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Nepal

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Total population	25,886,736 (Central Bureau of Statistics)
GDP per capita	PPP USD 1,500 (as of January 2007) (CIA World Fact Book 2007)
Key economic sectors	Agriculture, Tourism
Fixed-line telephones per 100 inhabitants	2.46
Mobile phone subscribers per 100 inhabitants	4.03
Internet users per 100 inhabitants	0.19
Domain names registered under .np	10,062 (as of February 2007) (Mercantile Communications)
Internet international bandwidth	37 Mbps uplink and 90 Mbps downlink (as of February 2007)

Overview

Political and social instability in Nepal slowed down the development of ICT in the country in 2006–07. Nevertheless, a landmark event in this period has been the localization of computing. Nepalese whose access to computing was restricted by language barriers can now use computers and the Internet in the Nepali language. They also have a choice of two operating systems in Nepali—MS Windows and Linux.

Recent developments in nationwide connectivity through optical backbone cabling and incremental growth in teledensity likewise bode well for the development of the ICT sector in Nepal. The liberalization of the telecom sector is expediting growth and improvement in the quality of ICT services and resulting in some price reduction. Nepal also stands to benefit from optical cable linking with its neighbouring countries. To provide the rural areas with basic telecommunication facilities is the rural VSAT project and the establishment of telecentres through multi-stakeholder partnerships. The recent de-licensing of Wi-Fi bands for public use is also expected to facilitate the deployment of wireless networking to the rural areas.

However, there is an urgent need to revise Nepal's IT Policy, the blueprint for attracting foreign investments in ICT. It is also necessary to address emerging issues such as use of open source software, human resource development, e-commerce, ICT for development, cyber security, VoIP, and the like.

Technology infrastructure

Lack of connectivity still prevents many Nepalese from reaping the benefits of ICT. However, some recent developments in nationwide connectivity and infrastructure are encouraging.

The optical fibre network and the Asian superhighway

The government, through Nepal Telecom (NT), has completed the first phase of the East-West Highway Optical Fibre Project that will build the optical fibre backbone for telecom services. This has substantially upgraded the reliability and quality of long-distance calls within Nepal and between Nepal and India. Phase I of the Project covers a distance of 850 km from Bhadrapur to Lamahi and from Kholapur to Nepalgunj. Phase II aims to cover 900 km from Birtamod to Kakarvitta and from Lamahi to Mahendranagar. Completion of both phases means that Nepal will be connected to India through fibre links via different connecting points and the country will have an optical fibre backbone from east to west. Several points have recently been hooked up and aligned with India's leading service provider. The completion of this ambitious project will also make Nepal part of the Asian Information Superhighway, a cheaper and more reliable alternative to existing satellite communications.

Funding for the fibre optic project comes mostly from the Indian government. But Nepal Telecom is receiving grant assistance from the Chinese government for the optical fibre project along the 115 km long Arniko Highway linking Kathmandu to Khasa, which borders China. China is already laying optical fibre cables from Beijing to Lhasa and there are plans to extend the cables from Lhasa to Khasa. When the Arniko Highway project is completed, Nepal will be connected to the information superhighway between Nepal and China. Since Beijing is already connected to Hong Kong via cable, then Nepal shall also be connected to Hong Kong, one of Asia's communication gateways to the rest of the world. This gives Nepal an alternative

route for international communication links, besides the existing satellite.

Efforts should be made to link the Arniko Highway Project and the East-West Highway Optical Fibre Project, in order to link the software cities of India like Bangalore and Hyderabad, to the hardware centres of China like Beijing and Shanghai. Nepal will thus become a transit state for trade and communication between China and India, two giant economies. Nepal stands to reap huge revenues from this development, as Nepal's policymakers must have realized when they undertook these projects. At the very least, with the completion of the Arniko Project, Nepal Telecom should be able to provide 24-hour high-speed information access to Nepal's first and only Information Technology Park in Banepa, which links Bangalore and Beijing.

Nepal rural VSAT project

The extension of infrastructure services to rural areas where the majority of the poor reside is an important goal. A key effort in this regard is the rural VSAT project that aims to connect 1,000 Village Development Committees (VDC) in the mountainous regions where other modes of telecommunications are not possible, to the national telephone network. Each VDC will have two telephone lines via solar-powered VSAT technology. Started in 2002, the project shall be completed in 2007. The VSAT phone lines are used as a public call office (PCO) or phone shop and effectively link remote rural mountain people to the lowlands.

There is also a special rural operator, STM Telecom Sanchar (P) Ltd., licensed to provide telecom facilities to 534 villages in the Eastern Development Region using VSAT technology.

Expansion of fixed-line services nationwide with CDMA

Nepal Telecom aims to provide on-demand telecom connections throughout the country through the addition of one million fixed-lines in five stages. This is in accordance with the aim of improving the fixed-line penetration to 4 per cent by 2007 and 20 per cent within the next six years. Using a wireless facility based on CDMA technology, Nepal Telecom recently launched a Limited Mobility service in Kathmandu. This will be gradually extended throughout the country. With its average data throughput of 120 Kbps, data users should find CDMA-based services attractive.

Enabling policies and programmes

ICT development in Nepal continues to be based on two policies, the IT Policy of 2000 and Telecommunication Policy 2004. Both have been extensively discussed in the 2003–04 and 2005–06 editions of the *Digital Review of Asia Pacific*. At this point, suffice it to say that a more realistic policy needs to be developed.

The High Level Commission on IT (HLCIT) has produced a draft IT policy with the following vision:

> By the year 2015, Nepal will have transformed itself into a knowledge-based society by becoming fully capable of harnessing information and communication technologies and through this means, achieving the goals of good governance, poverty reduction and social and economic development.

Given the dynamic developments in ICTs and the new opportunities they bring for the country's overall development, there is an urgent need for the draft IT policy to be finalised, endorsed and implemented.

The adoption of Telecommunication Policy 2004 was a strategic move to liberalize the telecommunications sector by promoting private sector participation and competition in all market segments for the purpose of broadening access to telecommunications facilities in the country. At present there are several operators in important market segments—fixed-line and wireless local loop, mobile, rural connectivity and value added services. The policy of promoting competition is bearing fruit. For example, getting a telephone connection is not as difficult as it used to be. The telecommunication sector kept the country going despite political instability and incessant conflicts, although it was not spared attacks on infrastructure by rebel groups and disruptions in service by the previous government. The cost for users has come down due to competition among telecommunication service providers. However, more needs to be done to ensure that telephones and telecommunications in general become inclusive tools for the common people rather than a luxury for the rich.

Legal and regulatory environment

The Nepal Telecommunications Authority (NTA) oversees the development of telecommunications and the Internet. It plays a key role in effective interconnection regulation, which is necessary to ensure the twin goals of maximizing the productivity and efficiency of rapidly growing networks, and extending these networks to those who cannot enjoy them and thus bridging the gap between technology haves and have-nots.

Nepal has recently moved a step further with the promulgation of the much discussed Electronic Transaction Act, also widely known as the Cyber Law, which legalizes all electronic transactions and digital signatures. Computer and cyber crimes,

such as hacking, piracy and fraudulent activities, have also been defined and penalties set accordingly. The new law should facilitate business processes and it is important that it is put into practice.

VoIP has not yet been legalized in Nepal. Recent moves to deregulate the frequency bands used by Wi-Fi could help make VoIP free and legal in the country. IP-based networks are increasingly being used as alternatives to traditional telephone networks in other countries, and VoIP should be seriously considered for the growth of the country's ICT sector.

Security

In Nepal as in other countries, Internet service providers (ISPs), business process outsourcing (BPOs) and the banking industry are the most sensitive to ICT security issues, as security breaches can cause them severe damage. Majority of Internet users are dependent on the security of ISPs. Corporations have their own security system, mainly in the form of a firewall against intrusion, hacking, viruses and spam. In government offices, the only means of protection is antivirus software, which is not enough.

Corporations, banks and ISPs also understand security issues from the point of disaster recovery. Because Nepal is in an earthquake-prone belt, all ICT assets need to be protected from natural disasters. Thus, the bigger business houses and banks have security mechanisms ranging from backing up of data on tape/disk to database replication and having a dual system, such as a mirror site or an offshore backup centre.

Security is another important area for IT policymakers and government to think about. The security and safety of various ICT platforms in government offices must be given priority consideration before any e-governance base is made fully functional. This assumes the adoption and use of security measures, including empowering law enforcers and the judiciary with knowledge of cyber forensics and digital evidencing.

ICT industries

Hardware and software

There is still very little hardware production in Nepal. Mercantile and Beltronix are the only two companies offering branded computers under their name. Both are ISO 9001 certified. There are however, plenty of local companies assembling computers from imported parts.

Some software companies are producing good quality software and even catering to the international market. Still, the software industry in Nepal is not growing as rapidly as envisaged. Experts are urging the Computer Association of Nepal (CAN) to establish a separate cell under it to more effectively address the problems confronting the software industry. Software companies are in need of basic policy guidance, support for starting software businesses and nurturing entrepreneurs, R&D and marketing, promotion of software developed in country, international cooperation and software certification.

IT-enabled services

Some IT-enabled services are finally transforming Nepal into a global outsourcing centre. They are not only contributing to the country's foreign currency earnings but also providing jobs to the youth and unemployed.

Serving Minds and D2Hawkeye are two local companies that have broken into the BPO scene, proving that the Nepalese can compete with better-known businesses in other countries in serving clients in a globalized economy. Serving Minds is a call centre located in Kathmandu. It is now one of the largest employers of Nepali graduates. Starting with only a few employees in 2003, it hopes to have 1,000 staff members by 2007. D2Hawkeye Services is an offshore centre for D2Hawkeye, a premier medical data-mining company that provides decision support, builds fully integrated medical and financial databases for its clients, and leverages these databases with applications that are relevant to clients. In three years, the company grew from three to over 50 computer engineers. It is the largest software company in Nepal.

There are other IT-enabled companies in Nepal that are offering services to clients in the USA and Japan. They are working in the areas of medical transcription, digitization of maps and call centres, like the newly established Link Tree Pvt. Ltd. This sector needs to be developed further with appropriate policies, as it not only brings in foreign exchange for Nepal but also provides employment on a mass scale.

Telecom sector

Fixed-line telecom service is growing more slowly than mobile telecom service. There are currently two operators providing fixed-line service—Nepal Telecom (NT) and United Telecom Limited (UTL). NT, with a market share of 88 per cent, provides PSTN as well as wireless local loop (WLL) services, while UTL provides only WLL services. The fixed-line penetration rate as of February 2007 is 2.46 per cent.

NT and Spice Nepal Pvt. Ltd. are licensed to operate mobile GSM telephone services. NT's mobile phone subscriber base has reached 690,369. Spice Nepal has a subscriber base of 351,450 as of February 2007. The mobile customer base is growing rapidly, thanks to the prepaid mobile scheme which has already

crossed the 933,052 mark and with the demand both inside and outside Kathmandu Valley still growing. Spice Nepal Pvt. Ltd. is extending its service to other districts as well. NT already has mobile service presence in 40 of 75 districts in Nepal.

NT is exploring use of CDMA technology to improve the quality and capacity of its mobile phone services. The company will be able to provide one million lines of mobile phones with the full implementation of CDMA. NT has already introduced multimedia messaging (MMS) services as well as Global Positioning Radio System (GPRS) services.

As of February 2007, teledensity in Nepal was around 6.48 (2.46 for fixed-line, including WLL and Limited Mobility service, and 4.03 for mobile). Mobile teledensity in 2002 and 2004 was 0.09 and 0.42, respectively, and fixed-line teledensity in the same period was 1.42 and 1.64, respectively. Lately, mobile teledensity has overtaken fixed-line teledensity.

Internet service providers

There are currently 39 licensed ISPs, of which 32 are operating in Kathmandu Valley. It is hoped that Internet services will be expanded to areas outside of Kathmandu Valley in the near future. There are around 50,000 active Internet subscribers in the country. However, the number of Internet users could be higher since many people access the Internet in offices and cybercafés.

Thirteen ISPs are currently connected to NPIX (Nepal Internet Exchange), which is owned by ISPAN (Internet Service Providers Association of Nepal). The international bandwidth used as of February 2007 for uplink and downlink is 37 and 90 Mbps, respectively.

Key ICT4D institutions

The key government institution coordinating ICT developments, including ICT for development (ICT4D), is the High Level Commission for Information Technology (HLCIT). It provides crucial strategic direction and helps formulate appropriate policy responses for the development of the ICT sector.

There are few institutions focusing fully on ICT4D in Nepal. Many seem to be counting on telecentres as a medium for development in the rural areas.

The Forum for Information Technology Nepal (FIT Nepal) (http://www.fitnepal.org.np/) is an NGO founded by a group of IT enthusiasts to promote ICT as a tool for development. FIT Nepal strives to bring the benefits of ICT to rural and marginalized communities by establishing community centres and through capacity building programmes.

Swaabhimaan is an alliance between government, civil society organizations, and public and private agencies. Its mission is to create a knowledge revolution in Nepal through some 1,500 telecentres. Swaabhimaan is an offshoot of Mission 2007 in India, a civil society-led nationwide initiative launched in July 2004 with the motto, 'Every Village a Knowledge Center'.

E-Networking Research and Development (ENRD) is an NGO operating from Kathmandu. It has been working closely with the Nepal Wireless Networking Project since 2005, helping to de-license Wi-Fi bands in Nepal. ENRD organizes basic computer education and hardware training programmes for villagers.

Nepal's Rural Education and Development (READ), an NGO based in Kathmandu, is providing no-cost public access to computers and the Internet and is committed to promoting information and literacy.

International and regional organizations like the International Centre for Integrated Mountain Development (ICIMOD), South Asia Partnership—Nepal (SAP), PANOS South Asia, BELLANET, Mountain Forum and the One World through Open Knowledge Network (OKN) initiative are also engaged in ICT4D in Nepal through knowledge sharing, diversification of knowledge delivery, including multimedia and radio, and creation of online communities.

Online services

e-commerce

Until recently the development of e-commerce was hampered by the absence of an Electronic Transaction Act. Moreover, most Nepalese do not have credit cards, connectivity in Nepal is low and few people have ready access to the Internet. Nevertheless, a number of businesses, such as munchahouse.com.np and nepalshop.com, provide e-commerce services by accepting and delivering orders through shops in Nepal, supported with offline payment. There are also full-fledged e-commerce-enabled websites where the payment function is based outside of Nepal and only the delivery of product is managed within the country.

e-governance

The government portal (http://www.nepal.gov.np) provides information on government activities and services. However, there is a need to go beyond providing information

to enabling online transactions such as payment of bills and e-procurement.

The government has been preparing an e-Governance Master Plan. E-governance is envisioned to reduce costs and to improve public service delivery. However, government officials will need to be reoriented and trained in e-governance. In line with the government's thrusts, the Asian Development Bank (ADB) is programming a loan assistance package for electronic public service delivery particularly in rural and semi-urban areas.

Digital content initiatives

Much of the digital content produced in Nepal is Web-based and English is the dominant language. The topics are usually tourism, news and media, culture, arts, entertainment, business, government, banking and finance, health, education and information technology. There are online directories and yellow pages. The tourism industry, a major economic sector in Nepal, has a strong Web presence.

Many government ministries and departments are putting up their own websites. Many of these are in English and, as mentioned previously, most are limited to providing information. Moreover, the URL for the government portal, which is managed by the National Information Technology Centre (NITC), is a cumbersome www.nepal.gov.np, instead of a more straightforward http://gov.np.

Most English language newspapers in Nepal have an online presence. News and current affairs are still the most sought after content. However, content in specialized areas is also surfacing. For example, Nepali journals will soon be available online. The International Network for the Availability of Scientific Publications (INASP) is working with the Central Library of Tribhuban University to establish an online platform for Nepal journals. Also, a network for sharing of programme content is helping Nepal's FM stations connect better. FM radios outside Kathmandu Valley are using the Internet, and wireless and other new media technology, to share six hours a week of audio software produced from a central hub. ICIMOD via menris.icimod.net is facilitating access to digital spatial content through Web mapping and using well-defined metadata, thereby reinforcing cooperation among digital content stakeholders. Moreover, the Nepal Bar Association makes Supreme Court decisions available to appellate and district courts through a website and periodic publication of case compendia on CD-ROM.

A big gap in digital content production is in local language publishing. Few newspapers in Nepali languages are online. The problem stems partly from the lack of support for local language computing. The recent landmark breakthroughs in Nepali computing, including support for Nepali Unicode (see the section 'Research and development in ICT'), should stimulate development of Nepali content.

Open source and open content

The development of NepaLinux was a significant contribution to the promotion of free and open source software (FOSS) and computing in Nepali and other native languages in the country. NepaLinux seems to be user-friendly. But because Linux is still relatively unknown to most Nepali desktop users, there is a need to popularize its use. A policy promoting open source software or content is also needed.

It is also time to discuss and experiment with the open content approach to fostering open and collaborative content development and dissemination.

Education and capacity building

The majority of ICT personnel (69 per cent) are in Kathmandu Valley. According to a CAN survey conducted in October 2005, females comprise 18 per cent of the total IT workforce. Almost 44 per cent of the workforce has qualifications in IT-related fields. Still, most ministries and government agencies lack IT human resources to meet technical capacity. There are few ICT-related positions in the civil servant career path, making it difficult to attract technicians to the government sector.

There are high-quality educational programmes in ICT that can turn out well-trained graduates. But the number of such graduates needs to be substantial, in order to sustain the ICT industry.

Nepal has four universities—Tribhuwan Univeristy, Kathmandu University, Pokhara University and Purbanchal University—offering several IT-related courses through their affiliate colleges. These include the Bachelor of Computer Engineering (BE), Bachelor of Engineering in Information Technology (BEIT), Bachelor in Computer Application (BCA), Bachelor in Computer and Information Systems (BCIS), Bachelor in Information Technology (BIT) and Bachelor in Information Management (BIM). Each of the courses has its own objective and intake stream. Some courses are more oriented to engineering (for example, BE, BEIT), some are a mixture of management and ICT (for example, BCIS, BIM), while others are focused on ICT applications (for example, BCA, BIT). The important characteristics of these courses are that they are imparting current trends in ICT, targeting a range of students and preparing students for a rewarding career in ICT. The total intake is about 6,000 students per year, of which 50 per cent graduate.

There are a few advanced courses in ICT, such as the Master in Computer Applications (MCA). Students seeking Master-level courses in IT can also study abroad. But the requisite ICT training is available within Nepal itself and at a lower cost.

Another 1,000 students complete their ICT studies in neighbouring countries, in particular India, Bangladesh and the Philippines, and then return to Nepal. Around 4,000 ICT graduates are produced each year. However, this number exceeds the number of ICT jobs available. Although there are job opportunities in the international market for ICT professionals, the discrepancy between supply and demand with respect to ICT graduates and jobs in the domestic market needs to be addressed by both IT policy and education policy.

Apart from the formal ICT courses offered by the universities, computer learning centres and training institutes, which have mushroomed all over the country, offer short courses on a wide variety of computer software use and applications, including certifications of internationally recognized courses like Microsoft Certified Professional (MCP), Microsoft Certified Systems Engineer (MCSE) and Cisco Certified Network Associate (CCNA). These are significant value additions to the development of human resources in ICT in Nepal. According to the CAN survey in October 2005, 28 per cent of the total ICT workforce work as trainers and instructors in these training institutions.

Research and development in ICT

A landmark development in the ICT scene in Nepal in recent years has been in the area of localization. Nepalese who were unable to use computers due to language barriers can now use computers not just for word processing but also for database, spreadsheet, layout, Internet and e-mail. They also have two alternatives to choose from—Windows XP or Linux. Microsoft, in collaboration with Unlimited NuMedia, released the Nepali Language Interface Pack for WindowsXP and Microsoft Office 2003. Almost at the same time, Madan Puraskar Pustakalaya (MPP), a not-for-profit NGO that maintains the principal archive of books and periodicals in the Nepali language, unveiled the all-Nepali Linux, called NepaLinux.

NepaLinux is a complete operating system in Nepali developed over three years under the PAN Localization project with the support of IDRC of Canada. A Nepali spell checker and thesaurus are also integrated in the OpenOffice suite and is available in the NepaLinux package.

MPP further proved its commitment to expanding use of NepaLinux by coming out with a new release in November 2006. Microsoft for its part has decided not to charge any license fees for the use of the localized editions of the new product, which has been under development for the last one and half years.

Another significant R&D output is the development of Dobhase, a Web-based machine translator that translates text in English to Nepali. Dobhase, which literally means interpreter, is the product of an 18-month project of the Information and Language Processing Research Lab of Kathmandu University in partnership with MPP. The project was funded by the PAN (Pan Asia Networking) ICT R&D grants programme. More needs to be done to achieve accurate translations and the two partners are working to refine the current software by expanding the lexicon size and incorporating a facility for translating text in Nepali to English.

Conclusion

The historic signing of a peace agreement between the Nepalese government and the Maoists could finally lead the country to peace and stability. It is hoped that this will also lead to the desired development of the ICT sector. There is no dearth of specific recommendations in reports and workshops, including this review. What is needed above all is the willingness to implement these recommendations based on a commitment to ensure the growth of the ICT sector within the changed political reality of a new Nepal.

References

Computer Association of Nepal (CAN) Website. Available at http://www.can.org.np

Dobhase English-Nepali Translator Project Website. Available at http://nlp.ku.edu.np/cgi-bin/dobhase

High Level Commission on IT (HLCIT) Website. Available at http://www.hlcit.gov.np

Internet Service Provider Association of Nepal (ISPAN) Website. Available at http://www.ispan.net.np

IT Professional Forum Website. Available at http://www.itpfnepal.org

Madan Puraskar Pustakalaya Website. (2003). Available at http://www.mpp.org.np

Ministry of Information and Communication Website. Available at http://www.moic.gov.np

Ministry of Science and Technology Website. Available at http://www.most.gov.np/

Nepal Telecom (NT) Website. Available at http://www.ntc.net.np

Nepal Telecommunications Authority (NTA) Website. Available at http://www.nta.gov.np

Nepal Telecommunications Authority (2007). *MIS report*, February.