Development of a Real Time Online Procurement Method to Reduce Cost and Time in Business for Central Bank of Bangladesh

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Abstract

E-procurement is beginning to offer opportunities for facilitating the traditional procurement processes in Bangladesh Bank (The Central Bank of Bangladesh) and identified as an area of B2B e-commerce where information system-enabled transformations of business processes and practices are likely to yield significant benefits. Both supplier and purchaser sides in the construction supply chain make use of e-procurement approaches as these facilitate the procurement process by providing opportunities for better communication and coordination and expanding the marketplace for both parties. With e-procurement, the purchaser side holds the advantage of reaching more suppliers and products of competitive cost, while suppliers have the advantage of reaching more customers in the online markets. Physical movement of bidders as well as physical document transformation (hard copy transfer) is significantly reduced in the proposed system. It was discovered that sorting bid-sheets manually takes a lot of time, resource constraining and is subject to a lot of fraud as well as bureaucratic tendencies. Specifically, it was discovered that sorting and ranking results arising out of electronic bid evaluation is quicker, enhances the evaluation process and it aids decision making. In other words modeling the tendering process as the fabric for electronic procurement plays a vital role in demonstrating the viability of e-procurement adoption in Bangladesh. It was concluded that electronic tender submission and evaluation systems can improve the procurement process significantly, if they are well adapted, they can save time in terms of bid submission and evaluation. The paper provides a real time online procurement method to reduce cost and time in business for different public and private organizations in Bangladesh specially in Bangladesh Bank. The paper concludes by giving the remedy of barrier for using e-Procurement and providing an analysis of the survey results of different public organizations that are currently using e-Procurement method. Lastly, if such demonstrative prototypes are implemented, they can adaptively interface with existing systems, hence attaining the government long term goal of e-governance.

Keywords
Barrier, e-Procurement, e-Commerce, Survey, Security Functions, Integrity, Digital Signature Confidentiality

1. Introduction
The transition from conventional government services to e-government services is becoming an international trend in various parts of the World [1]. Tendering, a method of entering into a sales contract, has been regarded as an effective contracting method to achieve favorable outcomes for both public and private entities. It is a complex business process and generates a series of contractually related legal liabilities. Substantial construction and engineering contracts are entered into through the tendering process [2]. In almost every country in the world today, annual government purchasing or procurement amounts almost one-fifth of Gross Domestic Product that is a significant amount of money [3].

In June 2004 the World Bank implemented a methodology on how to measure the performance and the standard of national procurement systems as well as follow up on how such standards develop over time (World Bank 2004) [4]. The procurement standards set aimed at providing a roadmap for development and improvement of national public procurement systems in each of the client countries.

Currently, many e-business systems are built by simply replacing a paper based traditional business process with the electronic medium. It is a simple mirroring process and is also the most common method for converting traditional business processes to an electronic business format. This mirroring process, though creating a boom in e-tendering systems around the world has left trails of security traps in current e-tendering systems [5-10]. An e-tendering system without adequate security creates undetected legal challenges [14] which may place both vendor and clients outside the existing legal framework.

Lack of a well-structured, efficient procurement and tender evaluation information system constrains the value chain [12-13] asserts that corruption and gross malpractices in the existing procurement system in many countries manifest itself in the inside dealings, bribery, wrong computation of costs by evaluation teams leading to shoddy commodities and goods. Manual tender and procurement systems, if well managed, could be efficient but are subject to a lot of influence and fraud from third parties with stakes in tenders being awarded. Information processing arising out of tender-document evaluation usually takes a longer time and is very resource restricting.

It was discovered that sorting bid-sheets manually takes a lot of time, resource constraining and is subject to a lot of fraud as well as bureaucratic tendencies. Specifically, it was discovered that sorting and ranking results arising out of electronic bid evaluation is quicker, enhances the evaluation process and it aids decision making[15-16]. In other words modeling the tendering process as the fabric for electronic procurement plays a vital role in demonstrating the viability of e-procurement adoption in Bangladesh. It was concluded that electronic tender document evaluation systems can improve the procurement process significantly, if they are well adapted, they can save time in terms of bid evaluation. Secondly, tender management systems can be implementable in government institutions if there is management buy in. Thirdly, although implementing such systems requires a big chunk of the institutional budget, it is worth the investment compared to an off the shelf system. Lastly, if such demonstrative prototypes are implemented, they can adaptively interface with existing systems, hence attaining the government long term goal of e-governance and this research will concentrate on issues of design in secure real time e-tendering processes converting a traditional business process to its secured electronic format.

Therefore reforms in government's procurement and tendering management information systems and processes are becoming critical in response to increasing demands for greater transparency and accountability in the management of public finances.

2. e-Business and e-Government and e-Procurement

The start of the 21st Century has seen a strong trend towards e-business, including e-government, e-commerce, and other e-services over the Internet, the worldwide network of networks. Public organizations spend about half their budgets on various categories of procurement, ranging from major acquisitions to routine office supplies hence making procurement an activity that needs smart management. This smart management can be provided by e-procurement [17].

Public procurement refers to the purchase of commodities and contracting of works and services, if such acquisition is affected with resources from state budgets or revenue received from economic activities of the state. Hawkins [19] define e-procurement as a process that uses the Internet and Internet technologies to support the identification, evaluation, negotiation and configuration of optimal groupings of trading partners into a supply chain network which can then respond to changing market demands with greater efficiency. Balanced Scorecard [17-18], defines e-Procurement as the adaptation of electronic methods in every stage of the purchasing process from identification of requirement through to payment, and potentially to contract management.

The procurement process brings together government requirements, bidders and hence goods and services. However, identification of the right people for delivery of good and services goes through the tender evaluation process. For the whole process to succeed there is a need to ensure that the foundation is well laid. This can be in terms of identifying the right people for the right job arising out of government needs at a given point in time. Technologically speaking, this is in terms of e-sourcing (e-tendering). This research concentrates on this focal point of e-procurement.

Despite the bottlenecks surrounding e-procurement implementation, there is a lot that can be gained in this scenario. Bhatnagar [20-21], maintains that e-procurement enhances public sector efficiency in various areas: Modernization ,

Efficiency improvements (the way people work), Improved commercial relationships with suppliers, reduced costs for suppliers dealing with government, Opens up the government marketplace, Improving departments' ability to manage their supply chain more efficiently among others.

There are different types of tendering methods running in Bangladesh Bank, like RFQ(Request for Quotation , RTM (Restricted Tendering method) and OTM(Open tendering method). In proposed e Tendering system all of the above tendering methods can be easily implemented.

There are some objectives of e Procurement system.

- Enable tendering systems to be used online
- Give a much wider reach to tenders
- Provide privacy and confidentiality to the documents within the tenders
- Keep the information regarding vendors confidential
- Reduce the human interface as much as possible by allowing the vendors to provide information and quote online

In Buyer end there are some activities:

- A buyer logs in to the system using his digital certificate
- The buyer creates and/or uploads a tender document
- The buyer uploads his public key for vendors to encrypt the data with
- Only the buyer's digital certificate can decrypt the content uploaded by the vendors

In Vendor Side there are also some activities:

- A vendor logs on to the system using his digital certificate
- The vendor creates and/or uploads a tender document
- The vendor uses the buyer's public key to encrypt data and digitally signs the content
- The digital signature and data is verified before storing it into the server
- All digitally signed content is time stamped

3. Architecture of the Proposed System

The basic units of the proposed system can be divided into 4 parts:

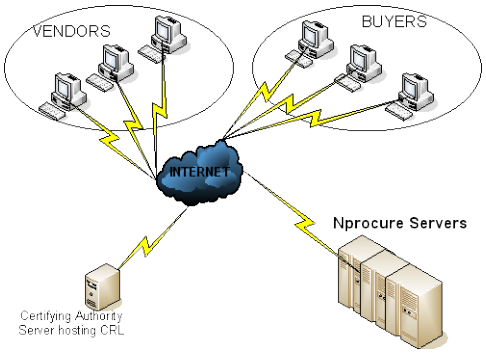


Figure 1: E-Procurement Diagram

For successful performing of e-Tendering process there are two basic entities. One is Bangladesh Bank user another is Bidders or tenderes part. Each entity must log on to system before performing any operation.

In Buyers side at first tender is invited and online system is created for bid offering to the buyers. There are some subsystems in this system. Bidders need to make a registration entering their necessary information in the system. After inviting and creating the tender then bidders can log on to the system using the user id and password and can submit their bid into the system. All data and corresponding information is stored in database as cipher text. After a finite period tender is opened by a group of member in buyers end and sent to tender evaluation process.

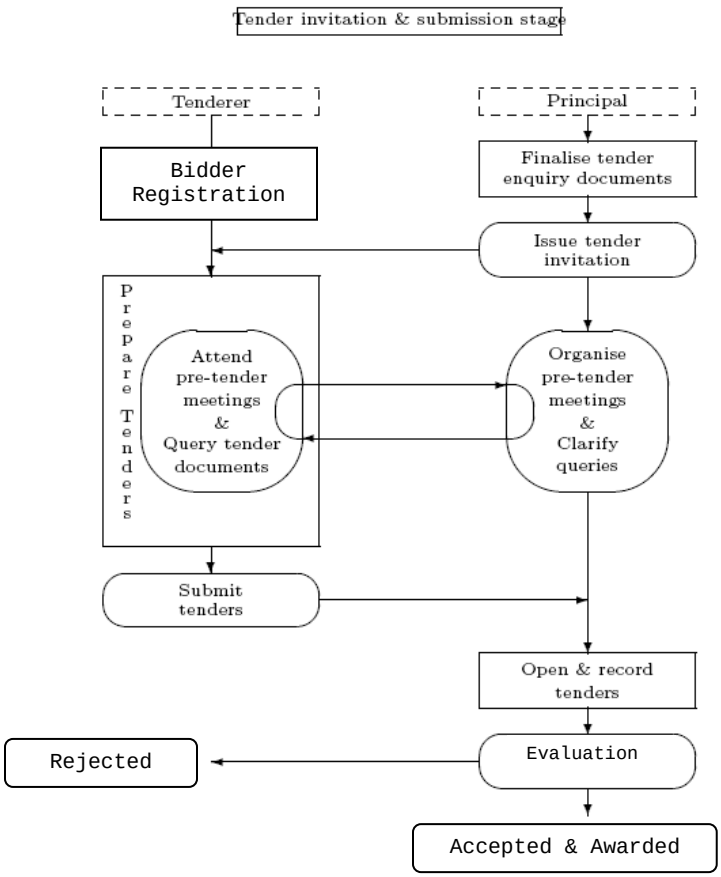


Figure 2: Proposed e Tender Model

Steps of proposed e Tendering Model:

1. User Need for Product or Service
2. Purchase Approval and Supplier Evaluation
3. Bidding, Negotiation, and Supplier Selection
4. Purchase Approval
5. Release and Receive Purchase Requirements
6. Continuously Measure and Manage Supplier Performance

4. Operation of the System

There are mainly two types of users of the system. One is Bangladesh Bank user another part is Bidders those who are interested to bid their tender. At first one tender is created and published for bidders with a certain closing and opening date and time by Bangladesh Bank user. Closing time means when the tender will be close from bidders. Opening time is a particular time when or after that time a specific tender may be opened. Bidders can submit their schedule and corresponding documents through the portal within closing time. Tender can be opened by opening committee directed by the chairman of opening committee. After opening the tender then the bidders also can see their bid through their user ID and password.

5. Artview of the Proposed System

The system is developed using HTML, PHP, MySQL, Java etc. tools. The system is tested for several months and after getting acceptance from the Bangladesh bank users and from the Bidders the system is now in GO Live operation. About 400 tenders already invited and submitted through this system. Some international tenders are also

performed with the system. Although the system is developed only for Bangladesh bank, it is now under operation in some other government organizations in Bangladesh.

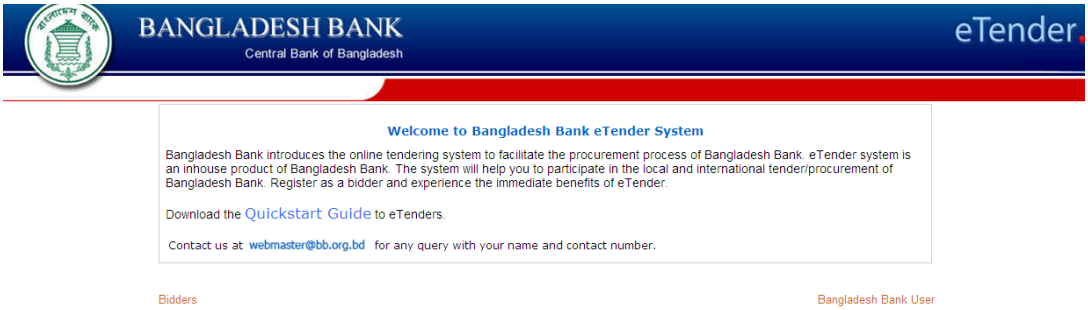
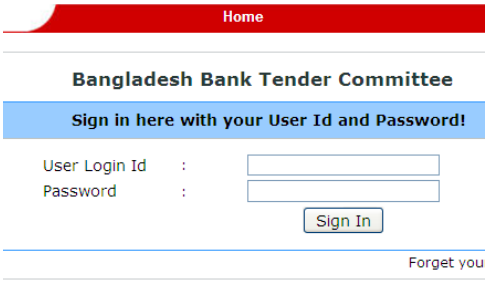
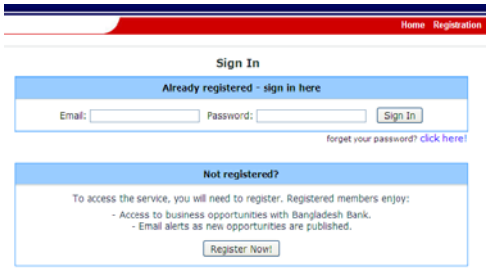


Figure: Home page of the proposed system



a. Bangladesh bank Tender Committe



b. Bidders

Figure 4: Log on Screen for Bangladesh bank Tender Committe and Bidders

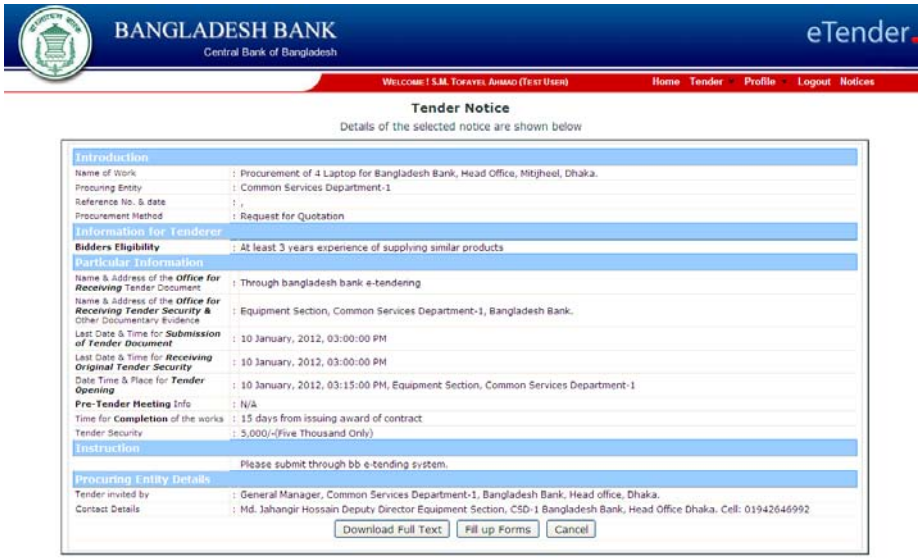


Figure 5: Tender notice (It can be seen after log on as a bidder)

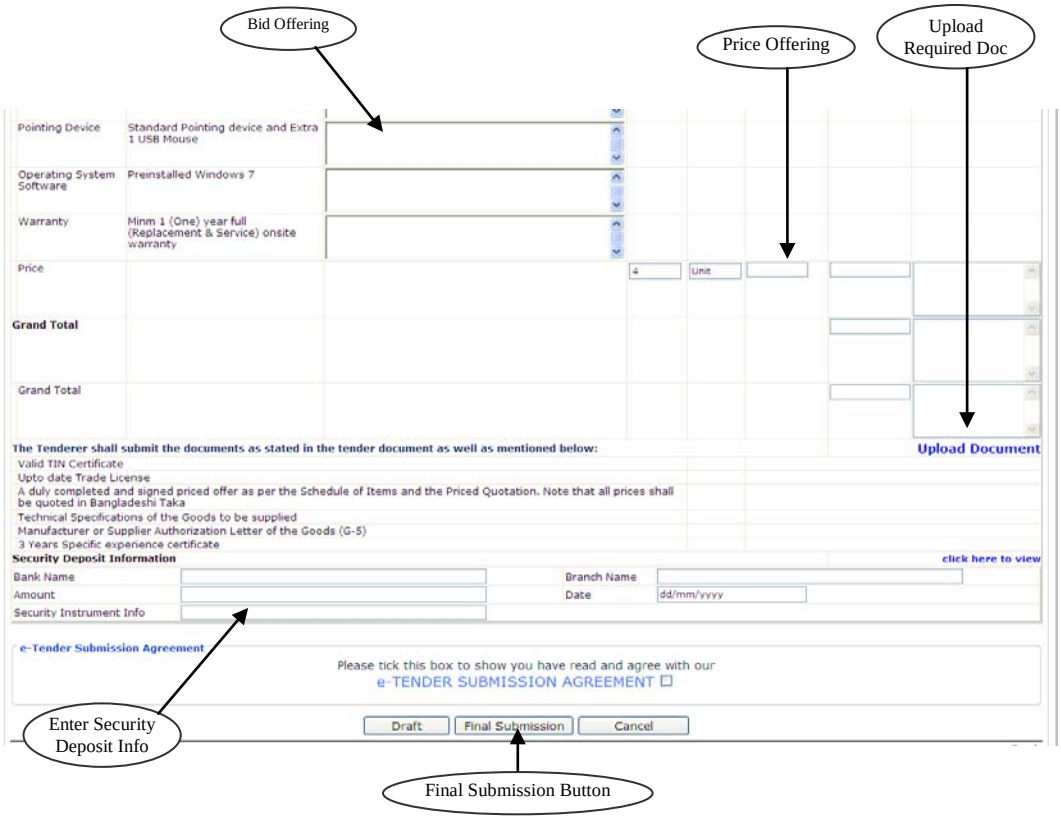


Figure 6: Tender Submission sheet

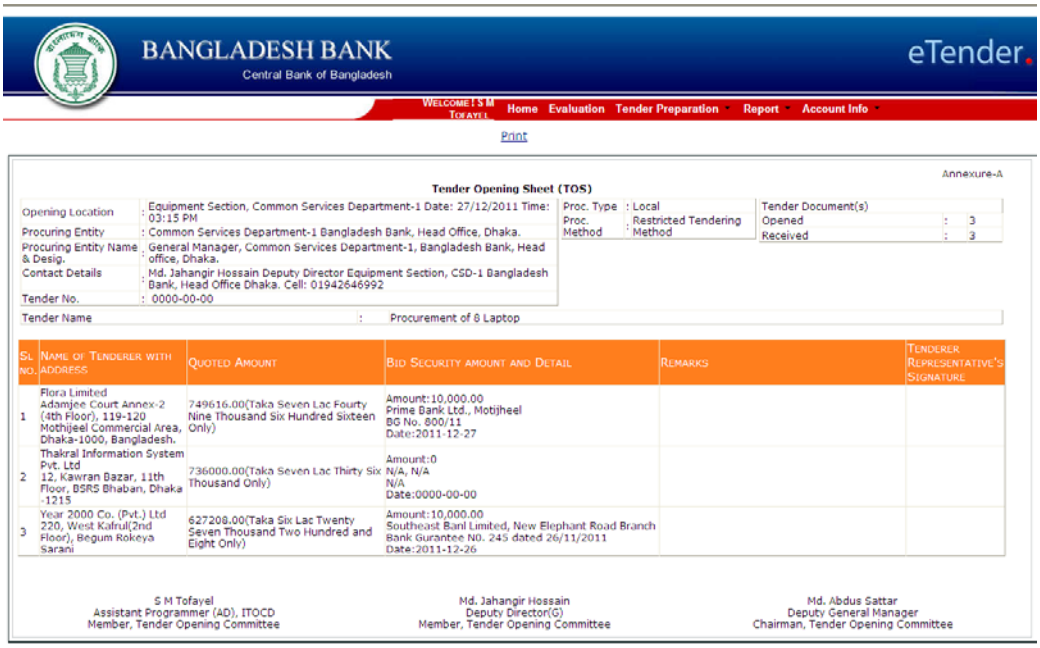
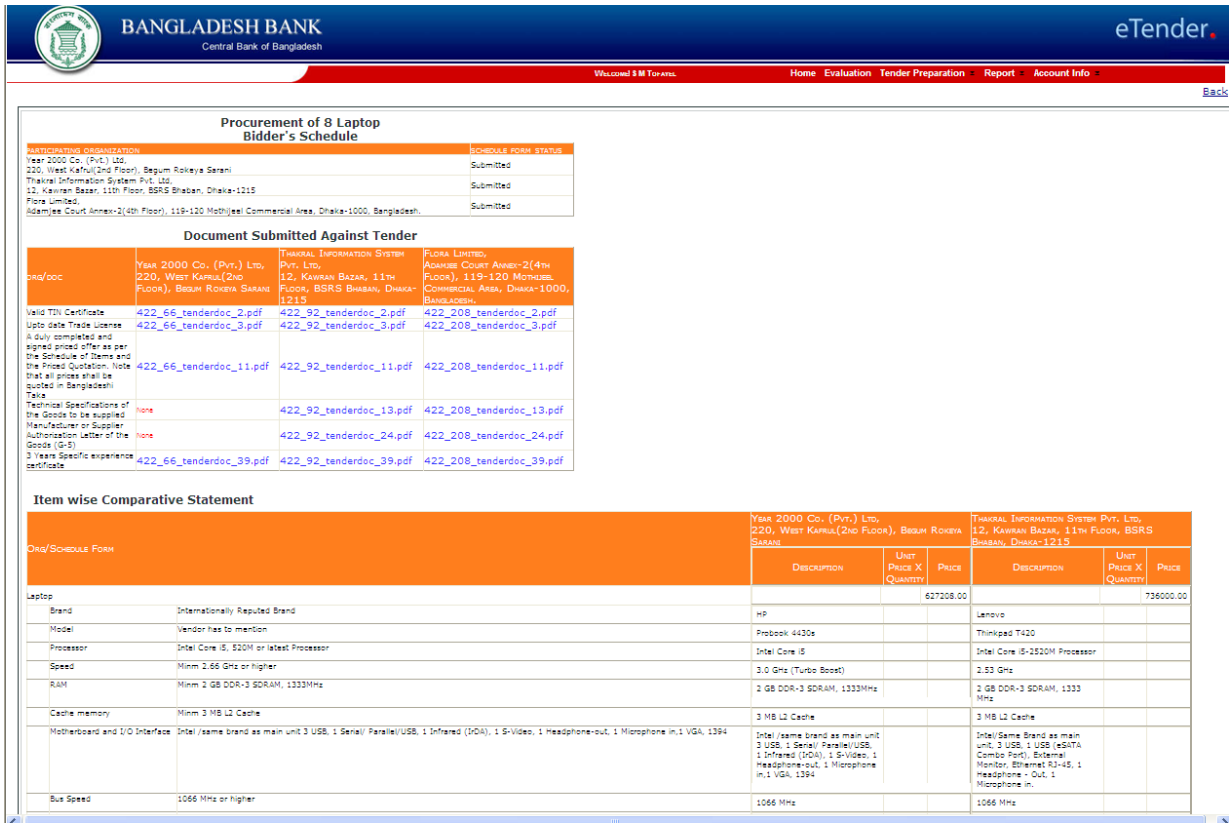


Figure 7: Bid Opening Sheet



BANGLADESH BANK
Central Bank of Bangladesh
eTender.

Welcome S M Tofazal
Home Evaluation Tender Preparation Report Account Info

Back

Procurement of 8 Laptop
Bidder's Schedule

Participating Organization	Schedule Form Status
Year 2000 Co. (Pvt.) Ltd. 220, West Kafrul(2nd Floor), Begum Rokeya Sarani	Submitted
Thakral Information System Pvt. Ltd. 12, Kawran Bazar, 11th Floor, BSRS Bhaban, Dhaka-1215	Submitted
Flora Limited. Adamjee Court Annex-2(4th Floor), 119-120 Mothijeel Commercial Area, Dhaka-1000, Bangladesh.	Submitted

Document Submitted Against Tender

Org/Doc	Year 2000 Co. (Pvt.) Ltd, 220, West Kafrul(2nd Floor), Begum Rokeya Sarani	Thakral Information System Pvt. Ltd, 12, Kawran Bazar, 11th Floor, BSRS Bhaban, Dhaka-1215	Flora Limited, Adamjee Court Annex-2(4th Floor), 119-120 Mothijeel Commercial Area, Dhaka-1000, Bangladesh.
Valid TIN Certificate	422_66_tenderdoc_2.pdf	422_92_tenderdoc_2.pdf	422_208_tenderdoc_2.pdf
Upto date Trade License	422_66_tenderdoc_3.pdf	422_92_tenderdoc_3.pdf	422_208_tenderdoc_3.pdf
A duly completed and signed priced offer as per the Schedule of Items and the Priced Quotation. Note that all prices shall be quoted in Bangladeshi Taka	422_66_tenderdoc_11.pdf	422_92_tenderdoc_11.pdf	422_208_tenderdoc_11.pdf
Technical Specifications of the Goods to be supplied	None	422_92_tenderdoc_13.pdf	422_208_tenderdoc_13.pdf
Manufacturer or Supplier Authorization Letter of the Goods (G-5)	None	422_92_tenderdoc_24.pdf	422_208_tenderdoc_24.pdf
3 Years Specific experience certificate	422_66_tenderdoc_39.pdf	422_92_tenderdoc_39.pdf	422_208_tenderdoc_39.pdf

Item wise Comparative Statement

Org/Schedule Form		Year 2000 Co. (Pvt.) Ltd, 220, West Kafrul(2nd Floor), Begum Rokeya Sarani			Thakral Information System Pvt. Ltd, 12, Kawran Bazar, 11th Floor, BSRS Bhaban, Dhaka-1215		
		Description	Unit Price X Quantity	Price	Description	Unit Price X Quantity	Price
Laptop				627208.00			736000.00
Brand	Internationally Reputed Brand	HP			Lenovo		
Model	Vendor has to mention	Probook 4430s			Thinkpad T420		
Processor	Intel Core i5, 520M or latest Processor	Intel Core i5			Intel Core i5-2520M Processor		
Speed	Minm 2.66 GHz or higher	3.0 GHz (Turbo Boost)			2.53 GHz		
RAM	Minm 2 GB DDR-3 SDRAM, 1333MHz	2 GB DDR-3 SDRAM, 1333MHz			2 GB DDR-3 SDRAM, 1333 MHz		
Cache memory	Minm 3 MB L2 Cache	3 MB L2 Cache			3 MB L2 Cache		
Motherboard and I/O Interface	Intel /same brand as main unit 3 USB, 1 Serial/ Parallel/USB, 1 Infrared (IrDA), 1 S-Video, 1 Headphone-out, 1 Microphone in,1 VGA, 1394	Intel /same brand as main unit 3 USB, 1 Serial/ Parallel/USB, 1 Infrared (IrDA), 1 S-Video, 1 Headphone-out, 1 Microphone in,1 VGA, 1394			Intel/Same Brand as main unit, 3 USB, 1 USB eSATA Combo Port), External Monitor, Ethernet RJ-45, 1 Headphone - Out, 1 Microphone in.		
Bus Speed	1066 MHz or higher	1066 MHz			1066 MHz		

Figure 8: Bid Document with Comparison sheet and Submitted doc list

6. Security and Integrity

Bangladesh Bank e-tender system is a collection of users, electronic media, digital data and actions that can be performed, enabling those users to interact. The e-tendering security mechanism is the collection of mechanisms which either prevent the change, or detect and log when this change occurs. Users in BB the e-tender system are the Bangladesh Bank official and bidders. Electronic media are communication media and databases. The major actions involved in e-tendering are documentation, assessment, document handling and communications. Digital data is generated during the e-tendering process by user interaction with electronic media and digital data. For electronic tendering system the threats are inherited from two areas, traditional process and the introduction of electronic technology. Security mechanisms are the technical tools for enforcing security policies. In an abstract form the following security properties are achieved to ensure the business requirements in the e-tender system.

- Confidentiality
- Authentication and Authorization
- System Reliability

To support this, the following disciplines are adopted in BB e-tender system to ensure effective management:

i) System Administration

- The system administrator for the software is independent of the procurement process, that is, he/she is not involved in any tendering process.
- The software administrator and database administrator are different.

ii) Access Control

- Access to the system is restricted to ensure that only appropriate officers have access to the system and there is sufficient segregation of duties
- Every user has a unique user id and password.
- Access control applied on the tender category level
- Access control applied on the user type

iii) Accessibility

- System is available 24x7.
- Store error logs for any down time or difficulties experienced by bidder completing the e-tender.

iv) Tender Opening

- This will be undertaken by approved "Tender Opening Committee (TOC)", which shall mean the purchaser committee representing the client trusts. The system administrator of the software grants access permissions of TOC to the particular tender so that they can access the particular tender with appropriate access rights.

iv) Receipt, Safe Custody and Record

- Client side encryption is use for the financial/sensitive data and store that encrypted data into data base.
- e-Tender System stored the tender documents completed/uploaded on-line into a secure location with password protection until the closing date and or opening time if different.

v) Audit Log

- The e-tendering software includes a built in audit log to record all events such as logged users activities. The audit log is reviewed periodically and in case of any anomalies.
- An audit log records the offer documents received date and time.

Beside those secure deployment environment/infrastructure and close monitoring is the key protection of the system.

7. Comparison with the Manual System and Performance Measure

A comparison of the BB e-tendering system and the current manual System in operation has been undertaken by the General Managers of Bangladesh Bank Purchasing Entity to establish the differences in the processes and whether there would be any reduction in the existing level of control, afforded by the processes documented in Bangladesh Bank Procurement Regulation (BBPR) and Bangladesh Procurement Regulation (BPR). The analysis looked at the new controls, procedures, and risk areas facing the implementation of the new system.

BB e-Tender is a purpose designed system and was supported by Bangladesh Bank internal audit. The auditor concluded that the software satisfies BBPR and BPR requirements for objectivity.

Tendering is a method by which councils acquire goods and services and includes the following core activities:

- Tender Preparation ,
- Advertisement of tender,
- Delivery of tender documents to bidders,
- Registration of bidder to receive bid,
- Opening of responses,
- Evaluation of responses (up to creation of comparison sheet).

e-Tendering is the carrying out of the tendering process using electronic means, such as the internet based specialist e-tendering software applications. The tendering process should be efficient, cost effective and transparent. It enables suppliers in different geographic locations to be notified of an opportunity, to express an interest, to download tender documents and to submit a response. This promotes competition for the tender, and provides a process that is efficient for both the purchaser and bidder and a selection process that is transparent to bidders.

The traditional approach to tendering is often characterized as time consuming and expensive. The responses are held in a secure tender dropping ‘box’ and can only be viewed after the closing date has passed and at opening time. The main difference of adopting an e-tendering system is that tender documents are issued and received electronically and there are no hard copies to be opened by Bangladesh Bank. Although the new system will replace the majority of paper tenders, there will be instances where a minimal number of paper based system may be necessary.

The key benefits that will be achieved from introducing the e-tendering system are:

- Reduction in staff time and overheads,
- Reduction in cost and time for tenders advertisement
- Enhanced audit trail
- Avoidance of delays in opening of tenders.
- Save staff time and overheads to prepare comparison sheet.
- Reduction in Physical movement of opening and evaluation committee.

The main elements of overhead cost savings are printing, copying, paper, postage and stationery which will mostly be avoided because tender documents and tender responses will be issued /received electronically. This is also environmentally friendly since it reduces the use of paper. It is important to note that realization of these benefits is

dependent on certain cultural changes, such as the evaluation of tenders being performed through electronic media rather than tender responses being printed out for evaluation. Advertisements for the tenders are placed in newspapers and journals, generate publication costs. The e-Tender site is the area of the Bangladesh Bank's website used for issues relating to the procurement under way.

The traditional tendering process collect tender in hard copy, so that bidders accept printing, copying and delivery costs. Further, Bangladesh Bank has to copies of the tender responses for all member of evaluation committee. Tender responses have to be opened by tender opening committee and evaluation committee processed and data collated for comparison and evaluation from the responses. Tender evaluation meetings have to be arranged to evaluation together. But in the e-tender system received of tender response, preparation of opening and comparison sheet and all other formalities done electronically and all documents are available online so printing, coping, distribution etc. cost can be eliminated.

In addition to the savings and benefits for the Bangladesh Bank, the following benefits are also available for bidders are a single website gives potential bidders 24 hour a day access to view all tender opportunities. Additionally the e-Tender system will proactively email the interested bidder about the newly launched tender according to their interest list.

The traditional tendering system relies on transparency to achieve equity. Because of the need for confidentiality, the transparency of the tendering process is low. The confidentiality mechanisms can increase the public verifiability of information without revealing the content. The e-tendering system can increase public verifiability to enhance its transparency, thereby achieving greater equity and economy for the principal.

8. Conclusion and Future Works

It is required to carry out a thorough requirements analysis of the tender evaluation/awarding systems so that requirements can be exhausted. If all requirements are analyzed, implementation will be faster and easier. Based on the requirements elicited, there will be a need for a system design that details all the components of the system. This will augment sufficient system architecturing; hence accentuating customization of the application. There is no existing formula to direct a designer as to how to obtain adequate security requirements. It is an engineering process and relies on investigation of all possibly related issues such as legal and business risk. Therefore accumulating past experience and widening research areas into different business types are very important for future research. Industry application of this research can employ procedures to analyze other business process areas, such as securing internet property transactions, virtual markets and automated BB procurement activities. Future studies should consider expanding the eTENDER boundary to include other factors such as knowledge development. There is need for further research on how best to mine patterns out of data collected overtime in terms of bid-sheets. With this kind of investigation, it is envisaged that predictive decisions can be made given historical data hence embrace decision-support. It would also be interesting to do further research on technological impacts of institutional change in adapting new technology since there is always resistance to change especially when it comes to automation. As BB authority embraces e-government including e-commerce and e-business, it should move swiftly on formulating cyber laws to regulate use of this technology, such legislations should cover issues on e-procurement; electronic signatures, electronic contracting, customs and taxes, encryption, privacy, security, consumer protection and certificate authorities among others. Developing a customized product is essential in achieving customer satisfaction and in minimizing unnecessary functionality. Consequently, adapting prototypes such as the eTEnDEr to a full implementable system would play a leading role in structuring the procurement process in Bangladesh Bank.

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