International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 11 Issue 10 ǁ October 2023 ǁ PP. 406-410

Hypothesis Test on Boosting Competition in an e-Procurement Implementation Assessment Model Framework: A Case Study on the Roads and Highways Division in Bangladesh

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Abstract
Using the policy tools PPA-2006 and PPR-2008, the use of manual tendering by public procurement agencies has traditionally been continues. But it had some challenges in terms of boosting bidders competition i.e. bidding competition was not more. In 2011, the e-Government Procurement (e-GP) guideline 2011 is obtained to address this issue. However, since the e-GP system was first implemented, a great deal of investigations or analyses have not been conducted to determine how well its tender competition is boosting. This research aims to investigate the essential variables that contribute to the successful implementation of an electronic procurement system in Bangladesh. Another goal is to identify e-procurement implementation issues and build an efficient e-procurement implementation assessment model. Survey questionnaires were employed to collect data from eleven Roads and Highways Division (RHD) zones as a population. The study sample size of the bidders was 139. Hypothesis test has been done choosing MLR model of SPSS software. Boosting competition was one of the eight hypothesis tests in the study. Findings proved that proposed model was fit. The study's findings will help academicians, students, e-GP users, procurement professionals, researchers, and policy improvement. The study's novel contribution is developing a theoretical design for the e-procurement implementation assessment model in RHD.

Keywords: *e-GP guideline 2011, e-Procurement assessment model, Hypothesis test, e-Procurement, Boosting competition.*

Date of Submission: 18-10-2023 Date of acceptance: 02-11-2023

I. Introduction

1.1 Introduction

The Central Procurement Technical Unit (CPTU) promulgated the Public Procurement Act 2006 (IPPA 2010) and the Public Procurement Rules 2008 to create a sufficient legal framework. Following that, Bangladesh used the old manual tendering procedure governed by the Acts and Rules. Despite this, public procurement agencies remain challenged in ensuring an efficient, free, fair, competitive, and transparent system. The manual tendering method is prone to abuse by vested interest groups due to its scope.

The Organisation for Economic Co-operation and Development (OECD) published report to increase competition and combat collusion in public procurement procedures in all member and non-members countries. The recommendation (OECD Report 2016) adherents to "*strive for public procurement tenders at all levels of government that are designed to promote more effective competition and to reduce the risk of bid rigging while ensuring overall value for money*".

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. In addition, e-GP was developed in response to a World Bank recommendation (World Bank 2002) to enhance the effectiveness, credibility and transparency of all public procurement in Bangladesh. On the other hand, e-Procurement (CPTU About 2021) is a reliable web-based application platform for engaging with the bidder's community in a paperless environment free of challenges, delays, and physical insecurity (Sanewu 2016). The e-GP system is currently in use. However, PEs and all bidders continue encountering complications, and assessments haven't been completed

since the e-GP system's deployment (Akando 2016; Marcella 2006). The final goal is to forecast the critical effects of various factors impacting the deployment of e-Procurement in RHD that helped to design an e-procurement assessment model.

The study implications are that academicians, students, researchers, bidding communities, and policymakers will be benefited from the findings. The ultimate goal (Becker 2018) is to conduct a KPI (key performance indicator)-based quality evaluation to identify potential flaws and difficulties in future e-tendering procedures to support and enhance future e-tendering processes.

1.2 Background of the Study

The assessment of the e-procurement system utilized by RHD to carry out purchases is the main focus of this study. The key concern is that the recently developed e-procurement assessment model had never been the subject of prior RHD studies. As a result, there is a gap in this context because there is no secondary data or findings. 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. However, some factors related to challenges are identified in the study. But no e-procurement assessment model on RHD was proposed and had no hypothesis tests. On the other hand, this study is carried out on eight dependent variables and thirty three independent variables correspondingly. This article reveals the result of one dependent variable *boosting competition* and its related three independent variables.

1.3 The Rationale of the Study

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 e-GP policy/guideline enhancement, this form of assessment data will be trustworthy, i.e. timely.

1.4 Research Question

To evaluate the e-GP platform, which was launched in 2011, a better e-Procurement assessment model can be created. As a result, the central research questions of the study were:
Q. What are the different factors that influence the adoption of the e-procurement implementation assessment model in RHD?

1.5 Specific Objective

Following the research question, beneath objective was taken into consideration to make a hypothesis and survey questionnaires.
Objective- To predict the significant effects of different factors influencing adopting the e-Procurement implementation assessment model in RHD development project procuring.

1.6 Motivation and Novelty

The study's motivation is to theoretical design an e-procurement implementation assessment model for RHD in Bangladesh. The theory is that the e-procurement assessment model will contribute to overcoming shortcomings and establishing a sustainable e-procurement system in Bangladesh. Boosting competition is one of the factors in the assessment framework. The novelty of the study is in the theoretical design of a new e-procurement implementation evaluation conceptual framework and model, which has been created for the first time in the RHD of Bangladesh. Additionally, a hypothesis test was conducted utilizing to assess the fitness of the model.

II. Literature Review

2.1 Theoretical Review

The contingency theory was believed in the study (Candela A. & Ulises F. 2022). This theory helped to put idea about improvement organizational performance in contingent. E-procurement adoption helped to enhance competions among bidders and added value for money in a procurement entity.

2.2 Empirical Review

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 aided in developing the study's conceptual assessment model framework. To build a conceptual framework for the in-depth study (Rashid and Uddin 2019) and to pursue data appropriately using SPSS software, variables are divided into independent and dependent variables, as shown in **Table 2.1**.

The term "success factors" outlines the particular 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 analyse 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.

Table 2.1 Variables Identification for the Proposed Assessment Framework

SL	Dependent Variable	Independent Variable
1.	*boosting competition*	*1) fair and open competition;* *2) standard tender specification;* 3) *distance barrier*

Data Source: Literature Review Survey, 2020

III. Methodology

All bidders of Roads and Highways Department (RHD) in Bangladesh were population. The study used survey questionnaires. The RHD bidders were considered respondents. The scope of the study was four wings of RHD in Bangladesh, which are 11 zones, 31 circles, and 70 divisions. Visited the RHD 11 zones of various procurement entity (PE) offices, yielded significant data. The survey's sample size bidders were 139 respondents. E-Procurement related bidders in RHD were randomly selected for the survey using a stratified sampling technique. All questionnaires were created following the study's objective. Data was collected from bidders with a 5-point Likert scale [Scale: 1= Not Satisfied, 2= Slightly Satisfied, 3= Moderately Satisfied, 4=Very Satisfied, 5= Extremely Satisfied]. The researcher used SPSS software for analysis. Multiple linear regression analysis was used to show the relationship of dependent with independent variables.

Objective Wise Data Collection Tools

Table 3.1 Objective-Wise Data Collection Tools

Study Objective	Question	Motivation	Tools
To predict the significant effects of different factors influencing adopting the e-Procurement implementation assessment model in RHD development project procuring.	*What are the different factors that influence the adoption of the e-procurement implementation assessment model in RHD?*	To test factors that contributes at e-procurement assessment.	Structured survey questionnaire (5 point likert scale)

IV. Results and Findings

Hypothesis– Effective e-Procurement implementation assessment significantly depends on boosting competition.

To assess the e-tender effectiveness on *boosting competition* had 4 proposed variables from conceptual framework of **Table 2.1**.

Inferential test:

From conceptual framework, variables are-

dependent variable Y = *boosting competition*

Three independent variables are

X1= *fair and open competition;*

X2= *standard tender specification;*

X3= *distance barrier;*

Proposed regression model is $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon_i$

Consider that, X influence Y, hence β_1, β_2, β_3 would exist. Value of β_1, β_2, β_3 cannot be zero.

Null hypothesis H_o: $\beta_1 = 0, \beta_2 = 0, \beta_3 = 0$

Alternative hypothesis H_a: $\beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0$

Table 4.1 Bidders Respondents' Statistics of Boosting Competition

	Mean	Std. Deviation	N
Boosting competition	3.80	.773	139
Fair and Open Competition	3.42	.992	139
tender specification	3.56	.693	139
Reduce distance Barrier	3.76	.779	139

Data Source: Field Survey, 2020

Table 4.1 shows that the total number of bidders who responded was 139. The mean value of the 4 variables is also seen as 3.80, 3.42, 3.56, and 3.76.

Table 4.2 Model Summary of Correlation on Boosting Competition

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.954[a]	.909	.907	.235	.909	450.893	3	135	.000

a. Predictors: (Constant), Reduce distance Barrier, Fair and Open Competition, tender specification

Data Source: Field Survey, 2020

The model summary **Table 4.2** provides the *R*-value representing the simple correlation of 0.954, which indicates a degree of correlation. Therefore, the analysed correlation value is 95.4%, indicating a positive strong correlation coefficient. From the findings, the R^2 value of **Table 4.2**, the dependent variable '*boosting competition'* has 90.9% depend upon three independent variables. This R^2 value indicates that the three independent variables can predict 90.9% of the variance in boosting competition.

Table 4.3 Regression Fit Test (ANOVA) on Boosting Competition

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	74.886	3	24.962	450.893	.000[b]
	Residual	7.474	135	.055		
	Total	82.360	138			

a. Dependent Variable: Boosting competition

b. Predictors: (Constant), Reduce distance Barrier, Fair and Open Competition, tender specification

Data Source: Field Survey, 2020

From the ANOVA **Table 4.3** (sig=.000; sig value <.005) H_o is rejected. So, the regression model predicts the dependent variable *boosting competition* significantly.

V. Discussion of the Findings

The Analysed correlation value is 95.4%, indicating a high (Evans 1996) degree (positive strong) correlation. The R^2 value of the dependent variable '*boosting competition'* has 90.9%, depending upon three independent variables. The study got the sig value is 0.00 which is less than the p-value. So, overall, the regression model is significant and statistically fit. According to the test result described above, efficient e-Procurement implementation evaluation significantly boosts competition.

VI. Conclusion

The RHD has been one of the largest public procurement departments of using the e-GP system in Bangladesh since 2011. This is why it was chosen bidders as population. As a data collection method, a survey questioner approach was adopted. Following the research methodology, survey questionnaires and hypotheses were established with study proposal objectives in mind. The data was gathered from eleven RHD zones around the country. MLR of SPSS software was used to enter and analyze survey sample data.

The researcher analyses data to predict the significant effects of numerous factors that influence e-Procurement implementation in RHD procuring. The researcher suggested a conceptual framework based on the critical literature assessment and research gap analysis. Dependent variable *boosting competition* in this conceptual framework had 3 independent variables. The hypothesis test's major conclusion was that H_o (null hypothesis) was rejected and H_a (alternative hypothesis) was accepted. As a result, it has been concluded that boosting competition is the factor in assessing effective e-procurement implementation. According to the research, the proposed approach for evaluating e-Procurement implementation can be utilized to improve e-procurement. Also, update the policy guidelines.

Conflicts of Interest: The authors declare no conflict of interest.

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