# Competitive Selection In Non-Competitive Structure– Some Methodological Issues

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***Abstract***: *The principal aim of this paper is to select a contractor who offers the best value for money. This will nearly always involve a process of competitive tendering. The final decision as to which contractor offers the best value for money will be determined by the factors like quality/price mechanism based on a numerical scoring and weighting system. However, in a political-emotional state of nature, this type of numerical scoring and weighting system, sometimes, faces the question of lack of transparency on the one hand and potential loss of resources of the authority on the other hand. This type of situation could have been resolved if the authority apply the reverse Delphi method. The advantage of this method is manifold- maintains transparency in the selection process; authority can achieved the least cost economic efficiency and, thereby, saves resources by utilising the competitive environment among the shortlisted contractors.*

**Key Words:** Competitive Bidding, Lowest Bid, Reverse Delphi Method, Public Sector Organisations.

**JEL Code: K2, K4, L2, L7**

## 1. INTRODUCTION

Selection of appropriate contractor is a crucial part in the literature of Economics of Infrastructure. The principal aim of the authority is to select the appropriate contractor out of available alternatives such that the best value for money is secured. This will nearly involve a process of Competitive Tendering where the best value for money of any project under consideration is achieved through optimizing the balance between Technical Efficiency and the Economic Efficiency of the project. The generally accepted view regarding the Technical Efficiency is that it runs in terms of quality of service where as the Economic Efficiency is achieved through securing the lowest price (or available lowest Price?) from the all potential contractor competing for the project. However, the traditional and the generally accepted concept of Competitive Bidding runs in terms of awarding the lowest responsible bidder or, on the refusal or failure of such bidder to execute a tendered contract, be awarded to the second lowest responsible bidder, or on that bidder's refusal or failure to execute a tendered contract, be awarded to the third responsible bidder and so on, unless it is determined by the authority that the acceptance of a responsible bid is not in the best interest of the authority, in which case all bids shall be rejected under its own discretion.

## 2. REVIEW OF LITERATURE

In most theoretical as well as empirical studies the conditions of free competition are assumed, and thus conclusions are subject to competitive behaviour. Plessner (1971) has shown how partial market equilibria for various leading firm and monopolistic structures can be computed in the context of an agricultural economy. In the real world, however, non-competitive structures are quite common and deserve no less but, from several viewpoints, more attention than competitive ones. Weverbergh (1979) has analysed Competitive Bidding with Asymmetric Information in the context of the problem, formerly treated by Wilson: two parties have to submit bids for an object. One of them knows the value with certainty, the other does not. The equilibrium derived differs from Wilson's solution and yields a simple explanation for the case cited by Wilson: the value of the game is essentially zero for the party with incomplete information. Earlier, Wilson (1967) treated the issue of competitive

bidding (via sealed tenders) under uncertainty when one of the parties knows the value of the prize with certainty. E. Diekmann, (1994) developed a method for quantifying and measuring the effectiveness of contractors competing for a cost-plus contract has been developed. Topcu (2004) proposes a multi-criteria decision model for construction contractor selection in the Turkish public sector. Current selection methods are reviewed and three main concepts are generated for selection: cost, time, and quality. The proposed selection model uses evaluation criteria related to these concepts and has a process with two main stages: contractor pre qualification and the choice of the eligible (compromised) bidder among pre-qualified contractors. This model can be used as a decision support system by project owners in order to identify an eligible contractor to be awarded the contract. In the recent past, Momani (2000) suggested that the insights provided should be taken seriously and provide a basis for thinking about the implications for future development of the construction industry where as Frank C. Harris (1997) proposes a quantitative model for selecting construction contractors which utilizes the multi-attribute analysis technique is being developed. Prequalification criteria for inclusion in the model have been identified and weightings to mirror their respective importance in the selection process determined. Skitmore (1994) presented a systematic multi criterion decision analysis technique to describe the contractor selection and bid evaluation based on utility theory. Several variations of MAA (Multi-Attribute Analysis) are presented by Harris (1994) and the fundamental advantages and disadvantages associated with each are highlighted. An overview of a three-tier MAA procedure designed to encompass the entire selection process culminates in a worked example of contractor evaluation utilizing a computer spreadsheet approach. While the procedure is presented in a construction contracting context, the methodologies cited are of potential benefit in a wide selection of purchasing scenarios. As such, no such significant work has been found with particular reference to the public sector organisations based on natural selection mechanism where transparency in the selection process is ensured, primarily. Hope, this paper will attempt to fill up that caveat.

The organisation of this paper is as follows: Section 3 evaluates the current methodology of competitive bidding in public sector followed by the introduction and review of literature in Section 1& 2, respectively. In Section 4, the methodological issues arising out of different variation in Competitive Bidding is discussed in detail along with the Proposed Proposition and the related issues. Limitation of the study is mentioned in Section 6 followed by objective of the paper. The paper concludes in Section 7.

## 3. EVALUATION OF CURRENT METHODOLOGY FOR PUBLIC SECTOR

The generally accepted tender selection process involves choosing the contractor quoting the least cost subject to a pre-specified level of technical efficiency as desired by the authority. This type of selection methodology sometimes termed as competitive bidding. The contractors among the short listed contractors ultimately end up with quoting least cost. Nevertheless, to mention that under traditionally accepted methodology of Competitive bidding, the available lowest bid is assumed to be synonymous to competitive bid. Though, in contemporary economic literature, the notion of competitive price is the lowest among all type of market conditions. The salient feature of pure competition is not reflected in the selection process. Automatically, available lowest bid appears as a proxy for competitive bidding due to the absence of free market mechanism. The availability of relatively smaller numbers of potential contractors, further, restraints the bid amount to reach its true competitive level. Hence, available lowest bid should not be identified as competitive bidding. Keeping this view in mind, several attempts have been made to modify the methodology of competitive bidding in several dimensions to make it competitive in true

sense, particularly, in public sector. In Denmark, for example, the two highest and the two lowest tenders are excluded and the closest to the average of the remaining bids is selected. A similar procedure is used in Italy, Portugal, Peru, and South Korea, but with only the lowest and highest being excluded. In Saudi Arabia, the lowest bidder is selected provided that the bid is not less than 70% of the owner's cost estimate. In Canada and the USA, especially in the public sector, the "lowest bidder" is selected, but a bid bond in an amount equal to 10% of the bid price also has to be provided. The French practice is to exclude bids which appear to be abnormally low. In all cases, bid prices are the sole basis for contractor selection and competition.

## 4. OBJECTIVE

The above mentioned selection methodology across the countries never takes the benefit of the competitive structure or rivalry situation among the contractors which could have been improved the solution in terms of lower project cost of the authority and thereby saved resources. Whatever be the difference of quoted amount among the least cost bidder and the other short listed candidate (even if it may be $1), the authority has to choose the least price bidder among them as a part of economic efficiency. Each time, whenever any tender is awarded by any type of authority, the people expect some sort of lack of transparency except that person who ultimately awarded that tender and the authority who select that contractor subject to the rules and regulation of the competing authority. The main reason behind this type of allegation arises as the existing selection procedure does not posses the criteria of natural selection and the present system sometimes are synonymous of winning a lottery like situation.

Against this backdrop, this paper tries to propose an alternative methodology of improving the economic efficiency of the project subject to the desired level of technical efficiency. The generally accepted methodology runs in terms of optimizing economic efficiency subject to a desired level of technical efficiency through competitive bidding (?). But competitive bidding in this type of situation may not be competitive in true sense as some sort of asymmetry of information persists among the competent contractors which ultimately restrains a pure competitive solution (as it is demanded in the traditional and generally accepted methodology). As a result, this asymmetry of information gives birth to the rumour of lack of transparency among the unsatisfied bidders and general public. To ensure transparency in the selection process and finding true competitive solution, the authority should take the advantage of this asymmetry of information by making it symmetrical and equally available among other short listed contractors to lower the project cost. The present paper attempts to concentrate on this particular issue and tries to propose an ad new dimension to the existing methodology to select the actual least cost bidder by taking advantage of the rivalry nature among the short listed candidate instead of selecting the simply quoting the least cost in a sealed envelope.

## 5. METHODOLOGICAL ISSUES

The basic premises are that in case of composite quotation, consisting of several sub-quotations, the overall lowest bid is actually the minimum of the aggregate of all sub-quotation. The aggregate of the minimum of sub-quotation may further be lowered than the available “lowest bid” (traditionally which is known as the Competitive bid). In view of this possibility, this paper attempts to develop a method of analyzing and processing composite quotation so as to explore the possibility of pulling down the quoted price lower than the initially quoted “lowest bid” through the use of Reverse Delphi method which is a variation

of the classic Delphi[1] technique to judge the efficiency of the short listed contractors not through experts' opinion appointed by the authority rather selecting the most (economically) efficient one through natural selection among the contractors in a transparent way.

**5.1 Model**: Without loss of generality, it may be assumed that the tender should be awarded to the single firm and responsibility of executing the project shall be vested on that firm accordingly.

Let, 'M' denotes the number of Contractors submitting the tender; and 'm' denotes the number of contractors satisfying the quality specification as specified by the authority. Definitely, m≤ M. It is, further, assumed that the actual tender consists of 'n' number of specification (may be spitted as separate sub-tender). On the other hand, the short listed contractors who ultimately qualified for price bid may be described as following:

The set of short listed contractors and the set of composite specification may be written as T = {T1, T2,…..Tm} and S={S1, S2,…..Sn}, respectively where as the decision matrix consisting of Composite quotation for the short listed contractors qualifying for price bid may be expressed as follows:

$$\begin{pmatrix} t_{11} & \cdots & t_{1n} \\ \vdots & \ddots & \vdots \\ t_{m1} & \cdots & t_{mn} \end{pmatrix}$$

Competitive Bidding ($T_c$) is achieved as Min Ti = $\sum_{j=1}^{n} t_{ij}$ for all i = 1,2,…….m

Where, $S_j$: $j^{th}$ specification of tender;

$T_i$: $i^{th}$ short listed Contractor's bidding price of the project; and

$t_{ij}$ : Price bid submitted by $i^{th}$ contractor for $j^{th}$ specification

for all i= 1,2,…..m & j=1,2,…….n.

The generally accepted methodology for selection of contractor ends up with Min $T_i$ = $\sum_{j=1}^{n} t_{ij}$ for all i = 1,2,…….m as the Competitive Bidding ($\mathbf{T_C}$) Price and the tender is awarded accordingly.

However, the authority could have improved the solution by making it more competitive through the natural selection mechanism from the short listed candidates. For this, the present paper deals with the following proposition:

**5.2 Proposition**: *The so called competitive Contractor solution ($T_c$) may be improved in the final stage ($T_F$) with a savings of Resources for the authority by the amount ($T_c$ - $T_F$) ≥ 0 through the use of Reverse Delphi method among the short listed contractors qualified for Price bid.*

**5.2.1 Proof:** First of all, the authority should take utmost care in preparing the project with different sub-specification so that in due course of time the information gathered may be used for making the transparent decision in selecting the contractor. The advertisement should be done accordingly. In the advertisement notice, suppliers would be asked to include detailed cost breakdown with their price quotations and the difference between buyers cost analysis and the suppliers cost breakdown need to be examined to arrive at mutually agreed figure that is the minimum price, which is normally expected. After collecting sealed envelope from the prospectus contractors, the authority is expected to ensure maximum number of eligible

[1] To reach at a consciousness of opinion among the panel of experts.

contractors competing for the tender to be awarded. As the numbers of prospectus contractors are relatively high as compared to number of different sub-specification advertised by the authority, it will automatically create some sort of pressure upon the price to be quoted for different subs-specifications. After this stage, the authority has to evaluate the different contractors' capability to implement the proposed project through proper evaluation of tender in terms of technical and quality specification. The objective of any authority is to achieve the desired level of quality requirement of any project by sacrificing minimum possible resources to implement that project. Emphasis on any one aspect and not the other will simply impede the basic requirement of any project. Hence, the authority should take utmost care to guarantee this quality requirement and should not compromise in any way with this technical efficiency of the proposed project. The initial short listing with respect to quality specification is, otherwise, essential for proper implementation of the proposed project. Once, this quality requirement is fulfilled, and then the authority should concentrate on achieving that at lowest possible price by applying the Darwinian natural selection mechanism through Reverse Delphi method. The precondition to apply this Reverse Delphi method is to ensure at least $m \geq (n+1)$ number of contractors at this stage where 'n' denotes the number of sub-specification and remaining one correspond to the so called Competitive Price bidder from traditional methodology. At this stage, the Authority Tender ($T_A$) is prepared by considering the finally short listed contractors who ultimately qualify for price bid with respect to each sub-specification (by adding the column minimum $t_{ij}$*) which is as under

$T_A = \sum_{j=1}^{n} t^*_{ij}$ , where again, $t_{ij}^*$ = Min $t_{ij}$ for all i= 1, 2,…..m & j=1, 2,…….n.

Definitely, $T_A \leq T_c$

Note in this context that the number of short listed contractors further reduced to (n + 1) where 'n' corresponds to number of hierarchy and the remaining one corresponds to overall minimum or $T_c$. After displaying the authority tender, $T_A$, short listed candidate are invited to revise their estimates against this authority tender, $T_A$.

In case, if there exist any tie in terms of minimum cost quoted by any contractor; the maximum number of finally short listed contractors further shrinks to {n + 1 – Number of Tie}. Lastly, the authority should take some judicious decision in selecting the contractor to be awarded. For this, instead of applying expert panel of the authority, let the Contractors to express their opinion in terms of their revised estimates (as such they are the experts and the process will continue until and unless consensus of opinion takes place). In this sense, it is the 'Reverse' Delphi method where consensus of opinion is achieved through direct participation of the Contractors and not by the authority.

Ultimately, the FINAL tender will be awarded ($T_F$).

However, it is clear that $T_A \leq T_F \leq T_c$.

The difference between $(T_c - T_F) \geq 0$ is the net savings of resources to the authority.

**5.2.2. Special Case**: if $t_{kj} = t^*_{kj}$ holds for all j= 1,2,…….n then it is best result derived from the traditional methodology of competitive bidding and, accordingly, $T_A = T_F = T_c$ holds and the $K^{th}$ Contractor will be awarded the contract automatically. Since, $T_k$ = Min $T_i = \sum_{j=1}^{n} t_{ij} = \sum_{j=1}^{n} t^*_{ij}$ for all i=1,2,…m

**5.2.3 Lemma:** *In the process of revision of estimates by the different contractors, the application of Reverse Delphi Technique may encourage the formation of one or more cluster(s) among themselves in order to strengthen their relative bargaining power in the subsequent stages to achieve the joint profit maximisation.*

The potential threats of losing the whole contract force the relatively weak contractors to negotiate with the leaders which automatically reduce the number of potential contractors in the subsequent stages.

## 6. LIMITATION OF THE STUDY

This paper is primarily based on the restrictive assumption regarding the objective of the authority of any public sector organisations which seeks to achieve the economic efficiency subject to a given level of technical efficiency. If the authority sticks to its position and try to lower down the quoted price below the threshold limit, it may lead to some sort of compromise with the desired level of technical efficiency in terms of the flow of quality of services. Moreover, if the tendency of quoting price below the threshold limit is not controlled, it may lead to some sort of negotiation among the prospective contractors before the game is played which ultimately may restraints the essence of the proposed methodology and its implementation in desired direction.

## 7. CONCLUSION

This paper has tried to propose an ad new dimension to the methodology of selection of appropriate contractor in a transparent way through the Reverse Delphi Method. The application of the proposed method is mainly meant for the Government sector/ Government Regulated organisations since the selection process in these sectors are always attracting the eyebrow of the Society. In other words, the private organisations have always enjoyed a greater degree of flexibility in the bargaining process as compared to that of the Government regulated industry/ organisations in selecting the appropriate contractors. Moreover, the Government/ Government regulated organisations are always suffered from the lack of confidence in the selection process since the society itself works as a watchdog in the selection procedures. A slight deviation from the prescribed rules and regulation leads to huge rumour among the public which force them to escape from the unnecessary departmental hazards. As a result, the solution always never able to touch the true competitive solution rather ends up with the sub-optimal solution. The non competitive structure in terms of fewer firms restraints the true essence of competitive solution. The application of proposed Reverse Delphi method can achieve the true competitive solution in a purely non-competitive structure.

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