Public Sector eService Development in Bangladesh: Status, Prospects and Challenges

M. Shakhawat Hossain Bhuiyan[1, 2]
[1]**Economic Relations Division, Ministry of Finance, Government of Bangladesh**
[2]**Swedish Business School, Örebro University, Sweden**
shbhuiyan@hotmail.com

Abstract: Rapid development of information and communication technology (ICT) creates extensive opportunities for efficient and cost effective public service delivery. Even though most developed countries have had established electronic services for several years, the vast majority of developing countries have started only recently. In 2007, Bangladesh has also started to prioritise eService development in the national agenda e.g. dissemination of service information through websites, availability of official forms online, utility bill payment through mobile phone SMS and so on. There is as yet a lack of studies capturing the overall picture of such initiatives and progress in this country. Hence, the aim of this study is to examine various public eService development initiatives in Bangladesh, assess eService maturity level, and thereby assist the government to expedite implementation of those services. The study is based on both survey and interview approaches. A survey of 44 public officials, working on eGovernment implementation in different ministries and central public authorities, was conducted using a structured questionnaire. In addition, nine top-level officials involved in ICT related government policy intervention were interviewed. A literature review covers theoretical tools on measuring and implementing eGovernment applications such as stage models to categorise eService maturity level. The survey and interview results aligned with a well-known stage model are used to provided an overall picture of public eService initiatives in Bangladesh. The study has identified existing major eServices and assessed the overall maturity level of the services. The study also contributes by identifying prospects for public eService delivery in Bangladesh, including growing use of mobile phones and public private partnerships (PPP); while inadequate legal regulations, scarcity of power supply, insufficient initiatives by top-level managements, service integrity and interoperability etc. are identified as challenges for the growth of public eService development and sustainability. Finally, the study also puts forward some recommendations to deal with major challenges.

Keywords: eService, electronic service, public service delivery, eGovernment application, interoperability, integrated service, Bangladesh

1. Introduction

Better public service requires first a thorough rethinking and re-examination of the structure of public services and then to exploit possibilities of creating value by working across boundaries and jurisdictions to foster potential gains of redesigned services in terms of speed and cost (Fountain, 2007). The 'eGovernment framework' allows public sector organizations to achieve such a gain through delivery of efficient services at national and local levels using Information and Communication Technology (ICT). Besides gaining efficiency in public service delivery through ICT, there is also evidence that demonstrates the potential of ICTs in empowering the poor (Zambrano, 2008). In spite of continuous efforts of the government toward ICT implementation, Bangladesh is still at a rudimentary stage, ranked 134th position in the EGovernment Development Index 2010 out of 185 countries. On the other hand, the country ranked 60th in Online Service Index 2010 (*Global eGovernment Survey 2010*); which indicates the potential of the country for online service development.

In fact, major computerization and infrastructure development in the public sector of Bangladesh has been taking place to replace internal manual work processes by ICT-based automation. Several websites have been launching for different public organisations. A nationwide survey (SICT, 2008. p.34) on the eGovernment initiatives in Bangladesh shows that 91% of government offices inside Dhaka city have their own website. However, very few interactive online services are available for citizens. In this regard, it should be mentioned that an accessible website can help citizens more effectively to interact with electronic government (W3C, 2009). Several countries have national guidelines for public sector websites such as Sweden (VERVA, 2008). Even though web presence of public agencies is not unsatisfactory in Bangladesh, there is a lack of comprehensive official guidelines to ensure accessibility of public websites. In general, public agencies are can only disseminate information by their websites and in some cases even this is not complete. However, the national web portal (www.bangladesh.gov.bd) shows that several online public services have already been introduced in Bangladesh.

Reference this paper as: Bhuiyan, M.S.H "Public Sector eService Development in Bangladesh: Status, Prospects and Challenges" *Electronic Journal of e-Government* Volume 9 Issue 1 2011, (pp15 - 29), available online at www.ejeg.com

On the other hand, the absence of a standard database management of the utility service providers (UNDP, 2010b), inadequate infrastructure as well as legal regulations means that there is not adequate support for online payment systems and transactional eService development. As a result, citizens are still using the traditional way of paying the utility bills, standing in line for hours and hours. In mid 2008, about 53 secretaries of the Government of Bangladesh identified at least one service to be delivered electronically under each Ministry, an initiative collectively known as '*Quick Wins*' (Mahmood & Babool, 2009, p.257; PMO, 2010). As of today at least 316 public agency websites (Bhuiyan, 2010) have been launched with the aim of eService delivery. To date, hardly any evaluation of the outcomes of such initiatives has been made. Under the above perspectives, the aim of this study is to portray *relevant* initiatives of Bangladesh government for developing various online public services, assess the maturity level of such services and as a result expedite the implementation thereof.

The rest of this section contains background information of the paper e.g. 'eService' definition, ICT related policies and regulations in Bangladesh, scope of the study and research question, public eService categorization and existing theories, followed by choice of theory for the current study. *Section-2* presents the method of study, basically the research design. *Section-3* presents the output or results of the survey and interviews, *Section-4* discusses the core results aligned with the research question and its objectives, and finally *Section-5* draws overall conclusions on the basis of empirical study.

1.1 eService

Electronic service shortened as 'eService' which refers to *any service that is provided by any electronic means e.g. Internet/website, mobile devices or kiosk.* According to Goldkuhl & Persson (2006a), eService means that an external user (a citizen) interacts through a user interface of a public IT system based on web technology. Rowley (2006, p.339-359) defined eService as:

> *"deeds, efforts or performances whose delivery is mediated by information technology (including the Web, information kiosks and mobile devices). Such eService includes the service element of e-tailing, customer support and service, and service delivery."*

Both of the above definitions reflect three main components- the *service provider*, the *channels of service delivery* (i.e., technology) and the *service receiver*. Rowley's definition seems more explicit as it includes mobile devices. As regards public eService, public agencies are the service providers and *citizens* as well as *businesses* are the service receivers. The *channel of service delivery* is the third requirement of eService. The Internet is the main channel of eService delivery while other classic channels (e.g. telephone, call center, public kiosk, mobile phone, television) are also considered. As complete implementation of an eService takes time, the traditional methods of service delivery (e.g. over-the-counter service, postal mail service) for the same service cannot be neglected during the transition period. In fact, citizens or businesses usually choose a channel of service delivery based on suitability of using the service and their expertise levels.

eService and eGovernment

According to Grönlund (2005), eService is a core component in the eGovernment domain because it bridges the gap between the government administrators and citizens. Figure-1 shows 'eService' as one of the main actors in eGovernment domain; where arrows indicate 'influence', circles indicate 'domains of control' and intersection of circles indicates 'transactions zones'.

In a democratic government system, the triangular relations (as in figure-1) are vital where service delivery is one of the main interactions between public servants (administration) and citizens & businesses (civil society). With the advent of ICT and the Internet, such interactions get a new dimension of '*virtual interactions*' instead of '*traditional front-desk interactions*'. The strength of virtual interaction is dominated by the eService existence and its quality.

1.2 Country overview: ICT related policies and regulations

Bangladesh is a developing country with a population of about 144.5 million (*BBS, 2009*) where the journey of the digital era basically started in the early 1990s through the use of personal computers. In the late 1990s, mobile phones became available for public use and gradually captured the market (HSR, 2007). The country has established vast mobile communication networks with 54.7 million

(38%) mobile phone active subscribers (*BTRC, 2010*) a number which continues to grow each year. In March 2010, public service telephone network (PSTN) phone subscribers have reached at about 1.72 million (1.2%). On the other hand, Bangladesh belongs to the top ten economies with the least costly mobile cellular sub-basket prices (ITU, 2009).

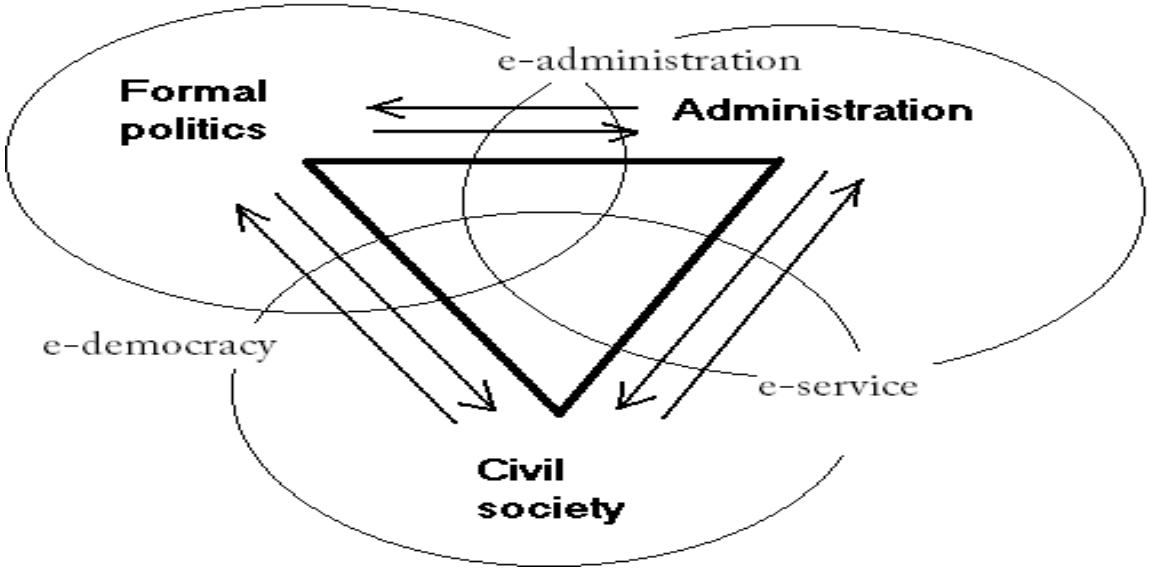

Figure-1: eService as a component in eGovernment domain (Grönlund, 2005)

According to ITU (2010), there are about 0.38 % Internet users in Bangladesh as of 2009, again this number is growing rapidly. In 2006 Bangladesh connected to the SEA-ME-WE4 submarine cable with data transfer capacity of 14.78 Gbps. The Government has also taken further initiatives to install a second submarine cable backbone as a redundant and alternate path to overcome the risk from disruption of the first one (Rahman, 2010).

The government has exempted all taxes on computers and peripherals to promote Information and Communication Technology (ICT) (SICT, 2008). The government has also been promoting call centers to develop business process outsourcing industry (BTRC, 2009). National ICT Policy'2002 has revised and replaced by national ICT Policy'2009 with notable changes in the methodological framework in the policy document including planned action items. The ICT Policy'2009 also reflects the government's vision to establish a "*Digital Bangladesh*" by the year 2021. The passing of the ICT Act 2009 and the Right to Information Act 2009 are further steps by the government to move forward. These acts include regulation of electronic payment and digital signatures as well as establishing a Controller of Certifying Authorities (CCA) which paves the way for introducing secure online payment services, a pre-condition for transactional eService implementation. All these efforts and developments show that Bangladesh is in a transition of moving into establishing nationwide electronic connectivity.

The government has also established the 'National Identity Registration Authority (NIRA)' under an Ordinance in 2008 to provide 18 services to citizens e.g. passport issue, opening bank account etc. It has introduced Voter/Citizen's ID cards, an initial step towards a future national electronic ID card system; which will assist in providing data for other national priorities such as integrating electronic services. In its consequence the government has passed National Identification Registration Law, 2010 very recently.

1.3 Scope of the study and research question

The aim of this study is to examine the status of public sector eService development in Bangladesh, The main focus is to investigate the presence or availability of eServices. Axelsson et al (2009) argued that several scholars agreed for the involvement of different stakeholder groups in eGovernment implementation activities involved in developing eServices. In relation to public eService development, there are usually two major groups of stakeholders - internal and external. Public agency officials are the internal stakeholders directly engaged in supply-side of public services, while citizens and businesses are the users, the external stakeholders in the demand-side. The scope of virtual interactions (as outlined in section 1.1) between public agencies and citizens (or businesses)

mainly depends on the supply of eServices. But there is lack of research to elucidate the supply-side potential of eService development in Bangladesh and hence this study is designed to examine the role of public agency officials in eService development as supply-side point of view.

Even though the interest in the eService field has started to shift from government at the national level to more citizen-related issues (Löfstedt, 2007), the external stakeholders (i.e. citizens and businesses) are out of the coverage of the study. The reasons for exclusion of external stakeholders in this study are two-fold. Firstly, Bangladesh is still in a rudimentary stage of eService implementation and the maturity of eServices is low. Hence, it is assumed that demand-side actors (citizens and businesses) are less keen to expedite the eService progress at this nascent stage. Secondly, if up-to-date supply-side status is known, then similar study can be extended later to investigate the progress of public eService from the demand-side point of view.

As public agency officials play major roles in eService development (supply-side), the main research question in this study is "***How do public officials experience the progress of eServices in Bangladesh***?" In order to investigate this question, the study is designed to address **three major objectives** asking the following enquiries:

- What are the **major eService initiatives** in the public sector of Bangladesh today?
- What are the **maturity levels** of public sector eServices?
- What are the **major challenges** encountered in deployment of public eServices?

1.4 Public eService categorization and existing theories

There are various types of public eServices from simple information dissemination to highly sophisticated automated eService. It is important to clarify the categories of eServices before further in-depth analysis. Goldkuhl (2006a, 2006b) explained some of the prescribed models to guide and evaluate the maturity or growth of eServices. Such models express the development of eServices by a series of stages (e.g. information, interaction, transaction and integration). In this regard, the widely referenced models are Layne and Lee (2001) model, Hiller and Belanger (2000), Australian National Auditing Office (ANAO) (2000), EU (Capgemini, 2007, 2009) and UN (UN, 2008). Despite the fact that the concepts of most models are similar, there are differences in number of stages (e.g. 4, 5 or 6) and the definitions of each stage. For example, both the EU and UN are five-stage models and corresponding stages of the models represent almost similar characteristics. Indeed, the main assumption of such stage models is that higher stages include the lower ones. However, such models facilitate categorizing the public eServices. Following EU model (Capgemini, 2007, 2009), the public eServices are categorized below:

Table 1: Public eService categorization

Stage	E-service Type/ Level	E-service Characteristics	Example
1	Information online	• Information for the service is available in website	Organizational Information and service information in website
2	One-way interaction	• Downloadable forms available • No authentication required	Downloadable official forms
3	Two-way interaction	• Online information exchange, online feedback etc. • Authentication required	Electronic official forms, uploading of application forms or online submission, Exam results obtain by mobile SMS, etc.
4	Transactional e-service	• No paperwork i.e. full electronic case handling, decision and delivery • Require transactional infrastructure, • Legal issues considered, • Real-time response, • Require electronic ID (authentication & authorization)	Online bill payment, Online ticket purchase
5	Targetisation/ Personalization (pro-active, automated)	• Fully integrated electronic procedures where applicant receives the service automatically based on previous registration of an event, • No need for user to request service • Re-use of available data	Child Allowance in Sweden: Automated social security service *(When child is born, hospital send birth certificate to Swedish tax agency for registration and the Swedish Social Insurance Agency pays the child allowance to the parents **automatically**.)*

Goldkuhl (2006a) criticized stage models and suggested an e-diamond model extending stage models with three polarities - (i) separated versus coordinated, (ii) general versus individualized and (iii) informative versus performative. However, all the stage models have been used to classify eServices so that the progress of eGovernment can be evaluated. The 8th Benchmark Measurement report (Capgemini, 2009, p.24) shows that Malta and Portugal have both obtained the maximum achievable sophistication score; followed closely by Austria and Sweden both having achieved 99% of service sophistication and some other countries near to completion of the fifth stage of the EU 2009 stage model. Then what will be the measurement of the next generation eService maturity level? In this context, Grönlund (2010) proposed a new model titled "eGovernment Domain Match Analysis Model (eGD-MAM model)" along with five criteria outlining that implementation of electronic services are clearly approaching the end of their history. Grönlund urged that as electronic services are continuing to develop and replace manual services, the evaluation method of eService progress will have to be more sophistically designed to meet legal requirements (e.g. accountability) and build public trust.

1.5 Choice of theory for the current study

The stage models as outlined in section 1.2 were either developed by individual researchers (e.g. Layne and Lee, 2001) or by practitioners of institutions (e.g. United Nations, 2008; European Union, 2009). Even if researchers' models are grounded in the research domain, they are not generally used in practice. The practitioner's models are used periodically to benchmark the progress of eServices e.g. the EU model has been using continuously and publishing measurement reports almost every year since 2001 for benchmarking 20 common eServices across the Europe; which is considered as an important basis for comparison. Out of 20 eServices, 12 eServices are citizen-oriented while the remaining 8 eServices are business-oriented.

On the other hand, the UN eGovernment Readiness Index comprises the *web measure index*, the *telecommunication infrastructure index* and the *human capital index*; where *web measure index* uses the five stages respectively, '*Emerging', 'Enhanced', 'Interactive', 'Transactional' and 'Connected'* in order to benchmark the member states on the basis of their ability to deliver online services to their citizens (UN, 2008, p.15). The UN model focuses only citizen-oriented eServices while the EU model focuses eServices for both citizens as well as business. Moreover, the EU model reflects how businesses and citizens can interact with public authorities (Capgemini, 2009, p.20). As the current study focuses the public eServices in general, either for the citizens or for the businesses in Bangladesh, the EU model is considered as the best choice of model for this study.

2. Method

The study is intended to reveal current status of public eService as well as its future prospects and challenges *in Bangladesh*. Several studies have used public officials as respondents. For example, Hoque & Zaman (2010) conducted a survey-based study titled "*EGovernment: Preparedness of Bangladesh Civil Service"*. Such studies validate the possibility of conducting similar survey on public officials regarding their opinion on eService development. As the respondents are class one officials of the government, they are almost homogenous in terms of social and economic status. In order to address the research question and three objectives mentioned in section 1.4 above, the study is designed based on both the survey and interview approach, as outlined below.

2.1 Survey

A survey on 44 public officials (22 key ICT professionals and 22 mid-level administrative officials), working at implementation levels in different public sector organizations of Bangladesh facilitated identifying major government initiatives for introducing public eServices. The survey and interviews were conducted over the period 3-21 April, 2010. Most of the public sector organizations have at least one or more ICT professionals who are responsible for system analysis, design and implementation of ICT activities or guide the administration in outsourcing ICT support, if necessary. Since ICT professionals are the main actors in the organization responsible for deploying eService as well as for technical management, they can provide reliable pictures of eService initiatives and its differentials. The mid-level administrative officials usually involve with financial and general management of the organization. They coordinate between policy-level (top management) and implementation-level (section officers) officials. Thus it is expected that they also have plenty of knowledge about eService management issues.

The survey questionnaire consists of several questions mapped to address the research question as well as its three objectives. A pilot survey with three officials took place before the original survey to examine the validity of the questionnaire and accordingly some minor inconsistencies were eradicated through adjusting some questions.

2.2 Interviews

It is sometimes difficult to collect information by survey from top management officials as they often do not like to answer questionnaires and hence semi-structured oral interviews are expected to be a better approach for data collection from them. For this reason open-ended interviews were conducted with nine top-level officials (e.g. ICT focal points, Additional Secretary/Joint Secretary of the Government) who were working at the policy level. A set of pre-planned sample questions were used, keeping in mind that real interviews may go beyond of those questions. Interviewing such officials facilitated the study to consolidate their perceptions and future thinking towards new eService initiatives along with inherent challenges that they face in the organization.

2.3 Selection of respondents and data collection

The study covers only selected public agencies in terms of potential eServices e.g. e-health, e-taxation, etc. The eServices mentioned in national web portal of Bangladesh (www.bangladesh.gov.bd) get preference as national focus. In addition, common list of 20 basic public services, measured in EU benchmark report (Capgemini, 2007, 2009), is considered as international focus. Since most of the eService initiatives come from the ministries or attached organizations, the study targets concerned officials as prospective respondents. The most potential eService providing ministries and/or attached agencies were covered under the survey. Ministries are chosen based on government's '*Quick Wins*' (Mahmood & Babool, 2009, p.257) agenda for priority of eService development.

2.4 Data analysis

Since Bangladesh is in its nascent stage of eService delivery as outlined in section 1.3, measuring the level of sophistication of public eServices creates a basis for future comparison as the progress of eService development in Bangladesh. The survey data was processed and analyzed using statistical tools (e.g. CS Pro Ver 4.0 and SPSS Ver 17.0). As most of the variables are categorical (nominal and ordinal), descriptive measures and interpretations such as tabular and graphical presentations, cross-tabulations, compilations of common opinions etc. are used for data analysis. The interview results were classified and summarized together with existing ICT policies and the regulations of Bangladesh were integrated with the empirical data through coding and data classification techniques.

The maturity levels of eServices were assessed following EU model mentioned in section 1.6 where each service was graded on a scale from 0 to 5. The grades of the scale are explained below:

- '0' indicates no information available on-line;
- '1' indicates relevant service information is available on-line;
- '2' indicates one-way interaction (e.g. downloading application forms);
- '3' indicates two-way interaction (e.g. uploading of application forms or online submission);
- '4' indicates transactional service or full online service available; and
- '5' indicates integrated and automated service without user request

Such grading has facilitated calculation of the percentage of services that fall in a particular eService sophistication category.

3. Results

The survey was planned to cover at least two respondents from selected organizations as outlined in section 2.3, but we found only 44 respondents from 36 different public organizations. This is mainly for two reasons. Firstly, some organizations did not have any ICT professionals and operate ICT by outsourcing. Secondly, several administrative or non-ICT officials expressed their inappropriateness to respond the questionnaire and they referred to their colleagues who are ICT professionals and key persons for ICT operation in their respective organizations. Given these factors, we have covered the

36 organizations in the best way possible. However, the chosen method may be replicated with higher sample size to examine the validity of the study.

3.1 Major eService initiatives

All the organizations surveyed have launched websites as the primary initiatives of eService development. These websites were established in different years during the last decade, starting from the year 1999, although the survey shows that a large number (52.2%) of them were launched between 2004 and 2007. The contents of all the websites surveyed are in the English language while a few (27%) of them have Bengali contents in addition. None of the sites supports usage by visually impaired people (e.g. enlarges text or change color). Most of the sites (54%) were developed and financed under development projects while 41% were financed under the revenue budget. Table-3 shows a summary on website development and financing practices.

Table 3: Website development and finance

		Mode of website development and finance			Total
		Under development project (%)	Under revenue budget (%)	Have no idea (%)	
Content language in the web	Only English	19 (43%)	13 (30%)		32 (73%)
	Both English and Bengali	5 (11%)	5 (11%)	2 (5%)	12 (27%)
Total		24 (54%)	18 (41%)	2 (5%)	44 (100%)

Maintenance and updates were being done by internal ICT professionals (52%), outsourcing (27%) and in some cases by both (18%). About 9% respondents had no idea regarding the updating of their organization's website while 66% reported that their websites were updated 'regularly' and 23% reported 'occasionally'.

Even though a significant number (64%) of respondents were not acquainted with the '*Quick Wins*' initiatives (see section 1.0) of the government regarding eService development, these initiatives ultimately have produced several eServices which are currently under operation or in the development stage. Such major eServices for citizens and businesses were identified in the survey and the list of eServices is exhibited at the end of this paper in **Annex-1**.

Table-4 shows the public sector eService development practices based on service recipients (citizens or business entities) and service types (registration, license permit, etc.). It reflects that 70% of reported eServices were developed for citizens only while 12% were for businesses and the remaining 18% eServices (e.g. vehicle registration) were developed for both citizens as well as businesses.

Table 4: Percentage of public eServices by recipients and service type

E-service recipient	E-service type				Total (%)
	Registration (%)	Permit or license (%)	Income generating (%)	Service returns (%)	
Citizens (%)	7	7	6	50	70
Business organizations (%)			3	9	12
Both (%)	2	1	4	11	18
Total (%)	9	8	13	70	100

Table-5 shows the percentage of eServices according to service fee payments mode. The table reveals that 86% eServices are now under operation while the remaining 14% are in the development stage. Some of these will be launched in the current year. About 44% eServices do not require any

service fee, 28% eServices require cash payment at the service counter, and 14% require cash payment at the bank. One of the important observations is that 14% public eServices have provision of paying service fee through mobile phone SMS, among which 13% are services are currently in operation.

Table 5: Percentage og public eServices according to service fee payments modes

		E-service delivery channel					
		Does not require service fee	Cash payment at service counter	Cash payment at the bank	Internet banking	Mobile phone SMS	Total
e-service status	Under operation	34	28	11	-	13	86
	Under development stage	10	-	3	-	1	14
	Total	44	28	14	-	14	100

3.2 Maturity level of eServices

The maturity of eService is assessed following the EU20 measurement technique where 20 basic eServices were investigated. The categories of EU20 eServices were matched with the public eServices in Bangladesh identified under the survey. Only 10 categories of eServices have been matched against the EU20 services as presented in table-6 that includes 7 (seven) eServices for citizens and the rest 3 (three) e- services are for businesses.

Table 6: Bangladesh 10 eServices (as of may 2010)

For Citizens	For Business
1. Income taxes	1. Corporate tax
2. Job search (e.g. online job vacancy publication, selection result publication)	2. Public trade license
3. Vehicle registration	3. Public procurement
4. Police: Online GD	
5. Birth certificate	
6. Enrolment in higher education (e.g. admission application, course registration, result publication etc.)	
7. Health-related services (e.g. health monitor for pregnant mother, diabetic patient etc.)	

Whereas 10 categories of basic public eServices in Bangladesh are used (in comparison with the EU20), the assessment of maturity level is done based on all eServices as reported by respondents. Information regarding the same eService reported by more than one respondent is included for simplicity. Information which does not map to the EU20 services is also considered for measuring the maturity level of eServices because most of the eServices are at primary stage. Even though all the public agencies surveyed have their own website, some of those do not really reflect the reported eService. Considering the above practical problems, maturity levels of eServices in Bangladesh are measured according to the five-stage EU model and presented in figure-2.

Figure-2 shows that 90% of eService information is online as reported by the respondents. The presence of public organizations' websites as linked to the national web portal www.bangladesh.gov.bd supports this result. About 51% eServices are in the stage of "*One-way-interaction*" i.e. electronic forms are available for such services, mostly in Portable Document Format (PDF). This is also evident from the link www.forms.gov.bd which lists several official government forms of different public organizations. Only 15% eServices are in the stage of "*two-way-interaction*" such as electronic forms can be filled-up and submitted online. For example, submission of online application form (http://pgadmission.buet.ac.bd/) for admission into Bangladesh University of Engineering & Technology (BUET) and publication of interactive online public examination results

(www.educationboardresults.gov.bd/ssc.php) for secondary and higher secondary level education etc. are notable two-way-interaction eServices.

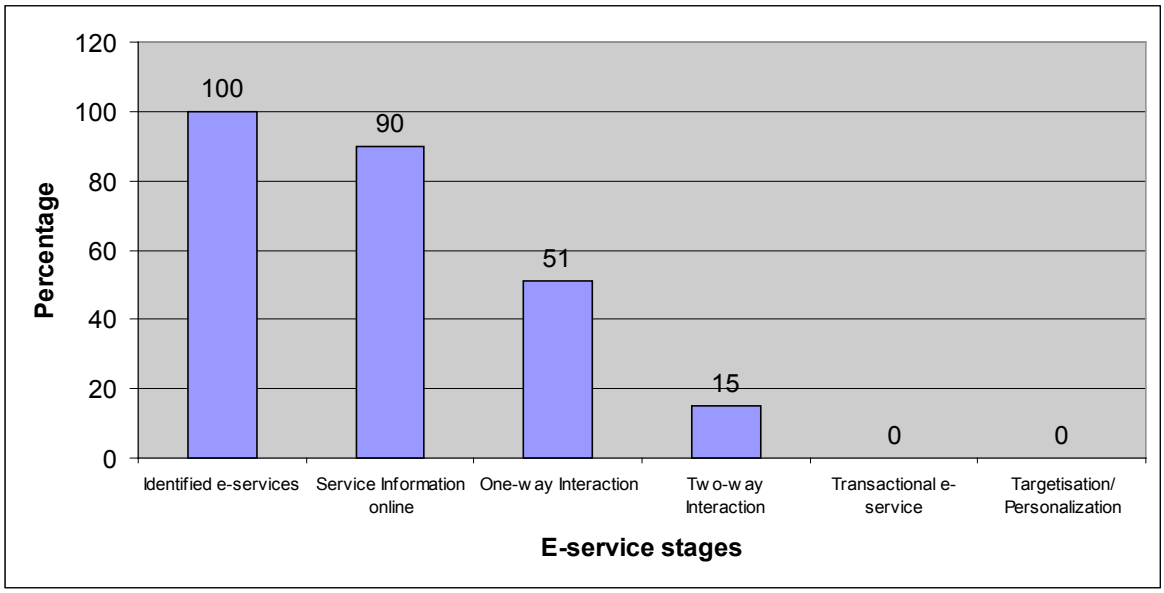

Figure 2: Maturity level of available eServices

3.3 Major challenges in deployment of public eServices

The prospects and challenges for public eServices in Bangladesh was investigated using the opinions of relevant public officials and based on selected factors commonly considered in developing or operating eServices e.g. barriers due to factors like budget and finance, top-level management initiatives, technical problems like integration and interoperability, inadequate power supply, lack of internet access, sustainability of eServices, legal issues like lack of regulations for electronic payment or data transfer etc.

Figure-3a reflects that budget is not a major problem in public eService development while figure-3b reflects that top-level management initiatives are the major and key barrier toward public eService development. Figure-3c reflects that there is little technical problems while figure 3d and 3e both indicate that the legal issues and power interruption are the major and key barriers for public eService development in Bangladesh at present. Finally fig-3f and fig-3g reflects that there are moderate barriers like lack of Internet access and sustainability of eService in Bangladesh.

A significant number of respondents (93%) claimed that more manual services could be improved through electronic means to ensure better service delivery. Almost all respondents think service quality has been getting better through online systems compare with traditional over-the-counter service systems.

3.4 Interview results

The interviews with nine top-management officials reveal the major initiatives by the government and immediate future plans to resolve several problems. Officials who are involved in implementation, coordination and integration of some specific services (e.g. electronic ID, electronic payment, digital signature) were interviewed. Since such officials are involved in policy intervention and formulating legal frameworks for the country, their experiences and opinions play important role in the current endeavor of public eService development. The summary of findings from the interviews is presented in this section. The Bangladesh Election Commission (BEC) is the caretaker of the national ID card which will create a potential eService delivery platform. The government is exploring an appropriate institutional framework to leverage this platform for eService delivery and develop necessary standards and frameworks (DIF, 2010). BEC official expressed the current challenges of national ID card issuing system as other public agencies (e.g. local government offices, city corporations). These are separately issuing different public documents (e.g. birth certificate, marriage certificate, passport, driving license etc.) with some common information based on citizens' statement. Problems arise for

information integrity and legal acceptability of several such public documents when very often it is discovered the inconsistency between two or more documents for the same citizen.

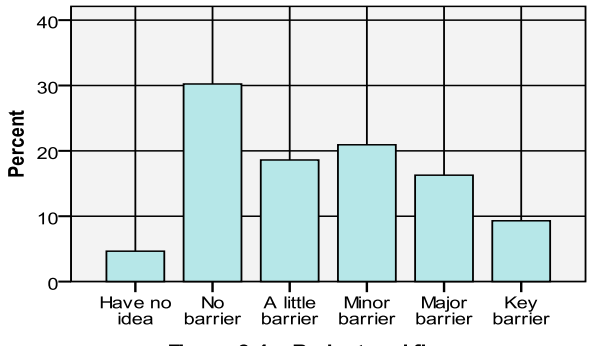

Figure-3a: Budget and finance

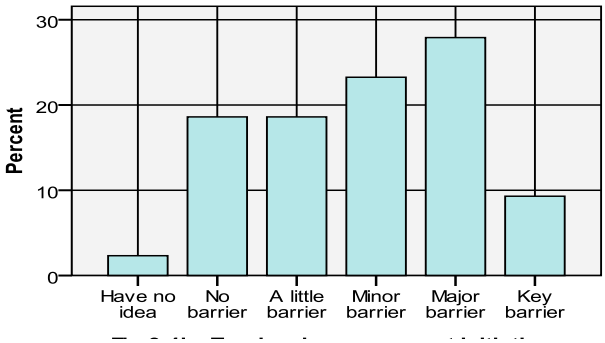

Figure-3b: Top-level management initiatives

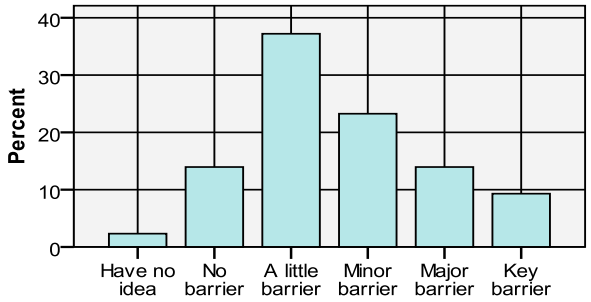

Figure-3c: Technical problems (e.g. coordination, integration and interoperability, …)

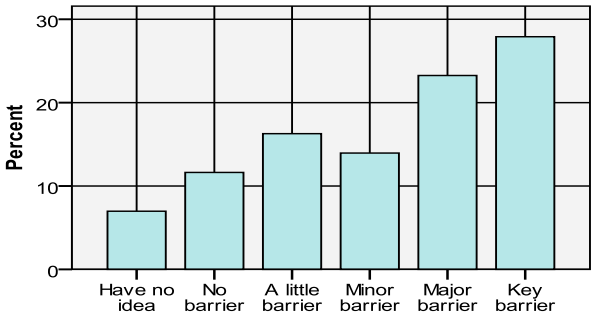

Figure-3d: Legal issues (e.g. lack of regulations for electronic payment…)

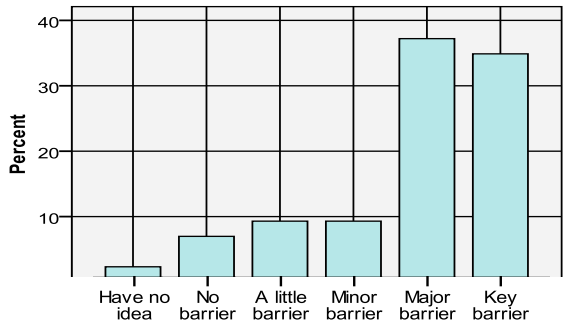

Figure-3e: Power interruption

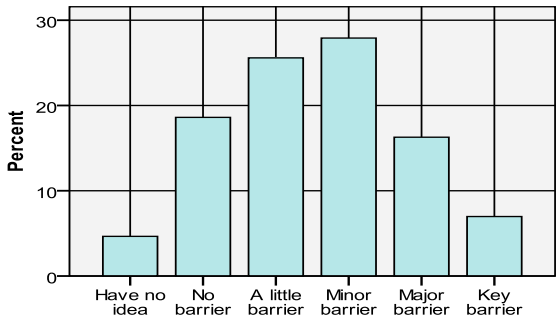

Figure-3f: Lack of Internet access

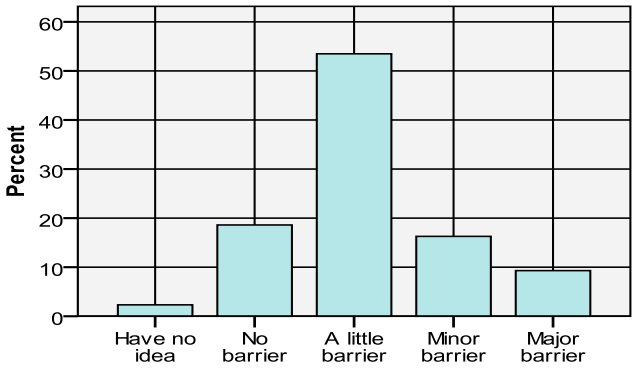

Figure-3g: Sustainability of eService

Bangladesh Bank (the central bank) has been working to shape legal issues of electronic payment (e-payment) and online money transaction in cooperation with the Ministry of Finance and the Ministry of Law and Parliamentary Affairs. As an initial measure, the Bangladesh Payment and Settlement Systems Regulations, 2009 have come into force with immediate effect. Government has established an office for the Controller of Certifying Authority (CCA) which is currently processing the recruitment of Certifying Authorities to introduce digital signatures. UNDP assisted Access to Information (A2I) under the Prime Minister's Office has been working on future plans that includes interoperability as well as technical, operational and administrative issues. The Cabinet Division has decided to develop at least one service at each tier of administration as a pilot basis e.g. one-stop service center at Deputy Commissioner's (DC) office at the district level.

Public Private Partnerships (PPP) are also being used for public eService development. For example, Bangladesh Railway had introduced e-ticketing system with 10% quota (BR, 2010) out of total ticket sales for limited routes. This service was developed through outsourcing a private company (CNS) and through collaboration with private mobile phone operator *"Grameen Phone".*

The Ministry of Education has prompted transformation of several traditional services into eServices. For example, primary and secondary school textbooks are available online (NCTB, 2010), public examination results have been published online in the last couple of years (ISEBB, 2010). Results are also disseminated by e-mail or mobile phone SMS recently (DIF, 2010). The ministry has advised all public and autonomous universities to initiate the systems for collection and submission of their admission forms online from 2010.

4. Discussion- the prospects and challenges ahead

The main *research question* of this study is "*How do public officials experience the progress of eService in Bangladesh*", which focuses three research objectives. These objectives are mapped with the empirical results obtained from the survey and interviews.

The ***first objective*** of the study focuses *the status* of major public eService initiatives. The survey shows that almost all the public agencies have their website. But most websites are yet limited to information dissemination and provision of downloadable official forms in pdf or txt format. On the other hand, several innovative public eServices have been introduced recently using the mobile phone as channel of service delivery. For example, the government has started to deliver information services through mobile phones from 01 May 2009 in each of the Upazila Health Complex as well as District Hospitals in order to improve health services for rural people (HSDB, 2009). Similarly, mobile phones are being increasingly used for utility bill payment, public exam results publication, e-ticketing etc. These initiatives show the potential for mobile devices in public eService development of Bangladesh.

The ***second objective*** of the study focuses *the overall maturity level* of public eServices in Bangladesh. Section 3.2 shows that 51% eServices fall in the stage of "*one-way interaction*" while 15% fall in the stage of "*two-way interaction*", but there is no internet-based transactional eService under operation as the country still lacks sufficient infrastructure and legal mechanisms like e-payment system and digital signature. However, the interviews show that Bangladesh Bank has been working to formulate legal frameworks for e-payment system and e-banking, while the newly established Controller of Certifying Authority (CCA) has been working for recruitment of certifying authority to introduce digital signature. It would be interesting to assess further the maturity level of the individual services (e.g. Job search, tax, birth registration, etc.). There is room for further in-depth study of these matters.

Despite the fact that there is no internet-based transactional eService in operation, a few transactional eServices are under development which are capable to start transactional eService. These include "*online application for trade license*" provided by Dhaka City Corporation and "*online application for University admission*" provided by Bangladesh University of Engineering & Technology). On the other hand, the recently introduced "*SMS based Automated Registration of Admission Test"* by Shahialal University of Science Technology (SUST) verifies the pre-qualifying results of candidates with concerned education boards and notifies the candidates using mobile technology. This service includes payment of admission fee through mobile phone SMS which again demonstrates the prospects for transactional public service delivery through mobile phone.

Even if the development of legal framework issues (e.g. digital signature and e-payment systems) are still at the planning stage, the maturity level of public sector eServices in Bangladesh is improving. Once the major barriers, especially the legal framework problems, have been overcome the maturity level will likely increase rapidly. Another observation is that a large number of eServices have been developed under public private partnership (PPP) in Bangladesh.

The ***third objective*** of the study focuses on *the major challenges* encountered in deployment of public eServices in Bangladesh. According to the survey, the major challenges for public eService development in Bangladesh are: (a) top-level management initiatives; (b) legal issues; and (c) inadequate power supply. On the other hand, according to the interviews, integrity of public eServices is another challenge as it involves technical, operational, administrative and political differentials. For example, different public authorities have been independently issuing different documents e.g. national ID card, passport, birth certificate, marriage certificate, driving license etc. Some common data fields on these documents are filled-in deliberately based on the citizen's declaration which very often leads to information mismatch among documents. These uncoordinated establishments of several public services will create immense challenges for future public eService development. This leaves room for further research how public agencies could achieve cross-agency integration to implement interoperable public services.

The study shows that technical problems are just one of the challenges for eService development and corresponds to the similar result of another study by Grönlund et al. (2008) regarding mobile technologies for development on Bangladesh perspectives. On the other hand, budget is not a major problem according to the survey. However, another challenge remains with a large number of public websites if those are not updated in time or lack detailed information about the public services.

5. Strength and limitations of the study

As public eServices in Bangladesh are still in a rudimentary stage, many respondents were found to be confused in providing precise information e.g. some respondents could not mention the exact name of services, but just explained the basic features of those services. Moreover, service names mentioned by some respondents are in some cases not exactly corresponds to the names stated on the websites. Another shortcoming of this study is that some respondents over reported the eService level. Hence, the collected data were examined against the information provided in organization's website by checking inconsistencies in order to achieve validity and reliability of data set. However, the study utilizes mixed research method (Creswell, 2003) to add considerable values in examining both the rationales that are given for combining quantitative and qualitative research.

6. Conclusions

This paper contributes by exposing various initiatives of the government for public eService development in Bangladesh. The study reveals that there is no policy barrier at the moment as steps has been taken to solve the problems like e-payment, digital signature and other issues. The study also identifies several prospects for the growth of public eServices in Bangladesh. Public private partnership (PPP) is one of the potential aspects due to increasing use of mobile devices for public eService delivery in the country.

The study found that eService initiatives taken by different public agencies are scattered and so far there exists no integrated services, leading to redundant works for most government information systems. Hence, public agencies immediately require concentrating to develop integrated and interoperable systems which will lead to provide efficient public service delivery. In fact, interoperable systems will help the government bodies to attain transparency as well as accountability, and thus will benefit the society as trust in government services may increase. On the other hand, some eServices will create greater scope for the government to generate more revenues, while citizens will benefit from prompt and improved service delivery.

The study also contributes by bringing to light the eService maturity level of Bangladesh, indicating that only 15% of the eServices have attained the third stage (two-way interaction) of the EU eService maturity model. However, the eServices in Bangladesh are becoming steadily more mature. The assessed level of maturity may possibly be used as a benchmark to measure periodically the comparative progress of Bangladesh in eService development. The study will create further scope for developing a temporal benchmarking model for assessing the progress of eService development in the country compared to its neighboring countries.

7. Recommendations

Even though eServices have been growing, the actual usage of them as well as their sustainability will be a challenge in Bangladesh if infrastructure problems (lack of internet access, inadequate power supply) can not be resolved in parallel. The maturity level of eServices will remain stagnant if relevant legal frameworks (e.g. electronic payment, electronic ID) can not be established soon. Moreover, implementing Government Interoperability Framework (GIF) is the precondition for efficient and integrated public eService delivery because it will facilitate information exchange among public agencies. On the other hand, every public agency is required to ensure full-time ICT manpower for system maintenance and regular update of organization's website. It is urged that the government set-up a central body for Research & Development (R&D) in order to achieve the quality and sustainability of the emerging new eServices with better citizen satisfaction that they will deliver.

8. Annex-1: List of major public eServices identified

S.N.	E-service Name	S.N.	E-service Name
1	Agricultural Information dissemination	24	Polling center information through SMS
2	Birth certificate	25	Postal charge calculation
3	Business: Application for trade license	26	Postal: Prize bond result search
4	Complain & help desk	27	Postal: Tracking and tracing
5	Disaster Management: Cell Broadcasting System (CBS)	28	Public procurement
6	Disaster Management: DMIN portal	29	Service information
7	Education: Application for MPO	30	Taxation: Income Tax return
8	Education: Application for university admission	31	Taxation: LTU tax return
9	Education: Course registration	32	Transport: Application for driving license
10	Education: Result publication	33	Transport: Application for route permit
11	Education: Survey Questionnaire online	34	Transport: E-ticketing for Train
12	Health monitor: diabetic patient	35	Transport: Train information
13	Health monitor: for pregnant mother	36	Transport: Vehicle registration
14	Health service	37	Utility Service: Application for telephone connection
15	Health: Telemedicine	38	Utility Service: Bill Pay Service (electricity bill payment)
16	ICT Training Information	39	Utility Service: Bill Pay through GP: Gas
17	Information dissemination	40	Utility Service: Bill payment: for telephone
18	Job search / e-recruitment	41	Utility Service: Water bill
19	National ID & Passport: Application for Passport	42	Utility Service: Electricity bill- Monthly updated
20	National ID & Passport: Application for travel grant	43	Utility Service: Daily water production-online information
21	National ID info. correction through website	44	Utility Service: Load-shedding schedule online
22	Police: Police clearance certificate	45	Utility Service: Telephone bill online
23	Police: Submission of General Diary (GD)		

Acknowledgements

I acknowledge the cordial support of Professor Åke Grönlund, who had overseen this study from the outset and arranged SPIDER financial assistance for the field visit and data collection. In fact, this study could not be finished at this point of time without the financial assistance from the Swedish Program for ICT in Developing Regions (SPIDER). So I like to pay my thanks to the SPIDER authority. I also like to give special thanks to my supervisor Dr. Annika Andersson and Program Manager Dr. Anders Avdic for their valuable suggestions & supervisions in this study. Finally, I have to remember my colleagues working in different ministries and different public organizations in Bangladesh who cordially cooperated and inspired me in conducting this research, mentioning it as an important research area for achieving digital Bangladesh dream.

References

Axelsson, K., Melin, U. & Lindgren, I. (2009). 'Developing public eServices for several stakeholders – A multifaceted view of the needs for an eService', *17th European Conference on Information Systems*, Viena, Austria.

BBS (2009). *Statistical Pocket Book of Bangladesh 2008*, Bangladesh Bureau of Statistics (BBS), January 2009. Ministry of Planning, Government of Bangladesh. [Online], *Available:* www.bbs.gov.bd [10 February 2010]

Bhuiyan, M.S.H. (2010). EGovernment Applications in Bangladesh: Status and Challenges. The Proceedings of the *4th International Conference on Theory and Practice of Electronic Governance (ICEGOV)*, 25-28 October 2010, Beijing, China. www.icegov.org

BR (2010). *Bangladesh Railway*, Ministry of Communication, Government of Bangladesh [Online], Available: http://www.railway.gov.bd/ [11 March 2010]
BTRC (2009). *Annual Report' 2007-2008*. Bangladesh Telecommunication Regulatory Commission, [Online] Available: http://btrc.gov.bd/ [10 February 2010]
BTRC (2010). Bangladesh Telecommunication Regulatory Commission, April 2010, [Online], Available: http://btrc.gov.bd/ [02 May 2010]
Capgemini (2007). *The User Challenge, Benchmarking The Supply of Online Public Services.* 7th Measurement. European Commission Directorate General for Information Society and Media, [Online], Available: http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/egov_benchmark_2007.pdf [10 February 2010]
Capgemini (2009). *Smarter, Faster, Better eGovernment. 8th Benchmark Measurement*. European Commission Directorate General for Information Society and Media, [Online], Available: http://www.epractice.eu/en/library/299159 [10 March 2010]
Creswell, J.W. (2003). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*, 2nd ed., Thousands Oaks, CA (Sage Publications: U.S.A.)
DIF (2010). *Digital Innovation Fair: Services at doorsteps*, Bangabhandu Shekh Mujibur Rahman Novo Theatre, 4-6 March 2010, Dhaka, Bangladesh.
[Online], Available: http://www.digitalinnovationfair.info/ [30 April 2010]
Fountain, J. E. (2007). *Better Public Services for Growth and Jobs*. National Center for Digital Government (NCDG), USA. NCDG Occasional Paper No. 07-007, [Online], Available: http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1025&context=ncdg [10 March 2010]
Global eGovernment Survey (2010), UN Department of Economics and Social Affairs (UNDESA)
Goldkuhl, G. & Persson, A. (2006a). 'From E-ladder to E-diamond – Re-conceptualising Models for Public EServices', Accepted to the *14th European Conference on Information Systems (ECIS2006)*, June 12-14 2006, Göteborg, Sweden.
Goldkuhl, G. & Persson, A. (2006b). 'Characteristics of Public EServices: Investigating the E-diamond Model', Accepted to the *First International Pragmatic Web Conference*, September 21-23 2006, Stuttgart, Germany.
Grönlund, Å. (2000). *Managing Electronic Services: A Public Sector Perspective*. Springer- Verlag London Limited.
Grönlund, Å. (2005). 'What's In a Field – Exploring the eGovernment Domain', *Proceedings of the 38th Hawaii International Conference on Systems Sciences*'2005.
Grönlund, Å.; Andersson, A. & Hatakka, M. (2008). 'Mobile technologies for development- a comparative study on challenges', *Proceedings of SIG GlobDev's First Annual Workshop*, Paris, France, December 13th 2008.
Grönlund, Å. (2010), *Ten years of eGovernment: the end of history and a new beginning*. In M.A. Wimmer, H.J. Scholl, and M.Janssen (Eds.): EGOV 2010, LNCS. Springer-Verlag Berlin Heidelberg.
Hoque, S.M.S. & Zaman, F. B. (2010). *EGovernment: Preparedness of Bangladesh Civil Service*, Bangladesh Public Administration Training Centre (BPACC), Savar, Dhaka.
HSDB (2009). *Health Service: On the Way to Digital Bangladesh*, Management Information System (MIS), Department of Health Services, Govt. of Bangladesh, June 2009.
HSR (2007). *e-Governance in Bangladesh: Horizon Scan Report' 2007* – Where We Stand. Access to Information (A2I) Programme, Prime Minister's Office, Bangladesh.
ISEBB (2010). *Intermediate and Secondary Education Boards, Bangladesh*, Ministry of Education, Government of Bangladesh [Online], Available: http://www.educationboardresults.gov.bd/ [11 March 2010]
ITU (2009), *Measuring the Information Society – The ICT Development Index, 2009 Edition*, Revised 16 March 2009, International Telecommunication Union (ITU).
ITU (2010). *World Telecommunication/ICT Indicators Database 2010 (14th Edition)*. International Telecommunication Union (ITU), June 2010.
Layne, K. & Lee, J.(2001). 'Developing Fully Functional EGovernment: a four-stage model', *Government Information Quarterly*. 18(2): 122-136
Löfstedt, U.(2007). 'Public EServices Research- A critical analysis of current research in Sweden', *International Journal of Public Information Systems*, vol 2007:2. www.ijpis.net
Mahmood, I. & Babool, A. I. (2009). *eGovernance for Development: Bangladesh Perspective*. eGOVsharE2009. *eTransformation in Public Administration: From eGovernment o eGovernance*. The Proceedings of International Conference on eGovernment Sharing Experiences, 8-11 December 2009, Antalya, Turkey, pp.256.
National ICT Policy'2002. Ministry of Science and Information & Communication Technology. Government of Bangladesh.
National ICT Policy'2009. Ministry of Science and Information & Communication Technology. Government of Bangladesh.
NCTB (2010). *National Curriculum & Textbook Board (NCTB)*, Ministry of Education, Government of Bangladesh [Online], Available: http://www.nctb.gov.bd/ [11 March 2010]
PMO (2010). *Access to Information (A2I) Programme*. Prime Minister's office, Government of Bangladesh [Online], Available: www.a2i.pmo.gov.bd [23 Mrch 2010]
Rahman, A. (2010). *Vision 2021: Challenges for Engineering Profession*. Keynote paper in the Inaugural Ceremony of National Seminar in IEB Chittagong, 03 January 2010. Governor, Bangladesh Bank.
Rowley, J. (2006). 'An analysis of the eService literature: towards a research agenda', *Journal of Internet Research*. 16(3), 339-359.

SICT (2008). *EGovernment Initiatives in Bangladesh – A sample survey 2008*. Support to ICT Taskforce Program Project (SICT), Ministry of Planning, Government of Bangladesh, [Online], Available: http://www.sict.gov.bd/digitallibrary.php [10 March 2010]

The Economist (2009). *E-readiness Rankings 2009: The Usage Imperative*. The Economist Intelligence Unit (EIU), [Online], Available: http://www-935.ibm.com/services/us/gbs/bus/pdf/e-readiness_rankings_june_2009_final_web.pdf [10 February 2010]

UN (2008). *UN EGovernment Survey 2008: From EGovernment to Connected Governance.* Department of Economic & Social Affairs, Division for Public Administration and Development Management, United Nations, New York.

UN (2010). *UN EGovernment Survey 2010: Leveraging EGovernment at a Time of Financial and Economic Crisis.* Department of Economic & Social Affairs, Division for Public Administration and Development Management, United Nations, New York.

UNDP (2010a). *Human Development Index 2009*. United Nations Development program (UNDP). [Online], Available: http://hdrstats.undp.org/en/countries/country_fact_sheets/cty_fs_BGD.html [11 March 2010]

UNDP (2010b). *Simplification of Public Utility Bill Payment System*, Access to Information Programme. BGD/04/004, Prime Minister's office, Bangladesh, [Online], Available: http://www.undp.org.bd/projects/prodocs/A2I/Electronic_payement_Recommendations.pdf [14 March 2010]

VERVA (2008), *Swedish National Guidelines for Public Sector Websites*, Swedish Administrative Development Agency (VERVA), April 2008, [Online], Available: http://verva.24-timmarswebben.se/upload/english/swedish-guidelines-public-sector-websites.pdf [10 April 2009]

W3C (2009), *W3C Web Standard Defines Accessibility for Next Generation Web*, [Online], Available: http://www.w3.org/2008/12/wcag20-pressrelease.html [19 May 2009]

Zambrano, R. (2008). 'E-Governance and Development: Service Delivery to Empower the Poor', *International Journal of Electronic Government Research*, Vol.4, Issue2, pp.1-13