Optimizing the Strategy of Technical Bid Analysis Using Multi Attribute Decision Making Models

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Abstract

The goal of this paper is to provide the decision makers with the information necessary to make an intelligent decision about the technical bid evaluation. It shows the steps of the technical evaluation from the planning until the final technical report.

Furthermore the paper critically discusses the main evaluation criteria category to be considered in the technical evaluation and how to measure these categories by using Multi-attributes of no compensatory models and compensatory models techniques or new methods extracted from Multi-attribute techniques to pick out the best option form the bidders.

This paper will provide the reader a full strategy, process and techniques of how to evaluate the technical bid and arrive at sound decisions.

Key words, Technical Evaluation, technical team, prequalification, selected criteria clarification, announcement of the tender, awarded criteria, Multi-attributes and technical report.

Introduction

Selection of the most suitable contractor is a crucial decision for decision makers and a signal of how the project will be achieved in the future. A lot of questions should be answered by the evaluators in order to choose the right bidder.

Why the technical evaluation is very important? What is the process for selection the best contractor? How the bidder should be treated? What is the difference between selection criteria and awarded criteria? What are the main criteria categories to be measured and how these criteria can be weighted? Who should be the evaluators? What are the main types of contract? What are the techniques to be used in technical evaluations?

The paper is concerned with providing the answers of all the above questions and aims to sum up all the recommendations in pursuit of better evaluation of construction bids technically.

Moreover the paper will provide a real example of a study case to explain the answers of the above mentioned questions.

The bidders should submit the client two sealed envelopes include technical tender and commercial tender. Commercial tender shall not open until the bidder passes the technical evaluation.
The processes of award contract are formation of technical team, prequalification of contractors, preparation of the scope of works and questioner, announcement of the tender, period of bidder’s clarification, submittals of Technical and commercial bids, clarification unclear items from the bidders, technical evaluation of the bids, technical report and opening the commercial bid. This paper would elaborate in the process of awarding contract and it excludes the commercial evaluation. In other words it is about the technical assessment.

1.0 Technical Evaluation

Technical bid evaluation is the procedure for the technical assessment of tender bids submitted by prequalified contractors.¹

Technical bid evaluation defined as a decision-making process that involves the development and consideration of a wide range of necessary and sufficient decision criteria used to assess the contractors’ capabilities. It requires knowledge and experience from the project manager in order to use the appropriate criteria to insure the selection of the most suitable contractor technically for the project.²

Technical Bid evaluation is used to denote the procedure for strategic assessment to tender bids submitted by pre-qualified contractors. The strategy used for bid evaluation should reflect the client’s objectives.³

In a nutshell, Technical basis upon which to help decide which contractors will perform the best.

1.1 Importance of Technical Evaluation

The main drawback of awarding of the contract is based on the price rather than on the quality of the product or service. Therefore the technical evaluation for the bid should be done carefully and precisely.

The best thing that the technical evaluation will be occurred usually prior the financial evaluation. In other words, the bidder should pass the technical evaluation and then proceed to financial evaluation.

Briefly, the selection of the contractor will impact on the course for the execution of the project in the future.

¹ Abu-Shaaban, N. N. (2008, May). DEVELOPMENT OF MULTI-CRITERIA DECISION ANALYSIS MODELS FOR BIDDING AND CONTRACTOR SELECTION.
1.2 Planning for the technical Bid Evaluation

Start planning early for the technical evaluation is the best practice to ensure that the right results in achieved. Planning leads to generate information and we need to put them in the blow steps:-

1. Formulate precisely the question we are trying to answer.
2. Collect the data and facts relating to that question.
3. Analyze the data to determine the factual answer to the question.
4. Present the data in a way that clearly communicates the answer to the question.

From the above mentioned step1 the formulated questions are as below points:-

- Who will be the technical evaluator team?
- Who should apply for the bid in the future?
- How to reduce and list the applicant?
- What should the tender include? And what should the bidder submit?
- How should the tenderer clarify about the tender?
- How should the tenderer be treated?
- What will be the evaluation criteria and how they will be measured?
- What bid evaluation technical report should include and why?

The answers of these questions depend on: project type; project size and clients’ type (public, private, Joint venture, etc...).

2.0 The Process of the Technical Evaluation

The process described below was extracted from two tender evaluation processes used by (Figure 2 the Process of technical evaluation in Oman Tender Board and Figure 3 Bid Evaluation in Saudi Aramco Company).

This process has been implemented in many projects in oil and company gas sectors such as Oman oil company exploration and production for four projects and this process would be discussed in details.
The Process Of Technical Evaluation

• 2.1 Formulation of Technical Evaluator Team
• 2.2 Prequalification of the Contractors in the market
• 2.3 Announcement of the tender and Receiving Clarification from bidders
• 2.4 Treatment with Bidders
• 2.5 Submittal of bids
• 2.6 Clarification period
• 2.7 Technical Evaluation Criteria's Category
• 2.8 Technical Evaluation Report

Figure 1- The Process of Technical Evaluation

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The Process Of Bid Analysis in Oman Tender Board

1. Registration of the contractors
2. Prequalified the contractor and list them
3. Writing the accurate scope of work
4. Technical Evaluation
5. Technical Report
6. Clarification period
7. Invitation of the tender
8. Opening Commercial bid
9. The allocation of Technical team for the project

Figure 2 the Process of technical evaluation in Oman Tender Board

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2.1 Technical Evaluator team

The client department is responsible for the technical evaluation of the bids. When preparing to issue tender, public bodies need to establish who will be involved in the evaluation of responses and ensure that there is sufficient capacity available to meet the required timeframes. For complex projects, it is likely that a range of individuals from different disciplines will need to be involved to evaluate the bids properly and it is likely to be a time-consuming task.

In the event that the client has no available specialized team this assignment might be dedicated to the expert qualified consultant or a special team could be recruited for this purpose.

The technical team plays vital roles in the following:
- Prequalifying the contractors who can apply for the tender in the future.
- Writing the scope of work for the project.
- Establishing the technical evaluation methodology.
- Contributing in invitation to the tender.
- Replying the clarification of the bidders before receiving the bids.

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- Clarifying unclear items in the bid from the bidders after the submittal of the bids.
- Evaluating the bids technically.
- Preparing the technical evaluation report to the contracting officer.

In one word, each member of the team should be fully briefed about the evaluation methodology that is being used.

2.2 Prequalification of the Contractors in the Market

Knowing the contractors in the market who did similar to our project is a stepping stone to get the right contractor for our project in the future. Client shall request from those contractors to register themselves in the company. This registration will facilitate the prequalification of those contractors.

Prequalification might be defined as the following:

Prequalification is a process used to investigate and assess the capabilities of the contractors to carry out a job if it is awarded to them.\(^7\)

Prequalification assists the client to assess the contractors on the ground. Prequalification provides a client with a list of contractors that are invited to tender on a regular basis.\(^8\)

The number of applicants for prequalification is often so great that clients have to reduce the number of contractors to a short list. The criteria used to narrow down the list might include regional and physical locations, technical and managerial expertise, and type and size of contract.

We are not going to elaborate in how to weighting the prequalification’s criteria because its convergence with the weighting techniques of technical awarding evaluation’s criteria which will be discussed later.

The evaluation criteria of the prequalification should measure the following six general categories. However, certain organizations may develop their own categories as appropriate depending on the organization's mission:

1. Effectiveness: A process characteristic indicating the degree to which the process output (work product) conforms to requirements. (Are we doing the right things?)

2. Efficiency: A process characteristic indicating the degree to which the process produces the required output at minimum resource cost. (Are we doing things right?)

3. Quality: The degree to which a product or service meets customer requirements and expectations.


4. Timeliness: Measures whether a unit of work was done correctly and on time. Criteria must be established to define what constitutes timeliness for a given unit of work. The criterion is usually based on customer requirements.

5. Productivity: The value added by the process divided by the value of the labor and capital consumed.

6. Safety: Measures the overall health of the organization and the working environment of its employees.

Prequalification is a perfect method in two types of awarding a contract:

1. Competitive tendering procedure.

2. Direct negotiation with the promoter. (Appropriate in cases of urgency, or where the selected contractor's expertise is unique and the firm is well known to the promoter).

**2.3 Announcement of tender**

Technical evaluation team has now clear picture about the contractors that could execute the project which will be tendering. Therefore the evaluators should work smart to collect the needed data accurately from the bidders and if a client wishes to cope with these new developments and invite acceptable bidders, it is necessary to the client to pay additional care for the items pointed out below:

- Writing a clear, an accurate and detailed scope of work.
- List of questions should be developed and sent to the bidders along with the tender (a detailed questionnaire from the client.).
- Advance disclosure: make the evaluation criteria known to bidders at the first opportunity.
- Granting the bidders realistic period to prepare their bids.
- Allowing the bidders and providing them enough time to clarify unclear items for them in the contract.

**2.4 Treatment with bidders**

Transparency: this is not simply about disclosure and openness but also the removal of Discretion and subjectivity. Evaluation must be based on objective criteria that are known to bidders in advance.

- Fairness: evaluation criteria and the evidence required from bidders must be actually and demonstrably related to the subject matter of the contract and applied proportionately to the stated objectives.

- Equal treatment (or non-discrimination): all bidders and potential bidders must be given the same opportunity, based on the same information and criteria, and evaluated in a non-discriminatory manner.
• The contracting authority to determine and disclose how it will assess a winning bid before it receives any information from the bidders.

• Evidence (the behaviors or characteristics that may support the authority’s judgment about the criteria).

• Keep an audit trail: document the reasons for awarding scores to each bidder and, where unusual, the reasons for choosing the criteria and weightings. Authorities must be able to defend the award process.

2.5 Submittal of Bids

Sufficient time shall be granted to the tenderers to submit their bids in accordance with the scope of work and the questionnaire those have been send to them.

The first thing should be reviewed by the technical team evaluation that the submittal of bids are in compliance with the requirement of the tender. In the event that submittals of the bids do not correspond with the requirements of the tender the client should give the opportunity to the bidders to resubmit again and the submission’s time should not exceed the clarification period.

2.6 Clarification Period

Clarification if bid is unclear often, when evaluating a bid, a submission may be unclear or an evaluator may feel that they need further information to enable them to evaluate the response properly. In this situation, the public body must ensure that it is fair and treats all bidders equally in the way that it seeks to clarify these matters. For example, if two bidders have both been vague in different ways about the provision of a service, both should be asked to clarify their answers.

2.7 Technical Evaluation Criteria’s Category

It is very important to differentiate between selection criteria and awarded criteria. Selection criteria relates to the bidder and are used to assess the bidder’s ability to perform the proposed contract. Selection criteria may only be applied at the pre-qualification stage in order to short-list bidders to be invited to tender or participate in dialogue. Awarded criteria relates to the tender and are used to identify the tender that is the cheapest or the most economically advantageous (for example, in terms of price, technical specifications and project management proposals).

The technical awarded criteria need to be challenging, but also realistically achievable. It should measure only what are important and not measured many things that may impact on the evaluation. The evaluation result should be displayed mathematically.

The awarded criteria rely on the type and size of the project and the vision of the client. It can include but it is not limited to:

1. General Understanding of Requirements of the Scope of work and completeness of overall submission.
2. Proposed project organization structures, manpower histogram, qualification and experience of proposed staff in similar projects and local presence of the staff during design and construction and quality of CV’s.

3. Completeness and comprehensive project execution plan, project execution schedule, project management procedures and material selection philosophy.

4. Quality Assurance/Quality Control including QA Manual Index and Policy Statement, Accreditation certificates, Quality improvement program, list of work procedures, QA method statement, Method of handling interfaces, Quality Plan and Internal quality system.

5. HSSE Plan & Procedures.

6. Details of work to be subcontracted.

7. Details of tenderer's principal resources.

8. Details of current and future workload.

9. Number and impact of technical exceptions made by Tenderer.

10. Track Record of Recent Similar Projects.

The awarded criteria should be weighted and the evaluation result should be displayed mathematically.

There are a lot of techniques to evaluate the bidders and this paper will use Multi-attributes of no compensatory models and compensatory model and that will be explained clearly in the study case. Furthermore an extracted method of them will be implemented to evaluate the bidders.

The following reasons for using Multi-attributes of no compensatory models and compensatory models in practice:-

- The over simplicity of the models’ assumptions makes them able to represent real life situations.
- Most clients are willing to struggle with simple mathematical Models.

2.8 Technical Evaluation Report

Following the completion of the technical evaluation, the technical team must provide a report to the contracting officer detailing the results of the evaluation, including details on all non-responsive bids and the reasons for declaring them non-responsive. Each person who participated in the technical evaluation as an evaluator must sign the report.
3.0 Real Study Case

3.1 Introduction of the Client

An upstream oil & gas company based in the Sultanate of Oman focus on upstream investments. The plans are to construct its own Head Office Building (HOB) and to be completed by the end of 2016.

3.2 Project

Consultancy services for Preparation of Schematic Design, undertaking detailed design and preparation of tender documents for the construction works of Headquarter office building and associated ancillary facilities essential for the overall completion of the building including external works such as roads, car park and landscaping, etc.

3.3 Formation of Technical Evaluation Team

The technical Evaluation team had been formed (Table 1: Technical Evaluation Team).

<table>
<thead>
<tr>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities HSSE Engineer</td>
</tr>
<tr>
<td>Senior Contracts Specialist</td>
</tr>
<tr>
<td>QA/QC Team Lead</td>
</tr>
<tr>
<td>Civil/Structural Engineer</td>
</tr>
<tr>
<td>Civil Project Engineer</td>
</tr>
<tr>
<td>Infrastructure Manager</td>
</tr>
</tbody>
</table>

Table 1: Technical Evaluation Team Position

3.4 Prequalification of the consultant companies

The client selected seven consultants (international & local) to be invited to register themselves for the prequalification. And they are listed in the (Table 2: Name of Bidders).

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bidder1</td>
</tr>
<tr>
<td>2</td>
<td>Bidder2</td>
</tr>
<tr>
<td>3</td>
<td>Bidder3</td>
</tr>
<tr>
<td>4</td>
<td>Bidder4</td>
</tr>
<tr>
<td>5</td>
<td>Bidder5</td>
</tr>
</tbody>
</table>

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The selection criteria for the prequalification are in the (Table 3 Prequalification Criteria).

<table>
<thead>
<tr>
<th>SR NO</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project organization structures,</td>
</tr>
<tr>
<td>2</td>
<td>Quality Assurance/Quality Control including</td>
</tr>
<tr>
<td>3</td>
<td>Health, safety and Security plan and procedures</td>
</tr>
<tr>
<td>4</td>
<td>Details of current and future workload</td>
</tr>
<tr>
<td>5</td>
<td>Track Record of Recent Similar Projects and experience in preparation of</td>
</tr>
<tr>
<td></td>
<td>Tender Documents and in Bid Evaluation.</td>
</tr>
</tbody>
</table>

The technical evaluation team decided to use Multi-attributes- no compensatory models to evaluate and rank the bidders and this model is made up of:-

- Dominance
- Satisficing
- disjunctive resolution, and
- lexicography.

The criteria of the feasible alternatives using no compensatory models as follow (Table 4 Feasible Alternatives)

<table>
<thead>
<tr>
<th>Criteria Category</th>
<th>Bidder1</th>
<th>Bidder2</th>
<th>Bidder3</th>
<th>Bidder4</th>
<th>Bidder5</th>
<th>Bidder6</th>
<th>Bidder7</th>
</tr>
</thead>
<tbody>
<tr>
<td>project organization structures,</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Quality Assurance/Quality Control</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Health, safety and Security plan and procedures.</td>
<td>Excellent</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Details of current and future workload.</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
<td>Fair</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Track Record of Recent Similar Projects and experience in preparation of Tender Documents and in Bid Evaluation.</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
</tr>
</tbody>
</table>

Analysis and comparison of the alternatives as below tables.

---

<table>
<thead>
<tr>
<th>Bidder 1 VS Bidder 2</th>
<th>Bidder 1 VS Bidder 3</th>
<th>Bidder 1 VS Bidder 4</th>
<th>Bidder 1 VS Bidder 5</th>
<th>Bidder 1 VS Bidder 6</th>
<th>Bidder 1 VS Bidder 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal</td>
<td>Equal</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Equal</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
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<tr>
<td>Equal</td>
<td>Equal</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Equal</td>
<td>Equal</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Worse</td>
<td>Equal</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>Equal</td>
<td>Equal</td>
<td>Equal</td>
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<td>Equal</td>
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<td>Better</td>
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<td>Better</td>
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<tr>
<td>Equal</td>
<td>Equal</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
<td>Better</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 5 Dominance Analysis

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### Table 6 Satisficing Analysis

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Minimum Acceptable Value</th>
<th>Maximum Acceptable Value</th>
<th>Unacceptable Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project organization structures,</td>
<td>Fair</td>
<td>Excellent</td>
<td>Bidder7</td>
</tr>
<tr>
<td>Quality Assurance/Quality Control</td>
<td>Fair</td>
<td>Excellent</td>
<td>Bidder7</td>
</tr>
<tr>
<td>Health, safety and Security plan and procedures</td>
<td>Fair</td>
<td>Excellent</td>
<td>Bidder7</td>
</tr>
<tr>
<td>Details of current and future workload</td>
<td>Fair</td>
<td>Excellent</td>
<td>Bidder7</td>
</tr>
<tr>
<td>Track Record of Recent Similar Projects and experience in preparation of Tender Documents and in Bid Evaluation.</td>
<td>Fair</td>
<td>Excellent</td>
<td>Bidder7</td>
</tr>
</tbody>
</table>

### Table 7 Disjunctive Resolution

<table>
<thead>
<tr>
<th>Comparison of Criteria Category</th>
<th>Maximum Acceptable Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project organization structures VS Quality Assurance/Quality Control including</td>
<td>More Important</td>
</tr>
<tr>
<td>Project organization structures VS Health, safety and Security plan and procedures</td>
<td>More Important</td>
</tr>
<tr>
<td>Project organization structures VS Details of current and future workload</td>
<td>More Important</td>
</tr>
<tr>
<td>Quality Assurance/Quality Control VS Health, safety and Security plan and procedures</td>
<td>More Important</td>
</tr>
<tr>
<td>Quality Assurance/Quality Control VS Details of current and future workload</td>
<td>More Important</td>
</tr>
<tr>
<td>Quality Assurance/Quality Control VS Track Record of Recent Similar Projects and experience in preparation of Tender Documents and in Bid Evaluation.</td>
<td>More Important</td>
</tr>
<tr>
<td>Health, safety and Security plan and procedures Control VS Details of current and future workload</td>
<td>More Important</td>
</tr>
<tr>
<td>Health, safety and Security plan and procedures VS Track Record of Recent Similar Projects and experience in preparation of Tender Documents and in Bid Evaluation.</td>
<td>More Important</td>
</tr>
<tr>
<td>Details of current and future workload VS Project organization structures VS Details of current and future workload</td>
<td>More Important</td>
</tr>
</tbody>
</table>

### Criteria Category Ranking

- Project organization structures, 5
- Quality Assurance/Quality Control, 4
- Health, safety and Security plan and procedures, 3
- Details of current and future workload, 2
- Track Record of Recent Similar Projects and experience in preparation of Tender Documents and in Bid Evaluation, 1


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Table 8 Lexicography

Bidder7 was excluded from the list as they had proven their poor performance during the competition. See (Table 6 Satisficing Analysis). Based on use Multi-attributes- no compensatory models are as listed in the table (Table 9 Rank of Competitor).

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name of the Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bidder1</td>
</tr>
<tr>
<td>2.</td>
<td>Bidder2</td>
</tr>
<tr>
<td>3.</td>
<td>Bidder3</td>
</tr>
<tr>
<td>4.</td>
<td>Bidder4</td>
</tr>
<tr>
<td>5.</td>
<td>Bidder5</td>
</tr>
<tr>
<td>6.</td>
<td>Bidder6</td>
</tr>
</tbody>
</table>

Table 9 Rank of Competitor

3.5 Invitation to the Tender

Proposed Contracting Strategy

A tender would be issued to the proposed Bidders.

- Bidders should submit their Bids in two separate sealed packages:
  - Technical Bid (Un-priced)
  - Commercial Priced Bid Proposal.


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- Type of Contract: Lump Sum Contract
- It is proposed to limit the invitation to companies that have previously qualified during the building concept design stage. Accordingly the following companies are to be invited:
  - Bidder1
  - Bidder2
  - Bidder3
  - Bidder4
  - Bidder5
  - Bidder6

The Criteria for the Technical evaluation was sent to the bidders along with the scope of see (Table 10 List of Deliverables) and Minimum pass mark is 70% for overall scoring.

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>List of Deliverables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>General</td>
</tr>
<tr>
<td>2.0</td>
<td>Project Organization / Key Personnel</td>
</tr>
<tr>
<td>3.0</td>
<td>Project Execution Plan</td>
</tr>
<tr>
<td>4.0</td>
<td>Quality Assurance/Quality Control</td>
</tr>
<tr>
<td>5.0</td>
<td>HSSE Plan</td>
</tr>
<tr>
<td>6.0</td>
<td>Work to be Subcontracted</td>
</tr>
<tr>
<td>7.0</td>
<td>Tenderer's Resources</td>
</tr>
<tr>
<td>8.0</td>
<td>In Country Value</td>
</tr>
<tr>
<td>9.0</td>
<td>Current Commitments &amp; workload</td>
</tr>
<tr>
<td>10.0</td>
<td>Technical Exceptions</td>
</tr>
<tr>
<td>11.0</td>
<td>Experience &amp; Track Record</td>
</tr>
</tbody>
</table>

**Table 10 List of Deliverables**

### 3.6 Technical Evaluation Criteria’s Category

After the completion of the clarification’s period of the bidders Four Consultant Engineering firms submitted their Technical and Commercial offers. The table list of companies submitted their bids for this project.

<table>
<thead>
<tr>
<th>SR. No.</th>
<th>Name of Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Bidder1</td>
</tr>
<tr>
<td>2.</td>
<td>Bidder2</td>
</tr>
<tr>
<td>3.</td>
<td>Bidder3</td>
</tr>
</tbody>
</table>

The client had clarified the unclear items from all bidders prior the commencement of the Technical Evaluation.

The Technical team chose the Multi-attributes - compensatory models to evaluate and rank the bidders. This model is composed of:-

- Non-dimensional Scaling; the alternative will be selected if have a highest of dimensionless value total.

\[
\text{Dimensionless Value} = \frac{(\text{Relative Rank} - 1)}{3} \tag{1}
\]

<table>
<thead>
<tr>
<th>Value</th>
<th>Dimensionless Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
</tr>
<tr>
<td>Good</td>
<td>0.67</td>
</tr>
<tr>
<td>Fair</td>
<td>0.33</td>
</tr>
<tr>
<td>Poor</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 12 Dimensionless Value

- The Additive Weighting Technique; the alternative will be selected if have a highest of total score for each alternative.

\[
\text{Normalized Weight} = \frac{\text{Relative Rank}}{\text{Sum of Relative Rank}} \tag{2}
\]

<table>
<thead>
<tr>
<th>Criteria Category</th>
<th>Relative Rank</th>
<th>Normalized Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>1</td>
<td>0.013</td>
</tr>
<tr>
<td>Project Organization / Key Personnel</td>
<td>12</td>
<td>0.158</td>
</tr>
<tr>
<td>Project Execution Plan</td>
<td>11</td>
<td>0.145</td>
</tr>
<tr>
<td>Quality Assurance/Quality Control</td>
<td>10</td>
<td>0.132</td>
</tr>
<tr>
<td>HSSE Plan</td>
<td>9</td>
<td>0.118</td>
</tr>
<tr>
<td>Work to be Subcontracted</td>
<td>8</td>
<td>0.105</td>
</tr>
<tr>
<td>Tenderer's Resources</td>
<td>7</td>
<td>0.092</td>
</tr>
<tr>
<td>In Country Value</td>
<td>6</td>
<td>0.079</td>
</tr>
<tr>
<td>Current Commitments &amp; workload</td>
<td>5</td>
<td>0.066</td>
</tr>
<tr>
<td>Technical Exceptions</td>
<td>4</td>
<td>0.053</td>
</tr>
<tr>
<td>Experience &amp; Track Record</td>
<td>3</td>
<td>0.039</td>
</tr>
<tr>
<td>Sum</td>
<td>76</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 13 Normalized Weight

---

### Table 14 Non Dimension Data

The Additive Weighting = Normalized Weight x Dimensionless Value

#### Equation 3

#### Table 15 Additive Weight

#### Table 16 Rank of Bidders

3.7 Technical Evaluation Report

Technical Evaluation Report was written Include the following:-
- Introduction.
- Scope of work.
- Client’s requirements.
- Details of the tender.
- Details of the bid.
- Technical evaluation criteria.

---

• Evaluation Procedures.
• Technical analysis for the bids
• Conclusions.
• Recommendations.
• Signatures of the Technical Evaluation Team.

Conclusions

Technical evaluation is the first step to ensure the success of the project. The process of the technical evaluation is composed of selection the technical evaluation team, prequalification of the contractors, writing the scope of work clearly, set up the awarded category criteria, disclosing the awarded criteria to the bidders, choosing the proper technique of evaluation, announcement of the tender, treatment of all the bidders equally and evenly, granting sufficient time for the bidders to submit their bids, present enough time to the bidders for clarification. Clarify unclear bids, evaluate the bid and write the technical evaluation report.

The result of the technical evaluation should be shown mathematically and one of the best techniques in the world and recommended to be used is Multi-attributes of no compensatory models and compensatory models techniques or to pick out the best option form the bidders. Theses techniques might be used for selection criteria and awarded criteria.

Multi-attributes- no compensatory models to evaluate and rank the bidders and this model is made up of:-

• Dominance: is a useful screening method for eliminating inferior alternatives from the analysis. By comparing each possible pair of alternatives to determine whether the attribute values for one are better off another, it may be possible to eliminate the inferior ones.

• Satisficing This method requires the establishment of minimum or maximum acceptable values (the standard) for each attribute. Alternatives having one or more attribute values that fall outside the acceptable limits are excluded from further consideration.

• Disjunctive resolution relies on comparing the attributes of each alternative to the standard. The difference with satisficing is that the disjunctive method evaluates each alternative on the best value achieved for any attribute.

• Lexicography this model is particularly suitable for decision situations in which a single attribute is judged to be more important than all other attributes. The alternative having the highest value for the most important attribute is then chosen. When two or more alternatives have identical values for the most important attribute, then the analyst examines the next most important attribute until a single alternative is chosen.

The Multi-attributes - compensatory models is composed of:-

• Non-dimensional scaling is the conversion of evaluation value to non-dimension form.
The additive weighting technique is developing weights for attributes (based on ordinal rankings) that can be multiplied by the appropriate non-dimensional criteria cattery values to produce a partial contribution to the overall score for a particular alternative.

Technical evaluation report should include:-

1) Introduction.
2) Scope of work.
3) Client’s requirements.
4) Details of the tender.
5) Details of the bid.
6) Technical evaluation criteria.
7) Evaluation Procedures.
8) Technical analysis for the bids
9) Conclusions.
10) Recommendations.
11) Signatures of the Technical Evaluation Team.
Bibliography


About the Author

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Ahmed Al-Abri is a Civil Engineer, graduating from Sultan Qaboos University in Muscat in 2000. Mr. AL-Abri has worked for different organizations for more than 13 years. Mr. AL-Abri worked from 2000 to 2004 in the Ministry of National Economy in the Sultanate of Oman, from 2004 to 2010 in a consolidated contractor company, from 2010 to 2011 in Monte Adriano Middle East Company, and his current position is a civil project engineer in Oman oil company exploration and production. Mr. AL-Abri has expertise in managing road projects, sewage projects and building projects. He can be contacted at ahmed.alabri@oocep.com