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Policy Commentary

Information and Communication Technology Scenario of Nepal: Assessing Policy Environment and Challenges

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Abstract

Advances in Information and Communication Technologies (ICTs) offer great opportunities for developing countries to stimulate economic growth. However, Nepal has not been able to harness the full potential of the ICTs and benefit from them to the extent possible because of the general absence of underlying fundamentals including policies and strategies aligned with the technological dynamism of the sector, to address ever evolving needs and fully capitalize on opportunities offered ICTs and digital technologies. To rise to the ICT challenge facing the country requires a thorough review of structural impediments to the transformative potential of ICTs and digital technologies, establishment of the policy environment that promotes innovative harnessing of these technologies by all actors, including the private sector, and a strategic orientation that factors in fast evolving technology landscape, where artificial intelligence, blockchain, analytics and Industry 4.0 are set to play defining roles going forward.

Keywords: IT Policy; transformative technologies; policy challenges; policy gap

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1. Background

Technological advances over the years in information, communication and digital technologies have offered great opportunities for developing countries to stimulate economic growth. These technologies have meaningfully augmented and complemented the public sector efforts aiming to achieve sustainable development goals. Recognizing their growing potential, governments worldwide are putting in place plans and policies to mainstream these technologies into strategies geared towards strengthening the foundations of good governance, achieving service transformation and redefining economic competitiveness. This broadly defines the context within which successive governments of Nepal have tried to accord policy priority for developing the Information and Communication Technology (ICT) sector in the country and harnessing these technologies for development.

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2. Overview of Nepal's Information and Communication Technology Sector

From an overarching policy objective perspective, discussions around emerging information, communication and digital technologies in Nepal are premised on two broad thematic lines: (a) the role of ICTs as general-purpose technologies to help the country achieve a range of policy outcomes and development objectives; and (b) ICTs as the service industry sector in its own right with the potential to boost the export of services and create entrepreneurial growth and employment opportunities.

In terms of a broad telecommunications landscape, the foundational aspect of the ecosystem defining the country's overall scenario of the information and communication technology is that the share of three major voice operators holds 98% of the market out of six licensed operators. The Internet Service Providers (ISPs) have also expanded their reach into urban and semi-urban areas of Nepal with cable and Fiber-to-the-Home (FTTH) deployments. There are 125 registered ISPs and 17 Network Service Providers (NSPs) operating with licenses from the Nepal Telecom Authority – the telecommunication regulatory body of Nepal. ISPs' contribution in this area is extremely important in terms of providing quality and affordable fixed broadband services to the communities. Preliminary observations reveal that most urban centres have ISP Points-of-Presence (POPs), providing citizens in these areas with relatively high-quality connectivity within price-points that a modest number of households and businesses can afford.

Some aspects of the ICT sector in Nepal have indeed registered a relatively robust growth over the years. For example, the telecommunications sector has achieved impressive growth over the past several years, especially in relation to its coverage and penetration. Along those lines, the overall telecom penetration rate, constituting primarily mobile services, currently stands at 130.75% (NTA 2021). Similarly, the penetration of broadband services currently stands at 91.55%, which consists primarily of wireless mobile broadband. The share of fixed broadband currently stands at 25.27% (NTA, 20201) of the total broadband penetration.

In terms of the type of broadband technologies deployed, mobile broadband consists mainly of 3G, covering around 40% of the population while 4G networks are also being expanded rapidly covering in excess of 27.27% of the population of Nepal, a trend that continues to grow as of this writing (NTA, 2021). The coverage of 4G networks has been expanded to more than 615 local governments (out of 752) in Nepal. There are clear indications that there will be significant growth in the expansion of 4G coverage in the coming months as telecommunications companies continue to aggressively expand such networks driven by a surge in demand for data to move away from predominantly voice-based business models.

As to the issue of bridging the digital divide, it is important to note the presence of the Rural Telecom Development Fund (RTDF) which serves as the universal access fund created and managed by the Nepal Telecom Authority as per the provision of the Telecommunications Act, 2053 (1997). The fund is created, pursuant to section 30 of the Act, by depositing two per cent of the gross adjusted revenue of each licence. The fund is to be mobilized for the development, extension and operation of telecommunications services in rural areas.

The RTDF has gained significant traction from the year 2018. It is being currently mobilized in two major activities supporting the connectivity divide:

- a. **Broadband Backbone Network:** Under it, a Fibre Optic (FO) backbone network is to be laid along the mid-hill highway to provide connectivity to district headquarters. The ongoing pandemic has severely hampered progress on this front. So far, only 308 km of FO backbone has been laid along the mid-hill highway out of the plan of 6,331 km (NTA 2021). The NTA hopes to expedite the process significantly once the situation stabilizes.
- b. **Broadband Access Network:** under this network, connections will be established among local government offices, community schools and community health centres.

As of October 2020, a total of 4783 community schools and 3809 community health centres in rural areas have been connected to the broadband network.¹ Similarly, a total of 5428 local government ward offices have also been connected by mobilizing the RTDF. There are issues though with regards to the quality and overall usability of some of these connections.

As for the demand-side drivers, there is a huge demand for quality and affordable telecommunication services, including broadband, throughout Nepal. The pandemic has significantly stimulated demand for online services, especially in the area of online education, telemedicine, e-commerce and digital payments. This has resulted in significantly enhanced demand for broadband connections. To be fair, all this has brought to the fore the gaps between digital “haves” and “have-nots,” a gap that has become more pronounced in the area of online education, where both access to affordable and quality broadband and devices have become major challenges among students, especially in rural areas.

Despite headways made on the front of connectivity footprint, however, Nepal’s ICT journey, on the whole, continues to be beset with and characterized by a host of challenges and missed opportunities. For example, while wireless broadband offers prospects of significant expansion in the reach of broadband services in Nepal, given its topography, there are issues relating to the quality and affordability of such services. Measured against Nepal’s GNI per capita,

1 <https://nta.gov.np/en/press-release-20210829/>

consumer wireless and fixed broadband prices in Nepal are still very high, impacting the abilities of communities to harness mobile internet connectivity effectively. Given the impact of the coronavirus pandemic, the need to afford and use distance education and telemedicine-related services has been highly felt. On this account, Nepal seems to be way off the SDG target for making entry-level broadband affordable by bringing its price point below 2% of GNI per capita (ITU, 2020).

An acceptable level of internet access is needed to satisfy the ever-increasing demand for data. Fixed broadband networks serve the purpose as they are robust enough to ensure scalability, resilience and quality. In terms of policy priority, there is, therefore, an urgent need to move away from over-reliance on mobile networks towards promoting investments in robust high-capacity, fibre-optic-based fixed broadband networks. Such investment is needed to build ‘future-proof’ connectivity infrastructure that can cope with an ever-increasing demand for quality connection and bandwidth.

Nepal’s wholesale (i.e., backhaul) market for telecommunications services also remains relatively underdeveloped. As a consequence, operators have deployed their own east-west backhaul networks running across the length of the country. Nepal Telecom and Ncell now own two complete east-west networks. A third east-west backbone is owned and operated by the Nepal Electricity Authority. Smaller providers operate their own, smaller backhaul networks.

In terms of backbone infrastructure, an east-west highway Synchronous Digital Hierarchy (SDH) optical network runs across the country providing a crucial backbone to build additional infrastructure. The main route consists of STM-4, while some routes use STM-16. Between the main route and major cities are STM-1 links. They provide the provinces with the fibre optic backbone infrastructure to build their networks. An additional fibre optic backbone network needs to be built to connect major urban centres and local governments within provinces.

Nepal’s current backbone infrastructure consists of three east-west, Kathmandu-Hetauda, and Kathmandu-Pokhara-Butwal Optical Fibre Cable (OFC) lines. Work is currently underway to lay a fiber optic backbone along the mid-hill highway running from the eastern part of Nepal to the western part. The total length of the highway is 1776 km. The fibre optic backbone along this highway is expected to serve many of the hinterland areas and enable the deployment of fixed broadband networks covering several peri-urban and rural communities.

One of the major issues that needs to be addressed going forward is no direct connectivity from Nepal to any submarine cable landing point, which has, resulted in high IP transit costs for Nepal. Currently, telecom operators and internet service providers in Nepal purchase internet bandwidth from India. Cross border fibre was introduced in Nepal in 2008 from India, before which all international traffic was routed through VSAT. Nepal Telecom and Ncell have optical fibre connectivity with India via Biratnagar-Jogbeni, Birgunj-Raxual and Bhairahawa-Sunaulin. Similarly, Nepal Telecom has connectivity with China via Rasuwagadhi and Tatopani.

Even though the Nepal-China Optical Fibre Link Project began commercial operation on January 12, 2018, connectivity through these transit points with China is beset with challenges. It is of low capacity and is frequently broken primarily because of the difficult terrain these

networks run through. Moreover, these bilateral networks are typically closed-access networks designed primarily for the use of investing operators. Nepal, therefore, continues to have a dependency on India in the area of access to the global internet.

Apart from a robust policy infrastructure, Nepal's telecommunications and the broadband sector is a low prioritised sector with limited resources available. The ICT sector is, thus, not able to effectively harness information and communication technologies that are necessary to stimulate growth and development and strengthen governance and service delivery. In addition, the sector also faces the following specific constraints concerning productive positioning of ICTs and digital technologies within Nepal's overall development and growth agenda:

2.1 Lack of a coherent and comprehensive national strategy

The Government of Nepal has yet to develop and implement a coherent and comprehensive strategic framework to effectively harness the potentials offered by ICTs and digital technologies to catalyze efforts aimed at improving governance, building capacity to capitalize on opportunities afforded by emerging digital technologies and strengthening and enhancing service delivery capabilities of federal, provincial and local governments.

Even though the government announced a comprehensive Digital Nepal framework outlining a broad set of activities across a number of domains, a lot of work still remains to be done for the framework to be completely and realistically implementable. For one, proper institutional arrangements are yet to be in place to spearhead the Digital Nepal initiative. Similarly, concrete investment proposals supporting each of the 80 activities listed in the framework are yet to be formulated in order for the framework to be wholly implementable. More importantly, given the record of largely ineffective implementation of a similar framework – such as the e-Government Masterplan – in the past, a thorough assessment of capacity will be needed to ensure that the Digital Nepal framework is grounded on an effective implementation arrangement.

2.2 Inadequate mapping of federal digital initiatives at provincial and local government levels:

As things stand now, infrastructure and services created at the federal level are not being fully shared and utilized by provincial and local governments despite the fact that there is a sizable scope for building upon the federal digital initiatives in a number of areas. For example, the country already has a government integrated data centre (GIDC) that could be scaled up and strengthened further to be shared by all federal, provincial and local government agencies to host their systems and help mitigate their technology management challenges. Similarly, the government enterprise architecture (GEA) and the Nepal government interoperability framework (NeGIF) developed at the federal level can be used to guide, standardize and facilitate the development and deployment of digital solutions for a more inclusive and connected government at the local, provincial and federal levels.

The fact remains, however, in terms of strategic orientation, these resources have not been favourably positioned to support their use across all government agencies. The public sector at large has yet to effectively share and harness key infrastructure and services created at the central level, such as the national data centre and the government cloud and national disaster

recovery centre. The factors hindering the effective appropriation of these resources are poor governance and concerns around the efficacy of management arrangements that are currently in place to oversee the sustained operation of these resources. These issues need to be addressed properly going forward to lower barriers for provincial and local governments and enable them to launch their digital initiatives and achieve a quick system development and deployment turnaround time.

2.3 Limited use of new technologies for public service delivery:

Nepal lags behind other countries in the region on using new approaches for developing a connected and participatory government. A very limited number of online services could be accessed and/or allowed transactions by citizens and businesses anytime from anywhere, through their internet and mobile phones. This is also in recent developments in the area, for example, the much-touted *Nagarik App*, which has much room for improvements and scope expansion to meaningfully meet a host of service delivery needs of the citizens. Such technological platforms can bring significant benefits in terms of improved access to public services and information to rural areas or disenfranchised groups in a landlocked and geographically diverse country like Nepal and increase transparency and accountability in government affairs across all three tiers. Despite its impressive coverage, the mobile phone remains a significantly untapped channel for service delivery in the country.

3. A brief overview of policy and regulatory environment

The introduction of Nepal's first Information Technology Policy in the year 2000 marks an important milestone in terms of the expression of priority by the government for the development of the information technology sector and for supporting efforts to achieve a range of policy outcomes harnessing these technologies.

The IT Policy has gone through periodic revisions over the years, backed by a number of regulatory instruments introduced by the government. The following constitutes some of the key federal policy frameworks that are currently in existence in Nepal.

3.1 National ICT Policy, 2072

The National Information and Communication Technology policy is aimed at creating an ecosystem conducive to the growth of the information and communication technology sector in the country. It provides a comprehensive framework covering both the supply and demand sides of a vibrant ICT and digital ecosystem. Among others, the policy highlights the need to (a) strengthen mechanisms to ensure cyber security and protection of ICT resources, (b) to align ICT strategies with developmental priorities especially in the area of provision of important public services, and (c) to develop strategies to stimulate the growth and competitiveness of ICT industry to expand employment opportunities, among others.

3.2 Broadband Policy, 2071

The broadband policy announced by the government in the year 2071 BS aims at promoting the expansion of broadband access and availability throughout the country as a key foundational element of a vibrant ICT and digital ecosystem. The policy stresses the need to focus on both

supply- and demand-side fundamentals shaping the broadband sector and strengthening the sector's competitive intensity. Among others, the Policy lists down strategies aimed at expanding the reach, availability and affordability of broadband to bridge the digital divide in the country. In addition, the Policy stresses the need to factor in the fast-evolving trends shaped by technological convergence and its policy and regulatory ramifications. The need to put in place strategies for ensuring optimum and productive utilization of USO funds in the form of RTDF to address issues relating to financing and viability funding gaps has also been highlighted in the Policy.

3.3 Telecommunications Policy, 2060

The telecommunications policy of Nepal highlights the need to put in place the groundwork necessary to promote the expansion of quality telecom connectivity throughout the country. The policy broadly deals, among others, with spectrum governance issues, strategies for telecom connectivity beyond areas where market demand exists and policy provisions required to stimulate competitive intensity of the sector offering consumers with choices.

In addition to the Policy document mentioned above, the telecommunications sector in Nepal is also governed by the Telecommunications Act 2053 (1997).

3.4 Electronic Transaction Act, 2063

The Electronic Transaction Act framed in 2063 was intended to provide a legal basis for transactions carried out through electronic and digital means. The Act stipulated a trust and authentication framework based on Public Key Infrastructure (PKI) and provides a legal sanction to contract and digitally signed documents. An Office of the Controller of Certification (OCC) was set up pursuant to the Act and certification agencies designated to govern and manage the issuance of digital signatures and digital certificates.

In addition to policy provisions as mentioned above, several legal and regulatory instruments have been framed, including a draft Cyber Security Bylaw, 2077 led by the Nepal Telecom Authority (which is awaiting approval). Other related initiatives have also been undertaken to strengthen the IT ecosystem in the country. Along those lines, a security response apparatus in the form of an NP Cyber Emergency Response Team (CERT) has been formed under the leadership of the Director General of the IT Division of the Ministry of Information and Communication Technology. In support of this, the Government has announced, through the budget speech for the year 2020/21, the establishment of a cybersecurity forensic lab.

3.5 Policy Issues Facing Nepal's ICT sector

As hinted earlier, policy frameworks about Nepal's ICT sector need to be analyzed along two dimensions. The first should focus on ICTs for development to harness ICTs and digital technologies to strengthen development, governance and service transformation. The second should concentrate on infrastructure and the digital economy, aimed at creating a conducive investment climate for stimulating investments in communication infrastructure, ICT and ICT-enabled industries and services to secure Nepal's transition into a digital economy.

One of the major challenges facing the ICT policy space in Nepal is the very nature of the evolution of information and communication technologies. As it is, ICTs are cross-cutting

technologies applicable across a range of socio-economic domains and policy jurisdictions. For example, the health and education sectors could be sizable users of ICTs going forward with the implications that policy efficacy in these areas can only be ensured if the roles of agencies active in those sectors and domains are adequately factored in ICT policy formulation. Similarly, increasing IT enablement of commercial and business activities is giving rise to innovative enterprise models in the e-commerce space that call for policy responses that can address a range of technologies as well as non-technical issues that range from intellectual property (IP) protection and consumer to data protection and privacy issues.

This poses a formidable policy implementation challenge in that no single agency can for all practical purposes be realistically designated as the sole agency responsible for furthering ICT and digital agenda. The Ministry of Communication and Information Technology is currently the designated agency for ICT policy development and implementation. Given the cross-cutting nature of ICTs and digital technologies, it is extremely important to ensure that ICT policy development is carried out under a thoroughly participatory process involving all agencies responsible for achieving a range of public policy outcomes where digital technologies could play a role. The Ministry of Communication and Information Technology can still be the focal ministry for furthering the digital agenda but its role should largely be that of a coordinator and facilitator to ensure goal and vision coherence among a diverse set of stakeholders. This imperative has yet to be reflected properly in Nepal's ICT policy-making processes. All this calls for a fundamental rethink of current institutional arrangements vis-a-vis Nepal's digital policy agenda.

In addition, ICT-focused policy clarity is needed to make digital technologies a lever for economic growth. Of late, policy gaps have become all too evident in Nepal in terms of sharing economy-based business models (like Tootle and Pathao). Policy clarity on these and other sharing economy-based services is required urgently going forward. Similarly, the government has yet to firm up its policy and regulatory positions on emerging technologies like the internet of things (I-O-T) and artificial intelligence. Any delay in taking concrete positions on the policy ramifications of services based on new and evolving technologies is bound to further stifle the innovation and development of knowledge-based enterprises.

Policy gaps in the ICT space here in Nepal are also evident in the area of data protection and privacy. Given that data will be more and more the mainstay of a range of user-centred digital activities, it is important to have a concrete policy position on data governance, data protection and privacy. This is one area that leaves much to be desired from policy perspectives in Nepal.

Prevailing policy provisions in Nepal also fail to respond adequately to vulnerabilities in the application of ICTs and digital systems, especially along the lines of online safety and cybersecurity. Given that ICTs and digital systems are increasingly deployed in mission-critical environments where trust and security of systems are of critical importance, effective policy and regulatory interventions are needed to secure critical information technology and digital assets. This includes, among others, actionable policy priorities to be accorded in securing financial infrastructure.

Similarly, policy frameworks currently in force fall short of providing an environment conducive to the growth of start-up ecosystems around digital technologies. Along those lines,

these frameworks need to be redesigned to create a policy environment for promoting innovative enterprises. This includes concrete policy positions on financing and incubation of innovative enterprises in line with fundamentals shaping the digital and knowledge economy sectors.

Nepal also needs to rethink the redundancy and resilience aspects of its access to the global internet. As it is, the country relies heavily on India for its cross-border connectivity for the global internet. Going forward, Nepal needs to look seriously into the prospects of leveraging both of the neighbouring country's large-scale connectivity or transportation projects (e.g., Road Initiatives in India, Railroads in China, and others) and other potential avenues of cross-infrastructure synergies to improve its access and resilience infrastructures connecting it to the global internet.

International IP transit costs also pose a major problem for the country and adversely affect end users' pricing and quality of services. Open access regimes to international gateways offer compelling prospects, as it was seen when Indian operators were forced to lower IP transit prices by nearly 30% when Nepal telecom entered into cross-border connectivity arrangements with China.

Nepal's backhaul infrastructure needs to marked improvement as it is unlikely to be sufficient to meet long-term broadband demands.

4. Conclusion

As indicated earlier, some aspects of the ICT sector have indeed registered impressive growth over the years in Nepal. Some definite headways have been made in the country on the front of the expansion of the telecommunication infrastructure, especially in relation to cellular networks and the penetration of mobile phones. Broadband penetration has also been increasing and the number of individuals using the internet is growing day by day. Among others, digital payments and e-commerce sectors have registered impressive growth over the years thanks largely to noteworthy private sector activism in the area and also due to pandemic induced digital reliance. However, a lot remains to be done for Nepal to be in a position to meaningfully and more productively harness ICT and digital technologies in ways that render effective contributions to Nepal's sustainable development aspirations and goals. A large swathe of the population still remains unconnected or poorly connected given the slow rate of the expansion of the quality broadband infrastructure. Nepal's overall achievement in the sector has been inadequate at best to match the policy intent at the implementation level. Barring the progress made in the area of expansion of the telecommunications infrastructure in the country by promoting policy measures aimed at stimulating competitive intensity of the telecommunications sector, strategic application of information, communication and digital technologies – in ways that meaningfully strengthen governance, service delivery and sustained growth – is still largely missing in Nepal compared with other countries in the region. There are instances where the government has become more receptive to the ICT and digital enablement of services. However, what is missing is a coordinated and integrated 'whole-of-the-government and economy' approach while pursuing strategies aimed at transforming service delivery and strengthening governance. Concrete policy orientation aimed at strengthening the role of the private sector is also missing, as existing policy provisions fall way

short of accommodating innovative entrepreneurial activities. Also, there is a need to future-proof Nepal's digital agenda by factoring in evolving technology paradigms like AI, blockchain, analytics, Industry 4.0 and the like.

However, a lot remains to be done for Nepal to be in a position to meaningfully and more productively harness ICT and digital technologies in ways that render effective contributions to Nepal's sustainable development aspirations and goals. A large swathe of the population still remains unconnected or poorly connected given the slow rate of the expansion of the quality broadband infrastructure. Nepal's overall achievement in the sector has been inadequate at best to match the policy intent at the implementation level.

Barring the progress made in the area of expansion of the telecommunications infrastructure in the country by promoting policy measures aimed at stimulating competitive intensity of the telecommunications sector, strategic application of information, communication and digital technologies – in ways that meaningfully strengthen governance, service delivery and sustained growth – is still largely missing in Nepal compared with other countries in the region. There are instances where the government has become more receptive to the ICT and digital enablement of services. However, what is missing is a coordinated and integrated 'whole-of-the-government and economy' approach while pursuing strategies aimed at transforming service delivery and strengthening governance. Concrete policy orientation aimed at strengthening the role of the private sector is also missing, as existing policy provisions fall way short of accommodating innovative entrepreneurial activities. Also, there is a need to build a future proof digital journey by factoring in evolving technology paradigms like AI, blockchain, analytics, Industry 4.0 and the like.

Fine-tuning policy instruments to secure alignment with the dynamism of the sector is one key area that needs serious attention going forward. More importantly, a thorough review of structural impediments attributable to policy implementation gaps must be carried out to ensure that discourses around the developmental and transformative potential of ICTs and digital technologies move beyond the level of rhetoric and focus on results that impact the lives of the people. Among others, the announcement of the Digital Nepal framework offers an opportunity to provide much-needed traction to Nepal's digital agenda.

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Author's Bio

Mr. Bhattarai is a leading ICT and information economy expert from Nepal. Until a few years back, he was serving as the Vice-Chair of High Level Commission for Information Technology,

an apex level ICT policy and strategy outfit Chaired by the Prime Minister of Nepal Mr. Bhattarai played a lead role in drafting Nepal's first IT Policy in the year 2000 as part of a team formed by the National Planning Commission, Government of Nepal. In addition to a number of policy formulation initiatives in the ICT and digital technologies space that he has been involved in over the years including revised ICT Policy in the year 2014, Mr. Bhattarai's has also contributed in the formulation of National Broadband Policy and National Broadband Masterplan for the Government of Nepal in the year 2015. Mr. Bhattarai played a key, leadership role in efforts leading to the formulation of eGovernment Masterplan of the Government of Nepal which has since culminated in a comprehensive eGovernment project being executed by the Government of Nepal. Among others, the project envisages to leverage information and communication technologies to promote good governance and improve delivery of public services. Mr. Bhattarai is also credited with the achievement of having provided leadership on delivering on one of the key, foundational components of eGovernment initiative namely the development of Government Enterprise Architecture/ Government interoperability framework. His recent engagement involves helping develop the Digital Nepal framework aimed at securing Nepal's transition to Digital Economy. Mr. Bhattarai maintains deep engagements with academia and civil society in exploring strategies for effectively leveraging technologies to achieve favourable policy outcomes as well as to stimulate economic growth.