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# Effects of Lowest Bidding Bid Awarding System In Public Sector Construction Projects In Pakistan

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**ABSTRACT**

Construction industry participants have started recognizing that accepting the least price bid does not guarantee maximum value. Achieving a value-based procurement approach is a challenge, particularly for the Pakistani public sector clients, who are limited in their ability to evaluate the competitive bids based solely on the lowest-bid award system. Persisting problems of inferior quality of constructed facilities, high incidence of claims and litigation, and frequent cost and schedule overruns have become the main features of Pakistan's public construction works contracts. This research was undertaken to assess the performance of public owned construction projects awarded on a lowest bidder bid awarding system. Also, the objective was to seek construction professionals' opinions about the traditional bidding procedure and other alternative systems for evaluation of bids and awarding contracts. An extensive literature search was carried out to identify different practices and a questionnaire survey was conducted among the different groups that make up the construction industry in Pakistan. Five alternate bid evaluation and contract award methods are discussed and presented in this research. The questionnaire was distributed online as well as through visits to contractors, clients and consultants. Additionally, 12 interviews were conducted with clients, consultants and contractors. In total 200 questionnaires were distributed. The data were collected and 112 valid questionnaires were analyzed by using MS Excel, PH stat, SPSS-20 and Sigma XL. The study concludes that 70% of the respondents consider the multi-parameter bidding method is to be more effective than lowest bidding method and ranked this method as best amongst all six selected methods. Insights and discussions are given in the analysis. Finally, this work will provide valuable information to clients, consultants and contractors and other stakeholders who desire to improve bidding methods in construction in Pakistan.

**KEYWORDS**: Bidding System, Construction Projects, Public Sector Construction, Public Sector Procurement.

## 1.1 INTRODUCTION

The construction industry is one of the major sectors which involve substantial financial and human resources. Design and construction play a vital role in the national economy, including the development of residential housing, office, commercial and retail buildings, as well as industrial plants, and the replacement, maintenance, and restoration of the nation's infrastructure and other public facilities. Bid and Procurement issues are widely related to the construction industry and its participants so that striving to improve the procurement of construction by the public sector in particular is in the best interest of both the community and the construction industry.

Currently, the public sector procurement of construction is largely based on the lowest bid award system. The customary practice of awarding contracts to a lowest bidder was established to ensure the least cost for completing a project. In public construction works, this practice is almost universally accepted since it not only ensures a low price but also provides a way to avoid fraud and corruption (Irtishad, 1993). While the low-bid procurement system has a long-standing legal precedence and has promoted open competition and a fair playing field, a long-standing concern expressed by owners and some of their industry partners is that a system based

 

strictly on the lowest price provides contractors with an incentive to concentrate on cutting bid prices to the maximum extent possible (instead of concentrating on quality enhancing measures), even when a higher cost product would be in the owner's best interest, which makes it less likely that contracts will be awarded to the best performing contractors who will deliver the highest quality projects. As a result, the low-bid system may not result in the best value for money expended or the best performance during and after construction. Moreover, the traditional low-bid approach tends to promote more adversarial relationships rather than cooperation or coordination among the contractor, the designer and the owner, and the owner generally faces increased exposure to contractor claims over design and constructability issues (Rizwan, 2008).

The study aims at analyzing the current status of Bid and Procurement Strategies in the construction industry of Pakistan. In Pakistan, the most common method of awarding the contract is the Least Responsive Bidder or Price Based method, which has inherent flaws of high competition and minimum performance. These incompetent practices pose a serious risk and problems. It is therefore, imperative to to assess the impact of competitive low-bid awarding system on performance of major public work projects (in terms of schedule, cost, quality and safety) in Pakistan construction industry. The study will forward recommendations and suggestions for developing a proposal for implementing alternative bid-evaluation and contract award procedures for the construction industry of Pakistan.

### 1.2 **Research Scope**

Mainly, the scope of the study is to analyze the performance of public owned construction projects which are awarded by the lowest bidder bid awarding system in Pakistan. A limited study of alternate bidding procedures followed in different parts of the world is also covered in this study. However, this research mainly covers public construction projects under the government of Pakistan. Private sector and other practices are given very little attention in this research and they may have slightly different results.

### 1.3 **Research Objectives**

(a) To highlight the weaknesses, performance, opportunities and implications of the public owned construction projects that are awarded on the basis of lowest bidder bid system in Pakistan.
(b) To analyze the existing bid selection and awarding system and to provide a comparative study of different alternative bidding systems.
(c) To present conclusions and recommendations on lowest bidding system performance based on analysis and results of this study.

## 2.1 **LITERATURE REVIEW**

The latest developments and desires in different aspects of human life, has directed the professionals in construction industry to use alternative methods of project delivery systems. However, the bidding and project awarding systems are still largely in their basic form. If a client wishes to muddle through these new trends and invite acceptable bidders, it is necessary to clarify and develop pre-determined selection criteria and the objective of the prequalification and bid evaluation processes (Hatush et al., 1997). In Pakistan, major client of construction industry is Government of Pakistan (GOP). And the most common procurement method is the lowest-bidder system in which contracts are awarded to a responsive contractor who offers the least price. In last twenty to thirty years, the prequalification criteria and bidding processes have not seen much advancement and are still in their old form. The client is provided by prequalification, with a list of contractors that are invited to tender on a regular basis. There are unambiguous benefits and distinct pitfalls to the lowest-bidder bid awarding system. It compels the contractors to lower their costs, usually through innovation and modernization, to ensure they win bids and maintain their profit margins. In addition, the process is beneficial specifically to the public sector because of the transparency and simplicity, an important criterion of public policy (Photios, 1993). However, allowing projects to be awarded based on the least price has inherent flaws. Delays in meeting the contract duration, increment of the final project cost due to high variations, tendency to compromise quality, and adversarial relationship among contracting parties are the major pitfalls associated with responsive low bid award procedure (Thomas., 2009). Moreover, the low-bid award system encourages unqualified bidders in the competition and in contrary it discourages qualified contractors to participate. In a survey conducted in the Oromiya regional state,

 

non-existence of real competition during contractors selection; excessive time overruns; compromising quality; and escalation of the final project cost from the estimated cost were the major problems associated with the existing approach of delivering projects (Lemma., 2006). Among many causes of disagreements in the construction project, the project delivery system selected is one of the significant elements (Abera, 2005).

### 2.2 Legal Framework (Bidding Procedures and Laws)

Government of Pakistan has statutes requiring submission of competitive bids for construction projects. As per Pakistan Engineering Council (PEC) and Public Procurement Regulatory Authority (PPRA), it requires public organizations to award such contracts to the "lowest responsive bidder." Public works procurement as defined by PPRA is "Save as otherwise provided hereinafter, the procuring agencies shall use open competitive bidding as the principal method of procurement for the procurement of goods, services and works" (Rule 20, S.R.O. 432(I)/2004). Few definitions and outline of bidding procedure followed in public sector of Pakistan is discussed in this section.

#### 2.2.1 **Procedures for Competitive Bidding**.

(a) **Single Stage – One Envelope Procedure**

Each bid shall comprise one single envelope containing, separately, financial proposal and technical proposal (if any). All bids received shall be opened and evaluated in the manner prescribed in the bidding document.

(b) **Single Stage – Two Envelope Procedure**

The bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal. Initially, only the envelope marked "TECHNICAL PROPOSAL" shall be opened. After the evaluation and approval of the technical proposal the procuring agency, shall at a time within the bid validity period, publicly open the financial proposals of the technically accepted bids only. The financial proposal of bids found technically nonresponsive shall be returned un-opened to the respective bidders. The bid found to be the lowest evaluated bid shall be accepted.

(c) **Two Stage Bidding Procedure**

**First Stage**

The bidders shall first submit, according to the required specifications, a technical proposal without price. The technical proposal shall be evaluated in accordance with the specified evaluation criteria and may be discussed with the bidders regarding any deficiencies and unsatisfactory technical features. After such discussions, all the bidders shall be permitted to revise their respective technical proposals to meet the requirements of the procuring agency.

**Second Stage**

The bidders, whose technical proposals or bids have not been rejected and who are willing to conform their bids to the revised technical requirements of the procuring agency, shall be invited to submit a revised technical proposal along with the financial proposal. The revised technical proposal and the financial proposal shall be opened at a time, date and venue announced and communicated to the bidders in advance; and the revised technical proposal and the financial proposal shall be evaluated in the manner prescribed above.

(d) **Two Stage - Two Envelope Bidding Procedure**

**First Stage**

The bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal. Initially, only the envelope marked "TECHNICAL PROPOSAL" shall be opened. The envelope marked as "FINANCIAL PROPOSAL" shall be retained in the custody of the procuring agency without being opened. The technical proposal shall be discussed with the bidders with reference to the procuring agency's technical requirements. Those bidders willing to meet the requirements of the procuring agency shall be allowed to revise their technical proposals following these discussions.

**Second Stage**

After agreement between the procuring agency and the bidders on the technical requirements, bidders who are willing to conform to the revised technical specifications and whose bids have not already been rejected shall submit a revised technical proposal and supplementary financial proposal, according to the technical

 

requirement. The revised technical proposal along with the original financial proposal and supplementary financial proposal shall be opened at a date, time and venue announced in advance by the procuring agency.

2.2.2 **Award of the Contract**

Subject to Clauses IB.30 and IB.34, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the least evaluated Bid Price**,** provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.3 and qualify pursuant to Sub-Clause IB 29.2.

2.3 **Alternative Methods of Procurement**

**PPRA** also allows the owners and clients to use other methods of procurement in special circumstances. These special circumstances are well defined and spelled out in PPRA rules. A procuring agency may utilize the following alternative methods of procurement of goods, services and works, namely:-

2.3.1 **Petty Purchases**

Procuring agencies may provide for petty purchases where the object of the procurement is below the financial limit of *twenty five thousand rupees. Such procurement shall be exempt from the requirements of bidding or quotation of prices. Provided that the procuring agencies shall ensure that procurement of petty purchases is in conformity with the principles of procurement prescribed in rule

2.3.2 **Request for Quotations**

A procuring agency shall engage in this method of procurement only if the following conditions exist:-

(a) The cost of object of procurement is below the prescribed limit of one hundred thousand rupees.
(b) The object of the procurement has standard specifications.
(c) . Minimum of three quotations has been obtained.
(d) The object of the procurement is purchased from the supplier offering the least price.

2.3.3 **Direct Contracting**

A procuring agency shall only engage in direct contracting if the following conditions exist, namely:-

(a) The procurement concerns the acquisition of spare parts or supplementary services from original manufacturer or supplier.
(b) Only one manufacturer or supplier exists for the required Procurement.
(c) Where a change of supplier would oblige the procuring agency to acquire material having different technical specifications or characteristics and would result in incompatibility or disproportionate technical difficulties in operation and maintenance.
(d) In case of an emergency.

2.3.4 **Negotiated Tendering**

A procuring agency may engage in negotiated tendering with one or more suppliers or contractors with or without prior publication of a procurement notification.

2.4 **Contract-Award Procedures in Construction**

Bidding procedures are mainly negotiated and competitive. Mostly, the other methods are either variant of, or somewhat between these two significant types. In competitive method, the work is awarded to the least-bidder, if he/she is proved to be a responsive one. In negotiated method of procurement the cost is discussed and negotiated with selected constructor. Some modifications have been proposed for minimizing the concerns and implications of these two extreme types, and tried in many countries. In this research, following contract-award methods are studied and considered:

(a) Competitive Lowest Bidding Method (Price-basis).
(b) Competitive Average Bidding Method (Price-basis).

 

(c) Multi Parameter Bid Method (Basing on quality, time, price and "other" factors) .
(d) Negotiated Bid Method (Competitive).
(e) Negotiated Bid method (Non-Competitive).
(f) A+B Method.

### 2.4.1 **Lowest Bidding Method (on Price basis)**

This is the most commonly used procedure to obtain and select contractors/construction firms for execution of construction projects. In broad-spectrum, the aim of competitive bidding (price-based) is to obtain the least possible price for a particular project, service or facility. Competitive bidding method tries to ensure that everyone gets an equal chance to bid, minimizes collusion, and saves the public money. It focuses on honest competition to obtain the finest work and supplies at the lowest possible cost. It also necessitates protecting against nepotism, favoritism, extravagance, corruption and fraud (Sweet., 1989). For the procedure to be fair and workable, it is required to have a clearly defined criterion to help the bid evaluating officials determine whether bids are responsive and the bidders seem to be responsible. In the competitive lowest-bidding method, the prequalified and responsive bidder who submits the least bid, meeting the specifications must be winner of the contract.

#### 2.4.1.1 **Implications and Concerns**

It is generally accepted that competitive lowest bidding method saves public money and protects public interest; this conventional method has been criticized in last two decades or so mainly because of low/inferior quality, incorporation of many changes/change orders, establishment of negative relationships, schedule overruns, and increasing cost of the overall project. The tendering process for award of construction projects in Pakistan is normally based on the lowest-bidding method. In this method, the firm which is responsive and submits the lowest bid, gets the right for the construction project. The main advantage is that contractors continuously try to reduce costs by adopting technological and managerial innovations which can save costs (Photois, 1993). This saving is then transferred to the owner through this competitive bidding process.

If a bid submitted by a contractor is drastically lower than the engineer estimate or client's expectation and the other bidders, it is hard to comprehend that how the contractor would complete the project profitably. Such bids are defined as 'Abnormally Low Tenders' by (Thomas, 2009). An Abnormally low tender is a bid whose price seems significantly low than all of or the average of total bids in the same tendering procedure. The European Union made a legislation to permit government sector clients with the choices of awarding a project either by adopting traditional lowest bidding or the Economically Most Advantageous Tender (EMAT). The legislation permitted public clients to minimize the risks of some of the unpleasant results of abnormally low tenders (ALT). It includes:-

(a) Undesired quality because of the need of construction costs reduction (Winch).
(b) Predatory pricing and unjust competition which distorts the construction industry, affecting other bidders negatively (Alexanderson et al, 2006).

A report on "Prevention, Detection and Elimination of ALT in the European CI" by European Commission's Europe states that a bid is considered abnormally low if by comparing it with the client's Engineer estimate and all the bids submitted, it seems to be abnormally low by not keeping a margin for normal level of profits. Also the ALT cannot be justified by economy of the selected method, the chosen technical solution, extremely favorable conditions on hand to the tender, or the originality of the proposed work (Thomas, 2009).

#### 2.4.1.2 **Assumptions Vs Implications**

The assumptions upon which competitive lowest bid method is based and their implications are discussed as following:-

(a) Competitive lowest bid assumes that the projects or services can be independently evaluated or compared before the award decision. This is not a simple task. To avoid these inherent problems, it is usually stated in ITB that for consideration, bids should be responsive and the bidders must be responsible.
(b) It assumes that the submitted bids are free and there is a true competition, whereas, often there is collusion among the bidders for the purpose of taking turns and fictitious bids are submitted. By

 

collusion, objective of obtaining the lowest price cannot be accomplished.

(c) The success of competitive lowest bid method depends on the integrity and capability of the bidder, which is normally difficult to gauge since the tendency is to take into account the price only.

(d) Another concern of competitive tendering is the complexity of involving the contractor during the design phase. Inflexible specifications also make competitive bidding method less effective because it doesn't provide the contractors a chance to come up with multiple options. If specifications do not allow for alternative products and a feasible method for substitutes, competitive cost may be restricted.

(e) Another problem associated with this competitive method is that when the bidders are as large in number as is the case in a slow economy, a client accepts a significant risk of choosing a contractor that might have accidentally or deliberately submitted an unrealistic lower price (Photois, 1993). A contractor may not stick to such a low price where, at the same time, it is expected to complete the project as per schedule and specifications, and also make a rational profit. The usual result is excessive claims and disputes that lead to time over runs, compromises in product quality, and ultimately shooting costs.

(f) Although lowest bidding method is supposed to promote innovations by forcing contractors for continuous effort to reduce costs by adopting managerial and technological innovations which are cost-saving yet it is criticized for discouraged innovation (Irtishad, 1993). Nicolson asserts, lower bids provide lesser margin for a builder to implement latest techniques or improve the quality of his new product.

(g) It has also been criticized for not offering any incentive for the high quality construction of a completed project at a reasonable cost.

(h) Another concerning practice of a contractor is that they intentionally submit an artificially low bid in expectation of making the profit through changes and construction claims (Thomas., 2009). Some bidders carefully review the bid documents to search for mistakes and doubts in those areas that may provide chances of change orders and claims at some stage in the project (Dowle et al., 1990). These contractors can use this knowledge to submit a low bid with the anticipation of retrieval of the money later. In such cases the ALT is not true reflection of the final contract cost or the unanticipated costs incurred by the client when dealing with number of change orders and claims.

### 2.4.2 **Competitive Average Bidding (Price-based)**

One of the variations of the competitive lowest bidding method of awarding construction works is based on the principle that the bid closest to average of all the bids is considered to be the best bid, and not the one which is minimum or maximum. Tenders which are bid far lower than the average are considered unrealistically underbid. The bids which are greatly higher than the mean are considered unrealistically overbid. On the basis of this principal some methods are evolved and these are generally known as European Methods (Irtishad, 1993).Generally, the best contractor based on the average-bidding method is the bidder whose bid satisfies a particular correlation with mean of all the bids. For average-bidding method, different measures are used for calculation of the average, or use different criterion for evaluating the best bid. But point to remember is that this method takes into account the price only.

For example, some countries use typical arithmetic average while few use weighted average. This method is mostly used in Taiwan. Another approach of obtaining the average includes the elimination of all the bids which differ largely (more than a specified percentage) or the outliers and then the mean of the remaining bids is calculated. The winner could be the one whose price is nearest to the mean, or the other whose bid price is closest but less than the average. This method is widely used for construction projects in Italy (Photios, 1993).

In Europe, a formula to calculate a realistic offer from a number of competitive bidders was developed which is known as "Danish" system. This system right away rejects the highest and the lowest offers and rest of the bids are considered only (Irtishad, 1993). The formula is similar to the PERT and stands as following:-

Where,

**NA = (NH + 4A +NL) / 6 {** NA = New average; NH = New high; A = Average of all offers &NL = New low}

The first bid which is above this NA is then treated as rational, reasonable and acceptable. The method is not effective unless the minimum number of bidders is eight and this is the key limitation of Danish system.

The fundamental idea of the average bidding method is that the best bid is the one closest to a defined average, neither the minimum nor the maximum. These competitive cost- based average bidding methods are mainly used to make sure that the selected contractor is responsible, to minimize project failure, and to avoid disputes and

 

construction claims.

The basic principle is that the bidders should get a reasonable and practical cost of their work. It is assumed that with a fair price, the contractor would ensure quality needs of the project, would finish on schedule, and will not have any adverse relationship with the client, consultant and engineer.

#### 2.4.2.1 **Implications and Concerns**

In average bidding methods, as described above, all the features of open bidding system are retained. The only variation is that the selected contractor is the one whose bid is close to the average of all the submitted bids. The major risk of the lowest-bidding method is the likelihood of awarding a contract to a person or firm that submits, accidentally or deliberately, an unrealistic low bid. Such an occurrence may lead to the owner's disadvantage by promoting disputes, increase in costs, and delays in schedule. To tackle this problem, some countries have adopted the average-bidding method and the contract is awarded to the contractor whose price is near the average- bid price. Average bidding method finds its relative merits over lowest-bid method (Photois, 1993).

The major advantage of this method is that it safeguards a client from signing a contract at an unrealistic low bid price that will certainly lead to adversarial relationships during construction (Ioannou et al., 1993). This method also provides shelter to contractors for not honoring a bid containing an oversight or a gross mistake.

The basic disadvantage of the average-bidding method is that it doesn't promote competition that leads to lesser costs for the client. A breakthrough (technological or managerial) resulting in major money savings will not necessarily be passed on to the client in the form of lower costs, unless all participating bidders are known to have this breakthrough. It has been criticized that average bid method results in considerably higher profits in construction projects (Irtishad, 1993).When such high profits are earned throughout the industry, bid prices are expected to fall gradually and the savings will eventually be passed to the client. It has been claimed that the average bid method would increase contractor profitability and it has the potential to improve relationships between the owner and the contractor.

From the above discussion, it is obvious that most of the apparent benefits of the average method may only be applicable in the long run. Some of these benefits are intangible in nature. The success of this method is also dependent on the need that subcontractors of prime contractor are also selected on the same average-bidding method. It would be very difficult to ensure in the way bidding is practiced when sub-bids are accepted till last minute. Additionally, current laws don't restrict main contractors to retain a preselected group of subcontractors.

Some pitfalls of the competitive lowest bidding method can also prevail with the average bid system. As in case of the lowest bid method, collusion among the bidders and the absence of prequalification may negate its intent and undesirable results will be produced (Ioannou et al., 1993).Higher profitability of contractor and better relationships between the client and the contractor cannot be ascertained in the countries which are practicing average bid method. Evidence is not enough to conclude that incidence of construction claims is less in European countries (that practice average bid method) as compared to those countries that are not following this method (Irtishad, 1993).

### 2.4.3 **Multi-Parameter Bidding Method (Based on price and "other" factors)**

This is a model based competitive bidding which not only on caters for cost but also considers other parameters as proposed by Herbs man and Ellis; they named it the multi-parameter bidding procedure (Herbsman et al., 1992). They suggest that the major parameters should be cost, time and quality with minor parameters on the discretion of the client. The amount of time proposed in the bid to complete the project can have an impact on cost. For example, a construction company which can complete a building project three months earlier than its closest bidder may save the owner some additional rent cost. By factoring this cost saving in the bidding process, a better reflection of the total costs can be estimated. Similarly, the impact of better quality may also be included in the contract award decision. The costs of repair and maintenance are directly associated with the quality of the built facility being constructed. In Multi-Parameter Bidding Method, estimation of quality may be calculated by the kind of materials and type of equipment proposed to be used, the past performance of the main contractor and the subcontractors which are proposed in the bid. In Multi-Parameter Bidding Method, time

 

and quality parameters are assigned a maximum number of attainable points. The bids are then evaluated and ranking is made basing upon these points, as well as the bid cost.

Some other parameters may also be included in the model as desired by the owner. Other factors may include safety records, past working experience with client, history of disputes and claims, defect rectification history etc. In this method a "total combined cost "will come up after applying all these factors (Tarricon, 1993). The total combined costs of all the bids are then compared to pick the best bidder.

2.4.3.1 **Implications and Concerns**

In this method factors other than cost are considered before contract award decision is made. This is done in a more meticulous fashion than the traditional practice of prequalification procedure. Technical merit, time and quality factors are given more emphasis in a bid evaluation. Some people stress that the innovation is needed for the sake of time and high quality, to get better value for the public money, to minimize life-cycle costs of a product for the public department, while maintaining a reasonable profit for the contractor.

For many years, the element of time was not the most important factor of construction projects in many countries. The element of cost was the most important one. In the last two to three decades, the CI of Pakistan has involved in both building of new roads and construction of new facilities. These construction projects are mainly in urban areas and cause substantial problems to the public. Also, high volumes of traffic cause delays in completion of the projects. For instance, in U.S.A, a few innovative procurement systems for "buying time" were introduced in order to minimize such delays (Zohar et al.). The common denominator of all those procurement system is the ability of the contractor to procure the time for completion of the project.

2.4.4 **Competitive Negotiated Bidding**

At times it becomes necessary to obtain bids from a selected group of builders who possess known technical, managerial and financial capacity to complete a multi dimensional complex project. Some classified projects may also require only those contractors who can perform work at some specific place. In such circumstances, competitive price-based open bidding may not be suitable. On the other hand, single-source negotiation method is very hard to put into practice in public sector as this may lead to allegations of corruption and favoritism. To stay away from these problems with single-source negotiated bidding many organizations and clients are using variations that include features of both competitive and negotiated methods.

To modify pure negotiated method, increase in the number of construction companies/contractors to negotiate with, provides multiple options for selecting amongst the contractors. In few cases, based on previous experience or reference, some companies which are well known to be professional and competent to complete a construction project, are contacted by the owner or client (Irtishad, 1993). The owner may negotiate a tender with the most qualified company for professional services at compensation which the organization determines are fair, competitive, and reasonable. In making such decision, the public body must conduct an analysis of the price of the professional services needed in addition to their complexity and scope.

2.4.4.1 **Implications and Concerns**

Request for proposals and/or request for qualification for a particular project are typical examples of competitive negotiated method. Proposals from more than one contractor are scrutinized for factors such as technical capability, project schedule as well as cost. These methods are usually engaged when the project is planned to be built under a design/build contract. Promoters of competitive negotiated bidding method claim that this method saves time, improves quality and reduces number of claims. The main pitfalls of this method are:-

(a) The cost and time spent by the contractor for preparing a proposal is higher.

(b) The system lends itself to a situation where the contractor is reserved to propose any new or innovative ideas because preconceived ideas of the evaluators may not fit in the particular situation; contractors are required to disclose confidential commercial and financial information that should not be released outside the company.

(c) The owner may try to get cost-saving ideas from the competing contractors during the interviews and yet may choose not to award the project to the contractor whose ideas would later be utilized; and the processes of evaluation turn out to be subjective rather than objective (Kelley, 1991).

 

2.4.5 **Non-Competitive Negotiated Bidding**

The non-competitive negotiated procedure is essentially the process of negotiating a bid with a single source, usually a preselected contractor. For this reason it is also known as sole-source negotiation. The cost to be paid, and the product or goods to be procured by the owner are normally the items of negotiation. The firm, that is known to be prequalified and having expertise, can be chosen without any notification or tendering advertisement. This saves additional effort, time and money but chances of favoritism and corruption are increased.

Different countries have different rules and regulations regarding direct procurement, but mostly these rules are similar in nature. In most of the cases, when there are no competitors available for technical reasons or if the required product can only be provided or constructed by one contractor/organization, non-competitive negotiated bidding method is adopted. Also, when there is a need of similar service or repetition of works from a firm, this method may be adopted. In Pakistan, for some classified projects or for projects which have security concerns due to geographical location of the project site, this method is adopted.

Direct procurement is usually common in the form of variations or change orders in the construction industry. This method is very common in new construction projects in the private sector like housing, commercial buildings, private schools, hospitals and industries etc. However, in government construction projects, it is almost nonexistent.

2.4.6 **A+B bidding Method**

In this method contractors bid on the cost (part A) and on the time (part B), and the lowest combined bidder (A+B) is awarded the project. In the last decade or so, many departments of transportation around the United States have experimented with using the A+B bidding method. A survey of 101 projects was conducted and it was analyzed by comparing the projects which were awarded using A+B bidding method with similar projects that were bid using conventional methods (cost only). The conclusion from the research shows that substantial savings in construction time have been achieved when using the A+B method with almost no addition in cost. This was achieved by better planning and management skills of the contractors that were using the time factor as part of their bid strategy.

3.1 **RESEARCH METHODOLOGY**

The research was started with extensive literature review in the form of previous studies, research papers, books on the subject and few case studies. The methods for collecting and generating research data are the questionnaire survey and interviews. A total of 35 parameters were identified for study of performance of lowest bidding bid system and then these were shortlisted to 26 keeping in view the Pakistani environment and culture. Basing on these parameters the questionnaire was prepared with 26 parametric questions and 5 opinion of the respondent based questions.

A pilot study was carried out from 12 construction experts with their interviews to finalize the questionnaire. For exploratory study 5 methods other than the lowest bidding bid system were selected and part II of the questionnaire was designed. 10 parameters were selected for comparison of these methods. The questionnaires were further reviewed and finalized after making necessary adjustments. The questionnaires were then distributed in different segments of construction industry as well were floated on line through Google Drive.

The collected data was analyzed using MS excel and Statistical Package for the Social Sciences (SPSS-20). Tests for normality and consistency of data were applied. All the selected parameters were analyzed individually and a comprehensive rating of performance was measured. Similarly, for comparison of other tendering methods all the parameters were assigned a numbers on likert scale and their comparison is made. The results obtained are concluded and some recommendations are made basing on these results.

3.2 **The Questionnaire**

The questionnaire form consisted of two parts. Part I was designed to study the performance of lowest bidder bid system in public sector of Pakistan Part II of the questionnaire was designed to make comparison with some other methods of tendering used in different parts of the world. A five-point likert scale, with 1 being

 

very low and 5 being very high, was utilized to judge the performance parameters. The questionnaire was distributed in hard form as well as it was uploaded through "Google Drive" for online filling and submission. A total of 120 questionnaires were invited online and 80 were sent to different firms and organizations. Out of these 200 questionnaires sent out, 117 were received. Five incomplete questionnaires are excluded, so final analysis is carried out basing on 112 questionnaires. Respondents to this survey include 32 clients, 21 consultants and 59 contractors/subcontractors.

### 3.3 **Sample Size**

There were 112 valid replies out of 200 showing an overall response rate of 56%. In the construction enterprises, a good response rate is around 30% (Black *et al.,* 2000). Therefore, the response rate in this research is acceptable.

### 3.4 **Pilot Study**

Before distribution of a questionnaire among respondents or a detailed study, a pilot study was carried out to check the workability, practicality and realism of proposed questionnaire form and also to find out the resources required for the research study. It was also aimed at to check the effectiveness of sampling frame and the level of success which was desired to be achieved through proposed techniques. Five detailed interviews were carried out from renowned professionals in the country belonging to public and academic sectors. The government officials from Ministry of Finance and NHA were interviewed to discuss the proposed research procedures and data analysis techniques. In private sector, FWO, NLC, MES and NESCOM were consulted to check the validity and reliability of the questionnaire form including its arrangement, language and time required to answer the questions. In academic sectors, renowned professors from UET Lahore and NUST were interviewed to find out any weaknesses in research plan or in data analysis techniques.

### 3.5 **Data Collection**

The main part of the research study was collection of required data, which was obtained through filling of questionnaire forms and carrying out of personnel interviews from targeted population. Out of 200 identified respondents, 117 were received back. On scrutiny, five were rejected due to different reasons and 112 were kept for analysis.

### 3.6 **Comparison study of alternative methods**

For comparison study, of lowest bidder bid system with different methods used in some countries of the world, Part II of the questionnaire was developed. 5 Alternate methods were selected after extensive literature review on the subject. To assess these methods, 10 parameters were selected pertaining to the performance of contractors for execution of a project. Instead of using "Yes/No" answers, a five point likert scale was used, to explore the complete range of possible replies between "Yes" and "No" (Fellow and Liu, 2003). In this study, questionnaire survey was administered as it is the most appropriate method for this kind of study (Naoum, 2007). For questionnaire survey same methodology was adopted as explained above in this chapter. The main consideration for using likert scale is to establish the extent to which respondents agree or deviate with a particular parameter (Cormack, 2000). The responses to each statement/question are then used to calculate RII ranging from 0 to 1. RII method has the limitation that it may capitalize on skewed data thus inflating the relative weight for a certain factor. In this research, the RII is renamed as parameter index (PI) and is used to rank each parameter in CI of Pakistan.

**Parameter Index = $\sum p$ / ( A * N )**

**PI = [0 n1 + 1 n2 + 2 n3 + 3 n4 + 4 n5 ] / [A * N]**

where;

*p* : weighting given to each parameter by the respondents ranging from 0 to 4.

n1 : number of respondents for impossible.

n2 : number of respondents for less likely.

n3 : number of respondents for likely.

n4 : number of respondents for very likely.

n5 : number of respondents for almost always.

 

A: highest weight i.e. 4.
N: sample size or number of samples.
All 10 parameters were assigned a weight and then their weighted average was calculated to establish the best ranking of these five methods. After calculating the parameter index of all parameters, weighted value for each method was calculated to rank the five methods as under:-

**Ranking Index = (2PI1+3PI2+PI3+PI4+PI5+2PI6+2PI7+PI8+PI9+PI10)/15**

Where, PI1, PI2, PI3 …….. PI10, are parameter Indices of parameters 1 to 10 respectively.

### 4.1 **RESULT ANALYSIS AND DISCUSSIONS**

To check the quality, normality, reliability and authenticity of questionnaire surveyed data which was received from various categories of respondents across the country pertaining to performance of lowest bidder, the following basic data analysis tests were performed on the received data.

### 4.2 **Measurement of Normality of Data**

The type of data used for the research study was on ordinal scale and more precisely it was based on the Likert scale measurement involving various categories of respondents across the country therefore. The Shapiro-Wilk test for normality of the surveyed data showed no normal distribution like parametric data behavior so it was treated as 'non parametric' for its further analysis and statistics study.

### 4.3 **Measurement of Reliability of Data (Non-Parametric)**

To estimate the internal consistency of scale data given by respondents as per Likert scale, Cronbach's Alpha (α) was used to measure its reliability or viability or correlation before its interpretation. The value of "α" ranges from negative infinity to one, where a score closer to one would indicate a higher degree of reliability (Cronbach, 1951). By using SPSS, the value of Cronbach Alpha was calculated as **0.968**, it can be interpreted that there was high level of uniformity or strong internal consistent reliability between the scores submitted by respondents in ranking of various bidding methods.

### 4.4 **Kruskal-Wallis Test for Reliability**

It is a non parametric test, used to determine whether three or more independent groups e.g. client, consultant, and contractor are identical or diverse on some variable of interest. If asymptotic significance < 0.05, it means there is significant difference between ratings or perceptions. If asymptotic significance > 0.05, it means no significant difference between ratings or perceptions. The test was conducted for two sets of group. Firstly, it was done to check between client, consultant, and contractor. The results showed less than .05 for only one parameter i.e. lowest bidder is selected among the qualified bidders. It shows that perception of three groups was not same. To identify the group whose perception is different from others, Mann-Whitney test was conducted. The same test is applied for experience of the respondents. Five groups of experience are made i.e. 0-5 years, 6-10 years, 11-15 years, 16-20 years and 20+ years. The difference in perception of the respondents was observed in two parameters. The result shows that the parameter "response to changes by the lowest bidder" was perceived differently by the different experience level respondents. Further to check this difference, Mann-Whitney test is conducted.

 

### 4.5 Mann-Whitney Test for Rejected Null Hypotheses

This test is conducted to check for a certain parameter for which the Null hypothesis is rejected by Kruskal-Wallis test. The results show that which groups differ in perception from other groups. The results are tabulated below:

| Null Hypothesis | Kruskal-Wallis Test Sig value | Mann-Whitney Asymptotic Significance Value Sig level .05 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Consultant-client | | | Client-contractor | | | Consultant-contractor | | | |
| Lowest bidder is selected amongst the selected contractors | .005 | .858 | | | .005 | | | .001 | | | |
| Null Hypothesis | Kruskal-Wallis Test Sig value | Mann-Whitney Asymptotic Significance Value Sig level .05 | | | | | | | | | |
| | | -5 & 6-10 | 0-5 & 11-15 | -5 & 16-20 | -5& 20+ | -10 & 11-15 | -10 & 16-20 | 6-10 & 20+ | 1-15 & 16-20 | 1-15 & 20+ | 6-20 & 20+ |
| Response to changes | .029 | .138 | .497 | .001 | .006 | .892 | .062 | .049 | .382 | .675 | .434 |

The result shows that the perception of contractors is different from clients and consultants as regards to the parameter of selection of lowest bidder. Similarly, the perception of low experience professionals is different from those having more experience in the CI as regarding response to changes.

### 4.6 Analysis of Lowest Bidder Bid System

In public sector, the lowest bidder bid system is widely used in construction projects of Pakistan. The detailed survey was carried out to ascertain different conditions associated with this system followed in different parts of the country. The questionnaire survey (part I) consisted of three main sections followed by few opinion based questions. Analysis of the different parameters and conditions selected after thorough literature review is given in this section. It includes analysis of performance parameters for the projects executed by the lowest bidder. Data obtained through questionnaires was not normally distributed but it was reliable. The analysis shows the medium level of performance by lowest bidder regarding cost, time, quality and other parameters. The perception of contractors is found to be different from clients and consultants regarding award of contract to the lowest bidder. Similarly less experience professionals have a different perception than experienced professionals. Five alternative methods of bidding were selected for comparison with traditional lowest bidding method. Around 70% of the respondents appreciated and supported the idea of multi parameter bidding.

## 5.1 CONCLUSIONS AND RECOMMENDATIONS

The first objective of the research was to study and analyze the performance of the lowest bidder in public sector of Pakistani CI. This was achieved through identifying 26 performance parameters and transforming them into a questionnaire along with some opinion based questions. To improve the project performance, 5 new methods were identified which are already in use in different parts of the world. 10 performance parameters were identified and performance index (PI) for each parameter of the five methods was calculated. After doing this through survey questionnaire, RI of all the methods was calculated on the basis of weighted parameters. This concluded to the best possible option against the lowest bidder. This study of comparison of different methods has provided the basis to undertake more elaborate studies for actual comparison between different alternatives. The obtained results, conclusions or recommendations may be sent to PEC or PPRA for further evaluation and consideration.

### 5.2 Conclusions

In this research, the performance of public owned construction projects awarded on the least bidder bid evaluation and contract award system were assessed. Additionally, it has been tried to investigate opinions of construction professionals from public organizations about the current method of bid award procedure and other

 

alternatives. The following conclusions are drawn based on the assessment made on information gathered through questionnaires from construction professionals.

(a) It can be concluded from the research that least responsive bid evaluation and contract award procedure is the main method of awarding public constructions works contract. Almost 83% of all the public projects are awarded to responsible and responsive bidders with the least price offers in CI of Pakistan.

(b) Collusion/Bid shopping is a malpractice in almost all the construction industries of the world. The phenomenon is also prevailing in Pakistani CI. The result shows that this practice prevails in 62 % of the cases. This not only affects the spirit of the competitive bidding process but also escalates the bid price because of the unrealistic Bid quoted by the Bidders for the project.

(c) Quality of the completed projects by the lowest bidders was found to be just satisfactory (index rating of 59%) and not the optimum. During interviews on few project sites, lower rates were the main reason given by the contractors for not finishing the job with optimum quality.

(d) Almost half of the public owned projects overrun the time stipulated for their completion. Lowest bidder cannot put in extra resources to boost the project as it costs more and profit margin is reduced. Ultimately the project is delayed as a whole and WBS is also not followed in letter and spirit.

(e) Cost is the major factor around which the whole process of bidding and construction revolves internationally in general and in Pakistani CI in particular. Except for few exceptions in the world, mostly the lowest bidder bid system is followed mainly because of saving the cost. But, at the same time, it is concluded that more than 50% of the construction projects overrun the budget and end up with a higher cost.

(f) No design can be perfect. Changes during or after the execution phase of the project are almost inevitable. More than half of the lowest bidders are normally reluctant to accept change orders, unless it is more profitable.

(g) Defects are generally observed in the more than 60% of the built facilities within the warranty period. Contractors are often called upon to rectify the defect and their response is generally good.

(h) More than 90% of the construction professionals opine that Construction projects should not be always given to the lowest bidder and the quality of the finished project will be improved if performed by the non lowest bidder and project can be completed before stipulated time.

(i) Study of alternate methods for bidding is supported by the construction professionals. It was appreciated that new methods in the field must be tried to get ultimate results.

(j) Multi parameter bidding method was appreciated by most of the construction professionals as it appears to be more comprehensive and more useful in selection of the best bid. It can contain as many parameters as desired by the client. It may have edge on the traditional lowest bidding method.

(k) Competitive negotiated bidding is also a method which can bring upon positive changes as compared to the lowest bidding.

(l) A+B method includes only cost and time. The project, in this case, may have only two major advantages i.e. early finish and least cost. If the quality and other aspects of the project can be controlled by the supervision consultant, this method can obtain rich dividends. Substantial savings in construction time can be achieved.

 

(m) The initial cost of the project in all five methods discussed in the study appears to be more than the conventional lowest bidding method. But, in long term comparison these methods have lesser life cycle cost with better quality and standards.

(n) It is discovered in the research that the progress as per the schedule of most projects awarded on the responsive least bidder bid award procedure was not satisfactory.

(o) Traditional bidding procedure has been criticized that it might guarantees the lowest cost project, but not the best.

(p) The perception of lesser experienced professionals was different from the experienced ones regarding response to changes by the lowest bidder.

## 5.3 Recommendations

Findings of this research show the moderate level of performance of public construction projects executed by the lowest bidders in most of the cases. The researchers of this thesis strongly recommend the Federal Government of Pakistan to look for other alternative bidding methods for evaluation and award.

(a) Keeping in view the inherent weaknesses of the lowest bid system it should be improved by taking following measures:-

i. Quality assurance team of the lowest bidder should be a pre requisite during the execution on public construction projects.

ii. System of incentives and penalties should be strictly imposed and implemented for scheduled completion of the projects.

iii. Projects should be planned in a way that changes are minimized. However, changes made during the execution of the construction project should be well worked out and it should be incorporated in a way that contractor accepts it voluntarily and a reasonable profit to the contractor be kept in mind.

iv. Safety infrastructure of the firm should be given adequate importance at the time of bid evaluation.

(b) Flexibility in method of awarding the project should lie with client in the best interest of the project keeping in view the life cycle analysis and nature of the project.

(c) Multi parameter bidding method was appreciated by most of the respondents. It can be adopted on trial basis and subsequently adopted if the results are better than the lowest bidding method.

(d) Bidding procedure should be made more fair and transparent.

(e) Percentage of Performance and insurance bonds should be revised for the lowest bidder to cope up the weaknesses.

(f) The cost of any project should not be kept in mind as a single factor but life cycle cost should also be evaluated.

(g) Government organizations should be authorized to reject the lowest tender even if the bidder is responsive and responsible if the authority considers non lowest bidder to be more beneficial for the execution of the project.

## 5.4 Direction for Future Research

(a) A study may be carried out with large sample size to validate the conclusions of this study.

 

(b) Case studies may be conducted on construction projects executed on lowest-bid and lump-sum basis and conclusions be compared for cost and schedule overruns.

(c) Alternative methods, other than conventional lowest bidding, discussed in this study may be analyzed by professionals in the industry.

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