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Analysis & Optimization to Improve the Tedious Tender Process in Civil Construction Industry

Shilpa R. Mahajan[1]

Assistance Professor .Civil Engineering Department, GSMCOE, SavitribaiPhule Pune University

ABSTRACT- The tender evaluation processes requires the development of necessary and sufficient criteria. Selecting a suitable contractor to execute a particular project is an important decision for the client to take. Awarding construction contracts based on the price only is not always a successful strategy as it could result in construction delays and cost overruns. The decision to bid is a major financial decision because of two reasons. First, the contractor assumes substantial costs for the preparations of the estimates and the tender at the risk of not recovering them if he is not awarded the job. Second, and most importantly, the contractor commits himself to investment in the construction of the project if he wins the tender.

1.1 Introduction

Building construction estimating is the determination of probable construction costs of any given project. Many items in influence and contribute of the cost of project, each item must be Analyzed, qualified, and priced because the estimate is prepared before the actual estimate. Construction ,much study and thought must be put into the construction document. The Estimator. Who can visualize the project and accurately determine its cost will become one of the most important. Persons in any construction company. For project constructed with the design-tender-built (DBB) delivery system, it is necessary for contractors to submit a competitive cost estimate for the project. The competition in construction tendering is intense with multiple firms vying for a single project. To say in business, a contractor must be the lowest-qualified tenderer on a certain number of projects, while maintenance an acceptable profit margin. This profit margin provides the general contractor an acceptable rate of return and competition for the risk associated with the project. Because the estimate is prepared from the working drawing and the project manual for a building the ability of the estimator to visualize all of the different phases of the construction project becomes a prime ingredient in successful tendering The working drawing usually contain information relative to the design, location dimension and Construction of the project, while the project manual is a written supplement to the drawing and Includes information pertaining to materials and workmanship, as well as information about the Tendering process. The working drawing and the project manual constitute the majority of the contract documents, define the scope of the work, and must be considered together when preparing an estimate. The two complement each other, and they often overlap in the information they convey. The tender submitted must be based on scope work provided by the owner or the architect. The estimator is responsible for including everything contained in the drawings and the project manual in the submitted, because of the complexity of the drawing and the project manual, coupled with the potential cost of an error, the estimator must read everything thoroughly and recheck all items. Initially the estimator can begin the process of quantifying of all the materials presented. Every item included the estimate must contain as much information as possible. The quantities determined for the estimate. will ultimately be used to order and purchase the needed materials. The estimated quantities and their associated projected costs will becomes the basis of project controls in the field. Estimating the ultimate cost of a project required the integration of many variable . These variables fall into either direct field costs or indirect field costs are also referred to as general conditions or projects overhead cost in building construction. The direct field costs are the material, labor equipment, or subcontracted items that are permanently and physically intergraded into the

building .for example, the labor and materials for the foundation of the buildings would be a direct field cost. The indirect field costs are the cost for the items that are required to support the field construction efforts .for example, the project site office would be a general conditions cost in addition factors such as weather transportation soil conditions labor strikes materials availability, and subcontractor availability need to be intergraded in to the estimate. Regardless of the variables involved

Estimator must strive to prepare as a accurate an estimate as possible. Since subcontractors or specially contractors may perform much of the work in the field the estimator must be able complexity of on estimate requires organization estimators best judgment complete specially contractors (subcontractors) tenders accurate quantity takes off and accurate records of completed projects

1.2 Introduction to Tendering

Tendering is the process whereby the prime contractor receives subcontractor and vendor prices for labor, material and \or the combination of the two. It is the systematic process of simplifying the facts, reducing errors and omissions, relaying upon speed and efficiency to produce the relative accurate results. Tension rise because of the mental concentration required, apprehensive over possible errors and anxiety regarding financial success or failure. It has been said that during the construction there is a more competitive pressure and more performance intensity than in any other industry.

In tendering, one is dealing with many divisions of the specifications, both broad and narrow scope in nature. Sub contractor and vendor quotations are matched to the specifications by the CSI 16 division format. The various sub contractors and vendor trades, federal regulations make a number crunching within a few hours of tender time is a major feat.

Bhushan Ratekar[1] his Studies in Tender/no tender Decision Various researchers have endeavored to establish a systematic tender/no tender decision process based on the factors that influence construction tender/no tender decisions. **Tejas C. Patil [2]** gave the rapid evolution of e-commerce in the past few years has introduced new ways for organizations to perform tendering processes and participate in tenderings **Friedman [3]** has considered the strategy of how to win a tender. The results of that study called for maximization of the expected profit from a tender in which each competitor concurrently submits one closed tender. It was found that the tenderer should select the mark-up on cost that maximizes expected value of the profit. **Gates[4]** re-interpreted Friedman' s strategy for a single tender into a general strategy with general applicability of a profit maximizing pricing model for tendering. There are many similarities between the Friedman and Gates papers (Runeson and Skitmore, 1999). However, subsequent work by Gates (1983) took a nonmathematical decision support model based on the Delphi technique, and reformulated. **Byung Gyoo Kang [5]** This work has inspected and looked at customer's perspective and contractor's perspective on focused tendering in the Sudan gathering industry. **Thogare N. Shridhara [6]** this paper concentrates on the improvement of a Water-DSS for configuration of treatment plant in Karkala Town, Udupi District of India. The planned apparatus is basic, precise, adaptable, competent and all inclusive, easily flexible to any comparative traditionalist treatment plant. Water-DSS1 is consequently recommended for general use in toward the day's end mitigating water contributes challenges.

2.Objectives

- To examine the execution of public claimed construction projects which are granted by the most minimal bidder offer honoring system in India.
- To investigate several issues and to find, how to formulate the bidding price and the recommendation in bidding process .

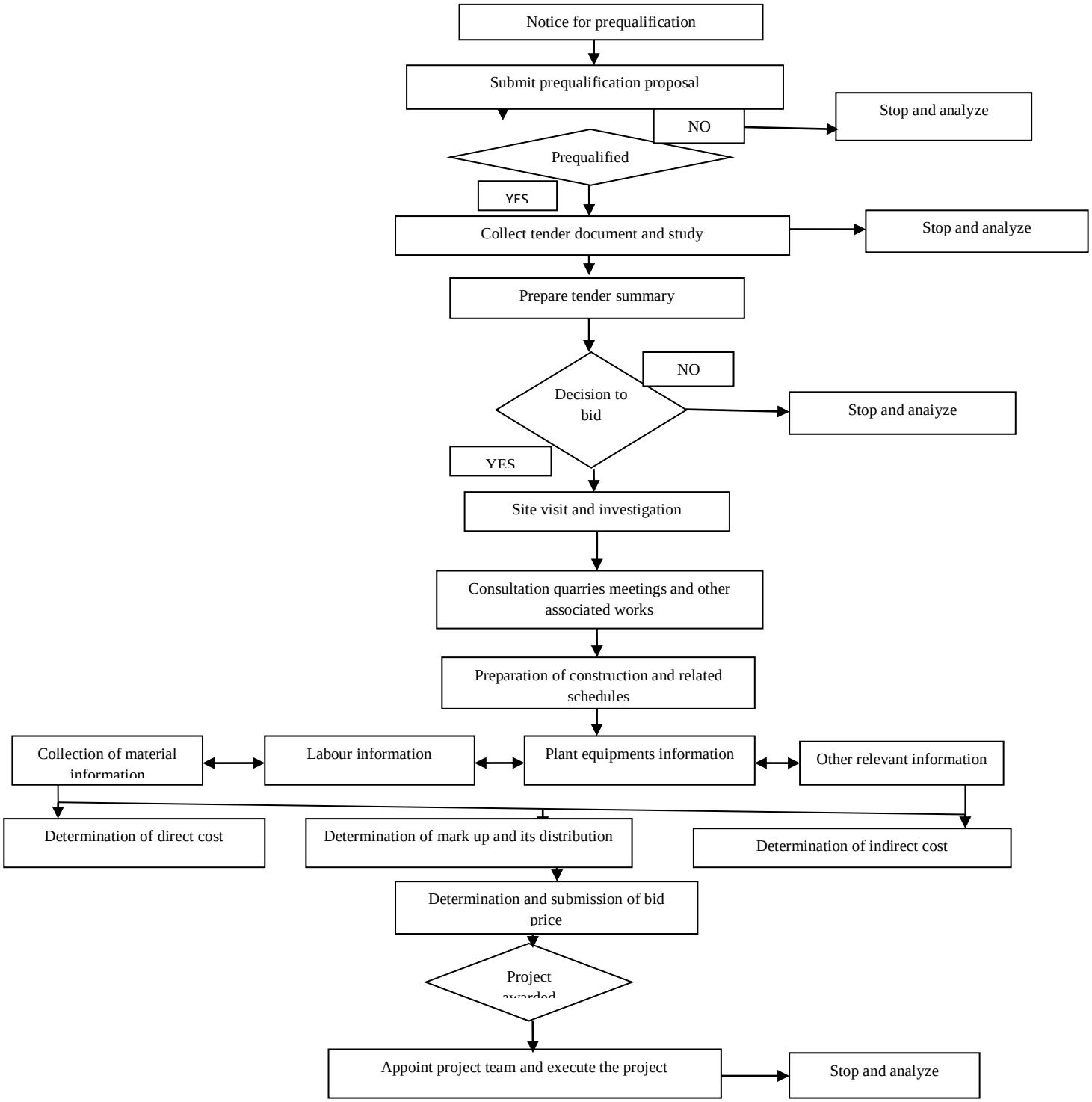
- To carry out fare thought which can be easily used to solve bidding tedious process.
- The present construction Bidding process, the lowest bidderahs to get awarded and it is tedious to justify the Bidding process. By analyzing the different parameters like Experience, Class of the registration, Qualification Rating, Financial standards and Work done, by formulating them in excel sheet and calculating the bidding price by using different formulae we can get better result and can give the justification easily.
- To decide Proper approach in bidding procedure and bidding price issues in the construction industry.
- To decide strategies to lay coverage plan which will justify the bidding price in the construction industry.
- To do an investigation of the bidding criteria and preparing a fair module to which our system can support and enhance the bidding procedure.

3.Methodology

The present work goes for the analysis and investigation of the thought of the Using modified tendering process formulation and calculation of tendering amount based on the structure of tendering criteria. The known parameter has dependably been firmly connected to the client prerequisites for particular work, tendering and contract system. The tendering procedure and the issuing relies on upon an expansive number of variables which plays a vital, for example, Experience of work (years), Class of registration, Qualification Rating, Requirement of showing the financial standard (Solvency certificate), Work accomplished for most recent 5 year, Profit ratings, Original tender quantity, Tenderers quantity, Least Tenderer, Final rating. A few parameters are of extraordinary significance and merit successive consideration and perception, though difference gives an unpleasant picture of tendering procedure and its quality status. The present study is completed with the accompanying destinations:

1. Analysis was carried out by Conventional methods.
2. Decision making by calculating the tendering price based on total cost and mark up of project (Contractor's Estimation of Cost and Tendering Strategy).
3. Analysis was carried out by modified excel formulation.

3.1 Determining tender price



4. Case study analysis

Tendering process in India is quite Competitive offering technique tries to guarantee that everybody gets an equivalent opportunity to offer, minimizes plot, and spares people in general cash. It concentrates on fair rivalry to get the finest work and supplies at the most minimal conceivable expense. It likewise requires ensuring against nepotism, bias, luxury, defilement and misrepresentation. For the technique to be reasonable and workable, it is required to have an unmistakably characterized model to help the offer assessing authorities figure out if tenders are responsive and the tenderers appear to be dependable. This is the most generally utilized technique to acquire and select contractor/construction firms for execution of construction tasks. In expansive range, the point of competitive offering (value based) is to get the minimum conceivable cost for a specific undertaking, management or office. In the focused most reduced offering strategy, the prequalified and responsive tenderer who presents the minimum offer, meeting the details must be champ of the agreement. Taking after information is dissected and results are drawn:

4.1 Conventional Method

4.1.1 Work Type –I: Improvements to jambhulwadi Road to joining dattnagar in ambegaon bk pune. PMC/2018-19/RD/WORK_INDENT41870 **,Est. Cost**: Rs.350.00 Lakhs ,**APT**: Rs.34663337.79 ,**Period**: 2 Months,**EMD**: Rs 519945.00 ,
Tender Validity Date: 30 Days

Table 4.1 Number of tenderers and their complete data scrutinized at the department:

jambhulwadi road pune						
Sl No.	Name of the contractor/firm	Class of registration	Original bid amount	Bidders amount	Least Bidder	Final rating
1	2	3	4	5	6	7
1	Ashok B Sureban	1		363.62	7	
2	C B Morabad	1		304.79	3	
3	H P Madhukar	1		333.38	6	
4	M B Kallur	1	350	274.39	1	M B Kallur
5	N B Hiremath	1		327.58	5	
6	N S Nayak & Sons	1		305.18	4	
7	S S Policepatil	1		300.08	2	

The tender has been called by the PMC and no of Tenderers are7, contractor had applied there tender quantity and they are 1. Ashok B – 363.62 Lakhs,2. B Morabad – 304.79 Lakhs,3. H P Morsbad – 333.38 Lakhs,4. M B Kallur - 274.39 Lakhs 5. N B Hiremath - 327.58 Lakhs,6. N S Nayak - 305.18 Lakhs,7. S S Policepatil -300.08 Lakhs,In this “M B Kollur” is the least tenderer and selected contractor for this work after verifying the documents and least tender.

4.1.2 Modified Tendering Process (EXCEL)

Table 4.4 Number of tenderers and their complete data scrutinized at the department by Modified Tendering Process:

Name of the work: jambhulwadi road

Sl No.	Name of the contractor/firm	Experience of work (years)	Class of registration	Qualification Rating	Requirment of displaying the financial standard (Solvency certificate)	Work done for last 5 year	Profit ratings		Original bid amount	Bidders amount		Least Bidder	Final rating
1	2	3	4	5	6	7	8		9	10		11	12
1	Ashok B Sureban	7	1	3	1591.94	276.22	0.17	5		363.62	1.039	1	3.00
2	C B Morabad	6	1	4	1194.68	283.49	0.24	6		304.79	0.871	5	5.00
3	H P Madhukar	4	1	6	7522.98	1013.13	0.13	4		333.38	0.953	2	4.00
4	M B Kallur	10	1	1	4832.92	228.69	0.05	3	350	274.39	0.784	7	3.67
5	N B Hiremath	8	1	2	8652.32	253.53	0.03	2		327.58	0.936	3	2.33
6	N S Nayak & Sons	5	1	5	16286.70	185.79	0.01	1		305.18	0.872	4	3.33
7	S S Policepatil	3	1	7	2917.31	1087.77	0.37	7		300.08	0.857	6	6.67

In compare to the conventional method here By Modified tendering process the tender is awarded to **N B HIREMATH**, the same result is obtained by Conventional Method is M B KALLUR. The others parameters which are drawn from analytical hierarchy process are analyzed and then the final award is made.

4.1.3 Modified Tendering Process with probability of winning (formulae)

4.1.3.1 Work Type –I, Name of Work: Jambhulwadi road, Est. Cost: Rs.350.00 Lakhs ,**Period**: 2 Months ,**Tender Validity Date**: 30 Days.

For 1st case, assuming that mark-up is 10 per cent of the total cost *TC*, the tender price B is given as:

$$B = \text{TC} + \frac{10}{100} \text{ X TC} \qquad \text{B=1.10 X TC}$$

B = 350 + [(10/100) x 350] = 385 lakhs

For 2nd case, when the mark up is expressed in terms of some per cent of the tender price *B*, the tender price is computed as:

$$B = TC + \frac{mark\ up\ (\%)}{100}\ X\ B \qquad \text{B=}\frac{TC}{(1-\frac{mark\ up(\%)}{100}}$$

B = 350/[(1-(10/100))] = 388.89 lakhs

385 lakhs will be the maximum amount over which the tendering will not be awarded to any parties.

Probability calculation:

1st Contract's probability **[1/ 7((363.62-350)/350) + 1] X 100 = 78.59%**

2nd Contract's probability **[1/ 7((304.79-350)/350) + 1] X 100 = -52.51 %** (-ve sign shows tendering is done below original tender amount)

3rd Contract's probability **[1/ 7((333.58-350)/350) + 1] X 100 = -75.05 %** (-ve sign shows tendering is done below original tender amount)

4th Contract's probability **[1/ 7((274.39-350)/350) + 1] X 100 = -39.80 %** (-ve sign shows tendering is done below original tender amount)

5th Contract's probability **[1/ 7((327.58-350)/350) + 1] X 100 = -69.04 %** (-ve sign shows tendering is done below original tender amount)

6th Contract's probability **[1/ 7((305.18-350)/350) + 1] X 100 = -52.63 %** (-ve sign shows tendering is done below original tender amount)

7th Contract's probability **[1/ 7((300.08-350)/350) + 1] X 100 = -50.04 %** (-ve sign shows tendering is done below original tender amount)

The rating can be given based on maximum percentage carring, such as for 78.59% we have to rate it as 1, for 75.05 % we have to rate it as 2, similarly for 69.04 ,52.63, 52.51, 50.04 and 39.80 we can rate them as 3,4,5 & 6 respectively .

Table 4.7 Number of tenderers and their complete data scrutinized at the department by Modified Tendering Process:

Name of the work: jambhulwadi road

Qualification Rating	Requirment of displaying the financial standard (Solvency certificate)	Work done for last 5 year	Profit ratings		Original bid amount	Bidders amount		Least Bidder	Probablity of winning (%)		Final rating	Award
5	6	7	8		9	10		11	12		13	
3	1591.94	276.22	0.17	5		363.62	1.039	1	78.59	1	2.50	
4	1194.68	283.49	0.24	6		304.79	0.871	5	52.51	5	5.00	
6	7522.98	1013.13	0.13	4		333.38	0.953	2	75.05	2	3.50	
1	4832.92	228.69	0.05	3	350	274.39	0.784	7	39.80	7	4.50	N B Hiremath
2	8652.32	253.53	0.03	2		327.58	0.936	3	69.04	3	2.50	
5	16286.70	185.79	0.01	1		305.18	0.872	4	52.63	4	3.50	
7	2917.31	1087.77	0.37	7		300.08	0.857	6	50.04	6	6.50	

In compare to the conventional method here By Modified tendering process with probability of winning the tender is awarded to **N B HIREMATH**, the same result is obtained by Excel template.

5. CONCLUSION

The prequalification and tender evaluation processes requires the development of necessary and sufficient criteria. The last two decades has witnessed a huge development in project complexity and client's needs and this has led to an increasing use of alternative forms of project delivery systems. In contrast, the prequalification and tender evaluation process, quantifying and the assessment of criteria is still in its original form. Selecting a suitable contractor to execute a particular project is an important decision for the client to take. Awarding construction contracts based on the price only is not always a successful strategy for contractor selection as it could result in construction delays and cost overruns. For instance, a bill of quantities is a list of all the materials (and other work such as amount of excavation) of a project which have sufficient detail to obtain a realistic cost, or rate per described item of work/material. The tenders should not only show the unit cost per material/work, but should also if possible, break it down to labour, plant and material costs. In this way the individual who is selecting the tender will be quite confident that the tender is feasible. Tenders are not only chosen on cost alone. Sometimes contractors submit lower tenders to win the contract and win the work. Either the costs that the contractor incurs are greater than the price he is charging the client (as a consequence of a lower tender determining the contract sum), and thus is likely to go insolvent or he will claim for "loss and/or expense" due to discrepancies in the contract documents (this can be done deliberately). The lowest tender is not always a feasible tender. The lowest tender is the most likely to increase the contract sum the most throughout the course of the project. Objectives of the study are to analyze the conventional process and to generate a new process to come over from the flaws which are there in conventional method of tendering. This was

formulated by analyzing different parameters and performance of tenderers (parties taking part in to the tendering process)

As in conventional method, In cost based tendering system, contractor for the work will be selected on the bases of least tender amount with some condition, other criteria's are to be sidelined in the conventional method due to which the grip on the work and the quality maintenance will be difficult. But in this method the contractor will be selected by considering by using efficient tender evaluation method and the result found different comparing to the conventional method because in conventional method cost was the only main criteria 1st considered before selecting any tenderer. But in this method of AHP all the data like Name of the Contractor, Experience of the work, Class of registration, Qualification rating, Solvency certificate, Work done for 5 years, Profit rating, Original tender amount, Tenderer amount, least tenderer and Final rating. Were considered and result is based upon least tender amount as well as experience and work done by that tenderer/contractor.

Based on the study we can conclude that.

1. Many studies have been conducted in India to assess the efficiency of the online reverse auctions. The main conclusions drawn from these studies are that the adoption of the on-line auctions can result in cost savings for clients. While, the main drawback of auctions is that award of the contract is mainly driven by the lowest price rather than best value or quality. Conventional method carries few flaws which are having direct impact on the quality control and there may be chances of awful methods in the conventional process.

2. By modifying the Tendering process it is possible to process with fair tendering system. Convectional method de-motivates the tenderer or competitive process by getting the unrealistic quotes.

3. Government needs to create opportunity for domestic consultants in the construction industry to work as joint venture with foreign consultancy firms for selection of contractors with modern methods. Greater quality can be achieved by the modified tendering process and we can save substantial time. If the lowest tenderer is of lesser experience their perception may be different from experience contractor or firm.

4. The developed multi-criteria model for mark-up decision, based on the analytical hierarchy process, can be easily used by contractors in the construction industry to determine which project will result in higher mark-up. This model takes into account various factors affecting mark-up decision.

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