be around 27.5 million in their July 2009 report, a number higher than the figure they quoted in the 2015 reports (cf. NTA-MIS 2009 and NTA-MIS 2015e). Plugging in the official numbers shows present mobile phone penetration at 91 percent instead of the NTA reported 102 percent. Irrespective of the errors, assuming that the subscriber numbers are correct, the September 2015 report shows that 44 percent of mobile subscribers are mobile Internet subscribers (NTA-MIS 2015e: 2). In contrast, our numbers

[32] According to the CBS, the January 2016 national population estimate is 28.26 million. See, http://cbs.gov.np; accessed 23 January 2016.

are by users (age greater than 15) rather than by subscribers (Table 16). Tangting has deep mobile penetration as the emigrant population is very high. Pragatinagar's figure can also be attributed to the same reason. At Dapcha, an average family spends two or three times less on mobile phone bills compared to other places. The high-tariff of the mobile Internet by itself is a clear put-off there. Panauti numbers are reflection of their high penetration rate in all ICT technologies among the sites.

While the survey respondents have overall male to female ratio as 67:33, the male respondents are higher in Changunarayan (83%), Dapcha (81%), and Panauti (79%). The skew is reverse in Tangting and Pragatinagar where female respondents accounted for 70 and 61 percents respectively. The following results (Table 17) have to be read in the light of the skewed sample. Even with this skew, however, we see that female mobile and mobile Internet users have increased in recent years, i.e., in the short-duration category. For instance, in Panauti where there were 29 male mobile users for every two female users in the long-duration category, the number of male users comes down to 10 in the short-duration category. Similar is the case for mobile Internet. There are four female users for every 50 male in long-duration category, which increases to 11 in short-duration category. This is true in all the sites, even in Tangting and Pragatinagar where the skew was opposite. This is no doubt an encouraging sign in itself.

Table 17: Female and Male Mobile Owners and Mobile Internet Users

Research Site	Long-Duration		Short-Duration	
	Mobile Owners' (Female to Male ratio)	Mobile Internet Users' (Female to Male ratio)	Mobile Owners' (Female to Male ratio)	Mobile Internet Users' (Female to Male ratio)
Changu-narayan	1:35	3:65	1:6	11:63
Dapcha	1:34	0:1	13:57	1:10
Pragati-nagar	19:20	25:27	29:18	29:23
Panauti	2:29	4:51	1:5	11:50
Tangting	31:14	11:5	21:8	29:9

The gender ratios are nearly equal if we compare the two sub-categories, i.e., mobile phone owners and mobile Internet users for both duration of

use in all the sites. This suggests that ownership of mobile phones and use of mobile Internet is perceived gender-wise in the same light (positively or negatively). This implies that an increase in the female mobile phone users is likely to increase the female mobile Internet users. However, this quantitative study is not sufficient to establish the direction of causality and decide if this tendency is actually an indication of the perception of the two technologies or a mere statistical coincidence.

Perception of the Internet Primarily as a Recreational Platform

Do users as well as non-users have negative perception of the Internet? Do non-users avoid Internet because of such perception? Can it be said, for instance, that a decade long use of the Internet largely for recreational facilities is to blame for the lack of other online activities? These questions are linked to the oft-repeated argument that people stop themselves from using the Internet because they perceive it primarily as a recreational platform with no or little material benefits. To compound such perception, as it were, Nepali ISPs and news media regularly report that the Facebook and YouTube are the Internet services with most traffic and most data usage respectively. Statistics indeed show that the Facebook use alone accounts for the 97 percent of social media usage, with YouTube at 0.04 percent (StatsMonkey 2015). One has to bear in mind, however, that the population penetration of Facebook users was at 6.3 percent in 2012, which increased to 14 percent (the overwhelming three-fourth share of the use is through the mobile phones) by 2014. It shows that the users of the online social media platform are a tiny percentage of the population. Since the landscape of a location and proximity with the municipality, among others, has a big say on availability of Internet, it can be argued that present Internet users are heavily clustered pockets in the country. Not a single household in Dapcha had home Internet connection. The whole of Tangting had access to the Internet through a single Ncell wireless dongle. While the traffic and data usage figures are undeniable, they hardly indicate common perception.

Entertainment is not the lone and widely sought use of the mobile and Internet technologies in this survey (Table 18). The overwhelming skew in the media's perception therefore might be explained as an effect of the failure of other stakeholders to engage the users by providing needed facility and

Table 18: Perceived Information Need and Availability (in %)

Area	Mobile Internet Users Only		Mobile and Broadband Internet Users		Non-users of Internet	
	Need	Available	Need	Available	Need	Available
Agriculture	79	52	86	70	77	43
Health	97	88	95	87	97	73
Education	94	82	95	87	83	67
Employment	87	44	94	68	77	25
Benefit and entitlement	78	65	82	79	73	51
Market price	91	54	95	74	81	35
Government plans/programs	79	46	89	68	58	23
Water/ electricity	95	64	94	83	87	40
Social engagements	89	76	94	86	81	67
Entertainment	87	73	94	87	67	47
Sports	84	59	92	90	62	33

information and in the sensible formats. The postulate on the entertainment being the overwhelming use of the Internet has arisen due to the blip in other areas. Entertainment is not chosen but is forced upon due to non-availability of the more suitable and needed content. Further, one should avoid viewing the use of Internet for entertainment purposes in a negative light. First, it is not necessary that the usage of Internet for a specific motive (such as information seeking, entertainment and interpersonal communication) detracts from it being used for other purposes (McCloud *et al.* 2016). Second, the poor use of Internet for aims other than interpersonal communication, leisure and entertainment can be falsely inferred as non-productive. ICT policies that focus on stimulating economic growth by increasing access to the Internet might not consider them as "effective use" as they are not "capital enhancing." The diverse use of Internet, however, is not a zero sum game. Broad use of the Internet may provide the user with skills that will enable them to be more active consumers of information (capital enhancing or otherwise). It is likely that poor usage

numbers of some activities is not an indication of a lack of motive. Rather this may be usefully attributed to the lack of suitable content for other purposes.

We observed this when the respondents were asked to select "yes" if the information that they perceive important was available to them through any medium or means. The availability of information was asked for 11 areas of general interest such as health, education, employment, government plans/policies and market price and included entertainment. For analyzing the responses, three categories of users were grouped: the exclusive mobile Internet users; the mobile and broadband Internet users; and the non-users of the Internet (Table 18). These three categories account for 45, 14 and 40 percent of the respondents respectively.

Information on health, water/electricity and education stood out as the most general interest across all three categories whereas the information on social benefit and entitlement (such as pension and elderly allowances), government plans and programs as well as sports are of the least interest. Demographics are yet to be convinced regarding the usefulness of Internet for agriculture. This is a failure of those whose vision for IT is sadly motivated by the housing need of the outsourcing companies and not by the everyday requirements of the public. Employment and agriculture are perceived as the low priority areas in the government plans and policies. The lack of useful public content in these issues is critical. At the opposite end, health and education top the perceived information availability list.

We further carried out another experiment to see if the 11 areas would be ranked similarly by the three categories of users. We found that the perception of users of the Internet through both mobile phones and broadband varied largely to those who do not use it.[33] From the gender perspective, the variation in the perception of male respondents was less observable compared to that among the female population. The perception of need, in other words, can hardly be generalized.

A closer look at the households of the three categories of users shows that the Internet non-user household is poorer than the other two households. Such household typically had a monthly income of Rs. 14,643 whereas the other two had Rs. 21,924 (mobile and broadband) and Rs. 20,933 (mobile). Similarly the non-user household showed a lower level of formal education

[33] Spearman's rank correlation coefficient (rho) of the ranking of the perception of need between mobile-only Internet user and both mobile and broadband Internet user was 0.90 (p-value = 0.0001). Rho between mobile-only and non-user was 0.86 (p-value = 0.0007). Rho between both mobile and broadband Internet user and non-user was 0.70 (p-value = 0.01).

and largely dependent on agriculture for the income. Although agriculture is the major source of income for other two categories as well, other sources contribute to the household income that accounts for the overall better income levels. Though illiteracy is the highest in non-use households, the level of formal education remain mostly at the secondary levels. Numerous studies have shown a positive relation between Internet penetration and education. Our findings show that this correlation remains valid and low higher education (no more than higher secondary) number is characteristic of a non-use household. This has to be read in the light that a non-use household has lower levels of most things such as education, income and are location disadvantaged as well. Our finding only describes the characteristics of a household and does not establish a causal relationship between education and non-use (or use).

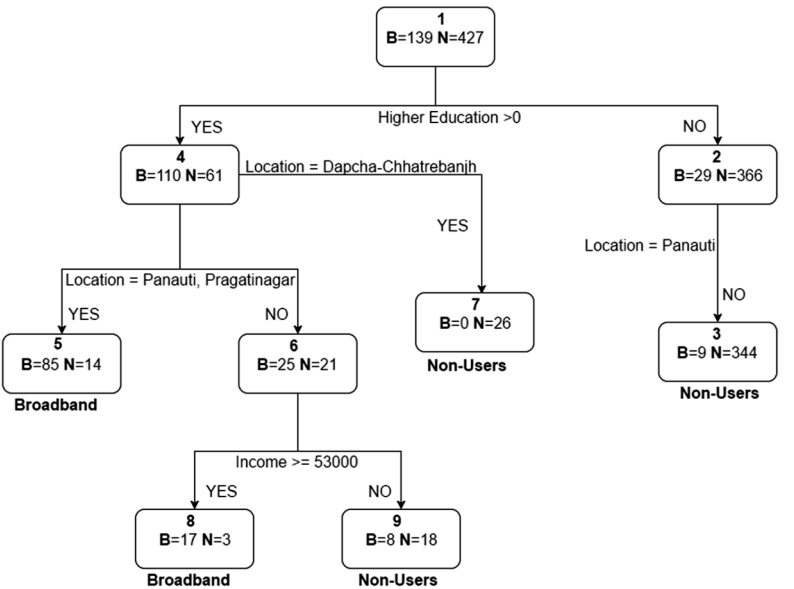

Figure 1: Decision tree for broadband Internet users' (Broaband) and non-users' of the Internet (Non-Users) households. The numbers inside the rectangle indicate number of respondents those who use the broadband Internet (B) and those who do not use the Internet at all (N) in our survey.

To understand the factors for broadband Internet use and Internet non-use we created a decision tree using the socio-economic, demographic and geographical attributes.[34] The important sections of the tree are shown in Figure 1.

We clearly see that location advantage and favorable terrain has a strong say in Internet use. Block 5 shows broadband use numbers in Panauti and Pragatinagar could be attributed to their geographical position. Respondent from Dapcha are distributed mainly in block 3 and 7. Again, the location criterion along with poor higher secondary education numbers (close to zero) characterizes the non-use of the Internet. Income plays an important secondary role to sift out broadband users. As expected, higher household income translates into increase in broadband use numbers.

General Perception of the ICTs

Respondents were generally positive about the effects that ICTs are promoted for. Most people find mobile phone as an important communication accessory. This is obvious given a very low penetration of the landline phones in the country. The September 2015 report published by NTA shows that fixed telephone subscription is around 3.20 percent of the population (NTA-MIS 2015e: 2). Based on the 2011 census household number, this subscription number translates to only 15.6 percent of household.[35] Despite the monopoly in the communication market, existing SMS capabilities are not attractive to the population. Major technological limitations aggravate the text experience. First, more phones in use are the basic pre-touch phones that make the typing tedious. Second, near one-third (31.4%) populace cannot read or write, females making the two-third of that number, and 9 out of 10 living in the rural areas (CBS 2012a: 226). Third, while 90 percent of the respondents perceived the Internet to be very useful, a majority does not

[34] Recursive partitioning technique was used to create the decision tree using information as the splitting index. We have used the rpart library available in R. The attributes used were: household income, expense, family size, location, percentage of children/youth, male/female percentage, percentage of members abroad, percentage of members with higher secondary education and percentage of members proficient in English language, percent of member currently in formal education. The classifier achieves 93 percent accuracy with high precision and recall (greater than 0.9) on a 10-fold cross validation.

[35] As would be expected, the 2015 numbers should be higher. But the exact number is not necessary to make our case.

experience it – particularly in rural locations such as Dapcha and Tangting – as useful facility in a mobile phone (Table 19).

Table 19: Usefulness of Mobile Phones (in %)

Perception	Changu narayan	Dapcha	Pragati nagar	Panauti	Tangting
Can make a call promptly	99	98	98	99	95
Can send SMS	79	37	53	39	39
Can get different information	85	25	54	60	86
Can listen to radio	92	50	58	45	23
Can listen to music	93	44	70	56	52
Can watch video	83	32	39	41	48
Can use Internet	77	26	50	57	23
Can play games	85	35	59	38	30
Can take pictures and video	83	33	43	44	47
Can record	75	19	27	25	17

The research shows that the presentation of the mobile phone as being critical to social discord not generally valid. People do not generally hold a grudge against the mobile phones. Generally, Internet is not seen as obtrusive towards local culture and the way-of-life. Matching views were expressed by the male and female population. Statistical tests revealed the views to be similar.[36] A common worry was its use had increased family budget unnecessarily. The "unnecessary" expenses view was expressed by adult respondents in response to the excessive use of mobile credit by the youth. In some parts, there was the perception that its proliferation has affected the children. These are the sites known for stronger views (Table 20).

[36] Spearman's rank correlation coefficient (rho) of the ranking of benefit and harm associated with mobile use between the male and female respondents were 0.89 (p-value = 0.00029) and 0.93 (p-value = 0.00091) respectively.

Table 20: Perception on the Negative Effects of Mobile Phones (in %)

Perception	Changu narayan	Dapcha	Pragati nagar	Panauti	Tangting
Makes people lazy	65	21	31	25	50
Harms health	72	7	29	25	12
Brings negative effect on society	79	5	32	15	21
Has negative impact on children	90	18	58	29	64
Wastes time	79	6	31	9	52
Increases unnecessary expenses	80	54	72	42	77
Disrupts harmony in a family	76	13	30	7	6
Has adverse effect on local culture	62	1	9	2	3

Similar pattern was seen about the perception of the Internet.[37] It was strongly agreed that the Internet was a useful tool during the daily routine. It was also strongly agreed that it was a tool for a common person and not only to the advantageous demographic (Table 21). The result also supports the common view that Internet is seen as an addiction among the young population engaging in activities leading often to the wastage of time and money. Again, as we have argued, this perception could come down significantly if much needed content and suitable technology were available to engage the youth.

Discussion

A key ambition of the past and present Nepali IT policies is to integrate communication system into lives of the citizens and to maximize benefits and minimize harms for them. The assumed relationship between technological changes, such as the nationwide introduction of Internet and economic growth has guided such prescriptions. The ICT enabled social transformation

[37] Spearman's rank correlation coefficient (rho) of the ranking of perception of the Internet between the male and female respondents was 0.87 (p-value = 0.00001).

Table 21: General Perception of the Internet (in %)

Perception	Male		Female	
	Agree	Disagree	Agree	Disagree
Very useful in daily life	72	2	58	2
Useful for a common person	62	6	54	4
For entertainment only	6	59	6	56
Only for advantaged population	10	67	5	66
Like a addiction	46	16	42	15
Useful for education	75	1	64	2
Can be used for personal development	70	1	54	1
Useful for access to government information	70	1	53	1
Wastes time and money	44	17	43	9
Important for getting access to information	72	1	59	1
Helps maintain connections	68	2	47	3
Can use it to buy and sell	48	8	30	6
Makes active in social engagements	59	3	39	3
Useful for access to political information	63	2	46	1
Useful for agriculture	52	6	31	4

is said to be necessary because the future Nepali society is envisioned as being "knowledge and information based": The currency will be digital and all social transactions will be Internet driven. The policy documents give an impression that such transformation is imminent in Nepal. They spell out a speculative future because their framers believe that knowledge and information as measurable. However, they leave out explanations for how the problems of inequality and exclusions would be resolved by the mere existence of knowledge and information platforms. Technologies borne out of the throat-cut competitive innovation may not hold the principles of democracy, human well-being and good society high.

The policies also present key issues and challenges as if they are largely of technical nature. This is evident in the drive for policy revisions. New

policies are thought to be necessary to address convergence in technologies and preparing for future innovations (such as Internet protocol television), and not to enable more participation or to generate appropriate content. Risks due to chronic energy shortages are given a nod. But its effect is seen as dampening the overall demand of ICT services thereby creating disincentive for investment. It fails to acknowledge that the IT infrastructure expansion needs a matching growth in the adjacent energy infrastructure, the supply side. A recent econometric analysis shows that for the full-scale services, as dreamt in the ICT policies are to be realized, the ICT sector will be one of the topmost consumers of energy not far away from the transport sector (Regmi and Pandey 2015).[38] The program to connect all public and community-run schools with the broadband Internet, where the spaces also acts as social hubs, cannot be sustainable beyond a scale unless the large energy demand is met. Irrespective of the logical constraint, the process seems to be already set into motion.[39]

The 2009 United Nations Conference on Trade and Development (UNCTAD) report claims that "information and communication technologies (ICTs) have proven to be a tremendous accelerator of economic and social progress" (UNCTAD 2009: xi). Such reports prompt the efforts to measure the diffusion of ICT devices. Specifically, there is now a strong focus on mobile phones, mobile Internet and, more recently, the broadband Internet (connected using optical fibre). For instance, the NTA reports cite the growth in mobile subscription and growth in data usage from mobile Internet as being the most promising developments in the sector. The ICT policy document highlights the mobile phone penetration of 90 percent as the major achievement of the telecommunication sector.[40] Mansell points out that such emphasis on diffusion numbers are "consistent with the prevailing dominant vision of a market (neoliberal) approach to building knowledge societies"

[38] Ncell, the largest private telecom (with half the total subscriber base), has come out with the number that matches with our estimate. According to them, the data center in Kathmandu alone consumes 4,500 liters of diesel per day (The Himalayan Times 2016). Add to it the thousands of rooftop-towers, devices/units between the users' and phones/laptops accessing the telecom networks, then only the number starts to provide a reasonable estimate of energy consumption by the telecom sector.

[39] On 6 April 2016 Nepal Telecommunications Authority issued an expression of interest (EoI) call for public and community schools to participate in the program.

[40] The July 2015 report had the number at 101.17 percent (NTA-MIS 2015a). This number has increased by five points between then and February 2016 (NTA-MIS 2016).

and that the policy environment for the knowledge societies "historically has been tilted in favor of market-led strategies" (2013: 3). Policy actions promoting economic growth but leaving out human development is indicative of market-led strategies. Human development in this context should be understood as a process of widening people's choices and creating an enabling environment for people to enjoy long, healthy and creative lives. Such thinking would arise once we view ICT (or the Internet) as just another technology in a long history of fantastic technological innovations that promises solutions to the development problems. Immediately, we could see that a technology is situated differently (with different meaning for its user in their daily life) across the world. There are authoritative discourses on governance of knowledge societies from both a top-down and bottom-up view. Mansell observes,

> If we take the question of adopting and enforcing appropriate policies for managing the production and circulation of information as a matter of human choice, rather than as the outcome of 'Moore's Law', we can see quite clearly the differences in the interests of stakeholders in the policy directions that are favored for knowledge societies. (2013: 7)

The lopsided emphasis on the positive impacts of ICTs is due to the view that there is a one knowledge society and that "knowledge society" upholds the principles of a "good society." This is the dominant position of ICT policy in Nepal as well. For instance, previous information technology policy (HLCIT 2067 v.s.: 6) explicitly mentions "to build a knowledge-based society" as its vision. This vision is intact in the latest ICT policy (MoIC 2015: 17) that supersedes it. UNESCO (2005) outlines an alternative pluralistic view of strongly participatory knowledge societies. It suggests that the concept of *information society* is largely based on technology breakthroughs and a broader vision of *knowledge societies* that celebrates diversity and capacities for knowledge sharing should replace it. It emphasizes information as a basic requirement to create knowledge societies for peace and sustainable development, but it is not a sufficient requirement. That is to say, the ambitions outlined in the policy documents should move beyond a focus on ICT infrastructure and emphasize on human well being and the process of learning (Mansell and Tremblay 2013). There is a growing concern that focus on other rights could be neglected such as those regarding persons with disability and marginalized people and groups in the rapid march towards the

access to information. For example, debates related to the ICTs have given emphasis to freedom of expression and privacy in Nepal. The freedom of expression is no doubt an important concern. But voices emphasizing other rights should not be lost in that clamor. For instance, ensuring participation should not be the end in itself. Access to ICT should be a necessary but not sufficient condition. Opportunities to exercise voice and hold others to account should be a topmost priority in all. The ICT policies and the discourse shaping them must first acknowledge the differences in visions about the kind of knowledge society Nepal needs.

It is also crucial to learn from both successes and failures. Internet in Nepal was introduced to the masses in the late 1990s. Its early stage was characterized by a very low penetration rate especially at the household level. Clearly, full effects of its introduction might yet appear when the diffusion rates increase beyond a certain limit. However, efforts to increase diffusion can be augmented by learning from experiences of other technologies placed to demonstrate major socio-economic transformations. From the same ICT sector, unraveling the contribution of computerization to productivity growth would be interesting. Learning of success and failures need not be limited to economic outcomes, and may be calibrated from the perspective of specific stakeholders, such as the disadvantaged population. The fear of missing out from the global race of technological innovations, thereby lagging in all aspects of development, as a sole reason to urge for ICT policy actions should be dropped. We have seen that a capacity centric policy implementation privileges the economically active cities. Such a misplaced priority further "heightens the enclave patterns of development with very mixed consequences" (Mansell 2013: 12). The ICT policies should not chase a single, off the shelf vision for a knowledge society. All societies (in the past and present) are knowledge societies. Simple as this may sound, this would mean that such policies should not privilege technological innovations. This would further mean that they do not foster market-led values and instead focus on human needs and aspirations.

The February 2016 report by NTA has now put the mobile penetration of Nepal at 106.66 percent of the population, nearly 20 points advance from the same time last year. This explosive rate of mobile phone diffusion poses an interesting question about the characteristics of *digital divide* related to mobile phones. It is no longer valid to look at the divide in mobile phones through simple dichotomy of access vs. non-access or use vs. non-use. Mobile

phones "combine a 'feminine' social technology with a 'masculine' gadget, with multiple functions" (Cotten, Anderson and Tufekci 2009: 1166).[41] Mobile phones, though private devices, are perceived as an extension of the body by their owners, and are increasingly used in public spaces. It therefore might be necessary to view mobile phones as representing a new *type* of technology, and not just a new technology.

Available research on the Internet use in Nepal is limited in its scope. It consists of largely small-scale academic exercises trying to relate the Internet use to socio-economic/socio-demographic variations such as education, income, occupation, gender, age and ethnicity. As indicated by the 2011 national census, the disparity in computer, Internet and mobile phone penetration across the mountain, hill and Tarai regions, shows that the large clusters in household Internet penetration are almost exclusively in the Kathmandu Valley. The eight municipalities/VDCs in Nepal with greater than 20 percent Internet penetration are all in the Valley. A more striking fact is that one in three homes in the Kathmandu Metropolis have such access; but these resourceful homes constitute only 4.7 percent of total Nepali households. The three cities in the Valley command more than one third of the total national household Internet use. The present survey shows that such exclusive character of the household connectivity has remained unchanged.[42] The non-utilization of the RTDF money is often cited as the reason behind the static Internet/telecommunications landscape. Without paying attention to the extra-technological dynamics behind the disparity, it is unlikely that the activities originating from the existing ICT policies will deliver the fruits of the much touted "digital Nepal." Only a clear understanding of use (and non-use) of the technology can lead to frame policies that can eventually translate into a greater and more inclusive Internet adoption and use. Simply averaging global numbers will mask the complexities for the use and for the constraints thereof.

Based on the findings presented in this essay, we make twofold argument in this article. First, household penetration of fixed broadband and access to

[41] This is mainly because telephones were once considered as a feminine technology due to its success as landlines (household use) and its primary use for casual conversation.

[42] The IT infrastructure assessment carried out shows that Internet connectivity (quality of service) and infrastructure (in public spaces such as schools, libraries and cyber-cafes) are poor in absolute terms of globally recommended minimum bandwidth and relative to the Kathmandu valley even in 2015.

communities are more critical than individual Internet diffusion for realizing the development goals set in the ICT vision, policy and roadmap documents. Hence, census or large-scale empirical exercises *at the household level* are needed to determine the significant socio-economic factors and barriers to broadband (both mobile and fixed) diffusion and adoption. Only such data should inform the IT policy actions. Internet adoption by households and a community relies on the local understanding of the relationship between local content, Internet infrastructure and affordability. The IT-related policies in Nepal follow a linear strategy where activities for universal access is placed at a later stage of the broadband Internet framework, preceded by a focus on supply-side and demand-side policies and developing a competitive environment. It is therefore all the more crucial to have a detailed understanding of current household use of the Internet to increase household access to the Internet before the expensive vision of the universal access is implemented. The problem, however, is that for high-speed broadband to reach the ubiquitous penetration level as the mobile phones require huge public funding, specifically to reach low-density and more inaccessible areas. This is difficult even without considering how the relevant content in different forms and through new services (such as electronic commerce) will accompany access. For the telecoms, the household level Internet access simply does not make business sense. The policies seeking an observable transformation in a short-term (five-year plan) through the use of Internet and related services therefore, should prioritize expanding the potential use of the Internet through mobile phones first.

The empirical data generated during the survey reported here clearly illustrate that Nepal's IT policies are cut-and-paste documents that have set abstract numerical goals arbitrarily chosen from the visions and policies of international agencies and other governments. Without understanding the socio-economic characteristics of the Nepali users intimately, enthusiasm alone will never help achieve the set targets as users continue to experience low use, unaffordable options and poor adoption. Misplaced emphasis and misconceived programs can easily create new types of digital or information divide.

Meanwhile, and this is our second argument, opportunities opened up through mobile phones and mobile Internet should be explored more vigorously given the rapid expansion in the telecommunication sector in Nepal. Particularly, government-to-citizen communications should

be strengthened on the platform as this will not directly depend upon household-level information. The mobile Internet should complement the core government service delivery through fixed broadband. Such development will go towards some distance both for demonstrating the efficacy of Internet delivery of services and for investing huge amount in the broadband infrastructure in coming years (Martin Chautari 2016).

Individual use of Internet through the mobile phones is considered an important policy issue as it is supposed to allow and facilitate digital citizenship. The argument for it is presented in the same effects education has had on promotion of democracy and economic growth (Mossberger, Tolbert and McNeal 2008). Use of the individual Internet therefore is thus said to provide an ability to participate in society online, i.e., digital citizenship by digital citizens who use it on a daily basis.[43] Similar argument is at the heart of the IT policies in Nepal. The policies argue for allowing everyday use of the Internet for a citizen through the access to mobile phones, technical competence and IT skills.

Though portable, mobile phones have small screens and keyboards. They use connections to slow speed wireless networks while on the move and have stringent data limits. And not all applications can run on mobile devices. These limitations make the device a poor substitute at best for a laptop or a desktop computer. Mobile phones are useful for quick and timely short exchanges making it suitable as a complement to other terminals. For instance, mobile Internet could be useful for taking an appointment at a hospital while the reports and forms are filled in and printed out through a desktop (at home or in public spaces such as telecenters). The Zero Mass Foundation in India is an interesting case-study where bank accounts can be opened and operated through mobile devices by rural pensioners. This eliminates the need to visit the bank. However, printing and filling-in long application forms required a device with a full sized keyboard and a printer. Similarly, while mobile phones can be used for registration by sending SMS and tracking of documents, the process of issuance of certificate and licenses require full sized printers and scanners which can be provided through an Internet kiosk (Bhatnagar 2009).

[43] New terminologies such as *digital citizen* and *digital society* have found place in popular usage but the difficulty is to define what constitutes (effective) *use* of a technology by a *digital citizen*.

Internet use through mobile phone is a combination of convenience and limited functionality. If we look at the history during the period where home broadband and dial-up co-existed as home Internet, it was consistently found that dial-up users went online less and carried out fewer tasks. Similar is being found from surveys and focus-group studies of mobile-only Internet users (Mossberger, Tolbert and Hamilton 2012). Though mobile-only Internet access can enable online use for economic activities such as job seeking, its efficacy is counter balanced by its limited functions. Many surveys and studies find the use of mobile phone as a primary form of Internet access has not been successful in reducing inequalities in online participation. This is especially true for the low-income communities. Therefore we argue that Internet access through mobile phones should only be seen as a first step to online. A complete access to the Internet requires affordable home broadband access.

Conclusion

In this article, we presented the results of an exercise towards large-scale studies related to the access and use of digital technologies. The results are helpful in developing critique of several assumptions behind Nepal's IT policy and promotional endeavors. They have also helped clarified many issues touted routinely as barriers and constraints to the universal access. They brought to the fore a better picture on the region, class, caste/ethnicity, gender, and literate/non-literate and urban/rural variations in the professed march towards universal access in Nepal.

We find that the household Internet penetration has not increased from the numbers reported in the 2011 census. The finding is backed by the NTA reports which show the Internet use is almost exclusively due to proliferation of mobile phones. The disinterest in uptake (and upgrade) is also evident from the observation that the market offers high speed Internet (larger than 1 Mbps) while the household Internet in the research sites were being delivered through entry level low speed connections (192 Kbps). Affordability was a major issue for the slow uptake. It is important to note that expense on Internet for a household has to account for the service charge (Internet bill), electricity bills and repair and maintenance cost. No wonder "slow and expensive" was the hallmark of Nepali Internet in the research sites. The slow uptake trend has continued despite the fact the IT policies have been highlighting the consequence that lack of access to digital content would lead to information

poverty. This has been advertised through the vision of a "knowledge and information society" and IT driven economic progress. We argue that the Nepali society is not information poor. It gets all the information it needs from conventional sources. Conversely, the present Nepali Internet does not deliver the rich information a community needs. We find that interest or perceived usefulness along with access and cost are the major reasons behind non-adoption of the Internet by a household. Lack of interest was also a key driver for the non-use of (individual) Internet from mobile handsets. Only half of the mobile phone owners had used mobile Internet.

We argue that it is not reasonable to attribute non-use of Internet on lack of awareness. The acceptance of social media in the community should have been reflected in the larger Internet numbers by now. It is our understanding that a significant portion of the population have simply chosen not to use the Internet in its current form. Information on health, water/electricity and education stood out as the most general interest for both Internet users and non-users. But our analysis finds that such perception of need can hardly be generalized. It is not surprising that the content that is most important to the people should be in their own language and relevant to the communities in which they live and work. Our survey reinforces the understanding that adoption decisions are primarily need-driven and based on cost-effectiveness of the investment. Farmers of Dapcha, for instance, are likely to revert to existing information channels if Internet do not offer content tailored to their information requests. The IT policies so far have failed to unlock such association between local content, Internet infrastructure and affordability. Lack of empirical research along this line means that the causal relationship between these three dimensions has not been understood. This is an immediate necessity, before huge investments are made to increase Internet diffusion in rural parts of the country. Nepali Internet as it is situated now is not compatible with the development needs of the rural communities.

We find that mobile Internet use is indistinguishable across gender. Here, social media, communication with friends and family, and entertainment are the three top-most uses of the mobile Internet. We did however observe that female mobile phone and mobile Internet users have increased in recent years. We also see that the female to male ratio in mobile phone ownership and Internet use are nearly equal. This was observed for long and short duration of use in all the research sites. This could well suggest that ownership of mobile phones and use of mobile Internet is perceived in the same light

(positively or negatively) across the gender categories. An implication could be that if female mobile phone users increase it is likely that we will see increase in female mobile Internet users. But our quantitative study is not enough to establish the direction of causality and decide if this tendency is actually an indication of the perception of the two technologies or a mere statistical coincidence.

We also could not find anything better than a weak association among the Internet use and socio-demographic variables. For example, people with higher education did not exhibit a tendency to use the Internet for education and employment activities. Age categories showed similar pattern in use. On deeper investigation, we found that the income groups were indistinguishable in their use of mobile Internet. In fact, the particular use of the mobile Internet did not correlate with income alone. Educational background, which may have a causal relationship with household income, was not a sufficient indicator for mobile Internet use on its own. Predicting mobile Internet use on the basis of socio-economic and socio-demographic variables is therefore complex. Results on the ethnicity-Internet link show that in a particular settlement the ICT penetration and ownership of devices seem to reinforce the socio-economic exclusion. Across the sites, however, people belonging to the single ethnic group have varied access levels of ownership such as the Newars in Dapcha and Panauti. We found that location advantage and favorable terrain offered a better explanation of Internet adoption than chasing the ethnicity and income threads.

Based on our findings, we have made twofold arguments in this article. First, household penetration of fixed broadband and community access is more critical than individual Internet diffusion in order to realize the development goals set in the ICT vision, policy and roadmap documents. Second, opportunities opened up through mobile phones and mobile Internet should be explored more vigorously given the rapid expansion in the telecommunication sector in Nepal. But Internet access through mobile phones should only be seen as a first step to the full possibilities offered by a complete access to the Internet. In order for the ambition of digital citizenship and digital society/community as laid out in the policy documents to materialize, the activities should eventually focus on affordable broadband access at the household and community level.

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References

Acharya, Buddhi Prasad. n.d. Message from Managing Director. Available at www.ntc.net.np/companyInfo/msg_md.php; accessed 6 January 2016.

Banstola, Amrit. 2007. Prospects and Challenges of E-banking in Nepal. *Journal of Nepalese Business Studies* 4(1): 96–104.

Bhatnagar, Subhash. 2009. Exploring Conditions for Delivery of Successful M-Government Services to the Bottom of the Pyramid (BOP) in India. Available at http://lirneasia.net/wp-content/uploads/2008/05/Mobile-2.0_mGov_final.pdf; accessed 22 December 2015.

Bhuju, Kriti. 2015. Lack of Policy Clarity Hinders Effective RTDF Use. *Republica*, 28 October. Available at http://admin.myrepublica.com/economy/story/30264/lack-of-policy-clarity-hinders-effective-rtdf-use.html; accessed 9 January 2016.

Britz, Johannes. 2004. To Know or Not to Know: A Moral Reflection on Information Poverty. *Journal of Information Science* 30(3): 192–204.

Broadband Commission. 2011. Broadband Targets for 2015. Broadband Commission for Digital Development/ITU/UNESCO. Available at www.broadbandcommission.org/Documents/publications/Broadband_Targets.pdf; accessed 22 December 2015.

Broadband Commission. 2015. The State of Broadband 2015: Broadband as a Foundation for Sustainable Development. Available at www.broadbandcommission.org/documents/reports/bb-annualreport2015.pdf; accessed 22 December 2015.

Bughin, Jacques and James Manyika. 2012. Internet Matters: Essays in Digital Transformation. Available at www. mckinsey.com/~/

media/McKinsey/Business%20Functions/Business%20Technology/Our%20Insights/Essays%20in%20digital%20transformation/MGI_Internet_matters_essays_in_digital_transformation.ashx; accessed 22 December 2015.

CBS. 2012a. *National Population and Housing Census 2011 (National Report)*. Kathmandu: Central Bureau of Statistics (CBS).

CBS. 2012b. *National Population and Housing Census 2011 (Village Development Committee/Municipality), Kavrepalanchowk*. Kathmandu: CBS.

Cotten, Shelia R., William A. Anderson and Zeynep Tufekci. 2009. Old Wine in a New Technology, or a Different Type of Digital Divide? *New Media & Society* 11(7): 1163–1186.

Dass, Rajanish and Atashi Bhattacherjee. 2011. Status of Common Service Center Program in India: Issues, Challenges and Emerging Practices for Rollout. Available at http://iimahd.ernet.in/assets/snippets/workingpaperpdf/2011-02-03RajanishDass.pdf; accessed 22 December 2015.

DiMaggio, Paul and Eszter Hargittai. 2001. From the 'Digital Divide' to 'Digital Inequality': Studying Internet Use as Penetration Increases. Working Paper 19. Center for Arts and Cultural Policy Studies, Woodrow Wilson School, Princeton University.

DiMaggio, Paul, Eszter Hargittai, Coral Celeste and Steven Shafer. 2004. Social Inequality: From Unequal Access to Differentiated Use. In *Social Inequality*. Kathryn Neckerman, ed., pp. 355–400. New York: Russell Sage.

Dutton, William and Grant Blank, with Darja Groselj. 2013. Cultures of the Internet: The Internet in Britain. Oxford Internet Survey 2013 Report. Available at www.iis.se/docs/OxIS_2013.pdf; accessed 22 April 2016.

Giri, Sanjeev. 2015. Nepal Telecom Installing 77 New Towers to Improve Service Quality. Available at kathmandupost.ekantipur.com/printedition/news/2015-01-27/nepal-telecom-installing-7-7-new-towers-to-improve-service-quality.html; accessed 9 January 2016.

Gulati, Girish J. and David J. Yates. 2012. Different Paths to Universal Access: The Impact of Policy and Regulation on Broadband Diffusion in the Developed and Developing Worlds. *Telecommunications Policy* 36(9): 749–761.

Hargittai, Eszter. 2002. Second-Level Digital Divide: Differences in People's Online Skills. *First Monday* 7(4). Available at http://firstmonday.org/article/view/942/864; accessed 7 January 2016.

Hawkins, Brian L. and Diana G. Oblinge. 2006. The Myth About the Digital Divide. *Educause Review* 41(4): 12–13.

Helsper, Ellen J. and Bianca C. Reisdorf. 2013. A Quantitative Examination of Explanations for Reasons for Internet Non-Use. *Cyberpsychology, Behavior, and Social Networking* 16(2): 94–99.

Hersberger, Julia A. 2003. Are the Economically Poor Information Poor? Does the Digital Divide Affect the Homeless and Access to Information? *Canadian Journal of Information and Library Science* 27(3): 45–64.

HLCIT. 2067 v.s. Sūcanā Pravidhi Nīti. High Level Commission for Information Technology (HLCIT), Kathmandu. Available at http://moste.gov.np/documents/IT_policy; accessed 22 December 2015.

Intel. 2009. The Economic Benefits of Strategic ICT Spending. Intel Corporation, California. Available at www.intel.com/Assets/PDF/whitepaper/Economic_Benefits_of_ICT_Spending.pdf; accessed 7 April 2016.

ITU. 2015. The World in 2015: ICT Facts and Figures. International Telecom munication Union (ITU), Geneva. Available at www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf; accessed 22 December 2015.

ITU. 2016. ICTs for a Sustainable World #ICT4SDG. ITU, Geneva. Available at www.itu.int/en/sustainable-world/Pages/default.aspx; accessed 17 May 2016.

Livingstone, Sonia and Ellen Helsper. 2007. Gradations in Digital Inclusion: Children, Young People and the Digital Divide. *New Media & Society* 9(4): 671–696.

Mansell, Robin. 2012. *Imagining the Internet: Communication, Innovation and Governance*. Oxford: Oxford University Press.

Mansell, Robin. 2013. Knowledge Societies Futures: Destabilization in Whose Interest? Paper presented in IAMCR 2013 conference, Dublin, 25–29 June 2013. Available at http://eprints.lse.ac.uk/50843/1/Mansell_Knowledge_societies_futures_2013.pdf; accessed 27 May 2016.

Mansell, Robin and Gaëtan Tremblay. 2013. *Renewing the Knowledge Societies Vision for Peace and Sustainable Development*. Paris: UNESCO.

Martin Chautari. 2014. *Universal Connectivity in Nepal: A Policy Review*. Research Brief No. 12. Kathmandu: Martin Chautari. Available at www.martinchautari.org.np/files/ResearchBrief12-UniversalConnectivityInNepal_ APolicyReview.pdf; accessed 22 December 2015.

Martin Chautari. 2015. S*takeholders for Universal Connectivity in Nepal*. Research Brief No.15. Kathmandu: Martin Chautari. Available at www.martinchautari.org.np/files/ResearchBrief15-StakeholdersForUniversalConnectivityInNepal.pdf; accessed 25 January 2016.

Martin Chautari. 2016. *Deliver through Mobiles First*. Research Brief No. 18. Kathmandu: Martin Chautari. Available at www.martinchautari.org.np/mc/files/ResearchBrief18_Deliver-through-Mobiles-First_June2016.pdf; accessed 2 June 2016.

McCloud, Rachel F., Cassandra A. Okechukwu, Glorian Sorensen and Kasisomayajula Viswanath. 2016. Entertainment or Health? Exploring the Internet Usage

Patterns of the Urban Poor: A Secondary Analysis of a Randomized Controlled Trial. DOI:10.2196/jmir.4375. Available at http://www.jmir.org/2016/3/e46/; accessed 10 January 2016.

MoE. 2013. Information & Communication Technology (ICT) in Education: Master Plan 2013–2017. Ministry of Education (MoE), Kathmandu. Available at www.moe.gov.np/assets/uploads/files/ict_mp_2013_final_.pdf; accessed 25 January 2016.

MoIC. 2071 v.s. Broadband Policy, 2071. Ministry of Information and Communication (MoIC), Kathmandu. Available at http://nta.gov.np/en/component/joomdoc/Broadband%20Policy2071.pdf/download; accessed 6 January 2016.

MoIC. 2072 v.s. National Information and Communication Technology Policy, 2072. MoIC, Kathmandu. Available at http://nta.gov.np/en/component/joomdoc/ICT%20Policy%202072.pdf/download; accessed 22 May 2016.

MoIC. 2015. National Information and Communication Technology Policy, 2015. MoIC, Kathmandu. Available at www.nta.gov.np/en/component/joomdoc/ICT%20Policy.pdf/download; accessed 6 January 2016.

Mossberger, Karen, Caroline J. Tolbert and Allison Hamilton. 2012. Measuring Digital Citizenship: Mobile Access and Broadband. *International Journal of Communication* 6: 2492–2528.

Mossberger, Karen, Caroline J. Tolbert and Ramona S. McNeal. 2008. *Digital Citizenship: The Internet, Society, and Participation*. Cambridge: MIT Press.

Nepal Telecom. 2070 v.s. ADSL Tariff Plans. Available at www.ntc.net.np/internet/adsl/adsl_tariffPlans.php; accessed 6 January 2016.

Nepal Telecom. n.d. Mile Stones of Nepal Telecom. Available at https://www.ntc.net.np/companyInfo/milestones.php; accessed 22 January 2016.

NTA. 2007a. Quality of Service Parameters for Internet Service. Nepal Telecommunications Authority (NTA), Kathmandu. Available at www.nta.gov.np/en/2012-06-04-05-30-21/internet; accessed 6 January 2016.

NTA. 2007b. Quality of Service Parameters for Basic Telephone Service Based on WLL/Limited Mobility and Mobile Telephone Services. Available at www.nta.gov.np/en/2012-06-04-05-30-21/cellular-mobile; accessed 6 January 2016.

NTA. 2013. Consultation Paper on Draft Quality of Service Regulation. NTA, Kathmandu. Available at www.nta.gov.np/en/component/joomdoc/Consultation%20Paper/CP%202013/Consultation%20on%20DRAFT%20QOS%20REGULATIONS%20final.pdf/download; accessed 6 January 2016.

NTA. 2015. Terms of Reference (ToR) for Development of Business Model for Utilization of the RTDF (Rural Telecommunication Development Fund) to

Deliver Telecom Access/Service in Rural and Remote Areas of Nepal. NTA, Kathmandu. Available at http://nta.gov.np/en/component/joomdoc/TOR%20for%20RTDF%20utilization.pdf/download; accessed 22 January 2016.

NTA-MIS. 2009. Nepal Telecommunications Authority: Management Information Systems (MIS) Report. 33(14). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-34/download; accessed 22 January 2016.

NTA-MIS. 2015a. Nepal Telecommunications Authority: MIS Report. 130(82). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-102/download; accessed 22 December 2015.

NTA-MIS. 2015b. Nepal Telecommunications Authority: MIS Report. 80(32). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-52/download; accessed 22 December 2015.

NTA-MIS. 2015c. Nepal Telecommunications Authority: MIS Report. 129(81). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-101/download; accessed 22 December 2015.

NTA-MIS. 2015d. Nepal Telecommunications Authority: MIS Report. 122(74). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-94/download; accessed 6 January 2016.

NTA-MIS. 2015e. Nepal Telecommunications Authority: MIS Report. 131(83). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-103/download; accessed 25 January 2016.

NTA-MIS. 2016. Nepal Telecommunications Authority: MIS Report. 136(88). NTA, Kathmandu. Available at www.nta.gov.np/en/2012-06-01-11-33-01/mis-archives/mis-reports/nta-mis-108/download; accessed 9 March 2016.

Rausas, Matthieu Pélissié du, James Manyika, Eric Hazan, Jacques Bughin, Michael Chui and Rémi Said. 2011. Internet Matters: The Net's Sweeping Impact on Growth, Jobs, and Prosperity. Available at www.mckinsey.com/industries/high-tech/our-insights/internet-matters; accessed 10 December 2015.

Regmi, Nischal and Shailesh Pandey. 2015. A Regression Analysis into Nepali ICT's Energy Consumption and Its Implications. In *9th International Conference on Software, Knowledge, Information Management and Applications (SKIMA)*, pp. 1–8. New York: Institute of Electrical and Electronics Engineers (IEEE).

Sachs, Jeffrey D., Vijay Modi, Hernan Figueroa, Mariela Machado Fantacchiotti, Kayhan Sanyal, Fahmida Khatun and Aditi Shah. 2015. *How Information and Communications Technology can Achieve the Sustainable Development Goals*. New York: Columbia University. Available at www.ericsson.com/res/docs/2015/ict-and-sdg-interim-report.pdf; accessed 22 December 2015.

Selwyn, Neil. 2003. Apart from Technology: Understanding People's Non-Use of Information and Communication Technologies in Everyday Life. *Technology in Society* 25(1): 99–116.

StatsMonkey. 2015. Mobile Facebook, Twitter, Social Media Usage Statistics in Nepal. Available at www.statsmonkey.com/table/21425-nepal-mobile-social-media-usage-statistics-2015.php; accessed 23 January 2016.

The Himalayan Times. 2015. NTA Plans to Check QoS of Telcos Soon. Available at http://thehimalayantimes.com/business/nta-plans-to-check-qos-of-telcos-soon/; accessed 9 January 2016.

The Himalayan Times. 2016. Fuel Shortage Hits Ncell's Services. Available at http://thehimalayantimes.com/business/fuel-shortage-hits-ncells-services/; accessed 24 February 2016.

The World Bank. n.d. World Development Indicators: The Information Society. The World Bank, Washington D.C. Available at http://wdi.worldbank.org/table/5.12; accessed 2 April 2016.

UN (United Nations). 2008. Official List of MDG Indicators: Target 8.F. Available at http://mdgs.un.org/unsd/mdg/host.aspx?Content=indicators/officiallist.htm; accessed 22 December 2015.

UN. 2015. Sustainable Development Goals: 17 Goals to Transform Our World. Available at www.un.org/sustainabledevelopment/sustainable-development-goals/; accessed 22 December 2015.

UNCTAD. 2009. *Information Economy Report 2009: Trends and Outlook in Turbulent Times*. Geneva: United Nations Conference on Trade and Development (UNCTAD).

UNESCO. 2005. *Towards Knowledge Societies*. Paris: UNESCO. Available at www.unesco.org/new/en/communication-and-information/resources/publications-and-communication-materials/publications/full-list/towards-knowledge-societies-unesco-world-report/; accessed 9 May 2016.

Van Dijk, Jan. 2005. *The Deepening Divide: Inequality in the Information Society*. Thousand Oaks, CA: Sage.

Yates, David J., Jeff Gulati and Joseph W. Weiss. 2011. Different Paths to Broadband Access: The Impact of Governance and Policy on Broadband Diffusion in the Developed and Developing Worlds. In *44th Hawaii International Conference on System Sciences (HICSS)*. Ralph H. Sprague, Jr. ed., pp. 1–10. New York: IEEE.

Zhou, Yan, Nirvikar Singh and P.D. Kaushik. 2011. The Digital Divide in Rural South Asia: Survey Evidence from Bangladesh, Nepal and Sri Lanka. *IIMB Management Review* 23(1): 15–29.

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