



Bhutan

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Overview

ICT has played an important role in speeding up socioeconomic development in Bhutan. Radio broadcasts on development issues reach 90 percent of Bhutanese homes today, providing information on the latest farming methods and treatments for cattle diseases. Almost one in five literate Bhutanese reads *Kuensel*, the weekly national newspaper. There are an average of about 3 telephones for every 100 people. Computers and the Internet are increasingly used in workplaces, bringing people closer to the World Wide Web of information. All this development would not have been possible without the timely establishment of the ICT infrastructure in the country. Bhutan now has access to good broadcasting, telecommunications, Internet and printing facilities; and every sector of the economy has started exploiting the benefits of computers and networks.

ICT is gradually helping to improve the quality of life. E-education, telemedicine, and agricultural information networks all hold much promise for the development of the country. E-government initiatives that are underway should bring about more efficient and transparent governance. At the same time, ICT is facilitating and strengthening recently introduced democratic processes in the country. The development of the Bhutanese font, Dzongkha, undertaken with the assistance of IDRC, will boost the use of ICT.

Unlike the public sector, awareness of the potential of ICT is low in the expanding private sector, which makes minimal use of the new technologies. But the situation is improving, and soon the private sector is expected to tap the full benefits of these technologies. The potential is immense: tourism can be promoted online, work productivity may be raised and, with appropriate training, the large numbers of unemployed youths have the option of going into innovative ICT businesses. Financial institutions need to urgently revamp their operations if they are to play an effective supportive role in growing the national e-economy and to catch up with the international financial sector. There is also an urgent need for policies that will facilitate ICT use by the private sector.

Indicators 2003

Telephone main lines per 100 inhabitants	3.4
Mobile phones per 100 inhabitants	1.1
TV equipped households per 100 households	3.1*
PCs per 100 inhabitants	1.4
Internet users per 1,000 inhabitants	20.4

* For year 2002

Source: *Monitoring the Digital Divide*. © Orbicom 2004

The most urgent and important concern today relates to the affordability and accessibility of ICT services. Bhutan's Internet connection costs may not be the highest in the world, but the hourly rate for Internet access is currently almost double the hourly wage of most office workers. Surveys found that the private sector is keen to make use of the Internet but is deterred by the high access fees. High costs are also discouraging IT training and awareness-building programmes from making use of online resources. There is therefore a need for a policy supporting universal access to ICT services.

Local online content

The first Bhutanese website in Dzongkha, the national language, was launched on 9 January 2004 by the Centre for Bhutan Studies (<http://www.bhutanstudies.org.bt/index-dz-a.htm>). Although the site does not contain much local content now, it is expected to play a leading role in the continued development of websites in Dzongkha. The initiative is hampered by low technology and the lack of a standardised font in the national language. Visitors to the website will notice that the pages are made up of large image files imported into HTML tags. This is not an ideal way, but it seems to be the best available option for the moment.

A number of websites were launched in 2003 to cater to specific local information needs. Many are public sector websites that offer a substantial local focus and are designed to enhance the dissemination of information within the country. These websites include the official government website (<http://www.bhutan.gov.bt>) and those of the Ministry of Agriculture (<http://www.moa.gov.bt>), Planning Commission (<http://www.pcs.gov.bt>), Ministry of Trade and Industry (<http://www.mti.gov.bt>), Department of Education (<http://www.education.gov.bt>), National Environment Commission (<http://www.nec.org.bt>), Royal Audit Authority (<http://www.raa.gov.bt>), Royal Monetary Authority (<http://www.rma.org.bt>) and Bhutan Telecommunication Authority (<http://www.bta.gov.bt>).

Online services

There are not many service-oriented websites in the country. Bhutan Telecom's website provides only static information without any services. Even the website of Druknet, the only ISP in Bhutan and which is owned and operated by Bhutan Telecom, offers only a limited number of online functions. Bhutan Power, an important national corporation, still has no official website of its own.

A special e-citizen initiative of the Department of Information Technology, which manages the government's official portal, aspires to provide online all basic public services required by Bhutanese. A large number of frequently used government forms have been posted online for downloading by the public, as well as all government circulars and transportation schedules. Links to other government agencies and organisations are provided too.

Use of ICT in the private sector

A World Bank survey¹ found that there were adequate ICT facilities in private sector firms and establishments, but they were underutilised. It also found that 62 percent of all private sector firms made use of the Internet, email, fax and telephone. Major factors cited as constraining the growth of ICT in the private sector included the high cost of Internet access, lack of skilled employees, high cost of engaging external professionals and underdeveloped ICT regulations. It also found that computers were used mainly for simple applications such as word processing.

Small and medium enterprises, which form the bulk of the private sector, will make more productive use of their computers if the cost of Internet access is lowered. No major business establishments, including banks, make use of leased lines. This is indeed surprising considering the significant amount of data and information exchange that usually takes place between banks. The use of computers for production control and automated inventory management is also rare, with the exception of a small number of factories. The lack of ICT professionals is another major impediment to the widespread use of computers and the Internet.

Employment generation

Obtaining employment is a major concern of the youth. It is estimated that 50,000 people will be seeking jobs by 2007 and 100,000 by the end of 2010. At the same time, a disturbing trend of rural-urban migration has emerged among the workforce. There is an obvious need to create more jobs. The prospect of this happening is not encouraging given the current state of the private sector and the trend of employing fewer people in the public sector, which has always been the primary employer in Bhutan.

The National Employment Board and its implementing organisation, the Department of Employment and Labour

(DEL), are entrusted with the oversight of the employment situation in the country. DEL's primary role is in matching demand with supply in the job market. However, a severe mismatch seems to exist. Although employers have indicated that ICT professionals are lacking, ICT trainees from the 18 ICT training institutes remain unemployed because of the low-level and inappropriate training given. Most of the ICT job seekers have a class 10 or 12 qualification and a few months of training in basic computer applications, while employers are looking for software and system engineers. This demand is now being filled by software specialists from India and system engineers of the Japan Overseas Cooperation Volunteers. Graduates with a diploma in information management system from the Royal Institute of Management are very much in demand, but most of them are hired by public sector organisations. DEL has conducted a nationwide job market survey to identify the most pressing employment issues in the ICT sector.

ICT can play an important role in addressing the employment issues in Bhutan. IT professionals who once worked in the civil service now own most of the private ICT companies, giving a major boost to the development of the private sector. However, it has been at the expense of government organisations, which have lost most of their experienced ICT professionals.

Business and commerce

Bhutanese businesses do not make use of e-commerce in its true sense. The closest form of e-commerce is the use of email for business development and communication. Online advertising hardly receives any attention, as most local websites do not allow visitors to interact on a real-time basis. Banner ads are hosted at Druknet, which receives about 400 hits a day mostly from Bhutanese living abroad. Payment by credit cards is still not possible in Bhutan. There are two common methods of payment for foreign customers. The first is by depositing the payment into a common account operated by the Bhutan National Bank at Citibank, New York. The Bhutan National Bank will in turn bank the payment in the local currency into the account of the merchant in Bhutan. The other way is via Western Union's money-transfer facility. Bhutan Post is the sole agent in Bhutan for Western Union.

There is much potential for e-commerce in the country, particularly in the sale of handicrafts and agricultural produce of villagers and in operating local tourism services. Women, who play a very important role in such enterprises, are potentially key operators of e-commerce activities. UNDP, in association with the Ministry of Trade and Industry and the National Women's Association of Bhutan, is promoting e-business among women entrepreneurs and handicraft producers in Bhutan. It is one of the first e-commerce projects in the country. Also, Bhutan Post is embarking on an E-Post project, which will be extended beyond email services to

cover a number of online services, such as bill payment, transport ticket reservation, banking and e-commerce.

Basic facilities necessary to enable e-commerce are absent in Bhutan. The foreign exchange policy of the Royal Monetary Authority does not allow citizens or commercial establishments to maintain foreign currency accounts. Only a few financial institutions, such as banks, and a small number of government agencies are permitted to maintain such accounts outside the country. There is an urgent need to formulate enabling policies and practical and realistic e-commerce guidelines for the country.

Banking and financial services

There are no e-banking services in the country. Although the computerisation of banking operations may have helped to streamline administrative processes within banks, the benefits of computerisation have yet to be shared with bank customers in the form of more efficient and convenient banking services. The Bhutan National Bank (BNB) and the Bank of Bhutan (BOB) are the only two commercial banks in the country, and neither have any e-banking facilities. The Druk Banking System of BOB was developed on the Microsoft Windows NT platform by an Indian consulting firm. It supports only counter services, data transfer, interest calculation and bookkeeping.

Being the main agent in Bhutan for Citibank, BNB uses Citibank's Micro Banker system. Although transactions with Citibank are normally carried out using conventional communication channels, such as fax and telex, this system has been very useful in helping BNB to standardise its day-to-day banking operations. It is used for running counter services, monitoring foreign exchange, keeping stock and inventory, making clearinghouse transactions and managing customer information.

The Royal Insurance Corporation of Bhutan uses an online system, which connects its headquarters with the Phuentsholing branch office, mainly for keeping records of insurance policies, managing the company's investments and preparing the payroll.

Key national initiatives

E-government

Bhutan's Ninth Five-Year Plan (covering July 2002 to June 2007) includes a number of initiatives aimed at promoting e-governance. The launch of the official government portal on 20 May 2003 by the Ministry of Communications was one of these initiatives. The website is hosted and managed by the Department of Information Technology (DIT). Unlike most other government websites, it was planned and developed entirely by Bhutanese developers at DIT. A number of LAN and WAN systems will be installed at various government facilities along with the building of other portal

sites. The Planning Commission operates a website that provides information on the country's five-year plans. The commission is also establishing LAN systems in various district headquarters.

DIT will install an inter-ministerial fibre optic network in the capital, Thimphu. Additionally, all government offices in the capital and the districts are scheduled to be networked by mid-2005, at a cost of US\$8.2 million, which will enable central and district government personnel to share information. DIT also plans to establish an intranet using a fibre optic backbone to connect ten ministries and government agencies. District administrations, and eventually local governments, will be connected to this intranet. Training will be given to local leaders, members of the private sector and other interested users. This project is expected to cost about US\$3 million.

E-Post

Bhutan Post has begun an E-Post project in collaboration with Bhutan Telecom, ITU and the Universal Postal Union. E-Post will provide an infrastructure that can be used to run online services such as e-business, e-governance and even web hosting. Bhutan Post is optimistic that E-Post will help to link government outposts, enable farmers to access agricultural information and allow people virtual access to medical consultation.

The project began with the installation of telekiosks rendering email services at 17 post offices in 2004. It will expand over a number of phases. The pilot phase will eventually network 38 post offices, which represent about a third of the 110 post offices in Bhutan. The current challenge is to design software required by the project. E-Post will initially offer the service of scanning and transmitting by email letters written in local languages. Postmasters participating in the pilot project have been trained on using the Internet and on showing customers how to use the email services. This pilot project is estimated to cost about US\$125,000.

E-health

The Health Department has installed computers in all 29 district hospitals. HMIS, a database application, is being used to manage information on the hospitals and their staff, their patients and the diseases treated. The hospitals in Mongar, Gelephu and Thimphu have started a telemedicine project for sending X-ray, ultrasound and ECG images by email to a focal point from where they are forwarded to specialists for their diagnosis. The specialists will then email their diagnoses and treatment recommendations back to the hospitals concerned. About four to five such consultations have been recorded each week since the project was launched.

The hospital in Thimphu is equipped with a LAN, a leased line and a number of computers. This facility allows

doctors to access medical literature and take part in forums held within Bhutan as well as overseas. The hospital has given high priority to the expansion of telemedicine, teleradiology and online health education.

A hospital management system is urgently needed at the Jigme Dorji Wangchuk National Referral Hospital for registering patients and scheduling appointments. The system may also be used for maintaining patient records. DIT has agreed to assist the hospital in designing and implementing the system.

E-education

The education sector does not have a policy framework on the use of ICT. However, a number of plans and activities have been implemented on a continuous basis to introduce computers to schools. The Department of Education has an ambitious plan to eventually equip all schools in Bhutan with computers. Although short of funds and resources, these plans do show an encouraging vision and enthusiasm for the adoption of the new technologies in schools.

In spite of the current situation, the education sector is the largest user of ICT in Bhutan. Educational establishments own more than 400 computers, exceeding all other sectors in the country. The use of computers is now concentrated in high schools. Each of the 35 high schools has on average four computers but without Internet access. Sherubtse College and the two national institutes of education at Paro and Samtse have more than 40 computers each. The government has committed an annual budget of Nu 5 million (US\$1 = Nu 45) to a programme for providing at least one computer to each school in the country. Not all schools will be provided with Internet access owing to technical difficulties and limited resources.

Most high schools have started optional computer courses. Sherubtse College runs a regular degree programme in computer science. It has also introduced a postgraduate degree course in IT for teachers that is conducted during the winter vacation. More than 100 teachers have attended this course. The National Institute of Education is running a distance learning programme for teachers that is now conducted using conventional methods without the support of any online facilities. An IDRC-funded project is aiming to change that by building an e-education portal. Teachers should be able to carry out much of their studies online at this portal site. However, unless the government commits to subsidising the high costs of the leased line required by the portal, this facility may not be sustained in the long term.

The Ninth Five-Year Plan also includes the establishment of 30 resource centres where teachers can meet and discuss issues of common interest as well as access online information resources. The centres will be established in strategically located schools, with each centre serving a cluster of other schools in the vicinity. It will be useful to

eventually network these centres so that teachers can communicate with their peers at other centres in the country.

The Department of Education website is a useful source of information, including school examination results. However, it suffers from low bandwidth and is thus rather slow. There are no official figures on the number of schools in Bhutan that publish their own websites. Private schools tend to make more active use of computers than government schools. The private Kelki High School in Thimphu has a fully equipped computer lab with more than 20 computers and a teacher of ICT.

Renewable natural resources

The Ministry of Agriculture has a 64-Kbps leased line and hosts its own website, which provides comprehensive information on renewable natural resources. Moreover, the four Renewable Natural Resource Research Centres of the ministry have been operating their own LANs since 1999 and have dial-up Internet access. Besides networking research centres, the ministry's website also provides important information on agriculture and forestry.

Environmental protection is one of the priority development objectives of Bhutan. Legislation and guidelines on environmental protection may be found at the website of the National Environment Commission, which serves as an information and resource centre on the environment. The commission has established an award scheme to encourage local communities to protect the environment.

Regulatory environment

Government

The king is Bhutan's head of state. The National Assembly, which was established in 1953, has 150 members, comprising 105 *chimis* (people's representatives) elected directly by the public for a tenure of three years, 10 elected representatives of the clergy, and 35 representatives of the Royal Government, of whom 29 are nominated by the king and 6 are elected cabinet ministers. Each year, the position of prime minister is rotated among the ministers. There are now ten ministries in the government. The judiciary is an independent entity. The High Court is the highest court of justice, and the Throne is the ultimate institution of redress and clemency.

There were previously six ministries in the government: Health and Education, Agriculture, Home Affairs, Foreign Affairs, Trade and Industry, and Communications. Some of them were split up to create four new ministries: Information and Communications, Public Works and Human Settlement, Labour and Employment, and Industries. Each ministry comprises a number of departments and independent agencies. Many service-oriented departments have been reorganised as state-owned corporations.

There are 20 districts (*dzongkhag*) in Bhutan, each headed by a district administrator (*dzongdag*). Districts also have their own district courts. The *Dzongkhag Yargay Tshogchung* (district development committees), established in 1981, coordinate development activities in the districts, while the 201 *Geog Yargay Tshogchung* (block development committees) handle development programmes at the village-block level. The committees are the lowest-level political establishments in the country and are headed by *gup* (village heads). They have been provided with substantial financial and administrative authority after the implementation of the government's decentralisation policy.

The district administrators supervise all their respective district sector heads and report to the Ministry of Home Affairs. The other ministries monitor activities in their respective sectors. In this way, district activities are conducted in an integrated and coordinated manner.

Regulatory institutions

All national acts and laws are debated and adopted by the National Assembly. The Constitution Committee is drafting Bhutan's first written Constitution, which will be debated soon for adoption. The Judiciary Bill, the Election Commission Act and the People's Representation Act will also be drafted. These democratic instruments will work within the structure of an established and historical hereditary monarchy.

The Bhutan Telecom Act and the Frequency Regulation were adopted in 1999. They were the first ICT-related policy documents ever produced. Under the new regulatory regime, the Bhutan Telecommunication Authority (BTA) will probably be reorganised as the Bhutan Communication Authority. It will oversee media and postal regulations in addition to telecommunications and radio regulations. Various acts and regulations are being enforced by the Ministry of Communications to control the ICT sector's development. The random use of frequencies has been streamlined as a result of the Frequency Regulation. A regulatory and legislative framework for the print, broadcast, multimedia and audiovisual media is planned. An ICT policy and act will also be put in place soon to support the development and use of ICT in the public and private sectors. Other policy guidelines and regulations regarding online content, information management and e-commerce will be prepared too.

Regulatory and policy activities related to ICT are carried out by two organisations within the Ministry of Communications. BTA is the telecommunications and broadcasting regulator that oversees tariff and licensing policies, while DIT oversees capacity building and the promotion, certification and standardisation of ICT-related activities. This structure will be revamped with the recent establishment of regulatory divisions within the new Ministry of Information and Communications.

Open source movement

Open source systems have been introduced to Bhutan for a number of years, but they have not been seriously considered as alternatives until now. One of the reasons for this may be that most of the software procured in the country is either public funded or donor funded, so the cost factor has never been an issue. Private sector firms use bundled systems and applications that are preinstalled by hardware vendors, while the use of PCs at home is very rare.

But things are beginning to change. Druknet, the national ISP, for example, runs all its servers on open source platforms. Some other organisations are also beginning to use Linux-based web and mail servers in order to reduce costs and ensure flexibility. The latest device running on open source software is the Simputer imported from India. This PDA is gaining prominence in rural communities after being adopted for the E-Post project.

However, the open source movement has not captured the full attention of the Bhutanese ICT community. The Ministry of Information and Communications has yet to announce concrete initiatives on open source. The movement is now confined to a small number of organisations and ministries, such as the Ministry of Education and BTA, which have acquired computers preinstalled with open source software for distribution to schools and monasteries.

Trends

ICT has a very short history in Bhutan. The first telephone lines were installed in 1963, while the first computers were imported only in the 1980s. By 1985, there were approximately 530 km of overhead telephone wires carrying 12 pairs of copper cables. An analogue microwave system was established that year connecting Thimphu and Phuentsholing to some Indian border towns. The first digital switching exchange and an Intelsat satellite earth station were commissioned in 1990. International telephone calls were routed via Madlay's station in the UK. The volume of international traffic remained low for the initial period, as the telecommunications network did not extend beyond Thimphu.

The state of telecommunications development, however, changed after the establishment of the domestic telecommunications network. According to Bhutan Telecom, there are now an estimated 21,500 telephone subscribers in the country with a total exchange capacity for 26,000 lines. This represents a phenomenal growth when compared with the 2,000 lines available in the mid-1990s. The area around Thimphu accounts for about half of all telephone subscribers. The Thimphu exchange was split into two main switches at Simtokha and Dechencholing using Pasolink. These two exchanges were operating at full capacity within two years. The demand at the Thimphu exchange is particularly high,

and its capacity will be increased with the installation of a new 5,000-line switching exchange.

Although traffic between exchanges at present requires minimal bandwidth, there is a plan to upgrade network capacity between some high-traffic segments in order to meet the projected growth in demand for voice and data services. The current capacity of three trunk circuits with 2 Mb bandwidth for each, or 90 voice circuits between Thimphu and Phuentsholing, will be increased when an additional fibre optic network is built. In fact, the initial phase has already been completed, which connects some major towns in the western region. It will be connected to the Indian fibre optic network that passes through Hashimara. This will represent a tremendous increase in capacity over the small narrowband analogue system operating in the early 1990s.

In tandem with infrastructure growth, tariffs for Internet access and telephone lines are being reduced continually. The PSTN tariff for data services, which are used mainly to access the Internet, has dropped by 25 percent recently. Bhutan Telecom has been lowering its telephone tariffs since its deregulation in 1999. Although the still high tariffs for ICT services are believed to be the major factor discouraging greater use of ICT, the trend of declining tariffs does give much room for optimism.

Bhutan Telecom commenced mobile phone services in November 2003 that include international calls, SMS and fax. The charges are very high, putting the services out of reach of most people. But the tariffs are expected to be reduced gradually in phases.

There are approximately 2,500 dial-up Internet account holders and more than 25 leased-line subscribers registered with Druknet. It is also estimated that as many as 1,050 computers are connected to the Internet through these leased lines. Druknet estimates that the actual number of Internet users is much higher than the number of subscribers, as many users go online from Internet cafés. With programmes to install computers and Internet connections in schools, the number of users is expected to grow. A new ISP has recently been granted a licence to provide Internet services via VSAT in urban as well as rural areas. With competition, Internet access will become more affordable to Bhutanese over time.

About 80 percent of Bhutanese live in rural areas spread over 201 village blocks (*geog*) of approximately 2,000 villages in the 20 districts. This rural majority has access to less than 10 percent of the telephone lines and accounts for less than 1 percent of Internet connectivity in the country. The teledensity is 2.86 percent nationally, but it is much lower in rural or semi-urban areas. If the three major towns of Thimphu, Phuentsholing and Paro were excluded, the teledensity would be only 1.39 percent. However, the situation is improving: 79 village blocks are now connected to the telephone network; and with a major rural telecommunications project underway, it will not be long before every village-block office will have a telephone and Internet connection.

Note

1. World Bank, *Bhutan Private Sector Survey 2002* (Washington, DC, 2002). The survey was carried out by the World Bank, the Bhutan Chamber of Commerce and Industries and the Ministry of Trade and Industry.