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Abstract

Bangladesh has used a manual tendering system since its inception, following the legislative direction of PPA-2006 and PPR-2008. Manual tendering has long been a source of concern for bidders when dropping tender documents in terms of tension, cost and time. To overcome this problem, the Government of Bangladesh launched the e-Procurement system in 2011 under the e-GP guidelines. Following the successful pilot testing conducted under the umbrella of the CPTU, all public Procurement Entities (PE) are attempting to implement e-procurement tenders. This study aims to test the cost and time involved in tender dropping both manual and e-procurement tenders. Roads and Highways Department (RHD) is chosen as population. Sample data was collected from the 11 RHD zones. Structured survey questionnaires were made to collect primary data from the bidders of RHD. The independent samples t-test was used to perform a hypothesis test of two groups like tender dropping cost and tender dropping time. The test results indicated that e-Procurement tender dropping costs and time were less than manual tendering. Academicians, students, practitioners, researchers, and policymakers will benefit from the study's conclusions.

Keywords: *Tender dropping cost, Tender dropping time, e-Procurement, t-test, e-GP Guideline, PPA-2006, PPR-2008*

1.0 Introduction

Electronic Government Procurement (e-GP) was established in response to a World Bank suggestion (World Bank, 2002) to improve the efficacy, credibility, and transparency of all public procurement in Bangladesh. The e-GP system is now operational, however procurement entities (PE) and all bidders continue to experience challenges (Akando & Islam, 2016; Corsi, 2006), and assessments have yet to be completed following the e-GP system's deployment. The goal of the study is to perform a hypothesis test whether the e-tender dropping cost and time are less with manual tender.

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There are some drawbacks in tender dropping that cause tension due to collision among the bidders. There are some bidders who want to capture the wooden made physical tender box so that others can not submit the tender bids. Small and powerless bidders are not able to drop the tender document in the tender box due to fear and personal safety. Physical appearance when tender dropping is a major barrier in this respect. In the manual tendering process distance bidders can not drop tender for involve travel cost and time. Due to collisions among bidders in PE dropping offices, tender document submission is a big problem in a manual tendering method. PE offices are also tense as a result of this. PE offices opted to put multiple tender dropping boxes in different offices to avoid tension. As a result, bidders encounter difficulties in submitting tender documents due to fear, cost, and time constraints. So tender submissions became fewer and competition became less. So transparency, accountability and competency are lost in the manual tender process. The use of an e-procurement system application website (www.eprocure.gov.bd) assisted in resolving the issue from 2011. The aim (Alam, 2011) of digital Bangladesh is to remove digital divide. By the introduction of e-GP system in public procurement urban and rural tenderers are capable dropping tender schedule.

It was an one study objective 'To compare the procurement efficiency of the RHD development project's manual and e-Procurement tenders'. It's now time to evaluate the costs and time commitments of bidders abandoning tenders dropping problems. Manual tendering vs. e-procurement tendering: which is more effective? This is justified by the hypothesis test in the study. The novelty of this study is to prove the effectiveness and efficiency of the e-procurement system in Bangladesh. By the study result, bidders will be more aware of manual tender and will be energized to adopt more in e-procurement system.

2.0 Related Literature

Public Procurement tools PPA, PPR & e-GP Guideline

Public Procurement Act 2006 (PPA 2006) is the primary legislation (CPTU, 2011) , and it focuses on main public procurement issues. The PPA 2006 directly requires obligatory adoption of rules/regulations on various occasions. Objectives of the PPA 2006 in Bangladesh are to establish transparency, establish accountability, ensure equitable treatment, and free and fair competition

Public Procurement Rules (PPR 2008) is the secondary legislation (CPTU, 2011) addresses those issues that, while vital for a proper and effective public procurement process, are best spelt out in secondary legislation. PPR 2008 was prepared based on the PPA 2006 and other relevant implementation documents, formats, models, guidelines, and instructions.

e-GP Guideline 2011 is the main guidelines for implementing the e-GP system in Bangladesh (CPTU, 2011) are outlined in this document. Section 65 of the PPA 2006 and rule 128 of the PPR 2008 were used to create this e-GP Guideline. The recommendations are also in accordance with the current ICT Act 2009, the Right to Information (R2I) Act 2009, and international electronic procurement practices. The e-GP guidelines guaranteed that the public procurement system was transparent and accountable.

Implementation of an electronic procurement system

CPTU started to implement the e-GP system as pilot basis choosing four big procuring agencies in Bangladesh. The agencies are: the Local Government Engineering Department, the Roads and Highways Department, the Water Development Board, and the Rural Electrification Board. The four pilot agencies accounted for approximately 40% of the national procurement budget for a wide range of goods, works, and services. The World Bank revealed a report (World Bank, 2021) on the e-GP platform. It found that it made every step of the procurement process

online, including registration, procurement planning, tender submission, evaluations, awarding, contracting, and payments, all of which took place online.

e-Lodgment / e-Submission

In Bangladesh, e-Lodgment (IMED progapon, 2011) refers to the submission of tender documents via the e-GP system. This submission assists in the legal binding of registered tenderers to a specific tender that has been posted on the www.eprocure.gov.bd website. This submission also confirms that bidders are eligible to participate in a tender and prepared for the tender competition, i.e. tender evaluation.

The tenderer's (Nazmul, Aknur, & Salahuddin, 2020) submissions are encrypted and stored in the e-GP database. Only the tender opening committee has access to the tender, and only after the indicated opening time can tenderers be identified. The identity of the participating tenderers and the contents of the submitted tenders are undisclosed to the opening committee members/ procuring entity/ eGP administrator, tenderers, or any other user before the tender is opened.

e-lodgment/e-submission advantages-

- It helps to submit/dropping tender documents from remote places also from abroad via internet.
- It helps to reduce tender dropping cost.
- It helps to reduce tender dropping time.
- It helps to avoid any collision among the bidders when tender dropping.
- It has been reduced digital divide.
- Bidders can save and encrypts all documents at central server hosted by CPTU server. Can also edit tender documents before submit/drop.
- and finally can tender documents can submit any time before the last date dropping time.
- All of documents are safe because it is saved at server by encryption and decryption is only possible by bidders himself by login. Bidders identity is hide before opening the tender by tender opening committee (TOC) members.

e-lodgment/e-submission Process

Tender notices can be published on the e-GP website by procuring entities (Nazmul, Aknur & Salahuddin, 2020). Tenderers can access the e-GP System Dashboard and e-GP functionalities for participating in e-Tendering only after completing the registration process. To participate in the tender, the tenderer/applicant must pay the stipulated fee for the tender document through scheduled banks listed with the e-GP portal. Tenderers can access the e-GP System to obtain a free copy of the tender document prepared by the Procuring Entity (PE). Tenderers must pay fees defined by the Procuring Entity (if applicable) for the document through the e-GP registered bank network prior to the creation of the tender. Fees can be paid in cash, by demand draft, or by check, and the bank will update the payment in the e-GP System. Credit and debit cards are also accepted for payment.

3.0 Research Method

The purpose of research design is to translate a research problem (Asenahabi, 2019, p. 76) into data that can be analyzed for the least amount of money in order to provide accurate answers to research-based questions. The study objective was 'To compare the procurement efficiency between traditional purchase and e-Procurement purchase of the RHD development project'. The study used quantitative and qualitative research approaches in a mixed-methods approach.

Survey questionnaires were used in the investigation. Respondents were bidders from the RHD. The RHD was chosen because, since 2011, when the e-GP system was launched in Bangladesh, it has been one of the largest departments actively using e-GP for procurement as pilot basis. Visits to the RHDs of several procurement entity (PE) offices in Bangladesh produced a plethora of data. The study covered 11 zones, 31 circles, and 70 divisions of Bangladesh's RHD. To fulfill the study's goal, this survey employs structured questionnaires. The questionnaires were approved by PhD supervisor and administered by the researcher. Document analysis and literature reviews were used to compile the secondary data. To choose e-Procurement-related bidders in RHD, the survey employed a stratified sample method. For survey questioners, the total sample size was 145. The independent samples t-test was used to compare data and also testing hypothesis from two groups using SPSS software.

4.0 Results and Discussion

4.1 Demographic Data Analysis

Q- What proportion of the respondents (bidders) are male and female in RHD?

Table 1: Gender Statistics of Bidders

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	145	100.0	100.0	100.0

Source: Researcher's Field Survey, 2020

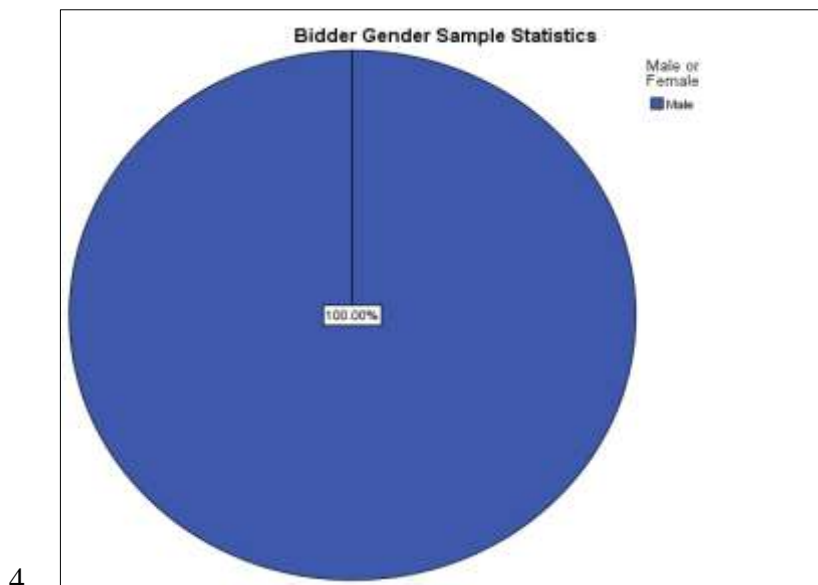


Figure 1: Bidder's gender statistics

Source: Researcher's Field Survey, 2020

Table 1 and Figure 1 show that all bidders were male. No female bidder responded to RHD e-GP bidding process.

Q- How dispersed the respondent (Bidders) age are?

Table 2: Bidders Age Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Age in years	145	48	27	75	46.10	8.974	.097	.201	.257	.400
Valid N (listwise)	145									

Source: Researcher's Field Survey, 2020

The findings in Table 2 indicated that bidders respondents' mean age was 46.10 years. The standard deviation of the age was 8.974, proving that respondents were of homogeneous age that started from 27 years and ended by 75 years. So, conclude that new, medium and highly experienced bidders' respondent is involved in the e-procurement system in RHD.

4.2 T-Test for Comparing Procurement Efficiency between Manual Procurement and E-Procurement

The study compared manual procurement efficiency to RHD e-Procurement efficiency. The study's purpose was to see how the e-GP system improved public procurement cost and time savings. RHD bidders were interviewed. The efficiency of the e-GP system was compared to the manual tendering system by 139 bidders. To compare the mean values of the two groups, an independent samples t-test was used.

Tender Dropping Cost

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

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

tender dropping cost (e-GP system) and manual tender dropping cost (manual system) whose means have been compared between the two groups.

Let consider, Null hypothesis $H_0: \mu_1 = \mu_2$

Alternative hypothesis $H_a: \mu_1 \neq \mu_2$

μ_1 = population means for tender dropping cost for e-tender.

μ_2 = population means for tender dropping cost for manual tender.

Significance level $p=\alpha = 0.05$

Confidence interval level = 95%

Table 3: Group Statistics for Tender Dropping Cost

	Tender Type	N	Mean	Std. Deviation	Std. Error Mean
Taka	Etender	139	776.0432	1282.91935	108.81580
	Manual	139	1626.6187	3189.42036	270.52310

Source: Researcher’s Field Survey, 2020

The average tender dropping cost of a bidder, i.e. the mean value for e-tender cost and manual system cost, is taka 776.0432 and 1626.6187, respectively, according to group statistics in Table 3. This suggests that the current cost of e-tender tender dropping is less than the cost of manual tender dropping.

Table 4: Comparing Tender Dropping Cost

	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	7.333	.007	-2.917	276	.004	-850.57554	291.58811	-1424.59483	-276.55624
	Equal variances not assumed			-2.917	181.517	.004	-850.57554	291.58811	-1425.91365	-275.23743

Source: Researcher's Field Survey, 2020

But from the Independent Samples T-Test Table 4, it was observed from Levene's test that the F value is 7.333 & its Sig. value is 0 .007. Here, sig value (.007) is greater than p-value (0.05), i.e. which is not significant. This indicates equal variances assumed here and rely on the first row of output. The first-row t value is -2.917, negative, left tailed & the Sig. (2-tailed)/2 = 0.004/2= 0.002. Here, the sig value is less than the p-value, which is significant. This indicates that the Null hypothesis H_0 is rejected & the alternative hypothesis H_a is accepted, i.e. $\mu_1 \neq \mu_2$. This states that *e-tender tender dropping average cost is not equal to manual tender dropping cost*.

Tender Dropping 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:

tender dropping time (e-GP system) and manual tender dropping time (manual system) whose means have been compared between the two groups.

Let consider, Null hypothesis $H_0: \mu_1 = \mu_2$

Alternative hypothesis $H_a: \mu_1 \neq \mu_2$

μ_1 = population means for tender dropping time for e-tender.

μ_2 = population means for tender dropping time for manual tender.

Significance level $p = \alpha = 0.05$

Confidence interval level = 95%

Table 5: Group Statistics for Tender Dropping Time

	Tender Type	N	Mean	Std. Deviation	Std. Error Mean
Days	Etender	139	.6263	2.21671	.18802
	Manual	139	2.5820	2.07382	.17590

Source: Researcher's Field Survey, 2020

The average tender dropping time, i.e. the mean value for e-tender time and manual system time, is .6263 and 2.5820 days, respectively, according to group statistics in Table 5. This means that the current e-tender dropping time is faster than the manual method.

Table 6: Comparing Tender Dropping Time between E-Tender and Manual Tender

	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	18.851	.000	-7.596	276	.000	-1.95568	.25747	-2.46253	-1.44882
	Equal variances not assumed			-7.596	274.784	.000	-1.95568	.25747	-2.46254	-1.44881

Source: Researcher's Field Survey, 2020

However, Levene's test observed from the Independent Samples T-Test Table 6 that the F value is 18.851 & its Sig. value is .000. Here, the sig value (.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. The second-row t value is -7.596, 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. $\mu_1 \neq \mu_2$. This states that e-tender tender dropping average time is not equal to manual tender dropping average time.

5. Conclusions

The study's findings are based on data collected from Bangladesh's RHD population. A structured questionnaires were developed in accordance with 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 analyze survey sample data using SPSS software. The researcher analyzes data in order to determine the procurement efficiency in the tender dropping 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 as compared to tender documents dropping by the RHD bidders. The findings of the study indicate that all bidders were male. No female bidder responded to RHD e-GP bidding process. Demographic findings also revealed that respondents were of homogeneous age that started from 27 years and ended by 75 years. So, conclude that new, medium and highly experienced bidders' respondent is involved in the e-procurement system in RHD.

The average tender dropping cost of a bidder, i.e. the mean value for e-tender cost and manual system cost, is taka 776.0432 and 1626.6187, respectively. This suggests the cost of e-tender tender dropping is less than the cost of manual tender dropping. The average tender dropping time, i.e. the mean value for e-tender time and manual system time, is .6263 and 2.5820 days, respectively. So tested that e-tender dropping time is faster than the manual method.

Independent sample t-test results for tender dropping cost and time 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 dropping.

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