Scientific Research Publishing

Comparing the Efficiency of Manual and Electronic Tender Document Preparation: Cost and Time Context

Md. Abdur Rashid[1]* ⓘ, **Mohammad Shorif Uddin[2]** ⓘ

[1]Bangladesh University of Professionals, Dhaka, Bangladesh
[2]Department of Computer Science and Engineering, Jahangirnagar University, Savar, Bangladesh
Email: *rashid.eee.cse@gmail.com, shorifuddin@gmail.com

Abstract

In Bangladesh, both manual and e-GP system is used to perform public procurement. Before tender publication, tender documents have to be prepared by the Procurement Entities (PEs). The problem is that the manual tendering system involves more cost and time in preparing tender documents. The study's purpose is to compare now the efficiency of tender document preparation in the manual system with the e-GP system. This study tests the cost and time involved in tender document preparation, both manual and e-procurement tenders. Sample data was collected from the 11 RHD zones. Structured survey questionnaires were used to collect primary data from the PE officers of RHD. A hypothesis test was performed using the model of independent samples t-test. The test results indicated that e-Procurement tender document preparation costs and time were less than manual tendering. Academicians, researchers, PE officers, and policymakers will benefit from the study's conclusions.

Keywords

Tender Document Preparation Cost, Tender Document Preparation Time,
E-Procurement, T-Test, E-GP System, Public Procurement, RHD

1. Introduction

Electronic Government Procurement (e-GP) was formed in 2011 in response to a World Bank report [1] urging Bangladesh to increase the efficacy, credibility, and transparency of all public procurement. Since 2011, the e-GP system is currently operational in Bangladesh. However, Procurement Entities (PEs) and all

bidders continue to face issues [2] and assessments have yet to be completed following the deployment of the e-GP system. The study's purpose is to see if the cost and time of preparing e-tender documents are cheaper than that of preparing manual tender documents.

Problem Statement

During the tender procedure cycle, the tedious duty at the PE office is preparing Standard Tender Documents (STDs). Tender proposals cannot be published until the standard tender documents are completed. Tender documents are formal paperwork that contains the many points that PE officers must fill out. In a manual tender system, preparing tender documents requires more time and cost. In addition, PE officers may not be interested in creating the document. As a result, the tendering process is delayed.

Study Rationale

One of the study's objectives was "to compare the procurement efficiency of the RHD development project's manual and e-Procurement tenders". It will be demonstrated that e-procurement systems are in a better position to create tender documents. Primary data collected from the RHD field level is used to prove a point via a hypothesis test. This encourages PE officials in RHD to use the e-Procurement system.

This study's original use is to demonstrate the effectiveness and efficiency of Bangladesh's e-procurement system. PE officers will be more aware of manual tenders as a result of the study's findings and will be motivated to use the e-procurement system more.

2. Related Literature

Tender Document Preparation

Tender documents must be prepared whenever the procurement organization has decided to procure goods, works, or services. This tender document is the paper written by a procurement entity's need or desire. The size of the tender document, or the number of pages, is determined by the type of procurement and the contract's total value. The Standard Tender Document (STD) can be downloaded from the CPTU website and then customized for each procurement entity. Tenderers must purchase the STD after the tender notice is issued. The tenderer decides to submit a bid after studying all PE requirements and specifications in the STD.

Standard Tender Documents

"Tender document or request for proposal document" refers to the document issued by the PE to the tenderer or consultant to review and fill out in preparation for submitting a tender or proposal [3]. The Procuring Entities (PEs) provides a particular tender form [4] at the regular cost. The contract conditions and any relevant requirements are printed in this tender form. Tender documents include detailed specifications for the expected goods or services.

The PE offices must complete separate Standard Tender Document (STD)

forms [5] for Goods, Works, and Services. Each STD form has a unique code. Tender document preparation costs and the time involved are higher in the manual tendering approach. On the other side, tender document preparation costs and the time involved are lower in the e-GP system.

3. Research Method

This section intends to explain the study methodology *i.e.* data collection techniques and related issues.

1) Research Design and Data Collection Techniques

The study's goal was to "compare the procurement efficiency of the RHD development project between traditional purchase and e-Procurement purchasing". The RHD in Bangladesh was used to collect the primary data. RHD was chosen because it has been one of the largest departments actively using e-GP for procurement as a pilot basis since 2011 when the system was implemented in Bangladesh. This survey uses structured questionnaires to obtain primary data to achieve the study's purpose. The primary data in this study comes from RHD PE officers who are active in the manual and electronic procurement systems.

2) Target Population

The population was RHD PE officers. Data were collected during visits to the RHDs of multiple Procurement Entity (PE) offices in Bangladesh. Bangladesh's RHD was studied throughout 11 zones, 31 circles, and 70 divisions. The survey used a stratified sample method to select e-Procurement-related PE officers in RHD. The total respondent sample size for the survey question on the cost and time involved in tender document preparation was 70 PE officers in RHD.

3) Validity and Reliability

A pilot study was done with select PE officers in RHD to determine the instrument's reliability. Instruments were finalized and used for data collection after receiving comments from the pilot study. This assured the integrity and reliability of the data.

4) Data Analysis

SPSS software was used to enter and analyze the primary data, because SPSS is one of the top data analysis and inference software. To compare data and test hypotheses from two groups, the independent samples t-test was performed.

Tender Document Preparation Cost

The independent samples t-test compares two groups on a continuous normally distributed variable's mean.

Here, Test Variable(s) *i.e.* two independent variable(s) are:

E-tender documents preparation cost (after e-GP system) and manual tender documents preparation cost (before e-GP system) whose means have been compared between the two groups.

Let's consider, Null Hypothesis H_0: $\mu_1 = \mu_2$.

Alternative Hypothesis H_a: $\mu_1 \neq \mu_2$.

μ_1 = population means for tender documents preparation cost for e-tender.

μ_2 = population means for tender documents preparation cost for manual tender.

Significance level p = α = 0.05.

Confidence interval level = 95%.

Tender Document Preparation Time

The independent samples t-test was done to test compares two groups on the mean value of a continuous normally distributed variable.

Here, Test Variable(s) *i.e.* two independent variable(s) are:

E-tender tender document preparation time (after e-GP system) and manual tender document preparation time (before e-GP system) whose means have been compared between two groups.

Let's consider, Null Hypothesis H_0: $\mu_1 = \mu_2$.

Alternative Hypothesis H_a: $\mu_1 \neq \mu_2$.

μ_1 = population means for tender document preparation time for e-tender.

μ_2 = population means for tender document preparation time for manual.

Significance level p = α = 0.05.

Confidence interval level = 95%.

5) Ethical Considerations

The researcher conducted the questions after obtaining approval from the Ph.D. supervisor. Before questioning PE officers, a formal letter was sent to the Chief Engineer of the RHD in Bangladesh. These PE officers were part of RHD's e-procurement system. Respondents were told that they had the right to refuse to participate in the participation in the study. Respondents were assured that their responses would only be used for research purposes. Anonymity was promised. There were no interviews conducted that were not related to the e-procurement system.

4. Results and Discussions

The findings and their interpretation and analysis are based on primary field data collected following the study's objectives. SPSS software was used to conduct the analysis. In the context of tender document preparation cost and time, a t-test is used to compare procurement efficiency between manual and e-Procurement. PE officers in RHD were the respondents.

Tender Document Preparation Cost

T-test Result

Group statistics of Table 1 show that the average tender documents preparation cost, *i.e.* mean value for e-tender cost and manual system cost, are taka 475.3623 & 7089.1304, respectively.

Table 2 observed from Levene's test that the F value is 50.799 & its Sig. value is 0.000. Here, the sig.-value (0.000) is less than the p-value (0.05), *i.e.* significant. This indicates that equal variances are not assumed here and rely on the second row of output.

Table 1. Group statistics for tender document preparation cost.

Group Statistics					
	Tender Type	N	Mean	Std. Deviation	Std. Error Mean
Taka	E-tender	69	475.3623	798.41862	96.11831
	Manual	69	7089.1304	8637.19670	1039.79629

Source: Researcher's field survey, 2020.

Table 2. Comparing tender document preparation cost.

Independent Samples Test									
		Levene's Test for Equality of Variances		T-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Taka	Equal Variances Assumed	50.799	0.000	−6.334	136	0.0	−6613.76812	1044.22941	−8678.79524	−4548.74099
	Equal Variances Not Assumed			−6.334	69.162	0.0	−6613.76812	1044.22941	−8696.86172	−4530.67451

Source: Researcher's field survey (2020).

The second-row t-value is −6.334, negative, left tailed & the Sig. (2-tailed)/2 = 0.000/2 = 0.000. Here, the sig.-value is less than the p-value, which is significant. This indicates that the Null Hypothesis H_0 is rejected & Alternative Hypothesis H_a is accepted, i.e. $\mu_1 \neq \mu_2$.

Tender Document Preparation Time

T-test Result

The average tender document preparation time, i.e. the mean value for e-tender time and manual system time, is 2.7650 & 7.2571 days, respectively, according to group statistics in Table 3.

Table 4 observed from Levene's test that the F value is 0.015 & its Sig. value is 0.901. Here, the sig.-value (0.901) is bigger than the p-value (0.05), i.e. insignificant. This indicates that equal variances are assumed here and rely on the first row of output.

The first-row t-value is −4.869, negative, left tailed & the Sig. (2-tailed)/2 = 0.000/2 = 0.000. Here, the sig.-value is less than the p-value, which is significant. This indicates that the Null Hypothesis H_0 is rejected & Alternative Hypothesis H_a is accepted, i.e. $\mu_1 \neq \mu_2$.

Table 3. Group statistics for tender document preparation time.

Group Statistics					
	Tender Type	N	Mean	Std. Deviation	Std. Error Mean
Days	E-tender	70	2.7650	5.64647	0.67488
	Manual	70	7.2571	5.26318	0.62907

Source: Researcher's field survey (2020).

Table 4. Comparing tender document preparation time.

Independent Samples Test									
		Levene's Test for Equality of Variances		T-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Days	Equal Variances Assumed	0.015	0.901	−4.869	138	0.000	−4.49214	0.92260	−6.31641	−2.66788
	Equal Variances Not Assumed			−4.869	137.324	0.000	−4.49214	0.92260	−6.31649	−2.66780

Source: Researcher's field survey (2020).

5. Conclusions

The study's findings are based on data collected from Bangladesh's RHD population. Structured questionnaires were developed following the research methodology and with the study's objectives in mind. Eleven RHD zones were used to collect data. The Independent Sample t-test was used to analyze survey sample data. The researcher analyzes data to determine the procurement efficiency in the tender document preparation of manual and e-procurement for the RHD public procurement context of time and cost. The efficiency of a manual tender vs. an e- procurement tender is compared to tender document preparation by the RHD officers.

The average tender document preparation cost of a PE officer, *i.e.* the mean value for e-tender cost and manual system cost Bangladesh Taka 475.3623 and 7089.1304, respectively. This suggests the cost of e-tender tender document preparation is less than the cost of manual tender document preparation. The average tender document preparation time, *i.e.* the mean value for e-tender time and manual system time is 2.7650 and 7.2571 days, respectively. So, tested that e-tender document preparation time is less than the manual method.

Independent sample t-test results revealed that the sig.-value = 0.00, which is smaller than the p-value, which is significant. This means the Null Hypothesis H_0 has been rejected and the Alternative Hypothesis H_a has been accepted. In

comparison to a manual tender system, the t-test model fit and ensured less cost and time in the e-procurement tender document preparation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] World Bank (2002) Bangladesh Country Procurement Assessment Report. Report No. 24144-BD, World Bank, Washington DC.

[2] Akando, Md.Z.I. (2016) Challenges and Prospects of E-Procurement in Bangladesh: A Study on Roads and Highways Department. Master's Thesis, BRAC University, Dhaka.
http://dspace.bracu.ac.bd/xmlui/bitstream/handle/10361/6516/14272015_MAGD.pdf?sequence%20=%201&isAllowed%20=%20y

[3] IMED Proggapon (2011) Bangladesh E-Gp Guideline.
https://www.eprocure.gov.bd/help/guidelines/eGP_Guidelines.pdf

[4] Dream Civil (2022) What Is Tender?: 5 Steps in Tender Preparation|Tender Notice.
https://dreamcivil.com/tender-preparation/

[5] CPTU (2022) Standard Tender Documents (STD).
https://cptu.gov.bd/standard-documents/standard-tender-document.html