An Effective Framework for Implementing Electronic Governance in Developing Countries: Bangladesh Perspective

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Abstract—In this paper, we propose an effective framework for implementing electronic governance (e-governance) and e-services in developing countries like Bangladesh. We also present a comparative analysis of present government architecture and the prospects and challenges of implementing e-governance in Bangladesh emphasizing on the usage and potential of facilitating e-services in various sectors of governance. Specific concerns of implementing electronic governance in a developing country like Bangladesh where there exists extreme shortage of resources, limitations in financing, absence of proper development planning, lack of skilled human resources, unavailability of stable and fair democracy and more importantly, a number of unavoidable circumstances including natural disasters. We especially present the adaptability of e-governance in the prime sectors of government and provide a methodical study on the strategies of involving mass people in the governance process improving information and service delivery with their participation in overall decision-making. The potential to ensure highest level of services in all the sectors of government with the implementation of e-governance is also presented in this paper. Moreover, we provide specific recommendations for implementing e-governance in the most feasible, cost-effective, and efficient manner. Analyzing the conducted survey result through statistical procedures also derives a couple of significant factors in implementing e-governance. This paper also aims to point the possible solutions in handling the barriers to implement electronic governance. The supporting framework for integrating the overall socio-economic activities under the information and communication technology framework is also conveyed in this paper.

Index Terms— E-Governance Framework, ICT Infrastructure, E-Commerce, E-Learning, E-Transparency, E-Administration.

I. INTRODUCTION

The prime concern of this decade is to establish and ensure a better way of administrative management, communication and development with the use of information and information oriented services. Crossing the boundary of personal computations and communications, the uses of digital media for greater levels of management has been initialized early in the century. E-Governance may simply be considered as an extension of this trade. With the enhanced facilities of technology for providing smart and easy living,

E-Governance has become a prime demand in the world for ensuring transparency, effectiveness, accountability and efficiency throughout the various sectors of government including decision-making, public policy building, access to information etc [21]. While developed countries of the western world have already been benefited with the effective and multidimensional use of Computer aided Information and Communication technology, most of the developing and under-developed countries of Asia (especially in south Asia) are still grasping to make sense of the applicability and effectiveness of Information and Communication Technology (ICT) in solving the age-old problems.

The main contributions of this paper are: firstly, it proposes a complete framework for implementing e-governance. It is the novelty of this paper that, it takes the overall factors of electronic governance into account whereas previous researches (to be best of our findings), primarily focuses on specific issues or factors of e-governance. Secondly, this paper proposes a hierarchical development or implementation of electronic governance, providing a clear indication of both short-range and long-term planning and policy making. This staged implementation policy may facilitate effective planning and proper service discovery with complete support of incorporating the prototyping aspects of successful e-governance implementation. Thirdly, we re-investigate the specific challenges and barriers on the way to establish e-governance in developing countries like Bangladesh. We have also compared the existing schemes and have analyzed their effectiveness from the socio-economic and techno-infrastructural point of view. Fourthly, whereas most of the existing researches propose framework for implementing electronic governance either by adapting the existing resources or by proposing to re-facilitate the infrastructure, it is our major contribution that, we propose a justifiable, feasible and effective framework for implementing e-governance by ensuring maximum utilization of existing infrastructure as well as providing a parallel initiation of the re-engineering process. Moreover, this paper raises some points of concerns which are to some extent unique to Bangladesh and consequently, those issues were not figured out by most researches.

The paper is organized into seven sections. The following section provides the definition of e-Governance. A study on existing researches regarding e-governance has been presented in section three. Section IV presents the dimensions of e-Governance developing countries. It also focuses on the issues, potentials and challenges in

implementing e-governance in developing countries like Bangladesh. Section V is devoted to illustrate the proposed framework for implementing e-governance. In section VI, analysis of the specific issues in implementing the proposed e-governance has been incorporated. A brief recommendation with concluding remarks is provided in section eight.

II. E-Governance

From various point of views, a number of definitions of e-Governance exist emphasizing on specific activities and functionalities. E-government and e-democracy are the mostly adapted criteria for defining e-Governance. The term e-democracy refers to the processes and structures that encompass all forms of electronic interactions between the government and the citizens in terms of information coverage and decision-making. E-Government is a form of e-business in governance and refers to the processes and structures needed to deliver electronic services to the public (citizens and businesses), collaborate with business partners and to conduct electronic transactions within an organizational entity. Taking the above two into concern, e-Governance is defined as the application of electronic means to improve the interactions between government and citizens and government and business as well as to employ electronic means in internal government operations to simplify and improve democratic government and business aspects of government with the primary goal of boosting administrative efficiency [8].

In a very short span, we may define e-Governance as the process of adapting electronic means in possible sectors and stages of government to ensure legitimate mass-access of administrative and service oriented information with the potential to establish transparency and accountability of government activities and maximum service by redesigning and redistributing the administrative and operating system of government. Adaptability, Awareness-building and Accessibility are the most important concern in establishing e-governance. Here adaptability and accessibility involves the socio-economic status of the citizens especially the economical strength and educational status of the people. Literatures in [2], [3], [6], [8] provide explanations regarding e-governance and related issues with specific sector-based implementation approach. In addition, e-government is called SMART government which is simple, moral, accountable, responsive and transparent that encompasses the use of Information and Communication Technology (ICT) to promote highly efficient and effective government services allowing greater public access to information (A2I), and making government more citizens-centered with an aim to conduct government activities in a more digital fashion. E-Governance is often thought of the combination f frameworks including Government to Citizens (G2C), Government to Business (G2B), Government to Government (G2G), and Government to Employees (G2E) [21].

E-Governance doesn't only mean to have a website in the internet rather to provide online services and information that increase mass-participation in decision making,

accountability of the authority, transparency of affairs involving public interests and domestic concerns [2], [21]. Though a good milestone towards establishing e-government has been made in the USA, Europe and other developed westernized countries such as Australia, Singapore, Canada, the developing countries too, are putting steps for implementing e-Governance in various sectors with a number of limitations, challenges and debates.

The prime objective of e-Governance is essentially to ensure good governance and strengthening democratic process providing equal access to information, freedom of constructive expression, greater equity, service efficiency, stable rapid economic growth and social inclusion. The successful integration of e-Governance in the developed countries has already illustrated the demonstrable and tangible evolutionary impact on increasing government functionality, efficiency, improving citizen participation and quality of life as a result of multi-stakeholders partnership [2].

III. Related Research

There are a number of researches regarding the scope of electronic governance. Most of the researches focus on the adoption of electronic means in management and communication aspects of governance and administration process. Moreover, the researches mostly emphasizes on the e-governance concerns for specific geographical regions or countries. In [16], Abu-Samaha et al. presents a number of key challenges to the Jordanian e-government initiative as a precursor to embracing mobile government service provision. They articulate the issues surrounding e-Government initiatives in terms of bandwidth and reach. They also reflect on a number of statistics and other qualitative reviews concerning previous experiences in the Jordanian electronic government initiative to establish why even a promising initiative may provide a limited partial success. Note-worthy, they simply investigate the concerns and don't provide any clear and legible framework for implementing electronic governance. This point of limitation motivates us to provide a complete framework for implementing electronic governance in developing countries especially in Bangladesh. In the following parts of this ongoing section we present an overview of such prevailing researches.

In [17], M. A. Rahman investigates the points of digital divide between the developed and developing countries. He also presents a number of points regarding the problems to access Information and Communication Technology in developing countries. Several recommendations in short span has also been presented in [17] with an aim to prevent the digital divide from deepening, and to attempt to narrow it as much as possible.

Since, it is essential to have power infrastructure and robust power supply to implement electronic governance, shortage of electricity is an extreme problem for the developing countries. In [18], an energy saving program has been proposed for reducing load-shedding and for continuity of power in IT sector. Proper and continuous power supply

may facilitate a lot in implementing other technical infrastructure like broadband internet support. Such a promising scheme of facilitating broadband connectivity and thus stetting the stage for e-governance using power line i.e. Broadband over Power Line Communication (BPLC) has been presented in [1] by Mottalib et al.

The potential of e-Government practices to promote transparency has been discussed in [26] by N. Rashid. It explains how the application of Internet-based technologies/e-government can under certain circumstances, encourage transparency, openness and better governance. Another detail study regarding the scope of fighting corruption through e-governance has been presented in [21].

In [19], cost effective e-governance implementation solution for Dibrugarh District Administration of Assam, India with minimal changes to the existing communication infrastructure has been proposed. Since rural telephony penetrates into most of the remote villages of the India, issues like getting active network connection through dial-up modem have been taken into consideration by them. But this scheme may not be an exemplar for Bangladesh because; still now telephone communication in rural areas is a dream.

In the recent literature regarding implementation of electronic governance, G. Islam et al. [20] propose network architecture, database and software aspects for implementation of electronic governance in Bangladesh. Their proposed model is based on a separate layout for rural and urban areas. This paper limits on the illustration of hierarchy model of infrastructure arrangement and doesn't propose any complete architecture or timeline based implementation policy for e-governance in Bangladesh.

Sobhan et al. presents the tangible benefits of e-governance in Bangladesh with illustration of e-government readiness through a survey in [4]. A couple of case studies have also been focused with an aim to pointing the challenges and implications of e-governance in Bangladesh. In [25], As-Saber et al. has provided a comprehensive study on the Information technology law and e-governance from Bangladesh perspective. They focus on the major concerns for policy documentations of electronic governance.

Opportunities and challenges of electronic governance in developing countries have been focused in [13]. V. Ndou presents a detailed overview of e-governance and related terminologies with comparative analysis of e-governance status in comparison with developed countries. The opportunities of electronic governance has also been investigated in [13] which includes, Cost reduction and efficiency gains, Quality of service delivery to businesses, transparency, anticorruption, accountability attainment, increase in the capacity of government reach, network and community creation to Improve the quality of decision making and promote use of ICT in other sectors of the society. Analyzing a number of case studies (which doesn't include any from Bangladesh), V. Ndou also figures out a couple of challenges in implementing e-governance. An overview on the current e-governance situations, progresses and existing barriers in the Asia-Pacific region has been

pointed in [24] by Wescott. He has also presented a number of recommendations regarding coping with challenges, while maximizing the benefits of e-governance.

There is an interesting as well as of no doubt a very important research has been carried out by Broadband Mobile Communications Research Lab (BMCRL), Asian Institute of Technology, Bangkok, Thailand which focuses on the Emergency Communications during Natural Disasters from the perspective of Infrastructure and Technology. Various contexts in disaster communications including disaster warning, post-disaster communications i.e. communications for emergency management has been discussed in [22]. They propose several models for setting up emergency communication networks which may be applicable for communication management during disasters in developing countries like Bangladesh.

In [23], several issues regarding the status, potential and barriers for grounding electronic governance adoption has been discussed for Vietnam. Conducting an interview based analysis; the authors have represented e-Government from demand side and have depicted the aspects of getting information for the non-users. On the basis of the state, several issues regarding the external challenges in implementing e-governance have also been raised in [23].

IV. ESTABLISHMENT OF E-GOVERNANCE: POINTING THE BARRIERS

In this section, we point out the main barriers of implementing e-governance. Basically, here we try to illustrate the points of concern which differs from those of developing countries towards implementing electronic governance. In developed countries, there are a couple of catalysts that ultimately mobilizes the process of implementing electronic governance. For example, the developed countries have flexibility in expenditure of a great sheer of annual budget in implementing electronic governance, which is never ever possible in developing and under-developed countries. The developed countries also posses great opportunity of effective policy making, enriched project management, skilled work force, available technology, equitable man-machine ratio, well broadband infrastructure, greater literacy rate and so forth. The buzzword Digital divide is really an echo of these aspects. Moreover, developing countries which are generally perceived to be overly bureaucratic, unaccountable and unresponsive also possess a couple of ill-cultures in governmental processes. Surprisingly, these developing countries are situated in the disaster prone parts of the world which is making the situations worse.

A. Absence of Infrastructure

The main problem in implementing electronic governance in developing countries like Bangladesh is the shortage of proper infrastructure. Here infrastructure doesn't solely indicate man-machine interface ratio but also focuses on the overall aspects of ICT support including internet facility, power facilitation, human resource support, legal framework and more importantly (and interestingly) existing

infrastructure for developing further infrastructure. Since the term 'development' indicates a faster running and robust support of these aspects, developed countries may arrange all these quite easily, whereas for developing countries it is a challenge.

B. Resistance to Change

The Buzzword electronic governance indicates a number of activities, which incorporates a wide variety of services including socio-economic aspects. Consequently, implementation of electronic governance will certainly require a paradigm shift in those sectors initiating a trend of new thinking and new concepts of development, which may not be welcome by most groups of administrative people with bureaucratic management practices. E-Governance is often thought of an analogy with e-commerce, where citizens are referred to as customers for government since governments need to empower rather than serve. In order to shift from bureaucratic hierarchy to participation with warm teamwork, to change from production cost-efficiency oriented architecture to User satisfaction and control flexibility achievement organization, and to be wide vision derived mission oriented customer focused rather than command and control oriented structure; the concept of moving towards better service establishment is not only necessary, but also to some extent essential. This radical change may often be protested by the nostalgic professional in the fear of loosing their evil-power derived from the lack of transparency in the government process may be one of the main obstacles towards implementing electronic governance in Bangladesh.

C. Lack of Education

The main issue in implementing e-governance is to have its perceived usefulness among the citizens. In comparison with the developed countries, the rates of literacy in the developing countries are lower. Because of this lower rate of literacy, it is extremely difficult to make the mass people understand the effectiveness of electronic governance. Since, success of electronic governance is indicated by the utmost success in implementation as well as the awareness, activity and use of the services by the citizens, which greatly depends on the level of literacy and mentality of the citizens, it is to some extent a fate that, implementation of electronic governance would face communication problems because of lower literacy rates in its application phases.

D. Natural Disasters

There are various unavoidable circumstances, which may also become a gigantic barrier in implementation of electronic governance. Most of the countries of Asia; fatally the developing countries of south Asia very often faces various natural disasters like flood, hurricane, typhoon and earthquake, Bangladesh being situated in a disaster prone area is flooded almost every year. Cyclones are also the annual fate of Bangladesh. Whereas providing elementary components like foods, drinking waters, dresses and shelters become a great problem after the disasters to the people, it is easily understandable that, to go on with uninterrupted e-governance in the disaster prone areas is not so an easy task. Since e-governance is dependent on a couple of infrastructures, maintenance of those with the aim to achieving possible maximum outcomes and services from those even during out-of-normal situations should be well planned.

E. Power Shortage

Among the infrastructure issues, power is an important point of concern. Power shortage is one of the burning problems in developing countries including Bangladesh. Since the services offered by electronic governance should must be accessed through computer and internet for which the driving force is electricity, it is necessary to have proper and reliable energy supply. Though the cost of computer and related accessories has already become lower, without the supporting power facilities, it is completely unusable. Still now, large portions of rural areas are far away from the touch of electricity. Even in urban areas, the power supply is unreliable. Reliable power supply is a major hindrance to develop telecom infrastructure in the rural areas. Support for spreading the use of solar energy to minimize this problem is still now limited to proposals and papers. Consequently, it is of prime concern to have support of power in implementing electronic governance. Without spreading proper energy infrastructure, it may be a challenge to even think of electronic governance.

F. Unavailable Internet Facility

Lack of Internet facility is a major barrier in implementing electronic governance. Since services of e-government are to be offered over internet, it is of no means possible to implement e-governance without proper internet facility. Moreover, in order to reduce the overall cost of establishing broadband infrastructure, it is imperative that power lines should be effective and efficient to support broadband over power line carriers, which may also be barred because of the absence of proper power supply lines.

G. Improper standardization of Bengali Software

One of the main barriers of implementing electronic governance is the lack of standardization of software development with Bengali interface and local content. Since, e-governance indicates access of information; without accurate perception and understanding of the conveyed information, it is about meaningless to have the access on that information. This complete understanding may only be possible through the adaption of Bengali in the graphical user interfaces. Because of some unwise introductory steps in establishing the basement of Bengali software development (For example, design of some widely used Bengali software which are based on Latin character set and are not at all Unicode compatible), the journey towards quality software has faced (and still now facing) gigantic problems. With this challenge of local content development, there are also a couple of problems in generic application software support.

Open Source Software (OSS) support is considered a boon for the countries which can not afford to buy proprietary software due to its extreme expense and also can't provide hefty license fees, As an extra advantage, adoption of Open

source software in implementing e-governance also reduces the monopolized dependence on the proprietary software developing companies. Moreover, it widens the scope for using the in-house skills and flexible support from the local developers to enhance the OSS at an extremely low cost. However, there are a number of challenges with OSS development including customer support, required technical skills, cost of ownership, optimal version upgrade and more importantly, lack (or absence) of accountability [14]. This sort of problems may bring down the overall situation of e-governance software development worse.

H. Absence of effective legal framework

Implementation of electronic governance also requires a consistent and effective legal framework. Though there exists an elementary legal framework for ICT, it is required to have a review of that for secured but faster adaptation of ICT in governance. In case of legal support it should be kept in mind that, with the 'prescriptions' of donors, the digital divide may not be acute.

I. Discontinuous Human Resource Support

Human resource is an elementary concern for implementing electronic governance. It is interesting that, though there are bright human resources in Bangladesh, it is deprived from continuous and uninterrupted longer support from those talents because, the blooming of talents and facilities of expressing the talents is not only limited but also

to some extent impossible in Bangladesh. This may be a barrier for implementing electronic governance.

J. Other Challenges

There are a couple of other problems with developing countries, which hampers the implementation of electronic governance. It is quite rare in the developing countries that, the government is stable. In most cases the activities of ruling side are meaninglessly opposed by the counter parties which often makes potential concepts nipped in the bud. E-governance may also face the same fate in such developing countries like Bangladesh. More importantly, corruption is a great barrier to have any better and transparent step in developing countries.

V. FRAMEWORK FOR IMPLEMENTING E-GOVERNANCE

The main contribution of this paper resides in the derivation of e-governance implementation framework. The proposed framework focuses on the hierarchical implementation of e-governance with maximum utilization of existing infrastructure. It is also novelty of our approach that, the proposed framework for implementation of electronic governance takes most of the perceived emerging issues into considerations. An overview of the framework has been presented in figure 1. In this section we summarize the phases of e-governance implementation framework, of which detailed components and backgrounds are discussed in the earlier sections. The proposed framework is based on the
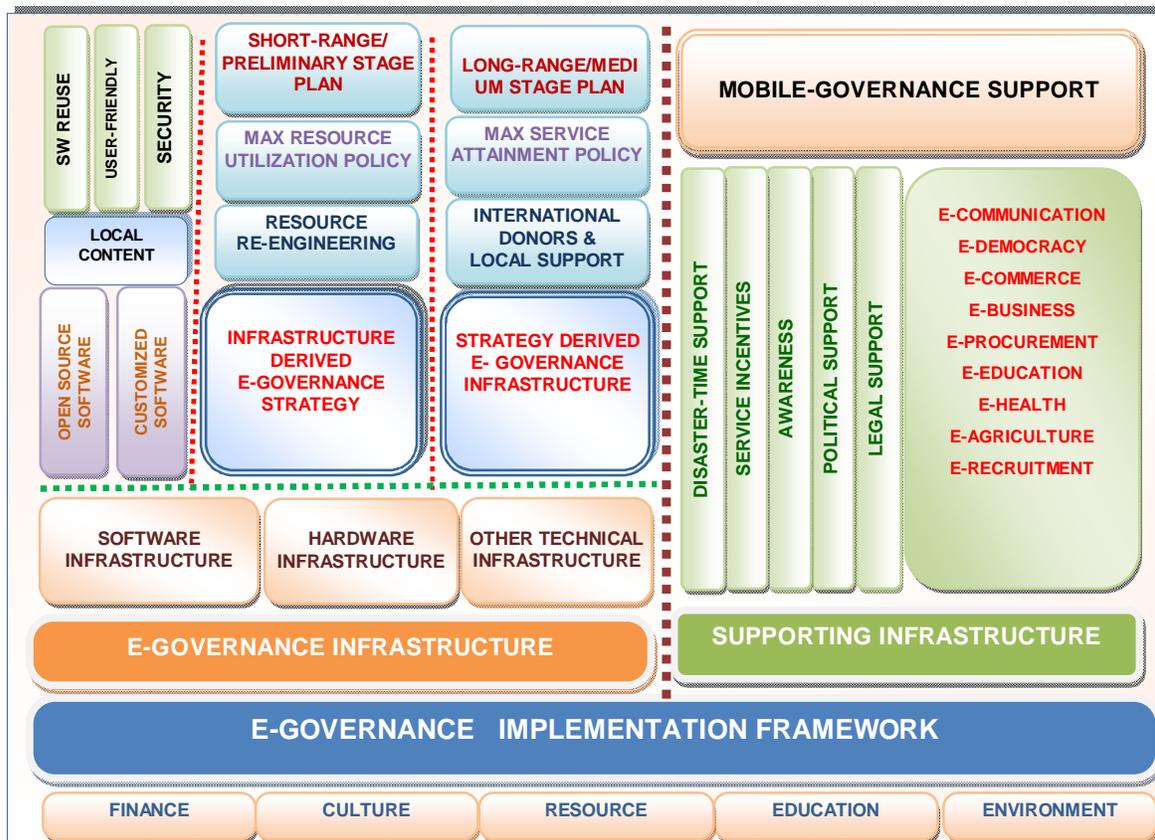

Fig.1 Proposed Framework for implementing electronic governance

socio-economic aspects which include financial circumstances of the inhabitants and the same for country itself, existing natural, technical and human resources, cultures and traditions, education and the overall environment. Economy of any country decides upon the readiness and rapidness of e-governance implementation. The implementation policy is also based on the financial conditions, standard of living of the citizens, educational level of the people and so on. Success (or failure) of e-governance implementation is also dependent on these criteria. Consequently, it is worth to point these as the basement of e-governance implementation framework. Again, since e-governance is the summation of heterogeneous multidimensional services which aims to provide better access to information and equal participation of citizens in management process, a number of sectors are related to the implementation of electronic governance. Hence we divide the e-governance implementation framework into two aspects namely, e-governance infrastructure and supporting infrastructure. The time-oriented architecture of e-governance implementation may be partitioned in this aspect too. That is, the first stream of e-governance implementation may be dedicated in arranging the e-governance infrastructure whereas the later stream which may be initialized after the successful establishment of the first one will focus on added-support of electronic governance as well as e-services.

In the phase of initiation, e-governance infrastructure should be established which comprise of three parts namely software infrastructure, hardware infrastructure and other technical infrastructure. Without any of these elements, it is never ever possible to implement electronic governance. Software infrastructure indicates the design and development as well as management issues for e-governance implementation which may be carried out by open source software and customized software. Though there are a number of pros and cons in adapting open-source software, because of the financial limitations, it may be advantageous and feasible to adapt open source software in the initial phase of development. Here it is to be noted that, decision on the choosing between open source software and customized software should be based on the level of security, usage and reuse. For both the alternatives it is a must to have local content. Issues like user-friendliness, clear and legible interface, interactivity and security are also major concerns for e-governance software development. Since the level of education is still now lower, and the support should be accessible to the people irrespective of their physical ability or disability, there should have support for both textual and non-textual means. Moreover, to attain greater level of security biometric identification is proposed to be integrated.

Hardware and other technical infrastructure is the main point of concern for the developing countries since, it is cumbersome for the countries to afford (and even to some extent impossible). Taking this limitation into consideration, we propose the multifaceted strategy. In the structure derived e-governance strategy, the policy is to utilize the existing infrastructure and then designing the basement on a short term basis. The purpose is to have quick initialization since, if we want to have a better and complete infrastructure, it may happen to wait another decade to start the journey. That is why, we propose to adapt infrastructure derived e-governance strategy for the initial phase and continue to shift towards strategy based e-governance policy (in along term basis) by gradually attaining the funds to afford better software and hardware infrastructure. In fact, there seems no other way to introduce e-governance in developing countries like Bangladesh without having rapid step towards the journey.

The second stream of e-governance implementation focuses on the add-on service development which includes e-communication, e-democracy, e-commerce, e-business, e-procurement, e-education, e-health, e-agriculture, e-recruitment and so forth. Detail discussions on these issues are beyond the scope of this paper. To have awareness building among the citizens is utmost important which may be made easy by integrating incentives for the people in use of e-services. Last but not the least; proper support should be incorporated in the e-governance implementation policy regarding the disaster time operations and communications. Implementation of electronic governance through mobile-governance architecture may be another dimension in the total concerns.

VI. ANALYSIS OF PROPOSED APPROACH FOR IMPLEMENTING E-GOVERNANCE IN BANGLADESH

It has already been stated that, implementation of electronic governance is not a single activity rather it's a composite activity the attainment of which is also based on couple of stages. An overview of the fluctuations in required costs and efforts at various stages of for implementing electronic governance has been presented in figure 2. Here phase 1 stands for the planning and designing phase for implementing electronic governance based on existing infrastructure, phase 2 indicates the stage for core e-governance implementation with organizing resource for enhancement and phase 3 is the actualization and enhancement phase.

From the above discussions, it is evident that, there is no feasible and optimal way of fighting the corruption without adapting, implementing and establishing e-governance in Bangladesh. Here we present some specific guidelines for implementing e-governance in Bangladesh.

In order to facilitate e-governance, we must have proper infrastructure. This infrastructure support must be affordable and effective for the country. In order to establish internet facility, we may employ Broadband over Power Line Communication (BPLC) [1], [7] strategies, as the most available infrastructure is electricity in comparison with tele-density.

It is true that, Bangladesh has already joined in the information super highway; the establishment of total fiber-optic based ICT-infrastructure requires a large amount of time as well as subject to huge expense. But, it may be the fastest and most cost effective to establish Broadband over Power Line Communication because the maximum

infrastructure already exists.

In this stage-setting step, we also intend to emphasize on awareness building. E-governance is aimed for good-governance, and this good-governance is aimed for the social, political, economical that is overall uplift of the citizens. This necessity and functionality of e-governance should be communicated to the people so that they may realize and evaluate e-governance.

As a developing country, it is not possible for Bangladesh to establish e-governance in all the sectors at a time. It is essential for Bangladesh to implement e-governance hierarchically. Consequently, we are to prioritize the sectors in terms of effectiveness, functionality and liability of providing services. The failure to identify the priority sectors may jeopardize the total scheme of implementation of e-governance. This prioritization process should also consider the interdependence and intercommunication among various service-providing sectors for ensuring a consistent, functional and effective analysis to implement e-governance. This feasibility analysis process should must involve citizens as well as system analysts and government officials of all levels.

One of the main issues for implementing e-governance in developing countries is expense. The huge expense of implementing e-governance often turns the e-governance implementation project into an abandoned one. But, this may be easily handled by involving universities and other organizations in implementation process. The universities and other ICT related organizations may provide major support by providing their experienced IT-experts and concerned human resource. This may also bring a new dimension of research in the organizations. As in Bangladesh, there are more than hundred universities (both public and private) among which about all the universities possess courses and degrees regarding computer science and information technology, there is a great scope to engage large amount of human resource into the design and development of e-governance system for various sectors of government. Selecting renowned universities to perform this job with the supervision of honorable experienced teachers may ensure a successful, effective and efficient design, development and implementation of e-governance system. The universities may also be benefited with the scope of e-governance analysis and implementation related research support. Basically, this may be the only driving force to install the framework for e-governance in minimum expense.

The design and implementation of e-governance should must take the social, economical and educational issues into concern. The adaptability and effectiveness of the e-governance depends mainly on the citizens, as they are the stakeholders of e-governance. It should be taken into consideration that, the first language of Bangladesh is Bengali. So that, it would be most effective to ensure the use of Bengali in implementation of e-governance for conveying information. The use of Unicode in representation of Bengali text is also expected to facilitate uniform and massively accessible platform. The integration of the facility to provide comments and other information through internet may guarantee the participation of citizens in decision-making and various multidimensional service-oriented processes. We propose to use a Phonetic based encoding scheme for obtaining the information from the concerned parties. Figure
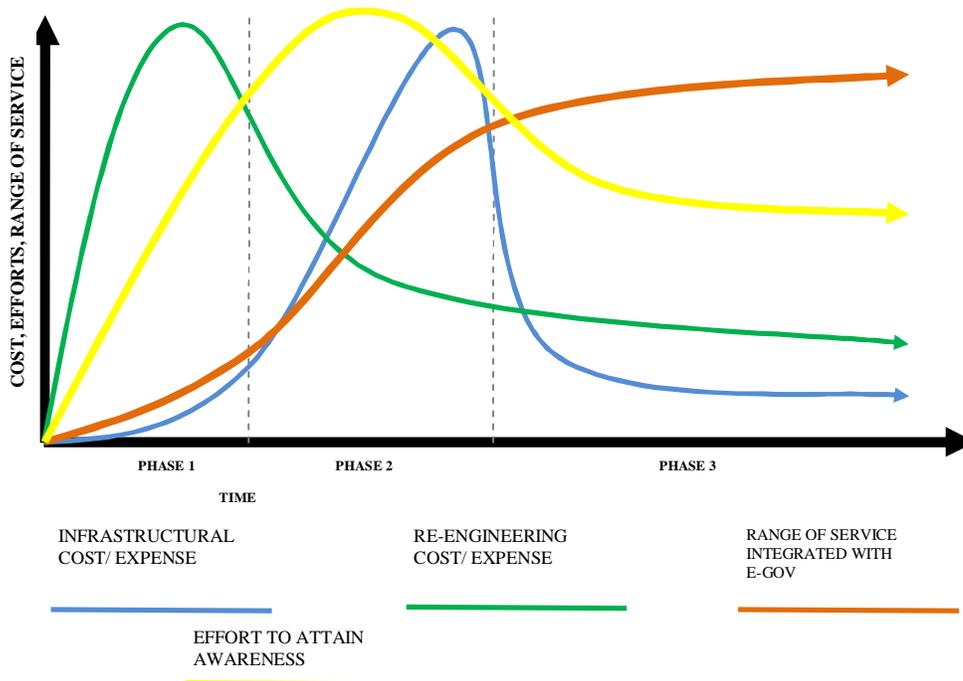

Fig. 2. Indication of required level of cost and efforts for implementing e-governance in Bangladesh at various levels/phases.

5 presents a typical screenshot of proposed phonetic based approach of Bengali text composition.

E-Governance is a large-scale activity which requires large scale data warehouses to be implemented. For faster, reliable and consistent database applications regarding development of e-governance, distributed database management may be the most effective. It is also necessary to consider WAP-support for all levels of design and development of services relating e-governance.

E-Governance is dedicated to establish the participation of the citizens in decision-making, policy building, objective selection and quickest service delivery fostering good governance in corruption-free and progress and success-oriented environment. This goal can only be achieved if people are informed about the sectors and services of e-governance. This communication can be made using traditional communication medias. SMS may be an effective approach in communicating the adaptation of e-governance in various sectors. Providing citizen-incentive lucrative facilities and services electronically through e-governance may bring rapid attention of the citizens.

TABLE 1: PERCENTAGE OF RESPONSES OF PART ONE QUESTIONNAIRES

Proposition	%
The basis of implementation of electronic governance should initially focus on electronic governance	38.46
The basis of implementation of electronic governance should initially focus on mobile governance	61.54
Strategy of implementation of electronic governance should emphasize on arrangement of complete set of infrastructure	42.31
Strategy of implementation of electronic governance should emphasize on starting with the current infrastructure and progress through developing the new infrastructure	53.85
Approach to robust, secured and reliable software Implementation should be based on available open source software	15.38
Approach to robust, secured and reliable software Implementation should be based on customized software	7.69
Approach to robust, secured and reliable software Implementation should be based on the projects carried out ICT wing or academic and research institutions.	42.31
For providing service to citizens, authentication and security should be based on biometric security	69.23
For providing service to citizens, authentication and security should be based legacy security policy	19.23

E-Governance requires proper infrastructure for implementation. This an inseparable major issue of the exercise of e-governance too. For developing countries, this is a dire point of concern. In order to facilitate e-governance, the essential infrastructure involving computer, internet and human resource is still now a great problem for Bangladesh. If we plan to employ e-governance with completely individuals interest, it is absolutely impossible to see the light

of e-governance. Conversely, it is also not possible to provide separate infrastructure for e-governance because the economical framework would not support that. The only feasible as well as optimal solution is to arrange the total infrastructure combining the previous two sectors with the use of existing resources. As, in most areas, including rural areas we have secondary schools or madrasas and within the last few years government with the help of various non-governmental sources has already distributed computers and computer peripherals, we may use these schools or madrasas as a information center or service point for facilitating the citizens to have free access to e-governance. Basic awareness building may also be motivated from these centers. Besides these, distinct and sophisticated Information Centers equipped with IT-peripherals and support personnel may be established for providing e-governance support.

The major research question which is subject to extensive cost benefit and throughput analysis of this research of providing a framework for implementation of electronic governance is the order to which various alternatives of electronic governance implementations may be applied. That is, whether it is worth to start implementation of electronic governance on the basis of the current infrastructure available or to wait until the entire hardware, software and relevant infrastructure is ready. Secondly, it is also a great point of concern to find out the most effective approach of implementation of electronic governance for country with lower literacy rate and limited internet facility. Moreover, the criteria of developing software is also a great concern for implementing electronic governance. In order to get comprehensive choices on these agenda, a survey was conducted among various levels of people. Authors made contact with faculty members of public university (Khulna University (07), Khulna University of Engineering and Technology (03), Jessore Science and Technology University (01), Bangladesh University of Engineering and Technology (01)), faculty members of higher secondary institution (Khulna Public College (04)), high government officials (forest department (02), department of post and telecommunication (01), department of communication (01), public works department (01), public administration (01)), non-government officers (04) and gathered their remarks i.e. selections on those aspects. The questionnaires were divided into two sections. The first part comprised of selective questions which was aimed to point various primitive aspects of electronic governance implementation including the basis of implementation of electronic governance, strategy of implementation of electronic governance, approach to Software Implementation and means to ensure security policy whereas the second part asked the respondents to provide their personal remarks about various artifacts including the barriers in implementing electronic governance, factors that may assist in implementing electronic governance, strategy to ensure greater participation of people, source of investment in implementing electronic governance, possible stakeholders on various phases of implementation and so forth. Major findings of the survey has been presented in table 1. It has

been observed that, implementation of m-governance has been considered more promising than e-governance because of its wide reach to the people. Secondly, in evaluating the strategy of implementation of electronic governance, 53.85% of the respondents remarked that, starting with the current infrastructure and progress through developing the new infrastructure is beneficial to have a rapid implementation of electronic governance however, most of the respondents mentioned the complexities in interoperability concerns. It has also been remarked that, developing a separate wing or incorporating academic and research institutions may be effective in developing software infrastructure for e-governance. Biometric authentication has also been pointed as the effective policy to most of the respondents. Thus most of the research hypotheses are satisfied.

VII. CONCLUSION

In this paper, we have presented an overview on the sectors for adapting e-governance from the point of view of the democratic governance in Bangladesh. We also describe the specific issues of corruption in various government sectors and have provided the feasibility study for reducing corruption from the corresponding sectors by adapting e-governance. The overall analysis on the usefulness and effectiveness to establish e-Government, e-Administration and e-Democracy in the form of e-Governance has been elaborately provided here. A detailed approach for implementing e-governance has also been presented in this paper. We also provide specific recommendations for designing, developing and managing the e-governance system in Bangladesh. The implementation of e-Governance is the only way left to uplift the country into a corruption-free developed nation.

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