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The Concept of Smart City: Digital Bangladesh Perspective

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Abstract:- In relation to the present initiatives of Bangladesh Government for establishing Digital Bangladesh, all the Cities must have to convert as Smart City, how it could be done, has been highlighted in this paper. This paper starts with the definition of digital society and a smart city, what is the present situation of Bangladesh, then describes the need for a Smart City, focuses on how to establish a stable ICT infrastructure which will, in the long run, act as the backbone of the development and also focuses on how a smart city will help to develop the digital Bangladesh. The areas of the developments are presented and implementation challenges have been discussed. Finally, few successful initiatives around the globe have been described.

Keywords:- Digital Bangladesh, Smart City, e-governance, ICT, Internet City, Knowledge Economic City.

I. INTRODUCTION

A digital society ensures an ICT driven knowledge-based society where information will be readily available on line and where all possible tasks of the government, semi-government and also private spheres will be processed using the state of the art technology. So, a digital Bangladesh must guarantee efficient and effective use of modern ICT in all spheres of the society with a view to establishing good governance. In other word, making Bangladesh a digital one, we have to establish technology driven e-governance, e-commerce, e-production, e-agriculture, e-health etc. in the society emphasizing the overall development of the common people, the major stakeholders of the country.

Smart cities refer to the urban centers which are made safe, environmentally green and efficient. The management of all utility services whether power, water, gas or transportation are maintained using advanced integrated sensors, electronics and networks. Finally, the services are interfaced with computerized systems comprised of databases, tracking and decision making algorithms. Technology has changed the traditional ways of city development. The characteristics [1] of a smart city are:

(a) A broadband infrastructure which is widely available and affordable to all, including developed and undeveloped area.
(b) Applications and services in different areas such as safety, health, education and economy.
(c) An interconnection between the communities through an integrated service architecture.
(d) A platform for innovation that promotes the development of new applications and services.

With the Internet and worldwide web, teleconferencing, video communication devices, cell phones, people and companies now have freedom to choose how they want to be organized in a smart city. Moreover, wireless technologies, have gained great momentum by the cities around the world as quick and effective technologies for enabling Municipal Area Networks (MAN). The availability of advanced broadband communications, services and effective electronic applications help in bridging the "digital divide [2]" and improved economic competence. In short, Information and Communication Technology (ICT) are increasingly recognized as a powerful instrument for reducing poverty, promoting and facilitating sustainable good governance.

The government of Bangladesh has made a large scale initiative [3] to convert it digital one. In order to make this initiative successful, the government has paid its attention on some specific areas. The areas are (i) private public partnership model of development (ii) formulating congenial policies and legal contexts (iii) implementation of best practices (iv) emergence and key elements of Digital Bangladesh (v) ICT as development enablers and (vi) ensuring the participation of related sectors.

The scope of Digital Bangladesh is not only e-governance or e-commerce or e-banking, or operating a country-wide mobile phone network through which one can access the daily newspapers or other internet devices. In fact, it is a combination of all of them. It is a country-wide application of 3G ICT to institutionalize the best management practices in every sector and sub-sector in all over the country.

II. APPLICATION AREAS OF SMART CITY CONCEPT

A smart city is recognized by the availability of some very common applications. This front end services are mostly electronically managed and maintained. The application areas of a smart city are numerous. Some of them are as follows:

Education

The spread of education in the smart city is ensured through distant learning methods [4]. More benefits are derived by establishing interactive learning process. Although not much effective but off-line digital learning is also a modern tool for education. Digital learning includes the provision for digitized lecture notes, electronic books and journal. Apart from the education itself, the system of education is computerized by providing web-based results, course content, students' record and/or teachers' performance.

Public Utility Services

All of the utility services provided to the citizens: electricity, water, gas etc. use state-of-the-art techniques using leading-edge ICT to change the way of services. Such techniques are used in order to improve customer service, productivity, effectiveness and efficiency.

Public Health Care

A prompt and accurate diagnosis is the fundamental requirement for an effective public health care system [5]. For that a distributed database is developed with patient records. And most importantly accessibility of the patient records to the doctors is established. This data includes the test reports of the patients.

Public safety

At the key installation and security sensitive area, network based security camera is installed for crime prevention [6]. Moreover, in order to make public life easy, smooth and reduce traffic congestions, synchronous traffic signaling is computerized. An online traffic update system is also established for the public to follow roads with less traffic.

Business

Different ICT projects in public and private sectors are encouraged to involve local ICT educated graduates; this creates more ICT related jobs for the younger generation. Experts are developed gradually for creating opportunities for more business from home and abroad. This, in turn, improves internal communication to help strategic planning and prioritizing resources as well as promote innovative thinking and collaboration. Within a short span of time, people learn how to become a successful entrepreneur.

Standard of life

In a smart city, the government delivers new "value-added" services to its citizens using leading-edge technology to improve their quality of life [7]. It is expected that each individual can derive economic benefits by accessing information in cost-effective ways. A smart city provides the tools and infrastructure to let citizens and community organizations take advantage of the information age and to participate and express their views as part of local decision-making process. By providing information open for all everything becomes transparent. By this, the misappropriations and corruption in the society are reduced and economic development of the country is ensured.

III. CURRENT SITUATION OF BANGLADESH

As outlined above, a smart city is run under an electronic governance. A research [8] conducted by BEI shows that there are several barriers to e-government development in Bangladesh. Despite the progress in e-Government, the country does face some significant barriers to its further enhancement with respect to the government's capacity. While the government's ICT infrastructure has improved notably, they are still limited mostly to offices in urban locations. Access to computers is also generally restricted to higher level officials, who often do not use them that often. The government's ICT staff is also not very well prepared for large-scale transition to e-Government due to several factors, such as low salary and unattractive career path. The administrative structure needed for a coordinated approach to e-Government is also non-existent, with different entities responsible for different components. Also, the requisite policy and legal framework to enable growth of e-Government still has some major gaps, with respect to guidelines for data standardization, shared ICT resources, data security and privacy. The study showed that (i) the capacity deficit in the public sector in Bangladesh at large, (ii) the digital divide within the entire Bangladesh, (iv) the poor technical infrastructure, and (v) the lack of proper institutional and legislative frameworks are the main barriers.

Technology must be perceived as a core element for developing the government administrative system as a whole. The research shows that the current administrative system in Bangladesh is building its strategy on three key elements namely (i) laws and legislation, (ii) human resources and (iii) insufficient budget, considering technology. Therefore such elements always act as an obstacle to the optimization of technology, as the need always emerges for new legislation or human resources development; upon launching new technology initiatives. Outside Dhaka, at present a few computer network infrastructures have been developed so far. Apart from some educational institutes outside Dhaka, observation finds that most of the LAN setups are Dhaka centric. This observation reveals the reality of the digital gap even within the country.

Non-adequate ICT trained manpower is also a barrier for the development of a smart city. The language barrier [9] of Information is also a factor for the success. Bangladesh expatriates can contribute for the development. A close network of Bangladesh expatriate is still absent.

IV. NEED FOR A SMART CITY

Countries can operate effectively in the new global economy only if they meet two conditions: they must command adequate information and communication technology infrastructure and they must generate the human resource to operate it. The ability to maximize the use of knowledge is now considered to be the single most important factor in deciding the competitiveness of countries as well as their ability to empower their citizens through enhanced access. The smart city is needed for several reasons. Some of them are discussed below:

(a) The world is becoming more urban. Cities and Towns are growing in size and influences.
(b) Governments are decentralizing i.e. devolution of functions to lower levels of Government.
(c) Cities are becoming more global.
(d) Government is being reformed.
(e) Technological developments and e-commerce are having a profound effect on society.
(f) Increasing pressure to alternate service delivery i.e. find creative methods through which municipalities can mobilize energy capacity and resources outside the municipality for the development of the area.
(g) Increasing pressure to become service and customer oriented.
(h) Increasing pressure to involve the community to the work of municipality.
(i) Increasing pressure to provide all relevant information to other levels of government, communities and other stakeholders.
(j) More and more functions are being devolved to local government.
(k) Lack of integration between departments and directorates.
(l) Increasing bureaucracy-huge reliance on manual processes and people based processes.
(m) IT systems focused mainly on cost reporting not business enablement.
(n) IT enabled social and economic development.
(o) IT enabled Administration / Service Delivery.
(p) IT enabled Governance.

V. STEPS TO BE TAKEN IN APPLICATION AREAS

In order to gain full benefit from the application areas several steps should be taken in different sectors. The major steps are:

Establishment of Internet connectivity and access to information for reducing digital divide,
(a) Development of ICT trained manpower
(b) Improved access to knowledge for students through ICT,
(d) Establishing and strengthening all fields of Research and Development,
(e) Establishing ICT virtual networks by opening up to expatriate Bangladeshis.

A. Reduction of digital divide

In the current days, the term “Digital Divide” is a basic consideration for the modern planner of a smart city. Without bridging the divide development of a smart city is difficult to achieve. Digital Divide occurs due to increasing knowledge gap resulting in growing socio-economic inequalities. The digital divide, and consequently the knowledge gap, is increasing because of the conditions under which the Internet is established. The ICT based education including Internet facilities have penetrated in key urban centers, and the higher-educated social groups, while most regions and most people remain out of the opportunity [10]. It is happening as the consequence of the lack of access, or limited access to ICT. One of those constraints is the ability to process information locally and over the Internet.

The role of ICT is to help fill the knowledge gap by facilitating knowledge sharing, education, research and development, production processes, financial services, and other activities that support the knowledge society. According to the modern theories of modernization and evolution, development is not possible without

the use of ICT. It is said that "development without the Internet would be the equivalent of industrialization without electricity". Digital Divide can be reduced by improving basic computer literacy and access of the youth to Information and Communication Technologies. The initiative can be started with a project for offering "Basic PC and Internet" Course. One-week computer courses, offering adoption of basic PC, Internet and e-mail skills will be very successful. An important asset of such initiative will be the multiplication effect of the acquired knowledge by the students towards their successors.

B. **Development of ICT trained human resources**

The lack of ICT professionals has several dimensions. While the available pool of ICT professionals is a concern, of particular concern for strengthening management and professional skills is the depth of the human resources pool for experienced middle and upper level managers [11], those with more than five years relevant experience. This shortage is felt strongly in software design, project management and software business consulting. In this cluster of activities particular emphasis should be placed on initiatives to strengthen management and professional skills where the benefits to industry are expected to be realized in the near- to mid- term.

A program should be undertaken with a broad goal to strengthen human capital across the ICT industry workforce, enhancing the skills and competencies of those entering and those already employed in the ICT industry. Initiatives should foster innovation and growth. A critical challenge for training and workforce initiatives will be to establish a balance between short-term solutions for issues of immediate importance, and long term goals, which may require five to ten years before the impact is felt.

The national universities (public and private) should produce a sizeable number of graduates every year in the Computer and Communications fields. More advanced degrees such as Masters and PhDs should also be launched in these domains. The brain drain should be brought to a minimum level in order to ensure sustainable growth of the ICT industry. Also, numerous training institutions should be allowed to operate in country with a diverse range of training courses. On the elementary and secondary education level, the national curriculum should be expanded to include computer courses and computer labs [12].

National ICT seminars, conferences and exhibitions should be arranged annually with areas of focus covering ICT domains such as the Internet, E-commerce, Telecommunications, Software Development, etc.

C. **Access to knowledge for students**

The present era of knowledge revolution results principally from the dramatic scientific advances and the development and spreading of information and communication technologies (ICT). This has changed business climates and conditions of governance worldwide dramatically. The new form of economy which is taking shape is captured by the expression "knowledge based economy" or "knowledge economy" (KE) [13]. A knowledge economy is an economy in which all sectors and agents are enriched with knowledge, source of new industries as well of renewal of established ones, factor of competitiveness as well as of improvement of social welfare. It is clear therefore that a knowledge-based economy requires much more than the development of ICT industries and services, even if those constitute its basic infrastructure. It requires also a skilled and creative population, a dynamic innovation climate where to create and disseminate new products in tapping into local and global knowledge.

The growing importance of the Internet and new developments in ICT has facilitated us in knowledge diffusion and towards access to information. Knowledge is a universal right, and fair access to information for all is essential to nurture education and stimulate innovation. In this age, change and information are two things that are always in motion, always propelling society further. So, up-to-date information is mandatory requirement for the advancement of a society. Now-a-days we find information on almost all subject area. Recently, in India, a project [14] has been taken up to digitize one million books as part of a global program to make these books accessible and available on the Net, so that knowledge could be shared. The knowledge in the form of information is spread over Internet. But, it is amazing that huge knowledge is available, especially with the internet. But how do you find what is relevant. How can you acquire more knowledge in less time? For that matter, online information retrieval system [15] is a must for any modern society. It has to be designed in such a user friendly way that it will enable people with little or no training or have experience in searching information and allowing them to work at a place and time of their own choice. Unfortunately, user friendly interface has not yet any such standardization of general system architecture, design detail or even architecture.

D. **Strengthening Research and Development**

Research and development on ICT-based systems for teaching and learning should be emphasized. It should be built on open platforms [16] and tools by exploiting the collaborative use of learning objects and resources (including cultural and scientific content). Work should integrate validation, supported by sound research methodologies and address the critical success factors for subsequent larger-scale deployment

initiatives. Pilot projects may be undertaken to test the efficacy of the developments. Research and development on advanced ICT-based eHealth systems and services focusing on integrated health information systems, intelligent environment for health professionals and online health services for patients and citizens. Applications should exploit advances in networking and mobile communications and ensure interoperability with existing networks. Moreover, eHealth applications should be built on best practices [17] established throughout the world and ensured all aspects of confidentiality and privacy. Examples of applications include regional health information networks, decision support for health professionals, mobile applications for health monitoring, home care monitoring and support to autonomy of patients.

Research and Development on home automation system [18] should be undertaken in order to automate day to day activities of the citizen. Optimum use of energy, ease of utility bill payment from home, building intelligence system, home security system etc. will fall under the research and development topics. This area involves the application of ICT and Engineering expertise.

Research and development on ICT-based systems should be undertaken to improve and innovate in the delivery of key public services, integrating interoperable systems for identity management, and to enable good governance in terms of efficiency, inclusiveness, democracy, openness and accountability. Work should integrate several back-office administrative systems and build secure and interoperable infrastructures for eGovernment [19]. In addition it should address relevant critical success factors for subsequent larger scale deployment. Example application areas are electronic public procurement, citizen services such as one stop life events, job search or social security.

Research and development addressing e-collaboration and enabling a particular cluster of SMEs to operate as a single business entity in the production of applications and solutions adapted to local business needs; B2B and B2C e-commerce allowing quicker response times and more dynamic business models at a lower cost.

E. **Involvement of Expatriate Bangladeshis**

A large number of the qualified and experienced human resources of Bangladesh that could contribute to the development process in this region live outside the country. Studies [20] conducted by different agencies on the expatriate nationals living abroad have indicated that a large number of highly talented and experienced expatriate nationals are willing to contribute to their home country.

Most importantly, congenial environment should be created for the expatriates so that attempts can be made to "repatriate" international ICT expertise through fostering links in a Global Network for ICT Expatriates and improving the profile of the ICT industry and the skill base of entrants into the ICT workforce.

Interactive events should be arranged to create chances for the local ICT graduates to meet the expatriates and can share with them their experiences, and will have the chance to interact with ICT executives and leading figures in the ICT industry. This will create investment opportunities in the ICT and will emphasize the opportunities for cooperation for the expatriates in these investment projects and initiatives.

To reduce the impact of 'brain-drain' the services of highly qualified expatriate consultants can be utilized by inviting them for visits to the development of the country. This will help in the transfer of latest cutting-edge technology from the developed countries to Bangladesh.

Same sort of importance will be given to all the big city's development and all the initiatives will be taken for the development of the big cities as smart-city thoughout Bangladesh. If all the big cities will become the smart-city, people will get all the facilities near their door-steps. So the aim of digital Bangladesh will become successful.

VI. RECOMMENDED ACTIONS FOR SMART CITY DEVELOPMENT

(1) A Smart City concept must be some key features for the city. Leadership in technology policy and strategy should ideally be found at the level of the CEO, mayor and from elected politicians. A program should be embarked to build the capacity and understanding of senior politicians and the officials with respect to technology policy and strategy. All councilors should be equipped and trained with PCs and internet connectivity in their homes. A special governance body should be created, aimed at actively engaging the multiple public and private stakeholders in the planning and execution of strategies, public policies, initiatives and pilot projects.

(2) All new legislation passed by the city must be designed to ensure digital age appropriateness. The city must ensure representation and participation in relevant legislative and policy processes and not to impact negatively.

(3) IT should be used as a strategic tool to re-engineer local government in such a way that (i) a highly efficient and effective local government services could be created, (ii) transaction costs could be reduced, (iii) anywhere, anytime services to citizens could be allowed and those services are deal in an integrated manner, (iv) local government could be made more customer friendly and citizen oriented, (v) it could be reduced discretion and arbitrariness by providing easy access to relevant and accurate information.

(4) IT should be used as an instrument to foster the economic and social development. Specific actions should be taken for (i) growth and retention of IT industry in the city, (ii) attracting more participants to IT industry, (iii) attracting investments from outside the city, (iv) providing high quality services in all spheres, (v) creation of employment potential, (vi) promoting knowledge as the key resource for economic progress of individuals and institutions, (vii) providing public access to IT infrastructures and internet, (viii) promoting IT education and IT enabled training, (ix) promoting local language interfaces and (x) gathering a wide range of social and economic data from all local government activities that are electronic to ensure better, more coordinated planning and targeted interventions.

VII. FEW SUCCESSFUL INITIATIVES

A. Al-Madinah Knowledge Economic City

Some successful Arab projects emerged as an exemplary model for the effective use of ICT for development; one of which is 'Al Madinah Knowledge Economic City' [21]. The $7 billion hi-tech project is designed to turn the Al Madinah region into a centre for knowledge based industry where young Saudi entrepreneurs can be trained and nurtured. It also intends to attract the best Muslim ICT talents from around the world to the second most holy city of Islam. ICT is a key enabler in the growth of the economy. KEC is currently witnessing a quantitative and qualitative transformation in use of ICT for development. ICT plays a pivotal role in the city. Business and Residential users will have access to a very high speed network to access their applications using ultra mobile *personal* computers. In addition, a centralized administration system has been built to reduce operational costs and maximize services. Madinah Knowledge Economic City will be one of the world's first truly integrated Smart Cities compared to other cities in Europe, US and Asia which have only certain components of Smart City.

B. SmartCity Malta

The first offices within SmartCity Malta [22] were expected to be open for business by 2009 with a target to finish the project within 14 years. The SmartCity Malta is expected to attract investments of about US$ 300 million. Apart from these, SmartCity Malta has the potential for developing as a regional knowledge-economy hub, the commitment of the government for knowledge-based development, the presence of a reliable ICT infrastructure and the presence of an educated workforce. The primary focus of Smart-City Malta is on "building an ICT and media cluster which is defined as its "core activity". About 46 per cent of the project will be used for ICT and media-related activities, 29 per cent will be used for commercial purposes; and 25 per cent will be used for lodging purposes. Rest of the land will be allocated for public spaces. The government welcomes companies who are interested in a long-term investment in Malta in order to establish a strong long-term relationship with Smart-City Malta.

C. Dubai Internet City

Dubai Internet City (DIC) [23], one of the largest managed ICT clusters in the world and a member of TECOM Investments, recently announced 112 new companies have chosen to locate their operations at the cluster during 2007, which translates to 33 per cent growth over 2006. The new entrants include global companies such as British Telecom, Qualcomm, Google, Layton International, Telecom New Zealand, Dimension Data, Logo Business Solutions and VeriSign, top-tier names in the ICT sector. Since inception, Dubai Internet City has played a critical role in actively developing the regional ICT industry. Through the governmental initiatives, it has successfully taken a lead in bringing knowledge and expertise to the region in collaboration with the business partners. Together the government has put DIC in the forefront of this region's ICT industry maintaining consistent growth while enriching the business community with international companies. Several reasons have fuelled the region's ICT sector's growth in the year 2008 including increased government spending on IT, a highly advanced infrastructure, availability of qualified cadres and the UAE's political stability and security – a key factor for attracting foreign direct investments and international companies. Many of the existing companies in the ICT cluster have doubled or expanded their premises, resulting in 84 per cent growth rate for rented area in 2007 against 2006. Dubai Internet City has facilitated the set up of over 1000 IT companies in the free zone offering business benefits for its business partners including a platform for networking, partnerships and business developments. Riding the crest of success, Dubai Internet City's parent company TECOM Investments developed the SmartCity concept to take the successful model beyond Dubai's borders in partnership with Sama Dubai, a Dubai Holding international property development entity. . The alliance has resulted in the establishment of self-sustained townships in two crucial locations - SmartCity Malta, Europe and SmartCity Kochi in the southern Indian state of Kerala – with more in the pipeline. Hosting most of the Fortune 500 companies as well as more than 1,000 specialized industry leaders from diverse segments of the information and communication technology sectors, Dubai Internet City have emerged as a global ICT hub.

VIII. CONCLUSION

The development of a Smart City is highly dependent on the development of ICT base of that city. The role of ICT for the success of smart city is inevitable. Two categories of emphasis are required for the creation of ICT base of a city. The first category involves the formulation of government's policies and regulations, building various related infrastructures etc. On the other hand, the second category of emphasis is related to the development of human resources. The elements of both the categories have been elaborated in this paper. A smart city should be established in such a manner that sustainability of the development is ensured. For that matter, an economic benefit through the establishment has to be gained. If all the big cities of Bangladesh are developed in that fashion, the development of whole country will be performed. And the dream, digital Bangladesh comes in the light.

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