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Executive Summary

Background

Bordering two of the world's fastest-growing economies – India and China – Nepal has eight of the world's highest mountains, an abundance of natural resources, and multidimensional cultural heritage attracting tourists globally. Despite having these enticing features, Nepal has not been able to tap its growth potential due to prolonged political uncertainty.

That stated, Nepal has made significant progress on reforms with the adoption of a new Constitution in 2015, transitioning from a unitary to federal state, and election of a stable government. The new Government's priorities are centered on development and targeted initiatives to realize its goal of attaining developing nation status by 2022, and middle-income country status by 2030.

The Prime Minister of Nepal, Khadga Prasad Oli, has outlined his vision of “Prosperous Nepal, Happy Nepali” with broad objectives to address some of the basic challenges facing the country. Key focus areas include:

- Building capabilities to grow the country’s tourism sector
- Focusing on rapid build-out of infrastructure – water, transportation, and energy
- Ending absolute poverty, illiteracy, and unemployment
- Providing health insurance and free health care for every citizen
- Accelerating post-earthquake reconstruction efforts
- Curbing the flow of young talent leaving the country
- Increasing farming productivity

Digital Journey

Nepal has enjoyed incredible success in digital adoption as compared to its neighbors, with mobile penetration exceeding 100% and Internet penetration reaching 60%. According to the Nepal Telecom Authority, there was an addition of 2.25 million new Internet users in 2017 alone, translating into approximately 250 new Internet users every hour.

Nepal is expected to lead Internet penetration by 2025 in comparison to major economies such as China and India, given its growth trend over the next few years. The growing popularity of social media is a crucial driver for Internet adoption in Nepal, coming second only to Bhutan in South Asia in social media penetration. As at January 2018, Nepal has nearly 9.3 million Facebook users. Entertainment and video sharing are other popular use cases with more than 6.4 million registered users on YouTube.
What is Digital Nepal?

The early success with Internet and mobile provide the impetus for Nepal to leverage the potential of digital technologies to drive accelerated growth. The Digital Nepal Framework is a blueprint that provides a roadmap to how digital initiatives can:

- Contribute to economic growth
- Find innovative ways to solve major challenges facing society in a shorter period with fewer resources
- Identify opportunities for Nepal to participate in the global economy

The digital initiatives have been selected based on:

- Alignment with the vision of Prosperous Nepal, Happy Nepali
- Demonstrated success in other similar developing markets
- Ability to execute in the local environment

The Digital Nepal Framework encompasses:

- One Nation
- Eight Domains
- 80 Digital Initiatives

The Digital Nepal program is designed to enable Nepal to harness its growth potential by leveraging disruptive technologies and driving socioeconomic growth. The program is expected to deliver an impact of up to NPR 800 billion by 2022.

Eight Domains and Eighty Digital Initiatives

Under the Digital Nepal framework, eight sectors - agriculture, health, education, urban infrastructure, energy, tourism, finance, and connectivity - have been identified based on close engagement with stakeholders.
Frost & Sullivan has identified 80 digital initiatives which aim to propel socioeconomic growth in Nepal by addressing crucial challenges while unlocking the growth potential in each of the eight key sectors.

### Agriculture

1) eHaat Bazaar  
2) Precision Agriculture  
3) Agriculture Tools Sharing  
4) Digital Payment of Subsidies  
5) Specialty Food Program  
6) Digitalization of Land Records  
7) Smart Irrigation Project  
8) Education and Training Programs for Farmers  
9) State of the Art Knowledge Centers

### Healthcare

10) National Digital Healthcare Program  
11) High Speed Internet Access  
12) Next Generation Digital Facilities  
13) EMR  
14) Health Procurement and Distribution Solution  
15) Mobile Health Units  
16) eMaternal Care  
17) Drones for Medical Emergencies  
18) Centralized Telemedicine Centre

### Education

19) Smart Classrooms  
20) OLE Nepal 2.0  
21) Online Learning Platform  
22) Rent-a-Laptop Program  
23) GSM Mapping  
24) Centralized Admission System  
25) Biometric Attendance and CCTV Cameras  
26) Co-creation Hubs  
27) Mobile Learning Centers in Rural Areas

### Energy

28) Smart Pricing  
29) Smart Metering  
30) Smart Grid  
31) NEA Official Mobile App 2.0  
32) Any Branch Payment  
33) Smart Building  
34) NEA Field Force Automation  
35) NEA Customer Service Portal  
36) NEA e-Learning Centre

### Tourism

37) Welcome Nepal Website  
38) Welcome Nepal App  
39) eVisas  
40) Multilingual Helpline  
41) AR / VR  
42) Electronic Tour Guides  
43) Omnichannel Marketing  
44) Free Wi-Fi for Tourist Areas  
45) Training Programs for Local Guides

### Finance

46) GPS Tagging of Branches  
47) National Biometric ID Card  
48) Gamification of Digital Payments  
49) Allow Telecom Operators to offer Digital Financial Services  
50) Digital Payments Campaign
### Urban Infrastructure

51) Water ATMs  
52) Smart Metering  
53) Pipeline Monitoring  
54) Intelligent Waste Management  
55) Crowd Sourcing for municipal services  
56) Automated Waste Sorting  
57) Connected Public Transport  
58) Public Transport App  
59) Multi-modal Smart Cards  
60) Intelligent traffic management  
61) Intelligent Parking Lot Management  
62) Intelligent Toll Booths  
63) National Disaster Management System  
64) Ride Sharing  
65) Disaster Management Training

### Connectivity

66) Internet - A Fundamental Right  
67) Availability of Spectrum  
68) Take lead in 5G  
69) Fiber Broadband Network  
70) High Speed Connectivity for Government Establishments  
71) Nepal Cyber Security Centre  
72) SEZ for IT sector  
73) Government of Nepal App  
74) eGovernance 2.0  
75) Paperless Government  
76) Kathmandu Digital Hub  
77) Public Wi-Fi Hotspots  
78) Digitally Streamlined PPP Platform  
79) Digital Literacy Training  
80) Government eLearning Platform

### Business Environment Enablers

The success of Digital Nepal Framework will require a high degree of emphasis on implementation. Government of Nepal needs to focus on the following priority areas to create an enabling environment for the success of Digital Nepal initiatives:

#### Technology and Infrastructure

**Digital connectivity needs to be a key priority.**  
Possible actions include:
- Make Internet access a fundamental right for every citizen  
- Improve availability of spectrum to the operators to enhance service coverage and quality  
- Take leadership in driving 5G adoption in South Asia  
- Establish a nationwide fiber network

#### Entrepreneurship/PPP

**Encourage private sector participation.**  
Possible actions include:
- Digitally streamline PPP application system to mobilize private investment  
- Tax holidays and incentives for investment in Digital Nepal program  
- Start-up accelerator program to build a strong ecosystem for nurturing innovation and entrepreneurship

#### Talent and Skills Development

**Improve Digital Education.**  
Possible actions include:
- Compulsory IT education in schools and colleges  
- Increase the education system's capacity to impart advanced ICT education  
- ICT literacy programs for rural communities and underprivileged Nepali people  
- Ongoing communication and celebration of digital stories of success

#### Facilitate development of a robust financial ecosystem.

Possible actions include:
- Encourage digital payments  
- Attract investments in Fintech by encouraging the growth of startups and telecom companies to offer services to drive financial inclusion

**Encourage foreign direct investment in priority areas.**  
Possible actions include:
- Fast-track FDI applications for Digital Nepal initiatives  
- 100% FDI and easier repatriation of funds for Digital Nepal initiatives

**Making public servants digitally-ready will be essential.**  
Possible actions include:
- Digital skills training for public sector employees
Setting the Context

Background

Bordered by two of the world’s fastest growing economies – India and China, Nepal has eight of the world’s highest mountains, abundance of natural resources (especially fresh water resources) and multi-dimensional cultural heritage attracting tourists globally. Despite these, Nepal has not been able to tap its growth potential due to multifaceted challenges including political uncertainty, trade disruptions, and natural disasters (like twin earthquakes in 2015 and floods in 2017). Political instability had become a part of life among residents, with the country changing twenty governments since the introduction of democracy in 1990.

However, Nepal has made significant progress on reforms recently with adoption of new Constitution in 2015, transitioning from a unitary to federal state, and election of a stable government.

- The country’s first-ever local government elections in state assemblies and the Federal Parliament in 2017 marked a crucial and positive move towards federalism and political stability.
- The new Constitution aims to turn around the economic and political situation, ensure a double digit economic growth over the next 10 years and create an inclusive, pluralistic democracy, and a mixed market economy.
- One of the key targets of the government is to graduate from its status as a LDC by 2022, become a middle-income economy by 2030, and a developed country by 2099, and towards this, has implemented several long-run policies and programs that are centered on the UN’s Sustainable Development Goals (SDGs).

Macro-Economic Environment

Nepal has registered a steady growth in GDP during 2010-2015, with GDP growth hovering around 5.0%. However, a massive earthquake in April 2015, significantly impacted the country’s economic development and GDP growth in FY 2015/16 dropped to 0.6%

- In 2016-17, growth picked up significantly to 7.5%, driven by good harvest, significant foreign aid, normalization of trade activities and improved electricity
supply management. Nepal ranked as the third fastest growing economy in the world in 2017\(^4\) in terms of GDP growth.

- Going forward, GDP growth is likely to normalize around the pre-earthquake figure of \(-5.3\%\), sustained by increased spending on reconstruction and election activities. However, this may be offset by a slowdown in remittance inflow due to a decline in the number of outgoing migrants.

Nepal GDP (US$ billion) and GDP Growth (%), at constant prices, 2013/14 – 2021/22F

![Graph showing GDP and growth rate]

Source: Frost & Sullivan, Nepal’s Macro Environment and Key Industry Prospects, 2017–2022; F indicates forecasts

Nepal is considered to be one of the least developed countries in the world with low per capita income. Further, low economic growth rates in Nepal compared to other countries in the region is a cause of concern.

<table>
<thead>
<tr>
<th>Per Capita of Gross National Income* of Asian countries, 2016, US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maldives</td>
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<tr>
<td>Sri Lanka</td>
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<tr>
<td>Bhutan</td>
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<tr>
<td>India</td>
</tr>
<tr>
<td>Pakistan</td>
</tr>
<tr>
<td>Bangladesh</td>
</tr>
<tr>
<td>Nepal</td>
</tr>
</tbody>
</table>

*Based on Atlas Method; Source: ADB, Basic Statistics 2018

Average annual GDP growth rate of Asian countries, 2012-2017, % (at current prices)

| Bangladesh | 13.4% |
| China | 7.4% |
| India | 7.3% |
| Bhutan | 6.6% |
| Pakistan | 6.3% |
| Nepal | 5.4% |
| Sri Lanka | 5.0% |

Source: World Bank, World Development Indicators

Criteria for graduation from LDC Category

Graduation threshold for any two of the following three graduation criteria must be met for two consecutive triennial reviews for graduation from LDC status:

<table>
<thead>
<tr>
<th>Graduation Criteria</th>
<th>Nepal progress vs. criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Capita Income</td>
<td>GNI per capita &gt; US$1,242 (three year average)</td>
</tr>
</tbody>
</table>

\(^4\) World Economic Forum
Nepal Gross National Income (GNI) per capita is significantly below threshold for graduation out of Least Developed Country (LDC) category. However, the country has made significant progress on human asset and economic vulnerability related KPIs, which have made it eligible for graduation for LDC.

However, Nepal has decided not to rely on the non-income criteria framed by United Nations to graduate from the LDC category, fearing the transition would significantly reduce the flow of foreign aid and deprive the country of other international support measures.

Expected economic growth rate of 5-6% are unlikely to help Nepal to achieve its objectives of:

- Meeting income criteria for graduation from LDC category by 2022
- Becoming a mid-income country by 2030

In order to achieve its vision to become a mid-income country by 2030, Nepal will require heavy infrastructure along with consistent growth rate of 8-10% annually.

Agriculture continues to remain the mainstay of the Nepali economy, accounting for the largest share of total value-add at -32.1%

- Future growth will be led by reconstruction of damaged irrigation facilities and sufficient supply of agri-inputs. However effects of floods and landslides in August 2017, which created significant food shortage, and unseasonal rainfall that affected paddy, may slowdown sector growth

Trade, Transport and construction are other key sectors witnessing strong momentum in Nepal.

- Wholesale and retail trade and Transport sector has picked up with the normalization of trade activities and expected to grow further in the import driven economy.
- Construction sector growth in 2017/18 will be boosted by continued momentum in post-earthquake reconstruction and large infrastructure project.
Foreign Direct Investment

Government of Nepal has undertaken several steps in the recent years to encourage foreign direct investment (FDI) in the country. As a part of its efforts to encourage FDI, the Government of Nepal issued the new Foreign Investment and One-Window Policy 2015, which replaced the Foreign Investment Policy of 1992. Further, the government organized Nepal Investment Summit in 2017 with an objective of attracting FDI. As a result of these efforts, foreign direct investment in Nepal grew by whopping 128% in 2017 to reach NPR 13.5 billion. However, Nepal has not been able to tap complete potential of FDI investments with net FDI contribution only 0.8% of GDP. Government of Nepal should continue its effort to attract FDI, as it does not only help in bridging funding gap, but also enables technology transfer and sharing of best practices from other economies.

Inflation Rate

Following significant volatility in the last five years, inflation rate in Nepal has stabilized, reaching a 13-year low in 2017, aided by declining food prices and moderation in the costs
of nonfood items. In 2018, experienced a marginal spike, due to a sharp increase in vegetable prices; however going forward, is expected to remain at the 5% level.

In recent months, strong trade linkages with India have resulted in Nepal’s inflation trend mimicking that of India.

<table>
<thead>
<tr>
<th>Nepal Inflation rate, 2013/14 - 2021/22F, %</th>
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<tbody>
<tr>
<td>--------</td>
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<tr>
<td>9.1%</td>
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</tbody>
</table>


**Population**

High population growth in Nepal has been long regarded as one of the key challenges inhibiting economic growth. The country’s population had almost doubled between 1960 and 1990. However, with the expansion of mass education, gradually rising economic opportunities, urbanization, growth in female labor force participation, and delayed marriages leading to a decline in fertility, the trend has started to reverse, with population growth slowing down.

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<tbody>
<tr>
<td>28.11</td>
<td>28.43</td>
<td>28.85</td>
<td>29.15</td>
<td>29.51</td>
<td>29.87</td>
<td>30.22</td>
<td>30.55</td>
<td>30.91</td>
<td></td>
</tr>
</tbody>
</table>


**Poverty**

With almost 25% of the population living below the national poverty line, 50% of the population earning below $3 per day, and a per capita income below international and regional standards, Nepal is considered among poorest nations in South Asia, trailing only Bangladesh. This is primarily due to socioeconomic conditions wherein almost 80% of Nepal’s population lives in rural areas, have large families, very small landholdings and lack primary healthcare, education, safe drinking water, sanitation and other basic necessities.

The earthquake in 2015 that caused widespread devastation, coupled with high dependence on agriculture and climate-specific issues such as rugged terrain, lack of rainfall and poor soil quality, has further exacerbated the situation. Huge disparities and inequalities continue to exist between regions and underprivileged social groups.

Despite such a dismal situation, Nepal has covered significant ground in alleviating poverty over the last five years, primarily due to high amounts of remittances from Nepali people who have migrated overseas – Nepal has among the highest foreign remittances in the world, at US$ 6.6 billion equivalent to 31.3% of the country's GDP in 2016.

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7 Pew Research Center and World Bank, 2017
Nepal poverty statistics

<table>
<thead>
<tr>
<th>Metrics</th>
<th>1995/96</th>
<th>2003/04</th>
<th>2010/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population Living Below International Poverty Line ($1.90 a day)</td>
<td>61.9%</td>
<td>46.1%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Population Living Below International Poverty Line ($3.10 a day)</td>
<td>86.6%</td>
<td>75.5%</td>
<td>50.8%</td>
</tr>
<tr>
<td>Population Living Below National Poverty Line</td>
<td>41.8%</td>
<td>30.9%</td>
<td>25.2%</td>
</tr>
</tbody>
</table>

Source: World Bank; Nepal Central Bureau of Statistics

Literacy rates

Nepal has made notable progress in improving its education system, increasing net primary school enrolment rates have increased from 68.0% to 94.7%8, over 1991-2017 and significantly closing the gender and age gap in education - one in five elderly people able to read and write - led by strong government policies such as the School Sector Development Program (SSDP) and significant ICT implementation through Open Learning Exchange (OLE) Nepal and OpenIDEO programs.

However, with an adult literacy rate of ~59.6%, Nepal continues to rank the lowest among key South Asian countries, as majority of the youth still struggle to gain access to education, particularly at the secondary and tertiary level. To overcome this, the government will need to devise stronger incentive and monitoring mechanisms to ensure implementation of its various programs.

<table>
<thead>
<tr>
<th>Literacy rate*, Nepal vs. Asian countries,</th>
<th>Enrolment Ratio, Nepal vs. Asian countries,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal</td>
<td>Malaysia</td>
</tr>
<tr>
<td>59.6%</td>
<td>44.1</td>
</tr>
<tr>
<td>69.3%</td>
<td>17.3</td>
</tr>
<tr>
<td>72.7%</td>
<td>9.7</td>
</tr>
<tr>
<td>91.2%</td>
<td>46.1</td>
</tr>
<tr>
<td>95.1%</td>
<td>118.6</td>
</tr>
<tr>
<td>%9</td>
<td>%10</td>
</tr>
</tbody>
</table>

*Latest available data, as per latest census data in the country

8 UNESCO
9 UNESCO Institute for Statistics, Data for the Sustainable Development Goals by Country
10 UNESCO Institute for Statistics, Data for the Sustainable Development Goals by Country
High Rural Population

In spite of rapid urbanization in recent years, Nepal continues to remain one of the least urbanized countries in the world. World Bank estimates that only one-fifth of the Nepali population lives in the urban areas, while more than 80% of the population continues to reside in rural areas.

![Urban Population (%) comparison chart](chart.png)

Source: World Bank

However, most of the infrastructure development in Nepal is centered in a few large cities, while people in the remote rural areas continue to struggle with poor infrastructure and limited access to basic services like healthcare, education and financial services. As a result, it is important for Nepal Government to focus on extending reach of its services and development agenda to rural Nepal in order to drive inclusive growth and achieve its vision of Prosperous Nepal, Happy Nepali.

To sum up, Nepal has made considerable progress in socio-economic parameters during the last decade. However, it continues to lag behind its South Asian peers in both economic growth and Sustainable Development Goals with high poverty and low adult literacy rates. Nepal needs to adopt a holistic approach and undertake significant investments in order to meet its socio-economic growth aspirations.
State of Digital Adoption in Nepal

Nepal - Mobile First Economy

Expansion of telecommunication infrastructure in Nepal was restricted due to multiple challenges including difficult topography, adverse economic conditions and political instability. However, the country has seen significant improvement in telecommunication landscape in last decade driven by significant investments by leading mobile network operators (Nepal Telecom and Ncell).

Like many other Asian countries, mobile services industry in Nepal has witnessed significant growth over the last 4-5 years. The mobile penetration in Nepal has grown exponentially in the last decade to reach 113% in 2017 from 21% in 2009. Further, mobile penetration in Nepal is expected to continue to grow strongly over the next five years.

Source: Nepal Telecommunications Authority

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11 Nepal Telecommunications Authority
Nepali people are realizing benefits of the Internet and Internet penetration in Nepal is growing at a phenomenal rate. During the last five years, internet penetration in Nepal has increased by 6-7 percentage points annually.

According to the Nepal Telecom Authority, 2.25 million new users were connected to the internet in 2017, which translated to approximately 250 new internet users in every hour.

Increasing penetration of internet in Nepal is driven by:

- Increasing popularity of social media (e.g. Facebook, Twitter and Instagram) and online communication platforms (e.g. WhatsApp, IMO, etc.)
- Increase mobile connection and smart phone penetration
- Increasing use cases, such as entertainment (e.g. YouTube), music streaming, and ecommerce

Nepal is expected to be a forerunner in internet penetration with continued growth in internet penetration in next several years. In the next few years, Nepal will see huge growth in mobile penetration and mobile internet usage, more than countries like India and China.
Mobile operators in Nepal are increasing investments in infrastructure in order to meet growing demand for data services. Leading mobile operators in Nepal have focused on expanding coverage of 4G services since its launch in early 2017. 4G services rollout will continue to remain a priority for telecom operators with 60% of Nepal’s cities getting 4G services in next 2-3 years.

Compared with the mobile broadband industry, Nepal’s fixed-line sector is significantly underdeveloped. Fixed broadband services have been largely confined to larger cities with some ISPs beginning to offer fiber-to-the-home.

Government of Nepal is undertaking steps to expand internet connectivity as part of its vision of a Digital society that connects 90% of the population to broadband services by 2020. In line with this, in May 2018, Nepal Telecom Authority selected Subisu, a privately owned Nepali company focusing on cable TV and cable internet, to build Fiber-To-The-Home (FTTH) network in eight districts in Province 2 of Nepal.

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12 Nepal’s ICT Development and Broadband Policy, 2015
Nepali people are embracing social media

Growing popularity of social media is key driver for adoption of internet in Nepal. Nepal is second only to Bhutan in South Asia in social media penetration.

![Active social media users (Jan, 2017)](image)

Source: Hootsuite, 2017

In Jan 2018, Nepal had nearly 9.3 million Facebook users. Entertainment and video-sharing are other popular use cases with more than 6.4 million registered users on YouTube.

The rapid growth of social media users and increasing of internet penetration in Nepal has catalyzed the stereotypical concept of traditional marketing and created the emergence of digital marketing in the country. Website development, social media marketing, content management, web design and e-mail marketing have vastly expanded in Nepal and have become one of the fastest forms of information dissemination.

eCommerce is still a new concept, but growing rapidly

As of May 2017, there were more than 56,286 registered websites in Nepal, including 40,000 commercial websites. Many business & organizations in Nepal started leveraging digital marketing to enhance their online presence on the Internet and promote their business globally.

Growth of eCommerce in Nepal is inhibited due to lack of supporting eco-system, such as limited digital payment options. However, this is changing with the emergence of FinTech startups such as eSewa and Khlati which are expected to disrupt the payments landscape.

Digital to unlock potential for Nepal

Digital Adoption in Nepal is higher than ever with near universal mobile adoption and nearly 60% internet penetration. Nepali people are adopting internet technologies at a rapid pace, but case studies for adoption in public sector and enterprises are far and few. Further, Nepal lacks a supporting eco-system (such as digital payments, online banking, etc.) which is critical for development of a digital society. As a result, Nepali society has not been able to reap full benefits of the ongoing digital revolution.

The recent times have seen emerging of new business models and disruptive technologies such as Artificial Intelligence, Robotics, Internet of Things (IoT), which have completely transformed the way work is done. These digital technologies have helped government and enterprises globally to unlock their growth potential to achieve exponential growth.

13 Hootsuite
14 Social Blade
15 Export.gov - Nepal Country Commercial Guide
Digital is Catalyst for Exponential Accelerated Growth

There are strong linkages between digital adoption and GDP growth. According to a World Bank report, every 10% increase in internet penetration in a country, results in an incremental economic growth of 1.3%. The impact becomes even more robust once the penetration reaches critical mass.

Nepal needs to grow at significantly higher rate (8-10%) than currently projections (-5%) to have a realistic chance of meeting income criteria for elevation from LDC category by 2022, and becoming a mid-income country by 2030. Disruptive digital technologies have potential to help Nepal in fast tracking social-economic growth in Nepal. The Digital Nepal Framework intends to help Nepal in identifying key digital initiatives that can help it in meetings its growth potential.

16 Exploring the Relationship Between Broadband and Economic Growth, World Bank, 2016
Digital Nepal program will help Nepal in unlocking its growth potential by leveraging disruptive technologies to enable social-economic growth. The program will help Nepal in embarking on its journey to an era of high economic growth, enabling it to become a developing country by 2022 and a mid-income country by 2030.

Nepal, GDP Growth Forecast

Impact of Digital Nepal program:
NPR 800 billion by 2022
Under the Digital Nepal framework, eight sectors – agriculture, health, education, urban infrastructure, energy, tourism, finance, and connectivity – have been identified based on close engagement with stakeholders. The framework aims to guide Nepal on its journey toward becoming a Digital State.

**Agriculture:** Digital Nepal initiatives in the agriculture sector encompass technological solutions aimed at maximizing yield and minimizing agricultural input. The use of Agritech solutions is anticipated to boost farm productivity and sustainability to meet growing food consumption, and in turn, increase farmers’ incomes.

**Health:** Digital Nepal initiatives in healthcare aim to assist the country in meeting its objectives of providing quality basic healthcare to all citizens. The program intends to leverage digital technologies (e.g., videoconferencing, e-learning, and mobile health) to address issues relating to access, affordability, and quality of healthcare for the Nepali people.

**Education:** Digital Nepal initiatives in education aim to prepare human capital to capture new economic opportunities through the creation of an enhanced teaching and learning environment. This entails the use of digital technologies to support teaching, enrich the learning experience, and improve educational outcomes.

**Urban Infrastructure:** Digital Nepal initiatives in urban infrastructure aim to leverage disruptive technologies to improve the quality of life in Nepal’s urban cities by improving essential services, such as water management, solid waste management, public transport, and traffic management.

**Energy:** Digital initiatives in the energy sector aim to create a sustainable energy infrastructure to not only reduce costs, but also reinforce energy networks. Smart solutions include customer-centric solutions, smart transmissions, and distribution networks, with interconnectivity playing an important role.
Tourism: Digital initiatives in the tourism sector seek to promote Nepal globally, attract visitors to the country, and create employment opportunities for the Nepali people. It involves the use of omni-channel marketing solutions, e-commerce, and disruptive technologies such as augmented reality to promote tourism, build human capital skills in the tourism sector, and offer better tourist experiences.

Finance: Digital Nepal initiatives in promoting the financial services sector target the sizeable unbanked population by leveraging digital technology and telecom infrastructure. Given the strong linkages between financial inclusion and economic prosperity, Nepal is poised to benefit considerably from the use of FinTech, broadening access to financial services to nearly 55% of the country's unbanked population.

Connectivity: Digital connectivity is the foundation of the Digital Nepal program. While Internet penetration in Nepal has risen sharply in the past few years, a large section of Nepali people remains digitally uninitiated due to concerns around affordability, access, and digital illiteracy. The program intends to bridge this gap by providing broader access to connectivity using public-private partnerships and Government initiatives.

Frost & Sullivan has identified 80 digital initiatives across eight critical sectors to guide Nepal as it embarks on its digital transformation journey. The 80 digital initiatives aim to propel socioeconomic growth in Nepal by addressing crucial challenges while unlocking the growth potential in each of the eight key sectors.

1 Country – 8 Domains – 80 Digital Initiatives
Agriculture

Primarily an agrarian economy, Nepal’s agriculture sector accounted for ~33% of the nation’s GDP and ~76% of total employment in 2016.17

Between 2008 and 2015, agricultural output in Nepal grew at an average 3.7% rate, before slowing down considerably in the next few years following the twin earthquakes that struck the country in 2015.

![Agriculture Growth (%), Nepal, 2008–2017](chart)

Source: Ministry of Finance, Government of Nepal

Almost three-fourths of Nepal's population relies on agriculture for their livelihood, making the sector a key component of the nation’s growth agenda. The Government of Nepal considers farming and agriculture as a critical sector for achieving its socio-economic growth aspirations, allocating nearly 4%-5% of its annual budget to the sector. There are multiple Government-led initiatives to drive agriculture sector productivity with a target to achieve self-sufficiency in food production in the near future.

**Challenges in Nepal’s Agriculture Sector**

Despite continued policy interventions and Government focus, progress remains slow and restricted to a few regions owing to inherent issues, such as high dependence on climate, difficulty obtaining credit and financing, poor distribution infrastructure, and limited access to extension and advisory services.

Nepal’s agricultural imports are also increasing significantly showing negative trade balance, especially with India. The import of agricultural produce, e.g., cereals, vegetables, and fruits has also grown sharply in the past few years.

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17 World Bank
Other challenges the agriculture sector faces include:

- Poor access to agricultural input and supply, including bottlenecks in obtaining basic equipment, seeds, and knowledge on agricultural best practices, particularly in remote rural areas.
- Low yields and declining productivity, especially for principal crops, such as rice, due to lack of irrigation facilities, smaller land holdings, and reliance on subsistence farming; Nepal has considerably lower agricultural yield compared to other developing countries in the region.
- Inadequate access to agricultural markets and end customers due to underdeveloped transport, infrastructure, and distribution facilities, increasing the risk of exploitation of farmers by intermediaries.
- Limited access to financial services, including loans and crop insurance.
- Labor shortage as rural workers are increasingly migrating to urban cities in search of better opportunities.

The Government is seeking to digitalize and modernize the sector to these issues.

### Wheat and Rice Yields by Country, 2016–2017

<table>
<thead>
<tr>
<th>Country</th>
<th>Wheat Yield (Metric tons per hectare)</th>
<th>Rice Yield (Metric tons per hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2016/17</td>
<td>2017/18</td>
</tr>
<tr>
<td>China</td>
<td>5.33</td>
<td>5.41</td>
</tr>
<tr>
<td>India</td>
<td>2.88</td>
<td>3.2</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2.78</td>
<td>2.97</td>
</tr>
<tr>
<td>Nepal</td>
<td>2.41</td>
<td>2.31</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: United States Department of Agriculture, Foreign Agricultural Service, June 2018

### Promise of digital solutions in Agriculture

For decades, the Government of Nepal has used many policy instruments to improve farm productivity. However, there are only marginal improvements to the yields of most farmers. Most farmers continue to use traditional processes that depend heavily on historical norms or use traditional tools that have not evolved for centuries.

As the barrier of entry for farming technology drops and digital tools such as cloud, compute systems, connectivity, and open source software become increasingly affordable, the Government can deliver these technologies to farmers more cost-
effectively. Authorities should also look at India’s “Digital India” program, as a case example for implementation.

The agriculture sector has made some progress in the use of soil health cards, modern irrigation methods (e.g., drip irrigation technology), mobile apps to access agricultural information, and e-commerce platforms. However, the initiatives seem too few and far between and focused on easily accessible regions, while hard-to-reach mountainous areas continue to be underserved.

Future success would be contingent on a consolidated and centralized ICT policy, led by the state or the central governments, with concerted efforts targeting specific pain points. Use of modern agriculture technologies is likely to provide measurable returns to Nepal, with industry analysts estimating technologies such as precision agriculture to improve yields on existing agricultural land by -70%.

Case Study: India’s plan to digitalize agriculture benefiting stakeholders across the agricultural value chain and increasing farmer incomes

In Feb 2018, Indian Prime Minister, Narendra Modi, unveiled an agricultural strategy aimed at boosting farmers’ income, decreasing production cost, increasing minimum support price, and reducing wastage.

Objectives
- Double farmers’ income by 2022
- Double private corporate investments in farming from the current 2% of agricultural investments
- Indian farms to become outsourcing hubs for global supermarket chains

Initiatives
- Encouraging the entry of private companies by relaxing the investment rules in contract farming, transport, marketing, warehousing, and food processing
- Creating a unified National Agriculture Market (NAM) to regulate the agriculture market. Through real-time electronic auctioning of commodities; and integrated assaying, weighing, storage and payment systems, the system will enable participation of both farmers and consumers in the market
- Initiating completion of 99 irrigation schemes delayed over the past 25 to 30 years by investing ~INR80,000 crores; ~50% of the schemes to be completed in 2018
- Launching “Startup Agri India” to support agritech entrepreneurs striving to improve the efficiency of the agricultural process; organizing hackathons among leading technology institutes in India to generate out-of-the-box ideas for agriculture
- Directing mandatory transfer of 50% of all cropped areas under new insurance schemes

Agriculture in Nepal: Pain Points, Priorities, and Digital Solutions

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Government Priorities</th>
<th>Digital as an Enabler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor access to agricultural input and supply</td>
<td>• Offer fertilizers, seeds, agriculture machinery and tools through the Agriculture and Livestock</td>
<td>• Mobile applications to provide information on the weather, market information, prices, and crops</td>
</tr>
<tr>
<td>• Bottlenecks in obtaining essential equipment, seeds, electricity:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18 Goldman-Sachs, 2016
### Low yields and declining productivity
- Declines in the production of key crops, e.g., Nepal currently has a 700,000 MT - 800,000 MT shortage in rice.
- Poor irrigation facilities, smaller land holdings, and a low share of high-value crops with greater reliance on subsistence level agriculture are key factors causing the shortfall.
- Focus on modernization and commercialization to double agriculture production in five years.
- Plans to extend the Prime Minister Agriculture Modernization Project.
- Achieve self-sufficiency in the production of food grains, fish, meat, eggs, and milk in two years.
- Precision agriculture to improve productivity through the use of satellites, drones, and soil sensors to monitor and manage crop growth in real time.
- Equipment monitoring using IoT and sensor technology to ensure optimization of resources.

### Poor irrigation reach
- Of Nepal’s 14.7 billion hectare area, only 2.6 million hectares are arable, and 1.8 million hectares are irrigable.
- Plans to implement modern irrigation system in potential agricultural land by 2022.
- Expand irrigation facility in Hills and Terai region using advanced technology and implementation of irrigation projects.
- Smart irrigation systems to minimize water loss and ensure higher irrigation efficiency.

### Limited financing and incentives
- Farmers have limited access to bank loans to buy seeds, fertilizer, and tools, despite Government policies requiring banks to provide easy loans to the sector.
- According to the Nepal Rastra Bank (NRB), banks’ lending to agriculture sector was only 6.16% of their total credit portfolio, as at Nov 2017, below the required target of 20%.
- The Government and NRB have put in place several concessional financing schemes, including providing 20% of loans to productive sectors, including agriculture.
- Digital payments to farmers and intermediaries via mobile money.
- Crowdsourcing and credit platforms to provide loan facilities to underserved farmers.

### Poor access to markets, transport, and distribution facilities
- Due to the inefficient transport system and poor rural road infrastructure, farmers are unable to reach markets limiting access and open to exploitation bymiddlemen.
- Processing, grading, and packaging are not well conceptualized, resulting in
- Under the Agriculture Development Strategy (ADS), the Government aims to support farmers and cooperatives for collective marketing using cleaning and grading equipment, collection centers, and storage facilities.
- Use of logistic solutions and sensors to track trucks and obtain location updates.
- Provide matching platforms to help grade the quality of produce.
- Deploy traceability and tracking systems and RFID for smart packaging.
- Big data analytics to analyze.

---

19 Agricultural Engineering Division, 2011
20 Investment Board Nepal, February 2017
21 Investment Board Nepal, February 2017
significant wastage of produce data for produce quality

<table>
<thead>
<tr>
<th>Labor shortage</th>
<th>• Underdeveloped storage facilities</th>
<th>• Establish professional and technical schools, colleges, and training centers to produce agriculturalists and other human capital for the sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migration of rural workers to urban areas for better opportunities are causing acute labor shortages in the agriculture sector</td>
<td>• Automation for ploughing, leveling, winnowing, harvesting, spraying, and irrigating reducing the need for manual labor</td>
<td></td>
</tr>
</tbody>
</table>

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**Digital Initiatives Roadmap for Agriculture Sector**

Frost and Sullivan recommends following digital initiatives to unlock the potential of Nepal’s agriculture sector:

<table>
<thead>
<tr>
<th>1</th>
<th>Technology and Infrastructure</th>
<th>2</th>
<th>Entrepreneurship/PPP</th>
<th>3</th>
<th>Talent and Skills Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>eHaat Bazaar</td>
<td></td>
<td></td>
<td></td>
<td>Educational programs for farmers</td>
</tr>
<tr>
<td></td>
<td>Precision Agriculture</td>
<td></td>
<td></td>
<td></td>
<td>Introduction of degree programs on AgriTech at universities</td>
</tr>
<tr>
<td></td>
<td>Agriculture Tools Sharing</td>
<td></td>
<td></td>
<td></td>
<td>Decentralized training and advisory centers in each village</td>
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<tr>
<td></td>
<td>Digital Disbursements for MSP and Subsidies</td>
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<tr>
<td></td>
<td>Specialty Food Program</td>
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<td></td>
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<tr>
<td></td>
<td>Digitization of Land Records</td>
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<td></td>
<td>Developing a Financial Ecosystem</td>
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<tr>
<td></td>
<td>Smart Irrigation Project</td>
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<td></td>
</tr>
</tbody>
</table>

**TECHNOLOGY AND INFRASTRUCTURE**

### 1.1 eHaat Bazaar

**Solution**

Develop an eHaat Bazaar, along the lines of India’s National Agriculture Mandi (NAM) platform:

- E-Haat Bazaar should be a pan-Nepal electronic trading portal which networks the existing haat bazaars to create a unified national market for agricultural commodities. It should provide a single window service for all haat bazaar-related information and services. This includes commodity arrivals and prices, buying and selling trade offers, and provision to respond to trade offers.
- Introduce digital payments as part of the platform to credit earnings/funds directly to farmers' accounts to enable them to increase margins and reduce handling costs.

**Stakeholders**

Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Timelines**

Short Term
Current productivity levels in Nepal are low compared to developed countries and South Asian neighbors that offer valuable lessons in optimal utilization of resources. The use of technology in farm management could improve efficiencies and lead to less dependency on manpower. Better farm management and monitoring enabled by wireless sensor networks, mobile applications, and precision farming could alert farmers on soil readiness and quality, water requirements, optimal harvest time, and market information.

Precision agriculture initiatives should aim to:

- Enhance efficiencies and reduce labor dependency
- Provide technology-driven applications such as wireless sensors and mobile applications for farm management solutions
- Offer real-time information on market prices, demand and supply, soil quality, climate, and water level
- Higher productivity (output per hectare)

**Stakeholders**
Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Timelines**
Medium Term
### 1.5 Specialty Food Program

**Solution**
The Government of Nepal aims to encourage production of high-value crops with export potential. It also plans to launch an agro-farming campaign to promote the organic produce of Nepal.

The Special Food Program should target the development of crops with export potential and organic produce. Modern methods such as urban farming and vertical farming concepts can be applied to allow these farms to run with less space and yield higher output as well as drive new R&D areas.

The initiative can also look into expanding the concept of cooperative farming in urban spaces where start-ups can create small kits to grow fruits and vegetables at home or in a community environment.

**Stakeholders**  Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Timelines**  Long Term

### 1.6 Digitization of Land Records

**Solution**
Create an electronic register of agricultural land across regions and villages, computerization of registration documents, digitize maps and survey, and update all settlement records to improve transparency around productive land, enable better monitoring, and reduce land disputes.

**Stakeholders**  Ministry of Agriculture, Land Management and Cooperatives (MoAD), Village Development Committees

**Timelines**  Short Term

### 1.7 Smart Irrigation Project

**Solution**
Lack of irrigation facilities in remote areas and high dependency on monsoon season are triggering the need for IoT in Nepal’s agriculture sector. Deployment of IoT for smart irrigation considers factors like humidity, temperature, and soil moisture to calculate the water volume required for irrigation on respective fields to minimize water loss and ensure higher irrigation efficiency.

The Government should consider leveraging Smart Irrigation technologies to extend its irrigation projects to underserved, remote areas as well as offer incentives to foster adoption of these technologies in farms.

**Stakeholders**  Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Timelines**  Long Term

### ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS

### 2.1 Private Sector Participation

**Solution**
Open the agriculture sector to private sector participation and foreign investments to boost competitiveness by relaxing norms and simplifying regulations for investments in various agricultural activities:
- A strong case for the entry of tech start-ups to promote technology adoption in the sector in partnership with the Government and local NGOs

Consider offering incentives, grants, subsidies, and tax breaks to companies and start-ups engaging in agricultural research.

**Stakeholders**
Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Timelines**
Short Term

### 2.2 Agritech Start-up Initiative

**Solution**
Initiative to support agritech start-ups seeking to improve the efficiency of agricultural processes.

Activities can include case challenges at leading engineering colleges and universities to generate technology-driven innovations to resolve critical challenges facing Nepal's agriculture sector.

**Stakeholders**
Ministry of Agriculture, Land Management and Cooperatives (MoAD); Ministry of Finance

**Timelines**
Medium Term

**Case Study: Govi Mithuru - A mobile agriculture service by Dialog, Sri Lanka**

Dialog Sri Lanka’s Govi Mithuru (Farmer’s Friend, Uzavar Tholan in the Tamil language version) is a value added service (VAS) which commercially launched in October 2015. The product rollout was supported by a matched funding agreement between Dialog Sri Lanka and GSMA under the mNutrition Initiative funded by UK aid from the UK government (DFID). By December 2016, the service had acquired over 250,000 registered users.

Govi Mithuru promises to ‘secure crop and family health’. It aims to offer comprehensive advice to farmers in Sri Lanka with a particular focus on reducing dependence on chemical inputs, an issue frequently raised in Sri Lanka. Users register with a one-click response to an outbound dialing (OBD) message, after which they are profiled through a series of OBD calls requiring one-click responses for profile perimeters, or by dialing 616 and navigating through an interactive voice response (IVR) registration menu.

The service offers agricultural advice at each stage of the farming cycle, from land preparation to postharvest support. Content is provided across eight crops, alongside nutrition and home gardening content, all provided by CABI Sri Lanka and quality assured by the Sri Lankan Department for Agriculture.

**Case Study: Start-ups in India targeting supply chain inefficiencies, falling yields, knowledge sharing issues, and agricultural wastage**

**Crofarm:** Founded in May 2016, Crofarm is an agricultural supply chain start-up that aims to address wastage during distribution and sale of farm produce, by digitizing the supply chain for fruits and vegetables. The system:

- Procures products with longer shelf-life from national sourcing zones and perishables from regional sourcing zones

**Aibono:** A smart farming collective that provides farm-related intelligence, technology, expertise and gadgets, and precision agriculture. Shares resources and expertise with small-scale farmers along with shared instruments to map data onto the cloud:
- Helping to increase yields by nearly 50% for 140 farmers working in the Nilgiri hills of Tamil Nadu

**Cropin:** A farm management company that seeks to digitize the entire agriculture ecosystem to deliver Smart Agriculture solutions with live reporting capabilities, analysis, interpretation and insights on farming operations.

**EM3 Agri Services:** Aims to increase agricultural productivity by delivering technology and mechanization to the farming community on a pay-per-use basis:
- Offers Samadhan Farming as a Service (FaaS), a platform that allows technology to reach farmers and farms cost-efficiently using the network of farm centers (Samadhan Kendras)

**Intello Labs:** Invented a first-of-its-kind application and equipment to test, grade, and analyze the visual quality parameters of agricultural commodities:
- Uses AI and deep learning to measure crop quality parameters including infestation incidence, nutrient deficiencies, harvest quality, evaluation of fruits, vegetables, grains and other crops, and farm-to-fork commodities

**Tessol:** Provides energy efficient and fuel-saving refrigeration technologies for cold chain storage and logistics. Its flagship range, PLUGnCHILL, targeting transport refrigeration uses the proprietary PCM heat exchanger technology, and provides 60% cost-savings by eliminating the use of fuels.

Other prominent start-ups in agriculture include Aarav Unmanned Systems, Ninjacart Gramco Infratech Pvt Ltd, FarmLink, and Gold Farm.

## TALENT AND SKILLS DEVELOPMENT

### 3.1 Education and Training Programs

**Solution**
Modernizing the sector requires building the skills of farmers. The Government should develop training curriculum covering areas such as climate change, supply chain, and standard compliance to produce skilled and knowledgeable farmers.

Qualified farmers can enroll in familiarization and attachment programs via collaborations with international bodies such as the Food and Agriculture Organization (FAO), and in ASEAN counterparts. Skills training on the use and maintenance of farming machinery and equipment to accelerate farm mechanization and automation are essential to increasing productivity and reducing labor reliance on foreign workers.

**Stakeholders**
Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Timelines**
Medium Term

### 3.2 State-of-the-art Knowledge Centers & Government Agriculture Centers

**Solution**
Establish knowledge centers to provide technical knowledge and skills on agriculture and livestock to the farmers. Additionally, provide applied and practical know-how on technology and skills through Government agriculture centers.
The Government should ensure that the proposed knowledge and agriculture centers have state-of-the-art infrastructure (e.g., high-speed Internet access, videoconferencing) to enable distance learning.

**Stakeholders**  Ministry of Agriculture, Land Management and Cooperatives (MoAD)=

**Timelines**  Long Term

### 3.3 Introduce Agritech Degree Programs at Universities

**Solution**  Foster collaboration between Ministry of Agriculture and the Ministry of Education to introduce degree courses in public universities to train agriculturalists and create relevance of agricultural education programs

**Stakeholders**  Ministry of Agriculture, Land Management and Cooperatives (MoAD)

**Ministry of Education**

**Timelines**  Long Term
Healthcare

Over the past decade, healthcare has been a key priority for successive Nepal governments, with public and private healthcare spending increasing considerably year on year. Total healthcare expenditure in Nepal as a percentage of GDP grew from 4% in 2006 to exceed 6% in 2015, comparatively higher than its neighbors such as India, Pakistan, Bhutan, and Sri Lanka with healthcare spending at 2.6% and 4.7% of GDP.\(^2\)

The rise in healthcare expenditure and continued focus by the government in enhancing healthcare policies and infrastructure have enabled Nepal to achieve vast improvements in its healthcare KPIs in the past 20 years. For example, neonatal and child mortality rates have declined significantly since 1995. Moreover, Nepal's consistent track record in improving other health outcomes such as maternal mortality, death rates, and life expectancy is acknowledged internationally.

![Image of Civil Service Hospital of Nepal]


<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Neonatal mortality</td>
<td>Per 1,000 Live Births</td>
<td>47.7</td>
<td>39.3</td>
<td>32.5</td>
<td>26.7</td>
<td>22.2</td>
</tr>
<tr>
<td>Infant mortality</td>
<td>Per 1,000 Live Births</td>
<td>76.8</td>
<td>59.6</td>
<td>46.3</td>
<td>36.3</td>
<td>29.4</td>
</tr>
<tr>
<td>Under-5 mortality</td>
<td>Per 1,000 Live Births</td>
<td>107.7</td>
<td>80.6</td>
<td>60</td>
<td>45.4</td>
<td>35.8</td>
</tr>
<tr>
<td>Crude birth rate</td>
<td>People per 1,000</td>
<td>36</td>
<td>32.1</td>
<td>27.5</td>
<td>22.9</td>
<td>20.2</td>
</tr>
<tr>
<td>Death rate</td>
<td>People per 1,000</td>
<td>10.4</td>
<td>8.5</td>
<td>7.3</td>
<td>6.7</td>
<td>6.3</td>
</tr>
<tr>
<td>Life expectancy at birth</td>
<td>Years</td>
<td>58.5</td>
<td>62.3</td>
<td>65.5</td>
<td>68</td>
<td>70</td>
</tr>
<tr>
<td>Maternal mortality ratio</td>
<td>Per 100,000</td>
<td>660</td>
<td>548</td>
<td>444</td>
<td>349</td>
<td>258</td>
</tr>
</tbody>
</table>


Despite improvements in Nepal's key healthcare outcomes, the country continues to trail its Asian peers and international benchmarks. For example, while efforts to enhance maternal and neonatal care in rural Nepal have resulted in substantial improvements in maternal mortality rates; yet the maternal mortality ratio in Nepal (at 258 per 100,000 live births) is notably higher than its Asian counterparts (at 148-178 per 100,000 live births for India, Pakistan, Bhutan and Bangladesh.

\(^2\) World Health Organization
Challenges in Nepal's Healthcare Sector

In 2007, Nepal’s Interim Constitution recognized access to primary healthcare as a right for every citizen. However, more than a decade later, Primary Healthcare for All remains an elusive dream for the Nepali people. In fact, Nepal lags behind its Asian peers and international standards on health service coverage, according to the World Health Organization (WHO).

Nepal, like many low- and middle- income countries, faces common issues such as:
- Limited access to healthcare, especially in remote rural areas, where patients need to travel long distances to receive quality healthcare
- Chronic shortage of healthcare professionals and reluctance of public servants to serve in remote areas
- Underdeveloped infrastructure limiting access to safe drinking water, sanitation, and hygiene practices
- Poverty and illiteracy coupled with high cost of private healthcare services
- Poor quality of care services at public sector hospitals and institutions

 Nonetheless, Nepal's new government aims to change this during its tenure. Acknowledging health as the primary right of every citizen, the government intends to roll out various initiatives (e.g., establishing a 15-bed hospital in every local area, extending health insurance for all citizens) to address these issues.

Promise of Digital Initiatives in Healthcare

Given the high mobile penetration in urban and rural areas, digital and mobile technologies have the potential to solve the challenges associated with Nepal's healthcare sector. Countries successfully leveraging digital and mobile healthcare technologies offer Nepal critical insights on resolving the healthcare hurdles it faces.

Nepal is initiating efforts to digitalize Healthcare sector, which includes the eHealth Nepal Project with UNICEF. eHealth provides teleconsultation services and vaccination reminders to users through SMS. However, the need of the hour is to adopt broad-based initiatives optimizing government resources and attracting greater private sector involvement.

Embarking on a Digital Health journey can help Nepal in address key challenges by improving coverage of quality health services, reducing the cost of healthcare services to deprived sections of society, plugging funding leakages, and optimizing utilization of healthcare skills and resources.

Case Study – How Novartis’ telemedicine model in Ghana is helping to expand access to quality care in remote rural areas

Objective: Expand access to quality care in remote rural areas to reduce transport times and costs to patients while minimizing unnecessary referrals.

Model: The telemedicine model was developed around frontline health workers using digital technology to enable centralization of healthcare expertise. Under the model, healthcare professionals at the teleconsultation centers coach and guide less-skilled community health workers in patient care. The initiative is not only empowering community health workers, but also improving the quality of care with a direct impact on patient health outcomes. In 2016, for example, more than half of all teleconsultations were resolved directly by phone, including 31% that avoided referrals.

Timelines: 2012 onwards

Results: The model pioneered in the Amansi West region by the joint efforts of the Ghana Ministry of Health, the Ghana Health Service, the National Health Insurance Authority, the Ambulance Services of Ghana, Millennium Promise, and the Novartis Foundation. The initiative is now successfully scaling throughout Ghana with strong local ownership by Ghanaian health authorities.
# Healthcare in Nepal: Pain Points, Priorities, and Digital Solutions

## Wide rural/urban gap in healthcare facilities
- 83% of Nepal’s population live in villages, while the country’s healthcare infrastructure and caregivers are predominantly in urban areas.
- Most private hospitals and institutions in Nepal are concentrated in cities such as Kathmandu, Pokhara, and Biratnagar.

**Government of Nepal’s Priorities**
- Aims to improve quality of basic and specialized healthcare services.
- Plans to offer free basic health services at the local level; specialized and referral health services from provinces, and modern and specialist health services from central health institutions.

**Digital as an Enabler**
- Digital Health (e.g., mobile health, telemedicine) can extend the reach of healthcare services to rural areas:
  - Equipping all healthcare centers in rural areas with high-speed Internet should be the top priority for the Government.

## Chronic shortage of health professionals
- Nepal has only 5.4 skilled health professionals per 10,000 population; compared to 24.1 and 14.0 skilled health professionals per 10,000 population in India and Pakistan, respectively.
- High brain drain among medical professionals and preference for medical workers to join the private sector.

**Government of Nepal’s Priorities**
- Set up at least one 15-bed hospital in each local level between 2018 and 2022.
- Hire at least one medical doctor in each local level.

**Digital as an Enabler**
- eHealth/mHealth can effectively utilize and expand the reach of healthcare professionals.
- Tap into healthcare talent from other countries (e.g., India, Philippines) to plug the demand-supply gap.

## Access to safe drinking water, poor hygiene habits, and sanitation facilities is a key challenge
- Nepal has the highest mortality rate due to unsafe hygiene, water, and sanitation compared to neighboring countries.
- Open defecation is a norm in Nepal (especially in rural areas):
  - 32% of the Nepali population practice open defecation.

**Government of Nepal’s Priorities**
- Provision of clean and safe drinking water and sanitation facilities to all Nepali people is a priority for the new Government.
- Become an open defecation-free country by 2022.

**Digital as an Enabler**
- Innovative use of digital technologies can boost awareness about the need to follow proper hygiene and sanitation practices.
- Technology can enhance access and simplify usage of public facilities.

## Expensive healthcare services
- Underdeveloped public healthcare infrastructure and poor perception of service quality at public hospitals has led to a surge in private/household healthcare expenses.
- 27% of Nepal’s population spend over 10% of their household income on healthcare.

**Government of Nepal’s Priorities**
- Improve healthcare services by building quality infrastructure, medical equipment, and human resources.
- Extend health insurance program to cover all Nepali people.

**Digital as an Enabler**
- Economies of scale and lower investment requirements for Digital Healthcare can help lower the cost of healthcare services.
Mismanagement of funds and supplies in rural Nepal

- Mismanagement of funds and government subsidies, inadequate supply of essential drugs, and budget limitations restrict the Government’s ability to provide proper healthcare facilities for its citizens
- Zero tolerance for corruption
- Leveraging latest Health Information Management (HIM) and procurement solutions can enhance auditing and compliance processes, minimizing the risk of mismanagement of funds and government subsidies

Digital Initiatives Roadmap for Healthcare sector

The Government of Nepal should consider setting aside at least 10% of its central health budget for Digital Health programs. The Ministry of Health (MoH) should establish a separate department/task force to drive implementation of Digital Health initiatives, with a focus on the following areas to reap the benefits of digital technologies in the healthcare sector.

<table>
<thead>
<tr>
<th>1</th>
<th>Technology &amp; Infrastructure</th>
<th>2</th>
<th>Entrepreneurship/PPP</th>
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<th>Talent &amp; Skills Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Digital Healthcare Platform</td>
<td>Ease of doing business in Digital Healthcare</td>
<td>Increase intake at existing medical colleges and open new medical colleges</td>
<td></td>
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</tr>
<tr>
<td>High-speed Internet access</td>
<td>Private sector participation in rural healthcare</td>
<td>Centralized telemedicine center for skills development of medical professionals</td>
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<tr>
<td>Next-generation digital facilities</td>
<td>Electronic Medical Records</td>
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<tr>
<td>Health Procurement and Distribution Solution</td>
<td>Mobile Health Units</td>
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<tr>
<td>Drones for delivery of emergency medical supplies</td>
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</tbody>
</table>

TECHNOLOGY AND INFRASTRUCTURE

The following initiatives targeting Digital Healthcare are identified as “quick wins” to be implemented as part of the Digital Nepal program. The selected projects are as follows:

1.1 National Digital Healthcare Platform

Solution

A National Digital Health Platform/Mobile App connecting all public sector health facilities in Nepal. The platform/app could offer features such as facilitating healthcare initiatives, providing public health information, listing locations of health centers, booking appointments with healthcare professionals, tracking patients’ healthcare records.

- Nepal should emulate the Telangana Ministry of Health (India) app that allows its citizens to access services at more than 800 public health facilities. The app was developed by the Government of Telangana in partnership with Mahindra Comviva.
<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Ministry of Health (MoH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timelines</td>
<td>Short Term</td>
</tr>
</tbody>
</table>

### 1.2 High-Speed Internet Access

**Solution**
All healthcare facilities in Nepal should be equipped with high-speed internet, video conferencing, e-Learning and collaboration tools. These digital technologies would enable delivery of remote healthcare services from the central/regional hospitals, along with facilitating rollout of other digital healthcare initiatives.

- The Government should aim to provide 100% high-speed connectivity to healthcare facilities in Nepal by 2020 (starting with rural healthcare facilities)

**Stakeholders**
Ministry of Health (MoH), Ministry for Communications and Information Technology (MoCIT)

**Timelines**
Medium Term

### 1.3 Next-Generation Digital Facilities

**Solution**
New public sector health facilities (including the proposed 15-bed hospitals at each local level) should be equipped with next-generation digital infrastructure with the goal to provide specialist healthcare services in remote areas.

**Stakeholders**
Ministry of Health (MoH)

**Timelines**
Long Term

### 1.4 Electronic Medical Records

**Solution**
The rollout of Electronic Medical Records (EMR) System at public healthcare institutions in Nepal. EMRs can significantly radically reduce the storage space necessary to store paper-based records and improve efficiency.

**Stakeholders**
Ministry of Health (MoH), Public healthcare facilities in Nepal

**Timelines**
Medium Term

### 1.5 Health Procurement and Distribution Solution

**Solution**
Health Procurement and Distribution Management Solution (HPDMS) will manage procurement, storage and distribution of medicines, drugs, injectable, surgical goods and medical equipment. It will the operational efficiency of the healthcare services provided across the national. The basic objective will be to maintain database of medical supplies and equipment.

**Stakeholders**
Ministry of Health (MoH), Public healthcare facilities in Nepal

**Timelines**
Short Term

### 1.6 Mobile Health Units
Solution  Roll out mobile health units/vans in other to improve reach of Healthcare services in rural, underserved areas. Mobile health units/vans allow regional healthcare facilities to extend their reach by going directly to the people in their communities, potentially saving lives and money.

The mobile health units should be equipped with digital connectivity and GPS services to effective tracking, route management and digital record management.

Stakeholders  Ministry of Health (MoH)
Timelines  Medium Term

1.7 e-Maternal Care
Solution  E-Maternal Care will be a technological platform for tracking of each pregnant woman and children. The objective would be to maintain effective medical records for pregnant women and children, provide healthcare related information, and enable access to healthcare services on regular basis.

The target beneficiary of this initiative is Pregnant Women, Mothers & New Born Child.

Stakeholders  Ministry of Health (MoH), Department for Women and Children
Timelines  Medium Term

1.8 Drones for delivery of emergency medical supplies
Solution  Consider use of drones for delivery of medical supplies and equipment in case of a medical emergency or natural disaster. Drones can be leveraged for delivery of essential medical supplies to remote areas where people are isolated by rugged terrain, bad roads, and seasonal flooding

Stakeholders  Ministry of Health (MoH)
Timelines  Long Term

ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS
The Government of Nepal should consider undertaking the following policy interventions to create an enabling environment:

2.1 Ease of doing business in Digital Healthcare
Solution  Private sector start-ups and telecom participants play a pivotal role in developing Digital Health solutions in many markets globally. The Government of Nepal should focus on creating an enabling business environment to encourage private sector players and start-ups to contribute to these priority areas:

- Focus on improving **ease of doing business, developing an ecosysterm** (e.g., digital payment platforms), **tax holidays** for NGOs and enterprises focusing on digital health in poor/remote areas

Stakeholders  Ministry of Health (MoH)
Private sector participation in rural healthcare

Solution

Private healthcare providers, which primarily focus on urban areas currently, should be encouraged to invest in Digital Healthcare programs to capture a broader market and contribute to the society as part of their Corporate Social Responsibility (CSR) efforts:

- Consider necessary policy interventions (e.g., tax benefits) to attract greater private sector involvement

Stakeholders

Ministry of Health (MoH)

Timelines

Short Term

TALENT AND SKILLS DEVELOPMENT

Chronic shortage of healthcare professionals, continued brain drain to foreign countries, and reluctance of caregivers to join medical facilities in remote areas are restricting the Government’s ability to improve the quality and coverage of healthcare services.

To address these challenges, Nepal needs to systematically scale-up the capacity of its healthcare system by increasing the intake of students in existing medical colleges and opening new medical colleges to meet demand. Additionally, Nepal can leverage ICT solutions (e.g., Centralized Telemedicine Center) for skills development of its healthcare professionals in remote areas.

Centralized Telemedicine Center

Solution

A telemedicine model developed around frontline health workers, with digital technology allowing for the centralization of healthcare expertise.

Under the model, healthcare professionals at the teleconsultation center of a major public hospital in Kathmandu can coach and guide less-skilled community health workers from various healthcare facilities in Nepal.

Stakeholders

Ministry of Health (MoH), Teaching Hospital, Kathmandu

Timelines

Short Term

Case Study: Telecom operator partners with Sri Lankan hospitals to build a Digital Health Platform

In 2016, Dialog, a leading telecom operator in Sri Lanka, entered a joint venture with Asiri Hospital Holdings to set up a digital health platform. Following the success of this initiative, two more hospitals in Sri Lanka joined the effort in March 2018. The joint venture connects more than 1,500 doctors in over 80 hospitals via its digital health platform, accessible through doc.lk, by dialing 990, or the Doc990 app.

Doc990 currently offers a range of medical services including channeling doctor sessions at hospitals island-wide for physical consultations, the Tele Doctor Service where consultants can be contacted over the phone, medicine delivery to the doorstep, and access to lab reports from selected laboratories via the Doc990 web portal.

The Doc990 app is integrated with all mobile operators and banks for multiple payment options such as add-to-bill, eZ Cash, Genie, Amex, Visa, and MasterCard.
<table>
<thead>
<tr>
<th>Unit of Measurement</th>
<th>Nepal</th>
<th>India</th>
<th>Pakistan</th>
<th>Bhutan</th>
<th>Sri Lanka</th>
<th>China</th>
<th>Japan</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Korea Rep</th>
<th>Thailand</th>
<th>Bangladesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled health professional density, 2005–2013</td>
<td>Per 10,000 population</td>
<td>5.4</td>
<td>24.1</td>
<td>14</td>
<td>12.4</td>
<td>23.2</td>
<td>31.5</td>
<td>137.9</td>
<td>44.7</td>
<td>77.1</td>
<td>71.5</td>
<td>24.7</td>
</tr>
<tr>
<td>Maternal mortality ratio, 2015</td>
<td>Per 100,000 births</td>
<td>258</td>
<td>174</td>
<td>178</td>
<td>148</td>
<td>27</td>
<td>30</td>
<td>5</td>
<td>40</td>
<td>10</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Skilled birth attendance, 2007–2017</td>
<td>%</td>
<td>58</td>
<td>86</td>
<td>55</td>
<td>89</td>
<td>99</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>Under five mortality and neonatal mortality rate, 2016</td>
<td>Per 1000 births</td>
<td>34.5</td>
<td>43</td>
<td>78.8</td>
<td>32.4</td>
<td>9.4</td>
<td>9.9</td>
<td>2.7</td>
<td>8.3</td>
<td>2.8</td>
<td>3.4</td>
<td>12.2</td>
</tr>
<tr>
<td>Health Service Coverage Index, 2015</td>
<td>Index*</td>
<td>46</td>
<td>56</td>
<td>40</td>
<td>59</td>
<td>62</td>
<td>76</td>
<td>80</td>
<td>70</td>
<td>80</td>
<td>80</td>
<td>75</td>
</tr>
<tr>
<td>Financial protection, 2007–2015</td>
<td>% of population spending large health expenditure</td>
<td>27.4</td>
<td>17.3</td>
<td>1</td>
<td>N/A</td>
<td>2.9</td>
<td>17.7</td>
<td>6.2</td>
<td>N/A</td>
<td>N/A</td>
<td>13.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Mortality rate due to unsafe hygiene, water, and sanitation, 2016</td>
<td>per 100,000 population</td>
<td>19.8</td>
<td>18.6</td>
<td>19.6</td>
<td>4</td>
<td>1.2</td>
<td>0.6</td>
<td>0.2</td>
<td>0.4</td>
<td>&lt;0.1</td>
<td>1.8</td>
<td>3.5</td>
</tr>
<tr>
<td>All vaccine coverage, 2016</td>
<td>% of population</td>
<td>25</td>
<td>76</td>
<td>53</td>
<td>90</td>
<td>99</td>
<td>99</td>
<td>93</td>
<td>99</td>
<td>88</td>
<td>97</td>
<td>95</td>
</tr>
<tr>
<td>Domestic general government health expenditure, 2015</td>
<td>% of general government expenditure</td>
<td>5.5</td>
<td>3.4</td>
<td>3.7</td>
<td>9.1</td>
<td>7.9</td>
<td>10.1</td>
<td>N/A</td>
<td>8.3</td>
<td>12</td>
<td>12.9</td>
<td>16.6</td>
</tr>
<tr>
<td>Access to safe drinking water, 2015</td>
<td>% of population</td>
<td>27</td>
<td>N/A</td>
<td>36</td>
<td>34</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>97</td>
<td>92</td>
<td>100</td>
<td>98</td>
</tr>
<tr>
<td>Total health expenditure, 2014–2015</td>
<td>% of GDP</td>
<td>6.2</td>
<td>4.7</td>
<td>2.6</td>
<td>3.6</td>
<td>3.5</td>
<td>5.5</td>
<td>10.2</td>
<td>4.2</td>
<td>4.9</td>
<td>7.4</td>
<td>4.1</td>
</tr>
<tr>
<td>Total expenditure on health per capita, 2014–2015</td>
<td>USD</td>
<td>135</td>
<td>267</td>
<td>129</td>
<td>281</td>
<td>369</td>
<td>731</td>
<td>3727</td>
<td>1040</td>
<td>4047</td>
<td>2531</td>
<td>600</td>
</tr>
<tr>
<td>Life expectancy at birth, 2016</td>
<td>Years</td>
<td>70.2</td>
<td>68.8</td>
<td>66.5</td>
<td>70.6</td>
<td>75.3</td>
<td>76.4</td>
<td>84.2</td>
<td>75.3</td>
<td>82.9</td>
<td>82.7</td>
<td>75.5</td>
</tr>
</tbody>
</table>

Source: WHO; UNICEF; Frost & Sullivan analysis

Legend: Green-Amber-Red Scale, where dark green signifies best in class performance, while dark red signifies worst in class performance
Education

Overview

Nepal’s education sector has made notable strides in the past 20 years. Between 1991 and 2017, the country’s net primary school enrolment rates grew from 68.0% to 94.7%, making it one of the few developing countries to reach near gender parity. Education is a key priority sector for Nepal, accounting for the largest share of the total national budget at -10.1% in FY2018/19, registering 11.8% CAGR over the past five years (2014/15–2018/19) to reach NPR134.5 billion (US$1.23 billion).

Development of the sector appears to be a key imperative to drive Nepal’s progress from least developed country status to developing nation by 2022. Access to education is even more critical given the country’s large youth base, with ~32% of its total population aged 14 and below.

To support its vision, the Government of Nepal is pursuing revisions to its education policy aiming for inclusiveness by making education up to secondary level compulsory and free.

Key Education Targets

- Investment of at least 20% of national budget each year in education
- All school-age children to be enrolled in school in the next two years
- All citizens to be literate in the next five years
- ICT usage to be made compulsory in schools

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23 UNESCO
24 Calculated using figures in the Budget Speech for FY 2018/19, Ministry of Finance
25 Calculated using figures in the Budget Speech for FY 2018/19, Ministry of Finance
26 UNESCO Institute for Statistics, Data for the Sustainable Development Goals by Country
27 Joint Election Manifesto
- E-library to be established and students to be provided modern education materials (e.g., laptops and textbooks)
- Higher education to be specialized by involving students in research and innovation
- Gurukul, Monastery, Gumba, Madarasa, and open and alternative education programs to be affiliated with the national education system

Source: Joint Election Manifesto (Please note this list is not exhaustive)

The Government has also formulated a range of supporting policies, grants and aids, and investment incentives, as well as turned to foreign aid to improve its key education metrics.

**Key Government Policies:**

<table>
<thead>
<tr>
<th>School Sector Development Plan (SSDP), 2016–2023</th>
<th>Five-year Roadmap</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aims for inclusive and equitable access, participation, and learning outcomes of the education system through:</strong></td>
<td><strong>In April 2018, the Minister for Education, Science and Technology unveiled a 10-point, five-year roadmap which includes plans to:</strong></td>
</tr>
<tr>
<td>• Investment of ~US$10.66 billion from 2016–2023 in multiple areas including teacher management and professional development; school governance and management; institutional capacity development; disaster risk reduction; school safety, monitoring, evaluation, and assessment; examination and accreditation, ICT, and health and nutrition</td>
<td>• Improve quality of education sector; structural and organizational reforms; primary child education; common commitments; quality of public education; regulation of private education system; higher education; open education; science and technology; and good government and management</td>
</tr>
<tr>
<td>• The EU continues to support the program with a recent funding injection of €6 million (~NPR700 million) directly to the Government of Nepal</td>
<td></td>
</tr>
</tbody>
</table>

However, the quality of education in Nepal continues to fall short of international standards due to inadequate funding, socio-economic issues leading to child labor, uneven development between rural and urban areas, lack of basic infrastructure, shortage of trained teachers, unemployability of graduates due to outdated coursework, and insufficient basic learning materials. This has resulted in an increase in student mobility among the urban and wealthy population, with a large number of youth moving to other countries to study.

While the country has achieved near universal enrolments at the primary level (135.4% in 2016), it drops significantly at the secondary (69.5% in 2016) and tertiary levels (11.8% in 2016), indicating substantial dropout rates at higher levels of education.

**Key Education Metrics/KPIs for Nepal**

<table>
<thead>
<tr>
<th>Metrics</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary total gross enrolment ratio (%)</td>
<td>134.75</td>
<td>134.94</td>
<td>135.38</td>
<td>134.12</td>
</tr>
<tr>
<td>Secondary total gross enrolment ratio (%)</td>
<td>66.88</td>
<td>67.14</td>
<td>69.5</td>
<td>71.21</td>
</tr>
<tr>
<td>Tertiary total gross enrolment ratio (%)</td>
<td>15.82</td>
<td>14.95</td>
<td>11.8</td>
<td>-</td>
</tr>
<tr>
<td>Out-of-school children (’000s)</td>
<td>185.34</td>
<td>103.66</td>
<td>101.86</td>
<td>159.21</td>
</tr>
<tr>
<td>Out-of-school adolescents (’000s)</td>
<td>-</td>
<td>-</td>
<td>237.55</td>
<td>222.24</td>
</tr>
</tbody>
</table>
**Challenges in Nepal’s Education Sector**

The Government of Nepal recognizes the importance of education and its implications in driving future growth. However, supporting initiatives do not appear to be reaching target areas, as institutions face delays in receiving funding and coordination challenges among stakeholders in the sector. This has placed Nepal at a disadvantageous position vis-à-vis other Asian developing countries.

Several inherent limitations also hinder the progress of the education sector in Nepal:

- Shortage of teachers per student and insufficient training of teachers, leading to high absenteeism and low student engagement and motivation
- Underdeveloped basic infrastructure and facilities at both rural and urban institutions, including lack of learning materials and equipment
- Significant disparities in infrastructure development and availability of quality education and teachers between private and public schools. Prohibitively expensive fees and limited presence of private schools are resulting in inequitable access to education and widening the gap between the haves and have-nots
- Poor availability of funding and government support due to an inefficient industry structure, red tape, and corruption

Source: UNESCO Institute for Statistics, Data for the Sustainable Development Goals by Country

Note: *Latest available data based on 2011 census
• High dropout rates due to socio-economic conditions and widespread poverty in rural areas, resulting in children working in menial jobs instead of attending school and creating issues such as child labor and child marriages

The Government appears to be focused on addressing these challenges during its tenure by establishing actionable targets for the sector in the current and subsequent budgets.

### Promise of Digital Initiatives in Education Sector

Near-universal penetration of mobile and Internet, and availability of low-cost smartphones and tablets provide a favorable enabling environment for integrating ICT into education. Nepal’s large youth demographic who are comfortable using technology stand to benefit greatly from technology-based delivery and access to education.

The positive benefits of the use of digital technologies in education are well documented with several success stories and proven results. Nepal should seek to learn from the multiple projects underway across developing countries in Asia and Africa.

Nepal has launched several technology initiatives, including strengthening ICT infrastructure at schools and universities; ICT-enabled teaching and learning; and integrating education management information system (EMIS) as part of the SSDP 2016–2023 Program.

However, stronger technology push coupled with skills development and awareness programs may be required to address persistent challenges, strengthen institutional capacity, bridge the digital divide in the country, and maximize the impact of ICT in the sector.

**Nepal is actively pursuing ICT programs for education with progress in several areas:**

<table>
<thead>
<tr>
<th>ICT – A Key Component of the SSDP 2016–2023 Agenda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key targets include:</td>
</tr>
<tr>
<td>• Provide ICT teaching-learning materials to strengthen interactive teaching approaches</td>
</tr>
<tr>
<td>• Establish ICT learning centers at model schools</td>
</tr>
<tr>
<td>• Prepare ICT teaching and learning materials initially for Science, Math, and English</td>
</tr>
<tr>
<td>• Provide ICT infrastructure and teaching-learning materials</td>
</tr>
<tr>
<td>• Implement unified computerized accounting software (CGAS) in the Ministry of Education system</td>
</tr>
<tr>
<td>• Introduce school-based integrated EMIS, including an Equity Index, school profiles, and unique student IDs to enhance effectiveness of governance and management</td>
</tr>
</tbody>
</table>

| Key achievements include: |
| • Established computer labs and Internet connectivity in District Education Offices (DEO) and selected schools |
| • Central agencies, regional education directorates, and 75 DEOs have launched websites |
| • Developed interactive digital learning materials for students in Grades 2 to 6 in Nepali, Math, English, and Science |

**Open Learning Exchange (OLE) Nepal:** Established in September 2007, OLE Nepal integrates technology in classrooms and the teaching-learning process. Key programs include:

- **E-Paath:** Interactive educational software that includes multimedia learning modules based on the national curriculum of Nepal. Developed 600+ learning modules for teachers
- **E-Pustakalaya:** An open, digital library comprising 6,000+ books
- **Teacher training:** Focuses on IT literacy, child-centric interactive teaching, and integrating ICT-based instruction. Has trained 600+ teachers in the program
**Technology infrastructure:** Helps install school network consisting of servers and Wi-Fi, and provide low-power, low-cost, durable equipment. Has deployed 5,000+ laptops in 100+ schools

**OpenIDEO:** An open innovation platform that works with local organizations in Nepal to provide funding and support, targeting the education sector in rural areas. Key programs include:

- **Picosoft:** A rural Internet service provider in Nepal which offers high-speed Internet service using Super Wi-Fi (TV White Space) technology to schools in rural areas where cable and ADSL Internet are not available. Also provides state-of-the-art computer labs and develops localized content for ICT in education in partnership with Kull Labs
- **REED Nepal:** An NGO that has introduced digital educational platforms and Teacher Training Quality Education Program for schools in earthquake-prone areas

### Education in Nepal: Pain Points, Priorities, and Digital Solutions

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Government of Nepal’s Priorities</th>
<th>Digital as an Enabler</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shortage of trained teachers</strong></td>
<td>As part of its latest budget, the Government plans to:</td>
<td>• Technology-based teacher training to build awareness and prepare them for using technology in a classroom setting</td>
</tr>
<tr>
<td>• Lack of qualified, well-trained teachers as well as decline in teacher-pupil ratio from 22.7 to 20.3 from 2014–2017[^30]</td>
<td>• Expand training programs for technical teachers</td>
<td>• Deploy videoconferencing, mobile, and collaboration technologies to enable training from any location remotely</td>
</tr>
<tr>
<td>• Teachers, particularly at public schools and universities, have inadequate technical, content, and pedagogical support and poor IT awareness</td>
<td>• Redistribute existing posts for teachers proportionately on the basis of number of students, subject requirements, and geographical conditions</td>
<td>• Install CCTV cameras and biometric systems in schools to track teacher attendance</td>
</tr>
<tr>
<td>• Limited ICT use in classrooms and administration and staff resistance to change, resulting in low teacher attendance</td>
<td>• Provide additional grants to schools to hire more teachers at secondary level on Science, Math, English, and Technical subjects</td>
<td></td>
</tr>
<tr>
<td>• Cases of teachers holding down multiple jobs and engaging in part-time businesses or research, further impacting their performance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Lack of basic infrastructure | The Government plans to reduce the urban-rural digital divide and improve infrastructure through: | • Use of wireless and satellite technologies to connect institutions’ IT infrastructure in hard-to-reach remote areas |
| • Setting up educational facilities in rural Nepal is a considerable technical and financial challenge due to the difficult geographical terrain | • Use of new technology and improvements to education standard | • Deploy high-density networks on school and university campuses at urban institutions to support uninterrupted running of devices, IT tools, and applications |
| • Strain on distribution of basic learning materials, e.g., textbooks, and poor access to basic necessities like water, sanitation, and hygiene | • Set up of Rural Telecommunication Fund to provide free high-speed Internet services to community schools | |
| • Public schools and universities in | | |

[^30]: UNESCO Institute for Statistics, Data for the Sustainable Development Goals by Country
<table>
<thead>
<tr>
<th>Disparities in education development and access</th>
<th>High dropout rates</th>
<th>Inadequate funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Huge differences in quality and provision of infrastructure between rural and urban areas, with development mainly concentrated in cities like Kathmandu</td>
<td>Dropout rates are particularly high at higher education institutes with gross enrolment rates decreasing from 135.4% at primary level to 69.5% at secondary and 11.8% at tertiary level in 2016 due to factors such as:</td>
<td>Public institutions often face delays in obtaining sufficient government</td>
</tr>
<tr>
<td>• Even within cities, gaps exist between private and public institutions, with the former having superior quality of education, teachers, and infrastructure</td>
<td>• Low student engagement and motivation as a result of poor quality of teaching and learning processes and over-reliance on teacher-centered classrooms that do not prepare students to think critically</td>
<td></td>
</tr>
<tr>
<td>• Low number of private institutions in urban areas and high fees makes private education inaccessible to rural and middle-class students</td>
<td>• Socio-economic issues in rural areas leading girls to leave school earlier than boys because of early marriages and to support their families financially</td>
<td></td>
</tr>
<tr>
<td>• Social inequalities prevent students belonging to lower castes and underprivileged groups from attending schools, e.g., in the Terai region, only 23.1% of Dalits were literate compared to 80% of Brahmans and Chhetris (higher castes), in 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In FY 2018/19, the Government launched Literate Nepal, and Let’s Bring to School, Retain and Teach programs that aim to:</td>
<td>• Ensure compulsory education for all children of school age Education up to secondary level is made free gradually</td>
<td>In April 2018, the Minister for Education, Science and Technology unveiled a 10-</td>
</tr>
<tr>
<td>• Leverage Massive Open Online Courses (MOOCs), i.e., online courses delivered via distance learning as a cost-effective option to reduce disparities in course quality and training</td>
<td>• Adopt digital technologies and blended learning techniques that combine online and face-to-face teaching modes in classrooms</td>
<td>• eGovernment solutions that automate tasks undertaken by public officials, reducing</td>
</tr>
<tr>
<td>• Use of cloud-based unified communication tools to interact with students, teachers, and administrators remotely</td>
<td>• Integrate gamification, AR/VR technology, badges, and rewards in the classroom to increase engagement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Introduce interactive learning modules in rural areas on specific subjects, hobbies, and women empowerment initiatives</td>
<td></td>
</tr>
</tbody>
</table>

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31 UNESCO
32 UNESCO Institute for Statistics, Data for the Sustainable Development Goals by Country
support and funding, possibly due to an inefficient education structure:

- Currently, the sector is supported by the Central Government, with regional/provincial governments having limited control and resources
- Red tape, corruption, and bureaucratic processes exacerbate the issue

point, five-year roadmap which includes structural and organizational reforms to improve the efficiency of the sector

spending leaks and improving transparency

- Introduce an automated, mobile-based customer management system for institutions to file complaints and track resolutions in case of delays in receiving support
- Use common CRM and ERP systems across departments and industry hierarchies to enable information sharing

Physical safety issues

Since the devastating earthquake of April 2015, education authorities in Nepal have yet to open the new academic session in several districts owing to the quake’s adverse impact:

- Over 16,000 classrooms at ~6,000 public schools were destroyed, over 7,000 classrooms have major cracks while 12,000 have repairable cracks
- The Government is drafting policies relating to disaster risk reduction and safety under the SSDP program
- The National Strategy for Disaster Risk Management in Nepal also highlights the role the education sector can play in reducing the vulnerability and exposure posed by natural hazards
- Use cloud-based back-up and disaster recovery solutions as well as sensor technology to predict and mitigate effects of natural disasters
- Use of laptops and handheld devices by students could help maintain learning continuity in case schools or universities are inaccessible

Poor quality of vocational training and lack of employability

Nepali students face significant challenges in finding employment after graduation due to gaps between skills gained and industry needs:

- Studies focusing on rote learning are not interactive and do not prepare students to tackle real-world situations
- Teachers lack skills in scientific teaching methods
- Vocational education curriculum is irrelevant and out-of-date

In September 2017, the World Bank approved a US$60 million credit to support the second phase of the Enhanced Vocational Education and Training Project in Nepal, called EVENT II that is:

- Designed to improve equitable access to market-relevant training programs and strengthen the delivery of Technical Education and Vocational Training (TEVT)
- Use of online testing tools to assess student capabilities and interests, and recommend courses accordingly
- Introduce technology-assisted learning modules, e.g., an institute in the UK introduced a renovation project in its vocational class that used film and Padlet to develop students’ functional Math and English skills in construction

Digital Initiatives Roadmap for Healthcare sector

While the Government of Nepal allocates a substantial share of its budget to the education sector, cohesiveness between initiatives remains a challenge. Development of an integrated digital education ecosystem that combines various ICT policies and aspects of technology adoption under a single umbrella organization by authorities could improve coordination among all stakeholders in the education value chain.

Frost and Sullivan recommends following digital initiatives to unlock the potential of Nepal’s education sector

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Independent news articles

33 Independent news articles
<table>
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<th>Technology and Infrastructure</th>
<th>2</th>
<th>Entrepreneurship/PPP</th>
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</thead>
</table>
| • Smart classrooms  
• OLE Nepal 2.0  
• Online learning platform  
• Rent-a-Laptop program  
• GPS mapping  
• Centralized admission application | • Promote entry of edutech startups  
• Co-creation hubs | • Mobile learning centers in rural areas  
• Redesign vocational curriculum |

**TECHNOLOGY AND INFRASTRUCTURE**

Technology infrastructure and services are pivotal to deriving the maximum benefits of next-generation education solutions. Key projects that can be undertaken to improve these areas include:

**1.1 Smart classrooms**

**Solution**

Integrate technology in classrooms at public schools and colleges including:

- Laptops, mobile phones, and tablets for students, along with sufficient charging points and Wi-Fi connectivity
- Projectors, audio-visual equipment, video recorders, and screens for showing teaching content
- Digital whiteboards that provide an interactive learning experience for students

**Stakeholders**

Ministry of Education, Schools and Universities

**Timelines**

Long Term

**1.2 OLE Nepal 2.0**

**Solution**

Extend the ongoing Open Learning Exchange (OLE) program by increasing the provision of E-Paath software, E-Pustakalaya, teacher training, and ICT infrastructure to 100% of schools in Nepal over the next five years from the current ~100 schools:

- To increase coverage, the Ministry of Education should devise incentive schemes and monetary compensation, and frequently monitor ICT usage
- The program should include development of a mobile app for the E-Pustakalaya digital library
- Extend E-Pustakalaya to include digital versions of the pre-primary and higher education (e.g., university and vocational courses) curricula
### 1.3 Online Learning Platform

**Solution**
Collaborate with educational institutions to develop a platform that delivers educational content as per the national curriculum, for school-going and out-of-school youth as well as teachers. The platform should be delivered on websites and mobile-based devices enabling:

- Students to attend pre-loaded video classes on specific subjects, check homework, submit assignments, and self-design learning programs according to their pace or preference
- Teachers to upload assignments, check homework, provide additional help to weak students through video chat, and publish exam schedules
- Integration of a cloud-based library where content can be downloaded onto laptops/mobiles to access in areas with no Internet connectivity

**Stakeholders**
Ministry of Education, Schools and Universities

**Timelines**
Long Term

### 1.4 Rent-a-Laptop Program

**Solution**
Nepal should consider launching a Rent-a-Laptop program to digitally empower students nationwide. As part of the program, Government of Nepal can provide basic laptops to students from underprivileged backgrounds at a marginal cost (e.g., nominal sum of NPR1,000 for one year).

The program can target underprivileged students studying at senior secondary and tertiary levels (e.g., colleges and vocational training schools).

**Stakeholders**
Ministry of Education

**Timelines**
Short Term

### 1.5 GPS Mapping

**Solution**
Map all schools and universities in Nepal on GPS and upload the data on a common portal to track the geographical location of each institute and check its proximity to the closest village/city/habitation. Target to complete GPS mapping of all institutions by 2025.

**Stakeholders**
Ministry of Education, Ministry of Science and Technology (MoST)

**Timelines**
Short Term
**1.6 Centralized Admission Application**

**Solution**

Develop a centralized admission application to be used by all public and private schools and universities, which integrates with existing SIS systems and tracks student admissions.

The tool will include an automated provision for admission quota of underprivileged (SC/ST) communities in the public school and university systems, ensuring transparency.

**Stakeholders**

Ministry of Education

**Timelines**

Medium Term

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**1.7 Biometric Attendance and CCTV Cameras**

**Solution**

Consider rolling out biometric attendance systems and CCTV cameras at all public educational institutions. Biometric attendance system and CCTV cameras would enable better tracking and monitoring of teacher attendance and quality of services delivered from public schools.

**Stakeholders**

Ministry of Education

**Timelines**

Medium Term

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**Case Study: Leading telecom operator in Indonesia connects 1,000 schools with high-speed internet**

XL Axiata, a leading telecom operator in Indonesia, launched “1,000 School Broadband Program” in October 2016. As a part of the program, XL Axiata facilitated 1,000 schools in various provinces to connect to high-speed internet networks as part of its on-going social activities in support of government programs for school digitization. The program helped more than 400,000 students and thousands of teachers in the learning process.

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**ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS**

While the education sector in Nepal shows immense potential to grow, challenges related to the country’s scale and diversity could impact its progress. Partnerships with technology innovators could go a long way in addressing various issues challenges and improving implementation of initiatives. The Government should consider the following approaches to create a conducive environment for entrepreneurship in the sector:

**2.1 Edutech Start-ups**

**Solution**

Encourage private sector participation in the education sector, particularly in higher education to boost competitiveness and innovation:

- Consider offering incentives, grants, subsidies, and tax breaks to companies and start-ups engaging in the education sector

Solutions from start-ups and niche online/digital education providers should address specific challenges facing the sector

**Stakeholders**

Ministry of Education
2.2 Co-creation Hubs

Solution

Open innovation hubs, research labs, incubators, and accelerators to foster cooperation between educational institutes and the corporate world on student internships and business-based projects:

- Organize lectures, workshops, and seminars for university students to highlight latest workplace trends and skills enhancement

Interact with industry players to redesign education curriculum

Stakeholders

Ministry of Education

Timelines

Medium Term

TALENT AND SKILLS DEVELOPMENT

Sustainable impact of ICT in education requires targeted awareness and skills development programs for all stakeholders in the education value chain.

3.1 Mobile Learning Centers in Rural Areas

Solution

Establish learning centers in rural areas that target underserved population with limited access to formal education:

- Provide self-learning and interactive learning in specific skills such as plumbing, electrician, technical training, culinary, sewing, and entrepreneurship

Deploy mobile phones, tablets, and laptops to increase impact of initiative

Stakeholders

Ministry of Education

Timelines

Medium Term

3.2 Redesign of Vocational Curriculum

Solution

Redesign education curriculum at technical and vocational colleges in collaboration with prominent companies across industries to make courses less theoretical, reduce the skills gap, and introduce practical training.

Stakeholders

Ministry of Education

Timelines

Medium Term

Case Study: Vodafone improving education access in rural Africa through its newly-launched Instant Schools For Africa initiative

Objective: Provide young people in Sub-Saharan African markets with free access to online learning materials, addressing the problem of access to quality education
Program Description: Launched in 2017, the initiative provides school going children in South Africa, the Democratic Republic of Congo (DRC), Ghana, Kenya, Lesotho, Mozambique, and Tanzania with free access to online learning materials. These include video/interactive exercises, optimized for basic mobile devices and low bandwidth. The initiative targets primary to secondary students (5-18 years old) and is part of Vodafone Foundation’s ongoing mission to use digital and mobile technologies to bring critical educational resources to Africa. Other ongoing initiatives by Vodafone in the region include Vodacom e-schools and the KA Lite open-source platform.

Expected Outcome: Vodafone is targeting to help three million children and youth through the program by 2020.
Energy

Reliable energy supply is essential for driving the economic growth and social well-being of a country. Severe energy shortfall in Nepal in the past few decades have led to a chronic imbalance between power supply and consumption. Electricity supply quality in Nepal is among the lowest in the world, ranking 137th out of 147 countries.\(^{34}\) Aggressive expansion in the country’s population, agricultural, and industrial activities have resulted in higher demand for power, worsening the severity of power shortage.

Similar to other countries in the region, the rate of electrification in Nepal is approximately 76%. However, significant disparities in electricity access between rural and urban areas exist with only 61% of the rural population having access to electricity, compared to 96% of the urban population.\(^{35}\)

Nepal is a net energy importer, with 34.76% of its energy needs imported from India.\(^{36}\) As energy generation via the Nepal Electricity Authority (NEA) is insufficient to meet domestic demand, Nepal supplements its energy sources by importing from India, and through Independent Power Producers (IPPs). Nepal’s rich hydro resources are estimated to be able to support power generation up to 42,000 MW.\(^{37}\) However, by the end of 2016, its total installed hydropower station capacity was only 802.4 MW, equivalent to less than 2% of its total generation potential.

Promise of Digital Initiatives in Energy Sector

The Government of Nepal continues to actively pursue measures to overcome load shedding and energy shortage issues in the country. Following the appointment of a new director at the NEA and strong government support, Nepal became load shedding free in May 2018 from improvements in the efficiency of management of supply and demand. Having resolved load shedding issues for both household and industrial users, the NEA is currently focusing on maintaining consistent power supply with quality and safety as priorities. The NEA is also

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\(^{35}\) Energizing Development (EnDev), a multi-donor partnership financed and governed by the governments of the Netherlands, Germany, Norway, the United Kingdom, Switzerland, and Sweden

\(^{36}\) NEA 2017

\(^{37}\) ADB, Technical Assistance for the South Asia Economic Integration Partnership – Power Trading in Bangladesh and Nepal (Subproject 1), Manila, 2014.
taking bold steps to strengthen its financial position through organizational restructuring exercises as well as introduce transparent transfer modality and other measures to improve services, reduce power wastage, and collect outstanding revenues.

Recognizing the need to develop its energy sector to reduce poverty and reinvigorate the economy, the Government is prioritizing energy development projects with multiple targets set over the next few years. It is also actively driving efforts to develop hydropower capabilities through initiatives such as the Nepal Power Investment Summit 2018.

**Case Study – Bhutan’s ambitious hydropower developments to become a net exporter of energy**

Over a 10-year period (2005–2015), Bhutan, a developing nation with similar topography to Nepal, increased its electricity production from 460 MW to 1606 MW, mainly generated through hydropower. Bhutan’s electricity exports grew from US$78 million in 2005 to US$176 million in 2017, contributing to 40% of its total exports and generating 25% of the government’s revenue.

Four out of five of its major hydropower projects are financed by the Indian government, with the fifth financed by the Asian Development Bank (ADB) and loans from Indian banks. The investment arrangement helps to cover the financial and construction risks of hydropower projects, with India committing to purchase surplus electricity reflecting production costs plus 15%.

Rapid development in the energy sector is reinvigorating Bhutan’s economy, with gross GDP projected to record 9.9% in the fiscal year ending 2018. Although current and future revenues generated from energy exports are forecast to cover the cost of hydropower investments, the Bhutan government is taking measures to monitor its hydropower-related costs closely. Under a 5-year plan, the government has stipulated that hydropower debt should not exceed 40% of hydropower earnings, while non-hydropower debt is limited to 35% of GDP.

**Challenges in Nepal’s Energy Sector**

The Himalayas cover approximately 75% of land in Nepal providing the country with ample free water resources and a favorable terrain for the production of electricity. Despite its power generation potential, Nepal is a net importer of electricity. In meeting the growing demand for energy, Nepal’s electricity imports increased at an average annual growth rate (AAGR) of 20.4% between 2011 and 2016, while NEA’s electricity generation grew at 0.3% annually over the same period.

Key hurdles facing Nepal’s energy sector include:

- Acute power shortfall, particularly during the dry season when water flow drops, adversely affecting hydropower generation
- Inefficiency in energy transmission through high technical and non-technical losses resulting in one of the highest energy losses in the world
- Underexploited hydropower capacity with Nepal only using a fraction of its commercially exploitable potential
- Despite its abundant hydropower resources, Nepal has one of the highest electricity tariffs in the world
- Regulatory barriers associated with foreign investments (including those in energy development projects), and land acquisition (private landowners for construction of transmission lines)

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38 Hydro World

39 Nikkei Asian Review, Aug 2017
### Energy in Nepal: Pain Points, Priorities, and Digital Solutions

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Government of Nepal’s Priorities</th>
<th>Digital as an Enabler</th>
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<tr>
<td><strong>Inadequate power generation</strong></td>
<td>• Increase electricity consumption per capita over the next 10 years from 110 kw/h to 1500 kw/h</td>
<td>• Digitally streamlined PPP application processes to mobilize foreign investment in the development large-scale hydropower projects and high-voltage transmission lines</td>
</tr>
<tr>
<td>• Nepal has a high dependence on energy imports from India as the NEA only meets 40% of Nepal’s energy needs (2017)</td>
<td>• Establish a center to implement large-scale PPP hydropower projects and provide relevant transaction advice. Additionally, the Government intends to diversify power generation to include other sources such as biomass, solar, wind, and solid waste</td>
<td>• Smart Grid solutions to develop necessary power distribution infrastructure</td>
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<tr>
<td>• Energy generation in Nepal fluctuates depending on water flow due to heavy reliance on hydropower, resulting in lower supply during the winter when demand is typically the highest</td>
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<td>• Smart Building/Smart Energy Management solutions for the public sector and large enterprises to reduce power consumption</td>
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<tr>
<td><strong>Limited rural electrification</strong></td>
<td>• Complete electrification throughout the country by 2021</td>
<td>• Smart Power (e.g., cloud-based operating systems, applications integration) can extend electricity and energy reach to rural areas through better management</td>
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<td>• Large disparity in electricity access with only 72% of the rural population having access to electricity, compared to 96% in urban areas</td>
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<td><strong>High transmission energy losses</strong></td>
<td>• NEA is leading several projects to improve grid infrastructure and increase efficiencies including the Smart Metering Smart Grid Project and the GIS Smart Grid Project</td>
<td>• Smart Grids and Smart Meters to conduct system loss analysis to reduce power losses by leveling, reducing or improving the quality and efficiency of power flows</td>
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<tr>
<td>• Nepal has one of the highest electricity output losses globally, recording 22.9% in 2017 during the transmission and distribution process</td>
<td></td>
<td>• Advanced analytics solutions to track energy consumption and check power thefts</td>
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<tr>
<td>• Technical losses such as energy dissipation in the transmission lines and non-technical losses such as faulty meters and unmetered energy are key contributors for the output loss</td>
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<tr>
<td><strong>Inefficiency of the Nepal Electricity Authority (NEA)</strong></td>
<td>• Measures to restructure the NEA and improve the efficiency of related organizations</td>
<td>• Use of Digital technologies in meter reading collection (Smart Meters), payment collection, customers services to improve operational efficiency</td>
</tr>
<tr>
<td>• In FY2016/2017, the NEA incurred a net loss of approximately US$8.98 million</td>
<td>• Plans to evaluate and adjust electricity tariff rates, power purchase rates, and wheeling</td>
<td>• Field Force Automation solutions for optimal use of</td>
</tr>
<tr>
<td>• Increasing cost of power purchased from IPPs could destabilize the agency’s financial position further</td>
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</table>
Concerns over the NEA’s ability to meet contractual obligations in power development projects due to its financial standing.

- Charges according to climate and time, to reduce costs and boost energy distribution efficiency.
- Field forces such as technicians and meter readers.

**Case Study: Digital tech addressing Brazil’s power theft crisis**

Rising incidence of electricity theft in Brazil was costing its government billions in lost revenue. On average, 8% of energy in Brazil was being stolen from the grid each year, reaching a staggering 40% in some areas.

**Solution:** Siemens used innovative Smart Meter software to access, collect, and process data from smart meters, integrating the platform with the billing and management system to ensure efficient energy billing to users. From the analysis of consistent data, Siemens was also able to identify the culprits as being a group of small and mid-sized enterprises that were using stolen energy to reduce their overheads. By building complicated user profiles, smart algorithms continuously compare an estimated consumption pattern to the amount of energy coming from the grid. The system can also detect any anomalies in electricity use, which is then inspected.

**Digital Initiatives Roadmap for Energy Sector**

The Government of Nepal should consider increasing its focus on digital investments in the energy sector to maximize its ability to meet power demands and generation potential.

<table>
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<tr>
<th>1</th>
<th>Technology Infrastructure</th>
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<th>Entrepreneurship/PPP</th>
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<th>Talent and Skills Development</th>
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<tr>
<td>• Smart Pricing</td>
<td>• Digitally streamlined PPP application to resolve regulatory barriers</td>
<td>• NEA e-Learning Center to enhance digital skills and knowledge of NEA staff</td>
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<tr>
<td>• Smart Metering</td>
<td>• Minimizing Inefficiencies in Power Transmission</td>
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<td>• GIS Smart Grid Project</td>
<td>• NEA Official Mobile App 2.0</td>
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<tr>
<td>• Minimizing Inefficiencies in Power Transmission</td>
<td>• Pan-Nepal Rollout of Any Branch Payment System (ABPS)</td>
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<tr>
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<td>• Smart Building/Energy Management Project</td>
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<tr>
<td>• Smart Building/Energy Management Project</td>
<td>• NEA Field Force Automation Solutions</td>
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<td>• NEA Customer Service Portal</td>
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Siemens
Technology and infrastructure

The recommended initiatives to expand technology-based electricity generation and distribution capacity in Nepal are as follows:

1.1 Smart Pricing

Solution
Implementation of Smart Pricing is highly recommended to facilitate revenue collection and improve the financial position of the NEA through:

- Automatic tariff adjustments based on fluctuations in currency exchange and price of power purchased from India
- Nationwide implementation of Time-of-Day (TOD) meter to charge different rates for electricity usage during peak and off-peak periods

Stakeholders
Ministry of Energy, Electricity Tariff Fixation Commission (ETFC)

Timelines
Medium Term

1.2 Smart Metering

Solution
Introduction of smart meters could help reduce energy losses and improve operational efficiencies from data analysis. The Government has allocations for smart meters in Nepal in the 2016/2017 budget with the project to be implemented in three phases. This is expected to improve efficiencies in the energy sector through:

- Nationwide shift from analogue to smart meters
- Automatic Meter Reading (AMR) system with Automatic Metering Infrastructure (AMI) application in existing meters
- Forecast load demand by actual electricity usage

Stakeholders
Nepal Electricity Authority (NEA), Electricity Tariff Fixation Commission (ETFC)

Timelines
Medium Term

1.3 GIS Smart Grid Project

Solution
Smart grids are electricity networks that enable monitoring, analysis, control, and communication capabilities in the electricity supply chain, from the power plant to the end user. Smart grids incorporating GIS technology in Nepal are funded through the Government budget 2016/2017 and will achieve the following:

- Manage proper information about poles, transformers & meters along with the consumer’s information geographically
- Forecast load demand by actual electricity usage
- Identify and manage electricity leakages

Stakeholders
Nepal Electricity Authority (NEA), National Transmission Grid Company

Timelines
Long Term

1.4 NEA Official Mobile App 2.0
Solution  In H2 2017, NEA launched the NEA Official mobile application where users can access all activities of the authority including electricity tariffs, register complaints, and locate areas experiencing a power cut and restoration times.

As the current version offers limited functionalities, the Government and NEA should consider the development of the NEA Official 2.0 application to meet the current needs of customers, in line with similar applications offered by leading utility companies worldwide.

Stakeholders  Ministry of Energy, NEA’s Distribution and Consumer Services Directorate (DCSD)

Timelines  Short Term

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### 1.5 Pan-Nepal Rollout of Any Branch Payment System (ABPS)

Solution  NEA has introduced the Any Branch Payment System (ABPS) in Kathmandu Valley, which allows customers to pay their bill at any NEA locations with ease.

ABPS services should be rolled out across Nepal to provide better customer experience to NEE customers.

Stakeholders  Ministry of Energy, NEA’s Distribution and Consumer Services Directorate (DCSD)

Timelines  Medium Term

### 1.6 Smart Building/Energy Management Project

Solution  Energy Management involves optimizing energy consumption in a building by employing energy-efficient measures.

Deployment of Smart Building/Energy Management Solutions in government offices and departments could be effective in reducing energy consumption and carbon footprint over the next five years.

Stakeholders  Ministry of Energy, All Government Offices and Departments

Timelines  Long Term

### 1.7 NEA Field Force Automation Solutions

Solution  Field Force Automation Solutions for improving the efficiency of NEA’s Field Force can help in the following ways:

- Automatically schedule and allocate work to Field Engineers
- Use of mobile applications (e.g., GPS tagging, automatic meter reading) to enable collection of meter readings and a reduction in complaints/fraud related to meter readings

Stakeholders  Ministry of Energy, NEA’s Distribution and Consumer Services Directorate (DCSD)
Timelines Long Term

### 1.8 NEA Customer Service Portal

**Solution**
As a part of its efforts to offer better customer experience, NEA is focusing on leveraging digital technologies such as online payments via partner banks and wallets and customer care helplines. However, it offers limited self-service capabilities to its customers.

NEA should consider offering better self-service options to its customer base by developing a customer service portal. It should leverage technologies such as artificial intelligence and chatbots to handle tasks such as complaints, queries, and digital payment solutions.

**Stakeholders**
Ministry of Energy, NEA’s Distribution and Consumer Services Directorate (DCSD)

**Timelines** Short Term

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**Case Study: Smart Grid Technology Reducing Power Outages in Bosnia and Herzegovina**

To the people of Brcko, Bosnia and Herzegovina, frequent power outages were a way of life affecting businesses, schools, and homes. During storms or technical failures, residents could lose power for extended periods.

USAID and its partners, the US Energy Association, Schweitzer Engineering Laboratories, and Brcko Komunalna, the electric utility serving the Brcko district of Bosnia and Herzegovina, joined forces to support a smart grid technology pilot project between September 2015 and September 2016 that dramatically improved the reliability of electricity supply in Brcko.

Schweitzer Engineering’s technology could instantly identify the location of power outages caused by storms and technical failures on Brcko’s distribution lines. Previously, during a power outage, employees would have to drive or walk along the power lines until they found the problem. The new technology not only reduces the number of trucks and employees needed to restore services, but also improves customer services while reducing emissions and costs associated with the use of diesel-powered backup generators. The project has reduced the frequency and duration of electricity outages. Over the project period, customers on an affected line reported a 51% drop in the number of outages, and 58% reduction – or about 8 hours – in the duration of outages compared with the same period the previous year.

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**Entrepreneurship/Public-Private Partnerships**

The Government of Nepal acknowledges the importance of private sector involvement and investment to develop Nepal’s hydropower capacity fully. In considering public-private partnerships (PPPs) hydropower generation models, the Government should also work to address constraints to private investments in infrastructure, including regulatory barriers (e.g., simplifying licensing procedures, forest clearance, land acquisition procedures).

### 2.1 Digitally Streamlined PPP Application

**Solution**
Digitally streamlined PPP application processes to create a conducive environment for the mobilization of foreign investment in the
development of large-scale hydropower projects and high-voltage transmission lines.

Stakeholders ministry of energy, NEA

Timelines Short Term

Case Study: A telecom tower company brings electricity to rural Bangladesh

edotco Bangladesh, a tower infrastructure company, leverages renewable energy sources to reduce its carbon footprint. The company operates 9,000 telecom towers in Bangladesh, of which 500 towers are powered by solar and wind energy.

The company has launched “Tower to Power” project as a part of its corporate social responsibility initiatives. Through this program, the company distributes a part of electricity generated from its renewable energy powered towers with communities around the site. As of August 2017, more than 160 homes, 13 mosques and 2 schools in Bangladesh’s remote areas benefited from edotco’s “Tower to Power” program.

Talent and Skills Development

Training public sector employees working in the electricity sector would be critical for success of the Digital Nepal initiatives.

3.1 NEA e-Learning Center

Solution A virtual learning platform to support the efforts of NEA Training Centers is essential to impart technical and digital skills and knowledge to its staff for a smooth transition to Digital Energy.

Stakeholders NEA Training Center

Timelines Medium Term
Tourism

Blessed with world-class tourist attractions, Nepal has a naturally rich topography and culture that caters to diverse travel interests ranging from pilgrimage/religious sites to wildlife parks, mountaineering, adventure trekking, and luxury holidays.

The travel and tourism sector is a primary source of revenue, foreign exchange, and employment for the country, contributing 7.8% to total GDP and 6.6% to total employment (translating into ~1,027,000 jobs) as at 2017.43 Given the sector’s direct positive impact on Nepal’s economic growth, the Government is stepping up efforts to promote travel and tourism through an array of market-friendly policies, targeted marketing campaigns, and investment programs.

Key initiatives fall under its new policy, the National Tourism Strategy 2016–2025, which envisages a fivefold increase in annual arrivals by 202544. An immediate focus area of the Government is the Visit Nepal 2020 program that aims to attract two million tourists and generate one million job opportunities in the sector by 202045.

**Key Government Initiatives in Tourism:**

<table>
<thead>
<tr>
<th>National Tourism Strategy 2016-2025</th>
<th>Visit Nepal 2020</th>
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<tbody>
<tr>
<td>Envisages a fivefold increase in annual arrivals and 9.29% growth in the sector’s contribution to GDP by 2025. Also aims to add 4,000 hotel rooms in Kathmandu by 2018-2019.</td>
<td>An immediate focus area of the Government, Visit Nepal 2020 aims to attract two million tourists and create one million jobs in the sector by 2020.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Attracting Tourists from Regional Countries</th>
<th>Partnerships with International Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Government is encouraging tourism, mainly from China, its largest tourist demographic, with the launch of its customized website in Chinese language.</td>
<td>Nepal Government has partnered with the World Bank’s International Finance Corp (IFC) and FMO, a Netherlands-based development bank, to build critical</td>
</tr>
</tbody>
</table>

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43World Travel & Tourism Council (WTTC), Data Gateway, Nepal, [https://tool.wttc.org](https://tool.wttc.org)
45Ministry of Tourism and Civil Aviation, Tourism Vision 2020 policy document, May 2009
Encouraging Private Investments in Tourism Sector

Driven by policies to boost the tourism sector, the hospitality industry in Nepal is in an expansionary mode to accommodate the influx of tourists, with domestic and foreign investors announcing plans to invest NPR60 billion (US$0.55 billion) in hotel projects across the country in 2016.

Prominent initiatives include the re-entry of Indian hotel chain, Taj Hotels Resorts and Palaces, into Nepal to operate a new lodge in Chitwan; ongoing construction by InterContinental Hotels and the Sheraton Group in various regions in Nepal; and expansion of several local hotel companies including Nepal Hospitality Group, Muktishree Group, and Glacier Hotel.

Despite the Government-led efforts, growth has been relatively slow, with tourist arrivals to Nepal at a five-year CAGR of only ~4.2% (2013–2017), reaching 940,218 tourists in 2017, primarily owing to underdeveloped infrastructure. To achieve its 2020 target of two million tourists, arrivals will need to increase multifold, at a CAGR of 28.6%, requiring the Government to intensify initiatives to boost the sector.

Challenges in Nepal’s Tourism Sector

While the Government of Nepal aspires to strengthen the tourism sector’s productivity, income, and image internationally, it continues to trail other countries in the region due to

46 The Himalayan Times, “IFC, FMO invest $5.5m in Fairfield Marriot Hotel”, June 21, 2017
47 Nepal Tourism Statistics 2017 publication, Ministry of Culture, Tourism & Civil Aviation
several inherent challenges. In 2017, the sector accounted for ~7.8% of Nepal’s GDP, as compared to 21.2% in Thailand, 11.6% in Sri Lanka, and 8.9% for countries in South Asia.\textsuperscript{48,49} Critical challenges in Nepal’s tourism and hospitality sector include:

- Poor infrastructure to support tourism activity, including congested airports, poor quality of roads, facilities, and weak IT infrastructure to support digital initiatives. The massive April 2015 earthquake that severely damaged many of the country’s historic sites further exacerbate this problem
- Lack of effective marketing and promotional activities to promote Nepal as a tourist destination, possibly due to lack of funds
- Tourists’ negative perceptions about safety and security risks due to past instances of political turmoil, terrorism from neighboring countries, and natural disasters
- Shortage of skilled and professional workforce, with most tour guides speaking very little English, weakening the image of Nepal as a tourism destination internationally
- Tourists to Nepal often complain about the lack of information on tourist spots, weather conditions, and activities available. There are also concerns about the reliability of information
- Low focus on promoting domestic tourism, leading to lost revenue opportunities for the sector

The new Government intends to revitalize the tourism sector during its tenure by rolling out a 100-day action plan to address various challenges. Key areas under the action plan include:

### Technology & Innovation
- Digitalize and consolidate archives of national importance; plans to catalogue, tag, and upload 11,550 of 31,000 handwritten manuscripts, along with 655,000 images preserved at the National Archives
- Form a think tank to gather suggestions and feedback regularly, and draft a concept paper on mobilizing tourism attachés in five major markets

### Administrative
- Establish a secretariat to oversee Visit Nepal 2020
- Form a committee to determine the actual contribution of the tourism sector to Nepal’s economy
- Resolve the dispute over the use of modern materials to rebuild the Rani Pokhari heritage monument and begin reconstruction
- Draft a formal Casino Act to streamline the gambling business and address the evasion of royalties and taxes by casino operators

### Infrastructure
- Finalize the modality of the proposed Nijgadh International Airport in Bara within 100 days
- Build a Guerrilla Trail and Yarsa Trail at least 10km long to offer a unique trekking experience
- Develop model tourist destinations in all seven provinces of Nepal such as Ilam, Janakpur, Makwanpur, Pokhara, Rupandehi, Mugu, and Kailali

\textsuperscript{48} World Travel & Tourism Council (WTTC), Data Gateway, Nepal
\textsuperscript{49} South Asia includes India, Myanmar, China, Bangladesh, Vietnam, Cambodia, Thailand, Sri Lanka, Laos, and Nepal
Promise of Digital Initiatives in Tourism

Increasing connectivity driven by the proliferation of the Internet and mobile devices and growing affordability of digital technologies are transforming the nature of tourism and consumer demand. Globally, ICT penetration is typically high in the travel, tourism, and hospitality sector, with the automation of almost every process from research, price comparison, ticketing to booking and reservations. Nepal can learn from other countries successfully implementing Digital Tourism technologies to address the inherent challenges of its tourism sector.

Use of digital technologies in tourism sector presents new revenue streams for Nepal through increased profitability of its various stakeholders and generates significant benefits for society through a reduction in environmental footprint, better safety and security, and cost and time savings. Nepal appears to be in the early stages of ICT implementation. Currently, digitalization efforts are limited to website development for the Ministry of Culture, Tourism and Civil Aviation (MoCTCA) and Department of Tourism while the hospitality industry operates basic CRM and revenue management systems. Nepal has a long way ahead to gain measurable benefits from ICT through the large-scale implementation of digital initiatives in tourism.

Tourism in Nepal: Pain Points, Priorities, and Digital Solutions

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Government of Nepal’s Priorities</th>
<th>Digital as an Enabler</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inadequate infrastructure</strong></td>
<td>Under the 100-day action plan, the Government has announced several measures to revitalize its airport, including:</td>
<td>• Use of digital signages and touchscreen kiosks to provide tourism information</td>
</tr>
<tr>
<td><strong>Airports</strong></td>
<td>• Increasing the operation hours of TIA from the current 17 hours/day to over 20 hours/day</td>
<td>• Advertise tourism-related offers and alerts via free Wi-Fi services at the airport</td>
</tr>
<tr>
<td></td>
<td>• Completing 40% of the physical infrastructure of Gautam Buddha International Airport in Bhairahawa and 50% physical progress by June 2018</td>
<td>• Digitize immigration, Customs and visa processes through the use of automated gateways to scan passports, visas, and boarding passes</td>
</tr>
<tr>
<td></td>
<td>• Purchasing six Twin Otter aircraft to serve remote areas</td>
<td>• Use of e-visas and digital immigration records to move toward paperless immigration processes which are faster and</td>
</tr>
</tbody>
</table>
The airport is the first point of contact for tourists. As such, any negative impression could hamper tourist growth in the country.

### Road infrastructure
- Congestion in popular tourist areas due to the poor quality of roads and traffic mismanagement
- Lack of last-mile connectivity in remote, hard-to-reach areas
- Weak regulation of driving licenses is a major contributor to the presence of unsafe, inexperienced drivers on the road, presenting significant reputational and safety risks

- **In Jan 2017, ~US$1.35 million grant was allocated to procure a 150-kilowatt solar power plant to power e-vehicles plying the World Heritage Site of Lumbini, to reduce congestion and pollution**
- **The Government has commenced construction of the Kathmandu Nijgadh Fast Track road**
- **Use of smart traffic management and intelligent lighting control systems for real-time and predictive traffic information**
- **Vehicle tracking and monitoring using RFID tags**
- **Use of GPS technology by cabs transporting tourists to check road conditions**

### Facilities
- Shortage of tourist facilities like ATMs, information centers, currency exchanges outside mainstream tourist spots
- Inadequate information on health, hygiene, and ecology

- **Under the Visit Nepal 2020 campaign, the Government is investing in the development of additional tourist facilities and infrastructure**
- **Equip self-service kiosks in tourist centers**
- **Enable booking through mobile and web channels**
- **Install Wi-Fi hotspots**
- **Develop websites and portals with comprehensive tourism information**

### 4. IT infrastructure to support digitalization
- Inability to perform digital payments due to poor integration between payment systems of banks, mobile wallets, and merchants; and lack of facilitation for foreign currency payments
- Highly fragmented databases and poor integration between airports, tourism authorities, travel agencies, and hotels

- **In May 2017, Nepal Rastra Bank (NRB) reviewed its retail payment systems to identify regulatory gaps and barriers, as well as to develop a national retail payment strategy, to support digital payments**
- **Implement centralized IT systems such as Global Distributed Software (GDS) and reservation management systems to connect all licensed agencies with the Government to enable information sharing**

### Limited tourism information availability
- Lack of information on tourism destinations, health and hygiene, natural hazards, changes in biodiversity, and ecology
- Tourism websites, books, and brochures are limited; ones that are available are scattered, not updated regularly or reliable

As tourism is an information-intensive business, poor data access

- **Nepal Tourism Board (NTB) has launched www.welcomenepal.com, its official tourism website, with detailed information on tourist attractions, activities, events, climate, and local transport**
- **Develop an official website and mobile application for the NTB with regular updates on attractions, weather, travel, accommodation, and e-ticketing**
- **Equip tourist centers with self-service information kiosks, digital signages,**
could weaken Nepal’s position in the global tourism industry.

### Lack of effective marketing strategies

Despite its rich cultural heritage and terrain, Nepal is not at the top of the travel list for most tourists due to lack of promotional activities advertising Nepal as a tourist destination. Other factors include:

- The Government’s inability to diversify tourism products, possibly due to lack of funding
- Lack of opportunity to fully capitalize on the country’s mountaineering, pilgrimage, medical tourism, and ecotourism features, indicating lost revenue channels

- The Government has introduced several tourism campaigns including Visit Nepal 2018, Campaign HAN, and Himalayan Travel Mart 2018
- Launch of a customized website in Chinese language to attract visitors from China who form a majority of Nepal’s tourists
- In 2017, the NTB signed up with BBC World, Reuters, and TripAdvisor to display promotional videos of Nepal through the media channels

- Use augmented reality apps to provide tourism information, navigation, guides, and translations
- Virtual reality technology to recreate tours, showcase accommodation, and advertise hotels
- Deploy online marketing, SEM/SEO tools including targeted ads for travelers
- Social media marketing, peer reviews, and user-generated content build brand value and attract visitors

### Shortage of skilled workforce in the tourism sector

As the majority of the country’s skilled talent have migrated overseas for work, Nepal’s tourism sector is forced to hire unskilled people from rural areas with little experience; gender equality issues and socio-cultural factors also prevent women from working in the sector

- Nepal Academy of Tourism and Hotel Management offers Bachelor’s and Master’s degrees in Hospitality Management, as well as Bachelor’s degree in Travel and Tourism
- The Government plans to set up training centers to coach tourist guides, and a Tourism University to offer higher education in tourism to meet human capital demand

- Use of automated tour guides that connect to visitors’ mobile phones and provide historical information, reducing the need for physical tour guides
- Monuments and heritage sites can be connected with sensor/IoT technology, QR codes, and RFID tags to provide information

### Low focus on domestic tourism

Majority of tourism policies in Nepal target foreign tourists with little being done to promote domestic tourism, leading to:

- Growth in outbound tourism as Nepali people travel overseas during the holiday season (October–November)
- Loss of opportunity to tap into the rising disposable incomes and spending power of Nepali people

- Government-led initiatives to improve infrastructure and marketing/promotional activities could benefit both international and domestic tourism
- Ongoing programs by NTB to boost domestic tourism such as Travel Nepal and Photo Nepal to promote Nepali tourism using photography; Safa Nepal to foster cleanliness around heritage sites, and Chulo Nepal to publicize Nepali food and hygiene conditions

- Create websites/helplines in local Nepali languages to cater to the diverse ethnic local population
- Train local entrepreneurs, particularly in rural tourists hotspots like Manang, Mustang, Rara Lake, and Ghandruk, to boost domestic tourism
Digital Initiatives Roadmap for Tourism Sector

The Government of Nepal should consider formulating a comprehensive model for the tourism industry, encompassing infrastructure, attractions, accessibility, amenities, and ancillary services, along with key technology tools.

Frost and Sullivan recommends following technology initiatives to unlock potential of Nepal’s tourism sector:

<table>
<thead>
<tr>
<th>1</th>
<th>Technology &amp; Infrastructure</th>
<th>2</th>
<th>Entrepreneurship/PPP</th>
<th>3</th>
<th>Talent &amp; Skills Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Welcome Nepal website 2.0</td>
<td>• Entry of travel start-ups and foreign companies</td>
<td>• Training programs for local guides</td>
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<tr>
<td>• Welcome Nepal mobile app</td>
<td>• Public-private investments and partnerships with sharing economy players</td>
<td>• Tie-ups with educational institutions</td>
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<tr>
<td>• Electronic visas</td>
<td>• Multilingual helpline</td>
<td>• AR/VR tours</td>
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<tr>
<td>• Multilingual helpline</td>
<td>• Electronic tour guides</td>
<td>• Omnichannel marketing</td>
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<tr>
<td>• AR/VR tours</td>
<td>• Free Wi-Fi services in tourist points of interest</td>
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<tr>
<td>• Electronic tour guides</td>
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<tr>
<td>• Omnichannel marketing</td>
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</tbody>
</table>

TECHNOLOGY AND INFRASTRUCTURE

The following initiatives seek to address the gaps in insufficient tourism infrastructure. Selected projects for the consideration of the Government of Nepal include:

1.1 Enhancement of Welcome Nepal Website 2.0

**Solution**
Enhance official web portal [www.welcomenepal.com](http://www.welcomenepal.com) to make it a one-stop shop offering services such as direct booking of accommodation, transport, e-tickets to sites, flights, visa and immigration information, support for special needs/disabled tourists, and helpline/emergency contact details:

- Integrate AI/chatbot technology to answer tourist queries

**Stakeholders**
Ministry of Culture, Tourism and Civil Aviation (MoCTCA) – Department of Tourism

**Timelines**
Short Term

1.2 Welcome Nepal Mobile App

**Solution**
Expand the Welcome Nepal web portal to the mobile platform to include tourist services such as online ticket booking to all tourist spots in the country, barcodes at heritage sites to provide information on the area in tourists’ local language, online booking feature for cabs and tourist guides, accommodation details, and other tourist-related services.
The website is currently available on Android and should be extended to include other operating systems such as Apple iOS and Linux to increase reach.

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA), IT service providers

**Timelines** Short Term

### 1.3 Electronic Visas

**Solution** Introduce electronic visas (e-visas) for entry into Nepal to replace the current paper visa application system. Start with a few pilot countries including India and China and extend to other nations over the next five years.

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA), Department of Immigration

**Timelines** Long Term

### 1.4 Multilingual Helpline

**Solution** Develop multilingual support – phone, website, and mobile application – to cater to multiple nationalities seeking to visit Nepal. Focus on English, Hindi, Bengali, and Chinese – the group of language speakers that constitute the highest share of tourists.

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA) – Department of Tourism

**Timelines** Short Term

### 1.5 Augmented and Virtual Reality Tours

**Solution** Deploy AR/VR technology on Nepal’s official tourism website and mobile application to showcase popular attractions (e.g., temples, Mount Everest) and immersive content, giving travelers a real-world feel.

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA) – Department of Tourism

**Timelines** Long Term

### 1.6 Electronic Tour Guides

**Solution** Provide devices with pre-loaded historical information on key tourist sites, temples, and museums; and offer travelers the option to purchase the device:

- Phase II would cover development of a mobile version of the guide that can be downloaded on travelers’ phones upon paying a small fee

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA) – Department of Tourism
Tourism

**Timelines** Medium Term

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### 1.7 Omnichannel Marketing

**Solution** Launch a comprehensive omnichannel marketing campaign across all channels – online, mobile, social media, TV, and print (e.g., newspapers, flyers) with a common theme and positioning to promote Nepal’s attractions:

- Consider partnerships with popular lifestyle magazines such as Time Out and sites like Trip Advisor to provide information about the best options for a night out, music, restaurants, films, and hotels in the area
- Look at India’s “Incredible India” tourism campaign and other efforts by its various state governments as examples for implementation

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA), Government of Nepal

**Timelines** Short Term

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### 1.8 Free Wi-Fi Services in Tourist Areas

**Solution** Availability of Internet connectivity and Wi-Fi hotspots at airports, hotels, and major tourist spots as a pre-requisite to support digital tourism initiatives:

- Nepal should target to roll out 100% Wi-Fi connectivity at its international and domestic airports as well as main heritage sites by 2020, in time for Visit Nepal 2020

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA), Ministry for Communications and Information Technology (MoCIT)

**Timelines** Short Term

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**ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS**

Suggest of digital initiatives in tourism sector would require active government-industry-consumer collaboration. To promote a vibrant tourism ecosystem, the Government should consider the following:

### 2.1 Encourage entry of travel start-ups and foreign companies

**Solution** Promote entry of start-ups that cater to niche segments of the tourism sector, e.g., online travel communities, travel planning, activities and experiences, travel guide services, food delivery, customized travel packages, community/crowdsourcing platforms, and hotel booking:

- Provide a market-friendly environment for tech start-ups by offering benefits including incentives, tax holidays, and knowledge
### Parks/Hubs

Attract participation from international hotel chains to increase tourism promotion and marketing activities

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA)

**Timelines** Medium Term

### 2.2 Public-private investments and participation in sharing economy

**Solution** Foster public-private partnerships to improve travel infrastructure and transport in Nepal. Launch hop-on hop-off tourist bus services operated by a private company under a PPP model to offer services such as free onboard Wi-Fi, digital commentary on sites along the route, real-time bus tracking, online ticketing platform.

Promote the sharing economy for ridesharing by allowing entry of companies like Uber and Ola as travelers are familiar with such services

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA)

**Timelines** Medium Term

### Talent and Skills Development

The tourism sector in Nepal is unorganized and highly fragmented with several small-scale players. Due to its non-technical nature, most workers in the sector, while skillful, come from rural areas and do not have proper education.

As part of its goal to formalize the sector and improve infrastructure, the Government needs to introduce language training and ICT education programs to improve the quality of human capital.

#### 3.1 Training Programs for Local Guides

**Solution** Create a structured training program for local tour guides in the areas of communication (English and other languages), technical know-how (e.g., operate trekking equipment), driving, and professional etiquette, among others.

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA)

**Timelines** Medium Term

#### 3.2 Tie-ups with Educational Institutes

**Solution** Set up specialized educational institutes that offer courses in Hotel and Travel Management to cope with demand for travel professionals. These institutes can consider alliances with existing hotels to provide practical, on-the-job training to existing employees in the tourism sector.

**Stakeholders** Ministry of Culture, Tourism and Civil Aviation (MoCTCA), Ministry of
### Case Study: Government-led initiatives and digital programs improving India's tourism infrastructure

#### Government Schemes

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>“Ude Desh ka Aam Nagrik” (UDAN)</td>
<td>A regional airport development and connectivity scheme aimed at improving transport connectivity to several major tourist spots, including investments in last-mile road and air connectivity in underserved areas.</td>
</tr>
<tr>
<td>National Heritage City Development &amp; Augmentation Yojana (HRIDAY); Pilgrimage Rejuvenation and Spirituality Augmentation Drive (PRASAD)</td>
<td>Launched in January 2015, the plan focuses on the development and rejuvenation of cultural-religious spots such as monuments, Ghats, and temples as well as revival of intangible assets in cities such as Ajmer, Amaravati, Amritsar, Badami, Dwarka, Gaya, Kanchipuram, Mathura, Puri, Varanasi, Velankanni, and Warangal.</td>
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#### Digital Initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Description</th>
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<tbody>
<tr>
<td>Incredible India digital calendar</td>
<td>A digital tourism calendar application for 2018 for Android and iOS platforms that features notifications and updated information on events and festivals in India during the year; personal travel planner; customized reminders for events; option to share event information with friends.</td>
</tr>
<tr>
<td>eTicketing of monument entrance tickets</td>
<td>e-tickets for access to 116 monuments across India using the web and mobile phones. While at the site, tourists can use their phones to access the available audio-visual guides and combine them with venue-specific barcodes encapsulating the information.</td>
</tr>
<tr>
<td>Multilingual helpline</td>
<td>Introduction of the 1363 helpline in 12 languages, one-of-its-kind in the world. The helpline also offers human assistance by dialing a “tourist's friend” or tourist facilitator. It also includes other travel-related services, prices, comparators, and certified experts.</td>
</tr>
<tr>
<td>Digital magazines</td>
<td>The Incredible India website includes e-versions of travel magazines such as India &amp; You, INDES, and Colors of India.</td>
</tr>
</tbody>
</table>

Source: Press Information Bureau, Government of India, January 12, 2018, Frost & Sullivan analysis
Despite the size of its economy, Nepal has a relatively diversified financial services sector. As at July 2017, there are 28 commercial banks in Nepal with a paid up capital of NPR 8 billion, 40 development banks, and 32 finance companies. As one of the largest contributors to Nepal’s economy, the financial services sector contributed 23% of GDP in FY2016. It is also one of the largest employers in the country with commercial banks alone employing nearly 30,000 people in July 2017.

A key driver for the financial services sector is the high volume of remittances sent to Nepal by the thousands of Nepali people working abroad since the 1990s. Remittances in 1995 accounted for 1.3% of GDP, growing to an estimated US$6.6 billion, equivalent to 31.3% of the country’s GDP in 2016.\(^52\)

While the sector consists of a diverse range of financial institutions, Nepal has yet to reap the benefits of a mature financial services sector as large section of Nepali society remains unbanked and unable to access these services. Only 45% of adults in Nepal are formally banked through an account with a financial institution.\(^53\) As a result, Nepal continues to be a cash economy with most transactions occurring outside its financial system.

Nepal’s sizeable unbanked population is its biggest hurdle to achieving financial inclusion in the country. In addressing this issue, the Government of Nepal and the Nepal Rastra Bank – Central Bank of Nepal (NRB) should consider promoting financial inclusion initiatives as a critical growth enabler and undertaking policy interventions to encourage banks and other financial institutions to expand their presence in remote areas. An increase in the number of financial institution branches could improve financial access in Nepal.

**Challenges in Nepal’s Financial Services Sector**

A large unbanked population and predominantly cash economy are the biggest barriers to the development of the financial services sector in Nepal. More than half of Nepali people do not have a bank account, with consumption of financial solutions remaining low even for people with access to financial services.
Fast Facts

<table>
<thead>
<tr>
<th></th>
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<th>Only half of bank account holders withdrew money from their accounts in the past year</th>
<th>15% of salaried employees receive wages through a bank account</th>
</tr>
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<tbody>
<tr>
<td>45% of Nepali people</td>
<td>are formally banked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9% of Nepali people</td>
<td>own debit cards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% of Nepali people</td>
<td>own credit cards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16% Nepali people</td>
<td>have made or received a digital payment</td>
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</tbody>
</table>

Source: World Bank, 2017

Banking fees, low literacy levels, and inaccessibility of bank services in rural areas due to poor infrastructure are vital factors mainly hampering the uptake of formal financial services in Nepal. Lack of legal identity documentation has also been reported to be a barrier to creating bank accounts.

Reasons for Remaining Unbanked (% of unbaked population), Nepal, 2017

- 20% Financial institutions are too far away (age 15+)
- 17% Financial services are too expensive (age 15+)
- 10% Lack of necessary documentation (age 15+)
- 8% Lack of trust in financial institutions (age 15+)
- 3% Religious reasons (age 15+)
- 40% Insufficient funds (age 15+)
- 18% No account because someone in the family has an account (age 15+)
- 1% No need for financial services (age 15+)

Source: Global Findex Database - World Bank; Frost & Sullivan analysis

Overall, the financial ecosystem in Nepal is still in its infancy due to several challenges hindering its adoption:

- Sizeable unbanked population due to a multitude of issues including:
  - Difficulty in accessing physical bank branches (especially in remote, rural areas). As of March 2018, only 394 of the 753 local levels designed under the new federal structure have bank branches. Additionally, ATM and commercial branch penetration in Nepal is significantly lower than that of most other countries in the region.
  - High cost of financial services and lack of proof-of-identity (or know your customer, KYC) documents limiting access to financial services for the poor and deprived sections of society.
- Underdeveloped digital financial services ecosystem with low credit and debit card penetration, low use of digital payments, online and mobile banking, and restrictive government policies (e.g., low maximum limit of digital payments).
- Widespread preference for informal financial channels (e.g., informal remittance transfer systems) that results in reduced resources for the Government to make productive investments, encourages tax evasion, and negatively impacts governance and exchange reserves.
• Lack of financial and digital literacy

**Promise of Digital Initiatives in Financial Services Sector**

With Internet penetration rate at 63%, Nepal is well positioned to benefit from digital financial services solutions. These solutions (e.g., mobile/Internet banking, mobile wallets, online digital payments) have the potential to address challenges such as difficulties accessing banks and high cost of services.

Globally, financial services institutions, IT companies, and telecom operators are joining forces to increase digital inclusion to drive socioeconomic growth. Given the nearly ubiquitous mobile penetration in Nepal, Intelligent Finance solutions combining digital technologies and telecom operators’ nationwide presence can be a feasible way to boost financial inclusion in the country. Nepal should learn from the success of mobile wallets in many African nations to expand digital inclusion and socioeconomic growth.

Development of the digital financial services ecosystem at existing banks and financial services institutions is integral to driving all aspects of the economy. In 2002, Kumari Bank pioneered digital payment services in Nepal with the introduction of Internet banking services for its customers. In recognizing the proven opportunities digital payment services offer, more digital solutions are beginning to become available in Nepal from traditional financial institutions and FinTech start-ups such as eSewa, IMEPay, Khalti, and iPay.

The Government of Nepal considers financial inclusion as a critical lever to driving socioeconomic growth, and as a result, has undertaken these recent measures:

• FY2018-19 budget allocation to digitize government payments and revenue collection (e.g., tax payments via mobile application)
• Launch of opening bank accounts campaign targeting every Nepali citizen
• Formulating and implementing necessary laws and regulations for electronic transactions to facilitate and govern digital payments

**Case study – Kenya M-Pesa transforming the economy through mobile money services**

**Objective:** Using mobile money technology to offer financial services in rural and marginalized areas.

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Source: World Bank, 2016; * Sri Lanka data is for 2015

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**Model:** The M-Pesa mobile payment platform launched in March 2007 as a product developed by Vodafone, in partnership with Sagentia, by integrating a mobile wallet with Safaricom’s rating, billing, and provisioning systems. The onboarding of customers on the platform was achieved by replacing the SIM of registered Safaricom users with the M-Pesa enabled SIM. Users load money into the mobile wallet by depositing cash with an agent to obtain e-FLOAT currency. The digital currency is then used for payments or transferred to other users through encrypted SMS.

The platform currently acts as a mobile wallet offering money deposits, payments, balance checking, cash withdrawal, and international money transfer services at a minimal cost. Besides Kenya, the digital wallet services are also available in Tanzania, Afghanistan, India, Romania, Egypt, Albania, and South Africa.

M-Pesa’s success in Africa can be attributed to its focus on micropayments, targeting consumers at the base of the banking sector pyramid. By offering convenient digital money transfer regardless of the value of the transaction, M-Pesa has achieved widespread adoption throughout the financial ecosystems in its markets.

Before M-Pesa was introduced in Kenya, the nearest bank was on average 9.4 km away from users. As at 2017, 96% of Kenya’s population can access financial services using their mobile phones, with an M-Pesa agent an average of 1.4km away.

In the first half of 2017, transactions through M-Pesa amounted to 48.76% of Kenya’s GDP. By the end of 2017, Vodacom processed US$7.3 billion worth of M-Pesa transactions globally per month.

Today, its widespread usage in Kenya has been credited with raising 2% of Kenyan households out of extreme poverty through access to mobile money services between 2008 and 2016. It also plays a crucial role in offering opportunities to small businesses as well as a range of financial services such as international transfers, loans, and health provisions using mobile.

### Financial Services in Nepal: Pain Points, Priorities, and Digital Solutions

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<td><strong>Difficulties in accessing banks</strong></td>
<td>Ensure BFIs establish rural branches first to be eligible to set up outlets in urban areas</td>
<td>Increased adoption of digital transactions and payments to minimize the need to visit bank branches</td>
</tr>
<tr>
<td>- As at 2017, about 81% of Nepal’s population lives in rural areas, with 20% of Nepali adults citing the distance they need to travel to banks as the main reason for not opening a bank account</td>
<td>- Offer interest-free loans to assist BFIs to expand into remote districts</td>
<td></td>
</tr>
<tr>
<td><strong>Large unbanked population</strong></td>
<td>- Introduction of microfinance institutions in Nepal to target the financially excluded, particularly in rural areas</td>
<td>- Launch digital payment systems in Nepal to help Nepali people leapfrog conventional banking systems to the digital payment system</td>
</tr>
<tr>
<td>- Only 40% of Nepali people are formally banked</td>
<td>- NRB is currently implementing a five-year strategic action plan (2012–2016) with financial inclusion</td>
<td>- Promote convenience of digital payment systems to build adoption momentum</td>
</tr>
<tr>
<td>- 26% of the adult population in Nepal are illiterate, impairing their ability to engage with financial services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- A quarter of the adult population lack a citizenship</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

55 World Bank
<table>
<thead>
<tr>
<th><strong>2018 DIGITAL NEPAL FRAMEWORK</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate, making them ineligible to apply for formal banking channels</td>
</tr>
<tr>
<td>Mostly homogenous products offered by financial services providers (FSPs) do not meet the needs of consumers across various segments</td>
</tr>
<tr>
<td>Low-income consumer market with highly seasonal and irregular incomes have unique needs for FSPs</td>
</tr>
<tr>
<td>As a strategic priority</td>
</tr>
<tr>
<td>Introduction of an e-mapping system to prioritize approval of new bank branches or channel points in unbanked areas</td>
</tr>
<tr>
<td>In Nepal</td>
</tr>
<tr>
<td>With the adoption of digital payment methods, the distance between end users and the nearest bank will no longer be an inhibiting factor with the integration of formal financial services</td>
</tr>
</tbody>
</table>

### High fees incurred from banking services

- Banking services in Nepal charge relatively high fees for financial services:
  - Nepal Investment Bank (NIB) charges NPR500 annually for SMS alerts for transactions and NPR200 annually for e-banking services
  - NIB and NMB Bank both charge NPR500 each per online transfer

- Consider reducing transaction service charges to encourage digital payment adoption
- Offer subsidies to banks to offset the costs incurred through payments

- Adoption of digital processes throughout the financial system to streamline processes, and in turn, reduce the cost of banking services at financial institutions

### Preference for informal remittance methods

- Informal channels to remit funds to Nepal, such as the **hundi** or **hawala** system which is still popular among Nepali people overseas mainly due to the hefty fees incurred through formal channels

- Foreign Exchange Management Department (FEMD), under the NRB, regulates the entire remittance industry in Nepal

- Digitalization of payment modes through partnerships with financial institutions to reduce the cost of remittance and encourage more Nepali people to remit money digitally

### Slow user adoption of digital platforms

- Complex user interface
- Language barriers
- Complexity of products offered

- Actively encouraging the adoption of digital payment systems via development of a Common Platform for Strengthening Digital Payment System in the South Asian Association for Regional Cooperation (SAARC) region

- Reduction in the number of steps to make payments and reload mobile wallet
- Simplification of user interface
- Platforms available in multiple languages

### Maximum limit for digital transactions

- NRB has introduced various limits for digital payments such as credit/debit card, mobile banking, Internet banking and mobile wallet restricting the payments that can be made digitally as well

- NRB has expressed that the limits may be adjusted to accommodate industry requirements

- NRB should increase the limit on digital transactions to encourage more transactions
**as the remittance amounts from abroad**

- The transaction limit for mobile payments has been set NPR 10,000 ($146) a day, in stark contrast to M-Pesa’s maximum transaction of US$675.

---

**Digital Initiatives Roadmap for Financial Services sector**

Digital offers a plethora of opportunities in driving financial inclusion, from improving access to financial services to improving tax collection. The Government is taking measures toward achieving this, such as digitalizing all government transactions to boost the adoption of digital payments. It has also started distributing social security allowances and all other government-to-citizen payments through banks to encourage financial inclusion.

<table>
<thead>
<tr>
<th>1</th>
<th>Technology Infrastructure</th>
<th>2</th>
<th>Entrepreneurship/PPP</th>
<th>3</th>
<th>Talent Development &amp; Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase Maximum Limit for Digital Transactions</td>
<td>Policy Interventions to Allow Telecom Operators to Offer Mobile Wallets</td>
<td>Financial Literacy Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPS Tagging for ATM/Branch Network Expansion</td>
<td>Encourage Digital Payments in Nepal</td>
<td>Digital Payments Campaign</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Reducing the Cost of Financial Transactions</td>
<td></td>
<td>Training for Retailers and Digital Payment Service Operators</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>National Biometric Card</td>
<td></td>
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<tr>
<td>Gamification of Digital Payments</td>
<td></td>
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</tr>
</tbody>
</table>

---

**TECHNOLOGY AND INFRASTRUCTURE**

The following initiatives targeting Financial Services sector can be implemented in Nepal to boost financial inclusion:

### 1.1 Increase Maximum Limit for Digital Transactions

**Solution**

NRB should look at reviewing the maximum transaction values for digital payments with the aim of increasing the limit for “low-risk consumers”. Low-risk consumers can be identified through the NRB’s KYC requirements for deposit-taking, remittances, cross-border transactions, and credit extension activities.

The move could encourage more consumers to adopt digital payment modes as the current limit is considered too low and restrictive for digital payment activities.

**Stakeholders**

Ministry of Finance, Nepal Rastra Bank (NRB)

**Timelines**

Short Term
1.2 GPS Tagging for ATM/Branch Network Expansion

**Solution**

ATM/branch network in Nepal is among the weakest in the world, with limited presence in remote parts of the country. A robust nationwide ATM and branch footprint is critical to achieving 100% financial inclusion in the country.

NRB can initiate a GPS tagging project requiring all commercial banks to tag their branches and ATMs on a central platform. The information can then be mapped against the census and other government data. The project could allow the NRB to track progress on network rollout in remote areas effectively.

**Stakeholders**

Ministry of Finance, Nepal Rastra Bank (NRB)

**Timelines**

Short Term

1.3 Reducing the Cost of Financial Transactions

**Solution**

High transaction fees for banking services (e.g., ATM withdrawals from other banks’ ATMs, minimum balance requirements, high charges for online banking, debit/credit cards) are key deterrents for financial inclusion in Nepal.

The Government of Nepal and NRB need to consider a reduction in the cost of financial services in Nepal. For example, public banks in Nepal should consider launching low-frill accounts for economically deprived sections (similar to India’s Jan Dhan accounts) to drive financial services adoption in India. Similarly, banks should be encouraged to absorb ATM withdrawal fees from other banks’ ATMs (at least on five to 10 transactions per month).

**Stakeholders**

Ministry of Finance, Nepal Rastra Bank (NRB)

**Timelines**

Short Term

1.4 National Biometric ID Card

**Solution**

Many underprivileged and uneducated Nepali people are unable to open accounts at financial institutions due to lack of proper KYC documents. Nepal, which does not have a national ID card system currently, should consider rolling out a National Biometric ID card project to issue a National ID card to each Nepali citizen. The National ID card will not only enable underprivileged Nepali people to open bank accounts, but would also allow them to benefit from many other government schemes.

**Stakeholders**

Ministry of Home Affairs

**Timelines**

Medium Term

1.5 Gamification of Digital Payments

**Solution**

- Gamification of digital payments can be achieved by rewarding...
consumers for continuous usage of digital payment methods:
- Usage frequency and volume of digital payment platforms for transactions will be rewarded with discount schemes and other incentives for selected users
- Users can progress to different levels based on their usage frequency and volume
- Introduction of gamification in improving customer engagement is likely to continually capture and maintain customers’ attention, particularly in behavioral-related products such as the use of digital payment platforms

**Stakeholders**
Ministry of Finance, Nepal Rastra Bank (NRB), Ministry of Trade

**Timelines**
Medium Term

**ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS**

The Government of Nepal should undertake the following policy interventions to create an enabling environment for digital financial services:

### 2.1 Policy Interventions to Allow Telecom Operators to Offer Mobile Wallets

**Solution**
Globally, telecom operators play an essential role in the financial services sector with the rollout of digital financial services such as M-Pesa and mobile wallets.

NRB and National Telecom Authority (NTA) should work together to draft a policy framework that allows the involvement of telecom operators and IT companies in promoting financial inclusion in Nepal. Telecom operators can be given the licenses to operate e-wallet/digital financial services using existing Telco KYC for authentication purpose.

**Stakeholders**
Ministry of Finance, Nepal Rastra Bank (NRB), National Telecom Authority (NTA)

**Timelines**
Short Term

### 2.2 Encourage Digital Payments in Nepal

**Solution**
Only 15% of Nepali wage earners receive wages in their accounts. The Government of Nepal should consider introducing policies that encourage employers (public and private sectors) to transfer wages, salaries, and other payments directly to employees and suppliers using financial services.

The Government should mandate the compulsory transfer of wages/salaries beyond a minimum threshold level to bank accounts. Until the rollout of a National Biometric ID card, the onus of helping employees in opening bank accounts should lie with the employers. Similar policies can be considered for other private and public sector payments.

**Stakeholders**
Ministry of Finance, Nepal Rastra Bank (NRB)
TALENT AND SKILLS DEVELOPMENT

In addition to infrastructure support, talent and skills development is essential to ensuring the successful adoption of digital payments in Nepal. To support the digital payments ecosystem, the country requires skilled programmers, financial technology experts, and operational support teams. Retailers also need to be sufficiently trained in managing digital payment systems to ensure the smooth flow of payments. These challenges can be addressed by training the local talent pool through partnerships with digital payment services providers to familiarize them with the system.

The Government could also launch educational campaigns to build awareness among consumers on the benefits of digital payments and financial inclusion to ensure the effectiveness of the other initiatives implemented.

### 3.1 Financial Literacy Education

**Solution**
Educating the public about the importance of banking systems and their advantages could be critical to stimulating financial inclusion in Nepal. Adults and school children should be introduced to offerings from financial institutions and assisted in opening an account.

**Stakeholders**
Ministry of Finance, Ministry of Communication and IT, Ministry of Education

**Timelines**
Short Term

### 3.2 Digital Payments Campaign

**Solution**
Advertisements on social media and radio/television that highlight the advantages of using digital payments.

**Stakeholders**
Ministry of Finance, Ministry of Communication and IT

**Timelines**
Long Term

### 3.3 Training for Retailers and Digital Payment Service Operators

**Solution**
Training for digital payment services operators and retailers aiming to adopt digital payment services.

**Stakeholders**
Ministry of Finance, Ministry of Trade, Key digital payment services providers

**Timelines**
Medium Term
### Comparison of Key Financial KPIs, Nepal vs. Selected Asian Countries, 2017

<table>
<thead>
<tr>
<th>Category</th>
<th>Nepal</th>
<th>India</th>
<th>Pakistan</th>
<th>Sri Lanka</th>
<th>Bangladesh</th>
<th>China</th>
<th>Japan</th>
<th>Malaysia</th>
<th>Singapore</th>
<th>Korea, Rep.</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Account holders Percentage</td>
<td>45%</td>
<td>80%</td>
<td>21%</td>
<td>74%</td>
<td>50%</td>
<td>80%</td>
<td>98%</td>
<td>85%</td>
<td>98%</td>
<td>95%</td>
<td>82%</td>
</tr>
<tr>
<td>Withdrawal in the past year % of account holders</td>
<td>51%</td>
<td>43%</td>
<td>66%</td>
<td>48%</td>
<td>52%</td>
<td>78%</td>
<td>90%</td>
<td>70%</td>
<td>91%</td>
<td>95%</td>
<td>70%</td>
</tr>
<tr>
<td>Used the internet to pay bills in the past year Percentage</td>
<td>1%</td>
<td>3%</td>
<td>7%</td>
<td>5%</td>
<td>2%</td>
<td>40%</td>
<td>24%</td>
<td>25%</td>
<td>50%</td>
<td>64%</td>
<td>10%</td>
</tr>
<tr>
<td>Used the internet to buy something online in the past year Percentage</td>
<td>2%</td>
<td>3%</td>
<td>1%</td>
<td>3%</td>
<td>1%</td>
<td>45%</td>
<td>46%</td>
<td>34%</td>
<td>48%</td>
<td>72%</td>
<td>17%</td>
</tr>
<tr>
<td>Paid online for internet purchase % internet purchases</td>
<td>14%</td>
<td>33%</td>
<td>-</td>
<td>24%</td>
<td>7%</td>
<td>85%</td>
<td>-</td>
<td>49%</td>
<td>89%</td>
<td>-</td>
<td>52%</td>
</tr>
<tr>
<td>Debit card ownership Percentage</td>
<td>9%</td>
<td>33%</td>
<td>8%</td>
<td>32%</td>
<td>6%</td>
<td>67%</td>
<td>87%</td>
<td>74%</td>
<td>92%</td>
<td>75%</td>
<td>60%</td>
</tr>
<tr>
<td>Borrowed from a financial institution or used a credit card Percentage</td>
<td>14%</td>
<td>8%</td>
<td>3%</td>
<td>17%</td>
<td>9%</td>
<td>23%</td>
<td>54%</td>
<td>23%</td>
<td>47%</td>
<td>63%</td>
<td>20%</td>
</tr>
<tr>
<td>Borrowed from family or friends Percentage</td>
<td>53%</td>
<td>33%</td>
<td>29%</td>
<td>16%</td>
<td>21%</td>
<td>28%</td>
<td>4%</td>
<td>15%</td>
<td>4%</td>
<td>12%</td>
<td>29%</td>
</tr>
<tr>
<td>Received wages: into a financial institution account % wage recipients</td>
<td>15%</td>
<td>31%</td>
<td>23%</td>
<td>44%</td>
<td>22%</td>
<td>65%</td>
<td>87%</td>
<td>72%</td>
<td>96%</td>
<td>94%</td>
<td>48%</td>
</tr>
<tr>
<td>Received wages: in cash only % wage recipients</td>
<td>77%</td>
<td>59%</td>
<td>67%</td>
<td>48%</td>
<td>69%</td>
<td>25%</td>
<td>12%</td>
<td>20%</td>
<td>3%</td>
<td>3%</td>
<td>45%</td>
</tr>
<tr>
<td>Credit card ownership Percentage</td>
<td>1%</td>
<td>3%</td>
<td>1%</td>
<td>5%</td>
<td>0%</td>
<td>21%</td>
<td>68%</td>
<td>21%</td>
<td>49%</td>
<td>64%</td>
<td>10%</td>
</tr>
<tr>
<td>Received government payments: into a bank account % payment recipients</td>
<td>36%</td>
<td>57%</td>
<td>0%</td>
<td>59%</td>
<td>0%</td>
<td>74%</td>
<td>86%</td>
<td>72%</td>
<td>87%</td>
<td>79%</td>
<td>67%</td>
</tr>
<tr>
<td>Made or received digital payments in the past year Percentage</td>
<td>16%</td>
<td>29%</td>
<td>18%</td>
<td>47%</td>
<td>34%</td>
<td>68%</td>
<td>95%</td>
<td>70%</td>
<td>90%</td>
<td>92%</td>
<td>62%</td>
</tr>
</tbody>
</table>

Source: World Bank; Frost & Sullivan analysis
Nepal is among the least urbanized countries in the South Asian region. However, it is urbanizing rapidly with urban population growing 6% annual since 1970s\textsuperscript{56}

Urbanization in Nepal is dominated by a few large and medium cities with an excessive population concentration in the Kathmandu Valley. The urban population distribution is uneven across the country with high urban growth in the Kathmandu Valley, the Pokhara Valley, the Inner Tarai valleys, and in a few market and border towns located on highways.

Trend towards urbanizations is likely to continue in the foreseeable future, as internal migration continues with Nepali people moving from rural areas to urban areas in search of better opportunities and facilities. This trend towards urban migration presents both opportunities and challenges for Urban Development and Municipal Authorities:

- **Urbanization as an engine for growth**: Like most other countries, growth of urban areas is likely to emerge as a key engine for growth for Nepal. Further, it is important for Nepal to develop other urban towns to decongest a few large cities (like Kathmandu, Pokhara, etc.) and contribute to a more sustainable growth across regions and geographies.

- **Need for investments in urban infrastructure**: Rapid urbanization is putting pressure on already weak urban infrastructure (viz., water supply, sewage & drainage, waste management, public transport, roads and public safety). Urban development authorities and municipal corporations in Nepal need to systematically upgrade urban infrastructure in order cope with surge in the demand.

\textsuperscript{56} Asian Development Bank
Urban Development and Municipal Authorities in Nepal need to focus on the following five pillars in order to prepare urban infrastructure that can deal with increasing demand due to rapid urbanization and increasing citizen expectations:

**Challenges in Nepal’s urban infrastructure**

There are wide deficits in basic urban infrastructure and quality benchmarking in the leading urban areas in Nepal. Deficiency of urban infrastructures is highlighted by the situation of water supply, sanitation, solid waste management, transport and safety.

Nepal ranks poorly on urban infrastructure when compared with other countries in the region. Nepal was ranked 131st among 140 countries on infrastructure in Global Competitive Index 2015-16.57

The gaps in the urban infrastructure have been a result of poor urban planning, inorganic growth of urban cities, and below-par existing infrastructure. Quality of urban infrastructure was further impacted by twin earthquakes in 2015.

**State of Basic Urban Infrastructure in Nepal**

In spite of abundance of fresh water resources, most cities in Nepal are battling with choric challenges in the water management sector:

- It has 2.7% of the fresh water reserves globally which makes the country 2nd country after Brazil with water reserves58
- However, quality and quantity of drinking water is insufficient in urban Nepal with only 32.9% of households in urban Tarai regions having access to piped water supply 59

Sanitation infrastructure in Nepal also compares poorly with its peers:

- Only 56.1% of urban households have access to sanitation system with only 88.2% households having access to toilet60

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57 Global Competitive Index 2015-16, World Economic Forum
56 International Institute of Water Management
59 National Urban Development Strategy (NUDS), 2017
60 National Urban Development Strategy (NUDS), 2017

Draft
Unplanned waste management system with poor collection and open dumping practice:
- The Kathmandu valley emits about 1,000 tons per day of solid waste of which only 900 tons is collected

Lack of landfill sites for waste management:
- Out of 58 municipalities in Nepal, only 6 have sanitary landfill sites and only 5 practice controlled waste dumping.

Public transport sector in Nepal is in nascent stages with limited investments made from Government of Nepal in developing the sector. Road Transport (buses) system is unorganized and managed by small private operators resulting in low reliability and quality of services. Kathmandu Valley and a few developed metros are in dire need of a public transportation system that is reliable, safe and comfortable. The need of the hour is to create a multi-model transport system consisting of bus, rail and/or metro networks.

Lack of resources and investment as well as topological structure (hilly terrain) are major challenges for road infrastructure improvement.

The construction and maintenance of roads remain a major challenge. Narrow and unplanned roads, unreliable public transport and increasing private ownership of vehicles are resulting in increasing traffic congestion and rising air pollution.

Nepal has high vulnerability to disasters due to its tropology and fragile geology. Natural disasters such as floods and landslides have long been a regular phenomenon in Nepal. Globally, it ranks 4th, 11th and 30th in vulnerability to climate change, earthquake and flood risks, respectively.

Disaster planning and management are critical functions for Nepal's urban development and municipal authorities due to looming dangers associated with national disasters.

61 National Urban Development Strategy (NUDS), 2017
62 UNDP Nepal
Case Study – AI and Drone for Tainan’s Smart City, Taiwan

Description: The city of Taiwan launched the AI X Drone smart city project in July 2017, where the drones collect aerial images on a periodic basis for the integration and development of Taiwan's artificial intelligence image recognition and analysis technology.

Objective: AI computing technology is planned to be used in the maintenance of historic sites, sightseeing assistance, environmental monitoring, traffic monitoring, among others.

Partners: Ministry of Science and Technology, GeoSat, NAR Labs.

Urban Infrastructure in Nepal: Pain Points, Priorities, and Digital Solutions

<table>
<thead>
<tr>
<th>Challenges / Pain Points</th>
<th>Government Priorities</th>
<th>Digital as an Enabler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water and sanitation</td>
<td>Formulated an umbrella act and policy for the water, sanitation and hygiene (WASH) sector that aims to raise the quality and performance of water supply and sanitation services.</td>
<td>Crowdsourcing solutions for citizens to report leakages, supply problems, etc.</td>
</tr>
<tr>
<td>Shortage of drinking water</td>
<td>Government has established the Sanitation &amp; Hygiene Master Plan to support effective planning, budgeting, human resource mobilization, monitoring, implementation, evaluation, and follow up of hygiene and sanitation programs and projects.</td>
<td>Mobile Apps to help citizens report service issues, data collection data on water, sanitation and hygiene by municipalities and NGOs for planning and allocation of resources.</td>
</tr>
<tr>
<td></td>
<td>A survey conducted in 2014 found that more than 80% of household stored water was contaminated with E.coli.</td>
<td>Water and Sanitation Information System (SIBS) monitoring system that monitors water pipes, tanks at residents’ homes to assess water supply, flow, pressure, etc.</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Polluion &amp; contamination of water</td>
<td>Key priorities and initiatives include:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Supply safe and pure drinking water to 95% of population by 2030.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Started Melamchi Water Supply project to ease water shortage in Kathmandu by diverting 170 MLD of fresh water.</td>
<td></td>
</tr>
<tr>
<td>Sanitation</td>
<td></td>
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<tr>
<td></td>
<td>Lack of adequate sanitary facilities, proper hygiene practices, and taboos on menstruation, due to prevailing attitudinal and cultural barriers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Further, has disparities in sanitation coverage across areas and socio-cultural groups.</td>
<td></td>
</tr>
<tr>
<td>Waste Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

64 The 2014 Nepal Multiple Indicator Cluster Survey (MICS)
### Poor Collection & Disposal
- Underdeveloped waste management infrastructure and limited use of digital technologies resulting in poor quality of waste management services for citizens
- Many municipalities practice road-side waste pickup from open piles and open dumping, which is creating environment and health risks
- Further, dumping of untreated waste in rivers and water is leading to severe contamination in many part of Nepal

Solid waste management (including collection, treatment and disposal of waste) is a responsibility of municipalities. Municipal authorities are undertaking various initiatives to improve solid waste management. Few examples include:
- Kathmandu City is planning to build robust waste management system consisting on e-toilets, underground waste disposal system, etc.
- Hetauda Sub-Metropolitan City has partnered with a private under for door-to-door waste collection, established a Resource Recovery Facility with compost plan, and is encouraging segregation of recyclable and non-recyclable waste
- Similar initiatives (especially around door-to-door collection of waste) are been undertaken by other municipalities as well.

### Public Transport
- Most urban areas in Nepal lack efficient public transport system.
- Key challenges include shortage of public transport vehicles, unreliable schedules, poor maintenance, cleanliness and overcrowding

**Kathmandu Sustainable Urban Transport project:** The ADB is working with the government of Nepal to develop an efficient public transport system and roads with pedestrian space that preserve heritage values. Provided a $10 million grant for the program

- Use of sensors and RFID tags for monitoring and real time information on public transport
- Mobile apps for providing information on routes, schedules, fares and real-time updates for all public transport models
- Integrated Smart Card based fare collection system for all private and public transport operators

### Road & Traffic
- The construction, improvement & maintenance of roads remains a major challenge due to lack of resources and a complicated topological structure
- This, coupled with increasing demand for mobility has led to road congestions and rising pollution
- Inefficient intersections, lack of

**The Kathmandu Valley Road Improvement Project is focusing on widening the current lanes**
- Kathmandu Sustainable Urban Transport Project aims to:
  - Improve 25 junctions in Kathmandu city center
  - Improve Bishnumati Link Road from Shova Bhagawati to Teku on left bank of Bishnumati River & construct

- Micro-simulation modeling for predicting vehicle and pedestrian traffic at specific times
- CCTV cameras, wireless sensors and trackers on roads and at major crossings to manage traffic, accidents, crimes, etc.
- Intelligent Parking and Intelligent Toll Management solutions to address parking

**IoT/sensor enabled waste bins to inform authorities, which bins reach their full capacity**
- GPS tracking for waste collection vehicles for effective route planning and waste management
- Predictive Waste Management Analytics for effective planning and reviewing of waste management services
- Crowd Sourcing to enable citizens to report unattended waste collection
- Automation for waste treatment plants
guidelines and rampant violation of traffic rules is enhancing congestion and traffic accidents

<table>
<thead>
<tr>
<th>two bridges</th>
<th>and traffic issues</th>
</tr>
</thead>
</table>

**Disaster Management**

- Nepal is highly prone to natural disasters such as earthquakes, floods, famines, epidemics, and landslides, some of which are repetitive.
- However, the country has limited capabilities to deal with large scale disasters. The 2015 earthquake highlighted several shortcomings including outdated systems, poor data management, weak search and rescue capacity, etc.
- Nepal is in the process to develop new disaster management act, and national strategic plan of action which is in line with the framework adopted in Sendai, Japan.
- The government formulated a Post Disaster Recovery Framework (2016-2020) and the Post Disaster Needs Assessment to provide a systematic, structured and prioritized framework for implementing recovery and reconstruction, following the 2015 earthquake.
- National Disaster Management Plan for effective disaster preparedness, response, recovery, and mitigation.
- IoT based early warning and monitoring systems for disaster management and planning.
- Emergency telecommunications equipment for better disaster response and recovery.
- Use of drones for delivery of relief supplies, damage assessment and communications.

**Promise of Digital Initiatives in Urban Infrastructure**

Use of digital technology to improve the functioning and efficiency of cities and municipalities has become a well-known strategy for urban planning worldwide. With proven results from the on-going projects in the developing countries of Asia, Nepal can pick up valuable lessons and best practices from existing programs.

Further, widespread proliferation of enabling technologies such as analytics, mobile, cloud, and broadband, as well as declining costs of sensors, hardware, and IoT devices, will create significant opportunities for Nepal to integrate digital technology for infrastructure development.

As part of its National Urban Development Strategy (NUDS) 2017, the country has laid down plans to modernize urban planning including land use, housing, transportation, and energy, as well as construct smart cities in Kathmandu, Lalitpur, Bhaktapur and Kirtipur.

This is expected to create significant opportunities for Nepal by improving efficiencies, enhancing visibility, boosting governance mechanisms, and building robust connectivity, as well as opening up new investment opportunities for infrastructure and real estate development in the country.

**Intelligent urban planning is expected to translate into measurable benefits**

- The global smart waste management market is estimated to be worth US$ 2.37 billion by 2021, growing at a robust CAGR of 16.9% over 2016-2021.

- In order to provide universal access to water and sanitation by 2030 globally, every $1 invested in water and sanitation, will generate $4.30 in economic returns through increased productivity.

- The global Intelligent Transportation Systems market is estimated to be a $72.32 billion industry by 2022, contributed by improved road safety, greater sustainability of vehicles, and environment.

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65 Smart Waste Management Market by Solution, Markets and Markets, August 2016
66 The Toilet Board Coalition Report, The Circular Sanitation Economy, November 2017
The emergency preparedness initiatives by UNICEF and the World Food Program (WFP) in select developing countries saved a total of $12 million towards future humanitarian response and created net savings of $6.4 million, on an investment of $5.6 million.

Digital Initiatives Roadmap for Urban Infrastructure sector

The Government of Nepal should focus on infrastructure development and up-gradation using ICT solutions, which is expected to promote economic growth and provide quality services.

<table>
<thead>
<tr>
<th>1</th>
<th>Technology Infrastructure</th>
<th>2</th>
<th>Entrepreneurship/PPP</th>
<th>3</th>
<th>Talent Development &amp; Skills</th>
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<td></td>
<td>Water ATMs</td>
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<td>Ride sharing</td>
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<td>Disaster Management Training</td>
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<td>Smart metering for water</td>
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<td>Partnership for urban</td>
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<td>Pipeline monitoring</td>
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<td>Smart, ConnectedBins</td>
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<td>Fleet Management</td>
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<td>Municipality mobile app</td>
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<td>Automated waste sorting</td>
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<td>National disaster</td>
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<td>management strategy</td>
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TECHNOLOGY AND INFRASTRUCTURE

Recommended initiatives for upgrade of infrastructure with a vision of Smart city to address key social and environmental challenges in cities and municipalities:

1.1 Water ATMs

Solution: Install “Water ATMs” in select public places in Nepal such as market areas, bus stands, railway stations, airports, etc. where people can purchase fresh, hygienic, bottled water by paying a token amount (say, NPR 2 for 300 ml water)

- Consider a pilot implementation in the Kathmandu district and subsequently expand into other municipalities.

68 BCG, The ROI of Emergency Preparedness
Can look at a similar initiative undertaken by the Delhi Jal Board in India, as an example for implementation

**Stakeholders**
Water Supply and Sewerage departments in Municipalities, The Municipal Association of Nepal (MuAN), Water and Energy Commission

**Timelines**
Short Term

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### 1.2 Smart metering for water

**Solution**
Replace analogue meters with smart digital meters for automatic reading collection. Rollout of smart meters will result in better operational efficiency, reduced complaints and leakage management

**Stakeholders**
Water Supply and Sewerage departments in Municipalities, The Municipal Association of Nepal (MuAN), Water and Energy Commission

**Timelines**
Long Term

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### 1.3 Pipeline monitoring system

**Solution**
Deploy of IoT sensors, flow meters and acoustic sensors in water pipes across the supply network - from river banks to people's homes, which will provide visibility on water network operations, help municipalities and government departments to monitor wear & tear of equipment, as well as undertake maintenance and timely repair to prevent water loss.

**Stakeholders**
Water and Energy Commission, Department of Water Supply and Sewerage

**Timelines**
Long Term

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### 1.4 Intelligent Waste Management

**Solution**
Deploy IoT technology and wireless connectivity to automate waste collection and management, which will improve efficiency of operations and reduce delays in trash collection. Include:

- **Smart Waste Bins**, installed with sensors in densely populated cities like Kathmandu, which will provide information on the type of waste in the garbage containers and measure the level of waste-fill. Provide alerts in case of overflows or any physical damage

- **Intelligent fleet management**: Install GPS powered devices in trucks used for waste collection, which collects data from bins and makes real-time decisions for optimal waste collection based on that. Also provides data on vehicle status and waste collection schedule

- **Waste management analytics system**: Install a centralized, web-based waste management analytics system in all the municipal offices that collects data from the collection trucks and connected bins, as well as monitors nearby areas or districts
Includes a visual dashboard and analytical tools providing comprehensive insight into waste management operations in the local area.

Also deploy predictive analytics to visualize waste generation patterns up to 24 hours into the future, thereby allowing districts and municipalities to optimize waste collection and use more efficient routes.

**Stakeholders**: Waste management departments in municipalities, The Municipal Association of Nepal (MuAN)

**Timelines**: Medium Term

### 1.5 Crowd sourcing for municipal services

**Solution**
Mobile app to enable residents of the municipality to share feedback and complaints for various basis infrastructure related services offered by the municipality.

For example, the app can enable the residents to share photos of unattended waste and water leakages with the officials. These photos along with GPS location can be shared by with app with the concerned authorities for quick action and monitoring.

**Stakeholders**: Local Municipal Authorities, The Municipal Association of Nepal (MuAN)

**Timelines**: Short Term

### 1.6 Automated waste sorting

**Solution**
Deploy automated waste sorting systems in recycling plants and in centers where garbage is collected. Uses optical sorters, sensors, RFID to sort waste materials based on composition and chemicals structure.

**Stakeholders**: Waste management departments in municipalities, The Municipal Association of Nepal (MuAN)

**Timelines**: Long Term

### 1.7 Connected public transport

**Solution**
Install RFID and GPS systems in public transport vehicles such as buses and taxis, and connected to a central system at the Department of Transport, enabling them to monitor the schedules, frequency, and condition of public vehicles.

- Real-time information from the connected vehicles can also be integrated into the public transport public apps to provide real-time transport running data to citizens.
- This also allows the department to communicate with drivers and ensure safety and security of passengers in case of any unwanted...
incidents.

- Buses should install digital displays that mention the next stop along with automated, IVR-based announcements.

**Stakeholders** Ministry of Physical Infrastructure and Transport, Operators (Samittees) of public transport vehicles

**Timelines** January 2019

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### 1.8 Public Transport mobile app

**Solution** Create an official mobile application from the Department of Transport in Nepal that lays down details of various public modes of transport including taxi, metro, and buses in a city. Provides information on the various routes connecting key locations, availability/ frequency/ schedule of the transport, time estimates, and fare details, among others.

**Stakeholders** Department of Transport

**Timelines** Medium Term

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### 1.9 Multi-modal Smart Cards

**Solution** Develop a new unified and coordinated fare system that integrates both bus and rail services, and uses a prepaid, smart card, in order to reduce congestion in stations. The government can introduce a fee structure that progressively increases based on the distance travelled.

The system can be expanded to metro / subway use, as and when it is developed in the country.

**Stakeholders** Ministry of Physical Infrastructure and Transport

**Timelines** Medium Term

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### 1.10 Intelligent traffic management

**Solution** Install CCTV cameras, road sensors, traffic detectors and speed cameras at major/ busy traffic crossings and roads such as New Road & Durbar Square in Kathmandu, and Kamal Binayak- Nagarkot road

- Help to monitor traffic conditions and collect real-time data on vehicle flow, to reduce congestion and ensure a smoother traffic flow.

- Also enable the authorities to get information on accidents and crimes, vehicle speeds and adherence to traffic rules (such as skipping of traffic signals, incorrect lane driving, etc.), thereby improving safety on roads

- The detectors connect to the local police station and automatically issue penalties or “challans” in case of violation of traffic rules and guidelines

**Stakeholders** Ministry of Physical Infrastructure and Transport, Traffic Police
Timelines Medium Term

1.11 Intelligent Parking Lot Management
Solution Intelligent Parking Lot management solutions to provide parking availability status to motorists through an app. The solution will require users to update their requirements at any given time on the app following which the system will reflect the current occupancy status of the slots. The system can also update the user about the prevalent parking rates at the designated spot, and allow user to reserve the parking using mobile payment.

Additionally, large cities in Nepal should also consider construction of automated parking in busy markets and business areas for effective management of limited space.

Stakeholders Local Municipal Authorities, Ministry of Physical Infrastructure and Transport

Timelines Medium Term

1.12 Intelligent Toll-booths
Solution Deploy RFID tag readers (for frequent travellers) in toll-booths on national highways that enables automatic deduction of toll charges and lets cars pass through without stopping for cash transaction. This will enable regulation of traffic flow and reduced congestion.

Stakeholders Ministry of Physical Infrastructure and Transport

Timelines Medium Term

1.13 National Disaster Management System
Solution Implement a comprehensive disaster management system that will help in predicting disasters before they happen as well as response & management after the disaster.

The system will consist of centralized systems installed in all government offices:

- **Information systems** - by installing early warning/ remote sensing systems, broadcast emergency warning systems, mobile broadcast warning & notification systems (through SMS), digital signage, message boards, and voice delivery systems

- **Search and rescue systems**

- **Connectivity** - by establishing portable emergency communication system, buried optical fiber links, emergency mobile networks, local wireless mesh networking, delay tolerant networking, satellite communications (VSAT systems, mobile satellite PTT, etc.)

- **Use of drones**: Formalize policies regarding the use of drones for
providing aid during disasters

- Will enable the government to map terrain more effectively, assess damage in real time, increase situational awareness through high-resolution mapping, as well as provide live-stream footage of critical rescue efforts
- Deliver aid and supplies more efficiently in remote and unreachable areas

Establish **Emergency Operations Centre (EOC)** at the village and district level which will include emergency tools and personnel trained in emergency response in disaster-struck areas

**Stakeholders**

- Disaster Management Section, Ministry of Home Affairs, Nepal Centre for Disaster Management (NCDM)

**Timelines**

Long Term

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**Case Study – How Shanzen transformed the traffic situation through the use of smart technologies**

**Challenge:** As Shenzhen city in China transformed from a small town into a metropolis, it faced major growing pains, particularly relating to traffic congestion. Shenzhen’s land size is less than 2,000 km², and there are only slightly more than 600 km of roads. It has the highest vehicle density in China with an average of about 530 vehicles per kilometer.

**Solution:** Shenzhen’s Traffic Police Bureau collaborated with Huawei to implement ICT to manage road congestion and launched a series of innovations, clubbed under an initiative called “traffic brain”. It includes:

- **Ultra-broadband traffic network:** Leverage Huawei’s high-speed Optical Transport Network (OTN) that enables transmission at 400 Gbit/s, data storage of over 20 PB, and data processing capacity for 10’s of billions of elements to support the data needs of Shenzhen’s police network
- **Data analysis of city-wide traffic:** Installed a road monitoring system that can detect traffic conditions through license plate identification, video surveillance, and other methods with a detection accuracy rate of up to 95%. Collects 700 million pieces of vehicle data every month, and integrates nearly 40 TB of data from 78 system databases, both internal and external
- **AI-assisted law enforcement:** Uses AI technology and big data analytics platform could respond to check for traffic violations, processing up to 10 million images per day. The technology enables the department to identify vehicle features and traffic violation images at an accuracy rate of more than 95%
- **Crime fighting efficiency using big data:** The police bureau uses a big data platform and traffic-analysis modeling engine to create multiple reports for disqualified driving, drunk driving, and cars with multiple violations. Intelligence can be generated within 30 minutes, from seven days previously
- **Increase in road capacity:** Set up a real-time surveillance system for all signal-equipped intersections in Shenzhen, and developed a precise traffic signal control mode based on the traffic time-space software engine. Also collects data via converged checkpoints and roaming police cars to establish lanes through intersections and organize traffic flow through big data management, enabling them to increase road capacity by about 8%

**Results:** Investigated and closed 37,055 cases of serious violations and detained 874 vehicles with
fake or cloned license plates. Vehicles with cloned or fake license plates, scrapped vehicles, and vehicles with multiple violations have now almost disappeared from the streets of Shenzhen.

**Going forward:** The Shenzhen Traffic Police Bureau plans to develop smart police terminals based on 5G technologies; analyses historical data by means of traffic simulation to predict traffic volume in each corner of the city; invest nearly CNY 3 billion (USD 453 million) to upgrade all checkpoint systems, including an improved high-definition video system, so that its coverage rate will reach over 70%.

### ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS

The Government of Nepal will benefit greatly from turning to the private sector for technological development in infrastructure. It may consider the following policy interventions to create a favorable environment:

#### 2.1 Ride sharing

**Solution**
Ride sharing platforms have potential to emerge as a strong alternative for weak public transport in Nepal. Government should encourage entry of ride sharing service providers like Uber and Ola. Alternatively, municipal corporations can also consider developing their own ride sharing platform to ensure efficient utilization of existing taxis.

**Stakeholders**
Department for Transport

**Timelines**
Short Term

#### 2.2 PPP for urban planning

**Solution**
- Undertake public private partnerships for urban planning and infrastructure, especially to gain access to capital and new technologies; improve efficiency of service delivery; and risk sharing – by providing incentives, preferential procurement terms, tax free investments, etc. to the private sector
- For disaster management, partner with local NGOs and international organizations for aid, disaster planning, relief efforts, etc.

**Stakeholders**
Ministry of Urban Development, Local Municipal Corporations, Nepal Centre for Disaster Management (NCDM)

**Timelines**
Medium Term

### Selected examples of smart urban infrastructure projects in Nepal:

#### Ncell initiatives in disaster management

In July 2016, NCell signed a Memorandum of Understanding (MoU) with the Department of Hydrology and Meteorology (DHM) to send early warning alerts through SMS to its customers living in areas with a high risk of flood and landslides, including West Rapti, Narayani, Kankai, Koshi, Bagmati, Karnali, Babai and Kamala River.

- DHM will provide the SMS content to Ncell, which will be triggered based on water level in rivers, following which Ncell will immediately send early warning SMS from short code
number based on the real time situation. After receiving message about the water level crossing danger level, people can move to government-designated safe locations, and once the water levels return to normal, SMS alerts will be sent again to inform the people that there is no immediate risk

The company also undertakes various steps in order to help disaster victims as part of its Corporate Social Responsibility (CSR) efforts. Some initiatives include:

- Contributed a total of NRs. 201 million and basic utilities, following the torrential rain triggered landslides and flooding in 2017
- Offered a bonus talk time to Sindhupalchowk’s flood and landslide affected customers

### Multi-level automated car parking system in Dharmapath and Teku

An automated parking system will be constructed in Kathmandu Metropolitan City within two years at the cost of NRs. 90 million under a public private partnership model

### TALENT AND SKILLS DEVELOPMENT

Illiteracy is a major challenge in the country, and may become a barrier for the effective implementation and operation of smart solutions in transport, water & sanitation practices, waste management and disaster preparedness. The government can consider the following projects:

#### 3.1 Disaster Management Training

**Solution**

Undertake training of government employees at all levels – central, state, district, and village in protocols, use of technology and emergency communications during disasters. Also provide training, drills and exercises to the military and police in rescue and search operations

- Allow participation of private sector and NGOs in training programs
- Promote greater awareness and sharing of best practices through conferences and workshops
- Leverage regional Emergency Operation Centers (proposed above) for imparting training

**Stakeholders**

Vocational and Skill Development Training Centre

**Timelines**

Long Term
Connectivity

**Digital Connectivity for Consumers**

Digital Connectivity situation in Nepal has improved considerably over the last 5 years, with exponential increase in access to mobile services. Mobile Connection and Mobile Internet Penetration in Nepal have almost doubled in between 2012-2017 with mobile penetration crossing 100%.

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2017</th>
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<tbody>
<tr>
<td>Mobile Penetration</td>
<td>60%</td>
<td>113%</td>
</tr>
<tr>
<td>Mobile Internet Penetration</td>
<td>21%</td>
<td>57%</td>
</tr>
</tbody>
</table>

Growth in mobile penetration in Nepal has been driven by significant investment made by leading mobile network operators in expanding their network footprint, and increasing affordability of mobile devices and services. Mobile operators have made significant investments in their data networks, with 3G network coverage in Nepal increasing from 25% in 2013 to reach 65% in 2017. Further, 2017 also witnessed rollout of 4G services from top three telecommunication operators in Nepal.

Source: Frost & Sullivan
However, fixed line and fixed broadband network in Nepal continues to remain underdeveloped with limited coverage outside large cities.

**ICT Sector**

ICT Sector, comprising on the Internet, telephone, mobile, IT-enabled services (ITeS) and business process outsourcing (BPO) is among the fastest growing industry in Nepal. ICT sector has a large role to play in driving socio-economic growth, as it has applicability in all sectors and potential to create large number of jobs. Due to its potential to transport the society, Nepal government has taken steps to liberalize the sector by allowing 100% FDI investment in ITeS & BPO sector, and 80% FDI in telecommunication sector.

Nepali outsourcing companies offer services at reasonable prices compared to other South Asian BPO companies like India, China and Philippines. There are more than 6,000 BPO companies in the country of which only 256 are legally registered as of 2017. Nepal offers distinct advantages as a BPO destination due to lower salaries / cost base and lower employee turnover. However, Nepal has not been able completely exploit potential of ICT sector.

**eGovernance**

Governments are typically one of the largest technology users in a country, and are therefore able to promote adoption and industry growth by delivering public services over digital. eGovernance and digitalization of public services has emerged as a key priority of Government of Nepal. Government of Nepal has undertaken several steps in this direction, as a result of which Nepal’s ranks on E-Government Development Index has improved from 165th in 2014 to 117th in 2018.

Source: UN

**Challenges in Nepal’s Connectivity Sector**
While Nepal has made great strides in rapidly expanding mobile and Internet connections, significant section of Nepali society continues to remain digitally un-initiated. Key challenges include:

- **Availability & Converge**: Almost 1/3rd of Nepal’s population is not covered by 3G networks while 4G networks covers less than 20% of population. Fixed broadband networks are only limited to the large cities
- **Lack of Digital Literacy**: High digital literacy, especially among the rural poor, creating digital divide
- **Lack of locally relevant, vernacular content** for Nepali speaking population
- **Limited Spectrum availability**: Nepal ranks 148th out of 167 countries (with a score of 12.06 out of 100) on Spectrum in GSMA’s Mobile Connectivity Index, 2017
- **High cost of broadband services**

In spite of rapid growth in mobile connections, Nepal continues to remain a follower in overall ICT development:

- ITU ranked Nepal 140th out of 176 countries in its ICT Development Index (IDI) for 2017
- GSMA ranked Nepal 137th out of 167 countries its Mobile Connectivity Index for 2017. GSMA Connectivity Index measures the strength of the enabling environment for connecting offline populations to the mobile internet

Low rankings in the ICT Development Index and Mobile Connectivity Index indicate considerable investment and focus is required in the Connectivity sector with regards to connecting digitally un-initiated population, increasing access and affordability of ICT services, providing digital education and increasing fixed broadband/fiber network.

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**2018 Digital Nepal Framework**

<table>
<thead>
<tr>
<th>Mobile Connectivity Index, 2017</th>
<th>Cluster</th>
<th>Index Score</th>
<th>Ranking</th>
</tr>
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<tbody>
<tr>
<td><strong>Singapore</strong></td>
<td>Leader</td>
<td>86.55</td>
<td>4</td>
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<tr>
<td><strong>Korea, South</strong></td>
<td>Leader</td>
<td>83.37</td>
<td>13</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td>Leader</td>
<td>80.04</td>
<td>21</td>
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</table>
Government of Nepal considers digital connectivity as an important driver for growth and is undertaking steps to expand internet connectivity as part of its vision of a Digital society that connects 90% of the population to broadband services by 2020. In line with this, in May 2018, Nepal Telecom Authority selected Subisu, a privately owned Nepali company focusing on cable TV and cable internet, to build Fiber-To-The-Home (FTTH) network in eight districts in Province 2 of Nepal.

Nepal Government’s ICT Policy 2015 intends to systematically enhance national ICT readiness. Key priorities of the ICT Policy include:

| Digital literacy skills to at least 75% of the population by the end of 2020 | Entire population of Nepal to get access to the Internet by 2020 | Offer online government services to 80% of citizens by 2020 |
| Universal broadband access to all people on an equitable basis. By 2020, 90% of the population to get access to the broadband services | Develop human resources in the ICT and related domain targeting critical skill areas | Promote e-Procurement as a means of driving transparency through government procurement processes |

Connectivity in Nepal: Pain Points, Priorities, and Digital Solutions

<table>
<thead>
<tr>
<th>Pain Points</th>
<th>Government of Nepal’s Priorities</th>
<th>Digital as an Enabler</th>
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<tbody>
<tr>
<td>Disparate availability and coverage of connectivity</td>
<td>The government set up the Rural Telecommunication Development Fund (RTDF) which includes four major projects:</td>
<td>• Incentivize mobile operators to improve footprint in remote areas with low ROI</td>
</tr>
<tr>
<td>Infrastructure development in urban and rural Nepal</td>
<td>• Building the District Optical Fiber Network program</td>
<td>• National</td>
</tr>
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</table>

Just four out of the 75 districts - Kathmandu, Bhaktapur, Lalitpur, and Kaski have the highest ICT penetration while districts in mid-western and far-

Source: GSMA

69 Nepal’s ICT Development and Broadband Policy, 2015
western regions and mountains in the north have the lowest penetration. Mobile phone ownership is significantly higher in urban areas and some rural areas are excluded from mobile or Internet coverage.

### Public Internet access
- Availability of public Internet access centers or cyber cafes is extremely limited and concentrated in urban cities. Even among the existing centers, quality of services is substandard with poor Internet speeds and lack of power backup.

### Coverage of 3G and 4G services
- Significant section of Nepali people are not covered by 3G/4G Services. Further, only 30% of the mobile connections in Nepal have high-speed internet (i.e. 3G & 4G).

### Low level of Digital Literacy
- Lack of digital literary and high illiteracy rates in Nepal limits ability of a large section of the society to reap benefits of the digital technologies.
- Digital illiteracy appears to start at a young age for underprivileged Nepali people as majority of schools and educational institutions located in rural villages lack basic computer

### Lack of vernacular content
- Limited mobile applications and phone content in local languages serves as a roadblock for digital adoption since a large proportion of the population living in rural areas cannot speak or understand English.

### Data Security
- Growing digital penetration and ICT Policy 2015 intends to:
  - Implement data security and protection standards

---

**2018 Digital Nepal Framework**

- Development of broadband infrastructure in 14 earthquake-affected districts
- Establishment of model e-village development committee
- Extending Internet services to 500 rural community schools & colleges
- Fiber/Broadband Network connecting important government establishments, municipalities, agriculture knowledge centers, etc.
- 5G for connecting disconnected, remote and rural communities in Nepal

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70 Shailesh Pandey and Nischal Regmi, “Changing connectivities and renewed priorities: Status and challenges facing Nepali internet, January 2018
71 GSMA Intelligence, Q4 2017, “Digital in 2018 in Southern Asia” report, January 2018; We are Social & Hootsuite
digitalization trend across industries has increased risk of cyber-attacks. Nepali people and businesses are facing growing threat from ransomware, data breaches, etc.
- Data security concerns in minds of consumers is also restricting growth of e-commerce and start-ups, as many people (especially older generations) are reluctant to share their financial details due concerns on online frauds
- Need for a comprehensive data security framework

### Underdeveloped BPO and ITeS sectors

- Growth of BPO and ITeS sector in Nepal is restricted by poor infrastructure, lack of technical talent, and limited foreign investment and government support.
- IT Services and BPO sector has been identified as one of nineteen sectors with the greatest export potential as part of Nepal Trade Integration Strategy (NTIS) 2016
- Strengthening IT infrastructure is critical for growth of BPO and ITeS sector
- Focus on IT education and training

### Promise of Digital Connectivity in Nepal

Internet and mobile connectivity forms the backbone of economic growth and employment generation, and creates an enabling environment for socio-economic transformation by improving income levels, empowering underprivileged communities and bridging the digital divide.

Strong inter-linkages have been seen in improvement in digital connectivity and economic growth. As per studies, every 10% increase in broadband penetration results in 1.3% increase in GDP. As result, it is critical for Nepal for undertake necessary steps to improve digital connectivity. Improving digital connectivity brings incremental value across the entire value chain by enabling new business models, job creation through BPO and ITeS industry, and improving quality of life through better access to information and services.

### Digital Initiatives Roadmap to Digital Connectivity in Nepal

Frost & Sullivan recommends following digital initiatives to address challenges of the Connectivity sector in Nepal:

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<tr>
<th>1</th>
<th>Technology and Infrastructure</th>
<th>2</th>
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<th>3</th>
<th>Talent and skills development</th>
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</thead>
<tbody>
<tr>
<td>• Internet - A Fundamental Right</td>
<td>• Public Wi-Fi Hotspots</td>
<td>• Digital Literacy Trainings</td>
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<td>• Improve Availability of Spectrum</td>
<td>• Digitally Streamlined PPP system for Digital Nepal initiatives</td>
<td>• Government Learning Platform</td>
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<td>• ICT in Education</td>
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Draft
• Take lead in 5G networks
• National Fiber Network
• High speed Internet connectivity for government establishments
• Nepal Cyber Security Center
• Special Economic Zones for ITeS/BPOs
• Government of Nepal App
• eGovernance 2.0
• Paperless Government and Collaboration
• Public Wi-Fi Hotspots

TECHNOLOGY AND INFRASTRUCTURE

Effective implementation of smart connectivity in Nepal with the aim of having a digitally connected nation will require an upgrade of infrastructure and technology, and universal connectivity on a countrywide level to reach even the remotest areas. Some key projects that the government may consider include:

1.1 Internet – A Fundamental Right

Solution

Internet – A Fundamental Right means that all people must be able to access the Internet in order to exercise their rights to freedom of expression and other fundamental human rights. It requires government to work to ensure that Internet access is broadly available and prevents it from unreasonably restricting an individual’s access to information and the Internet.

Several countries (including Costa Rica, Estonia, Finland, France, Greece and Spain) have adopted the Internet as a Fundamental Right. In most of these countries telecom operators must be able to provide every permanent residence and business office with access to a reasonably priced and high-quality connection with a downstream rate of at least 1 Mbit/s.

Stakeholders
Ministry of Communication and IT (MoCIT), Nepal Telecommunications Authority

Timelines
Long Term

1.2 Improve Availability of Spectrum

Solution

Strong correlation exists between availability of spectrum and quality of services. Nepal should focus on improving availability of spectrum as an enabler for better quality of services. Improving availability of spectrum in line with National Frequency Policy 2073 should be a key priority.
<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Ministry of Communication and IT (MoCIT), National Telecommunications Authority (NTA)</th>
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<tbody>
<tr>
<td>Timelines</td>
<td>Short Term</td>
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<tr>
<td><strong>1.3</strong> Take lead in 5G networks</td>
<td></td>
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<tr>
<td>Solution</td>
<td>Prepare Nepal for 5G telecom networks through a range of initiatives:</td>
</tr>
<tr>
<td></td>
<td>• Setting up a central committee for designing a roadmap for implementation, and deciding the stakeholders, timelines, pricing, etc.</td>
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<td></td>
<td>• Objective should be to take a lead in 5G, rather than a follower</td>
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<tr>
<td>Stakeholders</td>
<td>Ministry of Communication and IT (MoCIT), National Telecommunications Authority (NTA)</td>
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<td>Timelines</td>
<td>Medium Term</td>
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<tr>
<td><strong>1.4</strong> Expansion of Fiber broadband network</td>
<td></td>
</tr>
<tr>
<td>Solution</td>
<td>Construct high-speed fiber broadband that connects with international networks to improve latency and speeds</td>
</tr>
<tr>
<td></td>
<td>• Enable last-mile connectivity to bring FTTH networks to households and rural areas</td>
</tr>
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<td>• Replace and modernize current copper line with fiber broadband providing stable and high speed connectivity</td>
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<td>Stakeholders</td>
<td>Ministry of Communication and IT (MoCIT), National Telecommunications Authority (NTA)</td>
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<td>Timelines</td>
<td>Long Term</td>
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<tr>
<td><strong>1.5</strong> High Speed Internet Connectivity to government establishments</td>
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<tr>
<td>Solution</td>
<td>Ensure high-speed internet connectivity to all government establishments, municipal corporations, village development authorities, agriculture knowledge centers, hospitals, and education institution across the country. This can also be leveraged provide digital access to underprivileged sections of the society. For example, government can mandate opening of citizen cyber cafes in municipal corporations, village development authorities and agriculture knowledge centers to enable citizens to access Internet services free of cost.</td>
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<tr>
<td>Stakeholders</td>
<td>Ministry of Communication and IT (MoCIT)</td>
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<tr>
<td>Timelines</td>
<td>Short Term</td>
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<tr>
<td><strong>1.6</strong> Nepal Cyber Security Centre</td>
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<tr>
<td>Solution</td>
<td>Establish Nepal Cyber Security Centre for providing advice and support</td>
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Draft
for the public and private sector in how to avoid computer security threats.

It should be responsible for Nepal’s cyber security, with primary focus on securing government networks, protecting critical national infrastructure, and assisting businesses and citizens in protecting their own systems.

**Stakeholders**  Ministry of Communication and IT (MoCIT)

**Timelines**  Medium Term

### 1.7 Special Economic Zone for IT sector

**Solution**  Government of Nepal should consider creating Special Economic Zones in order to promote BPO and ITeS services. Government can consider giving special tax incentives (e.g. 3 year tax holidays) to organizations opening new ITeS and BPO businesses in these areas.

**Stakeholders**  Ministry of Communication and IT (MoCIT), Ministry of Finance, Ministry of Urban Development

**Timelines**  Medium Term

### 1.8 Government of Nepal app

**Solution**  Government of Nepal should launch one single umbrella app, which integrates app developed by all government departments and bodies. This app should act as an aggregator of all services provided by Government of Nepal, local governments and municipal bodies.

**Stakeholders**  Ministry of Communication and IT (MoCIT), Prime Minister's Office, All other ministries and departments

**Timelines**  Short Term

### 1.9 eGovernance 2.0

**Solution**  Government of Nepal has made considerable progress in eGovernance over the last few years, as reflected by improvement in E-Governance Development Index rankings. However, most government websites and app are interactional in nature providing services like online form submission, queries and correspondence, download forms, send emails to the concerned authority, ask query etc.

In the next phase of e-Governance, government needs to focus on moving from interactional services to transactional services, which enable citizens to make online secure payment, automate most tasks, and eliminate need for citizens to physically visit government departments, where possible.

**Stakeholders**  Ministry of Communication and IT (MoCIT), Prime Minister's Office, All other ministries and departments

**Timelines**  Medium Term
### 1.10 Paperless Government and collaboration

**Solution**
Government of Nepal should digitalize all internal and external processes in order to emerge as a Paperless Government. The program, led by MoCIT, should be supported by all other government departments. Government departments can establish multi-functional task force for identification and digitalization of processes in a time bound manner.

As a part of these program, the government should consider leveraging various collaboration tools and solutions (such as HD video conferencing, instant messengers, cloud based productivity apps) to ensure better inter and intra department collaboration.

**Stakeholders**
Ministry of Communication and IT (MoCIT), Prime Minister's Office, All other ministries and departments

**Timelines**
Medium Term

### 1.11 Public Wi-Fi Hotspots

**Solution**
Set up Wi-Fi hotspots via PPP route in public places in cities, which offer free basic internet services (say 1 hour of internet browsing per day, and chargeable at a nominal rate beyond the limit)

- Connect these hotspots in key public areas, including tourist spots, airports, railway stations, markets, and educational institutions

**Stakeholders**
Nepal Telecommunications Authority, Ministry of Communication and Information Technology (MoCIT)

**Timelines**
Long Term

### ENTREPRENEURSHIP/PUBLIC-PRIVATE PARTNERSHIPS

### 2.1 Kathmandu Digital Hub

**Solution**
Ministry of Communications and IT (MoCIT) and Department of Education can collaborate to develop Kathmandu Digital Hub. The objective of the Digital Hub should be to foster development of digital start-up ecosystem.

The Digital Hub can emerge as a platform for enable start-ups to have access to high-speed broadband and fiber optic connectivity, funding (both private and government), research and development facilities, collaboration with Kathmandu University and other education institutes, etc.

**Stakeholders**
Ministry of Communication and Information Technology (MoCIT), Department of Education

**Timelines**
Medium Term

### 2.2 Digitally Streamlined PPP System
Solution

Digitally streamlined PPP application processes to create a conducive environment for the mobilization of private sector and foreign investment for Digital Nepal framework.

The Portal should contain details of shortlist Digital Nepal initiatives and invite participation from private sector players and foreign companies. It should be positioned as single window that enables all interactions with external parties including proposed solutions, invitation of bids, shortlisting of projects, etc.

Stakeholders

Ministry of Communication and IT (MoCIT)

Timelines

Short Term

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**Case Study - Global GiGA Island Initiative: Digital Bangladesh**

*Korea Telecom (KT)’s ‘GiGA Island’ is a corporate CSR initiative that aims to enhance the quality of life and provide better access in terms of education, culture, and healthcare for people who live in remote areas, such as highlands and islands, by providing high-speed internet and ICT solutions.*

*Moheshkhali is a small island located in the southeast part of the Bay of Bengal with a total population of 250,000. Due to geographical limitations and a poor telecommunications environment, the residents of the island had limited access to public services including education, medical services, and information.*

*KT connected the Moheshkhali Island to the inland areas by installing the wireless network technology ‘GiGA Microwave’ and used copper-based KT’s providing giga-level internet solution ‘GiGA Wires’ to circulate network traffic within the island. With the ‘GiGA Microwave’, the island could successfully receive 500Mbps internet service, and the ‘GiGA Wire’ enables the island’s internet speed at the most 100Mbps. This enabled more than 30% of the residents in Moheshkhali to communicate with the world through high-speed internet.*

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**TALENT AND SKILLS DEVELOPMENT**

**3.1 Digital Literacy Trainings**

*Consider PPP route and partnerships with local & international NGOs for providing digital literacy trainings to digitally un-initiated sections of the society. Government can encourage these NGOs to leverage training centers, computer labs and citizen cyber cafes in government departments and educational institutions to provide digital literary trainings for a nominal fee / free of cost.*

**Stakeholders**

Ministry of Communication and Information Technology (MoCIT), Ministry of Education

**Timelines**

Long Term

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**3.2 Government eLearning Platform**

*Making public servants digitally-ready will be essential for success of Digital Nepal program. MoCIT should take lead in developing a*
Government eLearning Platform, which can also be leveraged by other government departments for providing digital/online trainings to their employees.

MoCIT should develop the centralized platform, which can be then used by the IT and training teams of the respective departments for creating training modules relevant for their needs.

Stakeholders: Ministry of Communication and Information Technology (MoCIT)
Timelines: Short Term

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<tr>
<th>3.3 ICT in Education</th>
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<td><strong>Solution</strong></td>
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<td><strong>Stakeholders</strong></td>
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<td><strong>Timelines</strong></td>
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</table>
Government of Nepal needs to focus on the following priority areas to create an enabling environment for the success of Digital Nepal initiatives:

**Technology and Infrastructure**

A robust ICT infrastructure and supporting eco-system will be the backbone of Digital Nepal program. Government of Nepal needs to undertake initiatives for driving digital adoption and facilitating the establishment of a reliable ICT infrastructure through public-private partnerships.

**Digital Connectivity needs to be a key priority**

Nepal has witnessed considerable improvement in digital connectivity during the last few years driven by rapid adoption of mobile Internet. However, it continues to lag behind its neighbors and developed economics on overall development of ICT sector.
As a result, strengthening digital connectivity needs to be a key priority for Government of Nepal. Frost & Sullivan recommends following actions in order to improve digital connectivity:

- Make Internet access a fundamental right for every citizen
- Improve availability of spectrum to the operators to enhance service coverage and quality
- Take leadership in driving 5G adoption in South Asia
- Establish a nationwide fiber network

**Facilitate development of a robust financial ecosystem**

Digital payments and financial transactions, conducted through smartphones and other mobile devices are now a vital cog in modern financial infrastructure. A strong digital finance eco-system can facilitate evolution of new business models and digital start-ups thereby generating new job opportunities and enabling faster economic growth. Further, digital financial services have the potential to give a big boost to financial inclusion by providing financial services to people hitherto cut off from the same.

Nepal has an underdeveloped financial eco-system with low penetration of digital finance services. As a result, facilitating developing of a robust financial ecosystem needs to be a priority of Government of Nepal. Possible actions in this direction include:

- Encourage digital payments
- Encourage investments in Fintech by encouraging the growth of startups and telecom companies to offer services to drive financial inclusion

**Entrepreneurship/PPP**

Digital Nepal program would require significant investments, which the government alone cannot provide. Public private partnership and foreign investments would need to play a major role in Digital Nepal by bringing technological expertise and capital infusion for sustainability and scalability of the program.

Government of Nepal should initiate necessary policy interventions to encourage private sector participation in the Digital Nepal program. Nepal could consider taking the following steps to improve the ease of doing business in priority areas:

**Private Sector Participation**

Private sector participation would be crucial for success of Digital Nepal program. Possible actions include:

- Rollout a digitally streamlined PPP application system for the mobilizing private investment in Digital Nepal program
- Consider offering Tax-holidays for investment in critical areas (e.g. companies focusing on Smart Health in remote rural areas can be given 3 year tax holiday)
- Start-up accelerator program to build a strong ecosystem for nurturing innovation and entrepreneurship in tackling key challenges and generating large-scale job opportunities

**Foreign Investments**

Government of Nepal can take steps to encourage foreign investments in the Digital Nepal initiatives. Foreign investment can also help Nepal in cross leveraging skills and insight from similar initiatives undertaken by foreign investors in other parts of the world. Possible actions to attracting foreign investments in Digital Nepal program include:
Fast-track FDI applications for Digital Nepal initiatives through a single window system
Consider increasing FDI limits and easier repatriation of funds (e.g. 100% FDI for Digital Nepal initiative)

**Talent and Skills Development**

Digital Nepal program intends to open several opportunities for socio-economic growth by addressing challenges in various sectors and enabling Nepal to enter into an era of high economic growth. However, investment in enhancing digital skills of Nepali people is critical for Nepal to reap real benefits of Digital Nepal program.

Government of Nepal needs to focus on the following areas:

- Invest in digital education
- Digital skills training of public servants

**Improve Digital Education**

Government of Nepal can consider following steps in order to enhance digital skills of Nepali people:

- Compulsory IT education for schools and colleges
- Systematically strengthen Nepal’s education system’s capacity for imparting advanced ICT education
- ICT Literacy programs aimed at combating digital exclusion in rural communities and underprivileged Nepali people

**Digital skills training of public servants**

Making public servants digitally-ready will be essential for success Digital Nepal program. Government should ensure establishment of IT training teams in all government departments for imparting digital training to its employees. Further, the Government can consider leveraging proposed National eLearning Platform to train its employees on new systems and technologies been introduced in their respective departments.
About Ministry of Communication and Information Technology

The Ministry of Communication and Information Technology (MoCIT) was established in the year (2049BS). The Ministry widely covers postal services, telecommunications, broadcasting, press and information, and film development. With the objective to develop and expand the information & communications sector up to rural level in the form of infrastructure for social and economic development through wide spread participation of the private sector as well with emphasis on the dissemination of information and communication technology.

www.mocit.gov.np

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“We Accelerate Growth”

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