.mn

Mongolia

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Total population	2,656,000 (February 2008)
Literacy rate	97.8%
	(Male = 98%; female = 97.5%)
GDP per capita	USD 2,900 (2007 est.)
Computers per 100 inhabitants	2.5
Fixed-line telephones per 100 inhabitants	6 (2007)
Mobile phone subscribers per 100 inhabitants	46 (2007)
Internet users per 100 inhabitants	0.65
Domain names registered .mn	2,020
Broadband subscribers per 100 inhabitants	0.3
Internet domestic bandwidth	155 Mbps (in rural areas); 2 Gbps (in Ulaanbaatar)
Internet international bandwidth	2.5 Gbps (June 2008)

(Sources: Ministry of Education, Culture and Science 2008; National Statistical Office of Mongolia 2008)

OVERVIEW

Many Information and Communication Technology (ICT) developments have taken place in Mongolia since 2006. The fibre optic cable backbone has been extended by more than 4,000 kilometres and the overall international bandwidth has more than doubled. Various types of ICT services are now available and service providers compete not only in network coverage, but also in service delivery. The number of mobile subscribers is over 1.1 million, representing an increase of over 35 percent from the number of subscribers in 2006. Mobile content development is one of the fastest growing services and it is contributing to the expansion of the country's ICT industry. Also, with the development of the ICT infrastructure, there is greater emphasis on ICT education at the secondary, vocational and tertiary levels.

However, a number of issues need to be addressed to further boost ICT development in Mongolia. There is a need to build a favourable policy and regulatory environment, develop human resource capacity, and foster coordination and cooperation among different stakeholders.

TECHNOLOGY INFRASTRUCTURE

Mongolia's ICT infrastructure has changed extensively in the last two years. The most significant change has been the extension of the fibre optic backbone network to up to five times its length in 2005. The backbone is now 11,500 kilometres long, connecting all of the country's 21 *aimag*[1] centres and going through 150 of the 365 *soum*[2] centres.

In January 2008, the overall international bandwidth reached 1.2 Gbps, 2.7 times more than the available bandwidth in 2006.

These changes in Mongolia's telecommunications sector took place following the split of the Mongolian Telecommunications Company into a network company and a service provider company in 2007. Also, in November 2007, the telecommunications company Skynetwork was awarded a licence to provide fixed telecommunications services within and between cities using Internet Protocol (IP), opening up new broadband services for Mongolia.

The F-Zone, a new type of wireless local loop (WLL), was introduced in July 2007 in Ulaanbaatar and 40 *soum*s. There are now 5,000 users of Next Generation Network (NGN) services in the country.

KEY INSTITUTIONS DEALING WITH ICT

Government institutions responsible for ICT development in Mongolia include the Information and Communications Technology Authority (ICTA), Communications Regulatory Commission (CRC), and National Information Technology Park (NITP). The National Commission on Integrated Registration System, which is chaired by the Prime Minister and which includes the state secretaries of ministries and all heads of government agencies, was established in January 2008. One of the commission's first acts was to approve the establishment of the National Data Center with funding support from Korean investors.

The Center, which was inaugurated in May 2008, puts together all data gathered by government agencies to facilitate access to relevant information as well as coordination among government agencies.

Non-government organizations (NGOs) continue to be involved in ICT development. The Mongolian Software Industry Association (MOSA) has organized a number of activities, including approval of the MOSA Charter, meetings with association members, involvement in the development of the Master Plan on software outsourcing, and organizing a study tour to Dailian, a technology park in China. The Mongolian Internet Service Providers Association (MISPA) worked together with the ICTA to increase overall bandwidth for Mongolia to 1.2 Gbps. This resulted in the reduction of the cost of Internet access from homes and offices.

ICT AND ICT-RELATED INDUSTRIES

By the end of 2007, there were 1,194,380 mobile subscribers throughout Mongolia, with mobile operators fiercely fighting over rural settlements. The target was for mobile services to reach all of the 365 *soum*s by mid-June 2008, with the Universal Service Obligation Fund (USOF) awarding contracts to mobile service providers accordingly and a World Bank project providing support for this. As of October 2008, the target has still not been met.

Internet service provision has been greatly improved with the increase in overall international bandwidth to 1.2 Gbps in 2007. The Internet connection fee for end users has been reduced: Digital Subscriber Line (DSL) connection costs for 64 Kbps are now just a third of the cost in 2006 and the cost for a 128 Kbps connection is now USD 20 per month, down from USD 69 per month in 2006. Thus, DSL connections are more affordable to households, small and medium-sized organizations and companies. In fact, the number of dial-up connections has been decreasing while the number of DSL or high-speed Internet connections is increasing. ICTA statistics indicate 17,329 Internet users in Mongolia in 2007, representing an increase of 37 percent from 2006. There are 10 more Internet service providers (ISPs), bringing the total to 34 in 2008.

Software development is one of the country's fastest growing ICT-related industries. The MOSA, established in 2007, has contributed extensively to the development of the Master Plan on Outsourcing for 2008–2015, which was approved in December 2007. It is recognized that software for development companies can not only develop software government organizations and the private sector in Mongolia but also engage in software outsourcing to other countries, such as Japan and the US. Software development companies have started introducing enterprise resource planning (ERP) solutions to enhance and support business and government operations.

In addition to software development companies, a big number of small and medium-sized enterprises are providing computer-based services ranging from encoding documents; Internet café services; development of name cards, brochures and small publications; digital photo services and scanning services, among others.

The number of companies supplying computer hardware and accessories has remained stable. But their service delivery is now more diversified, reflecting the needs of a growing number of customers. The big supplier companies have started introducing online shopping and delivery services, including online payment systems. The popular sites offer not only sale of computers, copy machines, printers, and the like, but also a range of services, from supply of hardware to networking services and providing software solutions. In addition, a few small entrepreneurs have emerged to provide computer and equipment maintenance services.

KEY ICT POLICIES, THRUSTS, AND PROGRAMS

Integrated Government Data Center

Under the newly approved National Program for Integrated Registration System, the ICTA will build the Integrated Government Data Center with a total budget of USD 5.9 million of which USD 5.2 million would be provided by the Government of Korea. The center is a centralized repository for the storage, management and dissemination of data and information generated and utilized by government organizations. The establishment of the center is expected to help government keep high standards for assuring the integrity and functionality of all government organizations, provide a reliable infrastructure for government IT operations, and ensure the availability, accessibility and integrity of public services.

e-Mongolia National Program

Extensive efforts are being undertaken by the ICTA, ICT companies, organizations and individuals to achieve 16 objectives outlined in the approved e-Mongolia National Program. For example, the Ministry of Road, Transportation and Tourism developed a regional coding system in 2007 in accordance with the objective of setting up a unified coding system in Mongolia to be used in postal services. Other activities that have been successfully completed since the approval of the e-Mongolia

program in 2005 are the 'Computers for All' program, software outsourcing, 'DSL to homes', e-government, country zip code, the 'Web for each organization, email for each person' project, and infrastructure development.

e-Government Master Plan

The e-Government Master Plan was developed with the assistance of the Korean International Promotion Agency (KIPA) in 2005. However, it has not been officially approved by the Government of Mongolia and no major activities have been carried out under it. The Master Plan needs to take into account changes that have taken place since it was drafted three years ago.

LEGAL AND REGULATORY ENVIRONMENT FOR ICT DEVELOPMENT

The fast growing ICT market and expanded ICT use by institutions and individuals are driving policymakers to improve current ICT policy and legislation and develop a new regulatory framework. However, despite the need for such laws, the draft General IT Law, e-commerce law, law on digital signatures and e-government law have not been approved by the Parliament of Mongolia. The submission of the draft laws was further delayed by the national elections in June 2008. Thus, there is still no formal regulation of electronic services such as e-commerce and e-taxation in Mongolia.

Within the framework of the ICT Infrastructure Development Project, an information security law was developed in 2007–2008 and is pending approval by the Parliament. The law aims to determine the legal basis and principles of activities related to information security and to establish information security measures for individuals, businesses, and government and NGOs. Moreover, the draft law on public–private partnership (PPP) for e-government has been drafted and is pending review by the government.

In addition, taxation and customs laws have been amended to reduce the tax on computers and computer accessories and to provide for an exemption from value added tax (VAT) for software products and computer supplies. As a result, the use of computers and the Internet is increasing.

DIGITAL CONTENT

Web Content

The number of local language websites is growing rapidly from year to year in Mongolia. Local language information portals play a key role in digital content development, Internet usage and the development of the Internet community as a whole. These portals provide all kinds of information, including on education, business, sustainable development, poverty reduction, food security, finance and economy, entertainment, information technology, and others. The popular information and service portals include www.gogo.mn, www.news.mn, www.tedy.mn, www.olloo.mn, www.osmo.mn, and www.legalinfo.mn.

Under the 'public organizations Web and email project' in the e-Mongolia National Program, all government organizations have developed their own websites. According to a February 2008 survey by *My Computer*, a Mongolian IT magazine, the top Mongolian government websites are:

1. www.mta.mn (Mongolia National Tax Administration)
2. www.pmis.gov.mn (official website of the government organizations of Mongolia)
3. www.legalinfo.mn (legal information system)
4. www.mongolbank.mn (Bank of Mongolia)
5. www.open-government.mn (Open Government)

A *My Computer* survey in April 2008 of over 1,500 websites showed that 850 of these websites (57 percent) are regularly updated. Sixty-three percent uses .mn, 17 percent uses .com, 14 percent uses .org, 5 percent use .net, and 1 percent uses .biz domain names. Around 53 percent of the websites belong to business/services, 21 percent are websites of private companies, 14 percent are websites of non-government organizations and civil society, and 6 percent belongs to government organizations. The number of business and private sector websites increased by 11.5 percent, the NGO and civil society websites by 2.8 percent, and government organization websites by 5.6 percent, compared to April 2007.

The number of fully functional websites with dynamic content is growing rapidly, compared to a few years ago when most websites were static with very basic introductory information. The increase shows that organizations, service providers and users are starting to use the Internet as an information and knowledge source and they are actively using it in their daily activities.

Personal websites or blogs are increasing in number. Platforms for user-generated content are being developed and popular portals such as olloo, GoGo, Banjig, and News.mn serve as an information and knowledge base where Internet users can share information, knowledge, experiences, solutions, and opportunities.

CD-ROMs

A lot of local language content on Compact Disc-Read Only Memory (CD-ROM) is being developed. Journals and magazines

such as *My Computer*, *Computer Times*, and *Game World* and some textbooks are distributed with CD-ROMs. Most of the CD-ROMs are learning materials developed by educational organizations and projects.

Teachers and students have started using educational CD-ROMs in the Mongolian language that were distributed to all primary and secondary schools in 2006 as part of the 'Innovating ICT for Rural Education of Mongolia' (IIREM) project of the Asian Development Bank (ADB). A total of 18,220 such CD-ROMs has been distributed to 550 schools in Mongolia in 2008. Based on lessons learned and experiences gained from the implementation of the IIREM project, the Fast Track Initiative (FTI) has been jointly developed by the World Bank, ADB and the Ministry of Education, Culture, and Science (MOECS) to improve access to and the quality of basic education, including further development of CD-ROM-based training and learning materials for teachers and students.

Mobile Content

Only a few years ago, the mobile telephone was a new technology and a luxury utility. Nowadays it is an essential and civilian utility. Due to the increasing competitiveness of the mobile communication sector in Mongolia, mobile content services have been growing dramatically during the last two years.

Interactive television (TV) via short message service (SMS) is currently the most popular short message-based service in Mongolia. There are now 300,000 TV SMS subscribers and their numbers are growing. There are around 80 TV and FM stations and newspapers providing this kind of SMS pull service.

WAP services are also popular, with 100,000 subscribers nationwide. Two mobile operators, Mobicom and Skytel, offer Wireless Application Protocol (WAP) services named i-WAP and SkyWAP, respectively.

Mobile broadcasting service is offered as Mobimedia service by Mobicom and U-media service by Unitel. The main service concept is broadcasting text content and a call back feature if additional service or information is required. Mobimedia service has around 210,000 subscribers and U-media has around 2,500 subscribers.

Ring back tone service is being offered by three major mobile operators — Mobicom, Skytel, and Unitel — to around 220,000 users.

ONLINE SERVICES

Due to the increasing competitiveness of the ICT sector and better and cheaper access to the Internet, online services have been increasing in the last two years.

Government organizations now use the Internet to deliver services to citizens. The National Tax Administration of Mongolia collects tax returns (corporate income tax, VAT and withholding tax returns) from 520,000 taxpayers via its own electronic filing system (http://e-tax.mta.mn). The site averages 20–30 hits per second during tax return submission period. The Education Evaluation Center at the MOECS has an online registration system (http://www.eec.mn) that issues entry documents for final graduation exams and certification of examination in tertiary institutions to all 16,000 prospective students in Ulaanbaatar. The website averages 1,500 visitors daily during the examination period.

e-Commerce and e-banking services are widely used by the public. Mobile service providers have their own Web-based services, such as www.tedy.mn (online phone shop), mobile.gogo.mn (mobile content, SMS), and www.u-media.mn (mobile content). Trading companies use the Internet for service delivery. Commercial banks are expanding their online services from checking account balances to complex online banking services such as money transfer, bill payments, and loan transactions. The popular Internet bank services are https://e-bank.anod.mn, https://www.ebank.mn/granet/, and http://www.egolomt.mn/. Other online services, such as e-booking (www.eticket.mn/), e-hosting (http://share.gogo.mn/), e-shop, (www.rose.mn, http://eshop.nomin.net), and e-TV broadcasting (http://www.tv5.mn/, http://www.tv9.mn/), are available.

ICT EDUCATION AND CAPACITY-BUILDING PROGRAMS

ICT in Secondary Education

The growing use of ICT in the country calls for the development of computer literacy in secondary education. However, there is a lack of policy to support effective use of ICT in education and to integrate ICT in teaching and learning. It is necessary to integrate ICT in the curriculum of each subject for new teaching tools and technology to replace and/or augment traditional teaching methods (Uyanga 2006).

According to MOECS statistics, 537,576 students (273,271 of them female) were enrolled in 754 general education schools nationwide in 2007–2008. There are 3,100 computers in 613 schools, or five computers per school on average. Most of the computers are used for teaching informatics and a limited number of computers is available for use by staff and teachers.

Due to poor infrastructure development and lack of equipment and skilled personnel, computers and the Internet are not widely used for subjects other than informatics. There are

572 (377 of them are female) informatics teachers. Secondary schools in the rural areas lack professional informatics teachers: the schools are either unable to offer informatics due to lack of teachers, or any graduate who knows a little about computers can work as an informatics teacher.

At present, several institutions are offering undergraduate and postgraduate degree courses in ICT-related fields. The Mongolian State University of Education (MSUE) and the Institute of Education are responsible for informatics teacher training and development. There are two curricula: one for informatics teachers and another for non-informatics teachers.

However, most of the graduates go on to work in non-educational sectors such as government and business. The government needs to resolve in a centralized way issues related to the training and education of informatics teachers. There is a need to increase the number of enrolments in informatics, and encourage applicants from the rural areas. In addition, it is important to introduce incentives for informatics teachers to work in schools.

Informatics Curriculum

Under the Informatics Curriculum Standard for Primary and Secondary Education that was introduced in 2005, informatics is taught starting from the fifth grade. There are five content domains: information, computer, algorithms, model, and IT.

Various activities are being implemented to improve the informatics curriculum, train teachers, and develop textbooks, training manuals and materials for secondary schools. As part of the shift to a 12-year education system, the Mongolian Informatics Curriculum Standard for Primary and Secondary Education will be updated in 2009.

ICT in Vocational Training

The compulsory ICT training in general vocational schools covers the same ground as the informatics course in secondary schools. A new vocational training centre has started providing ICT training. A franchise centre of Aptech World Wide India set up in January 2007 has over 170 students, and its newly opened media centre has attracted over 50 new students. There are also new training centres for software engineers set up with support from Japanese private investors.

The ICTA and the National Information Technology Park (NITP), in cooperation with the Japan Information Technology Engineers Examination Center (JITEC), has initiated an IT engineers skill standards and state examination system to evaluate the skills and competencies of Mongolian IT professionals. In April 2008, the Fundamental IT Engineers Examination, one of the categories of the Asian IT Engineers Professional Examination system, was officially conducted in Mongolia. Seven out of 53 engineers passed the examination and received certificates as IT engineers.

ICT in Tertiary Education

According to statistics from the MOECS, 150,326 students (91,720 of them female) were registered at 162 (49 owned by government) tertiary institutions nationwide in 2007–2008. The law on higher education requires tertiary education institutions to provide ICT education and to equip students with high professional and research capacity for science, technology, social sciences, and humanities.

ICT training at the tertiary education level can be divided into compulsory and specialized ICT training. Compulsory ICT courses are offered under various names such as 'Introduction to Computers', 'Introduction to Informatics', 'Application Programs', 'Computer Usage', and 'Computer Applications'. Compulsory ICT training aims to develop knowledge and skills in using ICT as a tool for learning. However, there are no common standards for ICT training in tertiary education nationwide, and the focus tends to be on the basics of computers and application programs. There is a need to refine the curriculum of the compulsory ICT training program to make it more relevant to training for specific professions and fields of specialization (Uyanga 2006). Specialized ICT courses are taken after compulsory ICT courses have been completed. Some such courses are programming languages, database, systems analysis and design, formal methods, and networking. These are intended for computer science majors. Courses in linear programming, systems analysis and design are offered to students majoring in maths. In addition, various maths and statistical tools are taught in these specialized courses.

At present, the following institutions are offering undergraduate and graduate courses in ICT-related fields: the Computer Science and Management School (CSMS) and the Telecommunication and Information Technology School (TITS) of the Mongolian University of Science and Technology (MUST), the School of Computer and Information Technology of the Mongolian State University of Education (MSUE), and the School of Mathematics and Computer Science (SMCS) and School of Information Technology (SIT) of the National University of Mongolia (NUM). There are also private tertiary educational institutions offering IT courses. According to statistics from the MOECS, there were 4,946 students majoring in ICT (1,813 of them female) in 2007–2008.

A consortium of Mongolian tertiary institutions training ICT specialists is currently reviewing existing training programs in

light of new developments in the ICT and education fields. Also, during the workshop on ICT for education under the 'Mega Mongolia' project, participants emphasized the need to develop a comprehensive policy on ICT in education, including the need to develop standards, build the capacity of teachers and lecturers, and update teaching methodologies.

OPEN SOURCE/OPEN CONTENT INITIATIVES

Many IT companies and some government organizations are making use of open source software. For example, the Ministry of Finance uses Sendmail as the internal mail server, along with some proprietary applications.

A new Mongolian open source content management system called MAUS is being developed based on the Joomla open source content management system.

However, use of open source software among non-IT personnel is quite low. Generally speaking, ordinary users of computer systems are not aware of the existence of open source operating systems such as FreeBSD. This is due to the lack of awareness-raising activities, such as seminars and workshops, on open source software.

ICTD RESEARCH AND DEVELOPMENT

International and donor organizations, including the ADB, International Development Research Centre (IDRC) of Canada, United States Agency for International Development (USAID), and World Bank, are helping to mobilize local research capacity especially in ICT for development (ICTD). IDRC is supporting the planning of a holistic ICTD research and development (R&D) program that includes policy studies and seminars in six areas — ICTD, e-government, health, education, business, and agriculture. About 350 people from various sectors are part of this R&D program.

CHALLENGES AND OPPORTUNITIES

Several challenges and opportunities still remain for ICTD in Mongolia. One of these is the need to strengthen the country's ICT policy and regulatory framework. Draft laws on ICT, including the draft law on e-government, e-commerce and digital signatures, should be reviewed and subsequently approved by the government.

Second, the telecommunications infrastructure needs to be expanded to reach the remote areas of the country and to reduce the digital divide between rural and urban communities and between privileged and marginalized groups of society. ICT-based services need to be developed further to reach those who are currently unable to receive those services.

Third, human resource capacity building needs to be addressed in a systematic way. There is a need for a master plan for ICT human resource development that would outline programs, curricula, information resources, delivery modes, and teacher training, among others.

Fourth, content development and delivery of e-services should be further enhanced and developed. Some aspects requiring attention are delivery of public services through ICT, integrating online payment systems with services delivery, and building telecentres for rural areas.

NOTES

1. An *aimag* is the largest administrative unit in Mongolia.
2. A *soum* is the second largest administrative unit in Mongolia.

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