

# Contractor Selection: A Case Study of Public Sector of Pakistan

\*<sup>1</sup>Mansoor Bhanabhro, <sup>2</sup>Nafees Memon, <sup>3</sup>Rehan Hakro

<sup>1,2,3</sup>Mehran University of Engineering and Technology, Pakistan

**Abstract** - In most developed countries, the contractor procurement process is considered to be fraught with prejudice, which may contribute to incompetent contractors being chosen since it is focused solely on human experience and emotions. The failure of managers to be impartial in contractor selection has significant implications for the government and corporate organisations in terms of expense, delivery time, and effect on the general welfare of the people. As a result, managers must be involved in the contractor selection process. Developing a model to resolve the issue of inadequate contractor assessment would, without a doubt, be a huge help in the contractor selection process. A prototype framework for contractor assessment decision is described in this research. Analytical Hierarchy Method (AHP) from pair wise comparison in Expert Choice Software is used to measure the weighting of major and sub-criteria. Financial Stability (54 percent), Expertise & Past Success (31.6 percent), Equipment (4.2 percent), and Affiliations (4.2 percent) were the main factors considered in this report (10.2 percent).

**Keywords:** Contractor Selection, Public Sector, AHP.

## I. INTRODUCTION

One of the most important decisions a client must make in the construction industry is selecting a contractor. Hiring the wrong contractor can result in delays, cost overruns, subpar work, disputes, and even bankruptcy [1]. The construction industry is crucial to any country's progress, and the physical development of construction projects like houses, highways, and bridges is a barometer of its economic growth. The construction industry, according to Ye et al. [2], is one of the most important industrial contributors to the European economy in terms of gross product and employment. As a result, most governments, consumers, and neighborhoods consider the success of a construction project to be a critical problem. The progress of a project is determined by a number of factors.

Contractors play a critical role in the performance of construction projects. The selection of the right contractor would not only ensure the project's overall quality, but will also allow for cost savings [3, 4].

Competitive bidding, in which the project is awarded to the lowest bidder, is commonplace in the building industry around the world. This strategy is intended to encourage healthy competition and ensure that the project's lowest contract price is achieved. Although private construction contractors may award contracts in a number of ways, most government agencies are legally obliged to award the project to the lowest bidder. Indeed, historically, public construction procurement, or the method of selecting contractors for public construction projects, has been focused on choosing the lowest bidder. The lowest bidder form, on the other hand, has caused a slew of issues. Rules intended to protect the public from corruption also made it impossible for construction delivery processes to be innovative. The low bid process ensures that the winner is chosen solely on the basis of price, rather than qualitative factors like past success or construction schedule [5]. There is some literature that highlights the role of contractors in project performance in the literature that deals with construction project success and causes of time and cost overruns in the construction industry.

The contractor will complete the project successfully if it is technically sound and has the necessary expertise, facilities, and staff to satisfy the client. Furthermore, the contractor's financial stability can aid in achieving the highest quality and project completion within the specified time frame. If a contractor's management capacity is strong, dealing with technical staff with expertise, efficiency, and management and project management skills is easy. If a contractor has a good reputation, clients will look at his or her past success and relationships, making the contractor more likely to be awarded contracts. By awarding contracts to the lowest price with multi-criteria procurement procedures, the selection of a suitable contractor is the secret to project success. In a multi-criteria process, both technical and financial criteria are considered. The majority of studies rate contractors' performance attributes based on tendering, prequalification, and long-term perceptions. The final decision to hire a contractor is based on qualitative, subjective, and imprecise results. Whatever approach is used, the importance of three parameters, namely time, expense, and consistency, should be taken into account. In this report, the public sectors of Pakistan were considered for final contractor selection in AHP.

## II. LITERATURE REVIEW

According to a review of the current literature, several studies have established various frameworks with different assessment requirements to assist owners in selecting the right contractor during the contractor selection process [6, 7]. The key benefits of these approaches and assessment processes are that they have a structured and analytical procurement process that considers a variety of variables in addition to the bid price. Using a multi-criteria approach to evaluate contractors may help solve a variety of issues related to their economic and technological aspects, quality expectations, previous results, and other tangible and intangible characteristics.

A variety of novel methods have been proposed in order to achieve the selection of "nice" contractors [8]. Some of these univariate or multivariate statistical approaches were developed with the aim of providing a quantitative indicator of a contractor's possible cost or quality output. Others also used multivariate statistical methods [9], which include one or more dependent variables and a variety of independent variables. The investigation of a contractor's particular capacity, such as the prediction of expense, time, or quality results, is prioritised in a universal selection process. Almost every previous research in this field has identified various performance evaluation approaches as the "most effective" for identifying a "good" contractor.

Multiple regression analysis was used by Doloi et al. [10] to analyse 43 controlling technical attributes in contractor selection and their ties to project performance objectives. According to the findings, technical experience, previous success, time in business, work methods, and working capital all have a major effect on contractor efficiency in terms of meeting time, expense, and quality goals.

Doloi et al. (2010) have used structural equation modelling to investigate 29 contractor qualification requirements and their relationships with project results. The results of the model, based on survey data collected across medium-sized construction projects in Australia, showed that the contractor's technical planning and managing experience is crucial to project success.

Sing and Tiong [11] investigated 102 industry-based contractors' selection criteria and their perceived significance among practitioners in the Singaporean construction industry. Quantity surveyors, developers, contractors, and public and private clients filled out 128 questionnaires, which they evaluated. According to their results, a contractor's prior experience with similar projects is one of the most significant factors in ensuring project success. The skills and experience of project managers and other management personnel, as well

as their working capital track records, were said to be critical in evaluating the capabilities of applicant contractors.

The BV (Best Value) contractor selection process is listed as a multi-criteria decision-making (MCDM) challenge in academia. The utility theory [12], the fuzzy theory [11], the performance-based model [13], and the analytical hierarchy method (AHP) [14] are just a few of the MCDM models that have been built for contractor prequalification or final selection. The AHP-based approach has gained a lot of traction among these models, owing to its simple and systematic implementation steps. While AHP has been reported to be used to weight decision criteria for selecting BV contractors in some countries (such as the United States), it is difficult to apply in others due to the numerous procurement regulations that must be followed. Because of some procurement conditions that are strictly applied in Taiwan, the AHP is not used in public procurement. Lin and colleagues [15, 16].

Contractor selection is a strategic decision for public authorities because contractors play such an important role in any building project. Multiple criteria decision analysis (MCDA) models have also been proposed recently. Hatush and Skitmore [17] present a multicriteria utility theory-based approach for contractor selection and bid evaluation that incorporates the benefits of scoring techniques and optimization models. In open tendering, Anagnostopoulos et al. [18] propose an AHP model for contractor selection. Each sub-criterion is given a seven-point rating scale (unacceptable, very bad, poor, decent, reasonable, very good, and outstanding) that is used to assess a qualified contractor. While this rating scale reduces the number of pairwise comparisons needed, it does not guarantee that decisions are fair. Prequalification and final selection are the two steps in the contractor selection process. The AHP model proposed by Fong and Choi [19] is aimed at the final point, namely choosing a contractor to whom a contract should be awarded.

There is no analysis or reported data on final contractor selection in Pakistan's public sector. In 2004, the Pakistani government established and introduced the Public Procurement Regulatory Authority (PPRA) rules for public works procurement (Choudhry, 2016). According to PPRA, the "lowest bid" criterion is binding in public procurements, with expertise, past results, staff, financial position, plant and equipment, and management capacity serving as guiding factors in contractor selection.

Despite following the recommended procedures, key construction stakeholders admit that the contractor selection, bid assessment, and procurement mechanism have weaknesses and shortcomings [20].

According to a report by Haseeb et al. [21], 80 percent of construction projects in Pakistan are delayed, and only 20% are completed on time and within budget. According to their results, contractors are responsible for a substantial portion of the delays in large-scale projects, including insufficient expertise, inadequate preparation, and poor site management. Others also discovered that the country's inadequate contractor procurement practises result in cost and time overruns, resulting in client-contractor conflicts.

### III. RESEARCH METHODOLOGY

The literature review yielded 30 parameters for contractor selection, which were grouped into major underlying factors. In Pakistan, a questionnaire survey of regular public sector construction procurers was conducted. The survey was used to: (a) determine public sector construction clients' attitudes toward the importance of tender price in final contractor selection; (b) determine client satisfaction with existing selection methods and contractor performance; and (c) priorities the criteria responsible for overall significance in final contractor selection.

Data was collected in the first stage through questionnaires and interviews. The majority of those who responded work in the construction industry. A total of 65 questions were floated, with 48 questionnaires being appropriate for study. Furthermore, only questionnaires that were fully filled out by respondents were included in the analyses. The data in Table was used to build a likert scale. The data was analysed using the SPSS programme.

Table 1: Likert Scale

Description for Level of Adoption	Scale
Not Applicable	1
Moderate	2
Less significant	3
Significant	4
Highly Significant	5

These preferences are often considered when the AHP is used to pick contractors. From 40 questionnaires sent out to clients of public agencies, 20 responses were received. A questionnaire survey is used to determine the relative importance of each criterion. The second-level elements (financial capacity, past performance, key personnel qualification, facilities, and affiliations) were organized in a matrix, and decision-makers assessed the relative value of each element in relation to the overall objective of selecting the most capable contractor. For pairwise comparisons, the decisions are entered using the fundamental scale.

### IV. DATA ANALYSIS AND RESULTS

The survey considers 48 factors that are grouped into 4 main criteria to identify the most significant factors in selecting contractors. From the 65 invitations sent, a number of 48 completed responses were received. This amount signifies a response rate of 73 percent. The average mean was calculated in IBM SPSS software. In the end the pairwise comparison between 17 shortlisted factors was done by AHP technique in Expert choice software. The result of the survey is as follows.

Table 2: Average Mean Index of Financial Stability Sub-Factors

S#	Financial Stability Factors	Minimum	Maximum	Mean
1	Annual turnover	4	5	4.7
2	Financial audited report	3	5	4.5
3	Financial statement	4	5	4.5
4	Liquidity	3	5	4.1
5	Financial firmness	3	5	3.9
6	Owned financial funds	3	4	3.4
7	Net worth	4	4	3.1
8	Profit	3	3	2.7

9	Balance sheet	1	3	2.3
10	Obligations	2	3	2.2
11	Bonding capacity	1	3	2.2
12	Financial references	1	3	2.1
13	Working capital	2	4	1.6
14	Credit ranting	2	3	1.5

**Evaluation Criteria (Past Performance, Qualification)**

**Table 3: Average Mean Index of Past Performance, Qualification Sub-Factors**

S#	Factors	Minimum	Maximum	Mean
1	Experience of technical personnel	4	5	4.8
2	No. of technical staff	3	5	4.6
3	Experience in similar projects	4	5	4.6
4	Projects completed on time	4	5	4.6
5	No. of years in construction	3	5	4.6
6	Qualification of key staff	3	5	4.5
7	Size number and location of ongoing projects	2	5	4.5
8	Claims and litigations	2	5	4.5
9	Past performance	3	5	4.3
10	Quality control policy	3	5	4.3
11	Compliance with quality and standard.	2	5	4.2
12	Past client relationships	3	5	4.15
13	Past Failures in completed projects	3	5	4.1
14	Senior Management	2	4	3.6
15	Financial management	3	4	3.5
16	Project management system	2	4	3.4
17	Safety record /performance policy	2	4	3.4
18	Quality management system	1	3	2.7
19	Subcontractor relationship	2	3	2.7
20	Client satisfaction	4	4	2.6
21	Projects completed on budget	1	3	2.4
22	Relationship with consultants	1	3	2.3

23	References	1	3	2.3
24	Experience in local area	1	3	2.1
25	Relationship with suppliers	1	2	1.5

**Evaluation Criteria (Equipment)**

**Table 4: Average Mean Index of Equipment Sub-Factors**

1	Equipment availability	4	5	4.7
2	Previous Backlog	3	5	4.6
3	Details of equipment. Machineries and transport owned by firm/contractor"	2	4	3.8
4	Details of equipment. Machineries and transport rented by firm/contractor"	1	3	2.3
5	Insurance Resources	1	3	2.1

**Evaluation Criteria (Affiliations)**

**Table 5: Average Mean Index of Affiliations Sub-Factors**

1	Category as per PEC Regulations	4	5	4.9
2	"Registration with FBR as an active tax payer"	5	5	4.9
3	Category as per PEC Regulations	4	5	4.9
4	Company/Firm not black listed	4	5	4.7
5	Valid Registration with PEC	4	5	4.5

**Table 6: AHP Priorities ratios**

Criteria	Weightage of Criteria	Sub-Criteria	Weightage of Sub-Criteria
Financial Stability	0.540	Financial Statement	0.458
		Annual Turnover	0.416
		Yearly Audit Report	0.126
Experience, Past Performance and Key Personnel Qualification	0.316	Projects Completed on Time	0.296
		Number of Years in Construction	0.180
		Experience in Similar Projects	0.15
		Experience of Technical Personnel	0.141
		Size number and location of ongoing projects	0.112
		Qualification of Key Staff	0.05
		Number of Technical Staff	0.043
		Claims and litigations	0.028
Equipment Availability	0.042	Equipment Availability	0.875
		Previous Backlog	0.125
Affiliations	0.102	Company/Firm not Blacklisted	0.420
		Categories as per PEC Regulations	0.289

		Registration with FBR as Active Tax Payer	0.168
		Valid Registration with PEC	0.123

## V. CONCLUSION

The aim of this study is to help contract superintendents gain a better understanding of the consequences of contractor failure and to help them develop adequate assessment systems prior to contract award using quantitative data.

Final contractor selection through the AHP allows clients to add or remove elements of a problem hierarchy as required for a specific project. In addition, each qualifying contractor's strengths and weaknesses are revealed.

Contractor selection is a risky process for ensuring that a project is completed on time and within budget, with high-quality performance. The aim of multi-criteria contractor selection is to find the "best" contractor from a pool of candidates by assessing them against multiple election objectives. The AHP has also been chosen as a reliable instrument for decision-making and problem-solving because of its versatility and performance.

The selection of a contractor is influenced by forty-one (41) factors, according to this report. These considerations have been grouped into four main consideration parameters. The major requirements for consideration were established after a thorough analysis of the literature, a review of various foreign procurement guidelines, and a study of Pakistani government departments. Financial stability, experience, past performance, key personnel qualification, equipment, and affiliations are among the most important factors.

Analytical Hierarchy Method (AHP) from pairwise comparison in Expert Choice Software is used to measure the weighting of major and sub-criteria. Financial Stability (54 percent), Expertise & Past Success (31.6 percent), Equipment (4.2 percent), and Affiliations (4.2 percent) were the main factors considered in this report (10.2 percent).

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**Citation of this Article:**

Mansoor Bhanabhro, Nafees Memon, Rehan Hakro, "Contractor Selection: A Case Study of Public Sector of Pakistan" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 5, Issue 3, pp 75-81, March 2021. Article DOI <https://doi.org/10.47001/IRJIET/2021.503015>

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