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Bangladesh

Ananya **Raihan** and Shah M. Ahsan **Habib**

GDP per capita	USD 482 (USD 1 = BDT 65)
Key economic sectors	Agriculture, textile and clothing, leather and leather goods, frozen fish, construction, transport, overseas services by temporary migrant workers
Computers per 100 inhabitants	1.2
Fixed-line telephones per 100 inhabitants	2.63 per cent
Mobile phone subscribers per 100 inhabitants	2.03 (2004)
Internet users per 100 inhabitants	0.22
Domain names registered under .bd	1,500
Broadband subscribers per 100 inhabitants	not available
Internet domestic bandwidth	>122 Mbps
Internet international bandwidth	Current capacity: 10 Gbps Capacity up to 80 Gbps Current utilization: 300 Mbps

Sources: ITU 2006; UNDP 2005; Bangladesh Bureau of Statistics; Mumit et al. 2007.

Overview

Bangladesh has become more visible on the global ICT map during the last decade. Both the government and the private sector have become more active in harnessing ICT to facilitate economic growth and development. The government of Bangladesh has declared ICT as a priority sector and the country's ICT industry is characterized by increasing availability of computers and Internet use, expansion of the telecommunications network, and a growing number of software development houses, joint-venture companies and institutions working for ICT4D. Particularly noteworthy is the increasing use of ICT in developmental activities for the underprivileged.

This chapter is an analysis of ICT regulation and policies, developments and applications, and issues related to a technology-enabled environment for socio-economic development in Bangladesh.

Technology infrastructure

Computers were first introduced in Bangladesh in the mid-1960s mainly for research and data processing purposes. In the 1980s, the printing and publishing industries promoted the use of computers but high prices restricted their general and commercial use. Personal computers began to gain popularity in the 1990s and became widespread in 1998 after the government imposed a tax exemption for computers and ICT accessories, which coincided with substantial price reductions in the global market.

Competition policy in telecommunications, particularly in mobile telephony, contributed to an exponential growth in the telecommunications infrastructure. Five mobile companies are now in operation: Grameen Phone, Banglalink, Aktel, CityCell and Teletalk. Grameen Phone has more than 60 per cent market share across the country. Mobile teledensity increased to 8.04 per cent in April 2006 from only 0.58 per cent in 2001. It is believed that 10 per cent mobile teledensity will be achieved much earlier than 2010. Mobile coverage improved to 85 per cent by the end of 2005 from only 36 per cent in 2003 (ITU 2006). This growth is remarkable for a least developed country where one-fifth of the population lives on an income of less than one dollar a day.

Bangladesh could easily have a 95 per cent telecom coverage if the government will allow telecommunication companies to expand their network in three hill-tract districts that are now restricted due to the insurgency problem. It is expected that the new government of 2007 will allow telecom operators to expand their network, which would pave the way for Bangladesh to achieve 100 per cent mobile telecommunication coverage.

There has been high growth of Public Switched Telephone Network (PSTN) telecommunication in Bangladesh as well. In 2000, there were 491,303 PSTN subscribers. By June 2006, this figure had grown to 1.01 million, the average growth rate being 15.07 per cent per annum (BTRC 2006).

As of April 2006, both fixed and mobile telephone subscribers had reached 12.6 million from only about 1.2 million in 2001.

Bangladesh's international telecommunication used to be satellite-dependent, relatively slow in speed and costly. In May 2006, a submarine cable was installed. Though late, it is a significant step in ICT infrastructure development in the country. The infrastructure being laid down will enable ISPs to provide

high bandwidth connectivity as the demand grows. Some ISPs have also been assigned the spread spectrum radio frequency band in the range of 2 GHz for point-to-point wireless communication between computers.

However, despite the remarkable growth in certain elements of information infrastructure, Bangladesh is still struggling to move forward with respect to other important components of a national information infrastructure, such as security and privacy of network and information, legal and financial infrastructure, and technology convergence.

Key institutions dealing with ICTs

In 1997, the government formed an ICT Task Force under the Prime Minister's Office (PMO) to foster ICT mainstreaming. A Support to the ICT Task Force (SICT) was formed in 2001 to identify and implement e-government projects. Five years later, in May 2006, an e-Governance Cell was initiated with the approval of the Prime Minister. In each ministry, a mid-level government official (at the level of Joint Secretary or Additional Secretary) has been appointed to act as the ICT Focal Point to coordinate e-governance activities and priorities within the ministry. Secretarial support to the National ICT Task Force is provided by the Planning Division of the Ministry of Planning. The latter hosts the SICT Programme to implement the objectives of the ICT Task Force, particularly in e-government, and is the hub for inter-connectivity among the PMO, Planning Commission and Secretariat.

It is the Ministry of Science and ICT, established in 2001, that is primarily responsible for mainstreaming ICTs in economic growth and development. It formulates ICT policies and pushes for ICT-related laws, such as the Intellectual Property Rights Act which was enacted by the Parliament in 2003 and amended in 2006, and the ICT Act which has been awaiting Parliamentary approval since 2002. The Ministry also facilitates the computerization of government institutions and schools.

The Bangladesh Computer Council (BCC) under the Ministry of Science and ICT is the main institution for promoting ICTs. It provides ICT training to government officials and citizens, incubates software companies, provides advisory support to government institutions regarding ICT, provides connectivity to ISPs and works for standardization through such projects as the development of a local language keyboard.

The Ministry of Post and Telecommunication is responsible for building and maintaining telecommunication infrastructure.

The Ministry of Education develops the curriculum for ICT education and spearheads the computerisation of schools.

The Bangladesh Telecommunication Regulatory Commission (BTRC) is the licensing authority and regulates telecom service

providers, while the Ministry of Law, Justice and Parliamentary Affairs reviews ICT-related laws.

In the private sector, the Bangladesh Association for Software and Information Services (BASIS) plays a key role in promoting the ICT industry. It organizes an annual exposition of software and applications titled SOFTEXPO; many foreign software companies attend this exposition, helping to boost the reputation of the Bangladesh software industry. BASIS likewise acts as a lobbyist with the government for fiscal incentives and promotional support, such as income tax waiver, VAT waiver, and higher foreign exchange retention facilities. BASIS also organizes capacity building programmes for its members, particularly in product marketing. Meanwhile, the ISP association, Bangladesh Computer Samity, played a key role in the elimination of import duties on computers in the early 1990s, which facilitated ICT penetration.

Private universities and institutions lead human resource development by offering advanced courses on ICTs.

Several institutions work in the area of ICT for poverty alleviation. Grameen Phone, BRACNET.NET and Development Research Network (D.Net) are three prominent institutions championing ICT access in the rural areas. Grameen Phone built a national GSM network which is now available for Internet connection anywhere in Bangladesh through EDGE and GPRS technology. D.Net is aiming to bring ICTs to the doorstep of poor people in the rural areas. It has developed a comprehensive volume of local language content on livelihood, making the Internet relevant to the common people.

Digital content initiatives

Digital content has become a major issue as PC penetration and Internet access have increased across the country. Without locally relevant content, ICTs are of no use to people. Content development is now a priority not only of the private sector and civil society organizations but also of the government. The content issue has been highlighted in the draft Broadband Policy.

The Government of Bangladesh in collaboration with UNDP, Bangladesh has published many government forms in digital format, both on the Web (http://www.forms.gov.bd) and in CD-ROM format. Several forms can now be downloaded free of charge. However, out of 40 ministries listed in the government website (http://www.forms.gov.bd/eng/ByMinistry.aspx), only eight ministries have partially released their forms. The downloadable forms include passport application, visa application, citizenship form, pension form, Internet connection (Bangladesh Telegraph and Telephone Board [BTTB]), birth registration, income tax return and driving license. The availability of

these forms online helps citizens access government services in less time and minimizes opportunities to bribe government officials. The website is bilingual and can thus be used by any literate person. Those who cannot read can get the forms from telecentres, which are now becoming popular in rural Bangladesh.

In 2003, D.Net started research on content development targeting the rural poor. Since then, a huge content base in Bangla has been developed. D.Net initially focused on the CD-ROM version of the content since Internet connectivity was not available in the rural areas at that time. But with the availability of access to the Internet through EDGE or GPRS from almost anywhere in Bangladesh, the Web version (www.jeeon.com) is scheduled for release in 2007.

The largest Bangla website at present is www.abolombon. org. The website is dedicated to human rights issues and provides legal practitioners with access to the full text of laws, the explanation of these laws, addresses of institutions for legal redress, and the like. Another local language website is www. gunijan.org, which features eminent citizens of Bangladesh for the young to get to know them.

Online services

Both government and non-government institutions offer online services, which range from information services to e-commerce.

The government's SICT programme has initiated and in some cases completed over 40 e-governance projects of varying sizes across many government agencies. The SICT programme is scheduled to end by 2006. However, there is talk of extending the project to 2011 with a new budget of about BDT 950 million (USD 14.3 million).

Among the more successful e-government projects is the innovative Ministry of Religious Affairs website (www.bdhajjinfo. org), which provides information-based services to pilgrims, their relatives and friends, travel agents and government officials. The interactive website, which was launched in 2002, can be used for searching information about individual pilgrims (including their current location and status), for sending and receiving messages from individual pilgrims and for accessing various information regarding rules and regulations.

Another successful e-government project is the Rajshahi City Corporation's (RCC's) Electronic Birth Registration System

D.Net's demand-driven digital content: Unleashing the potential for poverty alleviation of access to information

Content development at D.Net is unique in many ways. First, the approach is research-based, focusing on the information needs identified by rural communities and the cognition level of end-users. The research identifies two types of users: those who browse content for themselves and infomediaries who browse content for illiterate end-users. Then, raw content collected from various domain institutions is converted into easy-to-understand form and supplemented with pictures. D.Net also develops animated and audio-visual content because in many cases text and pictures are not enough to explain something to end-users.

D.Net's research, which is ongoing, focuses on the whole value chain of livelihood issues to be captured in the content. The content areas are agriculture, health, education, income-generating activities, disaster management, awareness, employment, and directory information. The rural folk visit rural information centres and browse content that addresses their livelihood problems. Through livelihood-focused digital content, hundreds of users might reduce livelihood costs, enhance income-generation opportunities, or protect themselves from potential loss or damage (see the case studies at http://www.pallitathya.org/en/case_studies/index.html).

This demand-driven approach towards content development opens up a whole new area of social entrepreneurship. Rural development organizations now buy the content for dissemination in their intervention areas.

Furthermore, the content-based approach gives a new direction to the global telecentre movement. A telecentre is traditionally a technology learning and communication centre. With D.Net's approach, telecentres in Bangladesh are now able to provide the core service—information and knowledge service. The content plays an important role in improving access to information, which is an economic resource. As poverty is an outcome of lack of access to resources, access to information is the new dimension in poverty alleviation discourse. Digital local language content and its dissemination through ICTs are thus directly linked with poverty alleviation.

(EBRS), which provides citizens with a unique identity card that they can use for various services, such as education and health care. Since the card helps them get certain social services and benefits, citizens are now encouraged to register births, which was previously considered by many to be a worthless hassle. The electronic ID is used for immunization purposes and also for getting admission to government primary schools in Rajshahi. The EBRS helps to keep track of each child registered through the system, starting from immunization requirements to school enrolment status. Since 2001, a total of 45,222 citizens have received birth registration services using EBRS, or 15.38 per cent of the total metropolitan population. In the Bangladesh context, this is a success: it means that almost all newborns are now registered with the electronic system. But there is a need for a campaign that would bring all citizens under the system.

Another laudable e-government initiative is the publication of the salary status of school teachers (http://www.dshe.gov.bd/search.php). School teachers can now check online whether their salary has been sent to the bank by the Directorate of Secondary and Higher Secondary Education.

While some e-government projects have succeeded, others have failed. An example is the Voter ID Card Project (see boxed article below).

Moreover, while providing easy access to up-to-date information is a crucial service the government can provide to its citizens, the information on government websites in Bangladesh is unfortunately not current in most cases.

Private sector online services perform better. An example is www.bdjobs.com, which was established in 2001 and which now has a monthly page view volume of 800,000 and 14,000 daily unique visitors. More than 140,000 résumés are posted on the portal, which has over 2,500 corporate clients. More than 2,500 employers in Bangladesh have recruited more than 35,000 professionals at different levels through the bdjobs.com service.

The most popular online information service provider is www.bangladeshinfo.com, a Web portal for researchers,

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The Voter ID Card Project: A disappointing conclusion

The Election Commission Secretariat of Bangladesh maintains a list of eligible voters which is updated every five years. But under this system, citizens are not given a unique identifying number. To correct this inadequacy, a project was undertaken by the Election Commission Secretariat in 1995 to generate laminated ID cards for every eligible voter in the country.

However, five years later the Voter ID Card Project reached a disappointing conclusion. The project was technically completed and some voter ID cards were distributed. But many of the cards had crucial mistakes that rendered them useless. It was a case of management and strategic failure, not technological failure. The media pointed out that the project would have opened up dimensions of government accountability around elections and service delivery not preferred by policymakers and law makers.

The important lessons to be learned from the 'failure' of the Voter ID Card Project are the following:

- Lack of adequate political will and support: From its inception, there seemed to be little political and bureaucratic commitment to the project. The issue of providing ID cards to uniquely identify voters is a politically sensitive one, and without the unequivocal support of all stakeholders, the venture cannot succeed.
- Poor planning: The Voter ID Card Project suffered from poor planning and execution. Many of the mistakes that compromised the project could have been avoided if appropriate strategies had been carefully crafted prior to implementation.
- Over-ambitious target: The project was overly ambitious, with impractical deadlines set and unrealistic expectations.
- No pilot projects: A nationwide programme worth BDT 1,870 million (USD 46 million) should not have been undertaken on a massive scale right from the start. The project should have been carried out in phases, through medium-scale projects that incrementally expanded the Election Commission's earlier successful pilot initiatives, in order to identify risk factors and other lessons before extending the project to a national level.
- Inadequate cultural consideration: The project did not take into account cultural issues, such as the resistance of some women to having their photographs taken. An awareness campaign and other special measures should have been undertaken to persuade women to sit for the photographs.

academics and policymakers. It currently hosts more than 2,000 papers, articles and book chapters on Bangladesh and South Asia published by prominent research and publication houses. The website has incorporated an innovative mechanism of selling research online through prepaid cards.

ICT and ICT-related industries

The ICT market in Bangladesh is estimated to be worth approximately BDT 11,000 million (USD 165 million) per year (excluding the telecom sector). Of the total domestic ICT market in Bangladesh, computer and network hardware has the lion's share with BDT 6,000 million (USD 90 million), while the software segment amounts to BDT 1,700 million (USD 26 million). The rest is to the account of Internet and network services and other ITES (ICT-enabled services) segments.

In 2006, the number of hardware and software companies increased to 2,500 and 350 respectively, from 1,200 and 100 respectively, in 2000. The number of Internet service providers increased fivefold (from 30 to 150) and the number of training and similar service providers reached 150 in 2006 from 100 in 2000 (BCS 2006).

ICT outsourcing is gradually gaining ground in Bangladesh. Recent export statistics show that over the last two years, export volume grew by about 70 per cent per year. In financial year 2006, the total volume of export of software and ICT-enabled services was USD 26 million, which was more than double that of the previous year. In financial year 2002, the volume of such exports was only USD 2.8 million (EPB 2006). Although the total volume of export is still very low compared to the export figure of the software giant India, this sector is becoming mature and has begun to compete with Indian outsourcing companies. Also, many Indian off-shore companies are setting up offices in Bangladesh. Bangladeshi software and ITES providers have also been able to attract foreign direct investments through joint-venture projects with European partners. In 2005–06, delegations from as many as 40 European and North American companies visited Bangladesh, resulting in 12 joint venture projects.

Enabling policies and the regulatory environment for ICTs

Public policies and private programmes make up an environment for ICT-led economic growth and development. In many cases, the government's attitude of non-interference has facilitated growth.

In keeping with the designation of ICT as a 'Thrust Sector', the Ministry of Science and Technology was renamed as the Ministry of Science and Information & Communication Technology and the National Policy on Information and Communication Technology was adopted in 2002.

The government abolished import tax and VAT on computer hardware, software and accessories in 1998, bringing down significantly the cost of computers at the retail outlets. Now even low-income households can afford to have PCs. PC importation grew more than 35 per cent during 2000–2005 and the current number of PCs stands at 1.5 million (BCS 2006).

The National Telecommunication Policy 2000 paved the way for competition, which facilitated the achievement of a teledensity of 8.4 per cent within five years.

The establishment of the Bangladesh Telecom Regulatory Commission (BTRC) in 2002 was also a step in the right direction. BTRC has full authority to grant licenses to all providers of telephony, data, networks and content services. However, some of its regulatory functions overlap with those of the BTTB, and market distortion has not yet been fully corrected.

A draft Information and Communication Technology Act was formulated and sent to the Parliament for approval in 2002. Now known as the IT Act 2006, the law contains provisions for an Electronic Certification Authority which will be established to issue licenses to entities for electronic signature authentication. Under the law, electronic documents will be accepted for various types of transactions.

A weak point in the draft law is that it is not mandatory for the government and its agencies to accept, or prepare, electronic records or deeds (Chapter 1, Article 11). This will create problems for institutions intending to deal in electronic deeds, particularly the financial institutions. It also creates an opportunity for government agencies to avoid adopting e-governance.

The Act also stipulates a maximum of 10 years of imprisonment for violation of security and privacy and damage to information systems and networks, as well as for sending spam e-mail. The penalty for electronic publishing of information is five years. However, this runs counter to the freedom of the press and of expression, which are fundamental rights under the Constitution.

The draft Act was first presented to the Council of Ministers in 2002. It was returned to the Law Commission for review. It was then presented to the Council of Ministers as IT Act 2006. However, the Council has failed to enact the Law. Thus, the potential for e-commerce remains unexplored due to the lack of a legal framework for e-transactions.

To protect the ICT sector and the country's software products, the government has amended Copyright Act 2000. However, due to lack of law enforcement, software piracy continues to be a problem.

Education and capacity building programmes

The National Education Policy of Bangladesh recommends compulsory computer courses at the secondary school level. The policy mandates ICT integration by 2010 in Bangladesh's 5,694 and 15,748 junior and secondary level institutions, as well as 922 colleges, 347 professional institutes and 1,462 mid-level technical and vocational institutes. It also recommends the introduction of ICT education in the 12 new science and technology universities being established by the government, as well as the introduction of a nationwide central examination system to maintain quality standards in both formal and non-formal ICT education provision (BCS 2006).

Between 2000 and 2006, the number of ICT professionals in Bangladesh increased from 11,440 to 25,200 (BCS 2006). Public universities play an important role in supplying the market with ICT professionals. The Bangladesh University of Engineering and Technology (BUET) first introduced formal education in Information Technology in 1984. At present, 10 public universities are offering postgraduate diploma programmes in information technology. Private universities have been offering various ICT degrees since 1995. However, in terms of quality, only a few universities out of more than 50 can supply professionals who meet industry requirements.

There are more than 350 training institutions in the private sector producing different categories of ICT professionals. Many of them are franchised institutes of the National Institute of Information Technology (NIIT), APTECH, CMC, TULEC, NCC and many other foreign institutes. However, it has been reported that many of these institutes charge high fees from students while failing to maintain minimum standards of course delivery.

Government employees are increasingly becoming ICT-literate. About 28 per cent of officials and 29 per cent of Ministry/Division staff have received ICT training. At the Department/Corporation level, about 23 per cent of officers have received ICT training (BBS 2005).

There are also several private and civil society initiatives for developing the ICT skills of rural children. The Computer Literacy Programme run by the Volunteers' Association for Bangladesh, New Jersey (http://www.vabonline.org/vabnj/) and D.Net, as well as the School Online programme (www.

ri.org/countries.php?cid=4) operated by Relief International, are particularly noteworthy.

Open source and open content initiatives

The Bangladesh Open Source Network is leading the open source movement. A number of institutions, including the Bangla Innovation through Open Source (BIOS) and Ankur (www.bengalinux.org), have played a pioneering role in popularizing the concept of open source.

Open content has also become popular. D.Net was the first organization in Bangladesh to launch Bangla websites built on the open content concept. Other noteworthy websites with open content are http://www.pallitathya.org/, www.abolombon.org, www.meghbarta.com and www.gunijan.org. Bangla wikipedia (http://bn.wikipedia.org/wiki) already has more than 15,000 entries.

Research and development

There are sporadic R&D initiatives related to ICT. Most have to do with localization and Bangla computing. Ankur (http://www.bengalinux.org/new/content/view/53/35) is one of the most prominent initiatives. The Bangladesh Open Source Network is the apex body, leading localization and open source initiatives. In addition, BRAC University is implementing a localization project under the PAN Localization Project supported by the Pan Asia Network of IDRC. BRAC University is developing the Bangla OCR, a spell checker and search engine.

There are ongoing robotics projects at the BUET. Some of these have received international recognition, such as the 2005 Robocon Panasonic Award in Beijing, China.

D.Net is conducting research on reduction of telecentre operating costs and enhancement of income opportunities in order for telecentres to be financially independent while serving the rural community.

Challenges

The digital opportunity index (DOI) for Bangladesh is only 0.20, and the country's overall ranking is 139th, which is better only than Nepal among its South Asian neighbours (ITU 2006). This proves that Bangladesh still has a long way to go in putting ICTs in the mainstream of efforts to achieve economic development and social well-being.

Investment is the biggest challenge both for the private sector-led ICT industry and ICT for development. Government allocation for ICTs remains small and scattered. Although the national ICT policy announced an allocation for ICTs of 2 per cent of the national budget, in 2006 the allocation was only 0.8 per cent. It is also unclear what the nature of the spending on ICT might be, due to ambiguous budget line items. Investment in telecommunications was relatively better. However, investment in human resource development is still missing.

Expenditure for rural ICT infrastructure is still not on the radar of development partners. The private sector is not likely to invest in ICT infrastructure in the rural areas until it becomes a licensing requirement. It is not clear to these groups that rural Bangladesh can be changed through ICTs, if proper infrastructure is made available with an appropriate pricing policy. However, grassroots initiatives show great potential.

Addressing the gender dimension of access to information through ICTs is also a challenge. The successful functioning of D.Net's Help Line in rural areas could contribute to women empowerment through ICTs. Through the project, the educated women in the villages, called 'mobile ladies', became the symbol of empowerment in the villages by providing access to livelihood information and advice of experts using mobile phones. The concept, which received the 2005 Gender and ICT Award at the World Summit on Information Society (D.Net 2005), must be replicated across the country. But once again, financing is a problem.

The institutions and government mechanisms are also a major challenge. The Ministry of Science and ICT is not an 'important' ministry for the government. A residual attitude to science and ICT still prevails among policymakers, and the Ministry is often a government dumping ground: people within the government who do not fit elsewhere are assigned to the Ministry. As a result, the Ministry has difficulty taking crucial decisions. It also does not receive adequate budgetary allocation to make its policy commitments a reality. Multiple centres of authorities add to the problem. As mentioned, the Prime Minister's Office took over

a number of responsibilities regarding ICT promotion, which literally made the Ministry redundant. Institutional restructuring is urgent, but policymakers seem reluctant to pursue this. If telecommunication is not merged with the Ministry of Science and ICT, then it would be difficult to address many important issues, such as convergence.

The private sector, NGOs and civil society organizations are vibrant in Bangladesh. They are the driving force of economic progress, despite all odds. With effective and efficient government, Bangladesh could become a middle income country within a decade.

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