

Seminar Paper Report (Article Format)

Enhancement of Bangla language in ICT through research and development initiative: an evaluation

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CERTIFICATE

This is to certify that the seminar paper entitled '**Enhancement of Bangla language in ICT through research and development initiative: an evaluation**' has been prepared by Mohammad Rashed Wasif, Deputy Project Director (Deputy Secretary), EBLICT Project, Information and Communication Division who is a participant of 126th Advanced Course on Administration and Development (ACAD) held at Bangladesh Public Administration Training Centre (BPATC), Savar, Dhaka. The paper has been prepared under my direct supervision and guidance accomplishing all the activities satisfactorily. The quality of the paper is above satisfaction to me and the course management can accept the paper as a fulfillment of the course.

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Abstract

The Government of Bangladesh (GoB) has taken initiative to enhance Bangla as a leading language in computing at the global stage. Consequently the development of ICT tools for using Bangla is necessary to remove the obstacle so that common people can use computer in vast scale in the country. The important aspect of the study is to know about the execution mechanism for enrichment of Bangla language by applying ICT. Another aspect of the study is to assess the ongoing initiatives. How the implementation mechanism is designed to attain the objectives of this initiative is a key concern. Qualitative approach is used to find out the research objectives of the study. Both primary and secondary sources data are utilised to answer the basic questions of this research. Long time is required for ToR design and approval due to technological challenges. Consulting firms are not well prepared for Artificial Intelligence (AI) based software. It is found that weakness is in the feasibility study and preparation of DPP due to lack of time and funding. Capacity building is necessary for the consulting firms by taking assistance from technical persons with relevant experience.

Keywords: Bangla Language, ICT tools, Implementation mechanism, ICT initiatives

Introduction

The Government of Bangladesh (GoB) has identified Information and Communication Technology (ICT) sector as a “Thrust Sector” (Chowdhury 2009). The feasibility study on enhancement of Bangla language in ICT by Bangladesh Computer Council (BCC 2016) shows that the government is encouraging all the concerned sectors to work together for making ICT as a real profitable sector. It promotes the use of ICT for the socioeconomic development of the country. One of the most important conditions for the expansion of computer technology is to create interest among the people. In our country, mass people are not familiar with the computer technology (BCC, 2016). Again, in the context of South Asia only 5% of the total populations who are very fluent in English are the primary users of computers and the movement of the use of computers is slow to localization (Hall et al. 2003). Though Bangla is the seventh most spoken language in the world with a rich heritage (Sultana et al. 2012), the position of Bangla language in the field of ICT is far behind.

However, the mother language has huge impact for the use of ICT and dissemination of information to the common people of Bangladesh. Due to the language barrier most of the people cannot get the benefits of internet and large English database of journals, books etc. Enhancement of Bangla language in ICT can bridge the gap between Bangla speaking rural people and overwhelming e-content available in English (Islam 2009). The impact of Bangla computing is not limited to knowledge dissemination, it will push the Bangla language identity on the global stage as well. The Government of Bangladesh (GoB) has emphasized to establish Bangla as a leading language in computing at the global platform (BCC 2016). In order to achieve this, the government has taken initiatives through research and development to standardize various features of Bangla language and develop different tools, technologies and contents for making the tasks of using Bangla in ICT easy.

Literature review

Bangla is the first language of Bangladesh and over 230 million people throughout the world speak in this language (Lewis 2009). However, little research and development is performed in the field of enhancement of Bangla language in ICT. Rashel (2011) researched about the computational linguistics in Bangladesh. The first Bangla font was developed in the beginning of 1980s in the Windows environment. Bangla font 'Shahid Lipi' was introduced in the computer system in 1986. 'Bijoy' Bangla software created a new dimension to the world of computing. However, the lack of compatibility of Bangla font in different systems was a big issue on that time (Rashel 2011). Unicode brings new light to solve the problem in Bangla computing in the late 1990s (Islam 2009). In 2004, Bangladesh Computer Council (BCC) came up with a national Bangla keyboard mapping. Around this time, BRAC University conducted some research projects that deal with Bangla language processing (Rashel 2011).

In 2016, the Government of Bangladesh (GoB) took significant initiatives in enhancing Bangla language in ICT and made it comparable with international level. Bangladesh Computer Council (BCC) conducted feasibility study on this initiative. The study gathered information from 1138 e-questionnaire responses from people in 7 divisions, from 82 key informant interviews, and from desk research. The study found the following challenges leading to comprehensive use of Bangla in ICT:

- Lack of any main / sub language corpora;
- In order to digitize and create searchable large meta data documents;
- Language input systems in computer is not updated;
- No language / sublanguage structural representation;
- Missing links between conventional ICT language data and current ICT driven language initiatives;
- Scattered initiatives of main and sub language standardization;
- Computational approaches and analysis of languages;

- No communication platform or tools has been developed to generate automated translation system for internationally interested researcher and common people;
- Extremely poor attention given towards physically handicapped especially visually impaired person;
- Deep computational analysis of language approaches;
- Absence of basic language tools from where our ICT entrepreneurs or freelancer can provide customized solutions to internationally established companies;
- No Multilanguage approaches has been taken so far to communicate our country's profiling in various areas towards multiple nation citizens;
- Except for one or two tribal languages, no other languages have their own computer input system;
- Absence of participation in international language interoperability system due to lack of appropriate tools of our languages.
- Though the world have taken necessary approaches for their own languages Bangladesh have failed to cope up with rest of the world because of computational linguistic initiatives (Bangladesh Computer Council 2016).

In order to solve the above mentioned challenges Bangladesh Computer Council (BCC 2016) have proposed 16 initiatives for enhancement of Bangla language in ICT through Research and Development. The following activities and approaches are required for improving current situation:

1. Development of Complete Bangla Corpus: The Bangla corpus will ensure correct pronunciation of the words of Bangla language along with all the pronunciation details and specification of the patterns of formatting.
2. Improvement of Bangla Optical Character Recognition (OCR) and integrating hand writing recognition system: The OCR will be able to identify both typed and hand written Bangla document. This has many applications including fast digitizing of old and rare Bangla books, handwritten documents (puthi, dolil, etc)

that save a lot of time compared to manually typing all the words in those books or documents.

3. Development of Bangla speech to text (STT) and text to speech (TTS) software: Bangla STT and TTS will reduce the cost and time for typing a document. These applications are well known as assistive aides for people who experience dyslexia, reading challenges, or visual impairment.
4. Improvement of the National Keyboard (Bangla): Till now, the use and application of National Bangla Keyboard is very limited. In order to make it more effective, its shortcomings will be identified and necessary steps will be taken for improvement.
5. Development of Bangla style guide: Bangla language has the written and spoken forms of the language. Two styles of writing, involving somewhat different vocabularies and syntax, have emerged. Regional languages have major differences in phonetics and vocabulary usage, and, to a lesser extent, morphology and syntax. So, pronunciation, vocabulary, syntax and style are needed highly for standardization.
6. Development of the Bangla font interoperability engine: In order to make computer applications in Bangla, it is necessary to establish a standard for encoding the data that is interoperable across different computing platforms. Based on the standardization some font encoding converters will be developed as font interoperability engine.
7. Development of Bangla CLDR resource and submit to Unicode: The Unicode Common Locale Data Repository (CLDR) provides key building blocks for software to support the languages of the world, with the largest and most extensive standard repository of locale data available. This data is used by a wide spectrum of companies for their software internationalization and localization, adapting software to the conventions of different languages for such common software tasks.

8. Development of Bangla Spell & Grammar checker: A good spell and grammar checker will help us to proofread our texts and make sure that they are accurate and free of mistakes.
9. Development of the Bangla Machine Translator (MT): Machine Translator is basically the use of software program which is specially designed to translate both verbal and written texts from one language to another.
10. Development of screen reader software: A screen reader is a software application that attempts to identify and interpret what is being displayed on the screen. This interpretation is then re-presented to the user with text-to-speech, sound icons, or a Braille output device. Screen readers are a form of Assistive Technology (AT) potentially useful to the people who are blind, visually impaired, illiterate or learning disable.
11. Development of software for disable people: Computers, websites, and software are always searching to improve their usability for consumers. Accessibility by all users is always a very important issue. Some Bangla software are required that can read the content of webpages aloud and braille keyboards and also for dumb people.
12. Development of sentiment analysis software in Bangla: Sentiment analysis refers to the use of natural language processing, text analysis and computational linguistics to identify and extract subjective information in source materials.
13. Developing an integrated service platform: This component will provide language tools including automatic transcription, translation and interpretation. It will provide streaming technology that can convert speech from lectures, meetings, and telephone conversations into the text in another language.
14. Translation of most popular/used sites into international language: Many websites have faith in the power of the English language to reach out to all countries and populations. However, in countries where proficiency in English is widespread, there is a marked preference for content in the mother tongue.

15. Standard keyboard for ethnic minority languages: Ethnic minority groups of Bangladesh have their own languages and letter. Their letter can be incorporated to Unicode and the keyboard will be built.
16. Incorporating Bangla IPA fonts and software to world language linguistic list: The International Phonetic Alphabet (IPA) is an alphabetic system of phonetic notation based primarily on the Latin alphabet. It was devised by the International Phonetic Association as a standardized representation of the sounds of oral language. Bangla International Phonetic Alphabet will be a system of Phonetic transcription, based on the Bangla alphabet, to adapt the IPA to the Bangla script (Bangladesh Computer Council 2016).

Problem Statement

In recent years information technology development process has shifted from English based into multilingual globally distributed process. Multilingual and multicultural aspects of technological advancement are very crucial in global software development at present (Abufaredah and Magel 2010). Moreover, many socio technical barriers affect technological collaboration including linguistic distance. The primary solutions to overcome these barriers include synchronous communication technology, and knowledge sharing infrastructure (Noll et. al 2010). Again, communication gap leads to failure to meet the expectations of customers in developing and releasing successful software products to the market (Bjarnason et al. 2011). The use of mother language through internet is also increasing due to high demand of internet-based applications (Ali and Ripon 2013). Therefore, the development of ICT tools for using Bangla is also required to remove the barrier to use computer in the large scale for the common people of the country.

Objectives

- To learn about the activities to enhance Bangla language with the application of ICT in Bangladesh
- To understand implementation mechanism of enhancement of Bangla language in ICT
- To assess the ongoing initiative for enhancement of Bangla language in ICT

Research questions

- To what extent this initiative enables the government of Bangladesh to promote Bangla language applying ICT?
- How implementation mechanism is designed to attain the objectives of this initiative?

Rationale of the study

Standard Bangla tools are not available for world class Bangla computing. Considerable amount of research and development is needed to develop Bangla tools for Bangla computing and to make Bangla compatible for new and emerging technologies. Constructing research and development for Bangla in ICT will definitely create more opportunity to use Bangla at international standard. People will be able to learn about the new technologies regarding the use of Bangla in ICT.

Conceptual framework:

National ICT policy-2015 highlights the development and promotion of ICT sector to ensure its effective use to achieve national development goals by 2021 and 2041. This policy promotes human resources development and ensures public services through public and private sector participation (Information and Communication Technology Division 2015). Enhancement of Bangla language in ICT through research and development initiative will focus to build up some ICT tools to ease the tasks of using Bangla in ICT. This will ultimately increase education quality. The researcher has been posted to Bangladesh Computer Council. Therefore, the study will be conducted conveniently and intensively during data collection. The focus will be on the challenges

of implementing mechanism to enhance Bangla language in ICT. The study will also assess the ongoing initiatives for enhancement of Bangla language in ICT.

Methodology

This study has emphasized on the qualitative approach to find out the research objectives. The study has aimed at analyzing the ongoing initiatives taken so far by the Government of Bangladesh (GoB) to promote Bangla language in ICT application. The study has also focused on the design of implementation mechanism to attain the objectives of this initiative. Qualitative data have been collected both from primary and secondary sources so as to answer the basic questions of this research. Primary data are from the stakeholders of Enhancement of Bangla Language in ICT through Research and Development (EBLICT) Project under Bangladesh Computer Council (BCC). Secondary data are from journal articles, research papers, books, etc. As a result, data have been collected through a combination of research tools including questionnaires, interviews, written documents (both published and unpublished material) and face-to-face interviews with relevant stakeholders, officials and experts. Primary data have been collected through key Informant's Interview (KII). The relevant stakeholders are from the members of Project Steering Committee (PSC), Project Implementation Committee (PIC), Expert Committee (EC), Proposal Evaluation Committee (PEC) and Senior Consultants of EBLICT Project.

A questionnaire survey has been performed with both open and close ended questions. Moreover, interview has been taken in details in the area of implementation challenges, procurement processes, and manpower resources and so on. The respondents are from the representative of Computer Science and Engineering (CSE) Department, both from Dhaka University and Bangladesh University of Engineering and Technology (BUET), representatives from Bangla Academy, International Mother Language Institute, CSE Department of Shahjalal University, Socio-economic Division of Planning Commission, Implementation Monitoring and Evaluation Division (IMED), Development wing of Information and Communication Technology (ICT) Division, Department of Bangla of

Jahangirnagar University and two Previous Project Directors and current Project Director of EBLICT Project. Some of them are involved with the decision making process and some are engaged with implementation of EBLICT Project.

The interview questions have been made structured and relevant with research questions. All data has been collected from 18 to 20 August, 2019. Findings have been presented in different subsections. These subsections are related with implementation mechanism and effectiveness. Each of these subsections discusses how the information of the interviewees has helped to answer our research questions. However, the study is only limited to Bangladesh Computer Council (BCC). BCC has the responsibility to promote the application of ICT. As a result, overall enhancement of Bangla language in ICT through research and development initiatives will not cover in this study.

Findings

The design of Terms of Reference (ToR) of sixteen components was not included in the Development of Project Proposal (DPP). Lack of budget was the main reason for not doing the design of ToR in the feasibility stage according to 50% respondents. The shortage of time as well as the plan to do the design of ToR in the implementation stage were the other two reasons mentioned by 25% respondents in each case. The design and approval of ToR required a long time due to various reasons. Usually the Expert Committee (EC) approves ToR for EBLICT project. The members of EC are technical persons from Computer Science and Engineering (CSE) Departments of different Public Universities, representatives from Bangla Academy, International Mother Language Institution, ICT Division, Bangladesh Computer Council (BCC) and Bangladesh Association of Software and Information Services (BASIS). Majority of the respondents believed that technological challenges were the main reason behind the requirement of long time for ToR approval. Other respondents opined that lack of human resources in Bangladesh and budget allocation were the other two reasons for delaying approval of ToR.

There are various types of implementation challenges of the development of Bangla language in ICT. As reported by 37.5% respondents, the relevant stakeholders had the lack of experience to develop the different components of the project. However, another 62.5% interviewees believed that Bangladesh had stakeholders with experience to develop these components. Majority of the respondents (58%) opined consulting firms were not well prepared for Artificial Intelligence (AI) based software. Some of the respondents (25%) emphasized that testing plan and performance metrics of different components were abstract. Others (17%) believed that standardization dependency was a barrier for implementation.

Moreover, different types of challenges exist in procurement of services. Majority (50%) of the respondents said that the scope of procurement was higher than the resources of the project. Some (25%) of the interviewees thought that software procurement should be dedicated to the project team rather than selection of companies for development. Others (25%) believed that the salary of procurement specialist was not justified in terms of current market price. Selecting appropriate consulting firms is another challenge. Respondents from evaluation committee believed that technical documents were not well prepared. Some respondents believed that submission of unauthentic documents was a concern in the selection process. Again, verification of financial papers was required in the selection process by other respondents.

Again, slow implementation of the project was due to several reasons. According to 37% respondents, lack of the state of the art technology for Bangla was a reason behind this slow implementation. 25% respondents believed that software development was an in house development process rather than procurement. Again, 25% interviewees opined that software development through service procurement was not familiar to the companies yet. Only 13% respondents believed that even after the final evaluation approval process for selecting a company was not very easy. Furthermore, 42% of the respondents viewed the decision of top management to be very slow. 25% of the

interviewees opined that top management decision was as usual. The top management decision was quick and slow mentioned by 16.5% respondents in each case.

There was weakness in the feasibility study and preparation of DPP due to lack of time and funding according to the respondents. The activities mentioned in the feasibility stage have been updated in the preparation of ToR stage. Majority of the respondents told that software procurement was infrequent to the persons involved in preparing DPP. Others said that the time was given less for service procurement in order to make the approval process of DPP smooth. However, majority of the respondents viewed the approval process of DPP to be 'extremely difficult and lengthy'. Some of the respondents told the DPP approval process was 'difficult and lengthy'. None of them mentioned that the approval process of DPP was either 'easy and normal' or 'automatic and quite easy'.

Besides these, in order to run the project smoothly the appointment of PD is crucial. Majority of the respondents believed that it took three months for joining the first PD of the project. Moreover, there were frequent changes of this position. The first PD remained in this position for only four months and second PD stayed for one year. The current PD is running the project for the last one year and one month. Moreover, relevant background of the PD was also emphasized by the respondents.

In order to achieve the sustainability of the project, majority of the respondents believed that sustainable model would be designed for making the outcomes sustainable. Majority of the interviewees believed that integrated platform would be an option for sustainability. Other respondents believed that a dedicated server would be hosted at National Data Center (NDC) for sustainability. In addition, the stakeholders will be benefited in different ways. Majority of the respondents believed that these initiatives would provide access to digital world with AI. Some of the respondents believed that these initiatives would remove the barrier of using Bangla as medium of communication due to localization. Others believed that these initiatives would easily accessible of software for marginal people.

Implications and recommendations

All of the respondents are involved with different relevant committees to enhance Bangla language in ICT through research and development initiative. They have vast experience ranging from ten to thirty years in their respective field. Moreover, majority of them possess good academic background with at least one Master degree from abroad. Both open and close ended questions are included in the questionnaire survey. Moreover, details interview have been taken in the area of implementation challenges, procurement aspects, and human resources. The design of ToR was not incorporated in DPP. ToR includes the specification of each component that is the required for taking the implementation process forward. Even after the approval of DPP, it took a long time to design ToR and get the approval from EC. Technological challenge was the main reason for the delay of designing the ToR. We have a small number of human resources with appropriate expertise in combination of Artificial Intelligence (AI) and Linguistics to design ToR of the components. Again, the budget allocation for designing the ToR was not included in DPP. Therefore, there was delay for getting administrative approval of preparing ToR. Therefore, proper allocation of budget is required considering the importance of designing ToR by the appropriate technical skilled persons at the preparation stage of DPP.

Moreover, it is observed that consulting firms are not well prepared to develop AI based software. Our consulting firms have the experience of database software. But majority of these firms are struggling to find suitable technical persons who have knowledge on artificial intelligence, natural language processing, big data etc. These expert persons are required to develop AI based software. As a result, some of the consulting firms hire expatriate Bangladeshis from the developed countries who have experience on the relevant field. Again, these consulting firms take the assistance from teachers of CSE and linguistics department from different renowned public universities in the country. Therefore, appropriate capacity building is required for the software firms by taking support with the technical person having proper expertise. Again, majority of the

components requires testing according to performance metrics. But the testing plan and performance metrics were not specific. Consequently there would be a challenge in the testing phase. In addition, some of the components require standardization. Implementation of some other components are dependent on this standardization. This standardization should be done in a way so that implementation of other components do not require to wait for this. Therefore, proper mechanism is needed to be developed for testing and standardization of the developed components.

Furthermore, the scope of procurement of sixteen components was higher than the resources of the project. The relevant project does not have enough manpower to do the procurement activities quickly. There are only three junior consultants, three mid-level consultants and one senior consultant work in the project team. The post of one important senior consultant is vacant for two years. After that this post has been broken down into two posts and makes two posts of mid-level consultants. In addition, there are two stages involved in service procurement. At first, advertisement is published in the newspaper for submitting Expression of Interest (EoI). Then the consulting firms are short listed after the evaluation by Proposal Evaluation Committee (PEC). Four to seven firms can be short listed. Then the Request for Proposal (RFP) is sent to the concerned firms. These firms submitted technical documents along with financial documents. PEC requires support from technical sub-committee for evaluation of technical proposals of consulting firms. Quality and Cost Based Selection (QCBS) method is used for the procurement of services. After the evaluation of both technical and financial documents consulting firm is selected. Therefore, the whole process for service procurement requires a lot of time. After the start of EBLICT project, only seven out of sixteen components have been evaluated completely and among them only three components have been given work order whereas Re-EoI has been issued for other four components. On the other hand, nine components were in the evaluation stage of technical and financial proposals. It has been observed that in a normal scenario on an average six months are required to select the consulting firms and sign contract with the firms. As a result, some of the respondents

thought that software procurement could be dedicated to the project team. That means the project will select individual consultants to develop each component in comparison with the selection of consulting firms for development. Moreover, the salary structure of procurement specialist is not consistent with the existing market price. This is also a barrier for efficient procurement process. From the above discussion, it can be said that the proper quantity and quality of manpower is essential for efficient procurement process.

In addition, the consulting firms did not produce well prepared technical documents. At the same time, unauthentic documents were a concern in the selection process. Consequently appropriate expertise is required for the consulting firms to prepare technical documents. Again, financial papers required verification during the financial proposal evaluation. All the consulting firms are not habituated with the state of the art technology for Bangla. Re-EoI has been issued for three components due to failure of the consulting firms in the technical proposals of those three components. Again, majority of the consulting firms struggle with the AI based software procurement. These firms are not familiar with this procurement. Moreover, it is observed that the decision of top management requires long time to follow the administrative process.

Feasibility study and the preparation of DPP were not done professionally due to lack of sufficient time and budget. To incorporate any change in the DPP is a long process. It is observed that less than three months were used for preparing DPP whereas four months were required for the approval of DPP. It took another four months to incorporate the first amendments. The implementation stage suffers a lot due to the weakness in the feasibility study and preparation of DPP. Therefore, sufficient timing and funding should be given for well preparedness of these two stages.

PD is administratively responsible for efficiently managing the project. Each time a new PD is posted requires time to settle and understand the nature of the work. Consequently frequent changes in this position hampers the progression and timing of the works.

Therefore, it is necessary to appoint a PD for the full duration of the project. It is also an added advantage to appoint a PD with relevant background.

Moreover, sustainability is essential for any initiative. An integrated platform has been designed in one of the components for ensuring sustainability. It will integrate all the developed components in a single platform. In addition to that a dedicated server will be hosted at NDC for proper storage and backup. It can be concluded from the above discussion that the sustainability has been ensured through developing service platform and dedicated server. The stakeholders will be advanced with the access to digital world with AI. This will remove the barrier of using Bangla as medium of communication in the field of ICT. These initiatives will also be helpful for marginalized people like ethnic minority, visually impaired, illiterate or learning disable, dumb people, and people with reading challenges. Therefore, the stakeholders of Bangla language will have the access to digital world and marginalized people will be benefited as well.

Conclusions

The GoB has taken initiatives to establish Bangla as a leading language in computing at the global platform. Constructing research and development for Bangla in ICT is essential in this regard. This study assesses the ongoing initiatives taken so far by GoB. The study also analyses the implementation mechanism to attain the objectives of this initiative. Appropriate budget should be kept in the DPP for designing ToR. Capacity building is necessary for the software firms to prepare technical documents. Accurate quantity and quality of human resources are essential for effective procurement process. Adequate timing and funding are essential for effective feasibility study and preparation of DPP. PD should be appointed with relevant background and full duration of the project. EBLICT initiative is sustainable through establishing service platform and dedicated server. These initiatives will provide the stakeholders of Bangla language access to digital world. Marginalized people will be benefited from this initiative.

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Annexure:

Questionnaire

Before the approval of DPP:

- Q. 1 Do you think that there was enough time for feasibility study?
A. Yes B. No
- Q. 2: How much time was utilized for completing feasibility study?
..... Months
- Q. 3: Was the fund enough to complete feasibility study?
A. Yes B. No
- Q. 4: Why was the design of 16 components not done in the feasibility study?
A. Lack of Budget B. Planned to do in implementation stage
C. Time shortage D. Other
- Q. 5: Why was it not considered enough time for service procurement of 16 components in Development Project Proposal (DPP)?
A. Software service procurement is infrequent to us
B. Others: To make it feasible to approval authorities
- Q. 6: Process and time to approve DPP is-
A. Extremely difficult and lengthy B. Difficult and lengthy
C. Easy and normal D. Automatic and quite easy
- Q. 7: (A) Did the appointment of Project Director (PD) take long?
- Q. 7: (B) If answer becomes yes from 7 (A), please mention the duration.

After the approval of DPP:

- Q. 8: Why was the approval of Terms of Reference (ToR) of 16 components take long?
- A. Technological challenge
 - B. Lack of HR in BD
 - C. Budget allocation
 - D. None of the above
- Q. 9: Are the relevant stakeholders in Bangladesh not experience enough to develop these 16 components?
- A. Yes
 - B. No
- Q. 10: What are the challenges of procurement of services?
- A. Scope of procurement is higher than resources of project.
 - B. Software procurement should have dedicated and different process.
 - C. Salary of Procurement Specialist (PS) is not justified in terms of current market
 - D. All of the above.
- Q. 11: What are the implementation challenges?
- A. Consulting firms are not well prepared for AI based software
 - B. Testing plan and performance metrics are abstract
 - C. Standardization dependency
 - D. All of the above
- Q. 12: How will the stakeholders be benefited from this initiative?
- A. Access to digital world with AI
 - B. Remove the medium of communication as a barrier due to localization.
 - C. Easily software accessibility for marginal people
 - D. All of the above
- Q. 13: (A) Do you take any initiatives to make the outcomes sustainable?
- A. Yes
 - B. No
- Q. 13: (B) If yes please mention the initiatives.
- A. Integrated platform

B. Dedicated server hosted at National Data Centre (NDC) C. All of the above

Q. 14: What are the reasons for slow implementation?

- A. Lacking of state of the art technology for Bangla
- B. Software development is a in house development process rather than procure.
- C. Service procurement especially software procurement is not familiar to all yet.
- D. Approval process is not so easy.

Q. 15: What are the main challenges of selecting consulting firm?

- A. Technical documents are not well prepared
- B. Financial papers require verification
- C. Submission of un-authentic documents
- D. All of the above

Q. 16: Are the decision of top management taking very long?

- A. Quick B. As usual C. Slow D. Very slow