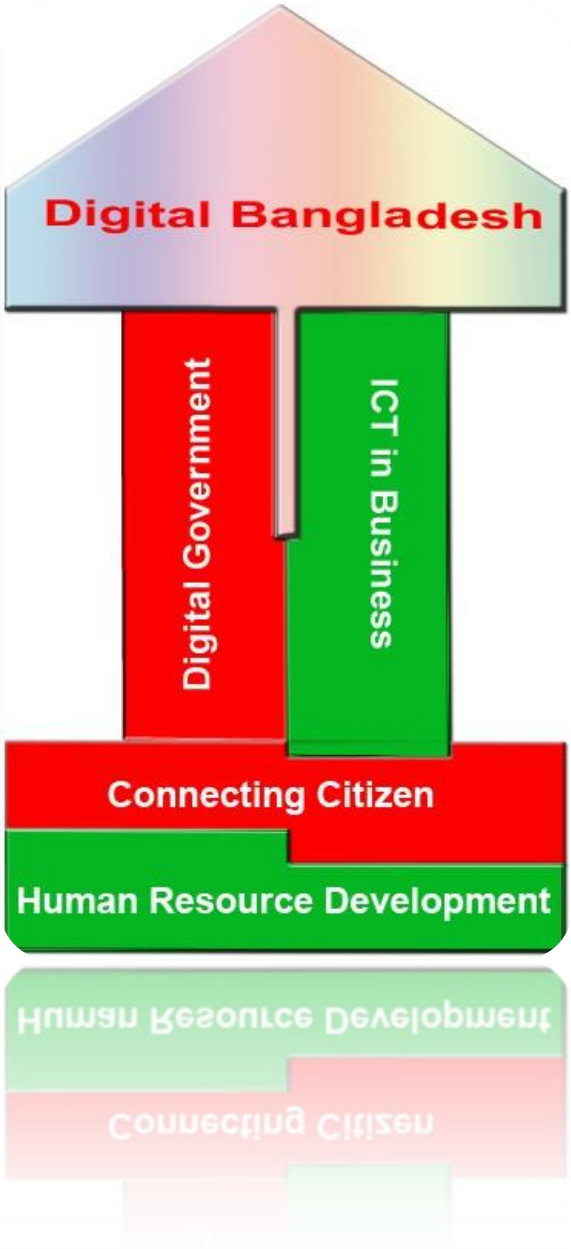

ACHIEVING DIGITAL BANGLADESH BY 2021 AND BEYOND

Background paper for the 7th Five Year Plan (7FYP)

ABSTRACT

This tracer study is part of 7th Five Year Plan background study series. It focuses on the implementation of Digital Bangladesh vision. The document reviews the progress made in this regard during the 6th Five Year Plan period and recommends specific priorities as well as recommendations to be considered for 7th Five Year Plan.

Hasanuzzaman Zaman and Rokonuzzaman, PhD

Executive Summary (To be attached)

Table of Contents

Achieving Digital Bangladesh by 2021 and Beyond[1]

Background paper for the 7th Five Year Plan (7FYP)

Hasanuzzaman Zaman and Rokonuzzaman, PhD[2]

1 Introduction

"Digital Bangladesh" is an integral part of the government's *Vision 2021*—which promises a prosperous and equitable middle-income Bangladesh by its golden jubilee of independence. The Digital Bangladesh vision, arguably, runs parallel to the Information Society vision advocated by the World Summit on Information Society (WSIS). The Honorable Finance Minister of Bangladesh elaborated on the concept in his budget 2009-10 speech as a socio-economic transformation process, enabled by information and communication technologies (ICTs). In the same year, the Honorable Prime Minister outlined the Digital Bangladesh having four key priorities – (a) developing human resources ready for the 21st century; (b) connecting citizens in ways most meaningful to them; (c) taking services to citizens' doorsteps; and, (d) making the private sector and market more productive and competitive through the use of digital technology. Hence, it was only natural that the 6th Five Year Plan (6FYP) places an equal importance to Digital Bangladesh as part of the nation's development strategy.

During the 6FYP period, the country has made important strides in utilizing technology to bring in tangible transformation in all four areas mentioned by the Prime Minister. Progress made in bringing government services to the doorsteps of citizen is probably the area where Bangladesh registered most significant progress. Vertical (with government ministries and agencies) and horizontal (i.e., with citizens) policy advocacy and development interventions have resulted in a number of citizen-centric e-initiatives and services such as multimedia classroom and teacher-led education content development in public schools, mobile phone based health service from Upazila Health Complex, agricultural and other livelihood information and services (e-Tathyakosh) online through grassroots outlets.

Recent recognition by International Telecom Union (ITU) for Bangladesh's innovative approaches towards introducing ICT-backed reforms in public service delivery (ITU, 2014) or the WSIS/ITU award for grassroots service delivery kiosks (WSIS Award 2014), can be cited in this regard. Also, it is worth mentioning that the "Alliance for Financial Inclusion" (AFI), an international organization of central banks and other financial regulators, awarded Bangladesh Bank for promoting financial inclusion policies in 2014.

A recent white paper by KPMG also echoes the progress made during the period as it observes that the "'Digital Bangladesh' initiative of the government is helping setup infrastructure for enhanced connectivity, ICT based citizen service delivery and ICT based education system. There is evidence of many global players, like Samsung, AMD, VizRT, WorldBridge Global – setting up operations in Bangladesh," (KPMG, 2012: 4).

1.1 Framing Digital Bangladesh for the 7th Five Year Plan (7FYP)

[1] This is a draft version of the study document for comments. Please do not quote.

[2] The authors acknowledge the review done by Mr. Nick Beresford, Country Director, UNDP. At the same time, the editorial support of Mr. KAM Morshed, Assistant Country Director, UNDP and Mr. Anir Chowdhury, Policy Advisor, Access to Information (A2I) project is acknowledged.

A plethora of acts, policies and guidelines are in place, some are more robust than the others, which is guiding the nation towards the realization of Digital Bangladesh (see box 1). Two of the documents, the ICT Policy 2009 and the 'Strategic Priorities for Digital Bangladesh' (A2I, 2011) also contain elaborate work plans. Because of the cross-cutting nature of the vision, these work plans encompass priorities in almost all development sectors. Hence, the 7th Five Year Plan (7FYP) needs to consult and align with those—at the same time, it also needs to identify scope for revising those documents in light of changes in the national priorities set in the 6FYP.

Box 1: Digital Bangladesh policies and regulatory framework

- ICT Policy 2009
- Right to Information Act 2009
- Perspective Plan
- ICT Act 2013 (amended)
- Strategic Priorities of Digital Bangladesh
- Cyber Security Policy 2010
- Rural Connectivity Policy Guideline 2010
- Broadband Policy
- Mobile Keypad Standardization Policy
- Guidelines for Utility Bill Payment
- e-Krishi Policy
- National e-Governance Architecture
- Mobile Banking Policy Guideline
- National Telecom Policy 2010
- Guidelines on Mobile Financial Services (MFS) for the Bank
- Secretariat Instructions 2014 (amended)
- Proactive Information Disclosure Guidelines 2014
- Innovation Team gazette
- National Portal management gazette

In addition, after the 6FYP was operationalized, the General Economics Division (GED) formulated a 'Perspective Plan' to set strategic directions and provide a broad outline for making Vision 2021 a reality (GED, 2012). This framework leaves implementation of the strategies to the two consecutive five year plans that is 6FYP (FY2010/11-FY2014/15) and 7FYP (FY2015/16- FY2019/20). Action plans for Digital Bangladesh for the 7FYP is also expected to be in line with the priorities set in the Perspective Plan after careful consideration of the progress recorded with regards to the set targets in 6FYP alongside other contextual realities.

ICT is the key driver of Digital Bangladesh. A September 2014 *McKinsey Quarterly* article concluded that "global flows of data, finance, talent, and trade are poised to triple in the decade ahead, from levels that already represent a massive leap forward," (Dobbs *et al.* 2014: 6). Less than 3 per cent of the world's population had a mobile phone and less than 1 per cent was on the internet 20 years ago; whereas today, more than two-thirds of the world's population have access to a mobile phone, and one-third of it is on the internet (ibid *opcit*). Bangladesh is no exception to this leapfrog where teledensity increased from less than 4 per cent to 78 per cent between 2004 and 2014 (MoF, 2014a). This robust growth in the last decade can be attributed to the phenomenal uptake of mobile phones – from 5 million to 116 million (more than 70 per cent of the population) – alongside robust growth in the number of internet subscribers which stands at 36 million today, or nearly one-quarter of the population, from less than a million a decade back.

Another continuing trend is the prominence of ICTs in promoting "good governance" including facilitating more effective role of the state in promoting economic growth and social development. Another related trend is the changing role of ICTs in influencing economic growth and empowerment of the traditionally disadvantaged groups. A report by the OECD, titled, *Innovation and Inclusive Development*, captures this in the following way:

> "ICTs constitute the most transformative innovation of the recent past. ICTs are interesting in the context of the inclusive development debate because of their ability to strengthen connectivity not only of higher-income groups but also of those at the lower income level," (OECD 2012: 43).

One final consideration for the 7FYP is the expectation that Bangladesh will become a lower-middle income country during this plan phase, and hence, the Plan needs to aid Bangladesh to both cross the LDC graduation thresholds as well as support the country to remain above the threshold level to be recognized as a middle-income country. Hence, the plan and this document emphasizes on both growth with justice and resilience.

1.2 Objectives and methodology

It is to be pointed out that for realization of Digital Bangladesh, a *Perspective Plan* has been formulated (GED, 2012). The latter sets strategic directions and provides a broad outline for making Vision 2021 a reality. This framework leaves considerable scope for the *6th Five Year Plan* (FY2010/11-FY2014/15), or 6FYP, and the *7th Five Year Plan* (FY2015/16- FY2019/20), or 7FYP, to work out operational details of how Bangladesh should proceed, considering progress recorded with regards to the set targets and other contextual realities. The objectives and targets of the FYPs need to be aligned and made consistent with the long-term strategic goals articulated in the Perspective Plan.

The present background paper is a tracer study which offers an overview of the Digital Bangladesh's progress– from both the institutional and market perspectives. It is aimed at informing the preparation of the Digital Bangladesh agendas for the upcoming 7FYP through conducting a review of the achievements and setbacks with regards to the 6FYP. The two *inter alia* objectives of the background paper are to: (a) review the progress made with regard to the 85 targets mentioned in the 6FYP (GED, 2010); and, (b) provide recommendations for the preparing of the 7FYP, which is to move Bangladesh closer to Vision 2021 as envisaged under the long-term strategic goals of the Perspective Plan (GED, 2012).

The report blends in a mix of primary and secondary sources of information. Relevant literature was reviewed to learn about the developments of the Digital Bangladesh agenda in lieu with the 6FYP and the Perspective Plan. In particular, the booklet prepared by the Finance Division *Digital Bangladesh Journey: 2014 Update* helped to set the ground for the tracer study (MoF, 2014a). Another report, by the PMO's A2I program *Strategic Priorities of Digital Bangladesh* helped to identify the challenges and opportunities for the 7FYP (A2I, 2011). This background study is also informed by discussions of open-ended interviews conducted with relevant specialists engaged in the preparation of the 7FYP and also in the implementation of Digital Bangladesh initiatives.[3]

1.3 Layout

The following section reviews the progress made with regard to 6FYP's targets alongside the Digital Bangladesh long-term strategic goals mentioned under the Perspective Plan. It is to be pointed out that

[3] The authors met with representatives from Policy Research Institute (PRI), Bangladesh Association of Software and Information Services (BASIS) and A2I.

Section 2 to *Section 5* reviews 6FYP's targets for Digital Bangladesh and also offer agendas for the upcoming 7FYP. An overview of the progress with regard to the 85 indicators is presented in Annex 1. *Section 6*offers a gender analysis of Digital Bangladesh where it is evident that there is a paucity of data to track progress of such transformation. *Section 7* looks at issues of resilience from the Digital Bangladesh perspective. *Section 8* then presents resource mobilization analysis drawing on budgetary trends and current projects, alongside the *Medium Term Macroeconomic Policy Statement* (MTMPS). *Section 9* concludes proposing a set of key recommendations which should be given immediate priority for the next five years.

2 ICT and Economic Growth

2.1 Review of 6FYP's targets

Due to continued expansion of the digital economy across the globe, growing expectations are riding particularly in G20 and emerging countries. In G20 countries, the digital economy is growing at more than 10 per cent a year (Dean et *al*., 2012). The growth of the internet economy in emerging countries is even faster: 12-25 per cent per year (WEF, 2014). Internet-based economic or iGDP activity is expected to reach USD 4.2 trillion in the G-20 nations by 2016, or more than 5 per cent of GDP. According to the McKinsey Global Study, the iGDP of Africa – iGDP is the measure of internet's contribution to a country's economic gain – stands at USD 18 billion, which is expected to reach USD 300 billion by 2025 (Manyika *et al*., 2013). Recently, a McKinsey study found internet economy is contributing to faster GDP growth in China as a result of increased productivity, innovation and consumption (Woetzel, *et al*., 2014).

Despite the absence of quantitative assessment (iGDP for Bangladesh) of contribution of digital economy to Bangladesh's GDP, there is a growing perception that progress is being made to meet the e-business objective of 6FYP to enable businesses, irrespective of their size, to avail ICT for production and to gain market access domestically and internationally. Following two sub-sections summarize the progress.

2.1.1 Online transaction and payment infrastructure

Usage of ICT in e-transactions, e-commerce and e-procurement have been made possible through the amended ICT Act 2009 (amendment) which has applied the provision for digital signature certificate through appointing the 6 certified Controller of Certifying Authority, (CCAP) organizations. 3 CAs have developed the capacity to provide digital signature certificates to government and private organizations and individuals. The BCC has been certified as the CA for issuing digital certificates to the government organizations. The Right to Information (RTI) Act 2009 has taken effect in order to make information easily available. As noted in the preceding section, Bangladesh Bank has already inaugurated NPS to support online transactions.

2.1.2 Promotion of e-business and commerce

The capacity of local ICT industry plays an important role to empower businesses and citizens. To support the development of the ICT industry, Bangladesh Hi-Tech Park Act was passed in 2010. Subsequently, Bangladesh Hi-Tech Park Authority (BHTPA) was established in 2010. The purpose of the Act is to establish BHTPA for creation, management, operation and development of hi-tech parks across the country.

Bangladesh's first university based incubator is being established at the campus of Chittagong University of Engineering and Technology (CUET). This incubator will help to bridge the gap

between ICT industries and academia for fostering meaningful research, innovation, entrepreneurship, job creation, and industry ready human resource development. More than BDT 95 million have been allocated over 2013-2015 to develop and promote the model of high value ICT research, innovations and entrepreneurships in the country.

Although new fund has not been established, changes have been made to policy of existing fund to meet financing requirement of the ICT industry. The Investment Promotion and Financing Facility (IPFF) project of the World Bank is aimed at funding PPP Projects, co-sponsored by government of Bangladesh and the Bank. Recently, the policy of eligible sector list has been updated to include ICT infrastructure projects. Upon having the policy change, US$20 million fund has already been approved for a private nationwide telecommunication transmission network (NTTN) operator to expand fiber optics backbone infrastructure.

To establish special purpose facility to meet unique infrastructure requirement of the ICT industry, Kaliakoir High-Tech park, Janata Tower Software Technology park and Jessore Software Technology park are being implemented. Moreover, three more parks have been proposed: Mohakhali IT Village, Silicon City Rajshahi, and Electronic city, Sylhet.

To address intelligence gap of global human resource needs vis-à-vis local capability to identify national focus, World Bank's *Leveraging ICT for Growth* (LICT) project, which is being implemented by BCC, has contracted an international consultancy, Tholons, to conduct a needs assessment research. Moreover, the LICT project has been collecting relevant data, including human resources, of different segments of the IT industry of Bangladesh. Such data will be useful in creating the strategic roadmap for human resource development.

Progress has made in arranging annual fairs, exhibitions and targeted workshops for local enterprises and organizing Road shows and other interactive programs such as seminars. The Government (ICT Division) in partnership with Bangladesh Association of Software and Information Services (BASIS) organized Digital World 2014. The exposition had three components: software, e-governance and mobile innovation. In this event, there were 30 seminars and 10 technical sessions in which about 160 enterprises featured their innovations and products. ICT Division in partnership with BASIS organized eASiA 2011 with the slogan - *Realizing Digital Nation*. The conference provided a unique opportunity for stakeholders to share a level-playing ground through active conferencing and networking.

It is perceived that promotion of ICT based model targeting micro, small and medium enterprises (MSMEs) will play important role in fostering entrepreneurships in the country. To take advantage from this potential, SME Foundation has undertaken a project to study growth potentials of software companies and constraints limiting the exploitation of those potentials.

In order to make ICT industry vibrant, a number of activities have been implemented. BASIS participated in the CeBIT 2013, the largest IT expo in Europe which was held at Hannover Germany from March 5-9, 2013. BASIS in collaboration with Export Promotion Bureau took part in this event. ICT business promotion council spearheaded by Ministry of Commerce on a PPP basis, supported BASIS in promoting ICT industry including the publication of software and IT service catalog 2014. It is to be pointed out that Bangladesh was among the first 30 most attractive destinations for IT/ITES outsourcing by a global consultancy, Gartner.[4] Also, Bangladesh was rated as the 26th most preferred

[4]Gartner - http://www.gartner.com/it/page.jsp?id=1500514 (cited in KPMG, 2012).

destination of IT/ITES outsourcing by another international consultancy, ATKearney.[5] Bangladesh entered the latter's *Global Services Location Index* in 2014.

In order to localize content for inclusive growth, Bangladesh has already joined the Unicode Consortium Forum as a member. As a result, there is an opportunity now to develop and share content in Bangla on agriculture, food and SMME. To facilitate it further, BCC undertook a few research initiatives on how to expand the use of Bangla through development of (a) Bangla spell checker, (b) "text to speech, speech to text" software; and, (c) "Bangla Word Sorting" software. Mobile Bangla keypad has been standardized for using Bangla in mobile phone. The e-Tathyakosh, a national e-content repository, is allowing public and non-state actors to publish and share their information in a more targeted manner.

To share indigenous knowledge and innovations related to pest management, crop preservation, etc a number of projects have been implemented. For instance, with the SIF's support, Bangla OCR software has been developed by a local IT company to facilitate sharing of indigenous knowledge. Digital innovation fairs have been organized firstly at Dhaka, then to other district level and upazila levels to create demands for e-Service and to make people aware of the e-services available at the government and nongovernment level. As noted earlier, the development of National Portal comprising of the 25,000 web sites will also contribute to compile and share indigenous knowledge and innovations.

There appears to be significant opportunity for strengthening supply chain of the agricultural production and distribution system of Bangladesh. To demonstrate such potential, a project has been implemented to strengthen sugarcane supply chain. To reduce the uncertainty of the previous paper-based (purjee) system by enabling farmers with punctual delivery of sugarcane to the mills benefiting farmers and sugar mills alike, e-Purjee system has been introduced in all state-owned sugar mills. As a result, as many as 200,000 sugar cane farmers are being benefited because they now receive "purjee" information through mobile SMS. This success will lead to wider capacity development to support the agricultural supply chain management system through business portals. Moreover, several e-commerce sites have already come to operation in the country to trade agricultural produce. A recent report of "Amar Desh Amar Gram e-shop" indicated that they have around 16,000 people in Dhaka alone who buy even vegetables from them. However, the exact impact and extent of these shops are still not verified. Their contribution is recognized in 2012 with the wining of WITSA Global ICT Awards.

In Bangladesh, there is an immense opportunity of improving productivity of sustainable agriculture through utilization of GIS based soil mapping system to analyze detailed data to provide information relating to crop suitability, land zoning, nutrient status and fertilizer dosage. To benefit from this opportunity, the Survey Department's project, "Improvement of Digital Mapping System of Survey of Bangladesh," is aimed at creating topographical digital maps: 1: 25,000 scale (over 988 sheets) for the entire country and 1: 5,000 scale (over 263 sheets) for the division-level cities. Work on the construction of a 5-storey Digital Mapping Center has been completed under this project.

Implications of mobile financial services on poverty reduction and economic growth are well perceived (Jack and Suri, 2010). Within a short span of time, Bangladesh has achieved significant progress in mobile based financial services. As noted earlier, Bangladesh bank has already given approval to 28 banks to provide mobile banking services.

[5]ATKearney - http://www.atkearney.com/documents/10192/5082922/A+Wealth+of+Choices.pdf/61c80111-41b2-4411-ad1e-db4a3d6d5f0d (Accessed on 28 September 2014).

2.2 Agendas for 7FYP

IT/ITES industry in Bangladesh has gained prominence in recent times. Nevertheless, measures need to be adopted to capitalize its growing share in global outsourcing business, which is becoming the largest employer of educated youth. Although a significant number of educated and qualified entrepreneurs have started ICT ventures during the last couple of decades, most are trapped in the 'small size-low growth' situation because of fund constraints. Besides, there is severe gap in both quantity and quality as far as the human resource for software industry is concerned. This is due to institutional deficiency of the tertiary ICT-related educational institutions (lack of industry orientation of teaching resources, slowness of curriculum modernization etc.) as well as inadequate quality input from the higher secondary education system to the tertiary level. Hence, the IT companies' cash flow are often erratic and cyclical, not favoring long term strategic planning.

High cost of bandwidth deters growth of domestic market for ITES and absence of IT park/software technology park, high internet cost, no redundant submarine cable, power shortage are some of the common infrastructural problems for most of the IT enterprises. Growth of export of ICT industry is below the expected level due to inadequacy in entrepreneurial dynamism, limited overseas marketing budget and absence of government level initiatives in promoting country brand. Policies and facilities are not friendly for value added service providers in the mobile phone industry. The underlying vision is to unleash potential of youth's talent and create good quality employment for them in the IT sector through cluster of innovation driven entrepreneurial initiatives.

2.2.1 Access to finance

Bangladesh Bank and Ministry of Finance should undertake specialized program for enabling banking and financial institutions to provide finance to IT industry. It is also important to build capacity of mid-level and top level bank officials to finance ICT industry with proper risk mitigation strategies. The program will also include support to banking and financial institutions to launch special working capital and long term project funding. Special provisions for initial public offer (IPO) or stock market listing (e.g. low level of mandatory paid up capital) will be explored for IT enterprises so that these companies can raise required capital from share market.

The government may consider creation of venture capital fund to attract innovative/creative young IT businessmen and professionals and at the same time, persuade development partners for providing project assistance in ICT sector. The IT component of the government's Equity Entrepreneurship Fund (EEF) can be amended for easing access to capital.

2.2.2 High-tech Park

The government in collaboration with development partners will build High-tech Park with complete facilities (facilities for employees, schools, medical support, recreation facilities etc). PPP modality should be considered as an option. The role of Kaliakair Hi Tech Park deserves scrutiny. It appears that the facilities need to be provided in the Capital or it's nearby for piloting small scale initiatives. Upon successful piloting, the scale up may require a remote facility like Kaliakair.

Here, lessons can be drawn from Malaysia's Multimedia Super Corridor (MSC). In the mid-1990s, the government of Malaysia established the MSC and began to encourage ICT companies, regardless of their origin, to invest in Malaysia. Initially, the response was poor - less than 200 companies relocated to the MSC. However, by the end of 2005, a total of 1,421 companies were awarded MSC status. By the end of August, 2012 the number of companies awarded with the MSC stood at 3,037 where the lion's share of the companies in the MSC is owned by citizens of Malaysia (nearly three-quarters),

while the rest are foreign-owned or operated joint ventures.[6] The MSC has helped to create more job opportunities for Malaysians nationwide, and at the same time, provided space for technological advancement for bringing about innovations in the public service delivery system.

It is to be noted that Malaysia started with a hi-tech park and then proceeded to experiment with innovations in public services. Bangladesh has already witnessed a number of innovations in the public service delivery without a proper space facilitating the entire process.

The ICT Division of GoB with financial assistance form the World Bank and DFID implementing the Kaliakoir Hi-Tech Park. A component of the "Private Sector Development Support Project (PSDSP)" named "Support to Development of Kaliakoir Hi-Tech Park/IT parks (SDKHTP)"[7] has already started operation. While the project was signed in May 2011, because of the delay in land related clearance from Bangladesh Railway, the project received nod from ECNEC in October 2013. Still issues of other infrastructure issues such as external access roads needs additional work. This demonstrate the need for better coordination among various actors in government. Considering the fact that the initial decision to establish the park was taken in 1999, additional factors such as change in government priorities can also be identified as one of the reason for delay.

It is now important to use the lessons learned in Kaliakoir Hi-Tech park in the implementation of other High-Tech parks that the government has already decided to establish specially when the issue of land has already identified as the key bottleneck in implementing the decision.

~~World Bank has recently approved loans for the hi-tech park. This will be the first site dedicate for ICT development in the country. In view of the progress recorded by Bangladesh in promoting e-governance in public service delivery, developed partners need to put in a concerted effort in order to accelerate the establishment of the hi-tech park undertaking prototypes in or nearby the Capital.~~

2.2.3 PPP and local ownership

All ministries and various government agencies could identify projects where ICTs can be mainstreamed as well as projects related to building ICT infrastructure for implementation where Bangladeshi companies will be given preference. In case of joint venture initiatives, the stake of local companies should be set at least 51 per cent. Ministries can prepare projects to be implemented under PPP framework where private sector will provide services to the citizens and business on behalf of the government. A series of programs through Office of the PPP should be organized for attracting projects under the PPP modality.

2.2.4 A branding strategy

The Ministry of Commerce/Ministry of ICT in collaboration with all ICT-related business associations can consider developing a 10-year master plan for promoting country brand, including specific actions related to inclusion of Bangladesh in globally reputed outsourcing/off-shoring index/ranking list. The non-resident Bangladeshi (NRB) associations are organized and active in many cities of the developed countries. They can be used as promoters of IT/ITES industries of Bangladesh.

[6] National ICT Association of Malaysia. (2012). *Malaysian ICT Sectoral Outlook: Trends, Challenges and Prospects*. Asia-Pacific Economic Cooperation.

[7] See http://sdkhtp.htpbd.org.bd/ for details.

2.2.5 Human resource development

A long term plan can be undertaken so that current supply of 5,000 yearly IT graduates can be doubled in next 2/3 years. Students from non-metropolitan cities with relatively low overseas migration trends (colleges under national universities must start IT education) will be encouraged to enroll. Also, special education loan policy and scholarship should be designed to encourage students for IT education enrollment. More industry involvement will be ensured during academic programs.

It is known that labor cost of IT/ITES sector in Bangladesh is much cheaper compared with India, China and Pakistan. This is a comparative advantage in this particular sector because in the IT/ITES industry, labor is one of the key determinants of the cost component, which governs outsourcing decisions. In the last decade, the wage rate of IT sector in the USA doubled. In 1997, the wage rate of a programmer was USD 2,700, which increased to USD 5,460 in 2006. This trend is also observed in India. However, in Bangladesh the rate is not beyond the range of USD 360-700. Wider publicity at home and abroad, through a comprehensive branding strategy, on the preponderance of potential IT workers, will play an important role in promoting IT/ITES industry of Bangladesh.

According to BASIS, ICT industry has consistently grown in recent years at 20 to 30 per cent per annum. Over 800 registered ICT companies generated total revenues of approximately USD 250 million. More than 75 per cent of companies are involved in customized application development and maintenance, 50 per cent are dedicated to IT enabled services, and 45 per cent offer e-commerce/web services.

If talent hunting could be carried out by IT/ITES expansion in other cities, districts and divisions (such as Comilla, Rajshahi, Bogra and Khulna) of the country, it would have been possible to identify the potential talents. As IT/ITES industry is women-friendly, creation of 'women labor pool' could deliver better results. India and China are competing with each other to capture the major share of the IT market. This can be a good opportunity for Bangladesh. Small companies rejected by India and China can be attracted to Bangladesh. A number of companies are trying to expand their business in the sub-continent and Bangladesh can seize this opportunity to expand its market share, which will heavily depend on the strength of its ICT infrastructure and literacy levels.

3 ICT and Education

The 6FYP envisaged restructuring the education system to make it more attuned with the technologically evolving global landscape (GED, 2010: 271). "The role of ICT in boosting the quality of education will be emphasized and steps will be taken for narrowing the ICT skills between urban and rural people," (ibid *opcit*). The human resource development category has four parts: (a) building e-learning infrastructure, i.e., one school, one computer lab, smart class room with e-learning facilities; (b) ICT education; (c) ICT-based education; and, (d) vocational ICT training facilities for the youth. On the other hand, the Perspective Plan calls for making ICT education mandatory at the secondary level by 2013 and also establishment of computer labs at the primary level by 2021 (GED, 2012: 57). Whilst the first target has been met, significant progress has been registered with regard to the latter.

3.1 Review of 6FYP's targets

3.1.1 Building e-learning infrastructure

A model is being implemented meeting two interrelated objectives: (a) creation of smart/multimedia classrooms; and, (b) training teachers to create digital contents for their use in classrooms. The

Ministry of Education (MoE) and Ministry of Primary and Mass Education (MoPME) undertook two initiatives *multimedia classroom* (MMC) and *Teacher-led Digital Content Development* after successful prototypes. Two separate projects under MoE and MoPME are currently underway aimed at establishing 20,500 MMCs and 7,000 MMCs at the secondary and primary level respectively.

The Bangladesh Computer Council (BCC) has set up computer labs in 3,544 educational institutions in order to expand ICT education at the grassroots level. For increasing the usage of internet by educational institutions, it is provided free of cost. Bangladesh Research and Education Network (BdREN) has been established in 6 universities and gradually, all universities will be brought under this network. BdREN is connected to the Trans Euroasia Information Network (TEIN-3).

3.1.2 ICT education

With regard to the second area, there has not been much progress (50 per cent of the targets). ICT courses for grade VI-XII have been introduced besides e-book conversion of 325 textbooks. An electronic teaching program for students (e-learning) has been introduced. The *Bangladesh National Library Modernization Project* is working in the following areas: digital library infrastructure, collect materials for full-text digitization, permanent store, create digital data storage, online data transfer, automatic binding and conservation measures to scientific and research.

ICT literacy evaluation as part of Public Service entrance exams has been introduced, but it needs to be extended in terms of depth of questions regarding the usage of ICTs for good governance in the delivery of public provisions.

3.1.3 ICT-based education

Bangladesh has made some progress in this third area. *Secondary and Higher Secondary ICT based Education* project has established 20,000 MMCs (13,700 school, 5,200 madrassas and 1,600 colleges) – internet connectivity, one laptop and one multimedia. The *Basic ICT Skills Transfer up-to-Upazila-level* has set up computer labs at 192 educational institutions. It has provided training to 7,890 teachers as master trainers and to 112,189 students. In addition, 12,500 teachers have been trained to create multimedia content. These teachers are creating and sharing multimedia contents through a Teacher's Portal (https://www.teachers.gov.bd/), which is a central repository for e-learning content for teacher training and for all students. Incentives, through public recognition of best contents, are being awarded to encourage teachers' participation. Digital World (international), Digital Innovation Fair (district and sub-district level), Education Leaders' Conference (international), and Teachers' Conference (national) are being organized.

3.1.4 Vocational ICT training

Finally, in terms of spurring ICT related vocational training, 4 MMCs in each of 64 Technical School and College (TSC) have been set up and teachers' training is underway for all teachers. Bangladesh Open University (BoU) has undertaken an initiative to launch e-learning/online program for its target audiences. Bureau of Manpower, Employment and Training (BMET) is also set to launch e-learning courses for migrant workers. Under the 7FYP, proposals could be made to enable delivery of such e-learning courses through Digital Centers which have been established across rural and urban Bangladesh.

3.2 Agendas for 7FYP

The present education system does cater to the 21stcentury landscape. Professional development for teachers including refresher training is inadequate or absent. Existing teacher training sessions are

provided at the cost of significant reduction to contact hours. There is high teacher absenteeism in primary schools. Vocational stream is not attractive for students and parents. Education administration is too centralized for effective monitoring, evaluation and further modernization. Focus of ICT in education is predominantly on ICT literacy which does not benefit students in primary and secondary schools due to its irrelevance to the rest of the curriculum.

Ultimately, every student will be equipped to face the challenges of the globalized 21st century through (a) reforming curriculum, pedagogy and teacher's capacity building to ensure quality education for all; (b) ensuring transparency, efficiency and effectiveness at all levels of educational administration; and, (c) securing accountability to the students and parents to enable stakeholders' participation in policymaking and decisions.

3.2.1 Interactive multimedia classrooms in every school

Every primary and secondary school will establish a multimedia classroom with a power-saving internet-connected laptop, projector/large-screen-TV and teachers professionally trained to use multimedia content for general subjects. Teachers will use digital content in the classroom for collaborative, problem solving sessions.

3.2.2 Incentives for teachers based on performance and innovation

Salary increments, bonuses and professional advancement for teachers may be instituted over time based on innovation and educational outcomes. Non-fiscal incentives may be designed in terms of recognition and opportunities for leadership in different levels. Some awards have been introduced but more incentives will need to be explored to make the system more competitive.

3.2.3 ICT literacy for students in tertiary education

ICT literacy, although not a necessity to be formally imparted in primary and secondary levels, will be mandatorily imparted at the tertiary level to prepare students for the employment market which increasingly demands ICT skills.

For tertiary education, and partially for ~~primary~~ secondary education, the internet's capacity for two-way interaction offers the greatest promise for improving access and affordability and for providing flexibility to combine work with further study. Specialized education in ICTs may be encouraged to feed the burgeoning IT industry. Alignment of the overall educational curriculum to embrace new ICTs in a broad but pervasive way focusing on education in global languages, especially English, is the key to expanding access to global content and employment market. This will have positive repercussions for the ITES industry of Bangladesh.

3.2.4 Accelerating ~~BdREN~~ Research Network

The internet was invented, in part, to coordinate higher research. Unfortunately, Bangladesh has been slow to get connected and fully harness such network of international research institutes. Bangladesh University Grants Commission is the host of Bangladesh Research and Education Network (BdREN). The network is now connected to several international research communities in Asia Pacific, Europe and North America, via the Trans-Eurasia Information Network 3 (TEIN3) and Internet2[8]. T Researchers connected to BdREN are able to communicate and collaborate with their counterparts overseas over the virtual work space

[8] Please see http://www.bdren.net.bd/index.php

at improved network performance and lower network latency. However, more needs to be done to expand the network both externally and internally in order to
~~Work on the BdREN should be accelerated in order to~~ ensure that a sizeable tertiary education population, has collaborative access to the best and brightest minds.

3.2.5 Monitoring at the field level

Close monitoring at the school level is possible through use of mobile phones and internet. Mobiles can be used to track not only presence (or absence) of the teachers and students, but quality of the education, examination results trends, etc. can be monitored through mobile and similar hand-held devices. Successful models have already been tested in the country.

3.2.6 Education TV or web TV

The almost unused second terrestrial channel of the government may be turned into an education TV channel after the broadcast of parliamentary sessions. As many as sixteen ministries have already shown interest for producing educational content for this TV channel. HDTV work is underway as indicated in section 2.1.1.

3.2.7 Financing ICT education

Special plans are needed to prevent brain drain and to encourage the meritorious and young IT graduates. In this regard, special education loan scheme and scholarship programs need to be introduced for suburban and rural meritorious students who are comparatively less likely to move abroad. This will facilitate their admission in universities in IT related subjects. The government may consider providing long term loan facilities (at least 4 year grace period and maximum 4 per cent interest) via commercial banks to create opportunities for IT education for the poor but meritorious students. They will be entitled to repay the loans after getting jobs on completion of graduation.

3.2.8 National Certifying Authority

A National Certifying Authority should be established immediately for ensuring uniformity in the quality of IT students graduating from different public and private universities. The Authority could begin its work by launching its own massive open online courses (MOOCs) targeting fresh university graduates to groom them into a world class IT manpower.

3.2.9 Youth empowerment

Since the launch of the Digital Bangladesh vision nearly 6 years back, the youth of Bangladesh, including the disadvantaged groups like women, the extreme poor, and person with disabilities accessed necessary information, skills and education to transform their lives individually and as members of groups. Nevertheless, lack of participation in decisions and policies is abysmally low which perpetuates risky behaviors among the youth (such as early pregnancies, substance abuse, sexually transmitted infections including HIV/AIDS, violence, criminal and gang activities, and premature death). Besides, poor job market opportunities are a key issue of concern. The absence of an organized network to distribute centralized information on various development sectors to local levels which can be spearheaded by youth, results in lost opportunities in achieving the MDG goals as well as bringing about sustained long term development. The next five years is the key to extract a rich demographic dividend through grooming the youth with secular, democratic, ethical, and humane values who will drive Bangladesh to a happy and prosperous nation.

Tiigrihüpe (Estonian for Tiger's Leap) was a project undertaken by the government of Estonia to invest in development and expansion of computer and network infrastructure, with a particular emphasis on education. Funds for the foundation of Tiigrihüpe were first allocated in national budget of 1997. An important primary effect of the project was rollout of internet access to all Estonian schools, combined with installing computer labs in most schools, and replacing those that already existed with IBM PC based parks. With the help of a government-backed technology investment body, called the Tiger Leap Foundation, all Estonian schools were online by the late 1990s.

"The youngest generation of E-stonians encounters electronic communication as soon as they enter school through the eKool (e-school) system. Exam marks, homework assignments and attendance in class are all available to parents at the click of a mouse."[9]

4 ICT for Greater Transparency, Good Governance and Improved Public Service Delivery

The Perspective Plan stipulates, "e-governance will manage the way that citizens deal with the government and with each other, allow citizens to communicate with government, participate in government policy making and planning, and to communicate with each other," (GED, 2012: 56). It articulated that "work flow in government and semi-government offices will be fully integrated with ICTs through re-engineering of government's business process," (GED, 2010: 271).

There are 23 targets under two interrelated components of the Digital Government category: (a) e-Administration, i.e., business process re-engineering of government agencies; and, (b) e-Citizen services, i.e., converting traditional service delivery into e-service delivery system to take "service at citizens' doorsteps." Besides, the 6FYP recognized 14 targets for improved public service delivery under two components: (a) an inclusive information and knowledge management system; (b) ICT for equity; and, (c) e-Participation to promote grassroots participation in policy discourse and effective feedbacks.

As the ensuing discussion reveals, Bangladesh has witnessed significant progress in the area of Digital Government, although the latest *e-Government Development Index* (e-GDI) ranking, prepared by UNDESA, positioned the country low at 148 (UNDESA, 2014). It is, nevertheless, to be pointed out that in 2012, in spite of Bangladesh's low 150th rank, the country got placed alongside the US, China, India, Brazil, Japan and other giant economies, i.e., in the category of countries with populations larger than 100 million, that succeeded in making a special effort to improve service delivery to large swathes of their populations (UNDESA, 2012). Also, ITU's *ICT for Development Index* (IDI) acknowledged Bangladesh as one of the three most dynamic countries in Asia-Pacific, alongside Australia and Mongolia (ITU, 2013).

4.1 Review of 6FYP

4.1.1 e-Administration

All public information is being made accessible in Bangla through electronic means and also mobile phones. All gazettes and notifications are being published online using the Unicode characters. Under the auspices of the Cabinet Division, the A2I supported designing, developing and implementing the National Portal of Bangladesh (www.bangladesh.gov.bd), which is a manifestation of the

[9]See the article, "How Estonia became E-stonia" by Tim Mansel at http://www.bbc.com/news/business-22317297 (Accessed on 14 November 2014).

provisions articulated under RTI Act, 2009. The National Portal is a gateway to 25,000 websites of all government offices starting from the lowest (union) to the highest (ministry) level.

This Portal embeds key information pertaining to agriculture, education, health, law and human rights, human resource development, social security, environment and disaster management, tourism and history, natural and archeological sites, educational institutions, business organizations, public representatives and eminent persons, freedom fighters list, government circular/gazette, procedures for applying and receiving public services, government forms, citizen charter, list of officers and personnel, digital guard files, e-directory, district-level and other e-services, development projects' activities and other information of public interest. Starting from the entrepreneurs of UISCs to the ministries and their divisions, about 50,000 trained government officials and employees are collating and updating the National Portal. The content is managed centrally by the Cabinet Division.

The government established District e-Service Centers (DESCs) across all 64 districts in 2011 to start the work on online-data sharing and decision making system. Through UISCs, citizens can today receive services such as land records (khatiyans) from the District Commissioner's (DC) office at a much lesser cost and time without having to undertake multiple visits. In light of this successful experience in district administration, development of National e-Service System (NESS) is underway (see Box 2). Under this system, the delivery of services at district, upazila and union parishad level will be directly connected with concerned ministries, divisions, directorates and other public departments. Work is in progress across 16,000 government offices to launch the NESS by 2015. This marks achievement of one of the long-term strategic goals identified by the Perspective Plan pertaining to the "introduction of e-governance at all executive levels of government by 2015," (GED, 2012: 57).

Box 2: Features of NESS

NESS will enable the following for citizens:

- Provide service for any kind of application submission through mobile, internet, UISC, upazila center, etc;
- Offer inquiry service to enable tracking progress of applications;
- File grievances and track any redressals;
- Receive notification through SMS and detailed acknowledgment through the internet; and,
- Empower citizens to discuss service delivery issues, provide suggestions and recommendations, share ideas through a provider-recipient social networking.

NESS will enable the following for the service provider organizations:

- Initiate e-Filing to simplify the process of file processing (i.e. file put up, file sending, file seeing) and it is to be noted that Secretariat Instructions 2008 has been amended to incorporate use of ICTs in file and record management;
- Enable tracking of any information at any time through file management and decision management;
- Maintain auto register so that each day's work/progress is entered automatically;
- Enable monitoring of all service providing government organizations from one single dashboard to ensure accountability and transparency; and,
- Allow automatic scheduled e-communication such as SMS, email or any other kind of alert for meetings, events, etc.

Source: Authors' own

The "National ICT Infra-Network for Bangladesh Government Phase-II" or the "Info-Sarkar" project involving BDT 13.33 billion is being implemented by BCC across government offices in 55 districts and 30 upazilas. It is aimed at bringing district and upazila-level government offices under ICT network in more than 17,000 government offices. Each upazila office would be brought under

broadband connection and Wi-Fi network and solar power system would be introduced for ensuring uninterrupted internet connection. Of BDT 13.33 billion, China will provide a loan of BDT 10.87 billion; a framework agreement and a subsequent loan agreement have already been signed in this regard. The ICT network facility created under the "Banglagovnet" project with Korean assistance would be expanded at grassroot level government offices through the Info-Sarkar project. This is one of the key priorities in paving the road towards building a networked society.

Video conferencing system has been introduced between PMO, Cabinet Division, Divisional Commissioners' offices, and DC offices to speed up field administration activities. This has enabled conducting online meetings and seminars with the central authorities. The Cabinet Division has undertaken a program for launching video conference system in 64 DC offices and 7 Divisional Commissioners' offices. The Info-Sarkar project is to set up 800 video conferencing systems at different offices including the ministry, department, upazila office and training centers.

National Data Center is in operation at the BCC. It is managing information on the government's official website, the Bangladesh Election Commission's national identity card and voter lists, and e-service-related activities. The Center is also providing services to 200 websites and 70 mail hosting services. The process of setting up an IV-tier data center is underway.

The Bangladesh Public Administration and Training Center (BPATC), Bangladesh Civil Service Administration Academy (BCSAA) and Bangladesh Institute of Management (BIM) are pioneering an initiative to introduce e-learning in public sector training organizations. As pilot, a demo version of e-Learning system for Bangladesh Civil Service has been developed based on free version of Moodle (http://moodle.com/). Three separate courses of the institutions have been identified for piloting e-learning modality.

Using the enterprise resource planning (ERP) software, financial statements of Bangladesh Bank are being prepared automatically following international systems, applications and products (SAP) standard. Under SAP, officials of Bangladesh Bank can easily access their salary statements, account balances and different human resource related information using intranet. All the procurements of Bangladesh Bank are being carried out through ERP. Maintenance of accounts in the Bank such as general ledger and accounting, budgeting, payables, receivables, cash management, budget and cost center accounting system, purchase management, fixed asset and HR management, have been automated.

In addition, district-level and field-level offices are connected with the Finance Division through WAN/LAN and all ministries/divisions through LAN/VPN. Information pertaining to budget making, implementation and evaluation is exchanged through Integrated Budget and Accounting System (iBAS). The latter has been introduced in the Finance Division to bring dynamism in budget formulation and implementation process and to improve the effectiveness of resource mobilization as well as its proper allocation. All 49 Chief Accounts Officer (CAOs), all District Accounts Office (DAOs) and 38 ministries/divisions, alongside nearly 400 upazilas, have been brought under iBAS. It has provided scope for monitoring activities in the process of financial re-imbursements and bills.

With regard to the final target under the e-Administration component, the underlying rational behind creation of Innovation Teams is to endorse a whole-of-government approach in embedding a culture of innovation. The government of Bangladesh formed Innovation Teams across all public offices through an *Innovation Team* gazette in 2013. Former e-Governance/ICT Focal Points were replaced by *Chief Innovation Officer* (CIO) as team leaders. This is a total of over a thousand Innovation Teams and over 6,000 Innovation Team members at different tiers of the government.

In March 2013, a *Service Innovation Fund* (SIF) was launched to enable CIOs and Innovation Teams to experiment with new and innovative ideas focused on the TCV algorithm. It is expected that by 2016, the SIF will disburse BDT 800 million (see Box 3). Institutionalization of innovation awards, introduced in 2010, will be the key in helping the government officials remain motivated to work honestly and ethically towards the goal of accelerating delivery of public services to its rightful beneficiaries. The National Integrity Strategy calls for establishment of an 'Ethics Committee' in each ministry/division for the latter purpose.

Box 3: Key Highlights of SIF

It was observed that one of the major challenges for carrying out prototypes pertained to a lack of seed capital for initial testing and observing for further replication. In March, 2013, A2I launched the SIF to: (a) provide seed funding to pioneering and creative innovations for more cost-effective provisions for public service to the underserved communities, particularly targeting women; and, (b) enhance capacity of small and medium initiatives working to find creating solutions in technology for development.

SIF started in 2013 with a USD 10 million for 3 years with a goal to establish a USD 50 million fund. To date (July 2014), the SIF has successfully disbursed USD 0.4 million to 17 innovative ideas – USD 0.1 million in this first round and USD 0.3 million in the second round. It is supporting 10 public entrepreneurs, 3 entrepreneurs and 4 initiatives from private sector – one university and 3 private organizations.

The SIF functions as an effective capacity building tool for the recently formed Innovation Teams in all Ministries, directorates, divisions, districts and upazilas to learn by experimenting with service delivery innovation prototypes. Ultimately, a culture of innovation within the government will emerge. The Fund limits its exposure to innovation that directly improves service delivery to citizens, particularly women, measured around three simple, easy-to-understand, TCV – time, cost and number of visit - parameters to realize the vision of taking "services to citizens' doorsteps." One of the key specific purposes of SIF includes enhancing capacity of small and medium initiatives creating innovations in public service delivery.

Source: Authors' own

4.1.2 e-Citizen services

The public service delivery mechanism of Bangladesh is in the midst of reinventing itself to become more transparent, accountable and responsive to citizens' needs. A *Transparency International Bangladesh* (TIB) report acknowledged 30 per cent reduction in corruption in the service sector due to the introduction of e-services (TIB, 2012).

In September 2014, the Cabinet Division launched the "Services Portal" and "Forms Portal" during the *Bangladesh Social Good Summit 2014*. Services, in terms of importance and popularity, were identified and accumulated in the "Sebakunja" thereby reducing TCV in terms of availing of a public service (www.services.portal.gov.bd). It is expected that this initiative will eventually cumulate to instill transparency and increase efficiency in public offices. All ministries, divisions, directorates and corporations are being liked with "Sebakunja" - about 400 services of 36 Directorates/Offices have been amassed in a "Single Access Point." Through "Forms Portal" (www.forms.gov.bd), on the other hand, citizens can download necessary forms, if and when, they intend to apply for any service.

Since 2009, applications for admission registration at 32 public universities, 400 colleges and all public medical colleges are being done through SMS service. All public examination results are also being delivered through mobile phone text message service since 2009. In 2013, 38.2 million results were delivered via SMS. Students can also apply for re-scrutiny of their papers through SMS. Bills of various public utilities such as electricity, gas and water can now be paid online or via mobile phones. Some 45,000 electricity bills and 25,000 gas bills are paid through mobile phones every month. WASA bill can be paid through Citycell and Robi mobile phone operators since October, 2010. It is to

be pointed out that the Perspective Plan articulated the initiation of the e-governance model through the introduction of e-bill payments (GED, 2012: 57).

Mobile banking is aimed at deepening financial inclusion. Bangladesh Bank has approved 28 banks to conduct mobile banking operations and 20 have already launched this service. To speed up banking transaction, implementation of Real Time Gross Settlement (RTGS) transaction speed system has been undertaken. If it is implemented, transaction of large sums of money from one bank account to another bank customer can be completed within a minute.

There are mechanisms for online status check of court cases. The date of the case and a short description of the results of the case are being provided through SMS and internet. The daily schedule of 13 courts in 13 districts (Daily Cause List) is being publicly displayed in the digital display boards. An initiative has been adopted to connect all subordinate/lower courts with the Bangladesh Supreme Court, through a web network to store important data, track case and modernize information exchange system.

Dhaka Metropolitan Police has launched an experimental online diary. Introduction of electronic general diary (GD) and first investigation report (FIR) at all police stations by 2021, initially in Dhaka and then in other metropolitan areas by 2015, is mentioned as strategic long-term goals under the Perspective Plan. It is to be pointed out here that Dhaka Metropolitan Police Service has developed an interactive mobile application. It has enabled an individual to immediately get directions to the three nearest police stations.

The e-Ticketing and mobile ticketing mechanism for Bangladesh Railway was inaugurated in March 2010. It is reported until 2013 that 1.75 million tickets were sold, of which, 25 per cent tickets were purchased through mobile phones. The service is available on Dhaka, Chittagong, Rajshahi and Sylhet routes. Thus, more work needs to be done in terms of scaling up the successfully limited m-service transport operations in Bangladesh.

The Board of Investment (BoI) has allowed online registration and work permit for foreign investors and online tax filing has been introduced by the National Board of Revenue (NBR), alongside submission of online income tax returns, VAT and income tax payments. Online tax calculator has been launched. Nevertheless, there is still room for making more use of national ID cards in creating a comprehensive tax database including all eligible taxpayers.

Vehicle registration confirmation is being sent through SMS. Automation of Chittagong and Dhaka Customs has increased transparency and dynamism in the import-export activities.

Domain experts of A2I program, Ministry of Law, Justice and Parliamentary Affairs and the Department of Registration are working in reducing TCV to receive a deed registration – involving sub-Registry of the upazila and Registry office of the district. The “Deed Registration Digitization” program has been undertaken in this regard and work has begun in 3 districts’ record rooms - Dhaka, Comilla and Jessore – in addition to 5 sub-registry offices.

Scanning and digitization of mouza maps prepared under the latest survey (RS/SA/CS) including mutation khatiyans have been completed. Implementation of digital land management system in 45 upazilas under 7 districts and establishment of 20 land information service centers in 20 different upazilas through another project titled, “Strengthening Governance Management Project, Component B,” is underway. Once the implementation phase is completed, citizens, at district and upazila levels, will be able to get latest updated record and maps of any plot in any upazila in the concerned district in quickest possible time (5-15 minutes after applying for the information) and will also be able to collect those in an hour. This project will be implemented under PPP’s build-operate-transfer (BOT)

basis, retaining overall control of the government. In order to reduce implementation time, the entire initiative for computerization of khatiyan and mouza maps as well as digitization of land records and survey, will be distributed among private organizations. In this case, the services relating to distribution of khatiyans and maps will be channeled through private organizations.

Bangladesh has introduced online payment for both domestic and international transactions. Online payment gateway service providers play an important role as an easy media in bringing numerous small fixed incomes home against ICT services provided by the freelancers. Besides, the authorized dealer banks have been directed to cooperate with Online Payment Gateway Service Provider (OPGSP) for the purpose of remitting small amounts of overseas income earned by freelance ICT-services' exporters at low cost.

A maximum USD 2,000 can be remitted home with this facility. 'AlertPay', the Canada based online fund transfer organization, has started their operations in Bangladesh. Necessary steps have already been taken by Bangladesh Bank to include Bangladesh in the service programs of 'PayPal', the worldwide online payment gateway for financial transactions. Recently, Bangladesh Bank issued a circular to purchase goods and services online amounting to USD 1,000 per year. Foreign currency has been remitted home at a low cost through online payment media by selling ICT services through internet including freelancing.

In order to spur e-commerce activities in the country, Bangladesh Bank has set up a National Payment Switch (NPS) to ensure the interoperability of different payment channels. The commercial banks having an ATM/POS/e-Payment Switch or being connected to any other shared switch network will be able to send inter-bank or inter switch payment instructions to the NPS for clearing and settlement purpose. This Switch acts as an electronic clearing settlement system and manages all electronic payments through cards and payment gateways irrespective of their ownership. The Switch went live on 27 December, 2012.

Already many banks have connected with NPS. It will help to consolidate legitimacy and credibility to e-commerce activities through secured electronic settlements of all financial transactions. Banking sector of Bangladesh will then improve further in green banking initiatives. The scope for providing faster banking services at a low cost will enlarge due to NPS. Electronic shopping will increase and people will be able to pay all types of utility and other recurring payments electronically.

Implementation of "Banking Application Software" has been completed to automate overall banking activities of Bangladesh Bank. Most of the financial transactions of the government are settled automatically at present. As a result, all the accounts of the government are balanced everyday automatically. Under this software, salaries are paid to government employees through electronic fund transfer (EFT).

The government has introduced online procurement system in phases. The Perspective Plan conceived this as one of the long-term strategic goals, alongside introduction of e-bills (GED, 2012: 57). Electronic government procurement (e-GP) has been introduced (www.eprocure.gov.bd). Both e-tendering and e-contract management have been integrated through e-GP (Integrated e-GP). This marks a major milestone in the Digital Bangladesh program. The e-GP has increased participation of organizations/individuals in tender submission. It is also facilitating more donor support. Additionally, an online procurement management information system (PROMIS) is enabling participants to monitor the administrative public procurement rules compliance with regard to the procurement process.

4.1.3 An inclusive information and knowledge management system

In the first area, there has been significant progress. In order to take public and private information and services to the marginalized communities in rural areas, the National Institute for Local Government (NILG), under the Local Government Division (LGD), and the A2I program of the PMO, launched 4,547 UISCs at the union parishad level. These Union Information and Service Centers (UISCs), rebranded to Union Digital Centers in August 2014, are required to be *de jure* run by one male and one female entrepreneur. In addition to information, these centers provide services to the general public pertaining to health, education, agriculture, legal services, online birth registration, foreign workers and professionals' online registration service, and various types of utility payment services (see Box 4).

New services are always being explored by NILG and A2I under public-private-partnership (PPP) arrangements. The PPP modus operandi is the key factor offering UISCs opportunities to not only further widen their service delivery spectrum, but also to ensure their financial independence and sustainability through new income generation opportunities. For instance, with support from the Directorate General of Health Service (DGHS), 30 UISCs have introduced telemedicine services. Besides, each Upazila Health Complex has a mobile phone so people can easily seek emergency medical advice. Many e-services and m-services (mobile services) in the areas of agriculture, health and services sector have been introduced by public and private sectors. In taking life insurance services to rural people's doorsteps, the national Life Insurance Corporation has partnered with 2,016 UISCs and it will be introduced to all UISCs in a period manner.

Box 4: A Snapshot of UISCs

A total of 3.91 million citizens are directly receiving information and services from UISCs every month (BBS, 2014). Of these, it has been estimated that total 949,120 are women, 16,160 ethnic or religious minorities, 62,266 physically challenged persons and approximately 237,282 citizens of aged over 50 years are receiving services in various types of information from these centers saving their time, cost and visits (ibid). UISCs reported to generate about BDT 42 million per month, thanks to its PPP modality. It is to be highlighted that the first online registration for less-skilled migrant workers seeking employment in Malaysia took place in January 2013 (see Chowdhury and Zaman, 2013 for a detailed discussion). Following, 40,000 women registered and sent for foreign employment in Hong Kong, Singapore and Middle East. So far, 51,500 rural citizens have received training (also English training) from the UISCs. The UISC Blog is another key innovation – the experience of exchanging information within a network of 13,500 members (including UISCs entrepreneurs, field-level officer, i.e., at the sub-district (upazila) and district level, and some ministerial/division level secretaries).

Source: Authors' own

In taking banking services to the doorsteps of unbanked citizens, the government has allowed 5 private commercial banks to provide mobile banking services through 1,700 UISCs across 40 districts. It is estimated that 10 million users have used mobile money order and cash cards through the post offices. Bangladesh Bank has also permitted banks to disburse remittance payments through various mobile operators' outlets operating at the grassroots level. This is hoped to attract more formal remittance as a result of strengthening the distribution network.

Ubiquity of mobile phones across all district and upazila hospitals has made it possible to launch a "mobile phone health care" program. 18 hospitals have introduced telemedicine services. A total of 800 health institutions have received computer supplies and have been brought under the internet service. This has enabled introducing an online reporting system by the DGHS. All upazila health complexes have been provided webcam which are being used to conduct video conferencing and at the same time, also acting as a monitoring tool. All 12,557 community clinics have a mini laptop with a built-in webcam.

Today, 14 community radio stations are proactively providing interactive voice response (IVR) related services and early disaster warnings to more than 4.6 million listeners of 67 upazilas under 13

districts. Until 2013, more than 3.5 million people were evacuated and in particular, during the cyclone Mahasen in May 2013, over 1.1 million people were evacuated by the government. Using websites and mobile phones, early warnings are being sent out across the country's climate vulnerable areas, prone to cyclones, floods and other natural disasters. Grameen Phone and the state-owned Teletalk are providing such early warnings through SMS alerts to the residents of Sirajganj district, a flood-prone area, and Cox's Bazar district, a cyclone-prone one. Moreover, citizens can avail of the latest weather information through IVR by dialing 10941. Altogether, disaster risks have been reduced as a result of adoption of early warnings and IVR through the provision of affordable communication through mobile phones.

The Ministry of Disaster Management and Relief, with support from UNDP's Comprehensive and Disaster Management Project (CDMP), has succeeded in increasing flood warning from average 3 days to 5 days. ADB estimates that this allows three-fourths climate vulnerable communities to move their animals and other productive assets to safer locations.

Some progress has been made in expanding the use of National ID cards in availing of public services, especially in designing an "electronic public grants (social safety net) delivery system." An initiative by Statistics and Informatics Division (SID), under the Ministry of Planning, is creating a hardcore poor database which is going to be linked with the National Population Register (NPR) to identify the most vulnerable, i.e., ultra poor. In creating a list of the latter and the NPR, the BBS has already carried out pilot projects in two districts – Manikganj and Tangail. *National Informatics Committee*, being led by the Planning Minister, is exploring the scope for using National ID cards for availing of various e-services.

If Digital Bangladesh is to be consolidated through locking-in progress made to date, creation of a NPR, by engaging a diverse portfolio of concerned authorities, is the key to streamline citizen-to-government (C2G) and vice versa, i.e., G2C interactions. Thus, NPR ought to receive the highest priority in the Digital Bangladesh agendas of the upcoming 7FYP (discussed later). Citizen Core Data Structure (CCDS), prepared by the Cabinet Division, is being referred by the BBS in preparing the Bangladesh Poverty Database, which will set the ground for working on a more sophisticated NPR.

Work is underway for launching of a new TV channel focusing on human development (or HDTV) by 2015. Not much progress has been made towards creating "citizens helpdesk" nor in establishing "a system of public grievances and reprisal," the sole target under the e-Participation component.

4.1.4 ICT for equity

With regard to the second area under the first component, there are different targets from vernacular content development, online market information to programs for land digitization and ICT-induced employment opportunities. The e-Tathyakosh (www.infokosh.gov.bd), a national e-content repository, is in operation which offers contents prepared by concerned authorities. A total of 350 partners, from both public and non-state sectors, came together in creating this national information portal which is enabling citizens to acquire information in less time. It is also to be noted that the National Portal of Bangladesh has been created in the vernacular to increase usability of the contents by the vast majority of Bangladeshis.

The Ministry of Commerce has implemented an "online price monitoring system" which offers daily price updates in its website. Nevertheless, awareness and usage of this information is not significant given the low rate of internet subscribers. Therefore, development of mobile apps which could be used by farmers and relevant beneficiaries can increase usage of this information.

A number of projects are in operation in land record digitization. In order to promote accountability and to ensure the reliability of land records, the latter are being digitized by the Ministry of Land. Digital land management system has been introduced in order to make land administration and management transparent and accountable by making land records available online, through conducting satellite technology based digital survey, preparation of digital maps and ledgers. A pilot project is being implemented in three upazilas to introduce "Authoritative Land Records" (ALR). Directorate of Land Records and Survey (DLRS) launched "Savar Digital Survey 2009" and digitization of 441,506 khatiyans (land records) and 4,089 mouza (an area covering 300 households) mapsheets were done on the basis of the survey conducted in 191 mouzas.

A total of 5 upazilas under Dhaka district have been chosen as pilot projects under a program titled "Computerization of Land Management of Dhaka District." Depending on the success of this project, all 64 districts will be brought under this program.

Steps have been taken to implement computerization of existing mouza maps and khatiyan across 55 districts under another project titled "Digitization of Land Survey, Record Preparation and Preservation Project, 1st Phase."Mouza maps, prepared under the latest surveys (RS/SA/CS) conducted in 54 upazila headquarters, under 54 districts, have been updated by scanning, digitization, geo-referencing and aerial photography.

Finally, the "Information Ladies" project is in progress. The "Learning and Earning" project has been approved to provide training to 55,000 citizens at the district, upazila and union level. The "Bari Boshe Borolok" (earn from home) initiative is aimed at providing basic outsourcing training to 12,420 women candidates, of which, 2,240 will be offered advanced training. Process has been initiated to create 30,000 skilled human resources (30 per cent women) in the IT/ITES sector through a World Bank financed project titled "Leveraging ICT for Growth, Employment and Governance."

4.1.5 e-Participation

As noted earlier, not much progress has been made towards establishing "a system of public grievances and reprisal." The MDG Progress Report 2013 reported Bangladesh as "very impressive" and "improving" under MDG 8, target 8.1F (GED, 2014: 118). This particular MDG target deals with cellular subscription and internet users. The Bangladesh government needs to devise strategies for tapping into this "mobile citizens" potential for accelerating Bangladesh's journey to Vision 2021.

4.2 Agendas for 7FYP

Operational efficiency of local government institutions is low which impede effective access to services and information by the citizens. Citizens' voice is unheard and their participation is not effective which creates gap between citizens' perception and direction of the central government. The vision is to unleash the power of ICTs for increased efficiency, transparency and accountability of local government institutions so that they are able to deliver information and services to the citizens and involve them in the process. In particular, the vision is to make appropriate integration of ICTs for ensuring better access to land records and bring about transparency and accountability in land transactions as well as better access to khas land by poor and community groups. Finally, in making services pro-poor through embedding the use of ICTs across the government, the underlying vision is to make the civil service capable and interested to use ICT tools for management, planning, implementation and monitoring budget and non-budget purposes.

4.2.1 Land reforms

Enforcing land acquisition ceiling and preventing anonymous transactions are difficult. One-fourth of all land records are disputed, resulting in nearly 3.2 million pending litigations involving around 150 million people; each dispute takes an average of 9.5 years to resolve. Manual tax management system is inefficient and available data related on land is inadequate and often contradictory. Years of unorganized land sale, revenue, survey and mutation records create serious difficulties for planned use of land in development. The reform will enhance public access to land records, transparent land transactions and efficient collection of land revenue through modernization of all land records. Marginalized citizens will be allowed to establish their legal rights on khas land through transparent distribution mechanism.

Consolidation: Lessons learnt from various pilot interventions seem to be conflicting at the first glance. The relevant authorities will conduct further investigations to sift through the evidences taking into consideration latest technological advances and develop a new set of policies for proper land administration and land use. A review process will be initiated to consider how the stakeholders of those policies and legal framework may be brought on board. A high-powered independent body will be established to give recommendations for next steps based on such a review and through a consultative and inclusive process.

Capacity development: The present manual system of land management and the proposed ICT based management represent two distinctively different cultural contexts. Hence, efforts will be undertaken to gradually transform the work culture of relevant agencies. To this end, modern technology will be introduced to support improved work-processes of the relevant agencies. Additionally, skill-training program for the management of these agencies to build leadership skills such as negotiation and communication skills will be organized.

In particular, it may be useful to learn how the Bhoomi project in Karnataka is working to reduce TCV associated with accessing land records. In 1999, the Indian government initiated Bhoomi program to computerize the land records across the country in order to improve transparency of the record administration, protect the records from manipulations, and increase the usefulness of data in the records. By doing so, the district administration would be able to use the records for complex planning and development activities.

By March 2002, all 177 Bhoomi centers became operational and citizens were able to check their land record data at a "first-come-first-served" basis. Computerized land record kiosks (Bhoomi centers) in taluk (sub-district) offices provide farmers with the Record of Rights, Tenancy and Cultivation (RTC). These kiosks are up to 40km away from a village. In case of Bangladesh, UISCs are at the most 3km away and they can play a more significant role in taking land record services to citizens' doorsteps. The software for Bhoomi developed after extensive discussions and consultation at division, district and state level.

In a 2004 case study of the system, Chawla and Bhatnagar noted that as a result of Bhoomi, major errors in land details declined to 4 per cent from 31 per cent.[10] It was also reported that the total time for completion, from first application to final approval, was reduced to about 45 days from six months.

4.2.2 Self-governed and responsive local governance

[10] See http://info.worldbank.org/etools/docs/reducingpoverty/case/96/fullcase/India%20Bhoomi%20Full%20Case.pdf (Accessed on 13 November 2014).

Operational efficiency of local government institutions is low which impede effective access to services and information by the citizens. Citizens' voice is unheard and their participation is not effective which creates gap between citizens' perception and direction of the central government. The vision is to unleash the power of ICTs for increased efficiency, transparency and accountability of local government institutions so that they are able to deliver information and services to the citizens and involve them in the process. It is hoped that a connected local government system will be established for efficient governance and effective information and service delivery to the citizens, coupled with enhanced transparency and opportunities for citizens' participation.

Seamless connectivity: The Ministry of LGRD ought to create seamless vertical and horizontal as well as reliable and high speed connectivity among the local government and central government institutions and agencies. Such network will accelerate decision making and implementation process. More importantly, inter and intra-agency horizontal and vertical electronic connectivity will increase operational efficiency and simplify decision-making processes.

Service process simplification (SPS): The Ministry of LGRD should try to integrate ICTs in local government institutions for back office automation so that front end service delivery is possible through one-stop windows. Paper-based procedures will be replaced gradually by automation coupled with digitization of all data and records. Application of ICT in office processes such as computerized billing system, inventory management, computerized data entry etc. will help establish more efficient service delivery regime at local levels.

It is recommended that the Governance Innovation Unit (GIU) under PMO, along with the Cabinet Division, Ministry of Public Administration, should institutionalize the TCV led SPS reform approach (see Box 4). This approach has not only been a tool for mobilization of popular support for service delivery reforms but it has also been recognized as an effective reform approach at the global level (ITU, 2014).

Capacity development: The LGRD will undertake program for comprehensive skills development of the government officials in using ICTs for their day-to-day activities. Government officials and elected representatives of local government bodies in both urban and rural sectors will be given training to develop ICT skills and adaptability to the change in old system.

One-stop centers: The government will create scope for service providers both within the government and private sector to deliver services and disseminate information using multi/alternative channels like Digital Centers, SMS, community radio and television as per their convenience is a top priority. The information and service delivery system will focus on education (e.g. formal, non-formal and technical/ distance learning), health-care (e.g. healthcare management, telemedicine), agriculture (e.g. pesticide, high-yielding cropping), disaster (e.g. preparedness), self-employment creation, government services, human rights protection and so on. Digital Centers are envisaged as information dissemination and service delivery outlets for rural and peri-urban citizens. Such centers are to be run with participation of private sector and non-government organizations for efficient operation and socio-economic viability. Fostering PPP will be the key for maintaining financial independence of such centers (as demonstrated by UISCs' experience).

One-stop services/help desk in all unions, upazilas and districts will be created for enhancing citizens' access to services. Digital Centers in district, upazila offices, city corporations, municipalities and union parishads present significant opportunities for the government to reduce red tape, streamline work procedures, and co-locate services from multiple agencies into one center.

m-Governance: Mobile phones can be a supplement to the physical location based information and service delivery points. The government should design an m-governance or m-service strategy to

explicitly set the scope for deploying such tools for improving governance in public service delivery and moving towards a pro-citizen civil service (see Table 2 in Annex I for a list of existing m-services).

National portal: The government has succeeded in bringing together all 25,000 government websites under a common e-architecture. Nevertheless, the National Portal needs to be made more interactive so that it can add value to the Digital Bangladesh vision. South Korea, recognized as the world leader in e-government development by UNDESA in 2012, has developed an integrated national portal where citizens can find almost every service they want, on both national and local level (UNDESA, 2012: 24). The main government portal is a gateway to services through multiple channels, by theme and subjects; citizens can also have a customized channel by inputting their own age, gender and services of interest. Back-office integration across many departments brings together a powerful search engine offering advanced categorizing function, which can list results by websites, services, and news, including at the local level.

A key reason which can be attributed to South Korea' continued leadership in world e-government progress is significant development and provision of downloadable mobile applications that are available from its national portal. The cross sector mobile apps for citizens are both iPhone and Android compatible including for e-Learning which allows students to learn on their mobile phone in areas such as social studies, English and Math. For employment opportunities, Jobcast provides the relevant information.

Tunisia's national government portal provides a 'most used services' section on the home page that provides quick access for citizens to information on services such as obtaining a driver license, and acquiring personal and home loans (UNDESA, 2012: 16). Information regarding government services is also laid out by sector, providing quick and efficient access to comprehensive data.

4.2.3 Pro-citizen civil service

It is of little surprise that civil service in Bangladesh, like many other developing countries, is overly concerned with compliance with rules and record-keeping. Incentives for innovation within civil service are almost non-existent leading to status-quo execution. Decision making is often done based on piece-meal information as a result of slow communication within the government. Knowledge management is person-dependent resulting in almost zero institutional memory and the use of ICT is yet to be made more relevant for their day-to-day work. Equally, if not more importantly, the civil service recognizes and promotes the potential of ICT tools and avenues for service delivery to citizens by re-engineering business processes. Ultimately, Bangladesh civil service will be transformed into a dynamic and responsive administration which will make informed and efficient governance decisions and deliver services with minimal TCV.

Change management: The introduction and beneficial use of ICT in reforming civil service and creating better service delivery is essentially a change management process. The needs, benefits, vested interests of all those concerned (whether senior or junior) should be given equal heed, in combination with continuous support to experimentation, risk-taking (within acceptable parameters) and learning.

The Digital Bangladesh Taskforce, which is the supreme body of the vision spearheaded by the Prime Minister, had only one meeting in the last five years. Steps should be taken to enable this Taskforce to play a critical role in the implementation of various projects under the auspices of Digital Bangladesh vision (see Tables 4 and 5 in Annex 1).

Innovation fund: The SIF is in operation for the civil service and this may be perceived as an encouragement towards easy fund mobilization for experimentation of innovation in service delivery. Nevertheless, participation is not upto the desired level which is a reflection of the government officials' unwillingness to use ICTs in revamping the service delivery processes.

Paperless or 'less paper' office: It is important to develop a strategy towards a 'less paper' environment for the civil service. Notable among various priorities are electronic tracking movement of files, automating the pension processing and payments, electronic submission of project pro-forma (DPP) documents from line ministries to the Planning Commission and electronic review of them during ECNEC meetings along with electronic access to all supporting documents. The *Secretariat Instructions 2008* has been amended to allow for making the use of ICTs in file and record management. Cabinet Division needs to set a timeline for its revision within the 7FYP's tenure so as to measure the progress of e-readiness of the government's back-end operations.

Connecting civil service: Providing reliable and high-speed connectivity across all tiers within the central and field administration, within a defined timeframe, ought to be a high priority. Much of the two-way information sharing, knowledge management, collaborative learning depends on connectivity. The necessary hardware and connectivity will be included in the Table of Organogram and Equipment (TO&E).

Capacity and leadership development: Mandatory ICT proficiency for all government officers will be ensured according to ICT Policy 2009. However, the skills will be focused on day-to-day functions and not on generic ICT literacy.

4.2.4 Healthcare

Inadequate healthcare services to the marginalized citizens, due to lack of availability of doctors in rural areas and high cost of accessing services in health facilities, is a key problem. Challenges exist with respect to accountability, promptness of service and timely decisions regarding strategic interventions from a healthcare administration perspective. The underlying vision is to accelerate quality healthcare services to doorsteps of all citizens.

Healthcare management: The Ministry of Health will play a stewardship role guiding and coordinating efforts. The government needs to focus on addressing shortage of ICT manpower in order to establish a proper monitoring system to monitor attendance, absenteeism and quality of service delivery. Health education will be arranged to service providers using ICT. Medical faculties will be connected to address remote medical needs.

Healthcare services: Telemedicine, particularly mobile phone based solutions, could be launched at a national scale to provide medical information, consultation and services. Standard operating procedures will be developed for clinics and hospitals. Patients' information and queue management protocol will be automated using the CCDS. On the other hand, similar to online and mobile payments facility for utility services, measures should be explored so that patients do not spend a significant amount of time in paying bills or in arranging accommodation. Availability of essential drugs should be monitored. It is imperative to design systems by considering persons with disabilities.

To bring health services to citizens' doorsteps, it may be useful to learn from a Greek initiative. The government of Greece has put in place an initiative which enables the disabled and elderly citizens to obtain official documents without having to leave their residences. In 2004, a law was introduced to simplify administrative procedures which stipulate that several official documents generated by public agencies would be issued automatically, without citizens needing to take action at all. The four most

often popular services rendered are: (a) criminal/police records (30%); (b) recruitment status (15%); (c) birth, death, marriage and family status (10%); and, (d) passport applications (5-8%).

Health and demographic information: National data on health indicators will be consolidated and updated. The electronic health record (EHR) being prepared by the DGHS will be developed to maintain an integrated system. The geographical database will be completed. Health data should be standardized using the CCDS and cooperation among large health facilities in disease surveillance ought to be strengthened.

4.2.5 Agriculture

The underlying vision here is to ensure that all citizens of Bangladesh, including disadvantaged groups like women, children, etc. have sustainable access to adequate food and nutrition and farmers derive equitable financial benefit from connected market access. Research and extension linkages need to be established to reach farmers (crop, fisheries and livestock) and ensure that production is adequate for meeting demand in basic foods from domestic sources. It will be imperative to ensure here that farmers are able to access market for receiving a better price which reflects the market realities.

Research and development (R&D): The Ministry of Agriculture and relevant research and extension institutions in association with institutions abroad should take an initiative to create a 'research to use network.' Here, researchers and extension workers will supply tailor made technology information to farmers and other players in the agri-value chain in a seamless fashion using different media (CD-DVD, internet, mobile phone, radio and television) for application on the ground.

Knowledge management: An ICT based surveillance system needs to be developed to assist farmers with timely and accurate detection, diagnosis, prevention, and control of diseases; and, to manage data of input and subsidy distribution. This system will provide accurate information for evaluating impact of policies and programs for growth and sustainable development of the sector.

Extension system: The Ministry of Agriculture will need to equip extension workers with ICTs and/or ICT based extension system so that they can take services to farmers' doorsteps. Lessons can be drawn here from the community clinic health workers where 12,000 tablets have allowed EHRs preparation and also instilled transparency and accountability. Mobile phone based applications should be developed and applied for livestock and forestry.

Access to information, services and market: The Ministry of Agriculture and relevant research agencies should work together with private sector to develop effective multimedia content for facilitating agricultural extension workers and tele-centers. They can help farmers and women with delivery of complex messages.

The Ministry of Agriculture should work with the Ministry of Commerce, Ministry of Industry and other relevant ministries, alongside the private sector, for developing alternative supply chain and promoting fair price for farmers and consumers. UISCs could be integrated as new intermediaries in the supply chain. e-Commerce for farmers can be promoted for direct trading within country and abroad. At present, a joint rural e-commerce initiative of Department of Women Affairs of the Ministry of Women and Children Affairs and BRAC called "Projukti haate Joyeeta'' is being implemented to enable local female artisans to sell their products online for a fairer price.

There are many global examples of e-services being provided to farmers to protect and improve their livelihoods. South Korea won the UN's Public Service Awards for its Information Network Village Project in 2011. The project sought to address loss of price competitiveness of major domestic

agricultural products resulted in the impoverishment of rural communities. Establishment of Information Network Village created information network environments and improved the income of residents through e-commerce in agricultural, fishing, and mountain regions usually excluded from information networks.

Another widely cited example is the e-Soko (agricultural market information platform) initiative in Rwanda. This initiative aimed at easing access to information on the market price of agricultural products, where over 75 per cent of its population depends on agricultural business. e-Soko was designed and developed to enable them to make effective market decisions, based on the information provided, which covers more than 60 agricultural products in the country's 41 markets. It is managed on the web and delivered to farmers, agri-business, and the government via mobile phone. e-Soko has eliminated the middlemen who used to capture a significant share of profits in the supply-chain.

Rural finance: Bangladesh Bank in association with commercial banks and financial institutions should explore potential for introduction of automated teller machine (ATM), a point-of-sale (POS) device located at a local retail or postal outlets, to understand whether it can be a sustainable and affordable alternative to connect rural farmers to formal banking system. Remote mobile loan payments will also be initiated using SMS and wireless application protocol (WAP) technologies.

GPS and radio-based system: The Ministry of Food and Disaster Management may consider launching an initiative to equip sea fishermen with Global Position System (GPS) to find their way when lost due to protect livelihoods of local small-scale fishermen.

4.2.6 Reduced environmental vulnerability

There is a severe problem of identification of victims and proper distribution of relief and post-disaster rehabilitation support. The underlying vision is to ensure that all citizens, irrespective of their residence, whether plain or high land, coastal or inland, can survive without fear of being affected by natural calamity and subsequent misery. Ultimately, the human and natural resources will be protected from natural disasters and climatic changes through a comprehensive and pro-active effort of national and international stakeholders.

Remote sensing and forecasting: Given the increasing frequency of climatic events, initiative to install geostationary satellite should be undertaken to ensure close and constant monitoring of weather patterns to forecast climatic events. A related priority is to improve internal capacity to analyze satellite data. The government will invest in 'automated weather station', now available at much lower cost than in the past, that measures various weather parameters like river water level, rainfall, precipitation, temperature, humidity, wind speed and direction etc.

Early warning and disaster recovery: ICT tools like mobile phone, VHV/UHF radio, broadcast radio, are common in Bangladesh. Given its nature, the government will need to amend related rules so that all cell phone carriers make it a free service for their customers. The mobile communication network will be upgraded to leverage 'location based service' which will allow a message to reach to all phones of a particular geographic location.

Satellite-based network: GPS technology can be incorporated into the radio receiver set, along with the unique code assigned to every receiver, which will allow hazard warnings to be issued in text and audio formats to sets that are within a vulnerable area, and also to radio sets with specific assigned

codes. Internet and email, particularly using handheld devices, will be promoted for the first responders, coordinating bodies or disaster managers.

GIS-based modeling: Bangladesh is already leveraging GIS based models to predict medium term river erosion months before such erosion actually take place. The immediate priority now is to mainstream the model into development planning so that aversive action can be taken by moving out communities from the probably areas of impact to reduce the probability of loss of life and assets.

Green ICT: The government needs to promote green ICT related education, training and skill development to meet demand for environmental skills and expertise at all levels and in all industries. Initiatives will be taken to minimize the environmental impact of ICTs in public administration through green ICT approaches, applications and services. Tele-working and videoconferencing are reducing externalities associated with commuting and travelling. The government will undertake initiative to minimize ICT–related disposal through reduce, reuse and recycle policies.

Leverage community radio: The established community radios can play a critical role in broadcasting disaster warning to not only among the community, but their signal can also reach out to the fishermen operating in the open water so that they can get back to safety in time. These radios should also play a critical role in post-disaster recovery stage and also during the preparedness and awareness stages.

4.2.7 Just judiciary

In the civil and criminal justice system, the case management process is excruciatingly slow, costly and time consuming, which restricts access to justice for the poor and the marginalized groups of the society. This resulted in high TCV for the citizens seeking justice (see Box 4 for TCV's explanation). Weaknesses in procedural law, prevalence of vested interest groups, poor training and physical facilities for judges and lawyers, lack of inspection and supervision, intrusion of political considerations, all contribute to such undesirable outcomes.

The vision of a just judiciary system consists of three major components: (a) ensuring citizens' easy and affordable access to judicial services; (b) eliminating pending cases through digitization of case and court management process; and, (c) improving legal enforcement system through integration of ICTs in all stages of legal process, e.g., digitization of case record management. As a result of responsive judicial process, it is hoped that there will be no more pending cases and justice will no longer be delayed for citizens, particularly for the disadvantaged.

Case process management: To expedite case management process, the present system should be transformed into a digital system, starting from filing, recording of presence (hazira) to witness and evidence production. This will automatically generate cause list of the day in the respective court with specified time. Court and other process fees should be paid online or through mobile phones.

Record keeping and proceeding: A modern record keeping, filing and maintaining case proceedings using ICT based management system can be introduced to strengthen the judiciary governance mechanism. Digitization of current files and introduction of e-filing will be introduced at the same time. Indexation of digitized record will be completed for easy retrieval. Orders and judgments dictated in the courts/ chambers will be signed using digital signature and will be automatically added to the respective e-Case file.

Documentation and referencing: The websites of courts at all levels should be developed which will ideally provide information on: general court information, cause lists, roster, court fees, case status, orders etc. Online forms for application for urgent listing, inspection, process fee, information about

certified copies, online filing, web casts and live streaming of certain cases, archived court cases, court functions, swearing in of judges and full court references. All digital data will be archived and will be backed up each day to two different locations in the same jurisdiction and to a third in a relatively disaster-free area, saving them from destruction by unforeseen calamities.

Legal services: Case and court procedure related information will be made available online or sent using SMS. Citizens will be able to monitor progress without travelling to the court premise. This will also reduce TCV for citizens. Agencies will maintain liaison with the local government institutions to use their information access points as their first face for filing any plea. The Information Commission has put in place a *Proactive Information Disclosure Policy* to specify the requirement for government institutions in complying with the RTI Act, 2009. It is important that the Commission, in collaboration with the Cabinet Division, monitors compliance of all government institutions.

4.2.8 Responsive law enforcement

Reliable and 100 per cent high-speed and high quality connectivity for the network of law enforcing agencies is still not available for prompt response at any place, any time. Skills of the members of law enforcing agencies are improving but it is not adequate. Cybercrimes have been added to list of crimes. The vision is to implant and infuse a high sense of security and rule of law among citizens' through friendly and digital services. It is hoped that rule of law and secured environment will be created, where digitized crime data management covering information on crime patterns and criminal records also play an important role in serving citizens to make their life safer and more secured.

Connectivity: Police is in strong need of secured and dependable connectivity to share/exchange data vertically and horizontally. All district, metropolitan, range and training institutes should be under WAN. In metropolitan areas, WIMAX based WAN should be established. At the initial stage, all highway/range stations and posts can be connected through VPN. The connectivity that links all DCs and UNOs may be extended for police usage joining all 64 superintendents of police (SP) offices and 600 police stations.

ICT skill building: Constables and all officers from ASI to upward will be gradually provided basic IT literacy. First and foremost, special emphasis will be given on ICT literacy of officers who have direct interface with citizens for various services such as GD preparation that can be automated through ICTs.

Information management: A uniform system should be developed where all details of the complaint will be recorded. Custody records for prisoners held in police stations can be used in preparation of cases for court. Passport verification report can easily be generated using SMS.

Crime fighting: In house management mechanism with efficient management information system (MIS), data analyses tools and other related mechanism with human resource can ensure quality service to citizens. Crime data management system (CDMS) should be installed across all district and divisional head quarters.

Citizens' services: Citizens' access to police services starting with access to police stations to lodge complaints regarding violation of rights will be strengthened keeping in mind the present need. ICTs will play a significant role to meet these challenges by making effective use of mobile phones especially in times of emergency.

Cybercrime prevention and prosecution: The law enforcing agencies ought to adopt programs to enhance their capacity in preventing and prosecuting cybercrimes and protecting citizens from breach of privacy, security and fraudulent activities. The government can undertake a comprehensive

program to protect children from child pornography, women from cyber stalking and citizens in general from various financial and privacy related crimes.

4.2.9 Effective and efficient social security

There is a serious problem in identification, allocation and distribution of benefits for specific disadvantaged and vulnerable groups. It is difficult to monitor quality and quantity of distribution as transparency is not ensured properly. ICT skills are not adequate among the personnel at the grassroots level which inhibits introduction of ICT-based social safety net program (SSNP) management system. It is also difficult to monitor progress and status of graduation of beneficiaries as data are not available in digital form and when available, they are not interoperable. The coverage of SSNP is set to become part of mainstream economic and social activities, and by 2021, number of such population is expected to decline to 15 per cent of total population. The vision is to design and implement an effective and efficient system of social safety net which will deliver punctual support to all right target audiences among the marginalized population of the country.

Building on CCDS: As noted earlier in 2.1.1, Cabinet Division has developed a uniform system of identification of citizens which is being used in the preparation of the hardcore poor database. Ministries need to coordinate among themselves under the guidance of the Cabinet Division to enhance use of CCDS for targeting beneficiaries and capturing their information in the database.

One entity for one national ID: An entity, comprising of relevant officials, needs to be made responsible for identification of beneficiaries of all SSNPs using an ICT-based SSNP management system, where all nodes of SSNP distribution will be linked gradually. The SSNP management system will have interface for each ministry and government agencies for update of information and processing of SSN benefit distribution. This system will be able to avoid multiple-targeting and reduce the time for subsequent beneficiary identification. The central database will be made available readily accessible at the local upazila level for entering information about new beneficiaries, and also for verifying identify of beneficiaries.

Portals: For ensuring citizens' right to information and proper distribution of SSN benefits, each district portal and subsequently upazila and union parishad portals should publish list of all eligible candidates for each type of SSNP. All the lists should be prepared using the CCDS to bear names of beneficiaries with photograph and other relevant information. Such disclosure of information will facilitate reduction in mis-targeting and involvement of citizens' groups for transparency and accountability. The web-portals will have a system to redress grievances if and when any irregularities take place.

SSN payments: A system of mobile-phone based payment of benefits can be developed so that target beneficiaries are able to receive payment directly without any other interfaces. For those who do not have reliable and private access to mobile phone, they may receive benefit at their doorstep through postal service system or the Union Digital Centers (previously UISCs). As the ICT usage matures and gains maximum coverage throughout the country, plans for automated delivery of cash grants will be considered, as solar-power ATMs can be introduced for expediency in local town centers where the literacy rates make such a program conceivable.

One of the most commonly cited examples in the area of m-payments is the m-Pesa, first introduced in Kenya in 2011. m-PESA is the first service where mobile money was used for social transfers. In view of the widespread use of mobile phones, the government could consider drawing lessons from the m-Pesa model to capitalize on the growing number of m-citizens. In particular, such a mechanism

can be of acute use in times of natural disasters when infrastructure becomes a key deterrent to disbursing money to those in need.

4.2.10 Service delivery oriented PPP

The concept of PPP is new for e-service or m-service delivery in Bangladesh. There is a gap in perception about PPP within the government and private sector in view of the dichotomy of public and private interests. The relevant stakeholders are not aware about strong political commitment of the government to engage with the private and non-state sectors. This is because the PPP Policy is not well circulated and not sufficiently explained among the stakeholders. The transformation of strategic priories from agenda into action requires significant resource mobilization, which is currently not available. The vision is to make e-service delivery a reality through active participation of private sector under PPP.

Strengthening Office of the PPP: The line ministries should collaborate with the Office of the PPP to identify, formulate and implement PPP projects in partnership with private sector actors. The Office should coordinate among various government and private agencies for accelerating approval and implementation of PPP projects. The Office and line ministries and implementing agencies will encourage private sector to come forward with unsolicited proposals where private sector innovation and dynamism will be leveraged for offering e-services to citizens. At least five projects should be identified and developed under each ministry to be initiated in each fiscal year under PPP modus operandi.

The Office of PPP, with support from GIU and A2I, could contemplate on developing a comprehensive five year plan under which PPP projects will be identified and contribution of the government to those projects will be estimated. These estimates will be included in the national budget in each fiscal year and progress will be reported at the annual budget session.

The Office can undertake programs for building capacity of government officials and private sector participants in collaboration with development partners so that project identification and approval process strictly adhere to stipulated time frame.

The Office needs to work with similar government agencies abroad to share views and exchange experiences to understand best practices and to make the PPP initiatives in Bangladesh vibrant and effective. The Office should work with the development partners to engage them in PPP projects for participating either in government contribution or investment by the private sector. The Office should follow state-of-the-art online process for proposal submission, processing, decision making and implementation progress tracking with individual interface for each ministry and implementing agency.

4.2.11 Parliament

The vision is to make the Bangladesh Parliament responsive to the needs and well-being of the citizens. It needs to be equipped with the tools of interactive democracy and its stakeholders, both elected representatives and government officials, need to be made comfortable and confident in the use of such methods which could strengthen democratic foundations. In so doing, the Parliament of Bangladesh will effectively fulfill its role as a legislative, representative, and oversight body according to the Constitution of Bangladesh and the citizens of Bangladesh will have access to more participatory democracy.

Enlighten: Competent, knowledgeable, impartial, professional and proactive services provided to the members are a key factor that can contribute to a parliament's effectiveness in accomplishing its major functions. Initiatives based on technology can deliver reforms in parliament which will eventually impact the entire populace of Bangladesh through better laws, better governance and better representation.

Ensure: The oversight functions of the legislative is a key activity which can benefit from the use of ICT. Parliamentary committees are a key nexus upon which much of the potential of a parliament can be built. Strengthening of members' knowledge of procedural issues can inform more meaningful debate in the House.

Engage: The number of constituent voters a Parliament Member has to keep in touch with has been increasing over the years. Using various means of e-Dialogue, e-Participation, e-Deliberation and e-Consultation can strengthen democracy and reinforce trust of the people in democratic processes. For instance, e-Petitions can introduced to allow for digital C2G and G2C interactions.

5 Enabling Environment

The increasing role of ICTs in accelerating delivery of public service is running parallel to the growing demands for transparency and accountability in all regions of the world. e-Governance attempts to deal with two interrelated and mutually exclusive objectives – (a) internal, focusing on processes (operations); and, (b) external, fulfilling people's needs and expectations by simplifying processes (Basu, 2004: 110-111). The concept of e-governance epitomizes horizontal and vertical connectivity by providing a virtual, yet, de jure platform for streamlining government-to-government (G2G), and G2C/C2G interactions, respectively (business-to-government (B2G) and vice versa, i.e., G2B interactions).

5.1 Policy and infrastructure

The first component of the 6FYP's Digital Bangladesh is ensuring that citizens have access to ICTs for accessing information and knowledge required to perform their day-today activities. "Access to information and knowledge will make the 'digital citizens' able to take informed choice in exercising their rights and entitlements," (GED 2010: 271). Five long-term strategic goals of the Perspective Plan can be related with this particular Digital Bangladesh category mentioned by the 6FYP (GED, 2012: 57). The Plan calls for establishment of tele-center/community e-centers with internet facilities across all unions and increasing teledensity to 70 per cent by 2015. Both targets have been met and Bangladesh is on-track to achieve 90 per cent teledensity by 2021- a key long-term strategic goal of the Perspective Plan.

Allocation for research and development (R&D) is, nevertheless, low alongside broadband penetration (both in terms of access and availability). Whilst China spends almost 2 per cent of its GDP on R&D, this is less than 1 per cent for Bangladesh. Similarly, broadband penetration for China and Bangladesh recorded 12.72 per cent and 0.39 per cent in 2012 (ITU, 2013).

With regard to widening internet connectivity, although there are challenges, significant strides have been made. A regional information highway network was established among 4 South Asian nations, Bangladesh, Nepal, Bhutan and India through South Asian Sub Regional Economic Cooperation (SASEC) in order to ensure broadband information communication, exchange information related knowledge and offer access to ICT in inaccessible areas. With an outlay of BDT 294 million,

establishment of 55 km fiber optic cable from Panchagar to Banglabandha, and 30 upazila community information centers, was completed by June 2014.

The second phase of SASEC is underway. High-speed fiber optic cable network is expected to become ubiquitous by 2017, after the project "Installation of Wireless Broadband network for Digital Bangladesh (4G, LTE)" ends. This project will cut across all 64 districts, 300 upazilas and an approximately 19,000 km optical fiber cable will be established. In 2014, Bangladesh officially joined the submarine cable SEA-ME-WE-5 – its second – and hopes to get connected to it by the first quarter of 2016. This will help to further add 1,300 GBps bandwidth.

5.2 Agendas for 7FYP

A total of seven strategic areas are discussed below. All focus on improving the citizens' experience of availing of key services from public and private sectors.

5.2.1 Democratizing access to ICTs

The vision here is to build a connected nation with high speed broadband internet connection with last mile access which enables connected citizenship. In spite of high mobile penetration, one of the major problems pertains to creating opportunities for common citizens to access high-speed internet connectivity. Besides, there is inadequacy of useful local language content and useful services. Mobile phone based value added services benefiting citizens' income and empowerment are limited for a number of reasons, particularly as a result of unattractive revenue sharing policy (see a list for m-services in Table 2 in Annex 1). There is a lack of synergy between private and not-for-profit sector and the government in democratizing access to ICTs – starting with the internet to mobile phones.

IT infrastructure development: The unlimited potential of IT sector may be diminished if steps are not taken to cope with the challenges of infrastructure development. The government needs to expedite the installation of second submarine cable connection for expanding high speed internet facilities. Even now is the time to plan for the installation of third submarine cable. It may be mentioned here that the government has already subscribed membership of SMW-5 submarine cable consortium and signed an MOU in this respect. This will help Bangladesh to get connected with second submarine cable link by 2014.

The government may invite private sector and not-for-profit sector for rolling out broadband connectivity in rural area. Basically it might be government-private-NGO partnership for reaching the very last mile, where there is already vibrant NGO presence. Here, local entrepreneurs will be encouraged to launch last mile internet service to local community.

The government needs to reduce price of bandwidth which will facilitate increasing number of net users, enhancing demand for local content and applications and developing a connected Bangladesh. The Rural Telecommunications Network Development and Utilization Guideline 2010 should be implemented to make sure that the existing network infrastructures have been optimally utilized for commercial communication and key social services (e.g. education, health care, e-governance, etc.). Whilst the lowest recorded price of fixed-broadband (as a percent of GNI per capita) is 0.7 per cent in case of China, it records 7.3 per cent in Bangladesh (ITU, 2013).

Telecommunication services: The government ought to revisit taxation policy for mobile telecommunications industry for creating opportunity for reaching out to the poor in rural Bangladesh. The Information Technology & Technology Foundation (ITIF) reported that Bangladesh, a significant outlier for tax rates, moderate assumptions put the growth drag at 8.5 percentage points of GDP per

capita per year (Miller and Atkinson, 2014). Nevertheless, recommending for its reduction will also highlight the need to explore policy and regulatory options for decreasing the cost and increasing the delivery quality of ICT services. Particularly, there appears to be significant scope for cost reduction in the mobile sector through pursuing appropriate policy of increasing resource utilization, such as transmissions and towers. Moreover, incentive for higher value added services should be given due priority, before recommending tax reduction.

The government needs to accelerate the process of introduction of new technology (e.g., 3G, 4G, and LTE) in the mobile telecom segment through transparent licensing system.

Access to broadband: A nationwide national IT infrastructure plan should be developed considering potential resource mobilization program so that every citizen will have effective access to information and service through various channels. The government should design appropriate incentives for value added service providers through mobile telecommunications and internet through regulatory arrangement so that providers can protect their investment. It should proactively promote PPP for launching various "e" and "m" based services, particularly those targeting rural and marginalized population in the areas of health, education, employment creation and human rights.

Content development and services: Synergistic opportunities could be explored between diverse communication media (e.g. FM Radio, Satellite TV, Cellular Phone services, etc.) to reach out to maximum number of people at the shortest possible time with valuable information. Community radio stations can emerge as another channel of last mile connectivity for the bottom-of-the-pyramid population.

Other policy issues: From special education loan policy and scholarship to Proactive Information Disclosure Policy, there is a wide should range of policies which will need to be out in place to increase resilience of the Digital Bangladesh initiatives.

5.3 Designing inclusive partnerships

Whether Bangladesh should forge institutional partnerships with software proprieties or outsourcing companies, will need to be settled within the 7FYP's purview. Egypt Information and Communication Technology Trust Fund (ICT-TF) was jointly established by the Ministry of Communications and Information Technology (MCIT) and the United Nations Development Program (UNDP) in January 2002. The ICT-TF aims to explore different means by which ICTs can enrich the livelihood of Egyptian citizens, as well as to foster socio-economic development by creating PPPs to support the use of ICTs with software propriety such as Microsoft. By empowering communities with access to valuable tools, skills, training and information, the ICT Trust Fund hopes to broaden the horizons of Egyptian citizens and increase their competitive advantage in a modern technological society.[11]

6 Digital Bangladesh and Gender: Data and Discourse Gaps

Technology is not gender neutral. While there is recognition of the potential of ICT as a tool for the promotion of gender equality and the empowerment of women, a "gender divide" has also been identified, reflected in the lower numbers of women accessing and using ICT compared with men. Unless this gender divide is specifically addressed, there is a risk that ICT may exacerbate existing inequalities between women and men and create new forms of inequality.

At the global level, it is argued that the decreasing share of women in IT workforce is mirrored by a decline in the number of women getting Bachelor's degrees in Computer Sciences and Information

[11] Partnerships http://www.ictfund.org.eg/ModulesEn.aspx?parent_id=119&moduleNo=7&menu_id=135

Sciences: between 2005 and 2011, in the US, the number of female graduates fell by nearly 10 per cent.[12] A 2013 study by Fenwick & West, a silicon valley law firm, to track the number of women serving on boards and executive management teams of companies in the Silicon Valley 150 index found that 80% of the companies have either one or none women directors[13].

This disparity is not a sudden blip in the radar, rather a systematic one that starts at the university level. According to the American Association of University Women (AAUW), "unfortunately, the ancient and erroneous belief that boys are better equipped to tackle scientific and mathematical problems persists in many circles today, despite the tremendous progress that girls have made in science and math in recent decades," (Hill *et al.*, 2010: 90). "Research shows that negative stereotypes about girls' suitability for mathematical and scientific work are harmful in measurable ways. Stereotypes also influence girls' self-assessments in math, which influence their interest in pursuing science, technology, engineering, and mathematics careers," (ibid *opcit*).

The *Global Information Society (GIS) Watch* reported that there are about 3.8 million Facebook users from Bangladesh, out of which close to one million can be estimated to be female users (GIS, 2013: 70). The private Dutch Bangla Bank limited reported that at least 15 per cent of their mobile banking users are female, while according to data from oDesk on freelance IT professionals, as of the fourth quarter of 2012, 1,200 of 30,000 registered users were female (ibid *opcit*). Nevertheless, it is pointed out by GIS Watch that in spite of an overwhelming share of population having access to internet in Bangladesh, "these data do not classify usage information, for instance, according to nature of usage or gender-based participation in online activities," (GIS, 2013: 70).

6.1 ICT Policy and gender

The 2009 ICT Policy focuses on gender as a cross-cutting theme for a number of areas. In particular, it refers to promoting women-led micro-enterprises. Action items 174 and 175 suggest that the government should work to increase enrolment of female students in ICT courses and foster a gradual increase of the female workforce in the ICT industry.

In addition, The ICT Act of 2006 and its amended 2014 version, provides a framework to define and penalize gender based cybercrimes. According to GIS (2013), the BTRC has set up a taskforce to deal with cybercrimes last year and it was "overwhelmed with thousands of complaints," (GIS, 2013: 71). It is imperative to equip law enforcement agencies with necessary skills and tools so that they can effectively deal with such issues. For instance, there is a cybercrime desk in each police station of Dhaka city, but hardly any cases are filed as per the cybercrimes laws in Bangladesh (ibid, *opcit*).

As noted earlier, more than 40 per cent of citizens visiting UISCs are women, which is close to a million. However, the UISC Census also revealed that 933 UISCs had no female entrepreneurs whilst in case of 1,355 UISCs, women entrepreneurs worked for 1-2 working days only (BBS and A2I, 2014). There is thus an urgent need to track the percentage of digital women. Such tracking will be helpful from many fronts, starting with providing opportunities for quick grievance redressal to making informed policy decisions with regard to sectoral priorities.

Women are prioritized in Vision 2021 and also in the Digital Bangladesh component. However, as noted already, not much official information is available to comprehend gender impacts.[14] There

[12] See http://www.techrepublic.com/article/googles-gender-gap-why-technology-is-still-a-mans-world/ for more debate on this topic.
[13] See http://www.businessinsider.com/silicon-valley-and-gender-equality-twitter-2014-2 for more details.
[14] Gender review of the background study also confirmed this claim.

needs to be a set of non-mutually exclusive and diverse indicators so as to enable comprehensive monitoring of the progress being made by Bangladesh.

6.2 Indicators for measuring Digital Bangladesh

It is to be noted here that the MoF (2014a) cites a BBS-A2I study which offers a set of 138 indicators for measuring Bangladesh's transformation to Digital Bangladesh.[15] The study takes not of the 57 global indicators (53 from ITU and 4 from UNDESA), and at the same time, it proposes a set of 47 home-grown indicators to depict Digital Bangladesh's progress with regard to sectoral priorities. Whilst ITU's indicators largely focus on the infrastructure, connectivity and skills status across a society, UNDESA's online service index indicators are of high significance when it comes to understanding e-government from the online service delivery perspective. The indicators are presented from Table 1 to Table 7 in a separate Annex II. This is a total of 104 indicators under seven broad categories.[16]

It is to be highlighted here that 41 indicators, cutting across global and national domains, are proposed to incorporate the gender perspective of Digital Bangladesh. The proposed set of indicators will not only aid to fill this critical void but more pertinently, allow making necessary policy reforms and adjustments to capitalize on any particular momentum. For instance, the 318 action items pertaining to gender priorities under ICT Policy 2009 could be reviewed through these indicators. At the same time, efforts should be made to make sure that the progress achieved in Bangladesh is comparable to others in the world so that the country can further build its ITES image and also emerge as a role model for implementing e-governance reforms in revamping traditional public service delivery processes.

It is suggested that the Ministry of Finance continues to produce annual updates of the Digital Bangladesh progress. This exercise could be further enriched through tracking progress made with regard to the 104 indicators mentioned Annex II. At the same time, it is to be recognized that ICTs descent has made it opportune to revisit traditional survey techniques. There is an online system for submission of industrial information/data although industries have yet to fully respond to this initiative. In strengthening the work of BBS under the Statistic and Informatics Division (SID), Ministry of Planning, three key partners have been identified: Ministry of Information and Communication Technology (MoICT), BCC, the Ministry of Information (MoI), and GIU/A2I. The objective will be to establish a mechanism aimed at regularly updating the method, collecting and processing relevant data, and subsequently, interpreting and disseminating the findings – through policy briefs - for the government to identify gaps in implementation. Such an exercise will draw upon both private and public sectors' stakeholders –two catalytic complements guiding successful implementation of Digital Bangladesh.

7 Building a Resilient Digital Bangladesh

At the conceptual level, resilience based development interventions promote inclusiveness that reduces relative vulnerability of less fortunate communities. To attain that, resilient transformation demands respect for context-specificity such that such development is based on deep and genuine analyses of context and not on best practices from afar as well as genuine ownership from the target

[15] This report is available online at http://a2i.pmo.gov.bd/sites/default/files/resource_docs/Global%20e-%20Indices%20Rankings%20and%20Bangladesh%20Indicators%20for%20Measuring%20Digital%20Bangladesh_final.pdf (Accessed on 10 October 2014).

[16] The Bangladesh Telecommunication Regulatory Commission (BTRC) is providing some of the data pertaining to ICT access to ITU; the Ministry of Public Administration does not have sufficient information to supply data to UNDESA.

population. At the same time, for a resilient transformation, people need to be empowered with knowledge and the capacity to mobilize to overcome or significantly mitigate adversity and hence, a culture of learning and innovation must be embraced.

As such, the 'Digital Bangladesh' is an inclusive vision—a vision that encompasses all citizen of Bangladesh and specially focuses the disadvantaged groups. Hence, resilience discussions in this context touch both building general resilience of the country as well as ensuring resilience of the transformation in this context. One of the important resilience aspects of Digital Bangladesh is that the vision is organic in nature, and it is driven from within. In addition, learning and innovation have been the hallmark of efforts undertaken to attain the vision. Effective tools such as the SIF, operated by both the Prime Minister's Office and the ICT Division targeting citizen services and citizen-centric mobile applications is noteworthy.

However, giving this initiative a structural form under an office that has cross-cutting mandate such as the Prime Minister's Office is needed to further institutionalize the culture of learning and innovation within the very fabric of bureaucracy of the country. Such an institution is also needed to coordinate plethora of interventions and build synergies with a whole of government approach. While so far most Digital Bangladesh initiatives were bottom-up in nature, more can be done to involve grassroots not just in the implementation but also in planning and prioritization.

From the promoting resilience angle one of the first issues to be highlighted is the fact that technology can make the strong even stronger and disempower the already weak. This phenomenon is also known as "digital divide"—which is actually several gaps in one. There is a technological divide—great gaps in infrastructure permeated by restriction of access both financial and physical. There is a content divide. A lot of web-based information is simply not relevant to the real needs of people. And nearly 70 per cent of the world's websites are in English, at times crowding out local voices and views. There is a gender divide, with women and girls enjoying less access to information technology than men and boys.

To avoid this pitfall, a nation must make the right choices in policy formulation, stakeholder engagement and choice of technologies. It is imperative to reduce the risk associated with any policy reform or change management by meticulously analyzing the incidence and impact of such change. To exemplify this issue, the case of massive scaling-up on multiple fronts of field-level service delivery through local government institutes can be considered. In this context, it is necessary to review the legal and policy framework guiding those institutions as well as assessment of their capacity to ensure that these services are accessible to the disadvantaged groups. At the same time, capacity of the beneficiary groups needs to be assessed and built if required. Disaggregated data indicating specific usage by disadvantaged groups and other priority groups like women is required to monitor this aspect.

Transformation envisioned by the Digital Bangladesh vision aims at sustainably raising the quality of institutional efficacy, greater mobilization and better utilization of resources. In addition, the modern society that the Digital Bangladesh vision aspires also requires fundamental reforms in governance structure which would significantly upgrade public service delivery systems and make it responsive to citizens' needs for information and services. Hence, it is needed to review the incentive systems and regulatory frameworks such as 'Civil Service Act' and promulgate/update related laws etc. to remove risks and uncertainties.

The other aspect of resilience is about privacy and citizen space. Technology has long been viewed as the source of many privacy concerns through amplification, routinization, and sublimation (UNESCO,

2010).[17] Arguably, however, right use of technology can protect individual's privacy as well. Hence, countries that are rapidly adopting technology like Bangladesh, need to consider specific steps and measures to ensure that Digital Bangladesh do not create scope for violation of fundamental human rights. Such steps should include regular review of privacy related laws and guidelines in light of Article 12 of the Universal Declaration of Human Rights and other UN Conventions to preserve privacy in the information society. Internationally accepted principles of freedom of expression, association and similar rights need to be protected in the context of cyber space too. In addition, it is important to emphasize the procedural consideration that should guide development of all law and policy concerning the development of Information Society, ensuring democratically meaningful participation of citizens in decision-making process. Such interests are invariably underrepresented in decisions taken by national and international governing borders.

National capacity to defend data, infrastructure and citizen from cybercrime is yet another frontier of building resilience. Bangladesh is going through an e-transformation; processing of public services, data belonging to private individuals, and data/information related to public safety and security are all being transferred to digital forms. The nation is also investing heavily in building digital infrastructure and new technology such as 'public cloud'. This is gradually making Bangladesh a worthy target of organized cybercrime often by international criminal groups. Recent cyber-attacks on government websites are one indication of this trend. In this context, specific steps are needed to build national capacity and institutions to ensure protection from such criminal activities. In addition, investment should be made to develop center of excellences to develop nationally owned/developed software systems to ensure adequate level of security. Leveraging Free and Open-Source software technologies, Bangladesh may develop her own backbones in partnership with local universities.

A final issue is building resilience against physical calamities caused by nature (earthquake, flood, etc.) and human activities (cyber-attacks, human errors, etc.). While Bangladesh is building Tier-2 datacenters in 7 divisional headquarters, and already subscribed to an alternate international internet backbone, efforts should be made to complete the on-going projects in due time. An overall national readiness and capacity assessment of safeguarding digital assets in the face of disasters, natural or otherwise, need to be carried out immediately and repeated in regular interval.

8 Resource Mobilization: 7FYP

It is predicted that by 2020, as a result of high internet speed facilitating ICT induced service delivery, human development and employment opportunities, Bangladesh's GDP will attain an additional 2.6 per cent of growth (MoF, 2014a). The sources of this additional growth is directly attributable to the IT/ITES industry and indirectly through service delivery reforms, which will allow citizens to be more productive as a result of increased predictability, transparency and accountability in public service delivery.

The strategy of developing the ICT sector is to reduce investment risk and strengthen market forces in order to increase productivity and efficiency of all conceivable governance activities and wealth creation sectors of the nation. To ensure inclusive growth, public investment is only recommended to deal with market failure which inhibits delivering ICT benefits to those market segments, where profitable private investment is not feasible for the time being.

8.1 Fiscal trends

[17] Available online at http://www.unesco.org/webworld/infoethics_2/eng/papers/paper_10.htm (Accessed on 14 November 2014).

Since the first budget under the 6FYP purview, i.e., FY2010-11, there has been a 45 per cent increase in budgetary allocation – from BDT 27.16 billion to BDT 39.39 billion (Table 3 in Annex 1). The highest allocation, nevertheless, was recorded during FY2013-14 with BDT 40.24 billion. A budget of BDT 39.39 billion has been allocated for the ongoing financial year although there is flexibility for increasing the amount if, and when, new projects are entered into the pipeline. The allocation for development projects is, nevertheless, the highest recorded compared to the corresponding years – BDT 32.29 billion against BDT 19.84 billion in FY2010-11 and BDT 31.77 billion in FY2013-14.A list of projects being financed by the latter is presented in Table 4 in Annex 1.

In view of the success attained in implementing various provisions under the Digital Bangladesh vision, the government has been financing a number of projects from its revenue budget. The number of such projects, at 37, peaked in FY2010-11 and FY2011-12 with a budget allocation of BDT 1.62 billion and BDT 1.08 billion respectively. At present, the number of projects stands at 16 with a budget allocation of BDT 770 million. This implies that work has been completed for a number of projects and thus, it is imperative that the 7FYP provides a recommendation for the Digital Bangladesh Taskforce to review project implementation status so that appropriate measures can be adopted at the opportune moment to capitalize on the momentum. A list of projects being financed through the government's revenue budget is presented in Table 5 in Annex 1.

It is recommended that the government continues to increase budgetary allocation for the realization of the Digital Bangladesh vision, to the tune of 14-15 per cent annually. In view of the rapidly changing nature of technology, the involvement of private sector actors and the priority showcased by government officials for moving Bangladesh closer to Vision 2021, it is, nevertheless, difficult to make any precise monetary projections for the Digital Bangladesh agenda.

The government needs to be proactive in order to apply flexibility for adjusting budgetary allocations and proposing measures for the development of Digital Bangladesh. In the immediate outlook, it is important to focus on creating a tax-friendly system which would correspond to the Digital Bangladesh vision. A study by ITIF covering 125 countries observed that the, "The worst offender by a large margin is Bangladesh, which adds an astounding 57.8 percent to the cost of ICT goods and services over and above the country's universal 15 percent value-added tax (VAT)," (Miller and Atkinson, 2014: 15). "Bangladesh's high level of ICT taxes and tariffs essentially puts the country in a league of its own, with Turkey, Congo, and other high taxers following some distance behind," (ibid: 16). Bangladesh records the highest tax rate in the South Asia region and therefore, the government ought to be cautious in imposing taxes which could make Bangladesh lose out on its competitiveness in the global market (Table 6 in Annex 1).

8.2 Agendas for 7FYP

The *Medium Term Macroeconomic Policy Statement* (MTMPS, 2014-15 to 2016-17) observes that "adequate investments in physical and social infrastructure education, health, skill development and digitization will be critical to underpin higher growth in manufacturing and services sector and create productive employments for new entrants in the labor market," (MoF, 2014b: 40). The MTMPS envisages increase in GDP growth from the present 6.5 per cent to 8.0 per cent by FY2016-17. "With a view to achieving accelerated and inclusive economic growth…encouraging the utilization of information technologies in providing public services and implementing Digital Bangladesh will remain the priority sectors in the public spending framework FY15-FY17," (ibid: 68). Accordingly, the MTMPS prioritizes automation of different processes and activities relating to both direct and indirect taxes in order to augment the tax-GDP ratio to an acceptable level. It mentions of a number of ongoing and planned initiatives in this regard (see Box 5).

Box 5: Reform Activities

- Use of e-TIN- an Unique Identifier for Income Tax, Customs and VAT to ensure better service delivery and combat tax evasion
- Implementation of Online TIN registration system linked with the National Identity Card Database
- Online VAT registration and Return Submission to start from January 1, 2015 and June 2015 respectively
- Introduction of e-payment for Income Tax, Customs Duty and VAT through debit, credit and other prepaid cards
- Implementation of e-Filing system for income taxes on a limited scales
- e-TDS (Electronic Tax Deduction Source) management system to be implemented soon
- Use of Alternative Dispute Resolution (ADR) to reduce number of revenue-related litigations
- Introduction of systems for submission, assessment and tax refund of VAT and Income Tax centrally and online
- Implementation of ASYCUDA World with a view to processing customs data in major customs stations leading to a paperless management system in near future
- Inclusion of transfer pricing procedures in Customs law
- Provision of higher training to revenue officials at home and abroad to improve their level of efficiency.

Source: MoF (2014b)

The MTMPS mentions that the Government has undertaken various measures to increase the flow of remittances by adopting steps to reduce migration cost by sending workers through G2G system and digitizing the migration management system and at the same time, easing the process of delivery of inward remittance as a result of mobile banking facilities. It also projects total spending in education sector to grow by 9 per cent annually to BDT 389.2 billion in FY17, as a result of a milestone initiative which is underway to build a technical school in every upazila (MoF 2014b: 75).

It is important that the government continues to provide support to both private and the public sectors through the EEF-IT and the SIF respectively. In order to ensure both effective and efficient resource mobilization, it is important to strengthen monitoring implementation of Action Plans mentioned in the ICT Policy 2009 and carry out half-yearly monitoring to this end.

9 Conclusion

Digital Bangladesh projects a transformation not only to a middle income economy but also to a position of equitable access to information and services. In this context, Digital Bangladesh proposes to use modern technology to bring about impacts on every aspect of public and private life and the way citizens, businesses and the government interact to improve the quality of life. This is very much in line with the Sustainable Development Goals put forward by the United Nations.

The driving philosophy of Digital Bangladesh is, therefore, to strike the right balance between equity and growth in the country. It recognizes the danger of adopting concepts, often western-led, of a so-called knowledge-based society which may contribute to growth but will miss the equity parameter significantly, and may further perpetuate inequity in the form of digital divide. As recognized in Chapter 7, ICTs impact is not unprejudiced - a nation must make the right choices in policy formulation, stakeholder engagement and choice of technologies to ensure that both equity and growth aspects are addressed. The deliberate focus on serving the underserved and empowering citizens is helping to break down traditional barriers by connecting citizens with government and non-government service providers through internet and mobile phone-based systems.

The following sub-sections mirror the rest of the document and summarize the major recommendations for what to include in the agenda for the Seventh Five Year Plan.

9.1 ICT and Economic Growth

- *e-Commerce and online/mobile transactions:* Mobile phones and internet have the potential to inter alia expand market access and level the playing field for small producers. At the same time, consumer prices will be driven down and the quality will increase due to increased competition. Specific focus on rural e-commerce and low-cost online transactions must be devised and popularized.
- *No one left behind – civil registry and financial inclusion:* The vision for Digital Bangladesh is to establish an equitable, inclusive society and economy. Development of a comprehensive civil registry that is linked to all service delivery by the government, and preferably also by non-government service providers, will ensure inclusion. A whole-of-government approach, possibly steered by the Cabinet Division, will be necessary to establish and use the civil registry across all service delivery organizations. True financial inclusion mechanisms that provide extremely low-cost mechanisms at citizens doorsteps for banking, money transfer including safety net payments and local and foreign remittances, credit including micro-credit, insurance including crop, health, life, disaster and other kind, must be formulated and popularized.
- *Business productivity:* ICTs have proven to increase productivity in virtually all sectors of economy and business ranging from agriculture, manufacturing and services. Appropriate productivity tools must be adopted alongside incentives for quick adoption.
- *Rapid expansion of the IT/ITES industry:* ICTs hold immense promise for a country like Bangladesh which boasts a booming youth population, with a sharp interest to learn ICT tools and put them to the purpose of gainful employment. A collaborative approach is necessary to develop technical and soft skills necessary for the sector, generate employment for local, foreign and outsourced jobs. Additionally, establishment of necessary infrastructure, international brand image of the country, and access to finance for entrepreneurs is required to tap into the imminent demographic dividend. These are elaborated in section 2.2.

9.2 ICT and Education

- *Education quality improvement through IT-enabled learning:* All classrooms in primary, secondary, tertiary and professional education must be turned into multimedia classrooms with appropriate infrastructure consisting of reliable power, high-speed internet and necessary equipment with teaching staff well equipped to use them to improve teaching-learning. Massive local content generation must be undertaken through industry participation and crowd-sourcing of teachers, teacher trainers and learners. MOOCs may become a viable, low-cost, high-outreach form of educational content delivery which is participatory and learner-centered.
- *Teacher empowerment in primary and secondary education:* Experiences of introducing technology in education in the world over have produced a consensus that no amount of technology can replace or marginalize the teacher's role. Thus, technology should be used to empower teachers with on-demand and on-the-job capacity development, peer collaboration and learning. The Teachers' Portal has played a particularly effective role in developing both collaboration amongst teachers and competition for educational excellence. Other innovation avenues must be explored to incentivize teachers for modulating their behavior and preparing them to improve teaching-learning in classrooms.
- *Strengthening vocational stream:* Vocational stream is not attractive for the youth, as was explained earlier in the document. However, there is a national target to increase enrolment in the vocational stream to 20 per cent of the entire student cohort. This will require re-branding of the vocational stream in order to ensure that the curriculum is market-ready, linking

graduates to the job market more effectively and making appropriate use of ICTs for training purposes.

- *Expanding IT graduate pool:* If Bangladesh has to meet the increasing demand of local and outsourced IT jobs in the world, tertiary educational institutions, industry and the government must work together to rapidly increase the number of qualified IT graduates who are industry-ready every year. In-house training may need to be established in companies (perhaps funded by the government) and accreditation mechanisms must be in place to ensure high quality – as proposed in section 3.2.8 with regard to the establishment of a National Certifying Authority.

9.3 ICT for Greater Transparency, Good Governance and Service Delivery

- *SPS, e-Services and RTI:* The RTI-based portals set up in all 25,000 offices of the government offices must be maintained with up-to-date information and made accessible through mobile phones and service access points. With the introduction of ShebaKunja in 2014, as noted in section 4.1.2, service maps of about 400 services from 36 major service delivery ministries and directorates have been amassed in one location. These maps show, in great detail from the perspective of the citizens, the exact steps, TCV to get a service. The next logical step for the concerned government agencies is to simplify service delivery using the methodology called Service Process Simplification (SPS), discussed in section 4.2.2, devised by the A2I program to reduce TCV for citizens. This is a mammoth undertaking that will possibly require significant coordination from the PMO and Cabinet Division. A whole-of-government approach must be adopted to set up electronic dashboards with administrative alerts across all ministries, directorates, districts, upazilas and union parishads, in order to monitor the speed and quality of service delivery.
- *Service access points:* The Union Digital Centers (previously UISCs) have proved that it is possible to take centralized services to highly localities and reduce citizens' TCV to access services. These service access points must be nurtured and made financially sustainable by strengthening the entrepreneurship-based model. The number of service access points may also be increased by incorporating other government agencies such as the post offices and community clinics, and non-government agency offices. In addition, with technical capacity of mobile phones rapidly rising and costs rapidly falling, they are becoming viable access points for services. Within the duration of the 7FYP, it is projected that over half of critical government services may be made available over mobile phones.
- *Incentives for innovation within civil service:* Lessons from A2I show that the latitude for experimentation offered to civil servants, especially the ones that are close to service delivery, have significant impact on generating new ideas for improving service delivery. Policy support, small funds to prototype new service delivery mechanisms and capacity building on innovation have proven to be effective incentives for kicking-off, prototyping and scaling up of innovations. In addition, public competition for service delivery excellence has proven to be, and will continue to be, another effective incentive for innovation.
- *e-Administration and flattening of hierarchy:* The e-Filing system in operation in the DC offices since 2012 has proven that unprecedented administrative efficiency gain is possible by leveraging ICTs. This system needs to be expanded to all offices of the government within the 7FYP's ambit. Additional systems such as human resources, payroll, leave, study tour, and training management, budgeting and expense management, inventory management and other ERP and decision support modules should be integrated with e-Filing to broaden and deepen administrative efficiency in government organizations. These will have the significant benefit of flattening of the bureaucratic hierarchy and will reduce make governance process more responsive through reducing decision-making time.

- *e-Participation and social media:* The rapid rise of social media in Bangladesh has created unprecedented opportunity to engage the citizens in decision making and policy formulation. There is now viable platform for the citizens' voices to be heard. With each DC hosting public Facebook page taking in citizens' grievances, there is a goldmine potential for increasing G2C and C2G interactions, and bringing the government closer to its citizens. The UISC Blog has showcased the potential of redressing grievances at the grassroot level and lessons from such a virtual platform needs to be further formalized within the government structure to make it more responsive to social injustices.

9.4 Enabling environment

- *Reliable and secure infrastructure:* ICTs require reliable infrastructure – consisting of power, high-speed internet connection and appropriate equipment - at a minimum to be functional. When service delivery and businesses become dependent on ICTs, this reliance is paramount and unavoidable leading to the requirement that the infrastructure needs to be ubiquitous. This means that redundant infrastructure must be ensured in all service delivery and business organizations that have adopted ICT-based service delivery. Information security becomes a critical priority of the government with appropriate measures in place to prevent against cyber attacks which will be increasingly common with citizens' identity and financial information becoming increasingly online. The country will need to build international alliance for software infrastructure from open source and proprietary technologies. These are elaborated in section 5.2.1.
- *Policy and legal framework and whole-of-government approach:* An innovation may start with experimentation but there is no getting around to the fact that policy framework, and often legislation, is necessary to scale up innovation. Institutionalization of an innovation almost always requires policy and/or legal reform. Years of e-Governance investment has been known to fail globally because required policy and legal safeguards were not developed to institutionalize the new ways of doing old things. The country's ICT Policy and ICT Act only facilitate certain fundamental issues regarding ICTs. In order to scale up and institutionalize ICT-based service delivery, administration, business productivity, a number of policy and legal reform may be necessary by sectoral ministries ranging from Cabinet Division, Ministry of Public Administration, Law, Education, Health, Agriculture, Banking, Election Commission, etc.
- To incentivize private sector investment into e-Services or ICT sector, policy and legal reform may be necessary in taxation, import duties, etc. Experience from within the country and from other countries indicates that a whole-of-government approach, although difficult to orchestrate, is most effective for policy and legal reform. Recently, efforts have been identified to formulate policies and develop platforms to open up data so that other organizations – both government and non-government – can make use of the data to add value to products and services. Also, a number of platforms – software systems, social media, mobile platforms, among others – are generating so much data that it is opportune to launch big data initiatives which will lead to value added products and services. For both open data and big data initiatives, a whole-of-government approach is highly recommended.
- *Financing:* Making Digital Bangladesh a reality will ultimately require undertaking of large investments. However, it is possible to mobilize finances in a flexible way. The ICT Policy allows the provision for a percentage of the revenue budget and development budget to be used for ICT-based expenditures. Many large projects have ICT components which can be more effectively designed and sourced often by pooling funds or sharing plans and activities. Mechanisms may be devised for a whole-of-government approach in ICT implementation especially when connectivity, hardware and software infrastructure components are

concerned. Since a large portion of ICT activities are funded by development partners, more aid effectiveness can be obtained by coordinating across development partners as well. Lastly, private investment can be mobilized directly or in the form of universal obligation funds. For ICT industry entrepreneurs, special investment funds need to be set up. Mechanisms for valuation of intellectual property are a high priority for the industry.

- *Partnerships*: For both service delivery and industry development, partnerships within the government, with non-state and global actors, can be of high value at least in terms of resource mobilization. There is a great value to be gained by striking partnerships across government organizations: infrastructure sharing, expertise sharing, complementary implementation, etc. Partnership with private sector may bring in private investment through PPP arrangement where the risk is shared across the partners. Partnership with reputable international companies has the additional benefit of developing the brand image of Bangladesh.

In closing, one must acknowledge that Digital Bangladesh proposes to leapfrog development in all its forms. The famous quote by Lewis Carroll in the book *Alice in Wonderland*, "You have to run as fast as you can just to stay where you are. If you want to get anywhere, you'll have to run much faster" is a reminder that making progress is not enough today; rather, the speed of progress is what determines real progress. Be it in infrastructure development or in human resource development, in improving governance and service delivery, or in creating new industry sectors for employment, strategies and policies must be formulated, implemented and monitored with relevant indicators in order to protect Bangladesh's resilience so that its competitiveness grows faster than its competitors, which will inevitably move the country closer to Vision 2021 and beyond.

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Annex I: Activities under 6FYP's

Table 1: Progress with regard to Digital Bangladesh targets under 6FYP

I. Connecting Citizens

Target	Description	Responsibility	Update (MoF 2014)
1. Building an inclusive information and knowledge system:			
1.1	Building a national partnership to establish an inclusive system of information and knowledge for all citizens through tele-centers and other forms of public access, with special emphasis on marginalized groups and disability	Relevant government agencies	• Establishment of information and service centers, i.e., Digital Centers, throughout the country – from the Union to the City level; 14 community radio stations in operation • Establishment of 172 community e-centers
1.2	Deployment of low cost broadband Internet connectivity across the country for offering e-learning, e-health and e-government services to the citizens.	PPP	• South Asian Sub Regional Economic Cooperation (SASEC) second phase underway • High speed fiber optic cable network is expected to become ubiquitous by 2017 • Bangladesh set to join the 2nd submarine cable which will help to further add 1,300 GBps bandwidth • Many e-services in the areas of agriculture, health and services sector have been introduced by public and private sectors • Each Upazila Health Complex has a mobile phone so people can easily seek emergency medical advice.
1.3	Launch Citizens Helpdesk in public organizations. The host is not mandated to be physically located at the relevant public organization. Telecom operators will have to provide low-toll/toll-free numbers for these call centers.	Relevant government agencies	• No progress
1.4	Expand the voter ID to National ID platform to be used for all citizens' services such as birth registration, passport, bank account, school enrollment, healthcare, vaccination, VGF/VGD and other social safety net programs.	Cabinet Division	• SID/BBS has undertaken is creating a hardcore poor database which is going to be linked with the National Population Register to identify the most vulnerable, i.e., ultra poor • National Informatics Committee being led by the Planning Minister to explore the scope for using National ID Cards for availing of various e-service
1.5	Deployment of Electronic Public Grants (safety net benefits) Delivery System	Relevant government agencies	

			• Citizen Core Data Structure (CCDS), prepared by the Cabinet Division, is being followed by the Bangladesh Bureau of Statistics (BBS) in preparing the NPR • Bangladesh Poverty Database project has been initiated which will be later converted into more sophisticated, NPR form
1.6	Launching of a development TV Channel	PPP	• Some progress towards launching of a Human Development TV by 2015
2. ICT for Equity			
2.1	Launching of multi-year localization program which includes research on Bangla language computing and Bangla content development	Public-private Partnership	• e-Tathyakosh
2.2	Launching of a program and system of protection of children from harmful content	Ministry of Home Affairs	
2.3	Deployment of public key custodian for ensuring network security. This is related to encryption standard and security related laws.	MoSICT, BTRC	
2.4	Deployment of system for protection of information, data and program from hacking, fraud and damage and introducing/spreading computer viruses	Ministry of Home Affairs	
2.5	Deployment of a robust, country-wide system of market information with daily price update of all markets in the country	Ministry of Food and Disaster Management, MOA	• Ministry of Commerce "Online Price Monitoring System" •
2.6	Program of digitization of land record	Ministry of Land	• A number of pilot projects undertaken and being implemented
2.7	Launching of Employment generation scheme for rural youth: info-lady, tele-center workers, BPO	PPP	• Many projects targeting different constituents are in operation
3. e-Participation			
3.1	Deployment of a system of public grievances and reprisal and publication of results of those grievances through electronic means	PPP	

II. Human Resource Development

Target	Description	Responsibility	Update (MoF 2014)
4. Building E-learning Infrastructure: One school one computer lab, smart class room with e-learning facilities			
4.1	Launching of program for ICT education in each secondary school which includes establishment of multimedia classroom, computer lab, teachers, training, technical support system, up-to-date curriculum, Community access for income generation	MOE, MOSICT, PPP	• Two key projects in operation: Multimedia Classroom (MMC) and Teacher-led Digital Content Development • BCC sponsored computer labs in 3,544 educational institutions at the grassroots level since 2009-10
4.2	Launching of program of e-learning	MOE	• Internet connectivity provided to

Target	Description	Responsibility	Update (MoF 2014)
	which includes providing free broadband access to each school		all public colleges
4.3	Installation of computers, LAN, reliable high-speed Internet connectivity for tertiary educational institutions	UGC	• Internet provided free of cost to educational institutions • Bangladesh Research and Education Network (BD REN) established in 6 universities
5. ICT Education			
5.1	Redesigning of the ICT literacy curriculum for secondary and higher secondary syllabus at regular intervals based on the needs of an inclusive and cost-effective knowledge society.	NCTB	• ICT courses for grade VI-XII introduced • 325 e-book conversion chest. So far, 1.1 million users have used e-book sites.
5.2	Initiate ICT Professional Skill Assessment and Enhancement Program (IPSAEP)	MOE, UGC	
5.3	Develop labor market information system to assess domestic and global labor demands for education planning	MoP, MoE	
5.4	Periodic ranking of IT programs of private and public universities by a competent body (including academia and industry) approved by UGC	UGC	
5.5	Introduce and allocate fund for industry-ready applied research projects with mandatory industry & academia collaboration using government grant facilities	MoE	
5.6	Ensuring ICT literacy evaluation as part of Public Service entrance exams	PSC	• Introduced
5.7	Launching program to convert all libraries into digital library	MOC	• Bangladesh National Library Modernization Project
5.8	Organizing regular national, regional, and International conferences.	MOE, MoSICT	
6. ICT-based Education			
6.1	Introducing ECDP for all poor rural children in regular and community schools for at least six months using multimedia Tools	MOE	
6.2	Launching program of ICT-based learning: Install computers, LAN, reliable Internet connectivity with reasonable speed and multimedia teacher training content for all Secondary Teachers' Training Colleges; with a special focus on Mathematics, Science and English	MoE	• "Secondary and Higher Secondary ICT based Education" project have established 20,000 educational institutions (13,700 school, 5,200 madrassas and 1,600 colleges) – internet connectivity, one laptop and one multimedia. • 12,500 trained teachers to create multimedia content
6.3	Launching program of ICT-based learning: Install computers, LAN, reliable Internet connectivity with reasonable speed and multimedia teacher training	MoPE	• The "Basic ICT Skills Transfer up-to-Upazila-level" has set up computer at 192 educational

Target	Description	Responsibility	Update (MoF 2014)
	content for all Primary Teachers' Training Institutes, like PTIs, URCs and NAPE		institutions till December 2013. It has provided training to 7,890 teachers as master trainers, 112,189 students.
6.4	Launching program of ICT-based learning: Establish smart class room with flat screen large television and laptop for supplementing learning in the class room with appropriate multimedia content	MoE, ICT Division	
6.5	Organizing regular national (including at grassroots level), regional, and international competitions on ICT related topics and support participation of national teams in international events.	Cabinet Division, MoE, ICT Division, A2I	• Digital World (Int'l), Digital Innovation Fair (District and Sub-district level), Education Leaders' Conference (Int'l), Teachers' Conference (National),
6.6	Creating central repository for e-Learning content for teacher training and for all students. Provide Incentives for e-Learning content development.	MoE	• Teachers awards, Teachers' Portal
7. Vocational ICT Training			
7.1	Install computers, LAN, reliable Internet connectivity with reasonable speed and multimedia educational content for TVET institutions	MTVEB, DTE	• Established 4 MMCs in each of 64 Technical School and College (TSC) • Teachers' Training is underway for all the teachers of TSCs.
7.2	Introduction of national certification examinations for different levels of ICT personnel/ professionals	Multiple Agencies	
7.3	Establishment of a central body for streamlining syllabus, evaluating eligibility of training instructors and for ranking of ICT training institutions	MoE	
7.4	Introduction of loan facilities for procurement of ICT equipment for government officials, students, teachers and working people	MOF	

III. Digital Government (23 – 2 parts)

Target	Description	Responsibility	Update (MoF 2014)
8. e-Administration			
8.1.	Digitally publish all govt. publications in Bangla using a standard encoding to guarantee document portability	All government agencies	• Member of the Unicode Consortium Forum • Unicode-6 based contents have already been incorporated in BDS 1520:2000 and it is now recognized as Bangladesh standard BDS 1520:2011.
8.2.	Mandate all public information to be made accessible through appropriate electronic means including SMS and other channels.	All government agencies	• National Portal of Bangladesh • Disaster alerts through SMS
8.3.	Launching of online-data sharing and decision making system	All government agencies	• District e-Service Centers(DESCs) across all 64 Deputy Commissioner's (DC) Office • Introduction of development of National

			e-Service System (NESS) - work is in progress across 16,000 government offices to launch the NESS by 2015
8.4.	Creating a national network for the government to connect the public organizations	All government agencies	• Banglagovnet Phase II – Info-Sarkar project
8.5.	Establishing necessary policy framework and introduce IP telephony and video conferencing services in critical government offices.	All government agencies	• Video conferencing system introduced between PMO, Cabinet division, Divisional Commissioners' office, and DC offices • Cabinet Division has undertaken a program for launching video • conference system across all 7 divisions and 64 DC offices • The Info-Sarkar project is to set up 800 video conferencing systems
8.6.	Establishing National Data Resource Center to control and manage the public network and act as a system of national databases to store and supply national data	All government agencies, BBS, PPP	• National Data Center created at the BCC • Wok ongoing in setting up a IV-tier data center
8.7.	Adding a 50-mark examination (to the current 300- mark examination) for applied computer and Internet literacy for senior scale promotion examinations for cadre services.	MoEst	
8.8.	Stopping new steno typist recruitment in the Government offices. Converting all existing steno typists into data entry operators through proper training.	All government agencies	
8.9.	Redesigning ICT and e-Governance curriculum of government training academies with a distinct focus on change management and process re-engineering.	MoEst, Cabinet, BPATC, PSC	• e-Learning introduced on a pilot basis by the Bangladesh Public Administration & Training Center (BPATC), Bangladesh Civil Service Administration Academy (BCSAA), and Bangladesh Institute of Management (BIM) • Innovation Circles
8.10.	Deployment of computer-based project planning and resource allocation system	MoP, MoF	• Bangladesh Bank: Enterprise Resource Planning (ERP) conforming to the international Systems, Applications and Products (SAP) standards. • Finance Division: Integrated Budget and Account System (iBAS)
8.11.	Launch ICT Technical Clusters to cover all public sector organizations to be run by ICT professionals. Create ICT posts for this Cell. All ICT posts in the public sector should be declared technical posts. Create an ICT cadre in the long term	MoEst, Cabinet	• Introduction of Chief Innovation Officers (CIOs), Innovation Officers (IOs) and Innovation Teams under a whole-of-government approach

9. e-Citizen Services			
9.1	Develop national web portal as a "one-stop shop" for delivering e-citizen services	All government agencies	• "Services Portal" and "Forms Portal"
9.2.	Enable payment of utility bills through mobile phones, banks, ATMs or other service centers from any location and at any time of the day	All relevant government agencies, PPP	• Various public and private organizations have started providing mobile-based services (m-services) since 2009 • To speed up banking transaction, implementation of Real Time Gross Settlement (RTGS) system has been undertaken
9.3.	Enable online status check of court cases	MOL&PA,PPP	• An initiative has been adopted to connect all subordinate/lower courts with the Bangladesh Supreme Court • Case related information being provided through SMS • Daily schedule of 13 courts in 13 districts (Daily Cause List) is being publicly displayed
9.4.	Enable electronic filing of GD and FIR	MoHA, PPP	• Pilot by Dhaka Metropolitan Police
9.5	Introduce service to access public transport schedules, fares and ticket purchasing through the Internet and mobile phone.	MOC, PPP	• e-Ticketing and mobile ticketing introduced but for specific routes
9.6.	Allow online registration and work permit for foreign investors	BOI	• In place
9.7.	Introduce online tax filing for all citizens	NBR	• Submission of online income tax returns, VAT and income tax payments • Online tax calculator launched
9.8.	Introduce online application for licenses in business, vehicle registration etc.	Multiple agencies	• Vehicle registration confirmation being sent through SMS
9.9.	Introduction automation of all customs check points	NBR, Port Authorities, PPP	• Automation of Chittagong and Dhaka Customs
9.10.	Automation of land record and registration system	MOLPA, PPP	• Couple of pilot projects to be scaled up ones implementation is successfully completed: "Deed Registration Digitization" program; "Strengthening Governance Management Project, Component B"
9.11.	Introduction of online payment both for transaction within country and international	BB, PPP	• Authorized dealer banks have been directed to cooperate with Online Payment Gateway Service Provider (OPGSP) • 'AlertPay', the Canada based online fund transfer organization has started their operations in Bangladesh. • Necessary steps have already been taken by both the government and Bangladesh Bank to include Bangladesh in the service programs of 'Pay pal', • Setting up a National Payment Switch to

			ensure the inter-operability of different payment channels • Implementation of 'Banking Application Software' which has enabled Electronic Funds Transfer (EFT)
9.12	Introduce online procurement system (in phases)	All government agencies, PPP	• Electronic Government Procurement (e-GP) introduced (www.eprocure.gov.bd) • Online Procurement Information System (PROMIS)

IV. e-Business

Target	Description	Responsibility	Update (MoF 2014)
10. Online Transaction and Payment Infrastructure			
10.1	Establish Certifying Authority (CA)	MoF, BB	• Usage of ICT in e-transactions, e-commerce and e-procurement have been made possible through the amended ICT Act 2009 (amendment) which has applied the provision for digital signature certificate through appointing the 6 certified Controller of Certifying Authority, (CCAP) organizations. 3 CAs have developed the capacity to provide digital signature certificates to government and private organizations and individuals. • The BCC has been certified as the CA for issuing digital certificates to the government organizations.
10.2	Develop capacity development programs for the judiciary & the law enforcement agencies	MoLPA	
10.3	Launch legal reform to protect interest of stakeholders in e-commerce	MoLPA	
11. Promotion of e-business and commerce			
11.1	Establish an Authority/Body on ICT Industry Development	MOC	• ICT Business Resource Center established in Chittagong Hill Tracts
11.2	Establishment of ICT Industry Development Fund	MoF	
11.3	Establishment of TP	MoSICT	
11.4	Conduct research on global Human Resource needs vis-à-vis local capability to identify national focus (every two years)	MOE, MOC	
11.5	Introduce free facilities for ICT industry/ ICT for Development Agencies in TP for five years		
11.6	Conduct regular study on ICT economy (every two years)	MOC	
11.7	Introduction of Venture capital Fund for ITES	MOF	

	Industry		
11.8	Arrange annual fairs, exhibitions & targeted workshops for local enterprises. Road shows and other interactive programs.	MOC	
11.9	Implement ICT based model SMME (one for each category) at Dhaka and other divisional HQs	SME Foundation, MOC, PPP	
11.10	Create special promotional program (by EPB)		
11.11	BMET, Probashi Ministry, and Foreign Labor wings, and Bangladesh Missions abroad) for high end overseas employment in IT	MOFA	
11.12	Create strategic roadmap for Human Resources Development for the ICT industry (both home & abroad)	MOE, MOC	
11.13	Enhancing competitiveness of business through business process re-engineering		
11.14	Develop Agriculture, Food and SMME related content in Bangla		• The e-Tathyakosh, a national e-content repository, is allowing public and non-state actors to publish and share their information in a more targeted manner.
11.15	Develop network within communities to share indigenous knowledge and innovations related to pest management, crop preservation, etc	MoI, MOA,PPP	
11.16	Establish SME resource center focused on agricultural needs spanning relevant supply chain in the local context.	MoI, MOA, PPP	
11.17	Support the agricultural supply chain management system through business portals accessible through various electronic channels.	MOA, PPP	
11.18	Provide training of extension workers and farmers on updated technologies, credit schemes, etc. using ICTs.	MOA, PPP	
11.19	Utilize GIS based soil mapping system to analyze detailed data to provide information relating to crop	MOA, SRDI, PPP	• The Survey Department's project, *Improvement of Digital Mapping System of Survey of Bangladesh* is aimed at creating topographical digital maps: 1: 25,000 scale (over 988 sheets)

	suitability, land zoning, nutrient status and fertilizer dosage.		for the entire country and 1: 5,000 scale (over 263 sheets) for the division-level cities. Work on the construction of a 5-storey Digital Mapping Center has been completed under this project. • The Agriculture Information Service (AIS) Bengali website (www.ais.gov.bd) has been introduced. This has enabled prompt feedback from agriculture experts through video conversation. Using UISCs, rural farmers can avail of AIS services answer relating to agriculture within a day's notice. Some UISCs in Dhaka, Rangpur, Pabna and Naogaon districts are enabling farmers to carry out soil tests and also seek advice on the use of fertilizers. In addition, work is underway for providing online and offline soil based fertilizer advice in 30 upazilas and 20 upazilas respectively.
11.20	Provide access to m-banking for farmers and agribusinesses	MOF, BB, Telcos	
11.21	Develop Internet and mobile-based trading platforms for agriculture produce for extended supply chain	MOC, MOA	
11.22	Initiate a pilot project to promote sector based customized ERP	MOC, PPP	
11.23	Create and disseminate e-Learning resources on Energy Efficiency, ISO competencies, Lean Six Sigma, advanced Production System, etc	MOC, Industry Associations	
11.24	Implement ICT based automation and MIS model at Division level	MOC, Industry associations, PPP	

Table 2: List of existing m-Service[18]

Sl.	Area	m-Service
1.	Agriculture	• e-Tathyakosh (infokosh) and pipilica offering general and tailored information • IVR based Farmers' Call Center by Banglalink • Agriculture content development for tele-centers by Grameen Phone and other private sector operators • e-Purjee introduced as an SMS-based public sugarcane procurement system, informing farmers to bring in their cane
2.	Disaster management	• Weather information through 10941 short code • Early Disaster Warning alerts by Teletalk, Grameenphone, and Banglalink
3.	Education	• Since 2009, applications for admission registration at 32 public universities, 400 colleges, all public medical colleges are being carried out through SMS service • Upto 2013, 2.7 million applications processed • SSC, HSC, JSC and PSC examination results being delivered through mobile phone text message service since 2009

[18] This list is not exhaustive and there may be some other services which are in operation.

		• In 2013, 38.2 million results were delivered via SMS • Students can apply for re-scrutiny of their papers through SMS • Courses in English which are available on mobile phones
4.	Employment	• Citizens can apply for job positions in the Bangladesh Civil Service and Bangladesh Army through SMS. • BMET has a special arrangement for targeting certain categories of workers which vary according to the requirement of host countries. • Important information is disseminated to prospective migrant workers through SMS services.
5.	Finance	• Mobile banking facilities available in 3,577 UISCs; total transaction: BDT 130 million (USD 1.6 million)
6.	Health	• All operators providing some form of remote consultation with doctors. • Teletalk, Grameenphone and Warid offer live consultations; Aktel, Banglalink, Citycell offer IVR services followed by doctors. • Vaccination information for expecting and new mothers. • Complains can be lodged through SMS against any government hospital. • 10,000 new tablets bought in fiscal 2013-14. All existing community health workers to receive a tablet with 2G/3G SIMs by end 2014. • It is reported that 80% health professionals use ICTs for medical purpose and 90% of government health facilities submitting timely and adequate report as specified by the HIS (MIS-H). All community clinics are expected to use telemedicine using Skype
7.	Local government	• Detailed, IVR-based, 64 district-level information can be accessed through short code 16345
8.	Smartphone apps	• There are a lot of smartphone apps that citizens are using, developed by private entrepreneurs. Smart phone app to locate and call all DMP police stations, apps on public information like Airport flight information, apps on health, agriculture, education, and many other services
9.	Utility	• Bills of various public utilities such as electricity, gas and water can now be paid online or via mobile phones. Some 45,000 electrical bills and 25,000 gas bills are paid through mobile phones every month. ✓ Water: WASA bill can be paid through Citycell and Robi mobile phone operators since October, 2010. Moreover, since March 2011, bills can be paid online through 5 banks and their respective branches (over 0.2 million bills paid via mobile phones). ✓ Gas: Citizens can pay Titas gas bills through Grameenphone mobile operator (1.2 million gas bills paid via mobile phones) ✓ Electricity: Consumers can now easily pay electricity bills via their mobile phones or online. Consumers can also pay through selected agent points approved by mobile phone operators. ✓ Power Development Board (PDB): 16 million bills cleared through mobile phones ✓ DESCO: 1.4 million bills paid through mobile phones ✓ DPDC: 2.2 million bills paid through mobile phones ✓ West Bengal Electricity Regulatory Commission: 0.4 million bills cleared via mobile phones ✓ Rural Electricity: Bill payment through mobile phones started in Cox's Bazar and Gazipur regions ✓ Bills can paid through 6 UISCs in Jessore and Narsingdi districts
10.	Miscellaneous	• A Bangla keypad has been developed for use in mobile phones. Moreover, import of any mobile phones without Bangla keypad has been restricted since January 31, 2012. • Most providers provide a mix of the following services to its subscribers: ✓ News Service, Wikipedia, market information, Islamic information, Hajj Portal, travel guide, emergency helpline, m-Farmer service, e-Traffic, legal advice, jobs link, songs/tunes/video download. • e-Ticketing and mobile ticketing for Bangladesh Railway was inaugurated in March 2010. It is reported until 2013 that 1.75 million tickets were sold, of which, 25% tickets were purchased through mobile phones. The service is available on Dhaka, Chittagong, Rajshahi and Sylhet routes.

		• e-Ticketing is available for entertainment shows at the Bangabandhu Sheikh MujiburRahman Novo Theater.

Table 3: Budget allocation for ICT over the last 5 Years (BDT million)

Allocation	2014-15		2013-14		2012-13		2011-12		2010-11		2009-10	
	Projects	Budget	Projects	Budget	Projects	Budget	Projects	Budget	Projects	Budget	Project	Budget
ICT sector	-	5,140	-	5,740	-	3,760	-	3,230	-	3,450	-	2,690
ICT related institutions	-	1,190	-	1,500	-	400	-	350	-	250	-	230
Programs under the revenue budget	16	770	30	1,230	34	960	37	1,080	37	1,620	22	1,210
Development projects	63	32,290	70	31,770	49	28,040	61	26,400	61	19,840	52	17,440
ICT entrepreneurship	-	-	-	-	-	-	-	-	-	2,000	-	2,000
Total		**39,390**		**40,240**		**33,160**		**31,060**		**27,160**		**23,570**

Source: MoF (2014)

Table 4: List of projects related to ICT sector development (BDT million)

Project	FY2015	FY2014
Improving Democracy through Parliamentary Development in Bangladesh (IPD)	0	126
Access to Information (A2I– II)	610.6	527.5
Improving Public Administration and Service Delivery through e-Solution: Improving Grievance Redress System	8.7	13.2
Construction of Upazila and Regional Service Stations for Electoral Database (3rd Amendment)	352.9	648.13
Strengthening Election Management in Bangladesh	205	227.7
Identification System for Enhancing Access to Services	4122	2791.95
Strengthening of Bangladesh Public Administration Training Center (BPATC)	57.2	93.8
Digitization of BPATC	75.1	50
Deepening MTBF and Strengthening Financial Accountability	1188.7	1562.45
SPEMP-B: Strengthening the Office of the Comptroller and Auditor General (OCAG)	339.9	598.9
Strengthening of Governance Management Project: (a) Online Filling and Digitization of Tax Returns, Component C: Establishment of Payers Information and Service Center	480	103.5
Governance Management Project: (a) Online Filing and Digitization of Tax Returns, Component C: Establishment of Payers Information and Service Center	3.6	2
Implementation of Digital ECNEC	59.2	64.9
Digital Information System of the Statistics and Informatics Division (SID)	0	42.8
Development of Bangladesh Poverty Database Project Component-3 of the Strengthening the Safety Net System for the Poorest	1447.7	57.7
Bangladesh Land Survey Department Digital Mapping Method Application	210	155
Introduction of Machine Readable Passport (MRP) and Machine Readable Visa (MRV) in Bangladesh	300	1850
Establishment of Bangabandhu Sheikh Mujibor Rahman Science and Technology University in Gopalganj	65	317.5
Developing ICT capacity of selected non-government colleges	1800	1000
Establishment of IT labs at all secondary schools in Dhaka	120.3	182.8
Establishment of Pabna Science and Technology University (Amended)	230	150
Establishment of ICT Bhaban at Shahjalal Science and Technology University	80	75
Development of Jessore Science and Technology University	0	141.9
Further Development of Jessore Science and Technology University	200	60
Strengthening Haji Mohammad Danesh Science and Technology University	170	120
Further Development of Patuakhali Science and Technology University	200	190
Development of Khulna Engineering and Technology University	120	60
Establishment of Rangamati Science and Technology University	70	5
Development of Maulana Bhashani Science and Technology University	70	20
Development of Noakhali Science and Technology University	70	10
Establishment of Upazila level ICT Resource Center	900	961.4
Bangabandhu Fellowship on ICT	160	168.4

Collection of Materials for National Science and Technology Museum and inspiring young scientists	0	148.1
Strengthening of Bangabandhu Sheikh MujiborRahman Novo Theatre	0	528.5
Health Information System and e-Health	610	952.5
Info apa (ladies): women's empowerment using information technology for building Digital Bangladesh	59	40
District-wise Training for Women	212.8	15
Evolving digitial information in BFDC	2.5	1
Digitization and modernization of wave transmitter- a compulsory medium of Radio Bangladesh.	31.2	202.2
Establishment of two 10 KW digital radio stations in Mymensignh and Gopalganj	110	45
Birth and death registration (3rd phase)	37.6	39.4
Development of ICT and e-citizen services at cooperative associations.	16.1	36.86
Disseminating agriculture related information through Agriculture Information and Communication Centers for improving rural livelihood	53.4	85
Union level fisheries farming technology dissemination	0	51.9
Registration and ID Cards for fishermen	300	200
Strengthening Settlement Press, Map Printing Press and Preparation of Digital Map	94.3	55
Strengthening Governance Management Project (Component-B): Digital Land Management System	697.4	20
Digitizing land survey and land records preparation and preservation (1st phase: Mouza maps and Khatiyans digitization)	140	20
Capacity Building and Supporting the Implementation Strengthening Government Management Project (Component B – Digital Land Management Systems)	13.4	23.6
Improving Public Administration and Service Delivery through e-Solutions (Market Plan for a Digital Land Management System Component)	12	0.5
Establishing Data Center and Web Portal System for BRTA	22.7	0.2
Telecommunication Network Development	3270	3266.6
Introducing 3G network alongside expanding 2.5G network.	1516	3200
Optical fiber cable network in 1,000 Union Parishads	700	355.8
Development project on establishing optical fiber cable network at the Upazila level	800	300
Technical Assistance for Improving Public Administration and Service Delivery through e-Solutions Project: Support Extending e-Services with Last Mile Connectivity in a Selected District	21	5.1
Establishment of NGN Telecommunication Network for Digital Bangladesh	100	0
Digitizing Bangladesh Post Division's operations & activities.	229	57.5
Establishment of ICT dependent rural post offices	100	52
Post-e-center for rural community	100	60
Establishment of SASEC Information Highway (Bangladesh Part)	0	195.5
Learning and Earning development project	200	50
Development of National ICT Infra-network for Bangladesh Government	1042	1004.8
Basic ICT Skill transfer upto Upazila level	0	60.1
Strengthening of BCC via infrastructure development.	25	221.5
Leveraging ICT for Growth, Employment and Governance	1041.2	141
Support to development of Kaliakar Hi-Tech park	1012.1	701.6
Empowering Rural Communities and Reaching the Unreached: UISC	0	0.1
Jessore Software Technology Park (STP)	317.9	51
Capacity Building of ITEE Management	93.7	130.3
Development of National ICT Infra-network for Bangladesh Government phase-2 (Info-Sarkar) project	4838.9	7070
Allocation for new approved projects (ICT Division and Post & Telecommunication Division)	758.7	0
Total	**32293.8**	**31765.2**

Source: MoF (2014)

Table 5: List of Programs in ICT Sector Finance from Revenue Budget (BDT million)

Project	FY2015	FY2014
Sangsad (Parliament) Bangladesh Television	0	28.06
Connectivity for MPs and intranet application for National Parliament	0	2
Procuring network core equipment for the Parliament to establish a modern data center	91	91
Capacity development of Cabinet Division	3.35	15.77
Development of Networking Automation and Database under MoPA	0	63.97
Modernizing printing of all government printing presses.	0	96.74
Computerization, networking and internet connectivity for all offices under Tax division.	0	67
Quality improvement of NA Wing's regular publication at the Statistics and Informatics Division (SID)	2.35	3.97
Modernization and digitization of deed registration procedure	39.71	59.57
Development of Noakhali Science and Technology University	0	11.72
Including all operations of Department of Women's Affair within E-service	0	22.81
Women Entrepreneur development training	0	88.96
Strengthening ICT system of BASOS	29.2	18.6
Modernizing training opportunities at the Bangladesh cooperative academy and regional cooperative institutes	0	4.43
ICT associated development of MoA	0	6.59
Developing e-governance along with training at the Ministry of Agriculture.	0	3.04
Integration system of Bangladesh Tourism Corporation.	50.24	50.24
Creating a database of freedom fighters and encouraging the mass population.	0	13
Special campaigns for the development of ICT sector within the ICT division.	190.04	234.69
Establishing IT Business Incubator at the Chittagong University of Engineering and Technology.	51.3	43.93
Learning and Earning Training	0	46.33
Survey on potentials for IT Village at all divisions.	0	9.91
Pilot campaign on establishing Labs for Virtual Desktop Computing Networks. (Dhaka, Khulna and Barisal Division)	0	2.79
Pilot campaign on establishing Labs for Virtual Desktop Computing Networks. (Chittagong, Rajshahi, Sylhet and Rangpur Division)	0	2.66
Distributing Digital signature certificates at all government offices for the use of electronic filing.	35.25	87.49
Increasing awareness and capability for the development of mobile application at the national level.	33.76	50.64
Developing text to speech software for Bangla corpus and Bangla OCR and creating digital talking book.	34.4	51.6
Converting primary education content into digital interactive multimedia version.	31.68	8.4
Freelance to entrepreneur development.	36.47	26.29
Making money from home-training project.	46.38	20.62
Cyber security campaign	46.34	0
Innovation for smart green building.	45.1	0
Total	**766.57**	**1232.82**

Source: MoF (2014)

Table 6: ICT Tax Structure in South Asia

Country	**Broadband tax**			**Wireless tax**			**Consumer product tax**			**Consumer product tariff**	**Business use product tariff**
	Base	*Extra*	*Total*	*Base*	*Extra*	*Total*	*Base*	*Extra*	*Total*	*Total*	*Total*
Bangladesh	15	45.5	60.5	15	114.1	129.1	15		15	17.7	14.1
India	12		12	10.3		10.3	13		13	1.0	1.5
Nepal	13	20.5	33.5	13	53.5	66.5	13	2	15	0.2	0.8
Pakistan	20	2.4	22.4	16	4	20	0		0	15.1	8.7
Sri Lanka	15	3	18	12	20	32	12		12	2.0	1.9

Source: Miller and Atkinson (2014)

Annex II: Indicators for Measuring Digital Bangladesh

Table 1: Core indicators on online public service delivery (UNDESA's online service index)

Code	Indicator	Possible source	Collection method
Stage 1: Emerging information services	Government websites provide information on public policy, governance, laws, regulations, relevantdocumentation and types of government services provided.	BBS, BASIS	Compilation
Stage 2: Enhanced information services	Government websites deliver enhanced one-way or simple two-way e-communication betweengovernment and citizen, such as downloadable forms for government services and applications.	BBS, BASIS	Compilation
Stage 3: Transactional services	Government websites engage in two-way communication with their citizens, including requestingand receiving inputs on government policies, programs, regulations, etc. Some form ofelectronic authentication of the citizen's identity is required to successfully complete the exchange.	TBD	Complied statistics
Stage 4: Connected services	Government websites have changed the way governments communicate with their citizens. Governments create an environment that empowerscitizens to be more involved with government activities to have a voice in decision-making.	TBD	TBD

Table 2: Core indicators on ICT infrastructure and access (ITU's ICT for Development Index)

Code	Indicator	Possible Source	Collection method
A1.	Fixed telephone lines per 100 inhabitants, by gender	BTCL	Administrative records
A2.	Mobile cellular subscribers per 100 inhabitants, by gender	BTCL	Administrative records
A3.	Fixed Internet subscribers per 100 inhabitants, by gender	BTCL	Administrative records
A4.	Fixed broadband Internet subscribers per 100 inhabitants, by gender	BTCL	Administrative records
A5.	Mobile broadband subscriptions per 100 inhabitants, by gender	BTCL	Administrative records
A6.	International Internet bandwidth per inhabitant (bits/second/inhabitant), by gender	BTCL	Administrative records
A7.	Percentage of population covered by mobile cellular telephony/ telephone network, by gender	BTCL	Administrative records
A8.	Internet access tariffs per month in US$, and as a percentage of per capita income	BTCL	Administrative records
A9.	Mobile cellular tariffs (100 minutes of use per month), in US$, and as a percentage of per capita income	MoPT/BTRC	Administrative records
A10.	Percentage of localities with public Internet access centers (PIACs): a. Number of inhabitants, by gender b. Location (rural/urban/etc)	MoICT/A2I	Administrative records (partial)
A11.	Proportion of households with electricity	LFS & HIES 2010, Population Census 2011	Survey, Census
A12.	Number of internet service providers (ISPs) and access lines in proportion to total population, by gender	MoPT/BTCL	Administrative records

Table 3: Core indicators on access, and use of, ICT by households and individuals

Code	Indicator	Possible source	Collection method
HH1.	Proportion of households with a radio, by gender	HIES 2010/SC	Survey
HH2.	Proportion of households with a TV, by gender	HIES 2010/SC	Survey
HH3.	Proportion of households, by gender, with a. Any telephone b. Fixed line telephone c. Mobile cellular telephone only d. Both fixed and mobile cellular telephones	HIES 2010/SC	Survey
HH4.	Proportion of households with a computer, by gender	HIES 2010/SC	Survey
HH5.	Proportion of individuals who used a computer (from any location) in the last 12 months, by gender	NA	
HH6.	Proportion of households with Internet access at home, by gender	HIES 2010	Survey

HH7.	Proportion of individuals who used the Internet in the last 12 months, by gender	HIES 2010/SC, LFS 2010	Survey
HH8.	Location of individual use of the Internet in the last 12 months: a. Home, work, school, etc b. Another person's home c. Community Internet access facility (UISCs, etc) d. Commercial Internet access e. Any place via a mobile cellular telephone f. Any place via other mobile access devices	TBD	Survey
HH9.	Internet activities by citizens in the last 12 months, by gender a. Getting information about goods or services b. Getting information related to agriculture, education, and other social services c. Getting information from general government organizations d. Interacting with general government organizations e. Sending or receiving e-mail f. Telephoning over the Internet/VoIP g. Posting information or instant messaging h. Purchasing or ordering goods and services i. Internet banking j. Education or learning activities k. Playing or downloading video games or computer games l. Downloading movies, images, music, watching TV or video, or listening to radio or music m. Downloading software n. Reading or downloading online newspapers or magazines, electronic books	TBD	TBD
HH10.	Proportion of individuals who used a mobile cellular telephone in the last 12 months, by gender	TBD	TBD
HH11.	Proportion of households, by gender, with access to the Internet by type of access: a. Narrowband b. Fixed broadband c. Mobile broadband	TBD	Survey
HH12.	Frequency of individual access to the Internet in the last 12 months, by gender a. At least once a day b. At least once a week but not every day c. Less than once a week	TBD	Survey, SC

Table 4: Core indicators on use of ICT in business

Code	Indicator	Possible source	Collection method
B1.	Proportion of businesses using computers	TBD	TBD
B2.	Proportion of person employed routinely using computers	TBD	TBD
B3.	Proportion of businesses using Internet	TBD	TBD
B4.	Proportion of person employed routinely using the Internet	TBD	TBD
B5.	Proportion of businesses with a web presence	TBD	TBD
B6.	Proportion of businesses with an intranet	TBD	TBD
B7.	Proportion of businesses receiving orders via the Internet	TBD	TBD
B8.	Proportion of businesses placing orders via the Internet	TBD	TBD
B9.	Proportion of businesses using the Internet by type of access: a. Narrowband b. Fixed broadband c. Mobile broadband	TBD	TBD
B10.	Proportion of businesses with a Local Area Network (LAN)	TBD	TBD
B11.	Proportion of businesses with an extranet	TBD	TBD
B12.	Proportion of businesses using the Internet by type of activity a. Sending and receiving email b. Telephoning over the Internet/VoIP c. Posting information or instant messaging d. Getting information about goods or services	TBD	TBD

	e. Getting information from general government organizations f. Interacting with general government organizations g. Internet banking h. Accessing other financial services i. Providing customer services j. Delivering products online k. Staff training		

Table 5: Core ICT indicators for social sectors: education, health, agriculture and land management, social safety net programs, and climate change

Code	Indicator	Possible source	Collection method
	Education		
ED1.	Proportion of schools with a radio used for educational purposes	TBD	Institutional Survey
ED2.	Proportion of schools with a television used for educational purposes	TBD	Institutional Survey
ED3.	Proportion of schools with a telephone communication facility	TBD	Institutional Survey
ED4.	Learners-to-computer ratio in schools with computer-assisted instruction, by gender	TBD	Institutional Survey
ED5.	Proportion of schools with Internet access by type of access: a. Any Internet access b. Access by fixed narrowband only c. Access by fixed broadband only d. Both fixed narrowband and broadband access	TBD	Institutional Survey
ED6.	Proportion of learners, by gender, who have access to internet at school	TBD	Institutional Survey
ED7.	Proportion of learners, by gender, enrolled at the post-secondary level in ICT-related fields	TBD	Institutional Survey
ED8.	Proportion of ICT qualified teachers, by gender, in secondary and tertiary level	TBD	Institutional Survey
ED9.	Proportion of schools with electricity	TBD	Institutional survey
ED10.	Proportion of primary and secondary schools having internet access for students	TBD	Institutional Survey
ED11.	Proportion of students enrolled in tertiary education having Internet access for study purposes, by gender	TBD	Institutional Survey
ED12.	Proportion of enrolled students to PC/internet (in primary, secondary and tertiary education), by gender	TBD	Institutional Survey
ED13.	Proportion of students enrolled in tertiary in an ICT field or an ICT dominate field, by gender	TBD	Institutional Survey
ED14.	Proportion of tertiary education institutions with e-learning courses (of the total number of tertiary education)	TBD	Institutional Survey
ED15.	Access to international research materials at the secondary and tertiary level	TBD	TBD
ED16.	Number of multimedia classrooms in proportion to total classrooms, students and teachers, by gender	TBD	TBD
	Health		
H1.	Geographic distribution of health institutions with computer, telephone and Internet connectivity	TBD	Survey
H2.	Proportion of health professionals who use ICTs for medical purpose	TBD	Survey
H3.	For what purpose do health professionals, by gender, use the Internet a. Tele-medicine b. e-Mail c. Research d. Health information e. Continuing medical education or distance learning f. Health promotion (including health information systems), database, software applications, etc.)	TBD	Survey
H4.	Proportion of government health facilities (Upazila Health Complexes, Community Clinics, etc) submitting timely and adequate report	TBD	Survey
H5.	Proportion of government health facilities (Upazila Health Complexes, Community Clinics, etc) using video/audio conferencing, mobile phone health service and tele-consultation services	TBD	Survey
H6.	Number of health facilities using in the upazila hospitals	TBD	Survey

Agriculture and land management			
ALM1.	TCV required to disseminate new technology/skills to field	TBD	TBD
ALM2.	Number of farmers using ICTs, by gender	TBD	TBD
ALM3.	Number of public organizations that uses a computerised land management system	TBD	TBD
ALM4.	Percentage of citizen who make on-line payment of land tax	TBD	TBD
ALM5.	TCV required for completion of land registration and mutation process	TBD	TBD
ALM6.	Proportion of households who accessed land records/information online	TBD	TBD
Social safety nets			
SSN1.	NPR created and actual number of vulnerable and marginalised population identified, by gender,in order to track graduation of beneficiaries from vulnerable groups to mainstreamed population	TBD	TBD
SSN2.	Share of G2C payments happening electronically and mobile technology, by gender	TBD	TBD
SSN3.	Proportion of households having access to some form of banking, by gender	TBD	TBD
Disaster management			
CC1.	Number of successful evacuation after an area is indentified as hot-spot for next erosion through early warnings	TBD	TBD
CC2.	Proportion of climate vulnerable households who received early warning through cell broadcasting and community radio, by gender	TBD	TBD

Table 6: Core indicators on ICT in government

Code	Indicators	Possible Source	Collection method
Civil service			
eG1.	Proportion of persons employed in government organizations routinely using computers, by gender	TBD	Survey
eG2.	Proportion of persons employed in government organizations routinely using the Internet	TBD	Survey
eG3.	Proportion of government organizations with a Local Area Network (LAN)	TBD	Survey
eG4.	Proportion of government organizations with an intranet	TBD	Survey
eG5.	Proportion of government organizations with Internet access (type)	TBD	Survey
eG6.	Proportion of government organizations with a web presence	TBD	Survey
eG7.	Selected Internet-based services available to citizens, by level of sophistication of service a. Proportion of households receiving e-services, by gender b. Proportion of e-services c. Customer satisfaction rating on public service delivery	TBD	Survey
eG8.	Proportion of government organizations using searchable database for administrative decision-making	TBD	TBD
eG9.	Proportion of CIOs who championed ICT-enabled service delivery in the last 12 months, by gender	TBD	TBD
eG10.	Proportion of government organizations using ICT-based knowledge management within the government	TBD	TBD
eG11.	Proportion of local government institutions connected to high-speed inter-agency network	TBD	TBD
eG12.	Proportion of local government institutions with information management system at the back-end	TBD	TBD
eG13.	Proportion of local government institutions with active front-end one-stop service delivery points	TBD	TBD
Judiciary and law enforcement			
JLE 1.	Number of cases disposed through digitized case process management	TBD	TBD
JLE 2.	Number of e-services that were introduced ensuring citizens access to case related information	TBD	TBD
JLE 3.	Number of courts using ICTs to improve front-end service delivery	TBD	TBD
JLE 4.	Proportion of cases recorded and preserved digitally	TBD	TBD
JLE 5.	Number of police stations where the process management is digitised	TBD	TBD
Parliament			
P1.	Access to, and use of ICT tools, by MPs for internal parliamentary activities, by		TBD

	gender		
P2.	Proportion of MPs using ICT tools to communicate with constituents, by gender		TBD
P3.	Proportion of parliamentary debates or records accessible in their entirety to the citizens		TBD
P4.	Proportion of incidences of citizens contacting their MPs or the Parliamentary Secretariat through ICT tools		TBD
P5.	Online petition through Parliament website and other ICT tools		

Table 7: Core indicators on ICT/ITES industry

Code	Indicator	Possible source	Collection method
ICT1.	Proportion of total business sector workforce involved in the ICT sector, by gender	TBD	TBD
ICT2.	ICT sector share of gross value added	BBS, BASIS	Compilation
ICT3.	ICT goods imports as a percentage of total imports	BBS, BASIS	Compilation
ICT4.	ICT goods exports as a percentage of total exports	TBD	TBD
ICT5.	Research and development (R&D) expenditure as a percentage of: a. GDP b. Public expenditure	TBD	TBD
ICT6.	Number of ICT related (software/hardware/IT Enabled Services) start-ups	TBD	TBD
ICT7.	Access to, and use of ICT by youth (gender disaggregated)	TBD	TBD
ICT8.	Number of young people having recognised computer use certifications (e.g. ICDL)	TBD	TBD