

Report On
Role of Electronic Tendering (e-gp) for Procurement: A Study
on Comilla University

By

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This report submitted to the BRAC Institute of Governance & Development in partial fulfillment of the requirements for the degree of Masters in Procurement and supply Management

BRAC Institute of Governance & Development
Brac University
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DECLARATION

It is hereby declared, this report submitted is my own original work while completing degree at Brac University. This report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate reference. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution. I also assure you that I have acknowledged all main sources of help.

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LETTER OF TRANSMITTAL

Md. Mosta Gausul Hoque
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Subject: Submission of report for in partial fulfillment of the requirements for the degree of Masters in Procurement and supply Management.

Sir,

I am pleased to present this report on **Role of Electronic Tendering (e-gp) for procurement: a study on Comilla University** for the fulfillment of the **Masters in Procurement and supply Management**. This is to inform you that I had the opportunity to closely work with the procurement team and other departments at Comilla University (CoU). It has been a great privilege to work and learn from such a friendly and helpful cordial work environment.

Working on this report has been an interesting & informative experience for me. I learned many unidentified facts by preparing my project Report, which will be supportive and helpful for my further research in the future. While doing this project report, I learned to integrate plenty of information into a concise volume. I have enjoyed working on this report and I hope that my report will meet the level of your expectations. I will try my best and shall be obliged to provide you with any clarification regarding the report.

Sincerely Yours,

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Non-Disclosure Agreement

This agreement is made and entered into by and between Comilla University and the undersigned student at BRAC Institute of Governance & Development, BRAC University. Comilla University allowed me to prepare a report on **Role of Electronic Tendering (e-gp) for procurement: a study on Comilla University** in partial fulfillment of the degree of Masters in Procurement and supply Management. I could work closely with the officials of the organization and had access to official data and information. Based on my work experience and the data collected from there i have prepared the report. I have used all sorts of data only to furnish the report and will not disclose it to any party against the interests of the organization.

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ACKNOWLEDGEMENT

It is with great pleasure that I have successfully prepared and submitted the research report on **Role of Electronic Tendering (e-gp) for procurement: a study on Comilla University (CoU)**. It would not be possible to accomplish the report without cordial cooperation and all sorts of assistance of the authority of “Comilla University”.

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I am deeply thankful to my respectable Workplace project supervisor Md. Sanwar Ali for inspiration, valuable suggestions and guidelines in every stage of this report. His valuable advice and suggestions helped me to prepare the report in well and organized manner.

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Abstract

Bangladesh's public procurement system has adhered to the legislative guidance of PPA-2006 and PPR-2008. However, using manual tendering by public procurement agencies has long been accompanied by difficulties and challenges. To overcome this problem and bring the transformational vision, Bangladesh's Ministry of Planning adopted the e-Procurement system following the e-GP guideline in 2011. Following the positive results of the pilot testing carried out under the auspices of CPTU, all public PEs are attempting to implement electronic procurement tenders. However, numerous investigations have yet to be done on analyzing the performance of the e-GP system since its inception. This study aims to look at the important characteristics of effective e-Procurement system execution in Bangladesh to meet the indicators of the 7th FYP. Another goal is to identify e-procurement implementation issues, compare e-tendering system efficiency, and build an efficient e-procurement implementation assessment model. Mixed methodologies, focus group discussions, interviews, and predominantly survey questionnaires were employed to collect data from Comilla University as a population. The outcomes showed that e-Procurement tendering was more efficient than manual bidding in terms of time, cost, and process contexts. The study's findings will help academicians, students, practitioners, and researchers. Furthermore, the public e-procurement policy, like e-GP Guideline 2011, can be updated.

Keywords: e-GP guideline 2011, Update policy, Mixed methods, e-Procurement assessment model, Hypothesis test, e-Procurement.

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LIST OF ACRONYMS AND ABBREVIATIONS

A

ADB- Asian Development Bank
ADP -Annual Development Program

B

BUP- Bangladesh University of Professionals
BWDB -Bangladesh Water Development Board

C

CSF -Critical Success Factor
CPTU -Central Procurement Technical Unit
CPPP- Central Public Procurement Portal
CPAR -Country Procurement Assessment Report

E

E-GP -Electronic Government Procurement

F

FGD -Focus Group Discussion

G

GED- General Economic Division
GoB- Government of Bangladesh

I

ICT -Information and Communication Technology
IT -Information Technology
IMED- Implementation Monitoring and Evaluation Division
IDB-Inter-American Development Bank

K

KII -Key Informant Interview

M

MOP-Ministry of Planning
MAPS -Methodology for Assessing Procurement Systems

N

NOA- Notification of Award
NIC- National Informatics Centre

P

PA-Procuring Agencies
PPA-Public Procurement Act
PPR-Public Procurement Rule
PPMO-Public Procurement Monitoring Office
PMIS -Project Management Information System Procurement Entities
PE-Procuring Entity
PG -Performance Guarantee
PPRP-Public Procurement Reform Project

R

REB-Rural Electrification Board
RHD-Roads and Highways Department

S

SaaS (Software-as-a-Service)

T

TOPSIS-Technique for Order Preference by Similarity to Ideal Solution

CHAPTER 1

Introduction

1.1 Introduction

Public organizations increasingly use Information and Communication Technology (ICT) like e-procurement applications. The purpose of the e-Procurement implementation (Yafin et al. 2021) is to cope with increasing procurement complexity. The e-procurement practice has increased managerial efficiency and effectiveness and reduced transactions cost. After briefly introducing e-Procurement, emphasizing increased access, transparency, procurement data quality, the European Commission sought to establish strategic priorities (Becker 2018). E-procurement assisted (Luay and Marhaiza 2018) in reducing company costs, which helped improve Jordanian firms' performance. To reduce the complexity of the procurement process, several firms have adopted e-procurement. E-procurement applications in firms have overlooked the power exercise role. According to Suzzy (Suzzy 2019), e-Procurement in Ghana has several advantages, including lower purchase costs, contract compliance, lower transaction costs, faster cycle times, and increased employee efficiency.

In terms of time, money, and process, the study aims to identify the difficulties encountered during the execution of e-Procurement in **Comilla University (CoU)** procurement. The other aim is to examine the major impact of various factors that affect whether the e-GP system implementation is successful by measuring the effectiveness of the e-GP system application on public procurement in various development projects in **Comilla University (CoU)**. In this respect, the study aimed to compare the **Comilla University (CoU)** e-Procurement effectiveness with manual tendering. The final goal is to forecast the critical effects of various factors impacting the deployment of e-Procurement in **Comilla University**

The study implications are that academicians, students, researchers, bidding communities, and policymakers will benefit from the findings.

1.2 Background of the Study

The assessment of the e-procurement system utilized by **Comilla University (CoU)** to carry out purchases is the focus of this study.

Based on the technological height of the electronic government procurement (e-GP) system developed and implemented by the CPTU of the Ministry of Planning, Bangladesh adopted the e-Procurement implementation (CPTU 2011) in the public procurement area in 2011. The e-GP system is currently in use. However, PEs and all bidders continue to encounter complications, and assessments have yet to be completed since the e-GP system's deployment

(Akando 2016; Marcella Corsi 2006). On the other hand, E-Procurement (CPTU About 2021) is a reliable web-based application platform for engaging with the bidder' community in a paperless environment free of challenges and delays. and physical insecurity (Sanewu, 2016).

Comilla University (CoU) was studied by using data from both primary and secondary sources, with the primary information taken from in-depth interviews. He obtained information by conducting in-depth interviews with necessary **Comilla University (CoU)** officers to gain critical strategic insights into procurement transparency and accountability management. Only two variables were examined in this study: accountability and openness. The research method is indeed the gap or missing link. Only 10 people were chosen as a sample, and they did not represent the **Comilla University (CoU)** population. Only five bidders were chosen as a sample of respondents.

A study was undertaken by Akando (Akando 2016). 'Challenges and Prospects of e-Procurement in Bangladesh: A Study on Roads and Highways Department' was the study's title. The challenges and possibilities of e-procurement in RHD were the main discussion topics in the study's conclusions.

The motivation of the study is to compare how well the Comilla University's field-level data can be used for manual and electronic procurement tendering processes in terms of time and cost. Which tendering procedure is the most effective regarding perceived time and cost? The theory is that e-procurement helps in saving time and decreasing tendering expenses. Based on field- level data analysis, this issue has been tested.

1.3 Statement of the Problem

The governments of Bangladesh goal is to use e- Procurement software to purchase all public goods, works and services. Another goal is to use the e-tender system to achieve 100% public procurement by 2020 (SFYP 2015). Following a comprehensive review of the e-Procurement literature, it is realized that numerous investigations have been done on analyzing the performance of the e-GP system since its inception in **Comilla University (CoU)**. As a result, even after establishing the e-Procurement system for public procurement, there may still be some bottlenecks that prevent the successful implementation of the e-GP system. Some of the problems are stated below, obtained from literature gaps. Contractors, Bidders, PE officers, and banks are still facing issues that must be addressed. There is no comparison between the current e-GP system and the manual tendering system regarding time, cost and process contexts. Server issues with E-GP system hinder the bidders and PE officers. Issues with the tender opening committee (TOC) and tender evaluation committee (TEC) in e-GP systems are

still problems. E-GP system-related bank service suffers bidders. There are still policy flaws. Bidders and PE officers are both dissatisfied due to policy flaws. Risks, uncertainty, inefficiencies from suppliers, cultural change, and staff resistance (Sanewu 2016) are also a problem in effective e-procurement implementation. To improve the e-Procurement evaluation, factors that affect an effective implementation assessment of e-Procurement should always be identified.

1.4 Rationale of the Study

Following the introduction of e-Procurement in Bangladesh in 2011, the CPTU identified four of the country's most prominent public procurement authorities (CPTU e-GP 2020) to implement e-Procurement on a trial basis. LGED & RHD are the two big departments that have successfully used the e-Procurement system. After implementation, the e-Procurement system's performance can be assessed so that obstacles and factors can be anticipated to improve the e-Procurement system further. The e-GP guideline (IMED Proggapon 2011) policy can be updated using this research findings and results. Also, using e-Procurement significantly facilitates 100 per cent excellent public procurement and safeguards its long-term sustainability. Therefore, it should assess the aspects that affect or influence Bangladesh's adoption of a successful e-Procurement system.

The study's findings will be helpful to e-Procurement practitioners. The suggested methodology will aid practitioners working in public procurement in reviewing, implementing, and modifying their procurement framework (OECD 2016). For subsequent timely. e-GP policy/guideline enhancement, this form of assessment data will be trustworthy, i.e.

1.5 Research Objectives

General Objective

The general objective is to assess the e-procurement system in **Comilla University (CoU)**.

Specific Objectives

- 1) To find the challenges experienced during e-Procurement implementation in the **Comilla University (CoU)** development project in the context of time, cost and process.
- 2) To compare the procurement efficiency between traditional purchase and e- Procurement purchase of the **Comilla University (CoU)** development project.

1.7 Limitations of the Study

The following limitations were noted throughout the phases of data gathering and analysis for the study:

*It was an attitude issue because some PE officers in **Comilla University (CoU)** were not interested in face- to-face interviews.

*There were few publications and secondary documentation on the Bangladesh e-procurement system study.

*Organizing bidders and contractors for the FGD at the **Comilla University (CoU)** proved difficult. They didn't have time to gather at a specific time and were uninterested in discussing the current state of the e-GP system. Furthermore, small bidders were dissatisfied because the e-GP method did not provide a new opportunity to win an award.

*The contractors were hesitant to respond because they claimed that the research would not change any policy.

*Sometimes, PE officers were so busy that they did not collaborate.

*Some PE officials are confused about data collection and are concerned about it. So. they were not psychologically prepared for the response.

1.8 Outline of the Report;

There are a total of **five** sections in this study. This part contains the broad outline and organizational structure of the remaining four sections of the research.

CHAPTER 2

Literature review & Structural framework of the research

2.1 Introduction

The e-procurement literature is examined in this chapter. The researcher tried to find the gaps in the e-procurement implementation. The researcher gathered all of the academic literature on the subject. An overview of the theoretical literature that supports e-procurement challenges is given in this section. In addition, this chapter examines the e-Procurement application scenario in Bangladesh and e-Procurement-related regulations and models in broadening perspectives on critical success factors. These suggestions about critical success factors will aid in developing the study's conceptual framework.

2.2 E-GP System in Bangladesh

e-GP Guideline 2011

This document provides an overview of the critical requirements for implementing the e-GP system in Bangladesh (CPTU 2011). This e-GP guideline was prepared using the PPA 2006's Section 65 and the PPR 2008's Rule 128. The suggestions also adhere to international electronic procurement norms, the Right to Information (R2I) Act of 2009, the ICT Act of 2009, and both. As a result, the e-GP guidelines improved accountability and transparency in the public procurement sector.

The CPTU data centre hosts the E-GP system, a secure web-based application program. The e-GP System is being created (CPTU FAQ 2020) and will be used by PES and bidders to complete the following procurement-related tasks:

- Publishing the Annual Procurement Plan (APP)
- Tender invitation
- Call for Request for Proposal (RFP)
- Call for Request for Quotation (RFQ)

Preparation of Tender documents/Tender Applications/Tender Proposals

Tender submission, tender opening, tender evaluation, and contract award notices

The Contract Management System (CMS)

- The E-Payments systems

* Performance monitoring of e-GP by Project Management Information system (FMIS)

e-GP Vision

The e-GP vision intended to improve Bangladesh's public procurement system's effectiveness and fairness (CPTU 2011). Figure 2.1 shows the e-GP vision.



Figure 2.1 Bangladesh e-GP Vision

e-GP Stakeholders

The list of stakeholders for the cloud-based e-GP system is displayed in Figure 2.2 Eight stakeholders have access after registering using their email addresses and passwords.

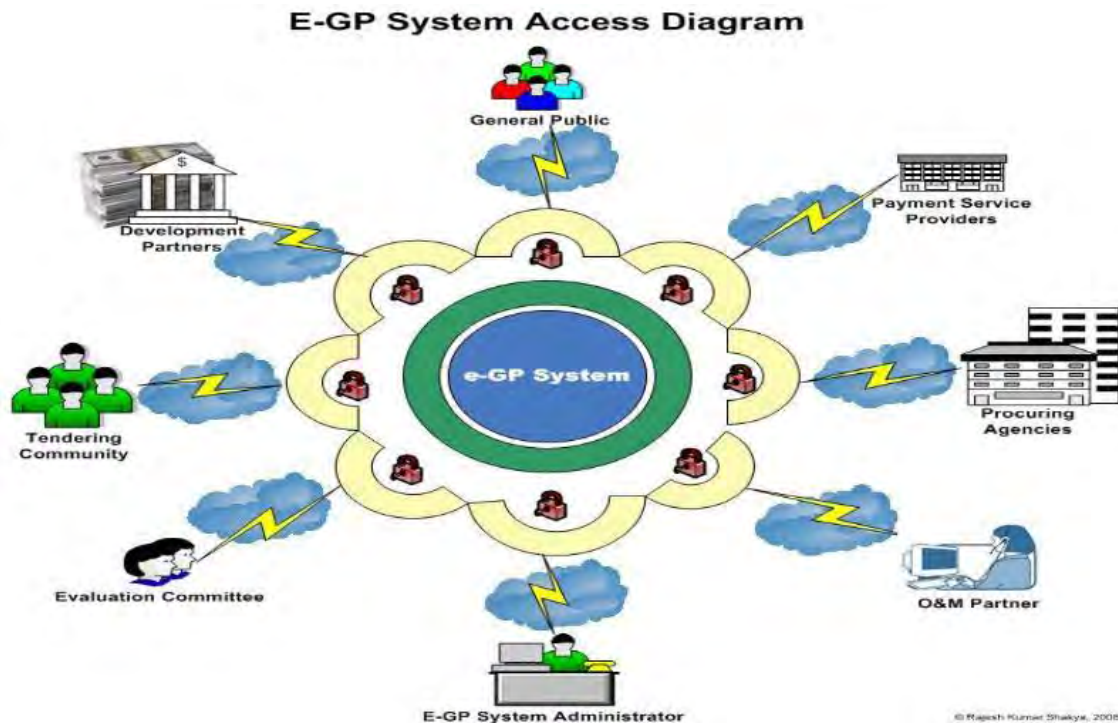


Figure 2.2. Bangladesh e-GP Access Diagram (www.e-procure.gov.bd)

e-GP SWOT Analysis

SWOT analysis is written following the e-GP literature review and an ADB report (ADB 2018). The world is progressing very first with technological advancement (Sachin 2022). This has to be considered a threat. There has to think on risk assessment analysis (Jenny and Elena 2020) on e-procurement using machine learning.

Table 2.1 SWOT Analysis

<p>Strengths</p> <ul style="list-style-type: none"> ✚ Public Procurement Act 2006 ✚ Public Procurement Rules 2008 ✚ e-GP Guideline 2011 ✚ Hosted in the tier-iv data centre ✚ Available on the online platform ✚ Domestic expertise <p>Opportunities</p> <p>The e-Procurement system is adopting in all over the world</p> <p>Reduced transaction costs</p> <p>Will drive some Business Process Reengineering</p>	<p>Weaknesses</p> <ul style="list-style-type: none"> ✚ Bidding community's preparedness and readiness (infrastructure & HR) ✚ PE community's negative attitude to transform ✚ Digital signature absent ✚ Payment to bidders, VAT, and IT absent using the e-GP system ✚ Lack of training for all bidders and PE officers ✚ Challenges faced by PE officers and Bidders/Contractors ✚ Sometimes other persons try to use an userid with the wrong password, and userid is blocked. ✚ The password recovery process is not Easy. <p>Reveals Official Cost Estimate (OCE) and cost price.</p> <p>All procurement methods are not integrated.</p> <p>Will slow implementation of the full system</p> <p>Threats</p> <ul style="list-style-type: none"> • Lacking the ability to cope Ever-changing world of technological advancement. • Lacking to cope with the use of machine learning in e-procurement • Lacking to cope with unfavorable risks analysis using machine learning in e-procurement • Cyber security risks
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e-GP Implementation Status in Bangladesh

The following Table 2.2 displays the status of e-GP deployment by the CPTU's IMED flagship (CPTU 2021).

Issues	Total
Registered Ministry,Division, Organization, and PE offices	❖ No of Ministry- 47 *No of Division - 27 No of Organization- 1358 No of PE Offices- 9997
Bidder Registered	National- 86553 International- 32
Debarred company	-354
Annual Procure Plan approved	-128494
Total contracts awarded	570868

Table 2.2 e-Procurement Implementation Status in Bangladesh

Turn to e-Procurement.

The government, acting as the buyer (CPTU About 2021), uses secure web-based application platforms to interact with the bidder's community in a paperless environment free from obstacles, major delays, and physical insecurity (Sanewu, 2016).

E-procurement purchases goods and services online or through an electronic network (Ilyas 2021, p. 2). E-procurement aims to improve accountability and transparency, encourage bidding competition, enable process monitoring and auditing, and meet the demand for recent information.

Another definition of e-procurement is using electronic methods at every stage of the procurement process, from requirement identification to payment and possibly contract administration, according to (Suzzy 2019).

According to Suzzy (2019), e-procurement is a web-based purchasing system that offers buyers and suppliers better administrative abilities and electronic purchase order processing, resulting in operational efficiencies and potential cost savings.

E-Procurement Cycle

In Bangladesh e-GP system (CPTU About 2021) are 11 steps to be covered in the e- Procuring cycle shown in Figure 2.3.

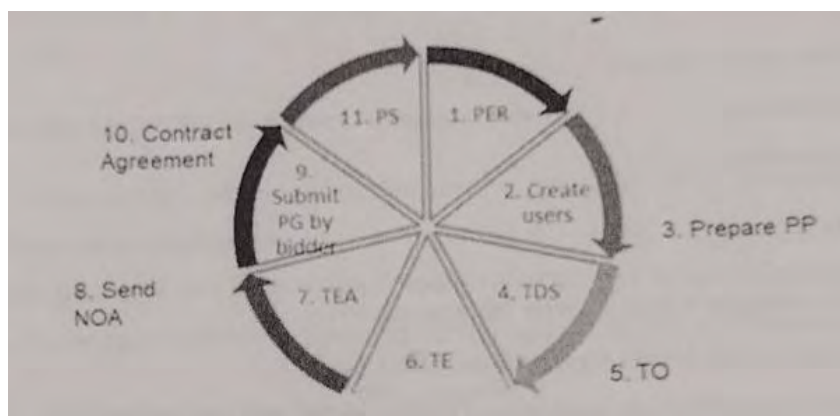


Figure 2.3 e-Procurement Cycle

1. Procurement Entity Registration
2. Create Users
3. Prepare Procurement Plan
4. Tender Document Sheet
5. Tender Opening
6. Tender Evaluation
7. Tender Evaluation Approval
8. Send Notification of Award
9. Submit Performance Guarantee by bidder
10. Contract Agreement
11. Product Supply

E-Procurement Challenges

The following are examples of prevalent e-Procurement Challenges in Bangladesh and other nations:

Bidder

Absence of the bidder's awareness

Lack of trust or doubt in the e-GP system

Internet knowledge

Organizational (Marcella 2006)

User's resistance to change

◦ Simply human habit not to change

The PE and bidders think that e-procurement is more complex and not user- friendly.

E-Procurement Outcomes

According to (Marcella 2006), the following e-procurement outcomes are frequently noted in the context of Bangladesh and other nations:

Intermediate Outcomes:

- Better service delivery

Cost-savings

Time-savings

Outcomes:

*Improvements in public sector labor productivity

*Economic rationality (organizational efficiency)

*Process simplification, establishing accountability and transparency

*GDP magnification

e-GP System Performance

Since 2011, Bangladesh has achieved significant leaps in the administration of public procurement. Following is a realistic image (Nazmul 2020) of the many features of e-GP system development:



Figure 2.4 e-GP System Performance

Figure 2.4 e-GP System Performance

Source-Nazmul 2020

According to the e-GP data, as of August 31, 2020, 1343 agencies are registered under 9267 PES, 74749 tenderers are registered, and 4,01,844 tenders are invited through the system. On the other side, a total of 2, 55,486 contracts worth USD 25.24 billion have been awarded (Nazmul 2020).

E-Procurement Major Target Agency in Bangladesh

When the e-procurement system was implemented in 2011, the CPTU concentrated on the top four public money spenders as a trial project. The (CPTU e-GP 2020) four organizations were the Bangladesh Water Development Board (BWDB), the Rural Electrification Board (REB), the Roads and Highways Department (RHD), and the Ministry of Planning (MOP).

2.3 e-Procurement Benefits

Adopting e-procurement technologies for public procurement is primarily driven by the need to boost competition for contracts, cut costs, and accelerate processes. According to a report by the World Bank (World Bank 2021), the e-GP system's tender invites are becoming more valuable and have a rising number of registered bidders. According to a separate article (World Bank 2019) published by the world bank, the public procurement reform has boosted

efficiency by 75%, competition is up to double its previous level, transparency is up to 85%, and yearly cost savings of \$150 million.

An article published on the CPTU website on November 17, 2018 (CPTU Media 2020) stated that e-GP initiatives led to significant cost savings for public procurement entities and e-GP bidders. The other results included improved public service delivery, increased competition, transparency, and efficiency. A case study finding of the Australian Municipal Council (Ilhan and Rahim 2017) is that three e-procurement benefit was observed. Three benefits are operational, tactical, and strategic. E-Procurement has a good and significant impact on budget absorption and procurement success, according to a study conducted in Indonesia (Sugianto, Salman. and Suryanto 2019). The use of e-Procurement also impacts the suppression or prevention of fraud.

2.4 e-Procurement Information and Cyber Security Risks

A dissertation submitted by a study (Akanda 2016) concerned with the challenges and risks of e-Procurement systems in RHD. In that study, technology risks and security risks are mentioned.

Technological risks-

- Disruption of electricity Low speed of the internet
- Reliable internet connectivity
- IT infrastructure
- Uninterrupted access to the e-GP server

Security risks-

- Protection against hackers
- Protection against hackers' viruses
- e-GP software problem maintenance capability
- Password confidentiality
- Documents confidentiality

A case study that examines the transactional security for integrating an electronic procurement solution in a large business (SAM GRUB 2021; Tim Rains 2020; Stephens and Valverde 2013). It examines the current threat landscape, security laws, system architecture. and security measures put in place to preserve the confidentiality and integrity of data. The following Table 2.3 explores some threats and their control measures.

Threat/Issue	Control	Source
Hackers	Logical Access Control, Vulnerability of the scanning tools, and Path management. Anti-virus, Anti-spyware; Data encryption - SSL, Secure FTP; Data transfer; Digital signatures; Security Policies, Security awareness training, and Password protection.	(Stephens and Valverde 2013)
Preventative authentication	The use of a secure RSA key to access Ketera via the Intranet	
Virus detection	E-mail monitoring, Anti-virus Software, Anti-spam filters, and Spyware removal software.	
Auditing events	Personal Firewall	

Table 2.3 e-Procurement Information and Security Risks and Control

Indonesia, Yogyakarta Province was subjected to a risk assessment by Zainuri et al. The findings (Sugianto et al. 2019) revealed a high risk of an information technology attack. They advise putting information security guidelines into practice. LPSE authority provides security guidelines for capacity and information security. The LPSE standard is a reference point for written instructions on different service procedures. The LPSE Standard is being implemented to enhance information security, capacity, and service quality in LPSE's E-Procurement implementation. The study looked at LPSE and ISO 27001 standards for maintaining e-procurement security. The 114 controls of the ISO 27001 structure are broken down into 14 control domains and are organized into 10 clauses. The following list in Table 2.4 includes information security and control.

There are major four categories of cyber securities controls (Raef Meeuwisse 2017) that can be used when constructing cyber security protection:

- 1) Physical
- 2) Technical
- 3) Procedural
- 4) Legal (Regulatory or compliance controls)

E-GP Security Management in Bangladesh

The e-GP system has implemented strict security (CPTU 2011) measures as a safety safeguard. The e-GP system software ensures Presentation Layer Security, Session Level Database Security, Transmission/Transaction Layer Security, Application Layer Security, Layer Security, Hardware Layer Security (Kevin 2016), and Workflow-based Security. To prevent hackers, the e-GP server has an SSL (Secure Sockets Layer) certificate (Ahsanul and Shafiul 2017). Data is transmitted via an SSL certificate both in encrypted and decrypted forms. As a result, the data cannot be stolen.

In Bangladesh, an Information Security Policy for the e-GP System (IMED 2019) was published in April 2014 through a gazette notification. The major objective of CPTU e-GP

system security is-

- Confidentiality
- Integrity
- Availability of e-GP
- Promote system security culture in e-GP management

An internal team from CPTU is obligated to conduct regular vulnerability analyses and risk assessments and report the findings to the Information Security Steering Committee (ISSC).

2.5 Assessing Procurement Systems

Nearly 9.5 trillion USD are spent by governments worldwide on public procurement. Public procurement contributes between 12 and 20 percent of each nation's GDP globally. Assessment tool for analyzing public procurement was developed in 2003/2004 and is called the Methodology for Assessing Procurement Systems (MAPS). Over 90 nations around the world have now finished their MAPS assessments (Mapsinitiative 2018). Soon, MAPS will be used in all nations. MAPS tools are handy for assessing the effectiveness and quality of the public procurement system. In addition, MAPS promotes environmentally friendly purchasing methods following national priorities and regulations. The MAPS adjustment was led by the following characteristics (Mapsinitiative 2018):

- Good governance
- Credibility
- Transparency
- Value for money

The MAPS Pillars to evaluate public procurement:

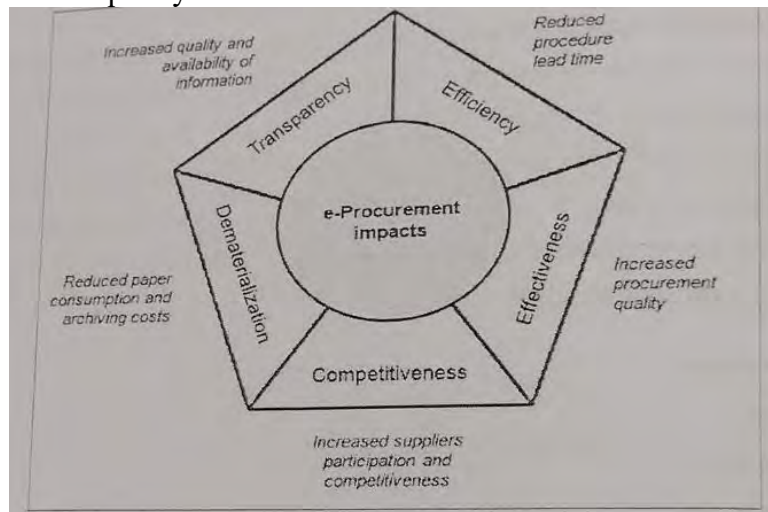
- 1) Legal, Regulatory, and Policy Framework
- 2) Management Capacity
- 3) Institutional Framework
- 4) Public Procurement Operations
- 5) Open Market Practices
- 6) Credibility, Good governance, and Transparency

Model for Measuring e-Procurement Impacts on Organizational Performance

The usefulness of e-Procurement in Bangladesh's public sector has been limited by empirical research on practical applications, research, and leveraging benefits. Since 2008, based on this current review, the model (Gardenal 2013) has been used to analyze e-Procurement in the public sector of the Lombardia region of Italy four times in a row. Efficiency, effectiveness, competitiveness, dematerialization, and transparency are the five dependent variables that Francesco Gardenal takes into consideration when evaluating the impact dimensions. Each effect dimension, or dependent variable, comprises a series of indicators, or independent variables, as depicted in the diagram below. However, after doing a rigorous analysis of this model, I discovered certain flaws. For example, more variables, such as impact dimensions, should have been added to improve the assessment.

Increased quality and availability of information
Reduced paper

consumption and archiving costs
Transparency
Dematerialization
Efficiency
e-Procurement impacts
Competitiveness
Reduced procedure
lead time
Effectiveness
Increased procurement quality



2.6 Critical Success Factors of e-Tendering

The term "success factors" outlines the areas where, if the results are good enough, a company will have a competitive advantage in terms of performance. For the organization to prosper, these are the areas where it must succeed. In contrast, if the results in these areas are insufficient, the firm's efforts will be futile. An organization can develop a known point of reference to better analyze its business's performance (Kevin 2016) and achieve goals by defining CSFs.

The researcher identifies various lists of CSF in the literature study that can be treated as independent variables to create a conceptual framework for this research.

CSFs are:

- use of digital signature
- the problem encountered in pe registration problem
- bidder registration problem
- problems in preparing procurement plan
- problems in tender document preparing
- absence of bidder awareness and training
- problems in tender opening
- problems in tec meeting
- send notification award

- submit performance guarantee by the bidder
- contract signing
- problems during supply
- payment to supplier
- absence of influence effectiveness of review panel
- handling errors and exceptions
- absence of trust in security features by pe agencies
- absence of trust in security features by bidders
- full-time help desk

2.7 Research Gap Analysis

2.7.1 E-GP System Implementation Worldwide

Canada began using the e-GP system in 1991, according to a paper titled e-Government Procurement (Rehana 2017). The e-GP system described in Figure 2.7 was successfully implemented throughout the rest of the nation.

Asian Development Bank Report

Asian Development Bank (ADB) has launched a web portal (ADB 2021) providing an e-GP link. This link holds some country lists where e-Procurement initiations information of some countries has been revealed.

e-Procurement Implementation in India

A central government e-Procurement web portal (PPD and NIC 2021) is now operational in India. It contains e-publishing and e-procurement modules and was launched on January 1, 2012 (MOF and NIC 2017). The Central e-Portal website was designed, built, and hosted by National Informatics Centre (NIC) in collaboration with the expenditure section. The Indian Ministry of Finance, NIC, and the Ministry of Electronics and Information Technology collaborate to operate this e-Procurement website (MoF and NIC 2017). All Central Government Organizations can now keep track of their corrigendum processes, tender inquiries, and contract awards. The initial goal of this web-based portal is to provide a single point of access to procurement data from various central government institutions. India's e-Procurement system is a unique initiative in increasing openness (Panda 2010). Typically, the website (PPD and NIC 2021) discloses that roughly 30000 tenders are floated on any given day, 1500 tenders are opened, and 2000 tenders are closed. In India, e-procurement allowed all bidders to access information from any location at any time. Since 2007, this method has been employed repeatedly (MoF Inida 2019).

According to (MOF and NIC 2017), the implementation of e-Procurement in India met over 75% of the nation's requirements for electronic procurement. This substantially helped the Indian government in gaining important knowledge about procurement expenditures, notably in terms of cost, visit, and time.

E-Procurement in Srilanka

The Sri Lankan government is considering significant structural reforms in procurement, such as using the E-GP procedure (Rehana 2017). In this scenario, the e-GP process will increase

the public procurement system's effectiveness and timeliness, providing extra advantages for carrying out value-for-money transactions.

E-Procurement Implementation in Nepal

By exercising power provided by Section 74 of the PPA, 2007, the Nepalese government established Public Procuring Rules 2007. In addition, according to the Nepal national electronic government procurement system website (PPMO 2021), the Nepalese government launched the GEPSON system, an e-procurement portal. The National Electronic System is monitored by the Public Procurement Monitoring Office (PPMO). The PPMO aims to create a consolidated e-GP system for purchasing public entities. This e-Procurement system is utilized in Nepal to reduce invisibility, discrimination, and access disparities in public procurements and ensure free competition.

E-Procurement Implementation in Malaysia

The Malaysian government has adopted e-Procurement, a system for online registration and tendering, also known as e-Perolehan (Nasrun 2017; Zaharah. A.R. 2007). The goal of implementing e-Perolehan is to improve the quality of the government tendering process's quality. This approach removed the obstacles to procurement procedures that existed at the time. It also makes getting reliable benefits in a complicated government procurement structure easier. It abolished long-standing red-tapism practices and legal compliance. It aided in the growth of internet-based businesses. It increased accountability while ensuring that government initiatives and contracts were more transparent.

The e-Perolehan method (Rathakrishnan and Zaharah 2007) has gained significant popularity in Malaysia. Additionally, it helped the government, and the bidder communities create a mutually beneficial partnership on a national scale.

The objective of the Malaysian e-Perolehan system is-

- To leverage maximum output from the money invested in public procurement
- To assure the providers of a quicker flawless payment
- To increase transparency and accountability of all public procurements
- To enhance the chemistry between Government with its business sector

E-Procurement Implementation in Russia

In 2011, the Russian Federation created an official procurement website (Rehana 2017; UIS 2021). Because it is a large country, there are distance and information hurdles to participation. This website facilitated remote tendering from areas like the North Caucasus, Siberia, and the Ural Mountains in the Moscow and St. Petersburg procurement markets. E- GP may also make it simpler for foreign firms to enter the domestic procurement market, promoting competitiveness, by lowering obstacles of distance and information.

E-Procurement Execution in Europe

In a brief study produced by the European Parliament's Directorate-General of Internal Policies (Becker 2018), the e-Procurement process is illustrated in Figure 2.9. The e-Invoicing, e-Control payment, and e-Evaluation processes are all extra to the Bangladesh e-Procurement system. The Bangladeshi e-Procurement process might include e-Control and e-Invoicing payment methods. An ex-post e-Evaluation completes the procurement process. By

comparing it with the standards for pre-purchase competency during this phase, contract performance may be assessed. The final goal is to conduct a KPI (Key Performance Indicator)-based evaluation to identify any flaws and issues that will help sustain and improve future tendering processes.

The goal of e-Procurement adoption (Becker 2018) was to "increase access, remove ambiguity, and improve the integrity and quality of procurement data.

- Transparency
- Fair and open competition
- Value for money

Where,

The goal, parameters, and procedure would all be made as transparent as possible to the vendors.

An open competitive platform will assure the best offers from suppliers, according to Fair and Open Competition (Civil Service College Singapore 2010). All vendors will have equal opportunity on a level playing field.

Value for Money (Civil Service College Singapore 2010) established that the value for money of procurement is determined by both the cost and benefits of the procurement based on the need and that the lowest bidder does not always win the contract.

e-Procurement Implementation in South Korea

South Korea has one of the world's most modern e-GP systems (Rehana 2017). Korea Online e-Procurement System is the name of the online system (KONEPS). In 2002, KONEPS (Korea 2021) was established nationwide. This system manages all types of Korean government contracts. Currently, two-thirds of all public procurements are processed using this method. In 2014, the system was used by over 250,000 commercial sector customers and over 50,000 government institutions.

e-Procurement Implementation in Indonesia

In 2008, Indonesia launched its e-Procurement operation (Sugianto et al. 2019). The standard designed and executed by Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP) provides a framework for examining and evaluating the skills, services, and information security held by LPSE as the overseer of the implementation of e-procurement in Indonesia. The government and suppliers in Indonesia have significantly benefited from adopting e-procurement. Suppliers can save on travel, lodging, consolidation, and document printing expenses.

E-Procurement Implementation in Bhutan

All procuring agencies in Bhutan can publish their tenders, corrigendum, and notifications of application software(<https://www.egp.gov.bt/>). This portal's primary objective is to provide users with a single access point to data on purchases made by various Procuring Agencies.

e-GP Strategic Overview by ADB, WB, and IADB

An e-GP objective is jointly developed and copyrighted by three international bodies (ADB 2004) to adopt by any organization. The e-GP objective is stated as:

E-GP Objectives:

- 1.GOVERNANCE
- 2.EFFECTIVENESS (Efficiency Value-for-money)
- 3.ECONOMIC DEVELOPMENT

2.7.2 Synopsis of Research Gap Analysis

An overview of the research gap has been provided following a critical examination of the literature. Over 75% of the country's needs for electronic procurement in India were satisfied by the GePNIC system (MoF and NIC 2017). This aided India's federal government in gaining experience in reducing procurement costs, particularly in cost, visit, and time. This e-Procurement system was launched in Nepal to improve the much-needed fairness and remove biases, ensuring equal access opportunities and, as a result, promoting fair competition in the Nepal public procurement system. It eliminated long-standing red-tapism and law-enforcement practices in Malaysia. It also aided in the growth of e-commerce. Government initiatives and contracts were carried in with good governance and transparency. The e-Procurement system in Russia is lowering distance and information obstacles in procuring participation for large nations.

Compared to the Bangladesh e-Procurement system, the European Union's e-Invoicing, e-Control payment, and e-Evaluation processes are customizable. In Portugal, e-Procurement has aided in the reduction of corruption and the restoration of integrity. In Singapore, e-Procurement system innovations saw increased SME involvement, time savings, cost reductions, bidders lists, value for money (buy a quality product at the best price), transparency, and fair and open competition. According to an overview of a strategy document (ADB 2004), economic development can be incorporated into e-GP objectives, and private sector activation can be included in an e-Procurement strategy to close the gap in Bangladesh's e-GP system. Although private sector activation in the e-GP system may be a factor in GDP development, it is not considered in Bangladesh's e-GP system. After her birth, Bangladesh's conventional manual procurement method caused many challenges. As a result, establishing accountability, efficiency, and openness in the public procurement system proved challenging. An e-GP system has been implemented to address these issues. Many countries, including India, Malaysia, Sri Lanka, and some European Union countries, use the e-Procurement system to make public and private sector purchases more transparent. Bangladesh's government implemented the e-GP system following international standards.

RHD is one of Bangladesh's first departments to use an e-Procurement system. According to the above countries' critiques of an e-Procurement system, there are several significant shortcomings in Bangladesh RHD's e-Procurement and e-GP systems compared to worldwide e-procurement and e-GP systems. Considering the experience gained from the research of RHD e-Procurement in Bangladesh, the e-GP system and its guiding principles can be developed further (CPTU 2011). As a result, this study requires a significant amount of time, and the gaps identified because of the findings will be useful for future e-GP guideline improvement.

Furthermore, the findings of this study will be used by academics to better their understanding of e-procurement; scholars will be assisted in conducting further research on e- procurement and related topics as a reference source. Finally, such research will be extremely useful to policymakers in updating policies to reshape the e-GP system and accomplish an e- GP vision.

2.9.8 Chapter Summary

The literature review section covers the essential issues linked to this study. To carry out the research, the researcher enhanced the applied concept. Briefly, RHD has been oriented for the sampling and population purposes of the study. This part presents the primary direction of Bangladesh's e-GP system. Finally, the essential issues regarding critical success factors are studied that are needed to make a conceptual framework. This chapter contains a thorough research gap analysis. Three international organizations, the ADB, the World Bank, and the Inter-American Development Bank, have conducted thorough studies on e-procurement. In addition, comprehensive research on e-procurement adoption in India, Nepal, Sri Lanka, Malaysia, Europe, Singapore, and South Korea was conducted, yielding various results. This research gap analysis helped to write a problem statement, making research questions and corresponding research objectives.

CHAPTER 3

Methodology of the study

3.1 Introduction

Methodology refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, and collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solutions towards the concerned problem or in certain generalizations for some theoretical formulation. It includes the process of gathering, recording and analyzing critical and relevant facts about any problem in any branch of human activity. It refers to critical searches into study and investigation of problems/ proposed course of action/hypothesis or a theory. The study requires a systematic procedure from selection of the topic to preparation of the final report. To perform the study, the data sources were to be identified and collected, to be classified, analyzed, interpreted and presented in a systematic manner and key points were to be found out.

3.2 Research Design

According to (Asenahabi 2019, p. 76), the study design aims to transfer a research problem into data that can be examined for the least amount of money to provide reliable answers to research-based questions. A mixed-methods strategy was employed in the study, combining quantitative and qualitative research approaches. The study used KII, focus groups, and survey questionnaires. The Comilla University department's PE offices, as well as contractors or bidders, are considered respondents. The survey's total sample size was around 42 respondents. Contractors, PE officials, and FGD accounted for 45 respondents. This survey combines structured and unstructured questionnaires to achieve the study's two goals. Data was also obtained and examined via telephone from practicing bidders and remote PE offices. The telephonic conversation helped clarify some responses to specific questions in this case. The secondary data was gathered through document analysis and literature reviews. E-Procurement-related bidders and PE officials in CoU were selected for the survey using a stratified sampling technique.

There are two objectives in this study report. All questionnaires were created following the study's two objectives. Quantitative data was collected from PE officers and bidders in CoU using a structured questionnaire survey method with a 5-point Likert scale. Three FGDS were held to collect qualitative data from bidders using the FGD checklists.

3.3 Scope of the Study

The scope of the study was three departments of CoU.

3.4 Sampling Design and Determination

Populations- All PE officers and bidders/contractors of the Comilla University (CoU) were population.

Sampling Technique- Multistage Sampling Technique => Stratified Sampling => Simple Random Sampling

Justification for Determining Bidder's Sample Size

Following the CPTU website link (CPTU 2020), there were 72385 registered bidders in the e- GP system in January 2020. All registered bidders don't participate at CoU because most CoU tenders are related to the cost, procured Goods, works and related services. Consider that 10% of the registered tenderers are actively bidding at the CoU public procurement system when selecting the suitable sample size for estimating the population proportion.

Justification of Determining PE Officer's Sample Size

The total number of registered PE offices in Bangladesh is 9610 (CPTU 2020). In CoU, a Total of 6 PE offices (CPTU 2024) are there, and each PE office is comprised of 2 to 4 members of PE officers. So, if considered that each PE office has an average of 3 members as PE officers at CoU, then the calculated sample size of the PE officer becomes $6 \times 3 = 18$.

3.5 Data Collection Instruments Primary Surveys (Questionnaires)

- Interview
- Focus Group Discussion (FGD)
- Key Informant Interview (KII)

Secondary

- Policies, procedures, and guidelines
- Websites
- Various Reports
- Bulletin
- Journal articles
- Researcher insights

Justification of the 5-Point Likert Scale

A five-point Likert scale structured survey (questionnaires) was created to collect data for hypothesis testing. What was the rationale behind utilizing a 5-point Likert scale? The researchers proposed using a rating scale from "very satisfied" to "not satisfied" since it would minimize respondents' frustration while increasing response rate and quality. It also aids respondents in making quick decisions.

3.6 Chapter Summary

The research methodology is the research's guiding tool. The research design was developed with this in mind. The study used quantitative survey and qualitative investigative methods in a mixed-methods approach. PE officers from the CoU and bidders were among the respondents. Survey questionnaires, KII, and FGD methodologies were employed to conduct the research. The survey's total sample size was around 42 respondents. Total bidders, PE officers, and FGD were 45 respondents. The chapter also shows objective-based data collection tools. Following the CoU 's current organogram, a sample size rationale was presented. The 5-point Likert scale survey questionnaire is justified. Lists of the tools for each object were shown.

CHAPTER 4

Data Analysis and Discussions

The analysis of the data and the results of the study are presented in detail in this chapter. The following significant headings illustrate the findings: PE officers' demographics; bidders' demographics; e-Procurement challenges. All of the analyses are based on data collected in the field.

4.0 PE Officer's Demographic Analysis

PE Officers Gender Statistics-

Q- What proportion of the respondents (PE officers) are male and female in the CoU population?

Table 4.1 Percentage Distribution of PE Respondents by Gender

	Frequency	Percent
Male	193	93.7
Female	13	6.3
Total	206	100.0

Data Source: Field Survey, 2023

According to Table 4.1, 193, or 93.7% of PE officers, were male, and 13 or 6.3% of respondents were female. According to this finding, men were most of the PE officers at CoU.

Table 4.1 show that the mean tender dropping time for e-tender and manual system are 06263 & 2.5820 days, respectively. This indicates that the present e-tender tender dropping time is lower than that of the manual.

4.2 Summary of Efficiency Comparison in Cost Contexts

The efficiency comparison of the test variables considered in achieving the second objective Cost Contexts-

Test Variables	Comments
e-tender advertisement cost	e-tender advertisement cost is less compared to manual tender.
e-tender document preparation cost	e-tender document preparation cost is less compared to manual tender.
e-tender document collection cost	e-tender document collection cost is lower compared to manual tender.
e-tender meeting arrangement cost	e-tender meeting arrangement cost is lower than manual tender.
e-tender TOC report preparation cost	e-tender TOC report preparation cost is lower than manual tender.
e-tender TEC meeting arrangement cost	e-tender TEC meeting arrangement cost is less than manual tender.

e-tender TEC report preparation cost	e-tender TEC report preparation cost is less than manual tender.
e-tender NOA issue cost	e-tender NOA issue cost is less than the manual tender.
e-tender contract sign cost	e-tender contract sign cost is less than the manual tender.
e-tender tender dropping cost	e-tender tender dropping cost is less than manual.

Data Source: Field Survey, 2023

4.3 Summary of Efficiency Comparison in Time Contexts

The efficiency comparison of the eleven test variables considered in achieving the second objective Cost Contexts-

Test Variables	Comments
e-tender advertisement time	e-tender advertisement time is less compared to manual tender.
e-tender document preparation time	e-tender document preparation time is less compared to manual tender.
e-tender document collection time	e-tender document collection time is lower compared to manual tender.
e-tender meeting arrangement time	e-tender meeting arrangement time is lower than manual tender.
e-tender TOC report preparation time	e-tender TOC report preparation time is lower than manual tender.
e-tender TEC meeting arrangement time	e-tender TEC meeting arrangement time is less than manual tender.
e-tender TEC report preparation time	e-tender TEC report preparation time is less than manual tender.
e-tender NOA issue time	e-tender NOA issue time is less than the manual tender.
e-tender contract sign time	e-tender contract sign time is less than the manual tender.
e-tender tender dropping time	e-tender tender dropping time is less than manual.

Data Source: Field Survey, 2023

4.2 Advantages and Disadvantages of Procurement System

The advantages and disadvantages of the e-GP system are obtained from the study's find

Advantages-

- Tender advertisement cost is less.
- The tender document preparation cost is less.
- The tender document collection cost is lower.
- TOC meeting arrangement cost is lower.
- TOC report preparation cost is lower.

- TEC meeting arrangement cost is less.
- TEC report preparation cost is less.
- NOA issue cost is less.
- The contract sign cost is less.
- The tender document photocopy cost is less.
- The tender dropping cost is less.
- Accountability has been increased.
- Procurement Governance has been improved.
- Helps to be a paperless office.
- Competition has increased.
- Transparency has been increased.

Disadvantages

- All bidders are not trained in the e-GP system.
- All PE officers are not trained in the e-GP system.
- The process flow chart is complex,
- Information is leaking, especially the Official Cost Estimate (OCE).
- Small bidders are not being awarded.
- Sometimes, tender specification-making is done in favour of a known bidder.

Likert Scale:

Data was collected in a nominal/categorical format on 5 Likert scales. The collected data was non-parametric. Scale marking was as follows:

Not satisfied=1,

Slightly satisfied=2,

Moderately satisfied=3,

Very satisfied=4,

Extremely satisfied=5

Hypothesis Test -

The Comilla University's (CoU) Bidder and PE community survey (Questionnaires) have significant effects on the conceptual framework. The eight hypotheses assisted in evaluating e-Procurement deployment in CoU. In this model, there are eight dependent and 33 independent variables.

Table demonstrate the conceptual framework with these 8 dependent variables and 33 independent variables. The proposed 8 dependent variables are:

- accountability,
- procurement governance,
- dematerialization,
- legal, regulatory and policy framework,
- process improvement,
- efficiency,
- boosting competition,
- transparency

Sl No.	Dependent Variables	Independent Variables	Applicable for survey
1	accountability	<ol style="list-style-type: none"> 1. collaboration increased between pe and bidders 2. pe officer's behavioral change 3. bidders' behavioral change 4. value for money 	PE Officers
2	procurement governance	<ol style="list-style-type: none"> 1. capacity development 2. integrating principles 3. annual procurement planning and published 4. quality of govt. tendering process 5. free from red-tapism 6. free from problems after contact awarding 	PE Officers
3	dematerialization	<ol style="list-style-type: none"> 1. paperless procurement process 2. reduced archiving cost 	PE Officers
4	legal, regulatory and policy framework	<ol style="list-style-type: none"> 1. overall cptu performance 2. ppa 2006 and subsequent amendments 3. ppr 2008 and subsequent amendments 4. e-gp guideline 2011 5. implementation of digital signature 	PE Officers
5	process improvement	<ol style="list-style-type: none"> 1. workflow management 2. managing capacity of large number of bidders 3. automatic generation of necessary report 4. e-contract management system 	PE Officers
6	efficiency	<ol style="list-style-type: none"> 1. e-payment process 2. cost 3. time 	Bidders
7	boosting competition	<ol style="list-style-type: none"> 1. fair and open competition 2. standard tender specification 3. reduction of distance barrier 	Bidders
8	transparency	<ol style="list-style-type: none"> 1. non-discrimination 2. online tender notice availability 3. access of open tender documents 4. discloser to upgrade policies 5. secrecy of bidder's information 6. elimination of undue 	Bidders

Three FGD checklists are discussed in CoU offices. When interviewed, each group had Three to Five bidders. Respondents were asked about the time, cost, and process challenges they faced when participating in e- procurement. Because the contractors are unfamiliar with e-GP processes, others must help them in processing e-procurement documents.

The study compares the cost and time efficiency of manual versus e-Procurement purchases for the CoU public procurement. CoU PE offices provided data. 06 PE officers and 32 bidders compared the e-GP method to the manual tendering system. The test showed that e-procurement saved time and money compared to manual tendering.

Some dependent variables were hypothesized. Accountability, procurement governance, dematerialization, legal regulatory and policy framework, process improvement, efficiency, competition, and transparency comprise the proposed e-Procurement assessment model.

4.3 Demographic Data

Discussion on PE Officer's Demographic Data

According to the survey, most PE officers have a Bachelor degree. Meanwhile, most of the responders who worked in CoU's e- procurement system was well-educated.

According to the replies to the current post of the PE officers, everyone from the lowest Sub Asst. Engineers, Asst. Engineers/SO, Executive Engineers, and Superintendent Engineers/DD. So, findings proved that all PE officers were actively involved with e-Procurement.

From the findings, PE users, TOC members, PE admin, and TEC members were the e-GP involvement of the PE officer's respondents.

How often have PE officer's received e-Procurement training? Statistics show that 15% of PE officers didn't participate in e-GP-related training. So, there are challenges and difficulties while dealing with tender documents related to e-Procurement.

Discussion on Bidders' Demographic Data

It was a question about the bidder's respondents having the highest level of education. According to the answer to this question, 62 per cent of contractors passed the Degree/Honors degree. As a result, a sizable fraction of the respondents can manage the CoU e-procurement bidding process.

How many contractors have received e-procurement training? According to the responses to this query, 71% of bidders did not take advantage of the e-GP training that CPTU could offer. Due to this, most bidders had challenges and difficulties completing tender papers connected to e-Procurement throughout the bidding process.

4.4 e-GP Implementation Challenges Faced by PE Officers

(Answering Research Question 1)

Detailed discussion on key findings from PE officers' respondents is stated here.

Challenges faced during e-Procurement implementation-

What are the challenges facing CoU 's PE officers as they adopt e-Procurement?

According to the primary results of KII, PE officers are now experiencing e-Procurement implementation challenges in terms of time, cost, and process. As a result, CoU should address the alarming and important challenges.

Challenges Faced During e-Procurement Implementation in Time Contexts-

Because in the LTM (lottery) method (up to 3 cores Taka), as many as 100 to 500 bidders participate in the tender bidding procedure, the evaluation matrix is a too time-consuming system. If more bidders participated in the e-Tender, releasing security money cannot be done in one work cycle if NOA is given. This tedious, repetitive operation keep the PE user occupied with other tasks, and the user grows tired, exhausted, and unwilling to utilize the e-Procurement tendering process. The e-Procurement system must be modified to allow all bidders' security money to be released in a single cycle task. There is no define time limit for hosting a TEC meeting. This is due to the significant time between TOC and TEC meetings. Bidders confront an increase in material costs during this time, which becomes difficult. Processing, downloading, and checking takes longer.

Challenges Faced During e-Procurement Implementation in Process Contexts-

Due to heavy traffic during peak hours, the E-GP server occasionally struggles to function correctly. If a PE user wants to replace any member of the TOC/TEC after the tender has been published, the PE user must go through a lengthy amendment process. Users will find this process tiresome, but it will be easier to handle. Furthermore, because TEC members work in separate offices, reaching a consensus takes longer.

Checking 400-500 pages of tender materials for TEC meetings is also time-consuming and reflects a manual tender method. Its process is too complicated for collaborative work. In addition, tenderers sometimes present ambiguous and misleading paperwork, which

committee members occasionally disregard because verifying all documents in such a short period is impossible.

e-GP guideline policy adequate or not

Do you think that the current e-GP guideline is adequate?

Following the KII, interviews were taken with the PE officer's respondents to check whether the current e-GP policy guidelines were adequate. Key findings from the PE officers who were asked about policy guidelines revealed that 80% of PE officers of CoU responded that the current e-GP policy guideline is adequate, and 20% answered that the current e-GP policy guideline is insufficient. Regarding the e-GP guideline policy, CoU PE officers commented on the lack of policy from the research findings. The results indicate that

Due to the erroneous evaluation policy, new, small and medium contractors are not getting an award. Only some big contractors are getting awards due to the wrong evaluation matrix. The bidders having a license with colossal experience are playing monopoly.

TEC members also evaluate the blacklisted companies. It is a problem.

Bidders add fraud and fabricated liquid assets and experience documents.

- Digital Signature is not incorporated.
- The payment system is still old, i.e. manual. Therefore, the online payment gateway should be integrated.
- The present three members of TEC are not adequate, and it needs to be increased to five at least.

E-GP Guideline Update Suggestions

Do you have any suggestions for updating the e-GP Guideline (Regulatory policy framework)?

The data shows 72 percent of respondents suggested updating the e-GP policy guidelines. As a result, the PE officers are unified in their decision to provide suggestions to revise the e-GP policy.

4.5 e-GP Implementation Challenges Faced by Bidders

(Answering Research Question 1)

Four checklists were used for each of the Three focus groups, and responses were noted in front of the contractors in each group. The following is a detailed discussion of the FGD findings.

Challenges encountered when using the e-procurement system in the contexts of time, cost, and process-

Checklist: Do you face any challenges experienced during e-procurement participation in the time, cost, and process contexts?

This checklist was created to know about the contractors' challenges in terms of time, cost, and process during e-tender participation. The following are some of the key points raised by the findings:

Challenges experienced during e-procurement participation in the time contexts-

o Because everyone works on the computer during office hours, the e-GP system sometimes can take longer than the manual system. As a result, when using e-GP, the server can sometimes become unresponsive. As a result, the tender submission is delayed and takes longer.

- Banks do not always cooperate when receiving money for schedules and depositing security money. As a result, it takes longer to begin bidding and causes harassment.

Challenges experienced during e-procurement participation in the cost contexts-

- Hiring a trained individual to submit an e-tender costs roughly 3000-4000 Taka because contractors cannot fill out e-tender documents in the e-GP system. Aside from that, computer shops always want a significant sum.

Challenges experienced during e-procurement participation in the process contexts-

The E-GP system server can become so overburdened that it hangs, preventing the e-tender system from running smoothly.

Because many contractors are unfamiliar with the procedure for dropping an e-tender, it is difficult to do so. Contractors may lose interest in dropping e-tenders in the e-GP system.

Challenges of Banking Service

Checklist: What Problems do you face while depositing e-tender-related (time, cost, and process contexts) money in e-GP registered banks?

This checklist was created to learn about contractors' difficulties depositing money in e-GP system-registered banks. This FGD checklist's data findings are given below.

The money that can be deposited at the bank is a challenge because the bank has a big queue, which can take a long time at times. It may take more than one day in some cases. Therefore, it would be preferable if the bank branch had additional locations.

Some e-GP system bank branches are uninterested in accepting schedule and security money. One branch advises the bidder to check out the other branches. Branch officers claim that they are busy, that they lack training, that entitled officers have been transferred, and so on. As a result, the bidder is subjected to a great deal of harassment, and some bidders are discouraged from submitting an E-tender.

Challenges After e-Tender Award

Checklist: What problems do you face after the e-tender award?

This focus group's purpose was to understand the obstacles or harassment that contractors faced after the e-tender was awarded. During the FGD, the following replies were noted.

Being an e-tender is not an issue; however, some laws and regulations must be altered. The issue is with the subcontract. They are paying the big contractor a commission. After the work is completed, the scheduled payment must be made within one month.

CHAPTER 5

Conclusions and Recommendations

5.1 Introduction

The section entails an overview of the key research findings, the study's main contribution, its answer to its research questions, its final observations, recommendations, and future research directions. After all, the researcher did his best to synthesize all the major points covered in this study.

5.2 Conclusion

The study's findings were supported by data collected from Comilla University's population. As a data collection method, a mixed-method approach was adopted. Following the research methodology, survey questionnaires were established with two study proposal objectives in mind.

More importantly, the demographic data suggested that CoU bidders and PE officers may be trained in the e-GP system multiple times. This will make managing the e-GP systems software a lot easier.

The researcher examines data to determine the challenges of the CoU e-Procurement deployment in terms of time, cost, and process. According to PE officers' replies to e-procurement challenges. 86 per cent of CoU PE officers are currently facing e-Procurement implementation challenges in terms of time, cost, and process. according to the study. Furthermore, 80% of CoU PE officers agree that the current e-G policy guideline, which was published in 2011, should be updated. The CPTU appears to have the right to impose a time limit on e-GP systems TEC meetings.

To collect responses on e-procurement challenges, the researcher used FGD methods fo bidders. Bidders are dissatisfied with the current tendering policy, according to key finding Due to the erroneous assessment matrix system, small bidders are not awarded. Only the mo prominent bidders are given preference. Suggestions for this study have been made based the findings. These proposals will help the CPTU improve the e-GP policy 2011 in the long run. The researcher Analyses data to evaluate the procurement efficiency of manual and e-Procurement purchases of the CoU, which is the research's second goal. The efficiency of a manual tender vs an e-procurement tender was compared in terms of perceived time and cost. The study included 11 variables for this aim: a tender advertisement, tender document preparation, tender document collecting, toc meeting, toc report preparation, tec meeting, tec report preparation, tender dropping, noa issue, contract sign and tender document photocopy. As a result, the e-procurement system outperforms the manual tendering approach in effectiveness and efficiency. In addition, the e-procurement system saves both time and money.

The researcher analyses data to predict the significant effects of numerous factors that influence e-Procurement implementation in CoU development project procuring, which is the third purpose of the research. The researcher suggested a conceptual framework based on the critical literature assessment and research gap analysis. Eight dependent variables were considered in this regard. accountability, procurement governance, dematerialization, legal, regulatory, and policy framework, process improvement, efficiency, enhancing competition, and transparency are all dependent variables in this conceptual framework. The hypothesis was evaluated individually in the study. The hypothesis test's major conclusion was that Ho

(null hypothesis) was rejected in eight cases, and H_a (alternative hypothesis) was accepted. As a result, the proposed conceptual framework has been tested, and it has been concluded that the proposed e-procurement assessment model is appropriate for CoU.

5.3 Recommendations

If implemented by the Ministry of Planning's CPTU, the following recommendations will help CoU support sustainable procurement processes aligned with national priorities and policies and effective and accountable institutions. In addition, the Regulatory, Legal, and Policy Framework will be improved if these recommendations are implemented. The following are potential data analysis insights, expected research outcomes, and study benefits currently being considered. The improvement are:

e-GP Guideline 2011 Update area-specific recommendations for e-GP system

- a) In the e-GP system, TEC membership would be increased to 3 to 5 members under the e-GP system.
- b) In the e-GP system, External members can be added to the TEC.
- c) The e-GP system can alert PE users to complete the TEC meeting within a time frame.
- d) A bill payment system would be integrated into the e-GP system, eliminating the current manual payment system.
- e) The e-GP system policy updating can be improved by using the E-Procurement implementation assessment model established and evaluated in this study.
- f) The e-Procurement assessment model adopts that developed by the study.

Server system Update

- a) The e-GP server system can be an improvement to support massive traffic and avoid hanging during office hours.

E-GP system software Update

- a) The digital signature would include in the e-GP system soon.
- b) Bidders who commit fraud, fake liquid assets, or experience certificates may be denied access to the e-GP System. In addition, PE officials can upload bidders experience certificates to the e-GP system.
- c) The E-GP system would give the bidder's database, including a record of all Bangladesh bidders' job experience.
- d) The software for the E-GP system should be more user-friendly. However, it no appears to be complicated. As a result, the E-GP process can be easier for bidders. e) A single cycle work could clear all bidders' security money in the software.
- f) In the review process, some unnecessary fields can be omitted. Writing issues wi evaluation reports can be eased. The amount of space available for making commen might be increased.
- g) The ability to amend re-tender documents can be added.
- h) Recovering a password would be simple.
- i) The e-auction process can be integrated with the e-GP system.

- j) The e-GP system must be used to begin the procurement process for Intellectual and Professional Services.
- k) In the e-GP system, the debarred company would be excluded from the TEC member review.

Bank System Update for e-GP system

- a) All bank branches must accept schedule and security money from bidders or contractors. As a result, the guidance will be in this direction.
- b) Banks upload liquid asset documents, i.e. bank solvency certificates, to prevent bidders from submitting fraudulent or counterfeit liquid asset documentation.

E-GP Training

- a) Five days of mandatory training for bidders or contractors is required. The certification mechanism can then begin.
- b) Online training can be provided using zoom for remote bidders.
- c) CPTU can provide more than one training for PE officers to enhance their capacity in using e-procurement software effectively.
- d) In this regard, an e-GP training server might be made available to all national training academies to improve e-GP training for PE officials and bidders.

5.4 Future Research Directions

From the study findings and researcher observation, future studies are being proposed to improve and implement more e-procurement.

First, The study of challenges to and possibilities for e-GP system integration of private sector participation.

Second, The survey on stakeholders' satisfaction with e-procurement uses to improve the e-GP system.

Third, A study on GDP growth due to e-GP implementation.

Fourth, A study on e-GP risks prediction and remedies using machine learning to ensure digital security.

5.5 Chapter Summary

This chapter confirmed the conclusions based on the results and discussion of the study. Recommendations are given based on the findings of the study. Finally, future research areas relating to e-GP systems are proposed for academicians, researchers, policymakers, and PE offices.

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Appendix 1: Survey Questionnaire

Title of the Study: Role of Electronic Tendering (e-gp) for Procurement:
A Study on Comilla University

Researcher: Reazul Zannath

SID- 20282005

[This is a survey questionnaire for conducting a research study. It is a part of the academic necessity for the Degree at the Brac University. Your response is valuable for the researcher. The researcher guaranteed you that the information given by you will be kept confidential and will be used only for academic purposes.]

Section A: (Respondent's demographic information)

For PE Officers:

1. Name & Department :
2. Sex : Male Female
3. Age :
4. Educational Qualification : BA (Pass) Graduation Post-Graduation

1. Name
2. Gender
 - o Male
 - o Female
3. Age
4. The highest degree of education
5. Mobile no.
6. Email-
7. Present job designation -
8. Present job place
9. Years of job experience --
10. E-procurement experience (Years)
11. e-GP system role
 - o ORG Admin
 - o OPE-Admin
 - o OPE User
 - o Hope
 - o AO (Authorize officer)
 - o TOC Member
 - o OTEC Member
 - o AU User
 - o Accounts Officer
12. E-procurement training -----times

For Bidders:

1. Name
2. Gender
 - o Male
 - o Female
3. Age
4. The highest degree of education --
5. Mobile no.
6. Email----
7. Total bidding experience (Years) --
8. Total e-Procurement bidding experience (Years) -
9. E-procurement training ----times

Section B: KII (for attaining objective 1)

Unstructured Questionnaires and checklist of Key Informant Interview:

[This is a checklist, which implies that the researcher randomly asks the interviewee according to the flow of discussion. Therefore, the researcher may not need to ask all the questions.]

Persons can be considered (Involved with the CoU e-GP system) as the Key Informant:

1. Director/Equivalent
2. Superintendent Engineer/DD
3. Executive Engineer/AD
4. Section Officer
5. Asst. Engineers
6. Sub Asst. Engineers/AO.
7. Key persons of other stakeholders, if any

Survey Questionnaires and Hypothesis Distribution:

The researcher constructed were all consistent with the objective. The summary information from the research questionnaires and hypotheses is shown in following Table A1.

Table A1 Questionnaire and Hypothesis Distribution

Study Objectives	Section	Question/ Checklist	Respondents
Characteristics of a population	A	Demographic information	Bidders and PE officers
To find the challenges experienced during e-Procurement implementation	B & C	Unstructured survey questionnaires and Checklist	PE officers
To compare the procurement efficiency between traditional purchase and e-Procurement purchase	D	Structured survey questionnaires	Bidders and PE officers

KII Unstructured Questionnaires for PE Officers:

1.1 Do you face any challenges during e-Procurement implementation in time, cost, and process contexts?

- Yes
- No

1.2 Do you think the current e-GP policy (guideline) is adequate?

- Yes
- No

1.3 Do you want to process e-auction tender in the e-GP system?

- Yes
- No

1.4 Do you have any suggestions to update the e-GP Guideline (Regulatory Policy Framework)?

Time: ...

Cost:

Process:..

Others:

[This is a checklist, which implies that the researcher will discuss with the CoU bidders group.]

Bidders

Checklist 1- Do you face any challenges experienced during e-Procurement participation in time, cost, and process contexts?

Yes No

Checklist 2- What problems do you face during deposit e-tender related (time, cost, and process) money in e-GP registered banks?

Yes No

Checklist 3- What problems do you face after the e-tender award?

Yes No

Checklist 4- If you have any other comments or concerns on the e-tender, please mention them.

Section D: Quantitative (for attaining objective 2)

Quantitative Survey Questionnaires for PE Officers:

Comparing between e-Procurement tender system and manual tender system in the context of time and cost

Q 1 Please fill the format below by average approximate cost and time.

the issue in Tender Process	Cost in Taka		Time in days	
	e-Tender	Manual Tender	e-Tender	Manual Tender
Advertisement of tender notice				
Tender documents preparation				
TOC meeting arrangement				
TOC report preparation				
TEC meeting arrangement				
TEC report preparation				
Issuing NOA				
Contract Signing				

Quantitative Survey Questionnaires for Bidders:

Comparing between e-Procurement tender system and manual tender system in the context of time and cost

Ranging from 'Extremely satisfied' to 'Not satisfied' was employed as the researchers have most recommended it that it would reduce the frustration level of respondents and increase response rate and response quality. It also helps to take the decision promptly by respondents. Questionnaires for PE Officers:

Q3.1 Put your opinion by a tick about the accountability of the e-GP system using your e- tender experience.

[Scale: 1= Not Satisfied, 2= Slightly Satisfied, 3= Moderately Satisfied, 4-Very Satisfied, 5- Extremely Satisfied]

Q 3.2 Put your opinion a tick about the procurement governance of the e-GP system using your e-tender experience.

[Scale: 1= Not Satisfied, 2= Slightly Satisfied, 3= Moderately Satisfied, 4-Very Satisfied, 5= Extremely Satisfied]

Q 3.3 Put your opinion by a tick about the dematerialization of the e-tender system using your e-tender experience.

[Scale: 1= Not Satisfied, 2= Slightly Satisfied, 3= Moderately Satisfied, 4-Very Satisfied, 5= Extremely Satisfied]

Q3.4 Put your opinion by a tick about the legal, regulatory, and policy framework of the e- GP system using your e-tender experience.

[Scale: 1= Not Satisfied, 2= Slightly Satisfied, 3= Moderately Satisfied, 4=Very Satisfied, 5= Extremely Satisfied]