CONTRACTOR'S SELECTION AND BID EVALUATION IN THE CONSTRUCTION INDUSTRY OF PAKISTAN

by

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DEDICATED

TO

MY PARENTS

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ABSTRACT

Procurement of construction work involves the selection of contractor through effective evaluation of bid, a very important aspect of contract administration which; if not carefully undertaken could adversely affect contract execution. Hence it is important that contractor selection be carried out with careful thought and consideration.

In Pakistan contractor's selection and bid evaluation process have many flaws and short comings that need to be improved to make the process of procurement better. The inefficient sources selection criteria being adopted by the employers all over the Pakistan for procurement of civil work results in frequent cost and time overruns and imminent quality issues.

Government of Pakistan developed Public Procurement Regulatory Authority rules 2004 and the same were enforced for the procurement of works by public entities. This research scrutinizes these rules and it was inferred that the Construction Industry accepts the efficiency of these rules but also recognizes the room for improvement. According to PPRA rules "lowest bid" criteria is enforced in public procurements and guideline factors to be considered in selection of contractor are experience, past performance, personnel, financial position, plant and equipment, and management capability.

Numerous criteria for selection of contractor have been developed over time through iterative learning and improved progressively. Some of the techniques devised by the researchers include, but not limited to; Analytical Hierarchy Process, Analytical Network Process, Multi Attribute Utility Theory, Fuzzy Set Theory, Complex Proportional Assessment, Evidential Reasoning etc. The procedure for contractor selection is giving way to more modern methods that make an effort to correct the inherent deficiencies and discrepancies resulting in more realistic evaluation.

The main objective of this study is to identify the significant criteria for contractor selection and bid evaluation in Construction Industry of Pakistan. The study also suggests the preferred criteria for evaluation and selection of contractors in Pakistan's Construction Industry.

Five main criteria used in bid evaluation and subsequent selection of contractor have been identified by literature review. These main criteria were ranked using severity index analysis and sequenced as technical ability, financial soundness, management capability, reputation and health and safety in the same order.

It was inferred that construction professionals in Construction Industry of Pakistan prefer multi-criteria for selection of contractors over single criteria and allocate higher marks to technical competence than to financial soundness in selecting a contractor for a given project. Few of the professionals involved in procurement process, know about the modern multi criteria selection method stated earlier, developed by the researchers.

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LIST OF ABBREVIATIONS

GoP	Government of Pakistan
AHP	Analytical Hierarchy Process
ANP	Analytical Network Process
PEC	Pakistan Engineering Council
MAUT	Multi-Attribute Utility Theory
COPRAS	Complex Proportional Assessment
FST	Fuzzy Set Theory
OSHA	Occupational Safety and Health Administration
ER	Evidential Reasoning
SPSS	Statistical Package for Social Sciences
ANOVA	Analysis of Variance
RII	Relative Importance Index
I	Severity Index
CI	Construction Industry

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CHAPTER 1

INTRODUCTION

1.1 Study Background

Construction projects pass through many important phases which are crucial for their successful execution. Bidding process is one of the important phases of project execution. Bidding phase involves Contractor selection, which plays central role in the overall completion of project. The selection of the most suitable contractor is quite difficult process. (Arazi Idrus et all, 2011). The possibility of Successful completion of a project increases with selection of a suitable contractor (Alhazmi and McCaffer, 2000). Selecting the most suitable contractor for a construction project is a critical decision for owners and project managers alike (M. Salama, A 2006). Construction projects are greatly influenced by contractors, so selection of competent contractor is crucial for the successful execution of project (Xiaohong Huang, 2011). Bid evaluation and contractor's prequalification are among the main issues of any construction industry. The nature of these issues varies in different construction industries depending upon the environment, processes and organization. Procurement process is an integral part of construction management. The failure of completion of construction projects within given budget and time span are the major issues caused in construction industry due to mismanagement of bidding and procurement process. Lowest bid selection process is the main practice in underdeveloped countries including the construction industry of Pakistan. This practice has many flaws including bad performance and very high competition of contractors.

Alternate bidding system assures the quality of construction. The outcomes of alternate bidding systems are high competition; and eventually high performance of the contractors. Now-a-days one of the alternate biding systems adopted in developed countries is "Best value procurement" (Rizwan U. Farooqui et al., 2008, *ICCIDC-1).* Construction industry is underperforming due to many reasons and many solutions and measures have been proposed and taken to improve its performance. The lowest bid selection process is still followed in the industry and is very common, which is the core reason for the current low status and underperformance of industry. Improvement in the construction industry is badly impacted by this practice of selecting lowest bidder [PBSRG, 1991 to date].

The process of bid evaluation and contractor selection varies in different construction industries of various countries; it relies on variety of different decision criteria according to

the environment of a specific construction industry. The study of different industries showed the existence of many decision criteria for the selection of an appropriate contractor. Some of the universal factors considered in the process of assessment of contractor include project packaging, invitation, prequalification, short listing and bid evaluation. Prequalification is the pre-tender process which provides client with a list of pre-qualified contractors to invite to tender. Bid evaluation is a post-tender process which accounts the capabilities of Contractor as well as the bid price (Hatush and Skitmore, 1997 a). Russel and Skibiniewski (1988) defined bid evaluation as a decision-making process to assess the capabilities of a contractor using numerous decision criteria. It requires knowledge and experience from the project manager in order to use the appropriate criteria to insure the selection of the most appropriate contractor technically and financially (Hatush and Skitmore, 1997a).

1.1.1 Pre-Qualification and Bid Evaluation Criteria

Contractors are assessed on different criteria to select a suitable contractor who can accomplish a specific project on desired level of performance; these criteria include technical capability, financial stability, managerial approach etc. The processes of pre qualification and bid evaluation incorporate these criteria to select an appropriate contractor for a given project (Hunt *et al.*, 1966). Organization structure of contractor's firm and experience in some specific type of construction are also among important criteria considered in the award of contract (Merna and Smith, 1990). Table (1) shows five main criteria used for contractor's prequalification and evaluation of bid and also the underlying information considered in these criteria (Hatush and Skitmore, 1997a).

The nature of project may impact the importance of selection criteria to be used for bid evaluation and contractor's assessment. For instance, design-build contract method was used to deliver the project of planning and tendering of the parallel runway for Kingsford Smith Airport. Contractors were assessed on different criteria including experience, management approach, and project delivery capability, relationships of contractor in industry and financial status to select a qualified contractor (Herbert and Biggart, 1993).

Table 1.1: Main Criteria and Sub-criteria for Contractors Pre-qualification and Bid Evaluation

Main Criteria	Sub-Criteria
Financial Soundness	Financial Stability
	Credit Rating
	Banking Arrangements and Holding
	Financial Status
Technical Ability	Experience
	Plant and Equipment
	Personnel
	Ability
Management Capability	Past Performance and Quality
	Project Management Organization
	Experience of Technical Personnel
	Management Knowledge
Health and Safety	Safety
	Experience Modification Rating
	OSHA Incident Rate
	Management Safety Accountability
Reputation	Past Failures
	Length of Time in Business
	Past Owner/Contractor Relationship
	Other Relationship

(Source: Hatush and Skitmore, 1997a)

In this research, Severity Index (I) analysis has been done to rank the criteria being used in Contractor's selection and bid evaluation in the CI of Pakistan. The results have been concluded by statistical analysis of the data and some recommendations have been given basing on the severity indices of the criteria for Pakistan's construction industry.

1.2 Research Significance

It has been observed that the performance of the construction industry of Pakistan in terms of project delivery is very poor. Only several construction projects are completed within the planned resources. In Pakistan most of the construction projects experience cost and time overrun leading to dispute b/w the clients and the contractors. One of the probable

reasons for these cost and time overrun can be attributed to the poor selection method of contractors. Present study will explore issues related to the contractor's pre-qualification and bids evaluation process in the construction industry of Pakistan and will provide project managers and professionals in Pakistan with recommendations about the suitable criteria for better evaluation of construction bids both technically and financially and finally selecting the best suitable contractor for the job.

1.3 Research Objectives

The main objectives of the current study are:

1. Reviewing the various criteria and variables used for contractor's selection and bid evaluation as stated in literature and public procurement regulatory authority, (PPRA) rules; of Pakistan.

2. Identifying the criteria and common underlying factors which effect contractor's selection in Pakistan based on the perceptions of clients and consultants.

3. Determine multi criteria selection methods that Pakistani construction professionals prefer in order to enhance contractor's selection in Pakistan.

4. Introducing guidelines to be considered for enhancing the contractor's selection process in CI of Pakistan.

1.4 Scope and Limitation

The extent of the present study is restricted to the construction industry of Pakistan only; and it primarily covers the perception of key stakeholders who are involved the process of bid evaluation and subsequent award of contract to contractor i.e. clients and consultants. Consultants for the questionnaire survey are chosen from the valid consulting firm's list of Pakistan Engineering Council (PEC). Clients mainly contain Government of Pakistan (GoP) bodies which are involved in different services like infrastructure, roads, dams etc. These bodies include National Highway Authority (NHA), Provincial Highway Authorities, Construction and Works departments etc.

1.5 Organization of Thesis

The thesis is organized in five chapters. Chapter 1 covers a brief introduction to Contractor's selection and bid evaluation and chapter 2 covering literature review. Chapter 3 covers methodology used in the research and chapter 4 covers results and analysis. The final (5^{th}) chapter presents the conclusions and recommendations.

1.6 Summary

This chapter gave a brief introduction to importance of Contractor's selection in the CI and listed the objectives of this research. An extensive literature review; see chapter 2, has been done to provide theoretical base for this research. The theoretical base for this research comes from an extensive literature review; see Chapter 2. This chapter contains significance of the research, scope and limitations and also provides an overview of the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Procurement of building works involves the selection of contractors through effective evaluation and it is a very important aspect of contract administration which if not carefully undertaken could adversely affect contract execution. It is therefore important that contractor selection be carried out with careful thought and consideration. The procedure for contractor selection however is giving way to more modern methods which seek to correct the inherent deficiencies and maladies to more realistic evaluation and reporting.

The researchers have done a lot of research on the problem of contractor's selection for construction industry. Different criteria and their underlying factors to assess the appropriateness of contractor have been in traduced. Quantitative model to select qualified contractor have been developed by Holt et al. in 1994. A client satisfaction model is introduced by carrying out a survey with a sample size of 101 clients by Ahmed and Hangari in 1995, this model incorporates important factors that are considered in the selection process of a contractor for a project. Holt et al. said that the contractors selection should base on the best value of money, lowest bid practice should be avoided as it has many flaws causing the failure of project completion. Some of the major and universally considered criteria for the process of contractor selection and bid evaluation include financial capability, technical capability, and management team and health and safety record of contractor (Hatush and Skitmore, 1997). Another technique developed for the issue of contractor selection is cluster analysis; it has been introduced by Holt in 1997. Multi criteria for the selection of contractor has produced great results and improved the process, a multi criteria method incorporating the quantitative and qualitative assessment of contractor is developed by Hatush and Skitmore in 1998, which basis on utility theory. The criteria for the selection of contractor vary from client to client. The priorities and requirements of clients and consultant vary depending on the nature of project for contractor. A study has been conducted to find out detail of such requirements which can be used as guidelines in the process of contractor selection by Chinyio et al. in 1990. Another research have been carried out determining the ranking of 35 different criteria followed in the contractor selection by Ng and Skitmore in 1999, the results showed that there is huge difference in the use of selection criteria as per the ranking of consultants and clients. Similarly a conceptual model to measure the impact of

different criteria for bid evaluation is developed for the construction industry of Saudi Arabia by Alsugair in 1999. A single prequalification or selection criteria has different significance depending on the requirements and nature of selection committee and environment of the specific industry. A survey has been conducted in UK to know the perception of different clients and consultant about single criteria by Ng et al. in 1999. The perceptions of clients about factors to be considered for selection of contractor greatly associate with each other when they are asked about a same project in both public and private sector (wong et al. 2000).

The results and conclusion of these studies are of great importance as they describe the factors which provide foundation to resolve the issue of contractor's selection and bid evaluation considered by different clients and consultants belonging to various construction industries. Table 2.1 is a brief summary of different criteria that are considered in the selection of main contractor in different construction industries according to various researchers.

Table 2.1: Criteria for the selection of Main Contractor According to Different Researchers

	Previous study			
Main contractor selection criteria	Topcu (2004)	Palaneeswaram and Kumaraswamy (2001)	Skimore (1999)	Holt *et al.* (1995)
Financial stability	✓	✓	✓	
Background of company	✓	✓	✓	
Technical capacity		✓	✓	
Cost	✓	✓	✓	✓
Performance	✓			
Standard of quality	✓	✓	✓	✓
Occupational health and safety	✓	✓	✓	
Time performance	✓	✓	✓	✓
Management capability	✓			
Failed contract	✓			
Progress of work	✓			
Human resource management			✓	
Level of technology	✓			
Relationship with client		✓	✓	
Relationship with sub-contractors	✓			
Fraudulent activity	✓			
Competitiveness	✓			

(Source: Arazi Idrus et al., 2011)

2.2 Assessment of the Existing Contractor Selection Practices

A study carried out in the construction industry of U.K. showed that the current practices for the contractor selection process have some major weaknesses. Typically, cost is the influential aspect on which contractor selection is based in the construction industry. Contractors' firm capabilities; such as, on time delivery of project, within budget limit and satisfactorily complying with requirements of client are not given high importance during the contractor's selection process. Although the reason behind this competitive approach for the selection of contractor is to allow free market competition, resulting in better value for the owner's money, this competitive approach occasionally leads to the selection of the lowest cost non-competent contractor (Marwa, 2003).

Public sector influences the criteria for contractor selection. Mostly it is the public sector that sets trends for procedures of contractors assessment and selection in any construction industry [Holt *et al* (1994), Herbsman and Ellis (1992), Merna and Smith (1990), and Moore

(1985)]. Lowest bid selection method is the mostly practiced technique in public sector [Russel and Skibnieswski (1988), Nguyen (1985)]. Mostly the reason behind the failure of construction projects in public sector is the practice of lowest price bid method [Holt *et al* (1994), Ellis and Herbsman (1991), and Bower (1989)]. It is in common practice that mostly contractors submit a very low price of bid to win a certain project, they have plan to recover their money in the form of claims after the award of contract in execution of project. This practice is done when contractors have shortage of business and so it badly impacts the project delivery system. This issue also suggests that lowest bid selection may harm client's requirements so it should be avoided. It is fact that in public sector this process of selecting lowest bidder cannot be easily changed, clients in public sector even know the incapability of lowest bidder but they cannot avoid their selection. This issue brought researchers to find its solution that is to find such technique which incorporates client's objectives and the same time assessment of contractor's capabilities and also bringing best value of money even in low price bid method (Hatush and Skitmore, 1998).

Contractors should be evaluated on multiple criteria for final selection and award of contract. In some cases evaluation of contractor is restricted to only some specific criteria as per the requirements and restrictions of client like fixed price and fix completion date of certain project, while in general scenario contractor should be evaluated on multiple criteria including technical capability, Organization, management, financial soundness, health and safety records and past performance (Hatush and Skitmore, 1998).

Tender evaluation is a very important and critical means through which the best evaluated tenderer is selected to undertake a project for a client, to attain best value for money. In the evaluation of tenders, price is not the primary factor that is considered; both technical and financial capabilities of contractor are also considered. A certain score is given to each criteria to find out the best contractor rather relying on only price of tender (Faridah, 2007).

The philosophy that 'lowest price wins' for contractor's selection has been reliable theme for years. In tender evaluation process lowest price win technique should be compared with the multi criteria for best results (Chee *et al*, 2001).

In last two decades a lot of new methods have been introduced for the procurement process in construction industry, despite of this success rate of construction projects is not improved to considerable level. On the other hand problems like delays, cost and time overruns, quality issues have been increased. Claims and litigation cases' increase in also observed (Latham, 1994). Competitive bidding is the main reason behind different issues arising in construction projects delivery as contract is awarded to lowest bidder in it (Hatush and Skitmore, 1997).

Clients have different project priorities and also the necessary selection time scale varies from client to client. These priorities will state the selection between alternatives 1 to 4 in Fig. 1 which is a flow chart presented by (kumaraswamy, 1995); showing Alternative ways to construction contractor selection.

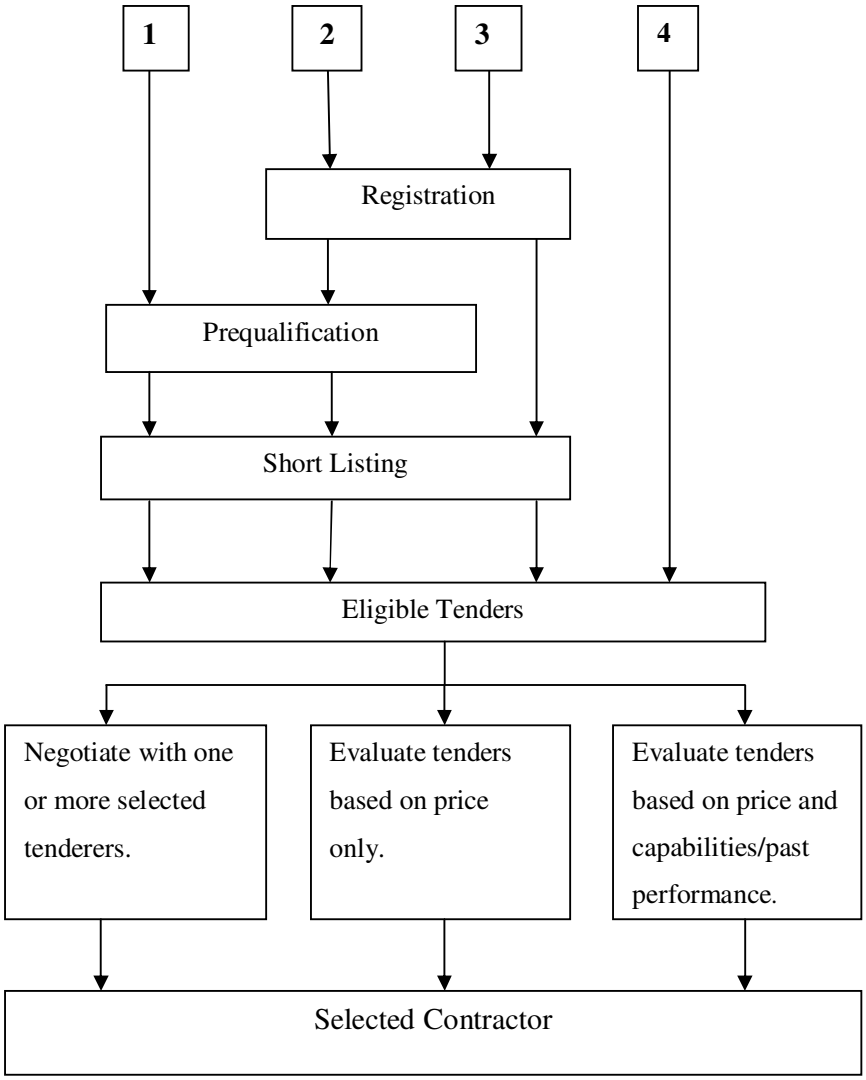

Figure 2.1: Alternative Ways to Construction Contractor Selection.

(Source: Kumaraswamy, 1995)

2.3 Public Procurement Regulatory Authority (PPRA)

PPRA is an independent department that has the authority to manage and govern public procurements for Pakistan. It is also responsible for making policies and developing procedures for public procurements, these procurements include procurement of goods, works and services. PPRA is made with a mission to develop governance, management, transparency, accountability and quality of public procurements. PPRA also have the authority to monitor public sector agencies for public procurements, the essential powers to PPRA has been given by ordinance of PPRA 2002 (http://www.ppra.org.pk/).

Governments the world over have tried to streamline their tender evaluation processes through laid down procedures in order to remove unfair competition in the selection of contractors. The government of Pakistan, for that matter enacted the PPRA Ordinance, 2002 (XXII of 2002), to guide its procurement processes; including procurement of works.

Public Institution and Government Agencies in Pakistan are regulated in their procurement, since 2004, by the norms of economic transaction established by the state. The PPRA Ordinance, 2002 (XXII of 2002) was enacted to provide the legal framework for the procurement of public works. The rules of Public Procurement Regulatory Authority are now known as PPRA rules 2004. Appendix I contains details of PPRA rules.

2.4 Multi-criteria Methods Used in the Selection of Contractors

Listed below are multi-criteria methods (models) used in the selection of contractors.

- Analytical Hierarchy Process (AHP)
- Analytical Network Process (ANP)
- Multi-Attribute Utility Theory (MAUT)
- Fuzzy Set Theory (FST)
- Complex Proportional Assessment (COPRAS) and
- Evidential Reasoning (ER).

Brief introduction of the above multi criteria methods of contractor selection and bid evaluation is presented below.

2.4.1 Analytical Hierarchy Process (AHP)

It is a multi objective decision making approach which includes hierarchically arranging dissimilar objectives and sub-objectives, assessing their comparative importance, making pair wise comparisons, undertaking a prearranged analysis of available alternatives and thereby enabling more organized decision making (Saaty, 1994b). Decision making models incorporating qualitative and quantitative mechanisms can be developed using this method.

In qualitative mechanism, a main problem is break down into clusters and sub clusters and so alternatives are identified at lowest level to be selected. Clusters and sub-clusters can be attributes, criteria, activities etc.

In qualitative mechanism weights are assigned to the elements at cluster and sub-cluster level and finally a global weight is calculated for final estimation. Relative significance is then measured by a ratio scale within a cluster.

2.4.2 Analytical Network Process (ANP)

Mostly upper level elements in a break down have relationship and reliance on the lower level elements, so in such case decision making problem cannot be ordered in a hierarchy (Saaty, 1996). In network system a decision making problem having functional reliance is structured.

The ANP is an overview of the AHP. Analytical network process allows composite interrelationships among decision levels and its feedback approach uses networks instead of hierarchies. In hierarchy process importance of alternative is determined by the significance of criteria, while in network alternative's importance may impact significance of the criteria (Saaty, 1996, Meade and Sarkis, 1999).

2.4.3 Multi-Attribute Utility Theory (MAUT)

MAUT is a multi criteria decision making technique for the assessment of contractor. It is based on utility theory which incorporates evaluation of different capabilities of contractors. Utility theory combines benefits of optimization models and simple scoring techniques, while in some situation where the satisfaction is not sure rational decision making is done using the probable utility (Hatush and Skitmore, 1998).

The concept of utility is used to determine the attitude of decision maker towards a certain risk. A large number of lottery type questions are asked from decision maker to find

out his preference and probability is calculated. This probability is then used in the derivation of utility functions (Keeney & Raiffa, 1993).

2.4.4 Fuzzy Set Theory (FST)

This theory helps to express evaluation of performance of contractor on decision attributes in linguistic condition rather on hard on fats standards. The method is useful when the selection criterions are full of ambiguity and indistinctness due to subjectivity of human conclusion.

The DM estimates linguistically the level of significance of every criterion to the anticipated project. The DM rate each contractor on all the criteria by means of linguistic variables such as Excellent, Good, Satisfactory, Fair and Awful. These linguistic variables are then used for fuzzy calculations. When all the necessary data is collected from the client, this information is translated into the fuzzy calculations. The criterion ratings are then pooled with the criterion weights for all criteria to generate total weight for each contractor for a specified project (Okoroh, 1996).

Formula:

$$R_{ave} = \frac{\sum_{i=1}^{n} Ri * Wi}{\sum_{i=1}^{n} Wi} \quad (2\text{-}1)$$

Where

R_{ave} = fuzzy set representing the overall weighted rating of an alternative.

R_i = fuzzy set representing the ratings of the alternative based on a particular criterion.

$W_{i=}$ fuzzy set representing the weight (or relative importance) assign to that particular criterion.

All operations in the above equation are fuzzy arithmetic operations (Okoroh, 1996). This procedure is appropriate for bids evaluation where there are contradictory objectives and for sensitivity testing with numerous stakeholders (keeney and Raiffa, 1993). It is also suitable for selection of construction equipments, prequalification of contractors and choosing construction and project managers.

2.4.5 Complex Proportional Assessment (COPRAS)

This process considers the values and significances of criteria; the versions are arranged in rows according to their preference (Zavadskas and Kaklauskas, 1996).

The process of determining the structure of criteria, its significances and numerical values of the interested parties under investigation is based on the use of various expert and other methods, recommendations, price lists, reference books, specifications and other documents. The analysis results of interested parties being compared are presented in the form of matrices in which the rows denote the interested parties under investigation, whereas the columns express their criteria. (Zavadskas and Kaklauskas, 1996).

2.4.6 Evidential Reasoning (ER)

This approach uses the idea of "degree of belief" (DoB) as a preference elicitation tool. The degree of belief can be explained as the degree of anticipation that an alternative will produce an expected result on a specific criterion. The DoB of an individual relies on their information about the subject matter and their experience. The DoB utilization can be justified by the reality that human judgment making process involves uncertainty, vagueness and elusiveness. That is, individuals can express judgments in probabilistic provisions with their knowledge and actual life experience. Probability has long been used to deal with uncertainty and risk in decision problems; it can be an influential tool to overcome the imprecision and uncertainty of human decision making.

Implementation of the ER Approach

The evidential reasoning approach for decision making process can be presented as a hierarchical assessment process in which all decision criteria are aggregated into one, which is the goal of project. The ER procedure is briefly described here in a stepwise way:

1. Present a decision problem in a hierarchical arrangement;
2. Allocate weights to every (major) problem criterion and also to their sub-criteria (if any exists);
3. Select a technique to assess a criterion either quantitatively or qualitatively;
4. Convert assessments between a core criterion and its related sub-criteria if they are assessed using dissimilar methods (i.e. quantitative or qualitative);
5. Assess each alternative based on the lowest level criteria in the hierarchical arrangement;
6. Enumerate qualitative assessments at the top level if essential and establish an aggregated significance for each alternative;
7. Grade alternatives on the basis this aggregated value and select the highest rank (Holt *et al*., 2001).

2.4.7 Modeling Approaches Used in Different Countries

Table 2.1 shows a few chosen modeling approaches and the contractor selection attributes used in these approaches for contractor selection (S.S. Padhi et al., 2010).

Table 2.2: Modeling Approaches for Construction Contractor Selection.

Author	Country	Selection Attribute Used	Modeling Approach
Kumaraswamy (1991)	Hong Kong	Financial status, technology offered, and experience in handling similar projects.	Performance-based scoring
Holt (1998)	UK	Quoted cost, quality of work, and completion time	Cluster analysis
Hatush and Skitmore (1998)	UK	Quoted bid price, financial soundness, technical ability, management capabilities, safety performance, and reputation.	Multi-attribute utility theory
Deng (1999)	Australia	Quoted cost, technical capability, services and references of the government officials.	Fuzzy-AHP
Al-Harbi (2001)	UAE	Experience in handling similar projects, financial stability, quality performance, manpower resources, equipment resources, and current workload.	AHP
Topcu (2004)	Turkey	Quoted cost, quality of work, and completion time	AHP
Lai et al. (2004)	China	Contractor organization structure, firm honor and competence, quoted bid price, and amount of material used.	Multi-attribute analysis
Missbauer and Hauber (2006)	Austria	Bid price	Integer programming
Lambropoulos (2007)	Greece	Quoted cost, quality of work, and completion time	Multi-attribute utility theory
Wang et al. (2006)	Taiwan	Conversion of all the attributes to price	Unit-price based
Padhi and Mohapatra (2009)	India	Quoted bid price, financial status, available physical resources, amount of work done, service during warranty period, co-operation and coordination offered, meeting of completion time, value of work done in each of the past projects, and pollution control measures.	Fuzzy-AHP-SMART

(Source: S.S Padhi et al., 2010)

Despite availability of worthy guidelines from the literature, which are being practiced for the selection of contractors and producing fruitful results, the individuals in CI of Pakistan have their own preferred criteria for the selection of contractors which are badly impacting the project delivery process and eventually destroying value of money.

2.5 Summary

In this chapter, contractor selection and bid evaluation is discussed in detail. PPRA rules for the contract award in Pakistani CI are discussed; key criteria used for selecting main contractor and bid evaluation according to different researchers are addressed. Moreover different modern multi criteria models and selection attributes used in them are presented in this chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The research methodology adopted for this study is discussed in this chapter. Strategy of research describes the path to follow to attain research objectives (Saunders *et al.,* 2007). Questionnaire survey and interviews are the major methods to collect data for research. This research is carried out to explore the factors and criteria used for the contractor's selection and bids evaluation in the construction industry of Pakistan and suggesting measures to improve them. Figure 3.1 shows the research methodology scheme followed for this research. Twenty one (21) sub criteria which affect the contractor's selection and bids evaluation in the CI are identified, from extensive review of literature (Arazi Idrus *et al*., 2011; Salama *et al*., 2006; Hatush and Skitmore, 1997; Topcu , 2004; Palaneeswaram and Kumaraswamy, 2001; Skitmore , 1999; and Holt *et al*., 1995). These criteria are then grouped into five (5) main criteria basing on previous literature.

After the pilot study, the questionnaire is further reviewed and adjustments are made by reducing the sub criteria for contractor's selection and bid evaluation to eighteen (18), to make it suitable for the CI of Pakistan. A five point 'likert' scale, with "1" being "not important" and "5" being "extremely important", is utilized to judge the severity indices of different criteria adopted for the contractor's selection and bids evaluation. The sample for this research is chosen from population of valid construction consultant's list of Pakistan Engineering Council in the industry. Some of the major clients who are involved in contract award activity are also made part of this survey. The questionnaire is sent to the valid registered consultants firms with the Pakistan Engineering Council (PEC). Total 200 questionnaires were floated in the industry for the purpose of survey, out of these only 157 were received back. The questionnaire properly filled and suitable for further analysis were 151 out of 157, six questionnaires were dropped. The set of respondents comprises of 14 clients and 137 consultants.

MS Excel and SPSS-18 are the software used for the analysis of collected data. The collected data is checked by performing two major tests for further analysis; these include normality test and internal consistency test (also known as reliability test). The test performed to check the reliability of collected data is known as Cronbach's coefficient alpha

method. Normality test performed on data is known as the Shapiro-Wilk normality test; which was performed to find out the nature of data either parametric or non-parametric. Descriptive statistics is applied to calculate sampling error. A 5% level of significance is considered to represent statistically significant relationships in the data. Ranking of the criteria used for contractor's selection and bid evaluation in CI of Pakistan is performed using Relative Importance Index (RII) method. Figure 3.1 shows the flow chart of the way research carried out.

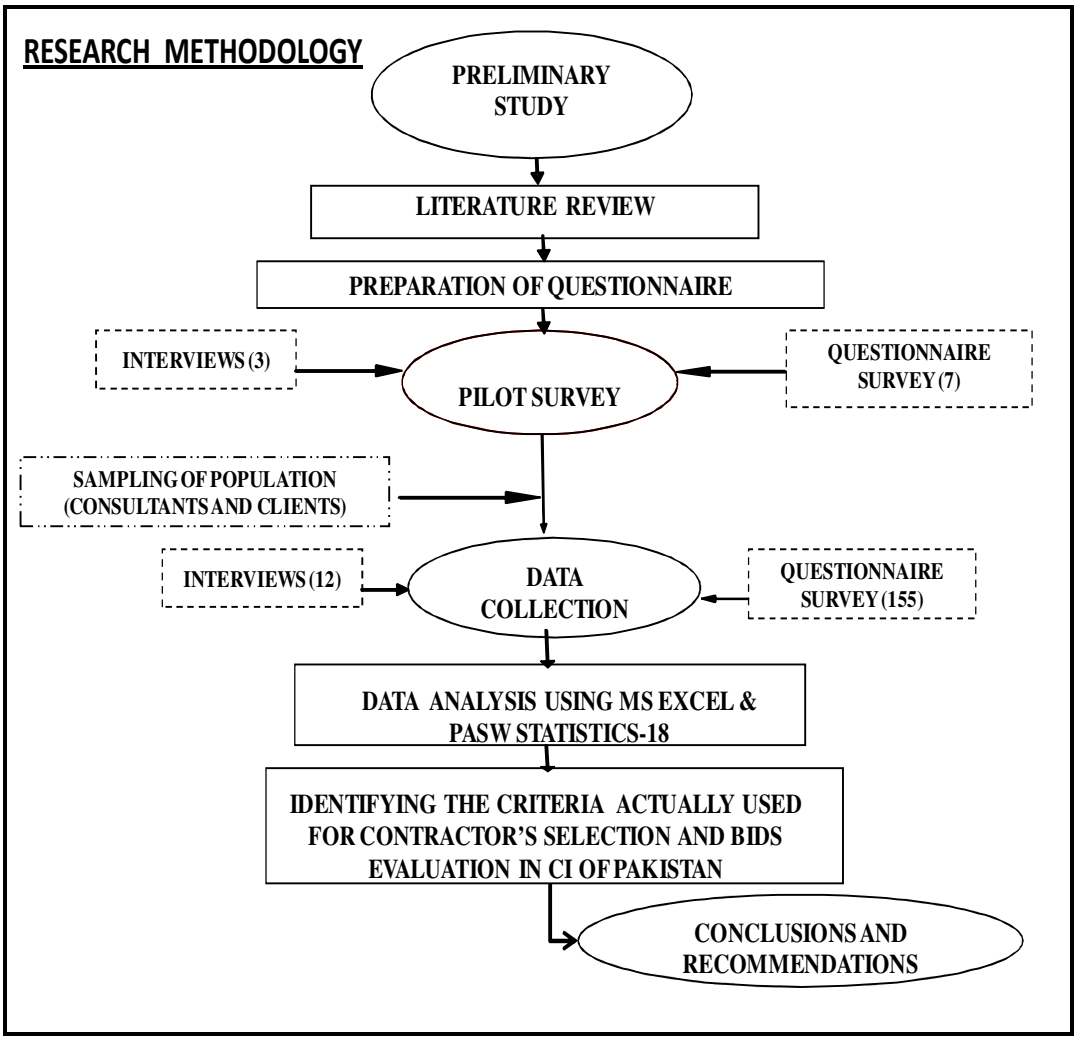

Figure 3.1: Research Methodology

3.2 Research Design

The objectives of the research have been established in the chapter 1. The procedures that can be followed for achieving objectives of the study are elaborated here in a suitable method. The procedures to carry out a research in societal sciences include analysis, experiments, case studies, experiments etc. the selection of the procedure to carry out a specific study depends upon the requirements of that study, which further depend upon extent of research, category of research function i.e. what, why, how, focal point of research and control over variables (Yin J, 2006). While choosing an appropriate method for a study, it is mandatory to think the associations between the collection of data and its analysis, also the major questions to be addressed, and the consequences. Therefore, when going on a study, investigate questions, data analysis approach and kind of data should be considered.

Questionnaire surveys are mostly used in construction management researches to collect realistic and observant responses. Descriptive and analytical surveys to find out facts, views and opinions are mostly done using questionnaires (Fellows and Liu, 1997; Naoum, 1998, Enshassi *et al*. 2010).

For the present study, questionnaire is designed on the basis of a detailed literature review. A combined list of criteria used for contractor's selection and bid evaluation is identified from this literature review. Professionals from CI of Pakistan are interviewed and their opinion is taken about the criteria on ground being practiced for the said matter. Finally a list of most probable criteria containing 18 criteria is produced to make questionnaire. The rating of these criteria was based on a five point likert scale where 1 = (Not Important), 2 = (Slightly Important), 3 = (Important), 4 = (Very Important) and 5 = (Extremely Important). Likert scale is used to determine the level to which respondents agree or disagree about an opinion, view or criteria (Cormack, 2000). These Reponses are then used to calculate Relative indices for statements which range from 0 to 1. Relative index ranking is used for non-parametric data analysis; in which ordinal measurements are involved (Olomolaiye *et al*., 1987; Holt, 1997; Idrus, 2001; Egemenn and Mohamed, 2006). Severity index analysis is one form of the relative index ranking technique (Elhag and Boussabaine, 1999; Al-Hammad, 2000; Ballal, 2000). Severity index analysis uses weighted percentage scores of the criteria under study to compare their relative importance. In this research first frequencies of the responses are calculated and then these are used to calculate severity indices using formula 3-1 as under:

$$\text{Severity Index (I)} = [\sum a_i \cdot x_i] / [5\sum x_i] * 100\% \quad (3\text{-}1)$$

Where,

x_i = variable expressing frequency of the response

For i

i = 1, 2, 3, 4, 5 as illustrated below

$x5$ = frequency of 'very high extend' response; and corresponding to $a5 = 5$

$x4$ = frequency of 'high' response; and corresponding to $a4 = 4$

x3 = frequency of 'moderate' response; and corresponding to $a3 = 3$

$x2$ = frequency of 'low' response; and corresponding to $a2 = 2$

$x1$ = frequency of 'very low response; and corresponding to $a1 = 1$

Other techniques, such as interviews are selected to complement and authenticate the study questionnaire. MS excel and SPSS-18 is used for data analysis.

3.3 Survey Sample

3.3.1 Sample Selection

Sample is selected to make synopsis measurements about a population's characteristics. Sample should be selected with such abilities that it can truly represent the characteristics of entire population, there many ways to select a sample for population. Sample selection depends upon the nature and characteristics of the population. Sampling techniques in practice include random sampling, non-random sampling and judgmental sampling (Francis and Hoban, 2002). Researcher makes a judgment without using statistics to select the sample in judgmental sampling. In non-random sampling there are three types of sampling in practice which include systematic, stratified and cluster sampling. Random sampling is used when population has no dinticnt chacteristics and has mostly identical composition. Probability of selection of each member in random sampling is same. Three conditions of the random sampling are satisfied while selecting sample for the present study which are;

1. Every consulting firm has the same probability of being chosen.

2. Sample size reflect the distinctiveness of the population (valid consulting firms of PEC) i.e. each firm selected come from the same population.

3. Every firm will be selected separately of any other firm.

The sample for this study is randomly chosen from the population of construction consulting firms registered with the PEC (Pakistan Engineering Council). Total valid consulting firms registered with PEC are round 480. The client institutions were identified through a preliminary survey to find those institutions routinely involved in construction and also has project management units in-house.

The questionnaire was therefore distributed to 200 randomly selected potential respondents, 175 working with consulting firms and 25 working in the project management unit of different clients.

Respondents are amply qualified and experienced. Around 45.06% (78) of the respondents have accumulated over 10 years of experience in CI, 31.12% (47) having 6-10 years construction experience, whereas only 15.23% (23) have less than 5 years of construction experience. Consequently; the information provided by these professionals is quite reliable.

3.3.2 Sample Size

Sample size is one of the important steps to carry on a reliable research. It relies on some important factors which include sampling error, population size and confidence level.

Sample size can be calculated by following equation 3-2.

$$Ns = [(Np)\,(P)\,(1-P)] \;/\; [(Np-1)\,(B/C)^2 + (P)\,(1-P)] \qquad (3\text{-}2)$$

(Dillman, 2000)

Where;

Ns: Sample size for the desired level of precision

Np: Population size i.e. 480

P: Proportion of the population that is expected to choose one of the response categories (yes/no); $P = 0.5$

B: Acceptable sampling error; (±10% or ±0.10)

C: Z statistic associated with the confidence level

(1.96 corresponds to 95% confidence level)

We can calculate sample size for any population using above equation, also the following table 3.1 gives the reliable sample sizes for confidence level of 95% at three level of precisions for different sizes of populations as shown.

Table 3.1: True Sample Size

Completed sample sizes needed for various population sizes and characteristic at three levels of precision

Population Size	Sample size for the 95% confidence level					
	±10% Sampling Error		±5% Sampling Error		±3% Sampling Error	
	50/50 split	80/20 split	50/50 split	80/20 split	50/50 split	80/20 Split
100	49	38	80	71	92	87
200	65	47	132	111	169	155
400	78	53	196	153	291	253
600	83	56	234	175	384	320
800	86	57	260	188	458	369
1,000	88	58	278	198	517	406
2,000	92	60	322	219	696	509
4,000	94	61	351	232	843	584
6,000	95	61	361	236	906	613
8,000	95	61	367	239	942	629
10,000	95	61	370	240	965	640
20,000	96	61	377	243	1,013	661
40,000	96	61	381	244	1,040	672
100,000	96	61	383	245	1,056	679
1,000,000	96	61	384	246	1,066	683
1,000,000,000	96	61	384	246	1,067	683

(Source: Dillman, 2000)

Shash and Abdul-Hadi also introduced an equation 3-2 shown below to compute the sample size for any population in 1993.

$$n = n' / (1 + n'/N) \qquad (3\text{-}2)$$

where;

n: Sample size from finite population

N: Total population

n': Sample size from infinite population, which can be calculated as $n' = S^2 / V^2$

S^2: Standard error variance of population elements = P (1-P); maximum at P=0.5

V: Standard error of sample population = 0.05 for confidence level 95%

The sample size is 151 for this survey, which contains 14 responses from clients which were selected through their addresses, and 137 of the valid consulting firm responses. However the reliability and accuracy of the sample size for present study can be counterchecked using above discussed equations (3-1 and 3-2) and table 3.1.

Until 2012, there are about 480 valid consulting firms registered with the PEC, which can be considered as the population size for the present study. The answers of the questions asked are assumed to be homogeneous and so p value is set as 0.5 i.e. the probability of occurrence is 50% and confidence level is ser as 95%. These values are used in equations (3-1 and3-2) already discussed and sample size is computed as 80 for a sampling error of ±10%. However collected data is analyzed using SPSS which gave a maximum sampling error of ±9.40% which is less than ±10%. It shows that any sample size greater than 80 for the present population size is quite reliable for a sampling error of ±10%. Therefore a sample size of 137 consulting firms for this study is reliable and acceptable to carry out further analysis.

3.4 Design of Surveys

3.4.1 Review of Previous Studies

Questionnaire design has great impact on the success of any study (Kim, 2010; Lingard et al. 2010). Questionnaire design plays an important role in the response rate of survey, so it is quite important to design such questionnaire which may fulfill desired requirements of the study. Therefore, a well designed questionnaire should be composed comprising of such questions that the respondents can easily answer without putting themselves in much of the exertion, without losing attention, and also it is less time consuming. The response rate to questionnaire survey is effected by many factors, like; size of questionnaire and its dimensions, color and type of the paper used, order of the questions, cover pages, and also the envelope and stamps used to mail the questionnaire (Memili *et al.,* 2011). Furthermore, mixed mode survey is preferred by the researchers to obtain best rate of response. Therefore, for the present study mixed mode of survey is employed, some interviews were conducted with the respondents and rest of survey was completed through e-mail questionnaire survey. Combined survey is also used to getter better response and it is an effective technique

recommended to get good response (Mbachu, 2008). Self administrating surveys are also used including use of web and e-mails. For the e-mail survey a template of the questionnaire was developed using Google docs which was very much user friendly to complete the response, and it proved to be very effective technique for better response. Tailored Design Method important method which assures the precision of survey and also response rate of the survey improves using this method.

There are some ways to get better results for a survey in the form of reliable and increased response rate. They include rewards for respondents, wining the trust of respondents, making them feel worthy to be respondents to the questionnaire etc (Dillman, 2000). Monetary or material incentives rewards can be provided to the respondents, they can be asked for advice, also make interesting questionnaire and inform respondents that the opportunities of survey are scarce, moreover offer them summary of results.

3.4.2 Tailored Design Method

Tailored Design Method is adopted for questionnaire survey in the present study. Key points which are considered during the questionnaire survey are:

Provision of Rewards

a. Admiring phrases are recommended to use at the end of questionnaire like "Thank you for your time", "Thanks for completing questionnaire" etc.
b. Respondents are made feel important as they are part of a very carefully selected sample because of their experience.
c. Covering letter is made which describes the significance and applications of the present study.

Reducing the cost for being a respondent

a. A five point likert scale is used to design the questionnaire which takes less time and effort of the respondents.
b. Different sections are made of the questionnaire providing a flow and ease in answering questions.
c. A template of the questionnaire is made on Google docs and sent via e-mail to the respondents, this template is very much user friendly and less time consuming.

Establishing trust

a. Covering letter of questionnaire is printed on the letterhead with the logo of NUST.

b. Complete contact information of the researcher is given to the respondent on covering letter.
c. Privacy of the respondents is assured and use of data is restricted to the present study only.

Follow up actions have incredible effects on rates of response. For the present study two follow ups are conducted. First follow up is done after three weeks and second after five weeks of first mail. Sample of the covering letter and questionnaire used are exhibited in Appendix-II and III respectively.

3.4.3 Reliability and Validity of Survey

The research instrument fulfills its desired purpose is determined by the reliability and validity of a study. Reliability refers to the uniformity of a measurement. It assures that if the same procedure is repeated the results will be the same. Mostly internal consistency is used to calculate the reliability of survey. Validity determines whether the question can calculate what it is believed to calculate (Oppenheim, 1992). Numerous methods are used by researchers to make sure the reliability and validity of a questionnaire. The use of the research tool which has already been used and is proved to be reliable and valid is recommended.

For the present study questionnaire is designed using the same approach to follow a valid and reliable tool. Questionnaire is drafted after a detailed review of the literature. After the preparation of the questionnaire a pilot survey is conducted in which interviews are conducted with experienced professionals and academic researchers, then some modifications are made in the questionnaire according to the requirements of CI of Pakistan.

3.5 Data Analysis Techniques

Two software's are used for the analysis of collected data, these are MS excel and SPSS-18. Level of significance followed is $\alpha = 0.05$ and statistical techniques used for analysis are as follow;

3.5.1 Test for Normality

Test for normality of data is performed to make decision which further techniques will be required for analysis of the data. Normality test is performed to check the nature of the data is either parametric or non parametric.

Shapiro-Wilk test is performed for the data sets of about two thousands elements or less than two thousands elements. The Significance value should be non-significant, to count as sufficiently normal, it should be greater than 0.05. Kolmogorov-Smirnov test is suitable method for data containing more than two thousands values, it is also known as K-S Lilliefors. Therefore for the present study Shapiro-Wilk test is used to test the normality of the data because of the limitation of size of the sample. The significant value of the data was 0.00, which showed that data is not normal, so the data was treated by non-parametric techniques.

3.5.2 Severity Index

Relative index ranking is a non-parametric technique used for the analysis of collected data. This technique is extensively used by construction management researchers to analyze structured questionnaire response data concerning ordinal measurement of attitudes. Severity index analysis is a form of this Relative index ranking that uses weighted percentage scores to compare the comparative significance of the criteria under study (Elhag and Boussabaine, 1999; Al-Hammad, 2000; Ballal, 2000).

Severity Indices of the criteria help to make the priority choices of the criteria, the criteria with highest severity index is ranked at the top and the criteria with least severity index is ranked at the bottom. Relative important indices of the criteria are calculated from five point likert scale used in survey for each criterion, therefore criteria are ranked on the basis of these indices. These ranks of the criteria determined the relative importance of the different criteria as per the perception of respondents from the CI of Pakistan.

3.6 Summary

This study uses multiple or mixed research methods. The main research tool adopted for the study is Questionnaire survey. This chapter contains a brief discussion on the research method, design, sampling techniques and design of the survey for the present study. In short, research methodology followed for the present study is explained in this chapter.

Chapter 4

DATA ANALYSIS AND RESULTS

4.1 Introduction

Construction industry of Pakistan is surveyed through questionnaire, which was designed to explore the current practices for the selection of contractor in the industry and comments on the PPRA rules 2004. Data analysis and results chapter contains the detailed analysis and outcomes of the research questionnaire inn order of the questions.

4.2 Analysis of Response

The questionnaires were distributed to client institutions that have project management units with construction professionals and professional consultancy firms made up of architectural, engineering and quantity surveying firms in active practice in the construction industry of Pakistan. Tables 4.1 shows the number of questionnaires issued to the institutions of respondents, number of questionnaire returned, and percentage of returned questionnaires.

Table 4.1: Institutions of Respondents

Respondents	No of Questionnaires Issued	No of Questionnaires Returned	Percentage
Clients	25	14	56
Consultants	175	137	78.28
Total	200	151	75.5

4.2.1 Clients Institutions

These are public or private organizations that usually commission and finance construction projects. Twenty five institutions were identified, during preliminary interviews, as routinely involved in construction and questionnaires were distributed to them as client institutions. These institutions had their headquarters in Islamabad, Lahore and Peshawar.

These institutions were located through their addresses and served with questionnaires. Fourteen (14) were returned properly filled. This gives a percentage response rate of 56. This encouraging high response rate is perhaps due to the fact that most of these client institutions were easy to locate and approach in the above mentioned areas.

4.2.2 Consultants Institutions

These are the valid construction consultancy firms registered with PEC. Out of 400 valid registered firms with PEC 175 were selected and questionnaire was served to them through e-mail and personal visit. The addresses of the firms were taken from the list of valid firms of PEC from its website. Out of 175 questionnaires 137 returned properly filled for further analysis. This gives percentage response of 78.28.

The response rate of the survey was 75.5%, which is 151 out of 200 questionnaires returned properly filled, this number exceeds from that of required as discussed in chapter 3. This response rate is good as per comparison with other similar studies carried out by other researchers like 21% by Proverbs (1999), 30-40% by Aibinu and Jagboro (2002), 27% by Idrus, (2001).

4.3 Analysis and Discussion of Questionnaire

MS Excel and SPSS-18 were the software used for the analysis of collected data. The interpretation of the results is discussed in coming paragraphs.

4.3.1 Job Title of the Respondents

Table 4.2 shows response to question 1. The survey shows that 8.61 percent of the questionnaires were answered by Managing Directors, 25.83 percent by Project Managers, 7.28 percent by Project Architects, 15.23 percent by Project Quantity Surveyors, 31.12 percent by Project Engineers and 11.93 percent by others. The title of respondents, who described themselves as others, was either Managing Partners or Estate Managers.

Table 4.2: Positions of the Respondents in Construction Industry

Job titles of the Respondents	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Managing directors	13	8.61	8.61
Project managers	39	25.83	34.44
Project architects	11	7.28	41.72
Project quantity surveyors	23	15.23	56.95
Project engineers	47	31.12	88.07
Others	18	11.93	100.0
Total	151	100	-

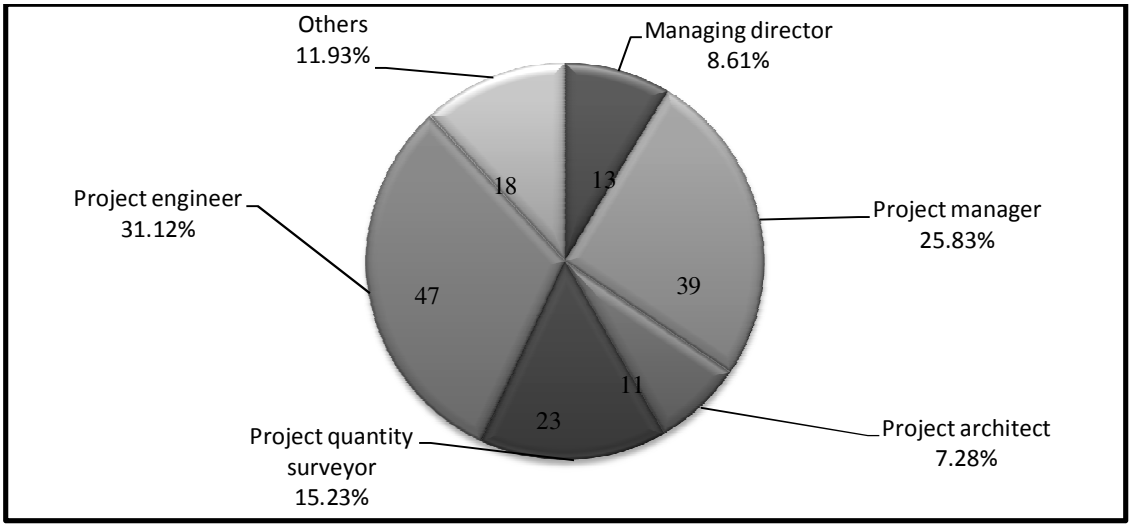

Figure 4.1: Positions of the Respondents in Construction Industry

4.3.2 Professional Fields of the Respondents

The client institutions also had construction professionals answering the questionnaire. The client institutions have these construction professionals in-house perhaps because they recognize their importance in giving quick advice on technical and cost issues before the engagement of consultants or contractors on projects. They may also provide service on smaller projects where the client may not need to employ the service of a similar professional at short notice and no extra cost to the client. Table 4.3 shows response to question 2.

Table 4.3: Respondents Professional Affiliation

Professional fields of the Respondents	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Architecture	11	7.29	7.29
Engineering	98	64.90	72.19
Quantity surveying	23	15.23	87.42
Others	19	12.58	100
Total	151	100	-

The questionnaire was designed to be answered by respondents who are professionals with experience in the Pakistan's construction industry routinely involved in contractor's selection and bids evaluation for clients. This target was achieved from the statistics

presented in Table 4.3 above as 87.42% of the respondents were either involved in architecture, engineering or quantity surveying.

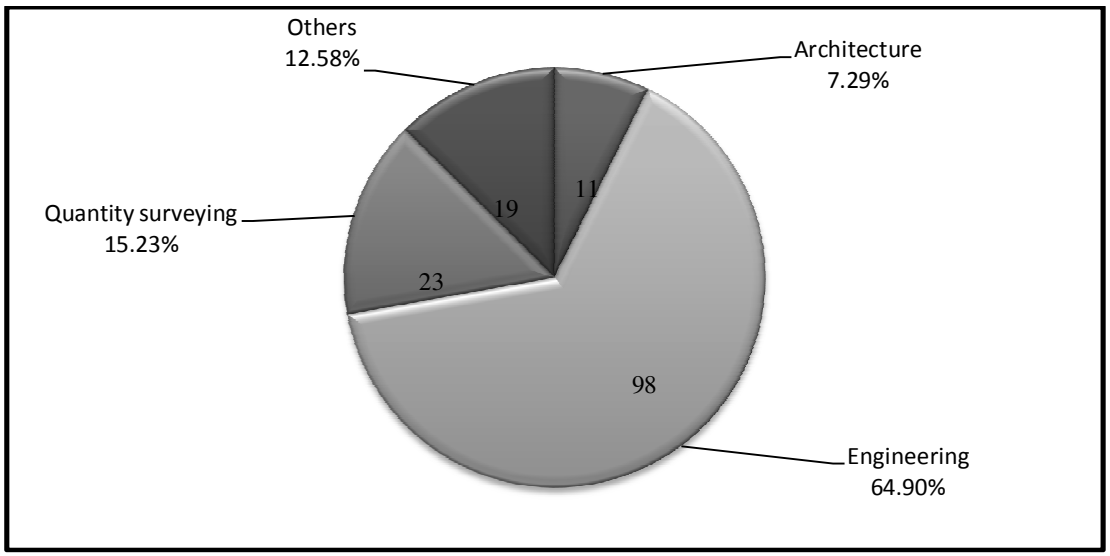

Figure 4.2: Professional Fields of Respondents

4.3.3 Experience of the Stakeholders in the Construction Industry

Table 4.4 Show responses to question 3.

Table 4.4: Experience of Respondents in Construction Industry

Experience of Respondents	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
0-5 years	23	15.23	15.23
6-10 years	47	31.12	46.35
11-15 years	56	37.1	83.45
16-20 years	13	8.61	92.06
20+ years	12	7.94	100
Total	152	100.0	-

From Table 4.4 above, 15.23 percent of respondents have 0-5 year experience, 31.12 percent have 6-10 year experience, 37.1 percent have 11-15 year experience, 8.61 percent have 16-20 year experience and 7.94 percent have over 20 year experience in construction industry. The survey shows that the 84.77 percent of respondents were having experience more than 5 year in construction industry in Pakistan.

From the experience of the respondents, it can be inferred that the sample provides a realistic profile that can be used to represent the criteria and sub criteria being practiced for the contractor's selection and bids evaluation in the construction industry of Pakistan.

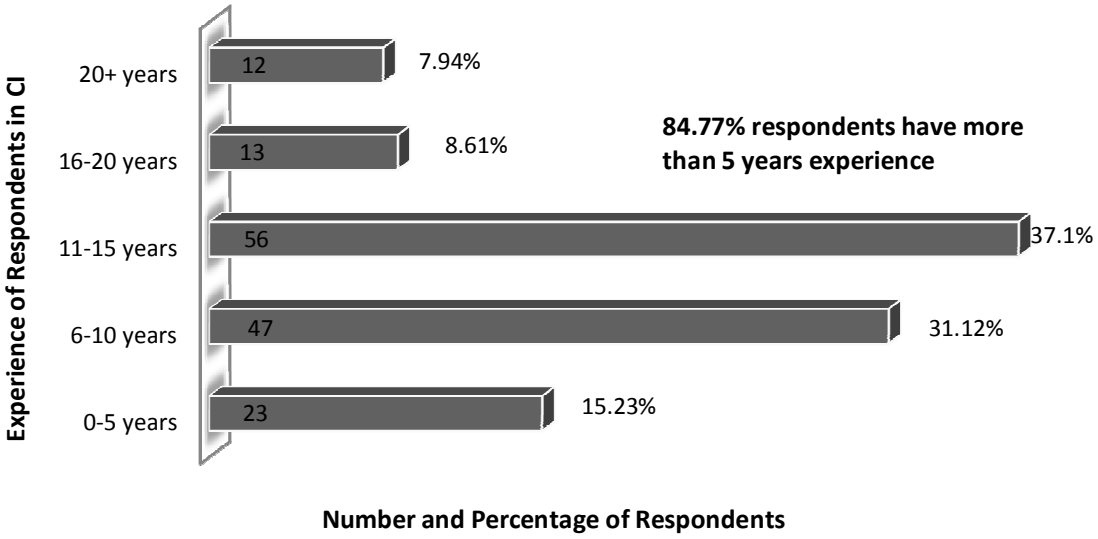

Figure 4.3: Experience of Respondents

From Tables 4.2, 4.3 and 4.4, it indicates that, most of the questionnaires were answered by people who were construction professionals, experienced and have theoretical and practical knowledge in contractor's selection and bids evaluation.

4.3.4 Provision of Consultancy Services to any Public Procurement Entity after the Introduction of the Public Procurement Regulatory Authority Ordinance, 2002(XXII of 2002)

Table 4.5 show responses to question 4 of the questionnaire.

Table 4.5: Provision of Service to Any Public Procurement Entity after PPRA Rules 2004

Response	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Yes	117	77.48	77.48
No	34	22.52	100
Total	151	100	-

Table 4.5 shows that 77.48 percent of the respondents have provided services to a public procurement entity in Pakistan after the introduction of the PPRA Ordinance, 2002 (XXII of 2002) also known as PPRA Rules 2004.

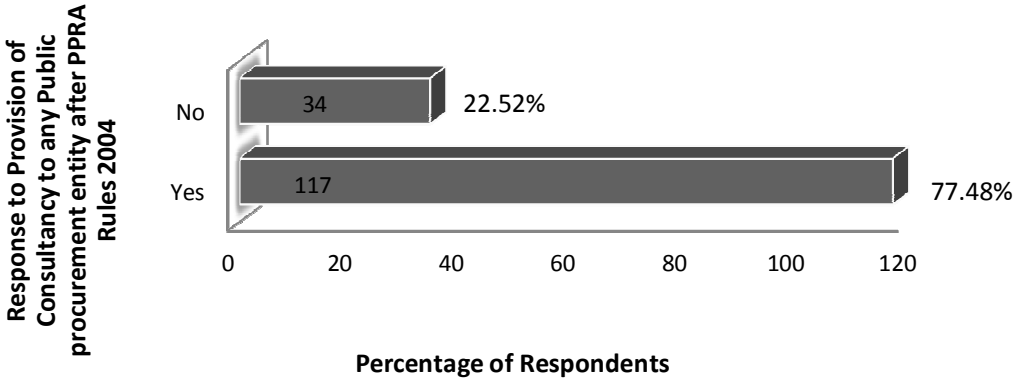

Figure 4.4: Respondents who delivered Services to Public Procurement Entity after PPRA Rules 2004

The response to this question indicates that the respondent have provided consultancy services to clients, since the introduction of the Public Procurement Regulatory Authority Ordinance. This can therefore be inferred that the respondents have information about the requirements of the law in terms of contractor's selection and bids evaluation.

4.3.5 Type of Contract used in Service Provided to Client by Respondents

Table 4.6 shows response to question 5.

Table 4.6: Contract Type Used in Service to Client

Type of contract	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Traditional contract	90	59.6	59.6
Design and build	23	15.23	74.83
Turnkey	6	3.97	78.8
Management contract	22	14.57	93.37
Traditional & Design and build	7	4.64	98.01
All methods	3	1.99	100
Total	151	100	-

The survey shows the procurement (Contract) types used in the services provided to various clients. It indicates that 59.6 percent of the services were based on traditional contract, 15.23 percent were design and build, 3.97 percent were Turnkey, 14.57 percent Management Contract, 4.64 percent were both traditional and design and build, 1.99 percent used all methods of procurement.

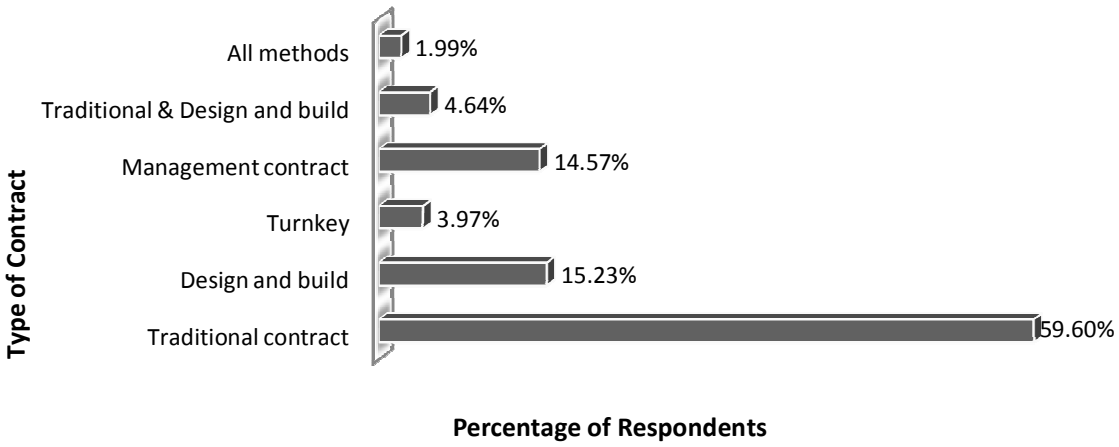

Figure 4.5: Contract Type used by Respondents

The statistics above indicates that traditional contract is still the predominant procurement method in practice in Pakistan. This is probably because the government is still the largest client whom most of the consultants provide service to. The government has still yet to fully embrace modern management methods of procurement such as design and build, management contract, turnkey etc.

4.3.6 Opinion of Respondents on Public Procurement Regulatory Authority Ordinance, 2002(XXII of 2002)

Table 4.7 shows response to question 6.

Table 4.7: Performance of PPRA Rules 2004 in Selection of Contractors

Opinion of Respondents	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Absolutely yes	12	7.95	7.95
Not at all	3	1.98	9.93
Yes but not absolute	107	70.86	80.79
Do not know	29	19.21	100
Total	151	100	-

The study showed that, in the opinion of respondents, 7.95 percent think the PPRA Ordinance, 2002(XXII of 2002) has been absolutely satisfactory in the bids evaluation and selection of contractors. 70.86 percent think it has been satisfactory but not absolute. 1.98 percent thinks it has not been satisfactory at all and 19.21 percent do not know how it has performed so far.

It can therefore be inferred from respondents that PPRA Ordinance, 2002(XXII of 2002) has proved satisfactory, although not absolute.

4.3.7 Method of Procurement Prescribed by PPRA Rules 2004

Table 4.8 shows response to question 7.

Table 4.8: Preference of procurement methods prescribed by PPRA Rules 2004

Method of procurement	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Single stage	9	5.96	5.96
Two stage	142	94.04	100
Total	151	100	-

Statistics in the above table show that 94.04 percent of the construction professionals prefer two stage method of procurement for the contractor's selection and bids evaluation as prescribed by PPRA, and the rest 5.96 percent think single stage procedure is better.

Table 4.9: Preference of One/Two Envelope Procedure by Respondents Who Selected Single Stage Method of Procurement

Single stage (sub methods)	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
One envelope procedure	3	33.33	33.33
Two envelope procedure	6	66.67	100
Total	9	100	-

Table 4.10: Preference of One/Two Envelope Procedure by Respondents who Selected two Stage Method of Procurement

Two stage (sub methods)	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
One envelope procedure	23	16.2	16.2
Two envelope procedure	119	83.8	100
Total	142	100	-

Statistics in Tables 4.9 and 4.10 shows that the professionals; who either selected single stage or two stage method of procurement for contractor's selection, preferred two envelope procedure as sub method in both cases.

4.3.8 Type of Construction Works

Table 4.10 shows response to question 8. The survey shows the type of construction work service provided to various clients. It indicates that 70.86 percent of the services were buildings, 7.28 percent were roads, 16.57 percent buildings and roads, 1.98 percent water and sewage, 0.66 percent dams and bridges, 2.65 percent was both roads and dams and bridges.

Table 4.11: Type of Construction works of Respondents

Type of construction	**Frequency of Respondents**	**Percentage of Respondents**	**Cumulative Percentage**
Buildings	107	70.86	70.86
Roads	11	7.28	78.14
Dams and bridges	1	0.66	78.8
Water and sewage	3	1.98	80.78
Buildings and roads	25	16.57	97.35
Roads, Dams and bridges	4	2.65	100
Total	151	100	-

The statistics in above table indicate that building work is the major service provided by respondents in Pakistan. This may include new buildings and/or building maintenance. The reason of mostly respondents being involved in buildings works is that the government is the major provider of infrastructure in roads, water and sewage, dams and bridges. The government

of Pakistan has agencies such as the National Highway Authority, Provincial Highway authorities, Provincial Construction and Works departments, cities development authorities like CDA (capital development authority), Water and sanitation agencies etc to provide consultancy services on behalf of the government. With building however, the government selects consultants to provide services through competition (expression of interest) where most private consultants are involved in.

4.3.9 Effects of Contractor's Selection on Construction Projects

Table 4.12, 4.13 and 4.14 shows responses of question 11. These tables indicate opinion of the construction professionals; who are involved in contractor selection, in Pakistan, on the extent to which stated problems in CI are attributable to the selection of contractor.

Table 4.12: Time Overrun Due to Contractor Selection

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
High	77	50.99	50.99
Medium	63	41.72	92.71
Low	11	7.29	100
Total	151	100	-

Table 4.13: Cost Overrun Due to Contractor Selection

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
High	69	45.69	45.69
Medium	61	40.4	86.09
Low	21	13.91	100
Total	151	100	-

Table 4.14: Quality of Product Due to Contractor Selection

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
High	83	54.97	54.97
Medium	49	32.45	87.42
Low	19	12.58	100
Total	151	100	-

Statistics in above tables show that 50.99 percent, 45.69 percent and 54.97 percent of professionals in CI think the problems of time overrun; cost overrun and quality of final construction project respectively were highly due to contractor selection, while 41.72 percent, 40.4 percent and 32.45 percent think same problems respectively were partially due to contractor selection. As noted by Nerija and Audrius, (2006), construction contractor's selection is a main decision which may influence the advancement and success of any construction project. These statistics goes to support the assertion of researchers such as Latham (1994) that contractor selection problems still lead to cost overruns, quality issues and extensive delays in the planned schedule.

4.3.10 Weights Assigned to Financial or Technical Evaluation

Table 4.15 and 4.16 shows answer to question 11 of survey questionnaire. Factors in evaluation of contractor are broadly divided in to two main evaluations; that is Technical and financial evaluation. Following tables show which evaluation criteria is given more weight by the professionals in CI of Pakistan.

Table 4.15: Weight of Price/Financial Evaluation in Selection of Contractor

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
High	63	41.72	41.72
Low	88	58.28	100
Total	151	100	-

Table 4.16: Weight of Technical/Quality Evaluation in Selection of Contractor

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
High	127	84.11	84.11
Low	24	15.89	100
Total	151	100	-

Statistic From Tables 4.15 and 4.16 show that, Pakistani construction professionals do not think price/financial evaluation should be allocated higher marks in evaluation to select a contractor for a project but rather higher marks should be allocated to technical evaluation with non-financial consideration such as the experience of the contractor on similar projects,

technical competence, available technical staff for project, available plant/equipment for project, management team etc. Lowest price bid method is not the only method to attain lowest cost of a project (Chee *et al*, 2001). This is confirmed by Chan *et al* (2001) that it is necessary that the contractor involved in a building projects possesses the suitable knowledge and aptitude to manage the project, as it extremely impacts the project performance.

There are many bad impacts of lowest bid price method on construction projects, they may include some of the majors like delays in completion, quality issues and financial losses etc (Hatush and Skitmore, 1998). Now a day's researchers are recommending the use of alternative multi criteria techniques to attain best value of money rather relying on lowest price method only (Palaneeswaran *et al*. 2003 and 2004).

4.3.11 Evaluation Criteria for Contractor Selection

Table 4.16 shows response to question 9 that which evaluation criteria are preferred by professionals in CI of Pakistan.

Table 4.17 Preferred Evaluation Criteria for Contractor Selection

Opinion of Respondents	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Single criteria (bid price)	13	8.61	8.61
Multi-criteria (time, cost & quality)	138	91.39	100
Total	151	100	-

From Table 4.17, only six (13) respondents, making up 8.61 percent of the total respondents choose single criteria as their preferred method of evaluation for contractor's selection.

All other respondents (138), making up 91.39 percent of the total respondents choose multi criteria as the evaluation criteria that will select the best contractor for a given project. This indicates that the preferred criteria of evaluation by Pakistani construction professionals is the multi criteria method of evaluation and subsequent selection of contractors for a project as suggested by Hatush and Skitmore (1998), Faridah (2007), Chee, Holt and Phil (2001). Contractor's selection must base on multi criteria in competitive and risky environment (Zenonas *et al*, 2008), except in some conditions single criteria is to be followed as per the requirements of client, single criteria can be fixed completion date of project or it can be

fixed price of project. Multiple criteria considered in contractors' selection include technical capability, financial status, experience, management, health and safety records and past performance etc (Hatush and Skitmore, 1998).

4.3.12 Multi Criteria Selection Methods

Illustrated below are responses to questions on multi criteria selection methods (question 13). From Table 4.18 below, 68.21 percent of respondents do not know about the multi criteria selection methods, 19.21 percent heard about methods, 6.62 percent read about methods, 5.96 percent know about the methods.

Table 4.18: Knowledge of Multi-Criteria Selection Methods

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Do not know about methods	103	68.21	68.21
Heard about methods	29	19.21	87.42
Read about methods	11	6.62	94.04
Know about methods	10	5.96	100
Total	151	100	-

From the statistics above, it implies that the majority of respondents, 68.21 percent, do not know about the stated multi criteria selection methods. Only 31.85 percent have either heard, read or know about the methods.

10.6 percent respondents did not answer the question 14 on the application of the listed multi criteria selection methods. 80.8 % never applied any of the methods in evaluation and selection of contractor, 7.28 % ever applied one of the methods in evaluation and selection on some of the projects; while 1.32% applied one of the methods in all projects. Table 4.19 below illustrates the distribution of the statistics.

Table 4.19: Application of Multi-Criteria Selection Methods in Pakistan

Rating	Frequency of Respondents	Percentage of Respondents	Cumulative Percentage
Never	122	80.8	80.8
On some projects	11	7.28	88.08
On all projects	2	1.32	89.4
Missing answer	16	10.6	100
Total	151	100	-

The results indicate that respondents who read or heard or know about the methods used it on some project. It may therefore be inferred that as more of the respondents know about the methods, the methods would be applied in evaluation and selection in Pakistan.

4.3.13 Preference of Multi-criteria Selection Methods

Table 4.20 gives responses to question 15.

Table 4.20: Preference of Multi-criteria Selection Methods

Experience of Respondents	**Frequency of Respondents**	**Percentage of Respondents**	**Cumulative Percentage**
Analytical Hierarchy Process (AHP)	3	1.99	1.99
Analytical Network Process (ANP)	2	1.32	3.31
Multi-attribute Utility Theory (MAUT)	1	0.66	3.97
Multi Criteria Complex Proportional Assessment (COPRAS)	0	0	3.97
Fuzzy Set Theory (FST)	1	0.66	4.63
Evidential Reasoning (ER)	1	0.66	5.29
None	5	3.31	8.6
Others	0	0	8.6
Missing answer	138	91.4	100
Total	151	100	-

Only 13 respondents, out of the total 151, answered question 15 which was about the recommendation of multi criteria selection methods listed. Out of these 13 respondents only 8 respondents made a recommendation of the multi criteria selection methods listed. Five (3) recommended the Analytical Hierarchy Process, two (2) recommended the Analytical Network Process, and one (1) each for MAUT, FST and ER. These statistics, coupled with the fact that most respondents indicated they do not know about the methods, may not be enough to make a conclusion on the multi-criteria selection method preferred by Pakistani construction professionals.

4.4 Statistical Analysis

4.4.1 Reliability of the Sample

Cronbach's Coefficient Alpha Method

Internla consistancty is most commonly assessed by Cronbach's Coefficient Alpha method, also when likert scale is used in the study; this method is mostly used to check the reliability of the scale. If the Cronbach's Coefficient Alpha's value is between 0.7 to 0.9 data is acceptable for further analysis, whereas when its value exceeds 0.9 the data is considered as excellent for analysis (Li, 2007). For the present case Caronbach's coefficient alpha is calculated using SPPS which came out 0.773 as shown in Table 4.21. This value indicates that data is consistent and reliable, further analysis can be started.

Table 4.21: Reliability Statistics

Case Processing Summary

		N	%
Cases	Valid	151	100.0
	Excluded[a]	0	.0
	Total	151	100.0

a. Listwise deletion based on all variables in the procedure.

Cronbach's Alpha	0.773
Number of Items	18

4.4.2 Normality Test

Shapiro Wilk normality test is conducted as shown in table 4.22. This test is performed to check the normality of data as per the requirements of sample size which is less than 2000. This test is performed to know the nature of data that is either parametric or non-parametric. Significance value found from the test is 0.00 which shows that the data is not normally distributed, as for sufficiently normal data significance value should be greater than 0.05. Therefore, for current data non-parametric techniques are used for further analysis as data is not normally distributed.

Table 4.22: Tests of Normality Shapiro-Wilk Test

Criteria for contractor selection		Shapiro-Wilk Test	
		Statistic	Sig.
Financial stability of the contractor	C01	.857	.000
Estimated cost of the project / Tender price	C02	.772	.000
Banking arrangements / Bonding	C03	.824	.000
Satisfactory settlement of final accounts on past projects	C04	.844	.000
Experience	C05	.808	.000
Plant & equipment holding	C06	.865	.000
Personnel	C07	.843	.000
Technical Competence	C08	.803	.000
Past performance on Quality	C09	.740	.000
Organization & management capabilities	C10	.777	.000
Methodology of managing subcontractors	C11	.869	.000
Attention to site welfare & safety	C12	.801	.000
Health & safety procedures	C13	.893	.000
OSHA incident rates (Accident rates – Injury / fatality)	C14	.873	.000
Management safety accountability	C15	.895	.000
Past failures	C16	.843	.000
Length of time in business	C17	.863	.000
Past client - contractor relationships	C18	.900	.000

4.4.3 Severity Index Analysis

Severity index analysis is a technique used for the analysis of non-parametric data, so it is performed for the analysis of question 10 of the questionnaire. As the current data collected is ordinal, distance between any two ratings is unknown. Therefore, parametric statistics such as mean, standard deviation etc will not produce meaningful results to analyze such type of data. Non-parametric techniques are adopted for such condition (Siegel, 1956; Siegel and Castellan, 1988; Johnson and Bhattacharyya, 1996).

Frequency analysis and Relative index ranking are non-parametric techniques used for the analysis of collected data. Relative index ranking technique is extensively used by construction management researchers to analyze structured questionnaire response data concerning ordinal measurement of attitudes. Severity index analysis is a form of this Relative index ranking that uses weighted percentage scores to compare the comparative

significance of the criteria under study (Elhag and Boussabaine, 1999; Al-Hammad, 2000; Ballal, 2000). For the present analysis; Firstly Frequency analysis was performed to determine the frequency of responses which were then used to calculate severity indices by means of the formula already discussed in chapter 3. Table 4.23 shows the severity index analysis of the criteria for contractor's selection and bid evaluation in the construction industry of Pakistan.

Table 4.23: Severity Indices of Criteria used for Contractor Selection

	5 Main Criteria (18 sub criteria)	Severity Indices of Criteria (percentage)	Severity Indices of Criteria	Ranking of criteria basing on Severity Indices	
				Within main criteria	Overall (1 to 18)
1.Financial Soundness					
01	Financial stability of the contractor	75.36424	0.7536	1	**3**
02	Estimated cost of the project / Tender price	73.90728	0.7390	2	**5**
03	Banking arrangements / Bonding	72.05298	0.7205	3	7
04	Satisfactory settlement of final accounts on past projects	70.59603	0.7059	4	8
2.Technical Ability					
05	Experience	80.2649	0.8026	2	**2**
06	Plant & equipment holding	75.36424	0.7536	3	**3**
07	Personnel	74.56954	0.7456	4	**4**
08	Technical Competence	81.8543	0.8185	1	**1**
3.Management Capability					
09	Past performance on Quality	74.56954	0.7456	1	**4**
10	Organization & management capabilities	73.37748	0.7337	2	6
11	Methodology of managing subcontractors	68.47682	0.6847	3	11

4.Health and Safety					
12	Attention to site welfare & safety	54.43709	0.5443	2	14
13	Health & safety procedures	53.77483	0.5377	3	15
14	OSHA incident rates (Accident rates – Injury / fatality)	56.82119	0.5682	1	13
15	Management safety accountability	50.99338	0.5099	4	16
5.Reputation					
16	Past failures	69.80132	0.6980	1	9
17	Length of time in business	69.00662	0.6900	2	10
18	Past client-contractor relationship	66.75497	0.6675	3	12

The statistics in above table show that respondents from CI of Pakistan ranked Technical competence of the contractor as the highest criteria considered in the evaluation of bid and contractor selection. The top five criteria ranked by professionals in CI of Pakistan are Technical Competence, Experience, Financial stability of the contractor, past performance on Quality, and Estimated cost of the project / Tender price.

The five least important criteria however were past client-contractor relationship, OSHA incident rates (Accident rates – Injury / fatality), Attention to site welfare & safety, Health & safety procedures and Management safety accountability.

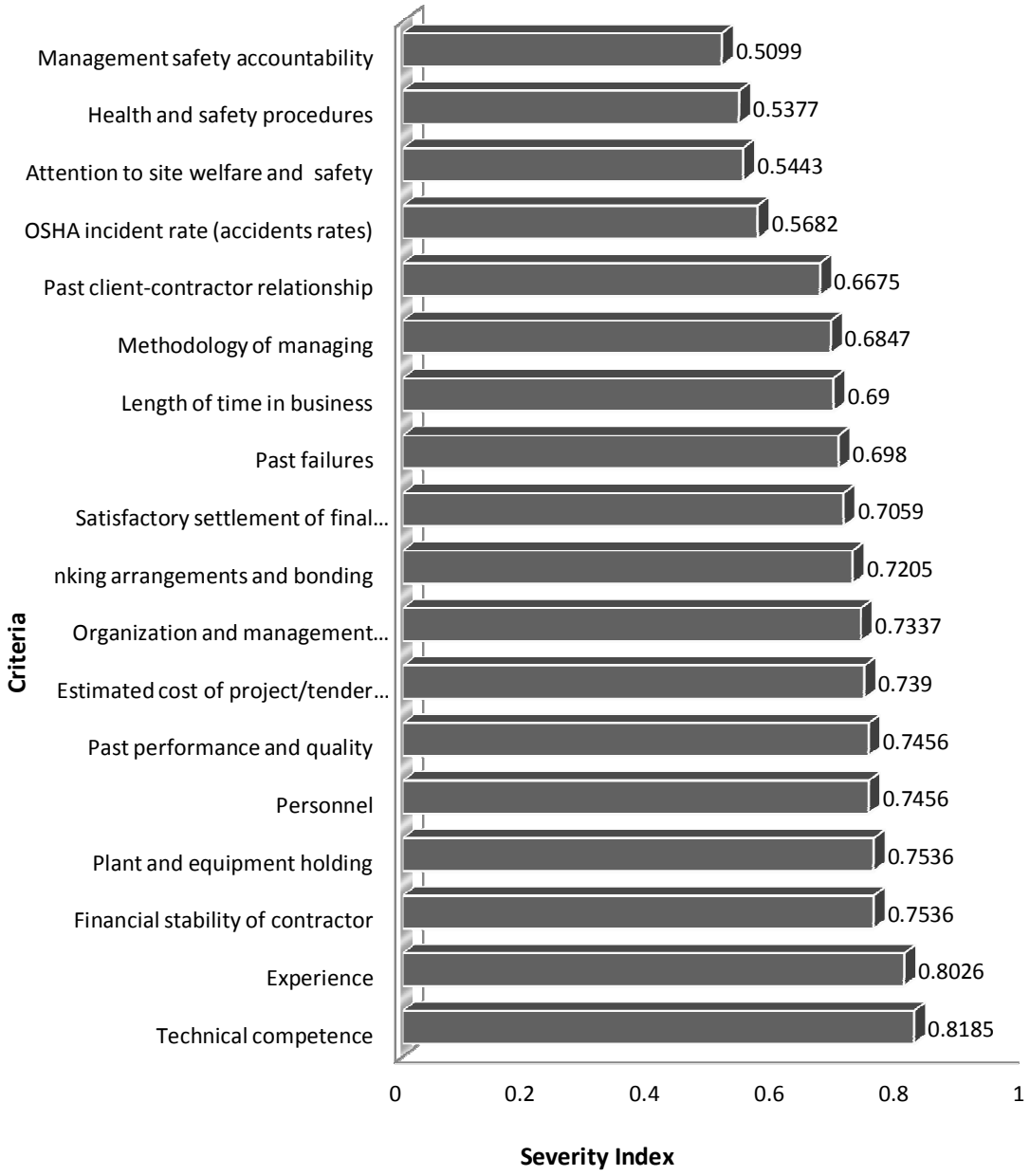

Figure 4.6: Severity Indices of Criteria used for Contractor Selection

Figure 4.6 shows the overall ranking of all the sub criteria which were used in the present study to be ranked by the professionals in CI of Pakistan for contractor's selection and bid evaluation

4.5 Ranking of Sub Criteria within Main criteria

4.5.1 Financial Soundness

Figure 4.7 shows the ranking of sub criteria within the main criteria of financial soundness. Professionals from the CI of Pakistan ranked financial stability of the contractor as the top most criteria with Severity index of 75.36 percent considered while evaluating contractor for the award of contract. However satisfactory settlement of final accounts on past projects is considered as the least important criteria with severity index of 70.59 percent.

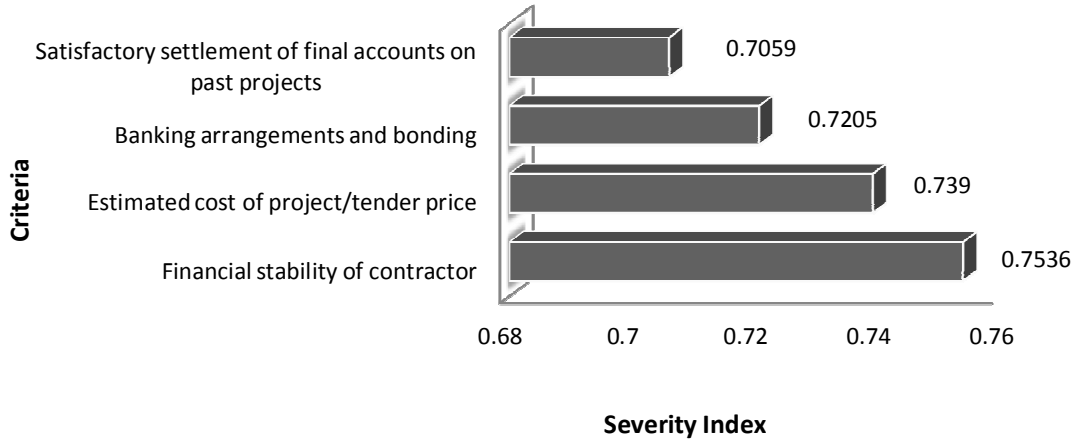

Figure 4.7: Ranking of Criteria within Main Criteria of Financial Soundness by Severity Indices

4.5.2 Technical Ability

Figure 4.8 shows the ranking of sub criteria within the main criteria of Technical ability of the contractor. Professionals from the CI of Pakistan ranked Technical competence of the contractor as the top most criteria with Severity index of 81.85 percent. Technical competence of the contractor is also ranked overall as the top most criteria. However Personnel of the contractor are considered as the least important criteria with severity index of 74.56 percent.

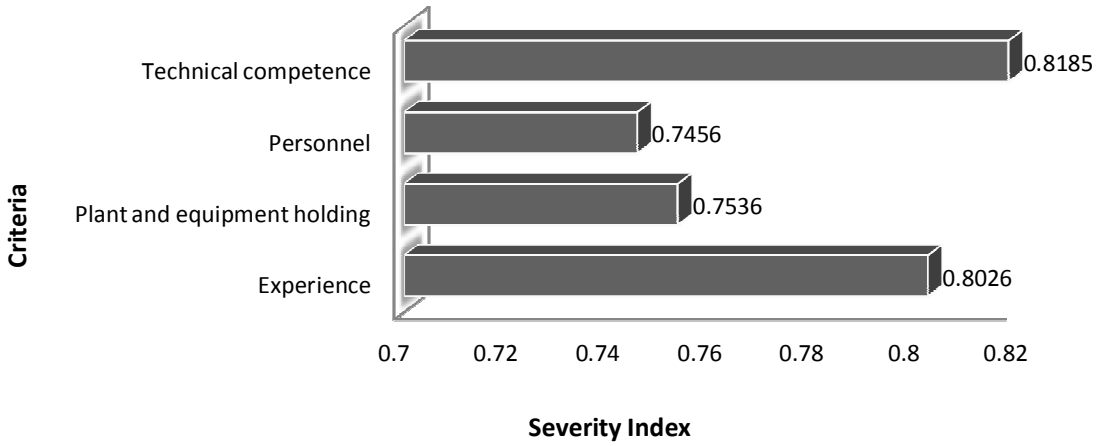

Figure 4.8: Ranking of Criteria within Main Criteria of Technical Ability by Severity Indices

4.5.3 Management Capability

Figure 4.9 shows the ranking of sub criteria within the main criteria of Management Capability of the contractor. Professionals from the CI of Pakistan ranked past performance and quality work of the contractor as the top most criteria with Severity index of 74.56 percent. However Methodology of managing sub contractors is considered as the least important criteria with severity index of 68.47 percent.

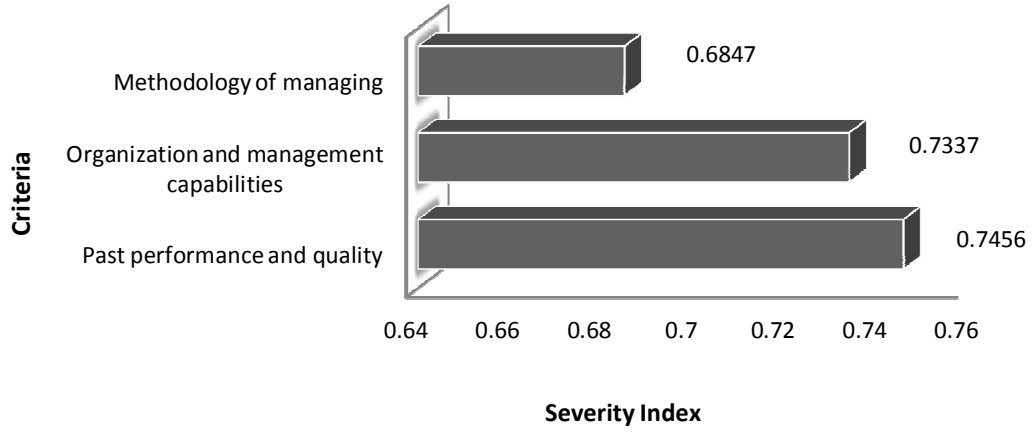

Figure 4.9: Ranking of Criteria within Main Criteria of Management Capability by Severity Indices

4.5.4 Health and safety

Figure 4.10 shows the ranking of sub criteria within the main criteria of Health and safety. Professionals from the CI of Pakistan ranked OSHA incident rate (Accident rate) of the contractor's firm as the top most criteria with Severity index of 56.82 percent considered while evaluating contractor for the award of contract. However Management safety accountability is considered as the least important criteria with severity index of 50.99 percent. Health and safety is the most ignored criteria in the CI of Pakistan while selecting a contractor even during the execution of the project.

Figure 4.10: Ranking of Criteria within Main Criteria of Health and Safety by Severity Indices

4.5.5 Reputation

Figure 4.11 shows the ranking of sub criteria within the main criteria of Reputation of the contractor in CI. Professionals from the CI of Pakistan ranked Past Failures of the contractor as the top most criteria with Severity index of 69.80 percent considered while evaluating contractor for the award of contract. However satisfactory Past client-contractor relationship is considered as the least important criteria with severity index of 66.75 percent. Past failures cause the firm as black listed in the CI.

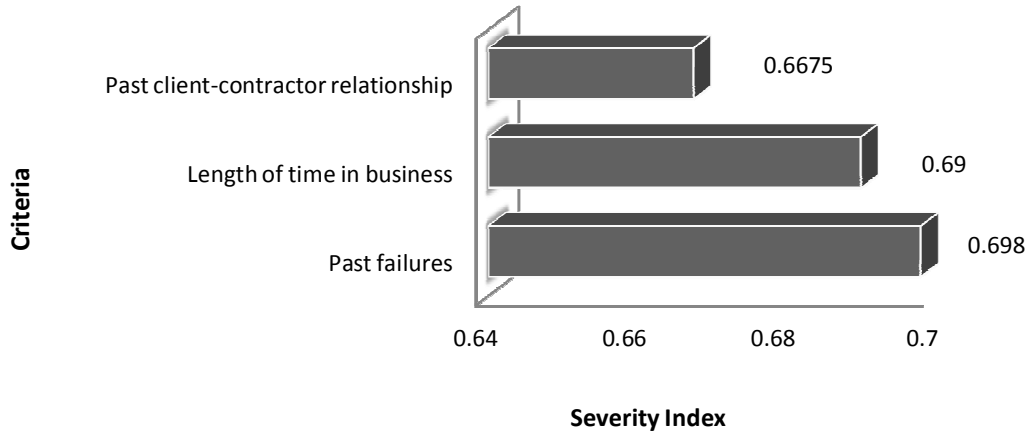

Figure 4.11: Ranking of Criteria within Main Criteria of Reputation by Severity Indices

4.6 Overall Ranking of the main Criteria

Figure 4.12 shows the overall ranking of the five main criteria used for the contractor's selection and bid evaluation in CI of Pakistan based on the average severity indices of the criteria.

Technical ability of the contractor stands first in the ranking with having highest average severity index value i.e. 78.01 percent. Technical ability is the most important criteria as per the perception of respondents in CI of Pakistan, according to them in this criterion clients assess contractors against some important factors including physical assets of contractors (machinery, equipments etc.), technical expertise level of contractor. Some other factors for the technical evaluation of contractor include construction techniques of contractor, skill level of technical staff, productivity level, and quality work produced and final outcome (Warszawski, 1996)

Financial soundness of the contractor is the second most important criteria considered in the CI of Pakistan by the professionals with average severity index of 72.98 percent. Financial stability of contractor is of great significance to client in the process of selection of main contractor, this criteria helps to find out whether contractor has sufficient finances to execute project or not. Financial soundness of contractor ensures stability of contractor against risks' having prospect of high returns. Financial strength of contractor plays significant role in the establishment of his reputation and credibility in any construction industry (Warszawski, 1996).

Management capability of the contractor is considered as the third most important criteria considered in the CI of Pakistan with severity index of 72.14 percent. This is also an important criterion in which organization and management capabilities of the contractor are judged which are very crucial for the execution and successful completion of the project.

Reputation is the fourth most important criteria for contractor's selection considered in the CI of Pakistan with average severity index of 68.52 percent. In this criteria contractor is judged by the past behavior in different aspects in the CI. Past failures, client contractor relationships, length of time in business are the main consideration in the reputation of the contractor in the CI.

Health and safety is the most ignored criteria in the CI of Pakistan with average severity index of 54 percent. It is the biggest drawback of the Pakistani CI that safety is ignored both in award of contract and execution of contract. Although safety clauses are there in the contract document but they are and enforced by client and practiced by contractor. Health and safety should be given a serious thought for the CI of Pakistan by concerned establishments.

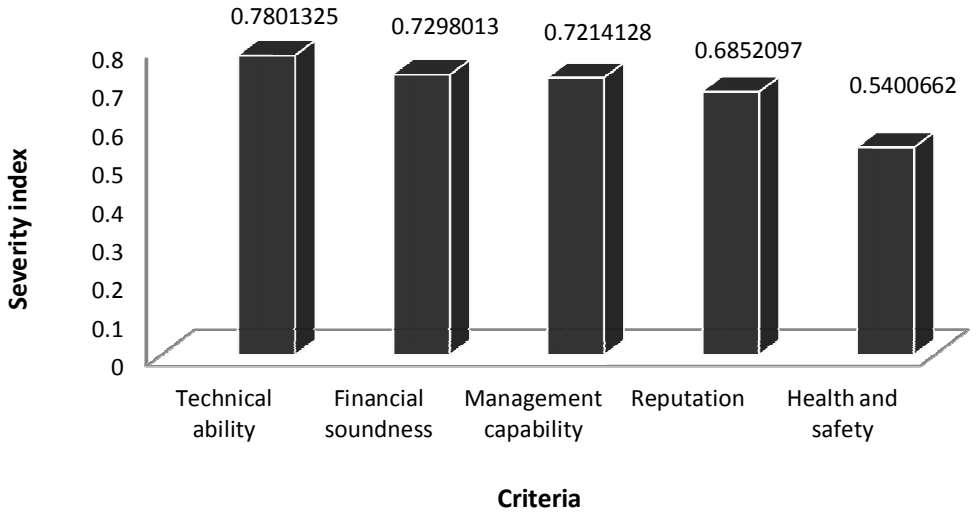

Figure 4.12: Ranking of Five Main Criteria with Respect Average Severity Indices

4.7 Summary

In this chapter statistical analysis has been discussed. Eighteen (18) sub criteria (grouped in 5 main criteria) for contractor's selection and bid evaluation are analyzed using SPSS-18, so as to Rank these criteria in CI of Pakistan.

Cronbach's Coefficient Alpha value (0.773) proved that the data is fairly reliable for further analysis. Shapiro Wilk normality test confirmed that data is not normally distributed so non para-metric techniques are used for further analysis. Severity index analysis is utilized for the ranking of criteria in CI of Pakistan.

Five main criteria are ranked by the professionals in CI as Technical ability, financial soundness, Management capability, Reputation and Health and safety. The ranking of the criteria is done on the basis of average severity indices of the criteria.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

It is a complex decision process to select the best contractor for construction professionals. This process involves simultaneous measurement and/or evaluation of huge number of variables. Several of these variables are associated to each other in a complex way. Selection variables very often conflict insofar as development in one often consequences in decline of another(s) (Sonmez et al, 2001).

It is of extreme importance to prevent project accomplishment failure due to the contractor's incapability to undertake or complete the works. Consequently, a standardized set of guidelines in selection of a contractor is crucial to make certain that pricing and background of contractor is systematically assessed and the best bidder is selected for award to ensure the successful execution of the project (Faridah, 2007). Mostly projects that are behind schedule, project cost changes and bad quality, are direct outcomes of selection of an inadequate contractor (Nerija and Audrius, 2006).

This study sought to find the preferred selection criteria of contractor, whether single or multi criteria, and method in Pakistan. The variables used in bid evaluation and selection of contractors are many and lie under five main criteria. Severity Index analysis is used in ranking five main criteria and their underlying eighteen sub criteria used for contract award in Pakistan according to the opinion of construction professional.

5.2 Review of Research Objectives

The main objectives of the present research are:

1. Reviewing the various criteria and variables used for contractor's selection and bid evaluation as stated in literature and public procurement regulatory authority, (PPRA) rules; of Pakistan.

2. Identifying the main criteria and their underlying sub criteria which effect contractor's selection in Pakistan based on the perceptions of clients and consultants.

3. Determine multi criteria selection methods that Pakistani construction professionals prefer in order to enhance contractor's selection in Pakistan.

4. Introducing guidelines to be considered for enhancing the contractor's selection process in Pakistan.

5.3 Conclusions

Within the aims and objectives set out in this study to find from the opinion of Pakistani construction professionals the significant criteria and sub criteria considered in bid evaluation, selecting contractors and the methods of selection, the following conclusion can be drawn from the analysis in the preceding chapter.

1. The majority of construction professionals (client and consultants) in Pakistan think the public Procurement Regulatory Authority (PPRA) rules 2004-10 are satisfactory in selecting contractors for projects although not absolute.
2. Mostly respondents are of the opinion that contractor's selection can affect the time of delivery, cost of project and the quality of final construction product.
3. Respondents favor multi criteria methods for selection of contractor than single criteria.
4. In allocating proportion of marks to either financial or technical evaluation most respondents allocated more marks to technical evaluation than financial evaluation.
5. A contractor selection system is needed that is proficient of considering multiple criteria, however the majority of professionals do not know about multi- criteria selection methods in this study such as ANP, AHP, MAUT, etc. the few that knew about them applied them in contractor selection.
6. The five main criteria with eighteen sub criteria for bid evaluation and subsequent selection of contractor were ranked by severity index analysis as Technical ability, financial soundness, management capability, reputation and health and safety.

5.4 General Recommendations for Improving Bid evaluation and Contractor Selection in Construction Industry of Pakistan

From the analysis and discussions in the preceding chapter, the following recommendation is made for consideration:

The few construction professionals that knew about the multi-criteria selection methods used it for the evaluation of contractor. This suggests that if the selection methods are known by construction professionals they will concern them for bid evaluation and subsequent selection of contractor. These multi-criteria selection methods should therefore be made known to construction professionals to help selecting 'best' contractors for clients to achieve project objectives smoothly through seminars and conferences by stakeholders.

5.5 Recommendations for Future Research

With the government Pakistan being a main participant in the Pakistani construction industry, it should take the initiative and encourage other stakeholders to study into the multi-criteria selection methods and determine which is/are suitable for any type of contract and type of client or stakeholder involved.

5.6 Summary

Contractor's selection is a critical assignment for a client to have his project accomplished within budget, on schedule and with good quality. The goal of multi-criteria contractor selection is to enable the selection of the "best" contractor from the set of available options through the evaluation of multiple selection objectives. The right selection of suitable contractors is highly beneficial to construction clients in the following ways;

1. To achieve project goals within budgeted cost,
2. To accomplish project delivery on time,
3. To ensure improved quality of final product,
4. To ensure value for money, and
5. Avoid risk.

The tasks of comparing presented options (contractors) and good decision making, in selection, using multiple-criterion approaches are accepted the best in contractor selection in Pakistan.

Using severity index analysis, it was determined that the five main criteria with eighteen sub criteria for bid evaluation and subsequent selection of contractor were ranked by CI professionals in Pakistan as Technical ability, financial soundness, management capability, reputation and health and safety.

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APPENDIX-I

PPRA Rules 2004-10

General Provisions

Definitions (2)

1) In these rules, unless there is anything repugnant in the subject or context,

a) "bid" means a tender, or an offer, in response to an invitation, by a person, consultant, firm, company or an organization expressing his or its willingness to undertake a specified task at a price;

b) "bidder" means a person who submits a bid;

c) "competitive bidding" means a procedure leading to the award of a contract whereby all the interested persons, firms, companies or organizations may bid for the contract and includes both national competitive bidding and international competitive bidding;

d) "contractor" means a person, consultant, firm, company or an organization who undertakes to supply goods, services or works;

e) "contract" means an agreement enforceable by law;

f) "corrupt and fraudulent practices" includes the offering, giving, receiving, or soliciting of any things of value to influence the action of a public official or the supplier or contractor in the procurement process or in contract execution to the detriment of the procuring agencies; or misrepresentation of facts in order to influence a procurement process or the execution of a contract, collusive practices among bidders (prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the procuring agencies of the benefits of free and open competition and any request for, or solicitation of anything of value by any public official in the course of the exercise of his duty;

g) "emergency" means natural calamities, disasters, accidents, war and operational emergency which may give rise to abnormal situation requiring prompt and immediate action to limit or avoid damage to person, property or the environment;

h) "lowest evaluated bid" means

i. a bid most closely conforming to evaluation criteria and other conditions specified in the bidding document; and

ii. having lowest evaluated cost;

i) "Ordinance" means the Public Procurement Regulatory Authority

Ordinance, 2002 (XXII of 2002);

j) "repeat orders" means procurement of the same commodity from the same source without competition and includes enhancement of contracts;

k) "supplier" means a person, consultant, firm, company or an organization who undertakes to supply goods, services or works; and

l) "value for money" means best returns for each rupee spent in terms of quality, timeliness, reliability, after sales service, up-grade ability, price, source, and the combination of whole-life cost and quality to meet the procuring agency's requirements.

2) The expressions used but not defined in these rules shall have the same meanings as are assigned to them in the Ordinance.

Scope and applicability (3)

Save as otherwise provided, these rules shall apply to all procurements made by all procuring agencies of the Federal Government whether within or outside Pakistan.

Principles of procurements (4)

Procuring agencies, while engaging in procurements, shall ensure that the procurements are conducted in a fair and transparent manner, the object of procurement brings value for money to the agency and the procurement process is efficient and economical.

International and inter-governmental commitments of the Federal Government (5)

Whenever these rules are in conflict with an obligation or commitment of the Federal Government arising out of an international treaty or an agreement with a State or States, or any international financial institution the provisions of such international treaty or agreement shall prevail to the extent of such conflict.

Language (6)

1) All communications and documentation related to procurements of the Federal Government shall either be in Urdu or English or both. Except where a procuring agency is situated outside the territories of Pakistan and procurements are to be made locally, the procuring agency may use the local language in addition to Urdu or English.

2) Where the use of local language is found essential, the original documentation shall be in Urdu or English, which shall be retained on record; for all other purposes their translations in local language shall be used: Provided that such use of local language ensures maximum economy and efficiency in the procurement.

3) In case of the dispute reference shall be made to the original documentation retained on record.

Integrity pact (7)

Procurements exceeding the prescribed limit shall be subject to an integrity pact, as specified by regulation with approval of the Federal Government, between the procuring agency and the suppliers or contractors.

Procurement Planning

Procurement planning (8)

Within one year of commencement of these rules, all procuring agencies shall devise a mechanism, for planning in detail for all proposed procurements with the object of realistically determining the requirements of the procuring agency, within its available resources, delivery time or completion date and benefits that are likely to accrue to the procuring agency in future.

Limitation on splitting or regrouping of proposed procurement (9)

Save as otherwise provided and subject to the regulation made by the Authority, with the prior approval of the Federal Government, a procuring agency shall announce in an appropriate manner all proposed procurements for each financial year and shall proceed accordingly without any splitting or regrouping of the procurements so planned. The annual requirements thus determined would be advertised in advance on the Authority's website as well as on the website of the procuring agency in case the procuring agency has its own website.

Specifications (10)

Specifications shall allow the widest possible competition and shall not favor any single contractor or supplier nor put others at a disadvantage. Specifications shall be generic and shall not include references to brand names, model numbers, catalogue numbers or similar classifications. However if the procuring agency is convinced that the use of or a reference to a brand name or a catalogue number is essential to complete an otherwise incomplete specification, such use or reference shall be qualified with the words "or equivalent".

Provided that this rule shall not apply to procurement made by public sector commercial concerns on the demand of private sector client specifying, in writing, a particular brand, model or classification of equipment, machinery or other objects.

Approval mechanism (11)

All procuring agencies shall provide clear authorization and delegation of powers for different categories of procurement and shall only initiate procurements once approval of the competent authorities concerned has been accorded

Procurement Advertisements

Methods of advertisement (12)

1) Procurements over one hundred thousand rupees and up to the limit of two million rupees shall be advertised on the Authority's website in the manner and format specified by regulation by the Authority from time to time. These procurement opportunities may also be advertised in print media, if deemed necessary by the procuring agency:

Provided that the lower financial limit for advertisement on Authority's website for open competitive bidding shall be the prescribed financial limit for request for quotations under clause (b) of rule 42.

2) All procurement opportunities over two million rupees should be advertised on the Authority's website as well as in other print media or newspapers having wide circulation. The advertisement in the newspapers shall principally appear in at least two national dailies, one in English and the other in Urdu.
3) In cases where the procuring agency has its own website it may also post all advertisements concerning procurement on that website as well.
4) A procuring agency utilizing electronic media shall ensure that the information posted on the website is complete for the purposes for which it has been posted, and such information shall remain available on that website until the closing date for the submission of bids.

Response time (13)

1) The procuring agency may decide the response time for receipt of bids or proposals (including proposals for pre-qualification) from the date of publication of an advertisement or notice, keeping in view the individual procurement's complexity, availability and urgency. However, under no circumstances the response time shall be less than fifteen days for national competitive bidding and thirty days for international competitive bidding from the date of publication of advertisement or notice.

All advertisements or notices shall expressly mention the response time allowed for that particular procurement along with the information for collection of bid documents which shall be issued till a given date, allowing sufficient time to complete and submit the bid by the closing date: Provided that no time limit shall be applicable in case of emergency.

2) The response time shall be calculated from the date of first publication of the advertisement in a newspaper or posting on the web site, as the case may be.

3) In situations where publication of such advertisements or notices has occurred in both electronic and print media, the response time shall be calculated from the day of its first publication in the newspapers.

Exceptions (14)

It shall be mandatory for all procuring agencies to advertise all procurement requirements exceeding prescribed financial limit which is applicable under sub-clause (i) of clause (b) of rule 42. However under following circumstances deviation from the requirement is permissible with the prior approval of the Authority,-

a) the proposed procurement is related to national security and its publication could jeopardize national security objectives; and
b) the proposed procurement advertisement or notice or publication of it, in any manner, relates to disclosure of information, which is proprietary in nature or falls within the definition of intellectual property which is available from a single source.

Pre-Qualification, Qualification and Dis-Qualification of Suppliers and Contractors

Pre-qualification of suppliers and contractors (15)

1) A procuring agency, prior to the floating of tenders, invitation to proposals or offers in procurement proceedings, may engage in pre-qualification of bidders in case of services, civil works, turnkey projects and in case of procurement of expensive and technically complex equipment to ensure that only technically and financially capable firms having adequate managerial capability are invited to submit bids. Such pre-qualification shall solely be based upon the ability of the interested parties to perform that particular work satisfactorily.
2) A procuring agency while engaging in pre-qualification may take into consideration the following factors, namely:-

a) relevant experience and past performance;
b) capabilities with respect to personnel, equipment, and plant;
c) financial position;
d) appropriate managerial capability; and
e) any other factor that a procuring agency may deem relevant, not inconsistent with these rules.

Pre-qualification process (16)

1) The procuring agency engaging in pre-qualification shall announce, in the pre-qualification documents, all information required for pre-qualification including instructions for

preparation and submission of the pre-qualification documents, evaluation criteria, list of documentary evidence required by suppliers or contractors to demonstrate their respective qualifications and any other information that the procuring agency deems necessary for prequalification.

2) The procuring agency shall provide a set of pre-qualification documents to any supplier or contractor, on request and subject to payment of price, if any. Explanation: For the purposes of this sub-rule price means the cost of printing and providing the documents only.
3) The procuring agency shall promptly notify each supplier or contractor submitting an application to pre-qualify whether or not it has been pre-qualified and shall make available to any person directly involved in the pre-qualification process, upon request, the names of all suppliers or contractors who have been pre-qualified. Only suppliers or contractors who have been pre-qualified shall be entitled to participate further in the procurement proceedings.
4) The procuring agency shall communicate to those suppliers or contractors who have not been pre-qualified the reasons for not pre-qualifying them.

Qualification of suppliers and contractors (17)

A procuring agency, at any stage of the procurement proceedings, having credible reasons for or prima facie evidence of any defect in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not: Provided that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that procurement proceeding.

Disqualification of suppliers and contractors (18)

The procuring agency shall disqualify a supplier or contractor if it finds, at any time, that the information submitted by him concerning his qualification as supplier or contractor was false and materially inaccurate or incomplete.

Blacklisting of suppliers and contractors (19)

The procuring agencies shall specify a mechanism and manner to permanently or temporarily bar, from participating in their respective procurement proceedings, suppliers and contractors who either consistently fail to provide satisfactory performances or are found to be indulging in corrupt or fraudulent practices. Such barring action shall be duly publicized and communicated to the Authority: Provided that any supplier or contractor who is to be blacklisted shall be accorded adequate opportunity of being heard.

Methods of Procurement

Principal method of procurement (20)

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.

Open competitive bidding (21)

Subject to the provisions of rules 22 to 37 the procuring agencies shall engage in open competitive bidding if the cost of the object to be procured is more than the prescribed financial limit which is applicable under sub-clause (i) of clause (b) of rule 42

Submission of bids (22)

1) The bids shall be submitted in a sealed package or packages in such manner that the contents are fully enclosed and cannot be known until duly opened.
2) A procuring agency shall specify the manner and method of submission and receipt of bids in an unambiguous and clear manner in the bidding documents.

Bidding documents (23)

1) Procuring agencies shall formulate precise and unambiguous bidding documents that shall be made available to the bidders immediately after the publication of the invitation to bid.
2) For competitive bidding, whether open or limited, the bidding documents shall include the following, namely:-

a) invitation to bid;
b) instructions to bidders;
c) form of bid;
d) form of contract;
e) general or special conditions of contract;
f) specifications and drawings or performance criteria (where applicable);
g) list of goods or bill of quantities (where applicable);
h) delivery time or completion schedule;
i) qualification criteria (where applicable);
j) bid evaluation criteria;
k) format of all securities required (where applicable);
l) details of standards (if any) that are to be used in assessing the quality of goods, works or services specified; and

m) any other detail not inconsistent with these rules that the procuring agency may deem necessary.

3) Any information, that becomes necessary for bidding or for bid evaluation, after the invitation to bid or issue of the bidding documents to the prospective bidders, shall be provided in a timely manner and on equal opportunity basis. Where notification of such change, addition, modification or deletion becomes essential, such notification shall be made in a manner similar to the original advertisement.

4) Procuring agencies shall use standard bidding documents as and when notified by regulation by the Authority: Provided that bidding documents already in use of procuring agencies may be retained in their respective usage to the extent they are not inconsistent with these rules, and till such time that the standard bidding documents are specified by regulations.

5) The procuring agency shall provide a set of bidding documents to any supplier or contractor, on request and subject to payment of price, if any. Explanation.- For the purpose of this sub-rule price means the cost of printing and providing the documents only.

Reservations and preference (24)

1) Procuring agencies shall allow all prospective bidders to participate in procuring procedure without regard to nationality, except in cases in which any procuring agency decides to limit such participation to national bidders only or prohibit participation of bidders of some nationalities, in accordance with the policy of Federal Government.

2) Procuring agencies shall allow for a preference to domestic or national suppliers or contractors in accordance with the policies of the Federal Government. The magnitude of price preference to be accorded shall be clearly mentioned in the bidding documents under the bid evaluation criteria.

Bid security (25)

The procuring agency may require the bidders to furnish a bid security not exceeding five per cent of the bid price.

Bid validity (26)

1) A procuring agency, keeping in view the nature of the procurement, shall subject the bid to a bid validity period.

2) Bids shall be valid for the period of time specified in the bidding document.

3) The procuring agency shall ordinarily be under an obligation to process and evaluate the bid within the stipulated bid validity period. However under exceptional circumstances and for reason to be recorded in writing, if an extension is considered necessary, all those who have submitted their bids shall be asked to extend their respective bid validity period. Such extension shall be for not more than the period equal to the period of the original bid validity.

4) Bidders who,

a) agree to extension of their bid validity period shall also extend the validity of the bid bond or security for the extended period of the bid validity;

b) agree to the procuring agency's request for extension of bid validity period shall not be permitted to change the substance of their bids; and

c) do not agree to an extension of the bid validity period shall be allowed to withdraw their bids without forfeiture of their bid bonds or securities.

Extension of time for submission of bids (27)

Where a procuring agency has already prescribed a deadline for the submission of bids and due to any reason the procuring agency finds it necessary to extend such deadline, it shall do so only after recording its reasons in writing and in an equal opportunity manner. Advertisement of such extension in time shall be done in a manner similar to the original advertisement.

Opening, Evaluation and Rejection of Bids

Opening of bids (28)

1. The date for opening of bids and the last date for the submission of bids shall be the same. Bids shall be opened at the time specified in the bidding documents. The bids shall be opened at least thirty minutes after the deadline for submission of bids.
2. All bids shall be opened publicly in the presence of the bidders or their representatives who may choose to be present, at the time and place announced prior to the bidding. The procuring agency shall read aloud the unit price as well as the bid amount and shall record the minutes of the bid opening. All bidders in attendance shall sign an attendance sheet. All bids submitted after the time prescribed shall be rejected and returned without being opened.

Evaluation criteria (29)

Procuring agencies shall formulate an appropriate evaluation criterion listing all the relevant information against which a bid is to be evaluated. Such evaluation criteria shall

form an integral part of the bidding documents. Failure to provide for an unambiguous evaluation criteria in the bidding documents shall amount to mis-procurement.

Evaluation of bids (30)

1. All bids shall be evaluated in accordance with the evaluation criteria and other terms and conditions set forth in the prescribed bidding documents. Save as provided for in sub-clause (iv) of clause (c) of rule 36 no evaluation criteria shall be used for evaluation of bids that had not been specified in the bidding documents.
2. For the purposes of comparison of bids quoted in different currencies, the price shall be converted into a single currency specified in the bidding documents. The rate of exchange shall be the selling rate, prevailing on the date of opening of bids specified in the bidding documents, as notified by the State Bank of Pakistan on that day.
3. A bid once opened in accordance with the prescribed procedure shall be subject to only those rules, regulations and policies that are in force at the time of issue of notice for invitation of bids.

Clarification of bids (31)

1. No bidder shall be allowed to alter or modify his bid after the bids have been opened. However the procuring agency may seek and accept clarifications to the bid that do not change the substance of the bid.
2. Any request for clarification in the bid, made by the procuring agency shall invariably be in writing. The response to such request shall also be in writing.

Discriminatory and difficult conditions (32)

Save as otherwise provided, no procuring agency shall introduce any condition, which discriminates between bidders or that is considered to be met with difficulty. In ascertaining the discriminatory or difficult nature of any condition reference shall be made to the ordinary practices of that trade, manufacturing, construction business or service to which that particular procurement is related.

Rejection of bids (33)

1. The procuring agency may reject all bids or proposals at any time prior to the acceptance of a bid or proposal. The procuring agency shall upon request communicate to any supplier or contractor who submitted a bid or proposal, the grounds for its rejection of all bids or proposals, but is not required to justify those grounds.
2. The procuring agency shall incur no liability, solely by virtue of its invoking sub-rule (1) towards suppliers or contractors who have submitted bids or proposals.

3. Notice of the rejection of all bids or proposals shall be given promptly to all suppliers or contractors that submitted bids or proposals.

Re-bidding (34)

1. If the procuring agency has rejected all bids under rule 33 it may call for a re-bidding.
2. The procuring agency before invitation for re-bidding shall assess the reasons for rejection and may revise specifications, evaluation criteria or any other condition for bidders as it may deem necessary.

Announcement of evaluation reports (35)

Procuring agencies shall announce the results of bid evaluation in the form of a report giving justification for acceptance or rejection of bids at least ten days prior to the award of procurement contract.

Procedures of open competitive bidding (36)

Save as otherwise provided in these rules the following procedures shall be permissible for open competitive bidding, namely:-

(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

i. The bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal;
ii. The envelopes shall be marked as "FINANCIAL PROPOSAL" and "TECHNICAL PROPOSAL" in bold and legible letters to avoid confusion;
iii. Initially, only the envelope marked "TECHNICAL PROPOSAL" shall be opened;
iv. The envelope marked as "FINANCIAL PROPOSAL" shall be retained in the custody of the procuring agency without being opened;
v. The procuring agency shall evaluate the technical proposal in a manner prescribed in advance, without reference to the price and reject any proposal which does not conform to the specified requirements;
vi. During the technical evaluation no amendments in the technical proposal shall be permitted;
vii. The financial proposals of bids shall be opened publicly at a time, date and venue announced and communicated to the bidders in advance;

viii. 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; and

ix. The bid found to be the lowest evaluated bid shall be accepted.

(c) Two stage bidding procedure

First stage

i. The bidders shall first submit, according to the required specifications, a technical proposal without price;

ii. 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;

iii. After such discussions, all the bidders shall be permitted to revise their respective technical proposals to meet the requirements of the procuring agency;

iv. The procuring agency may revise, delete, modify or add any aspect of the technical requirements or evaluation criteria, or it may add new requirements or criteria not inconsistent with these rules:

- Provided that such revisions, deletions, modifications or additions are communicated to all the bidders equally at the time of invitation to submit final bids, and that sufficient time is allowed to the bidders to prepare their revised bids:
- Provided further that such allowance of time shall not be less than fifteen days in the case of national competitive bidding and thirty days in the case of international competitive bidding;

v. Those bidders not willing to conform their respective bids to the procuring agency's technical requirements may be allowed to withdraw from the bidding without forfeiture of their bid security;

Second stage

vi. 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;

vii. 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

viii. The revised technical proposal and the financial proposal shall be evaluated in the manner prescribed above. The bid found to be the lowest evaluated bid shall be accepted:

Provided that in setting the date for the submission of the revised technical proposal and financial proposal a procuring agency shall allow sufficient time to the bidders to incorporate the agreed upon changes in the technical proposal and prepare their financial proposals accordingly.

(d)Two Stage - two envelope bidding procedure

First stage

i The bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal;

ii The envelopes shall be marked as "FINANCIAL PROPOSAL" and "TECHNICAL PROPOSAL" in bold and legible letters to avoid confusion;

iii Initially, only the envelope marked "TECHNICAL PROPOSAL" shall be opened;

iv The envelope marked as "FINANCIAL PROPOSAL" shall be retained in the custody of the procuring agency without being opened;

v The technical proposal shall be discussed with the bidders with reference to the procuring agency's technical requirements;

vi Those bidders willing to meet the requirements of the procuring agency shall be allowed to revise their technical proposals following these discussions;

vii Bidders not willing to conform their technical proposal to the revised requirements of the procuring agency shall be allowed to withdraw their respective bids without forfeiture of their bid security;

Second stage

viii 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;

ix 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:

Provided that in setting the date for the submission of the revised technical proposal and supplementary price proposal a procuring agency shall allow sufficient time to the bidders to

incorporate the agreed upon changes in the technical proposal and to prepare the required supplementary financial proposal; and

x The procuring agency shall evaluate the whole proposal in accordance with the evaluation criteria and the bid found to be the lowest evaluated bid shall be accepted.

Conditions for use of single stage two envelopes, two stage and two stage two envelope bidding procedures (37)

Single stage one envelope bidding procedure shall ordinarily be the main open competitive bidding procedure used for most of the procurement. Other appropriate procedures of open competitive bidding shall be selected in the following circumstances, namely:-

a. Single stage two envelope bidding procedure shall be used where the bids are to be evaluated on technical and financial grounds and price is taken into account after technical evaluation;
b. Two stage bidding procedure shall be adopted in large and complex contracts where technically unequal proposals are likely to be encountered or where the procuring agency is aware of its options in the market but, for a given set of performance requirements, there are two or more equally acceptable technical solutions available to the procuring agency; and
c. Two stage two envelope bidding method shall be used for procurement where alternative technical proposals are possible, such as certain type of machinery or equipment or manufacturing plant.

Acceptance of Bids and Award of Procurement Contracts

Acceptance of bids (38)

The bidder with the lowest evaluated bid, if not in conflict with any other law, rules, regulations or policy of the Federal Government, shall be awarded the procurement contract, within the original or extended period of bid validity.

Performance guarantee (39)

Where needed and clearly expressed in the bidding documents, the procuring agency shall require the successful bidder to furnish a performance guarantee which shall not exceed ten per cent of the contract amount.

Limitation on negotiations (40)

Save as otherwise provided there shall be no negotiations with the bidder having submitted the lowest evaluated bid or with any other bidder: Provided that the extent of negotiation permissible shall be subject to the regulations issued by the Authority.

Confidentiality (41)

The procuring agency shall keep all information regarding the bid evaluation confidential until the time of the announcement of the evaluation report in accordance with the requirements of rule 35.

Alternative methods of procurements (42)

A procuring agency may utilize the following alternative methods of procurement of goods, services and works, namely:-

a. 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 4: Provided further that procuring agencies convinced of the inadequacy of the financial limit prescribed for petty purchases in undertaking their respective operations may approach the Federal Government for enhancement of the same with full and proper justifications.

b. Request for quotations

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

i The cost of object of procurement is below the prescribed limit of

- One hundred thousand rupees.
- Provided that the respective Boards of Autonomous bodies are authorized to fix an appropriate limit for request for quotations method of procurement subject to a maximum of rupees five hundred thousand which will become financial limit under this sub-rule:

ii The object of the procurement has standard specifications;

iii Minimum of three quotations have been obtained; and

iv The object of the procurement is purchased from the supplier offering the lowest price:

Provided that procuring agencies convinced of the inadequacy of the financial limit prescribed for request for quotations in undertaking their respective operations may approach the Federal Government for enhancement of the same with full and proper justifications;

c. Direct contracting

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

i The procurement concerns the acquisition of spare parts or supplementary services from original manufacturer or supplier:

Provided that the same are not available from alternative sources;

ii Only one manufacturer or supplier exists for the required procurement:

Provided that the procuring agencies shall specify the appropriate fora, which may authorize procurement of proprietary object after due diligence; and

iii 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:

Provided that the contract or contracts do not exceed three years in duration;

iv Repeat orders not exceeding fifteen per cent of the original procurement;

v In case of an emergency:

Provided that the procuring agencies shall specify appropriate fora vested with necessary authority to declare an emergency;

vi When the price of goods, services or works is fixed by the government or any other authority, agency or body duly authorized by the Government, on its behalf, and

vii For purchase of motor vehicle from local original manufacturers or their authorized agents at manufacturer's price.

d. 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. This procedure shall only be used when

i The supplies involved are manufactured purely for the purpose of supporting a specific piece of research or an experiment, a study or a particular development;

ii For technical or artistic reasons, or for reasons connected with protection of exclusive rights or intellectual property, the supplies may be manufactured or delivered only by a particular supplier;

iii For reasons of extreme urgency brought about by events unforeseeable by the procuring agency, the time limits laid down for open and limited bidding methods

cannot be met. The circumstances invoked to justify extreme urgency must not be attributable to the procuring agency:

Provided that any procuring agency desirous of using negotiated tendering as a method of procurement shall record its reasons and justifications in writing for resorting to negotiated tendering and shall place the same on record.

On account payments (43)

All procuring agencies shall make prompt payments to suppliers and contractors against their invoices or running bills within the time given in the conditions of the contract, which shall not exceed thirty days.

Entry into force of the procurement contract (44)

A procurement contract shall come into force,-

a. Where no formal signing of a contract is required, from the date the notice of the acceptance of the bid or purchase order has been given to the bidder whose bid has been accepted. Such notice of acceptance or purchase order shall be issued within a reasonable time; or
b. Where the procuring agency requires signing of a written contract, from the date on which the signatures of both the procuring agency and the successful bidder are affixed to the written contract. Such affixing of signatures shall take place within a reasonable time:

Provided that where the coming into force of a contract is contingent upon fulfillment of a certain condition or conditions, the contract shall take effect from the date whereon such fulfillment takes place.

Closing of contract (45)

1. Except for defect liability or maintenance by the supplier or contractor, as specified in the conditions of contract, performance of the contract shall be deemed close on the issue of overall delivery certificate or taking over certificate which shall be issued within thirty days of final taking over of goods or receiving the deliverables or completion of works enabling the supplier or contractor to submit final bill and the auditors to do substantial audit.
2. In case of defect liability or maintenance period, defect liability certificate shall be issued within thirty days of the expiry of the said period enabling the supplier or contractor to submit the final bill. Except for unsettled claims, which shall be resolved through arbitration, the bill shall be paid within the time given in the conditions of contract, which shall not exceed sixty days to close the contract for final audit.

Maintenance of Record and Freedom of Information

Record of procurement proceedings (46)

1. All procuring agencies shall maintain a record of their respective procurement proceedings along with all associated documentation for a minimum period of five years.
2. Such maintenance of record shall be subject to the regulations framed in this regard from time to time.

Public access and transparency (47)

As soon as a contract has been awarded the procuring agency shall make all documents related to the evaluation of the bid and award of contract public:

Provided that where the disclosure of any information related to the award of a contract is of proprietary nature or where the procuring agency is convinced that such disclosure shall be against the public interest, it can withhold only such information from public disclosure subject to the prior approval of the Authority.

Redressel of Grievance and Settlement of Disputes

Redressal of grievances by the procuring agency (48)

1) The procuring agency shall constitute a committee comprising of odd number of persons, with proper powers and authorizations, to address the complaints of bidders that may occur prior to the entry into force of the procurement contract.
2) Any bidder feeling aggrieved by any act of the procuring agency after the submission of his bid may lodge a written complaint concerning his grievances not later than fifteen days after the announcement of the bid evaluation report under rule 35.
3) The committee shall investigate and decide upon the complaint within fifteen days of the receipt of the complaint.
4) Mere fact of lodging of a complaint shall not warrant suspension of the procurement process.
5) Any bidder not satisfied with the decision of the committee of the procuring agency may lodge an appeal in the relevant court of jurisdiction.

Arbitration (49)

1) After coming into force of the procurement contracts, disputes between the parties to the contract shall be settled by arbitration.
2) The procuring agencies shall provide for a method of arbitration in the procurement contract, not inconsistent with the laws of Pakistan.

Mis-procurement (50)

Any unauthorized breach of these rules shall amount to mis-procurement.

Overriding effect (51)

The provisions of these rules shall have effect notwithstanding anything to the contrary contained in any other rules concerning public procurements: Provided that the prevailing rules and procedures will remain applicable only for the procurement of goods, services and works for which notice for invitation of bids had been issued prior to the commencement of these rules unless the procuring agency deems it appropriate to re-issue the notice for the said procurement after commencement of these rules.

APPENDIX-II

Covering letter

SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING (SCEE)

To: _____

Subject: **CONTRACTOR'S SELECTION AND BIDS EVALUATION- RESEARCH QUESTIONNAIRE**

Department of Construction Engineering and Management at School of Civil and Environmental Engineering (NUST) Islamabad is conducting a Research Survey to investigate the underlying factors which are considered for the selection of contractors by clients or consultants in CI of Pakistan.

The construction industry (CI) is one of the most important industries, participating in our national infrastructure development. An increase in the volume of construction is a positive indicator of national development and economic prosperity. This research is aimed to improve the process of contractor's selection and bids evaluation in the CI of Pakistan for better procurement of construction projects.

We are interested to find which criteria and factors you consider while evaluating a contractor's bid for the award of contract. We are conducting confidential surveys. We would like you to complete the attached questionnaire, for which confidentiality is assured. Your kind suggestions are also requested, to find out more necessary factors to be considered for selection of appropriate contractor.

It is important for you to be completely honest about your method of contractor's selection. All responses will be treated in strict confidence. This will assist us with analysis and interpretation of results.

We thank you for your assistance and cooperation in advance.

Yours sincerely,

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DR. RAFIQ MUHAMMAD CHOUDHRY
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APPENDIX-III

Q u e s t i o n n a i r e

National University of Sciences and Technology, Islamabad

QUESTIONNAIRE-SURVEY FORM

Subject: Contractor's selection and bids evaluation in Construction industry of Pakistan

Company name: _____

Respondent name: _____

Contact no/E-mail address: _____

1) Which is your job title?

Managing Director [ ] Project Manager [ ] Project Architect [ ]

Project Quantity Surveyor [ ] Project Engineer [ ]

Others [ ] (specify) ……

2) Which professional field do you belong to?

Architecture [ ] Engineering [ ] Quantity Surveying [ ]

Others [ ] (specify)……..

3) What is your experience in the construction industry?

0-5 years [ ] 6-10 years [ ] 11-15 years [ ] 16-20 years [ ] Over 20 years [ ]

4) Have you provided service as a consultant to any public procurement entity since the introduction of the Public Procurement Regulatory Authority Ordinance, 2002 (XXII of 2002)?

Yes [ ] No [ ]

5) What type of contract (procurement) was used in your service to the client?

Traditional contract [ ] Design and build [ ] Turnkey [ ] Management contract [ ]

Others [ ] (specify).....

6) In your opinion, has the Public Procurement Regulatory Authority Ordinance, 2002 (XXII of 2002), proved satisfactory in the selection of contractors?

Absolutely Yes [ ] No at all [ ] Yes but not absolute [ ] Do not know [ ]

7) Which method of procurement you think is better; prescribed by PPRA.

a. Single stage: if checked which sub method

1. One envelope procedure [ ] 2.Two envelope procedure [ ]

b. Two stage: if checked which sub method

1. One envelope procedure [ ] 2. Two envelope procedure [ ]

8) Which of the following type of construction works are you usually involved in?

Building [ ] Roads [ ] Dams and bridges [ ] Water and Sewage [ ]

Others [ ] (specify)……

9) Which method of evaluation do you think will select the 'best' contractor to obtain value for the client?

Single criteria i.e. bid price [ ]

Multi-criteria i.e. time/cost/quality [ ]

10) The following is a list of criteria and their underlying factors considered in contractor evaluation and selection. Rank them on given scale.

NO.	**Criteria**	**RANKING**				
		Not - Important	**Slightly important**	**Important**	**Very important**	**Extremely important**
Financial soundness						
1	Financial stability of contractor	1	2	3	4	5

2	Estimated cost of project/tender price	1	2	3	4	5
3	Banking arrangements and bonding	1	2	3	4	5
4	Satisfactory settlement of final accounts on past projects	1	2	3	4	5
Technical ability						
5	Experience	1	2	3	4	5
6	Plant and equipment holding	1	2	3	4	5
7	Personnel	1	2	3	4	5
8	Technical competence	1	2	3	4	5
Management capability						
9	Past performance and quality	1	2	3	4	5

10	Organization and management capabilities	1	2	3	4	5
11	Methodology of managing sub-contractors	1	2	3	4	5
Health and safety						
12	Attention to site welfare and safety	1	2	3	4	5
13	Health and safety procedures	1	2	3	4	5
14	OSHA incident rate (accidents rates)	1	2	3	4	5
15	Management safety accountability	1	2	3	4	5
Reputation						
16	Past failures	1	2	3	4	5
17	Length of time in business	1	2	3	4	5
18	Past client-contractor relationship	1	2	3	4	5

11) Below are some problems that are usually associated with construction projects. In your opinion, to what extent are these problems attributable to the selection of the contractor?

ITEM	PROBLEM	RATING		
		low	medium	high
A	Time overrun			
B	Cost overrun			
C	Quality of product			

12) Factors used in evaluating contractors are broadly divided into (a) price/financial evaluation and (b) technical/quality evaluation.

Indicate, by ticking, in your opinion which type of evaluation should carry more weight in selecting a contractor.

Criteria	Low	High
Price/financial		
Technical/quality		

13) Listed below are multi-criteria methods used in the selection of contractors. Analytical Hierarchy Process (AHP), Analytical Network Process (ANP), Multi-Attribute Utility Theory (MAUT), Complex Proportional Assessment (COPRAS), Fuzzy Set Theory (FST) and Evidential Reasoning (ER).

Please indicate the extent to which you know about these methods.

Do not know about methods [ ] Heard about methods [ ]
Read about methods [ ] Know about methods [ ]

14) If you know about the methods listed in (13) above, have you ever applied any of the methods in the selection of contractors for a given project?

Never [ ] on some Projects [ ] On all projects [ ]

15) If you know about the methods listed in (13) above or ever applied any of them, which multi criteria technique will you recommend to use in selecting a contractor?

Analytical Hierarchy Process (AHP) [ ] Analytical Network Process (ANP) [ ]
Multi-attribute Utility Theory (MAUT) [ ] Multi criteria Complex Proportional Assessment (COPRAS) [ ] Fuzzy Set Theory (FST) [ ]
Evidential Reasoning (ER) [ ] None [ ] Others [ ] (please state) …….....

Thanks for your co-operation

APPENDIX-IV

Respondents

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