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EVALUATION OF COMPLETED CONTRACTS FOR FUTURE PRE- QUALIFICATION OF CONTRACTORS

BY

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ABSTRACT

A paper is presented to establish and review the pre-qualification process by evaluation of various contracts that were awarded to pre-qualified contractors for the construction of high pressure gas pipeline. The methodology outlined in this paper can be used in other organizations as it provides a guideline for revising the pre-qualification criteria and procedure to make it a fruitful exercise. Five categories of the pre-qualification criteria along with the process are explained. Relaxation given during this process are also discussed. Shortcomings that directly relate to contractors of various projects executed by awarding contracts to pre-qualified contractors have been pointed out and analyzed. Based on these discussions modifications are suggested to various categories of the pre-qualification criteria. These modifications include adding new sub-categories and strict following of the criteria. A revised criteria has been then formulated incorporating the recommendations.

INTRODUCTION

The successful execution of a project requires selection of appropriate contractor/constructor beside other factors. Various procedures are in use to pre-qualify contractors before actual bidding. All these criteria and modifications thereafter are evolved based on the specific project requirements. These criteria range from financial aspects to technical aspects like experience, equipment availability and skilled labour etc. (Potter et al., 1995), (Bubshait et al., 1996).

Once the pre-qualification process is completed, formal bidding takes place. This ensures that only those contractors are participating which have the ability to execute and complete the project successfully. However, there would be hardly any project that does not encounter problems of varying nature. These problems may relate to financial aspects or technical aspects. The responsibility of occurrence of such problems may be fixed on contractor, client or consultant. In some cases the delay results due to negligence of two or more parties to a contract. Although it cannot be generalized yet contractors are found to be responsible for most of the delays that occur in the life cycle of a project.

Post qualification of contractor and post evaluation of contract will allow the client/consultant to modify the pre-qualification criteria according to the observations of post qualification. It will also provide an opportunity to client to amend and correct their own

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procedures and practices as per specific needs of their organizational structure and project requirement.

A case study is presented here in which the pre-qualification process of Projects Department of Sui Northern Gas Pipelines Limited is discussed for construction of cross country gas pipeline. Observations from various projects are collected and summarized to arrive at factors of pre-qualification procedure that need to be reviewed.

PRE-QUALIFICATION CRITERIA

The pre-qualification criteria consists of five major categories. Each category has been allocated certain marks. Among these five categories, a total of 100 marks have been distributed. Each applicant needs a minimum of 60 marks to qualify and enlisted as approved contractor. The complete pre-qualification criteria is provided as Appendix A. These five categories are discussed below.

Experience

The experience factor is based on scaled marking and has been allotted a total of 15 marks. It revolves around experience of high pressure gas pipeline construction. The variables are:

- ☐ Length of pipeline constructed: More length of pipeline laid means exposure to varying topography and site conditions.
- ☐ Diameter of pipeline: This points to difficulties and changing methodology in handling bigger or smaller diameter pipeline. Welding procedures also change with the change in the diameter of the pipe. For higher diameter, deployment of heavy machinery might become essential.
- ☐ Number of projects completed: It also points to exposure to different type of site conditions.
- ☐ Type of pipeline viz. Distribution or transmission: Transmission lines are high pressure gas pipeline and construction of these require stricter quality control than construction of distribution lines. This involves more resources allocated to the pipeline cleaning, welding, and coating and wrapping. Testing of pipeline is also quite strict. Whereas the distribution line being a low pressure line does not generally require such strict quality control.

Personnel

Without experienced and qualified personnel, an easy going project might suffer heavy losses. Maximum marks allocated to this factor are 20. These marks have been distributed among various skills and qualifications. Half of these marks have been allocated to skilled labour who are the physical workers of the project. Their efficiency directly effects the efficiency of the

project. Hence properly skilled personnel with relevant experience are required for successful execution of a project especially a pipeline construction project.

An experienced and competent project manager is an essential requirement of every project. He is the brain of the project and hence can be considered most important. His experience and planning guides the course of the project. Qualified graduate engineers and sub-engineers also form a part of the construction team and have four and three marks allocated to them respectively.

Equipment

This factor has an allocation of 35 marks, the maximum to any category. It contains a list of equipment with 35 marks distributed among them. the highest marks allocated to any equipment is 6 which have been given to Welding Plants. The distribution of marks is based on the importance of the equipment as well as its time requirement for the efficient and smooth progress of the project. The awarding of marks require that these equipment be owned by the contractor and should be in excellent working condition. The contractor has to provide ownership documents for these equipment. He also has to point out their exact location at the time of submitting documents for pre-qualification for inspection by the pre-qualifying authority or their representative later on.

Company status

It has two sub-categories. First sub-category is company registration status. A maximum of 6 marks can be awarded under this sub-category based on scaled rating. A limited company has 6 marks. It does not differentiate between a public limited and a private limited company. If the company has national tax number and is either a partnership or proprietorship, then two additional points are awarded. Thus a total of 5 points are awarded to partnership and 3 points to proprietorship.

Organizational structure sub-category has 4 points allocated to it. The working units of the project are engineering, management, administration, accounts, stores, etc. If these sections are well established and work separately then a total of 4 points are awarded. Fewer points may be awarded to less developed structure.

Financial position

In order to have a continuos cash flow, a company must have good financial resources. Under the category of financial position, these resources are measured in terms of financial value of the projects completed. No consideration is given to the existing bank balances or to the cash flow statements of projects completed earlier. Also no information is required as to existing debt on the company whether in the form of loan or otherwise.

Score of 20 has been scaled for projects of varying financial value. A company with at least one project of value well above 50 million Pakistani rupees is awarded 20 marks. On the

other hand, a company with no project of value above one million Pakistani rupees will be awarded 0 points.

PRE-QUALIFICATION PROCESS

As required by the Company procedures, contractors are invited to apply for pre-qualification through newspaper advertisement. Applications received till the last date of submission are considered for pre-qualification. Generally, applications received few days after the deadline are also included since the pre-qualifying authority needs to have the best companies listed for projects.

Each application is then browsed and points are awarded under various categories that constitute the pre-qualification criteria. Some relaxation is given to contractors in various categories. These relaxation are based on some reasons which may or may not be valid. However, relaxation in each category of the pre-qualification criteria are discussed below to point out the exact procedure through which the contractors were qualified.

Experience

Contractors with only distribution pipeline construction experience are sometimes awarded higher than allotted points if their experience involves laying of a part of line outside city limits in cross country area. Similarly, some relaxation is also given and maximum points are awarded in the case when the total length of pipeline laid is even less than 100 miles.

Personnel

Generally, maximum points for project manager and engineers may be awarded with their relevant experience less than specified. Though curriculum vitae and registration with Pakistan Engineering Council of project manager and engineers are required yet not much importance is given to these and marks are awarded without reviewing these documents. However, the marks for skilled labour do not deviate much since only 10 marks have to allocated for a long list of skilled personnel.

Equipment

This category receives the maximum relaxation among all the categories. Generally, points are awarded without receiving and reviewing ownership documents and without inspection. The main reason for this relaxation is that the equipment is available on rent from the market and hence the contractor does not actually need the equipment to be present with him all the time.

Company status

The allocation of marks is quite simple and hence no such deviation has been observed under this category. All the companies have the National Tax Number whether these are limited companies, partnerships or proprietorships. Documents showing the status of the company like

the memorandum of partnership are enough for the award of marks. Similarly photocopy of the certificate showing the National Tax Number is quite enough for the award of these marks. No copies of tax returns are required under this category.

Financial position

Higher than specified marks are sometimes awarded under this category, if good number of projects have been completed with values in that specific range. If the contractor has worked simultaneously on various projects, the total value of all these project is considered for awarding these marks.

EVALUATION OF CONTRACTS COMPLETED

Projects completed earlier have involved deviations, changes or alterations. The effect of all these on the performance of contractor have been noted during the execution of work. Especially from the point of view of contract administration, the problems encountered by the contractor or by the client due to contractor's faults or drawbacks are well observed. These observations have been possible mainly due to comparative study of contracts executed by different contractors. The shortcomings are explained below.

Water logged area

Contractors had encountered problems in adverse site conditions like the water logged area. Managing equipment movement in water logged area has been main challenge to the contractors especially during rainy season. Equipment like steel rope to pull out a machinery once stuck in the mud has at times become critical item while working in such areas. Lack of general strategy to cope with such situation has also been observed.

Crossings

Crossings like railway and canal crossing require extensive planning due to the shortage of time. At times it has been observed that ill-planned crossing has become a nightmare for the project. Failure has been to such an extent that a single crossing has taken enough time to complete for which the whole project was scheduled. Lack of planning has been observed even at the stage when the preparations are under way to attempt the crossing. Lack of proper equipment, failure to follow Engineer's advice, inexperienced project manager or site in-charge, all contribute to failure of the team to complete the crossing in the scheduled time.

Shortage of equipment

A critical situation is created and delay of the project occurs when any equipment required at a specific time is not available, even if the equipment is required for one day out of the whole project. A general ill planning regarding the availability of equipment has sometimes been found among the contractors. If an in-depth analysis is made, such a condition usually occurs when the project manager is incompetent. This incompetence may be due to lack of education or lack of

experience or even lack of general management skills. Also, non-availability of such resources in the market accounts to this problem.

There are some equipment which form the life line of the project mainly due to their continuos use during the life cycle of the project. These equipment can be listed down as:

- ☐ Side boom
- ☐ Welding plants
- ☐ Crane
- ☐ Excavator
- ☐ Shot blasting plant
- ☐ Coating plant
- ☐ Line up clamps

Some equipment are required once or twice during the execution of the project. But the problem is that these are not, generally, available near the site. This creates serious delay of the project. These equipment can be:

- ☐ Bending machine
- ☐ Testing and filling pumps
- ☐ Dewatering pumps

Other equipment like the ones below are, generally, available abundantly in the market. Therefore, these do not create problem by being not available at site.

- ☐ Concrete mixer
- ☐ Dozer
- ☐ Generator
- ☐ Air compressor
- ☐ Tractors etc.

Contractors who own most of the above listed equipment have performed extremely well as compared to those who hire such equipment from the market. Generally, the equipment of the third list are owned by the contractors since their cost is much lower and these are widely used than the equipment in the first two lists which are high cost and mostly limited to pipeline construction only.

Frequent breakdown of equipment

Another reason which accounts for delay in the completion of the project is frequent breakdown of the equipment. Excavator and crane are the two equipment which are frequently reported to have broken down at site. An appropriate reason is that these are power hydraulic machines and proper repair is not undertaken which results in their breakdown frequently. Proper repair requires the replacement of broken parts with parts of the genuine quality but rarely does a genuine part replaces the broken part. Hence resulting in shorter life of that part. These equipment are not generally owned by the contractors due to their high cost value. Another reason is that experienced mechanics are not available with the contractor and the repair has to

done from the market which consumes extra time. This is especially true since the site is at remote places and private workshops are found near city areas.

Unavailable skilled labour

Sometimes the progress is hindered due to non-availability of skilled labour like the welders, machine mechanics, or machine operators. Various reasons can be attributed to this problem. Few of the labour leave the job without notifying when they get a better deal somewhere else. A few times labour has gone on strike due to less pay or non-availability of site amenities. An in-depth analysis reveals that the labour was hired without proper paperwork on daily basis. Also very less incentives were offered to the labour which resulted in their leaving the job as soon as they got a better offer.

Incompetent Project Manager

A very main reason of intermittent stoppage of work and delay of the project is an incompetent project manager. It has been very well observed that a qualified project manager with experience of at least the same volume of work as the project itself is important for the success of the project. Project managers on different project representing various contractors have been observed. A project manager with even more than 20 years of experience but without proper education has not performed well in a new situation. It implies that without proper formal education the project manager is not equipped to handle adverse situations. A graduate engineer with experience of about ten years has shown to be a good project manager.

Inefficient planning

Planning a project is the first part of the execution of the project. One of the requirements of the bid is that a work schedule should be provided with the bid. However, generally, this factor is not taken into account at the time of award of the project. If the documents provided by various contractors are observed, it will be noted that contractors with qualified staff including project manager and graduate engineers provide the work schedule along with their bid.

Failure to plan ahead the requirement of the equipment and material has resulted in the stoppage of work and delay of the project. An incompetent project manager and lack of resources can be the contributing factors to this problem. An equipment is not hired until the last moment to avoid the daily charges since the project manager is not sure whether the requirement will utilized on time or not. Although a mobilization advance equivalent to 10% of the value of the contract is provided to the contractor at the start of the project, it has been observed that contractors, generally, depend on the clearance of bill for their cash flow. A delay in the processing of the bill sometime does result in stoppage of work at site due to shortage of resources.

RECOMMENDATIONS

Observations as stated above lead to deduce various results so that the pre-qualification criteria may be changed to take into account shortcomings of the contractors beforehand at the time of pre-qualification. Each problem discussed above is reviewed below to arrive at some suggestions. The recommendations are presented in the form of a table, however, a reference is made to the discussion above by pointing to the problem from where the inference has been arrived.

S. No.	Category	Modification	Remarks
1	Experience	New sub category should be introduced regarding experience in water logged area. Methodologies used by the contractor in such previous cases should also be asked to be provided with the pre-qualification documents.	
2	Experience	New sub category of experience in crossings of various nature should also be included. It should ask number of such crossings completed including the time taken, the methodology and resources used.	Railway, canal, and highway crossings.
3	Equipment	The process of pre-qualification should ensure the ownership of critical equipment by the contractor. These equipment include: ☐ Side boom ☐ Welding plants ☐ Crane ☐ Excavator ☐ Shot blasting plant ☐ Coating plant ☐ Line up clamps and also preferably the following equipment: ☐ Bending machine ☐ Testing and filling pumps ☐ Dewatering pumps	Ownership documents may be registration documents or bank documents.
4	Equipment	Generally good condition of the equipment should be stressed however in case of the following equipment it should be made imperative: ☐ Excavator ☐ Crane ☐ Welding plants ☐ Shot blasting plants ☐ Coating plant ☐ Testing and filling pumps	Physical condition implying visual observation as well as condition of engine and other moving parts.

S. No.	Category	Modification	Remarks
5	Personnel	Awarding of marks for project manager should strictly follow the requirement. Lesser marks should be awarded to a non-qualified project manager although having a vast experience.	
6	Personnel	Marks for skilled labour should be awarded on the basis of permanently employed labour. Secondly, a sample contract may be asked to be provided which will be used to hire skilled labour. Thirdly, minimum pays may be fixed for various skills and points may be awarded for skilled labour above their relevant minimum pay.	
7	Experience	Planning methodologies & plans for some of the major projects completed previously by the contractor may be asked to be submitted along with the pre-qualification documents.	
8	Financial position	Contractors may be asked to provide their cash flow statements for their major projects completed previously.	Proof may be asked to be provided.
9	Personnel	Curriculum vitae of project manager and engineers should be made compulsory for the award of marks under this category.	

REVISED PRE-QUALIIFCATION CRITERIA

The pre-qualification criteria can be revised in light of the above suggested modifications. Division of marks among various sub-categories can be carried out with slightly disturbing the main distribution of marks which seems to be appropriate as observed in the discussion earlier. The revised pre-qualification criteria in provided in Appendix B.

The experience category has been divided into two sub-categories. First sub-category remains the same with reduced allotted marks equal to 10. The second category has distributed marks equal to 7 for various conditions encountered like water logged area. Proper planning as well as completion delays of previous projects are also considered for awarding marks in this sub-category.

Personnel category almost remains the same. Marks for project manager has been increased to 5 from 3 while various requirements have been added for the awarding of marks to each of the personnel under this category.

Equipment category has been divided into two parts where first list of equipment requires essentially the production of ownership documents whilst the second list does not need so for the

award of relevant marks. Inspection of equipment of the list has also been recommended to be made compulsory..

Marks for limited company and partnership have been reduced to 5 and 2 respectively. For organizational structure 5 marks have been allotted due to its observed importance.

The category of financial position has been divided into two. First sub-category is the same as before while the second category requires submission of cash flow statements of previous projects.

CONCLUSIONS

This paper discusses the pre-qualification criteria used to pre-qualify contractors in the Projects Department of Sui Northern Gas Pipelines Limited for construction of high pressure gas pipeline and reviews the completed projects and suggests modifications based on the review.

Almost all the projects involve some kind of problems. Some of these problems may be eliminated from future projects by strict pre-qualification of contractors among other steps. Evaluation of previous projects highlights shortcomings and hence allow to plan efficiently in future. Observations from previous projects from contract administration point of view have been recorded in this paper and shortcomings of contractors have been highlighted. In order to eliminate these shortcomings modifications in the pre-qualification criteria has been recommended and division of marks has been revised accordingly. Some new sub-categories were included to incorporate the modifications. Thus a contractor who lacks essential elements as discussed in this paper but passed under the old criteria will achieve about 15-20% lesser marks under the new criteria and will not be able to get enough marks to be pre-qualified.

This exercise is by no means final. Revision of the criteria is a continuos process and further execution of projects will highlight areas of shortcomings among the contractors. It must be noted that very extensive pre-qualification criteria exist in the literature and has been implemented by various companies around the world with modifications. However, those pre-qualification methods (Bubshait et al., 1996) are too extensive for the organization under study. Also some of the categories are not relevant to the organization's project requirements.

Though this discussion is related to one organization yet it paves the way for analyzing the pre-qualification methods being used in various organizations and suggest possible methodology for their revision. Also no literature was found to be available for pre-qualification of contractors for high pressure gas pipeline construction.

REFERENCES

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Appendix A

PREQUALIFICATION CRITERIA

Pass Marks = 60

1. Experience — Max Marks = 15 — Scaled

14 - 15	=	High Pressure. Cross country. Above 8" dia. 100 miles.
10 - 13	=	High Pressure. Cross country. 8" dia. 50 miles.
6 - 10	=	High Pressure. 8" dia. 2 projects.
1 - 5	=	Distribution line construction. 15 miles. 6" - 8" dia.

2. Personnel — Max Marks = 20 — Distributed

3	=	Project Manager. 10 years relevant experience.
4	=	Engineers. 2 Nos. 5 years relevant experience.
3	=	Sub-engineers. 3 Nos. 3 years relevant experience.
10	=	Skilled labour including welders, mechanics, operators etc.

3. Equipment — Max Marks = 35 — Distributed

Sideboom	2	Excavator	2
Trencher	1	Generator	1
Bending machine	1	Air compressor	1
Welding plants (10 nos.)	6	Pumps (test & fill)	1
Shot blasting plant	3	Line-up clamps	1
Coating plant & Kettle	3	Dewatering pumps	1
Crane (10 Tons)	3	Vehicles incl. Tanker, truck	4
Concrete Mixer	1	Tractor (6 nos.)	2
Dozer	2		

4. Company Status — Max Marks = 10 — Scaled

6	=	Limited company
3	=	Partnership
1	=	Proprietorship
	+	
2	=	National Tax Number, if Partnership or Proprietorship
	+	

4	=	Organizational Structure incl. management, engineering, stores, accounts etc.

5. Financial Position Max Marks = 20 Scaled

Handled projects of amount,

18 - 20	=	Pak. Rupees 50 million or above
12 - 17	=	Pak. Rupees 20 - 50 million
8 - 11	=	Pak. Rupees 10 - 20 million
4 - 7	=	Pak. Rupees 5 - 10 million
1 - 3	=	Pak. Rupees 1 - 5 million
0	=	Pak. Rupees 1 million or below

REVISED PRE-QUALIFICATION CRITERIA

Pass Marks = 60

1. Experience — Max Marks = 17 — Scaled & Distributed

			Scaled
8 - 10	=	High Pressure. Cross country. Above 8" dia. 100 miles.	
5 - 7	=	High Pressure. Cross country. 8" dia. 50 miles.	
2 - 4	=	High Pressure. 8" dia. 2 projects.	
0 - 1	=	Distribution line construction. 15 miles. 6" - 8" dia.	
	+		*Distributed*
2	=	Water logged area experience. Methodology. Planning	
2	=	Railway, Canal, etc. crossings. Methodology. Planning. Equipment.	
3	=	Actual time < scheduled time for major projects. At least 50%	

2. Personnel — Max Marks = 22 — Distributed

5	=	Project Manager. 10 years relevant experience. CV & PEC registration provided.
4	=	Engineers. 2 Nos. 5 years relevant experience. CV & PEC registration provided.
3	=	Sub-engineers. 3 Nos. 3 years relevant experience.
10	=	Skilled labour including welders, mechanics, operators etc. Marks to be awarded for permanent skilled labour only.

3. Equipment — Max Marks = 35 — Distributed

Ownership documents required	
Sideboom	2
Welding plants (10 nos.)	6
Shot blasting plant	3
Coating plant & Kettle	3
Excavator	2
Crane (10 Tons)	3
Bending machine	1
Pumps (test & fill)	1
Line-up clamps	1

+

Ownership documents recommended	
Trencher	1
Concrete Mixer	1
Dozer	2
Generator	1
Air compressor	1
Dewatering pumps	1
Vehicles incl. Tanker,truck	4
Tractor (6 nos.)	2

4. Company Status Max Marks = 10 Scaled

5	=	Limited company
2	=	Partnership
1	=	Proprietorship
	+	
1	=	National Tax Number, if Partnership or Proprietorship
	+	
5	=	Organizational Structure incl. engineering, management, accounts, administration, stores etc.

5. Financial Position Max Marks = 16 Scaled

Handled projects of amount,

9 - 10	=	Pak. Rupees 50 million or above
6 - 7	=	Pak. Rupees 20 - 50 million
4 - 5	=	Pak. Rupees 10 - 20 million
2 - 3	=	Pak. Rupees 5 - 10 million
1	=	Pak. Rupees 1 - 5 million
0	=	Pak. Rupees 1 million or below
	+	
6	=	Cash flow not depending solely on payment of bills