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Towards Digital Bangladesh: Scope of ICT integrated Urban Planning and Management

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Abstract

The world has already entered into the Information Age where information regulates all types of activities. Developed countries have gained expertise dealing with the information in their decision support systems for planning, governing, service delivery and management of resources. With the "internet bust" of the last few years, ICT becomes an enormous engine of the development process. Bangladesh and other developing countries are yet to attain this technological benefit. At present, the Government of Bangladesh (GoB) is striving to turn the country into "Digital Bangladesh" by launching an ICT based planned development and management practices throughout the country. Optimum utilization and management of the resources through better planning and management of the facilities, improve the life standard of the city dwellers. ICT can ensure the best utilization of existing resources and ease the management process. In addition to that, ICT can generate virtual spaces for delivering services and creating employment opportunities, and thus can go over the limitation of physical spaces. The current trend in development indicates that the local government institutions will be the major hub of information communication in near future, albeit the easy storage, retrieval, analysis and integration of the spatial data with non-spatial datasets requiring involvement of various central and local government institutions/departments simultaneously. A conceptual guideline is provided here for the professionals engaged in urban planning and management in the country about the changing circumstances in information based planning practices. This paper mainly examines the dimension and prospect of E-planning in Bangladesh and depicts the role of different stakeholders in this process. The ways in which urban planning and management practices may best be altered in this regard is also addressed.

Introduction

Technology is the systematic application of scientific and other organized knowledge towards solving practical tasks (Azim, 2002). At present, knowledge is available in the form of information which is used to get various expected outputs with the support of modern technologies. The total efforts are known as Information Technology (IT). IT is a broad term covering technologies developed for collecting, organizing, analyzing, sharing and presenting information in different forms (Rahman, 2007). Information Technology, when integrated with any communication device, system and/or media, which enable users to access, store, transmit, and manipulate information, is known as Information & Communication Technology (ICT). ICT helps to transform the traditional society into a modern knowledge based society, also known as information society, in terms of better access to information, job creation and income distribution, getting education and health care facilities, providing effective public service delivery through efficient governance and the diversification of economic opportunities for further development. People who have the means to partake in this form of society are sometimes called digital citizens (en.wikipedia.org).

Urban planning and management at local level is becoming more and more crucial due to the dramatic increase in urban population and allied urban problems. However, absence of appropriate

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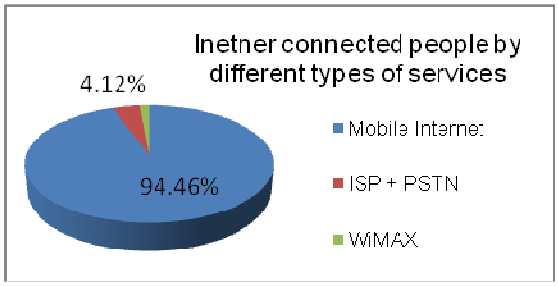
information and its limited sharing is one of the important factor affecting planners and decision makers' ability to deal with urban problems (Qureshi et al., 2007). The core objectives of urban planning and management are seen as understanding dynamic urban processes and developing effective interventions that contribute to the sustainability of urban development. ICT is the only tool which can help to attain these targets. The present government has outlined an ambitious plan, known as Digital Bangladesh, with the aim of having the entire country digitally connected by 2021. The motto "Digital Bangladesh" refers to an advanced governing system at both central and local level where ICT will play the pivotal role. Meanwhile, Bangladesh Government with the Technical Assistance of UNDP introduced Union Information Service Center (UISC) at 4501 Union through its Access to Information (A2I) programme (www.undp.org.bd, 2011). Twenty Agricultural Information and Communication Center (AICC) and 14 Community Radio Stations (CRS) have also been introduced in selected geographical locations of the country with a view to making the agri-information available to the farmers (www.ais.gov.bd, 2011, www.apc.org/en/blog, 2011). Radio, TV, Desktop and Laptop Computers with internet connection, and mobile phone are very well known communication device where mobile phone now-a-days becomes more popular with the mass. According to the Bangladesh Telecommunication Regulatory Commission (BTRC), the total number of mobile phone subscribers has reached 98.466 million at the end of September 2012, where the total number of internet subscribers has reached 29,415.693 thousand at the end of July 2012 (Table 1).

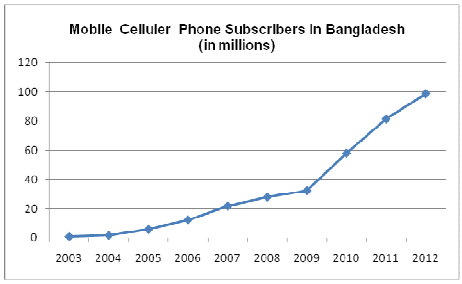
Table 1: Population Status and Digitally Connected People in Bangladesh

Population			Digitally Connected people		
Total (million)	Urban (%)	Rural (%)	Mobile Subscriber	Internet Subscriber	Percentage
149.77	23.3	76.7	98.47 m	29.42 m	67%

Sources: BBS, 2012, BTRC, 2012



Sources: http://www.btrc.gov.bd/



Sources: ITU, 2012

Planners started to use main frame computers for forecasting and modeling in land-use and transportation studies from late 1950s and 1960s (Creighton et al., 1959, Harris, 1965). During the same period, computers were also used for mapping successfully (So et al., 2000). Compare to them, the present generation has got smart phones having several applications related to information sharing, GPS with GIS Mapping, emergency response and so on. In Bangladesh, the government has already introduced *3G (Third Generation)* support for mobile services by its publicly owned mobile telephone operator company *TeleTalk*. The other mobile operators in Bangladesh will gradually get the opportunity to provide this service. This 3G system will develop the service delivery systems which will bring a rapid change in the lifestyle of the people. After

installing the 3G technology, the mobile user would enjoy the Real-Time Video Calling, Live Mobile TV, High-Speed Download, E-education, Public Health, Telemedicine and E-shopping. The BTRC has disclosed, untill August, Teletalk had nearly 1.4 million subscribers of which only 25,000 subscribers are using its internet connection while the six mobile-phone operators had a combined 99.5 million subscribers.

According to the Talvitie (2004), modern telecommunications can be seen not only as a new way of working but also as a new form of traffic. The quality and diversity of conventional transportation networks and services are important locational factors for many industries and activities. Urban planners deal with a vast amount of information regarding a wide array of issues such as sustainability, climate change, traffic congestion, crime, land values, legislation and zoning codes, population growth and so on. Urban planner could be considered a green collar profession as they satisfy the demand for green development by implementing environmentally conscious design, policy, and technology to improve conservation and sustainability (en.wikipedia.org). Bangladesh has been struggling with its' over population, limited natural resources and unplanned growth which have brought the country in the row of least developed country. By the proper use of ICT, new business and employment opportunities, along with providing education and health care at the root level, could be generated by ensuring the optimum use of existing resources. Planner and other professionals, who are engaged in urban planning and management process at different local government institutions in Bangladesh, are supposed to promote this technology for the development of socio-economic and infrastructural conditions, and for the conservation of environmental and agricultural advantages within their command area. Moreover, we must have to step forward at the same bit with other countries in this globalization era which demands ICT integrated arrangement in all spheres of life. Traditional concept of urban planning is obliged to be changed in this age.

Scope and Outcome

ICT incorporated Urban Planning is commonly known as E-planning in the developed country. E-planning is a common approach to modernize planning service delivery through the use of the internet……. E-planning offers considerable opportunity for early and rapid change to the future delivery of planning services, with an emphasis on electronic delivery. This enables the provision of services to suit customer needs in a format, and at a time, most convenient to the individual (Rahman, 2007). In Bangladesh, after the 40 years of independent, planning practice is still at the primary stage. Master Plans of 240 municipalities, 2 city corporations and a Tourism Development Plan for Cox's Bazar have been being prepared and will be completed within a short period. At the same time, GoB has launched various projects with a view to providing efficient services at different stages of its governing systems. It has brought massive changes of lifestyles of the people and also the inter-relations among the city dwellers, planners, and utility and other service providers in Bangladesh. The country has 14,97,72,364 people within its 1,44,570 sq. km which indicates 1015 persons in per sq. km (BBS, 2011). Per capita income of the country people is only US$ 848 where per capita electricity generation is about 236 kw/hr and near about 48.5% people have got electric facility (Economic Survey, 2012). Urban Planners of the country face challenges to prepare a sustainable plan for this over populated and economically poor country. An ICT integrated planning can create virtual space functioning side by side with that wedded to conventional real (physical) space, and also can ensure less time and cost while providing better facilities. A conceptual guideline is provided here for the professionals, engaged in urban planning and management in the country, about these changing circumstances and for helping them to be compatible with this knowledge and information based planning practices. This paper mainly examines the dimension and prospect of E-planning in Bangladesh and depicts the role of different stakeholders in this process.

Objectives and Methodology

This paper aims to explore the potential role of ICT in urban planning and management through effective and efficient information integration and sharing in Bangladesh context. It tries to identify the major impediments and analyze the future prospects of ICT in planning, governing, service delivery, disaster management, economic development and resource management and other related sectors in the country. The ways in which urban and regional planning practices may best be altered in this regard is also addressed. The research is mainly based on conceptual ideas, secondary information and empirical field observation. Nevertheless, a substantial amount of information regarding this research was also collected from secondary sources through a survey of literature and relevant websites.

Digital Bangladesh and Vision 2021

Digital Bangladesh is a political motto of the present government and it refers to a knowledge-based and ICT-integrated country system, where people have access to information to get the desired public services in a swift and simple manner. An ICT integrated system, known as E-governance, help to promote Good Governance in all sphere of life, which include effective, efficient, participatory, consensus, accountable, transparent, responsive, equitable, inclusive, and having effective law and order situation. ICT supported service delivery system takes less time and people can get the services from anywhere of the country. It also seems like a form of decentralization.

Likewise, vision 2021 is a comprehensive plan where Bangladesh has been estimated as a mid-income country by promoting of equitable, environment friendly, inclusive and socially sustainable pro-poor accelerated growth along with establishing a knowledge-based society. In accordance with this plan, the country people are expected to have excess to all types of public facilities within 2021, the year of the golden Jubilee of country's independence. The government has targeted ICT as the major driving force in this regard to create a SMART (simple, measurable, accountable, responsive and transparent) 'Digital Bangladesh'.

It is assumed that by 2021 Bangladesh will have a countrywide ICT network that will operate to ensure high speed information flow between the decision- centers wherefrom instructions will be transmitted electronically to the action centers to make the intended actions happen. The goal is to accelerate a national decision-making process and to implement the decisions, monitor the performance of the government functionaries at all levels (http://www.thefinancialexpress-bd.com /2009/01/10/55476.html).

Area of Urban Planning and Management

Local government institutions, almost in every country, are the main custodian of urban planning and management. In Bangladesh, though Urban Development Directorate and different City Development Authorities under Ministry of Housing & Public Works are responsible to prepare master plan for major urban areas, a vast number of master plans are being prepared under the supervision of Local Government & Engineering Department of the Ministry of Local Government, Rural Development & Cooperatives. Upon receiving the master plans thus prepared by different government bodies, development authorities (only in major four cities, namely, Dhaka, Rajshahi, Khulna, Chittagong), city corporations and municipalities are responsible for the implementation of their respective master plans and management of their respective urban areas. Urban management is a broader concept than urban planning. The urban planners are to prepare plan, monitor, supervise and guide the local government authorities to provide a sustainable built environment. In that sense, planners also have to provide some efforts in the entire urban management practices. Due to the complex and in some cases overlapping rule of business,

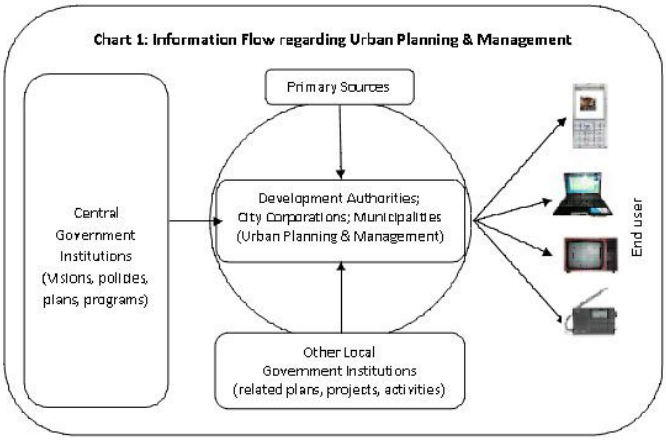
besides the aforementioned institutions, other local and central government institutions also participate in urban management system in Bangladesh. The areas of a sustainable urban planning and management, considered in Bangladesh and similar countries, mainly include the following sectors:

- Infrastructural development
- Utility services: Electricity, Gas, Water, telephone and internet facilities
- Community and recreational facility
- Drainage and flood protection
- Fire & emergency responses
- Income and employment generation
- Social security and safety nets
- Disaster management
- Environmental planning and management
- Special area (military, flood prone, earth quake prone, hazardous, industry)
- Administrative boundary
- Other public services, such as Judicial and Police service
- Land use planning
- Transportation planning
- Housing
- Solid waste Management
- Public participation and awareness building
- Health and sanitation
- Business opportunity creation
- Education and recreation
- Agricultural development
- Social infrastructure (education, health care, community use, religious, grave yard, crematory, post office, police, fire brigade, assembly place, etc)
- Conservation and maintenance of open spaces, forest, water bodies, and national and local heritage

Scope of ICT-Integrated Urban Planning and Management in Bangladesh

Planning is a future oriented activity and is a means for preparing for actions. It occurs through a process in which: (1) information is collected and analyzed; (2) logical alternatives courses of actions are developed consistent with the goals of a constituency; and (3) a course of action is recommended (ASCE, 1986). There is a huge potential to improve the planning service through better use and sharing of information. Information and Communications Technology (ICT) provides the opportunities, but they must be properly harnessed. A more consistent approach in using and presenting planning information can help to provide a better service to the citizen. The more information available about people's actual needs and preferences, the better planners are able to satisfy them (Dandekar, 1988). In the longer term, sharing information should help to improve its quality. It should also lead to better-informed public involvement in planning, decision-making and investment (Sheling, 2003).

Master plan for a town is generally prepared for 20 years with a view to serving a predetermined population. To meet up this demand, detail demographic, socio-economic, environmental, topographic, land use, agricultural and some other information of the project area are required at the early stage of planning and every stages of urban management. Different government institutions deal with those information for their daily business, such as- Bangladesh Bureau of Statistics (BBS), Department of Land Records and Survey (DLRS), Department of Environment (DoE), Department of Agricultural Extension ((DAE), Local Government & Engineering Department (LGED), Roads & Highway Department (RHD), Bangladesh Metrological Department (BMD), Department of Public Health Engineering (DPHE) and so on. Sharing information by using ICT will debar the repetition of work which has already done and can save public money, time and energy. This will also help having consistency of information besides getting information more accurately and within the shortest time and less cost. Urban planners need the accurate and latest information in planning, decision making, resource mobilization and



providing civic facilities. The quicker they get it, the quicker they can serve. Computer based Management Information System (CMIS), with suitable Wide Area Network (WAN) and Local Area Network (LAN) can help planners to provide real time service and would help to share the data available in different offices and also the processed results. For example, map and drawings related to Development Plan could be prepared under a standard drafting software package like AutoCAD and distributed across the network for planners and staff in other departments to update and add information relevant for planning purposes. This would facilitate working on the common digital database, and therefore, maximize time management and labor efforts. In addition, information on various court cases of set-back rules, compensation, betterment fees, land acquisition, etc can also provided using common data-base management system (Dalton, 2001).

GIS based network map of utility services will help to control and provide services in different locations and/or to responses quickly in an emergency period. For example, a water supply network map includes the production capacity, the distribution channel, and position of different overhead tanks with their capacity and the possible demand of that area. Thus the information helps while giving permission for new connection or to control the development for a specific area. The situation is same to all other utility services. Likewise, an ICT-based integrated transport management system helps planners for dynamic route planning and traffic management. Nowadays, GPS Tracking device is very popular with the vehicle owners, especially car owners, as it applies for anti-theft of vehicle. GIS and other ICT-based systems can be helpful for agricultural crops estimation, for conservation of nature while accommodating compatible land use to maintain the ecological balance. It could also be used to solve the most pressing problems of environment in the urban areas like toxic emissions from vehicles, industries and other sources. In addition to that ICT is the most effective tool for an early warning system, alongside it could be used for determining the actual situation before and after the natural hazards occurred.

The emergence of ICT has changed the nature of space, place, time and distance as the determinants of location factors. At present, distance is no longer a problem where one can easily transmit information via telecommunications networks. The same applies to time. All transmissions can take place at once. Wireless communications will allow the making of connections at any place at any time where the service is offered. In principle, space and place for industry, business and other commercial activities are thus no longer affected by distance and time factors in the same way as before (Talvitie, 2004). So, the previous concept of industrial area planning, business and commercial area planning is obliged to be changed according to the present situation. The consequences of the application of ICT in production and services will change the traditional ways of running businesses in industry, services and other organizations as well as changing everyday life more generally (Talvitie, 2004).

Source: Internet

ICT can create virtual spaces and can reduce the demand on physical space which is an important issue for the over populated country like Bangladesh. Digitization of dating back land records could make worthwhile just to avoid having to go retrieve old records from dusty archives stacked on shelves in multiple rooms. At the same time, a GIS based land record system will reduce the number of civil cases and ensure ownership of land and thus indirectly will help to implement land use planning. Moreover, the online registration system for various services, and e-commerce, e-banking, mobile money transfer etc. service delivery system has reduced the requirement of physical space. In near future, a very little land will be needed for delivering these types of service.

Involvement of people could be ensured through ICT which create scope for the citizen to place their demand and the planning process can, therefore, be made more participatory and interactive in nature. A number of Judicial, Legal and Police services could provide through ICT. Online General Diary (GD) has already been introduced in some model Police Stations in the country. A few other citizen services have also been introduced with E-governance systems by different authorities. Anyone can view the planning proposals and maps when accessed on the web site of the planning authority and can register suggestions and objections on-line. Dissemination of information and delivery of certain services to the citizens are thus simplified, expanded and expedited. It obviates the need to visit Municipality/City Corporation in person to pay tax, or to get certificates, Licences and so on. If the database server of the municipalities/city corporations is developed such a way that it is connected with citizen counter, banks and information and facilitation counters by Local Area Network (LAN), Wide Area Network (WAN) and Dynamic Website, public can remit their taxes in the banks, citizen counters and facilitation counters nearest to their residences. Moreover, the E-governance ensures transparency and the residents can easily know about the dues they have to pay and information they want to know at any place at any time. The services related to e-governance for municipalities/city corporations include:

- Static information about municipal corporation, registration of on-line grievances; complaints, application download provision
- Utility services: utility bills, line connection and complain management
- Issue of various certificates: birth certificate, death certificate, NOC etc
- On-line payment: property tax; non-tax; professional taxes
- Land records information; permission of building plan, land development plan
- Trade License collection, renew and cancellation
- Health care information and management, providing blood bank facility, Telemedicine
- Safety net programs: old age allowance, VGD and VGF card allowance, Freedom fighters allowance, Maternity allowance etc.
- Security and Civil services: a concept of creation of Municipal Police force is on card. Near future, people also could get the same e-services which are now available in many model thanas. For example, general diary, case filing and status checking, immigration support, car tickets, etc.

Improve the urban health conditions, mobile phone based medical advice, remote online telemedicine, dissemination of nutrition and health care information via SMS to citizens and remote phone consultation with doctors will be the perfect use of ICT. The municipality/city corporations could help the ailing dwellers by scanning and transmitting medical reports and receiving transmit back prescriptions/instructions to and from the specialized doctors. Besides this, it could also possible to create scope for video conference systems between doctors and patients. Another best way to use ICT for helping people in bad time is emergency disaster response. Information can be disseminated by ICT to warn people and to get their actual condition during

and after the crisis. International Telecommunication Union is trying to prepare a dissemination/ communication network of the flood forecasting and warning center where they took Bangladesh as a case study for its potentiality and due to its past striving attitude against the natural hazards (Figure 2).

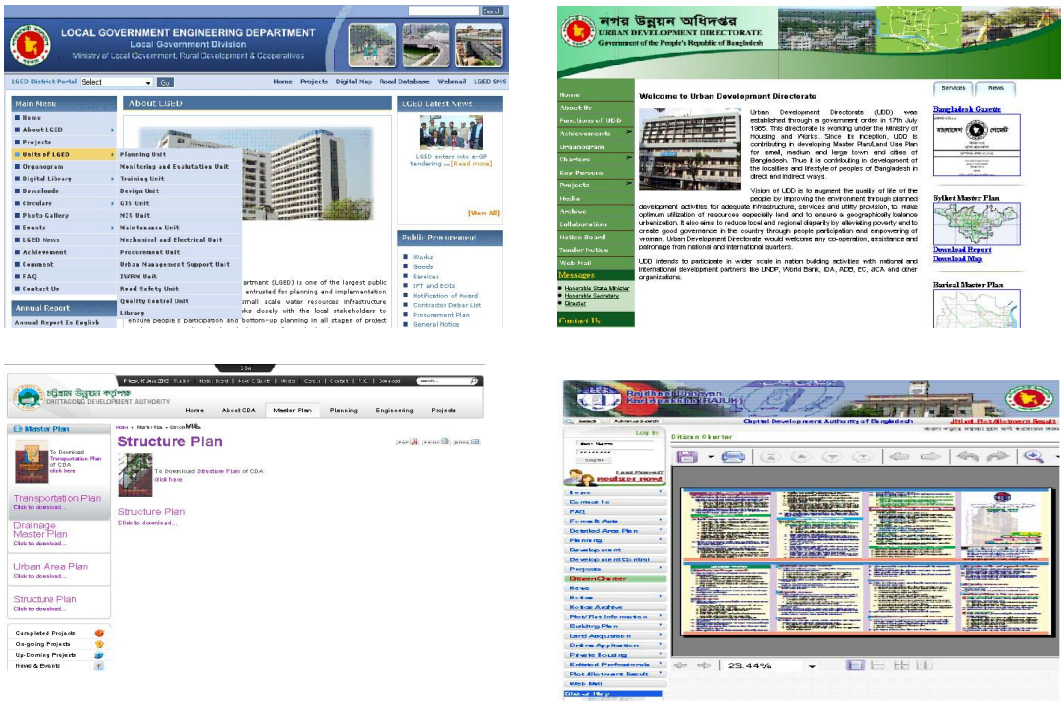
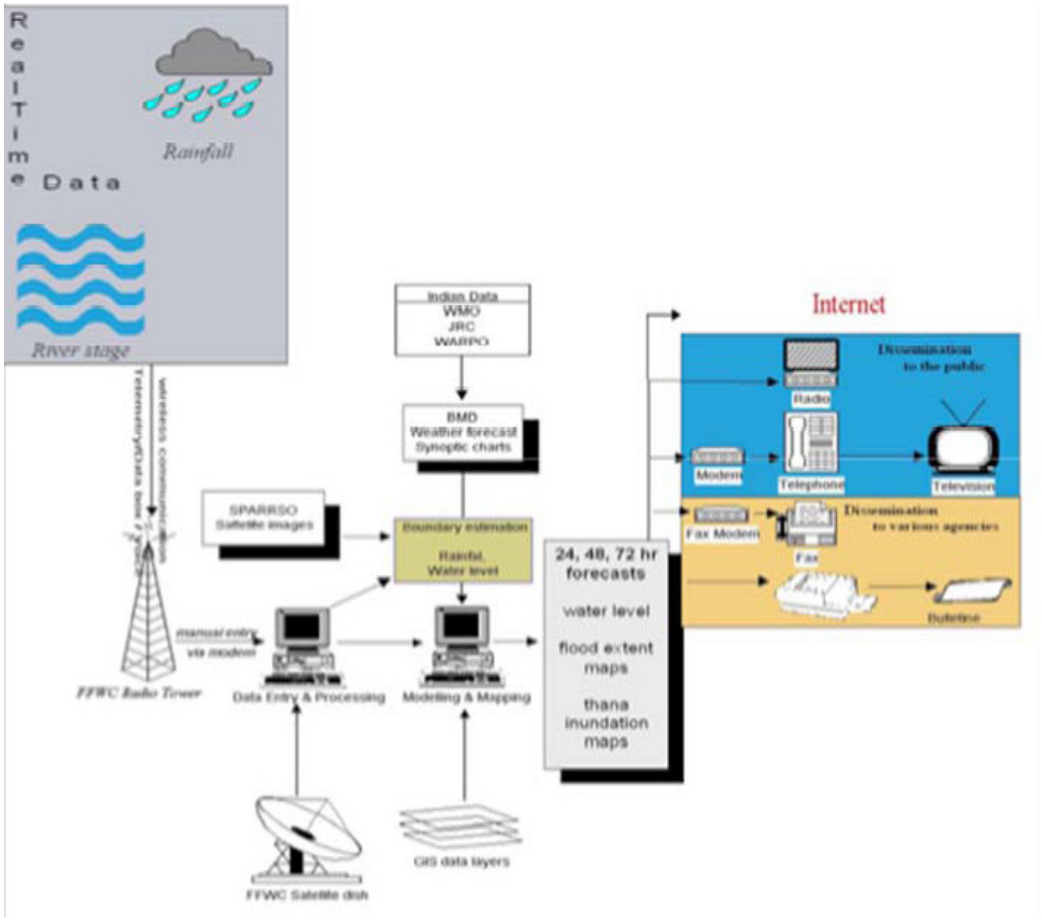


Fig. 1: Online service provision by different urban development institutions

Different educational services such as- online registrations, applications and admissions, certificate requests, information for higher education, e-learning, etc. have already been introduced by the government. The SMS based registration for university admission test and SMS based dissemination of exam results become very much popular with around 1/2 million students who take the Higher Secondary Certificate (HSC) examination a year. They no longer have to face large travel and accommodation costs and the hassle of traveling hundreds of kilometers. Instead they just send their HSC results via a mobile phone and get a reservation for the university exam. Application fees are deducted from the applicant's mobile phone account. Following the successful piloting of the SMS registration, 28 post secondary educational institutions implemented the system in 2010 (BRTC Report, 2011). At present, different utility bill are also being paid through mobile phone application. E-banking, Money transfers, E-ticketing have also become popular with the mass people (BRTC Report, 2011).

Information provision for the agricultural sector, are widely used in order to increase the transparency and the volume of information flowing through the supply chains for different agricultural products. The ability of market information systems to provide a valuable service has been strengthened with the development of the internet and the advance of electronic commerce (business-to-business, B2B; consumer-to-consume, C2C; etc.). Industry structure, product complexity and the demanding nature of agricultural transactions are considered determining factors for the development of B2B electronic commerce in agriculture.



Source: ITU, 2012.

Fig. 2: Proposed dissemination/communication network of the Flood Forecasting and Warning Center in Bangladesh

A Case Study on E-governance Pilot Project in Bangladesh

A related case study is going to be discussed here to get a perception of the benefits of e-governance. The GoB has introduced another innovative application named the *District E-Service Center (DESC)*. Citizens are to apply at District Headquarters for various licenses and certificates. This had been burdensome with middlemen benefiting from a lack of transparency and district offices overwhelmed with the paper-based system. The DESC allows citizens to file requests online or directly at the District Center where the paperwork is scanned and entered into the system. Citizens are given a receipt or sent a tracking number by SMS. The DESC was piloted in the Jessore District and the DESC has been implemented in ten districts with all 64 stated to receive the system by the end of 2011 (http://www.ictdata.org/2011/10/going-digital-in-bangladesh.html).

Table 1: Service Delivery Condition after initiating DESC in Jessore District

Service Description	Before	After
Avg. number: request received for certified copy of land records/day	150-200	230-240
Avg. number: request processed for certified copy of land/day	120-130	180-200
Avg. time: preparation of per certified copy of land records	18-20 days	12-14 days
Avg. time: disposal of applications	3-4 hrs up to 1 day	Max 1 hr
Avg. time: decisions making (full cycle)	2-7 days	1 hr to 2 days
Total number: applications received by E-Service System	0 (no provision)	19,723 in 6 months

Source: http://www.ictdata.org/2011/10/going-digital-in-bangladesh.html

Municipalities/city corporations provide more or less same types of services. So, it could be expected that our local government institutions will also be able to provide their respective services through ICT. In addition to that, Table 1shows that people have easily become familiar with this system as 19, 723 applications were submitted in only 6 months.

Role of Different Stakeholders in ICT integrated Urban Planning and Management

Table 2: Major stakeholders and their role in an ICT integrated urban planning and management

Stakeholders	Role in proliferation of ICT integrated UMP
MoICT	The central authority to patronize the ICT at the root level through policy support, resource mobilizing and infrastructure development.
City dwellers	Mainly the beneficiaries of this service and will also have effective role in modifying and upgrading the quality of service provided.
People's representatives (Mayors & Councilors)	The main custodian of providing all necessary services to the city dwellers, leading sustainable planning and management, and keep liaison between the government and the dwellers.
Urban Planners, Engineers, Architects, IT experts and other relevant professionals	Maintain quality and standards of the services, seek new opportunities, ensure of getting rapid and secured facilities to all and play key role in this regard.
Local Government Institutions	Work together to disseminate information quickly, and financially and technically manage the service center.
Development Partners	The influential associate which could provide financial and technical assistance for capacity building to provide this service. Already UNDP, ADB and some other have been doing this well.
Informal sector (NGOs, advocacy groups, think tanks, etc.)	The informal sector could play more effective role in capacity building, expansion of services and upgrade the service quality.
ISPs	The Internet Service Providers will get huge opportunity for expand their business but they should maintain an optimum standard for providing service.

Educational and technical institutions, Youth development Centers and similar institutions	These institutions would play the key role of technology (ICT) transfer at the root level. These institutions could supply required manpower to proliferation of services through ICT.
Private sector (Businessmen, Individual Entrepreneurs, etc.)	Businessmen will also get a huge option to expand their business if ICTs are available within the city, as nowadays, each and every business depends on ICT. New business opportunities and employment will also be emerged and vis-à-vis this situation will also help to develop the technology into better version.
Transport service provider	Bangladesh Railway has already introduced a mobile based ticketing system and other transportation service providers will obtain this system consequently.
Law and order controlling forces	The negative uses of ICTs should have to be controlled by the Law and order controlling forces and they can also provide their regular services through ICTs.
Unions of Farmers, Labors etc.	ICT connects all types of groups in a single bond. Farmers, labors and other similar groups could inform their problems and could know about market price, job related information and will get expected technical support through ICTs. In Philippines, a website named Community e-center, has been developed to promote its local products.
Fire Brigade and Civil Defense	An ICT based early response system can help to avoid causalities and can save lives. GIS based map helps to find out the location of crisis occurred and the nearest rendezvous point. And after any disaster, communication is necessary to carry out the rescue and relief work.
Other related government Ministries, Divisions, Departments, Directorate, Bureaus, Institutes etc such as- Ministry of Health, Ministry of Education, Ministry of Relief and Disaster Management, Judiciary Division, Department of Environment, Directorate of Land Records and Survey, Bangladesh Bureau of Statistics, Archeological Directorate, Agricultural Research Institutes etc.	• Ensure access to the information • Provide accurate and secured data/information • Ensure quick dissemination of information and uninterrupted flow of information, • Archeological Directorate will contribute in planning by providing necessary information about the national and local heritage of that area. Considering this heritage, planners will allocate space and resources to uphold the places and attract tourists. • Agricultural Research Institute could provide e-agriculture to the farmers and other technology transfer programmes through ICTs to maintain food security.

Challenges and Threats

The earlier discussion clearly illustrates that ICT is now a significant factor affecting spatial change, the consequences of which can often be rather surprising. This necessarily provides planners with some challenging problems. Spatial change from the point of view of urban planning and management is always both an opportunity and a threat. Current ongoing changes however offer opportunities to use the new possibilities inherent in ICT to enable regions, cities and rural areas to partake in new types of development. New development trends can however also threaten the future of these areas. Therefore planners have to find ways to try to forestall such possible negative effects (Talvitie, 2004).

ICT integrated urban planning and management depends much on the transfer of the information and communication technology all over the country. Some steps has already taken in this regard, such as- tax exemption on computer items; new value added services like Integrated Service Digital Network (ISDN), e-commerce, e-education, telemedicine, online money transfer, e-ticketing, etc. has been introduced by the Bangladesh telecom sector; and other strategies to encourage rapid development in ICT sector for attracting private sector investment. But still now Bangladesh faces considerable challenges on its way of achieving such standards. Some of the key challenges of ICT integrated planning in Bangladesh are:

- Computer and other Information technologies are not available in the country side
- Relatively low investment for establishing last mile connectivity in non-urban areas due to the absence of sufficient commercial viability.
- Communication technology has not yet spread out all over the country
- Data communication infrastructure is not suitable enough and high speed data network is not available throughout the country
- Lack of legal support
  - no strong law against cyber crime
  - no law of electronic authentication
  - no electronic certification authority
  - weak intellectual property rights situation
  - no standardized way of storing government's data and information so that they can be exchanged and shared seamlessly
  - lack of data privacy which defines who will get access to what kind of data
  - no shared service platforms about re-usability of information systems to avoid duplication of efforts
- Lack of skilled manpower and inadequate fund in this sector
- Power supply is still deficit in our country, specifically in rural and semi-urban areas.
- Under-utilization of the present submarine cable capacity. Rapid cost depreciation of broadband internet needs to be matched with the availability and accessibility of the ICT infrastructure by both public and private operators.
- Lack of sufficient contents in local language.
- ICT usage service charge is still high. SIM Tax and high tax burden on the telecom operators.
- Possibility of hacking and information leakages

Massive use of ICT also creates some hazards about which Planners should have to be concerned. The troubles will come forward mainly in two forms, such as:

- Vast use of ICT will create huge silicon wastes, known as e-waste, which contain hazardous elements would be the major environmental concerns in this case. Those elements are harmful for human as well as for environment. Treatment and management of these waste is not well defined still now.
- Communication is the vital part of ICT based services. So, if some how the communication system breaks up, the entire system will face the difficulties. Cyber Security threats should be considered carefully while developing the entire system.

Recommendations

Any technology sustains for its appropriateness. A technology is whether appropriate or not is depends on space, time and its acceptance (i.e. social, political, religious, economic and environmental acceptance). The rapid expansion of the use of ICT proves it as an appropriate technology to all form of uses. But a technology consists of four components, namely, Orgaware, Infoware, Humanware and Hardware. To reap the optimum benefit from a technology all components should have to be strong enough with a technology planning. ICT integrated urban planning and management is a specialized area where ICT should have to be developed considering the demand and criteria of urban planning and management. It also requires consistent and pro-people regulatory environment as well as a competitive market place supported by a state of the art infrastructure (http://www.digitalbangladesh.gov.bd/documents /Connectivity.pdf). To foster the access and use of ICT throughout the country, the following action points should have to be set out by the Government:

- Enhancement of the capacity of Local Government institutions should have to be made such a way so that they could assess the actual requirements and can cope up with the changing demands, and be able to transform the traditional service provision into the digital version. Different central government institutions also have to develop their capacity for rapid share of information, both in general and in confidential. Ministry of Information & Communication Technology would play the key role to proliferation of ICT and can introduce necessary capacity development program for the different central and local institutes. The government will have to develop a Government Wide Network (GWN) to link up all government institutes in a single frame of network.
- All the recent policies, plan, program and budget have been developed considering the diffusion of ICT. But if urban planning and management is expected to link up with ICT, the common policies, rules and regulation will have to be compatible with the current demand. Research on the spatial consequences for the development of the information society and the impact of ICT on this development should be intensified, and new spatial and urban theories and planning methods and models should have to be developed. The government should have to formulate strategies and prepare action plans supported by necessary financial and human resources to achieve the target.
- The nature of service delivery is not same for all services. Planners should be trained for developing the service delivering systems of different planning and management related services through ICT. GIS based MIS is the basic tool for the planners in these cases and they could provide the real time services on line internet facilities and/or through mobile networks. To develop the skill of planners in ICT, the programmes of planning education and training should be updated.
- High price of computer, mobile phone, ISP services and other accessories inhibits the kind of e-services that can be provided. GoB has already taken initiative to manufacture computers and mobiles under government agencies at a lower price. The state-owned telecoms company Telephone Shilpa Sangstha (TSS) last year manufactured first home made laptop “DOEL” which named after the national bird. DOEL has four models and the price range vary from Tk. 10,000 to Tk. 20,000 (US$131-262) depending on its configurations. Manufacture of mobile phone locally is under process. Broadband internet access does not cover throughout the country, although mobile networks have nationwide coverage. The internet service charge is still very high that goes against of making the internet popular among the mass. Discretionary pricing scheme for social and public services available over mobile phone, for example, could be introduced to ensure that people can access essential services at a lower cost. A holistic approach needs to be taken by all the stakeholders to reach the ICT facilities to the doorstep of

the common people. It is the time to take initiative to hand over a computer to every child of the country. The broadband internet charge needs to be reduced at minimum level.

- Key strategies for connecting the millions of Bangladeshi citizens through nationwide information network need to address the challenges of equity, cost, regulations, relevance and civic awareness. The government will also focus on providing integrated multimedia broadcasting service to reach the marginal section of population.

Conclusions

New book of Knowledge (1968) defines, "Technology is the human activity that changes the material world around us to satisfy our needs. The ability to apply technological methods separate men from other animals. Men have technology, whereas other animals do not. It also separates civilized men from primitive men. Primitive men had a few tools, which they used for many jobs……..civilized men have specialized tools, which are suitable for particular jobs. The advanced technology of civilized people makes it possible for a given piece of land to support many times the population that it would under primitive conditions." The Planner, in the current information age, will need to know how to find, analyze and share different information modes and media (Rahman, 2007). Planners deal with huge amount of information in a regular basis in planning and management of an urban area. In addition to that, ICT has been emerging as the main driving force of socio-economic development and have a diversified spatial impact. Therefore ICT should be taken into account in urban and regional planning as an important new aspect in this process. Planners should therefore recognize this new need and challenges.

In spite of having a high level technology, ICT has been proved uncomplicated to provide even at the root level of the country. According to the Bangladesh Telecommunication Regulatory Commission (BTRC) and the Bureau of Statistics (BBS), E-services are leveraging on growing mobile access—80 million subscriptions at August 2011, a household penetration rate of 64% in 2010 compare to just 11% in 2005 (BRTC Report, 2011). This situation has created some scope before planners to ensure optimum use of our limited resources and to balance between planning and development control. Key strategies for connecting the millions of Bangladeshi citizens through nationwide information network need to address the challenges of equity, cost, regulations, relevance and civic awareness. The government will also focus on providing integrated multimedia broadcasting service to reach the marginal section. The incorporation of the spatial impact of ICT into planning practices will not however occur without the purposeful actions of those who are responsible for practical planning or those who regulate and support planning.

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