
SELECTION OF CONTRACTOR/S FOR OIL AND GAS PROJECTS IN PAKISTAN

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ABSTRACT

The management of project is a pressure packed business, more so engineering and construction industry.

In recent past, a number of projects have been executed in Pakistan under various contractual arrangements:

- 1) A local contractor taking lead in engineering, procurement and construction (EPC) and working directly with an exploration and production (E&P) company.
- 2) A local contractor working as sub contractor working to a main contractor or to an E&P company.

In either scenario, the selection of a contractor is vitally important to convert a concept into reality.

Typically, a project cost can be attributed as :-

Design engineering cost	:	5~10%
Procurement of material	:	70~80%
Construction	:	15~20%

Although, the construction phase does not constitute the largest expenditure, its management and execution can have immense influence on the project's success. In fact, construction has been referred as the "Last Bastion of Defense" in project management texts. A good construction effort will secure the project and bail it out from possible upstream troubles.

This paper will examine the challenges of selecting a suitable contractor for oil and gas project implementation vis-à-vis availability of suitable project management

expertise in Pakistan to undertake such jobs meeting international standards.

INTRODUCTION

The growing energy requirement of the country has been a motivator for development of indigenous oil and gas reserves. A number of international exploration and production (E&P) companies have come forward and shown interest. One of the greatest challenges that they face is knowledge of local contracting strengths, capabilities and establishment of reliable partnerships.

Typically, the activity cycle of an oil and gas project starts with seismic survey, drilling, well site development etc. In this phase of a project local contractor participation is primarily in well site development which in its initial stages is temporary in nature subject to the success of a discovery. The drilling work is managed mainly by the E&P company utilizing specialist overseas contractors. Following a discovery, reservoir appraisal is carried out and development economics determined through a number of design stages and analyses of risks. Certain criteria will have to be met before a development go-ahead is approved. In the second stage an oil and gas field is developed for commercial production. At this stage contractors with expertise of developing oil and gas facilities have a major role to play. Basic and detailed engineering has to be performed to process the feed stock to make it commercially sellable, followed by procurement of specified equipment and materials. Finally construction of a facility and installation of equipment is carried out. Different E&P companies may choose to exercise various routes to set up a grass-roots facility. It may hire a contractor who can provide

'one window' service to the company i.e undertake all engineering work, perform procurement services, undertake construction / installation works and finally commission and hand over the plant to owner company for operations or it may opt for a piece-meal approach of having smaller packages of work entrusted to as many contractors. A typical flow chart indicating various stages of a project is given in "Fig.1 (a)" and "Fig.1 (b)".

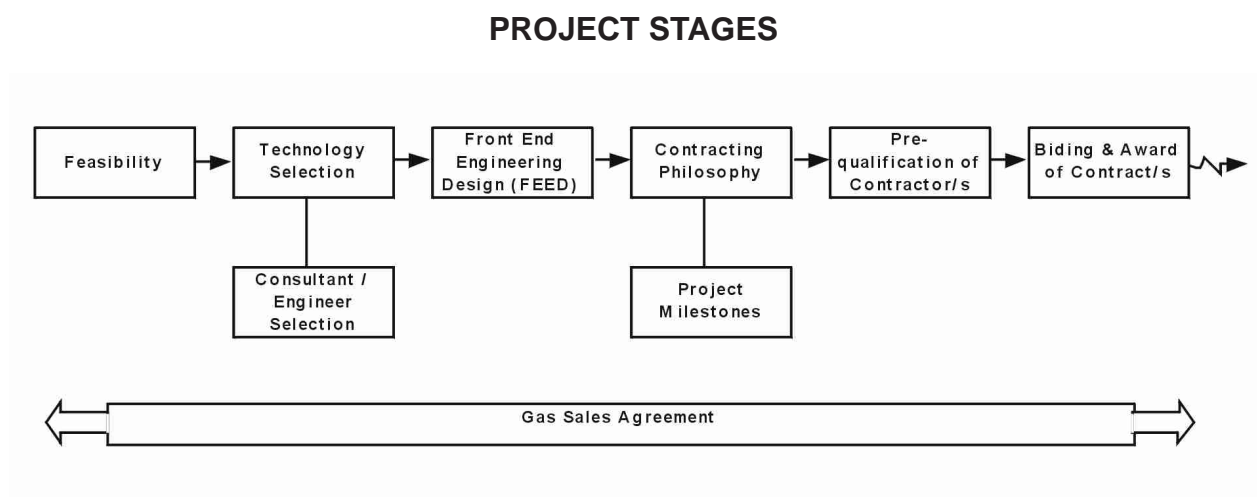


Fig. 1(a), - Various stages of project implementation

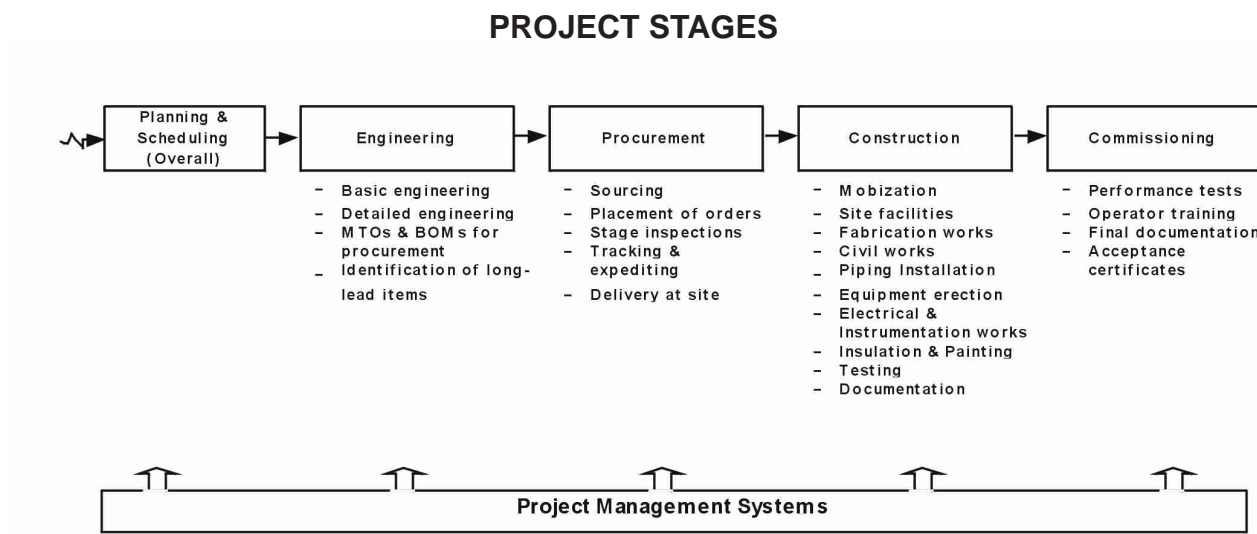


Fig. 1 (b), - Various stages of project implementation

Several combinations of the activities shown in the fig.1 (a) & 1 (b) have been exercised by E&P companies for project implementation. However, knowledge of local contractors and their capabilities to undertake engineering, procurement and construction works is extremely important. A number of local contractors are available in Pakistan, with expertise in one or more of

the above categories. The selection of a contracting philosophy is one of the key factors successful project completion and risk for management. This paper attempts to briefly describe the challenges of seeking suitable contractors for oil and gas projects and the availability of expertise in Pakistan.

An oil and gas development will be sanctioned with specific targets e.g completion date, budget, local content etc to be met. Not unusually, these will be required to meet certain internal hurdles and will be bench marked against external “norms“. Often risk management techniques will also be applied. The factors leading to a less than expected performance, are delayed completion, increased cost and less than expected performance to meeting project specifications. These are generally attributable to lack of familiarity with and of the skills needed to manage the contractors and suppliers by the E&P company and also to the in-country contractor’s knowledge of the E&P company’s expectations. The lack of industry specific experience, though important, have become secondary due to ease and abundance of know-how sharing opportunities.

TECHNICAL CONSIDERATIONS

Engineering

One of the most important challenges of selecting an engineering contractor is the technical capability of that organization. This consideration remains valid through all phases of a project. The company and contractor both must have organizational set-ups that have sufficient knowledge of project execution and capability of continuous interpretation of technical documents and solutions to various problems encountered.

The basic engineering details are the start of a project. Selection and availability of technology is the most important factor. With the advent of internet, accurate basic engineering know how can be obtained from specialist organizations. This information is then translated into detailed engineering packages. It is important that a “no change“ policy is adopted by the E&P company through out the project. This is particularly important in the transition from basic to detailed design. It is recommended that detailed engineering be performed locally, however, sufficient expertise does not seem to have developed and competition is very limited. The construction technology assumed while developing the engineering details has to be in line with local construction practices and using where ever possible locally available materials. A design that cannot be constructed easily will result in excessive construction management to mitigate design deficiencies. A constructability review process can be performed by involving a construction specialist at an early phase of project design. The location of design office is another consideration. An engineering support close to job site can ideally save time if a change in technical documents is required. The designers can readily move to site and

suggest alternates, discuss with owner company’s engineers for progress and design review. Similarly, certain advantages can be had in the context of HSEQ (Health, Safety, Environment and Quality) related activities such as Hazops, Hazid etc. This is particularly true if the project is “brown field“. The engineering contractor should be able to prepare a package that gives specifications and quantities of materials to be procured. The long lead items are identified and specified so that their procurement does not become a bottleneck. Similarly bulk materials can be identified such that their procurement can run as a parallel activity with detailed design completions. The preparation of a technical package to solicit construction bids also falls in purview of an engineering contractor. This package as a minimum shall include:

- 1) Scope of work.
- 2) Project master schedule.
- 3) Identification of engineering standards and procedures.
- 4) Basic plot plans.
- 5) Listing of materials with specifications to be supplied by construction contractor and others.
- 6) Inspection and testing requirements.
- 7) Quality and HSE standards.

It is the responsibility of E&P company to ensure that form of the construction contract corresponds to the extent of detailed engineering performed, for example, it is inappropriate to ask for lump sum tenders if the level of scope definition is low.

The difficulties that may be encountered and for which vigilance is necessary are:

- 1) Incomplete or vague design and specifications.
- 2) Frequent revision of drawings.
- 3) Specification of materials and procedures that are not in line with local practices and experiences.
- 4) Timely finalization / approval of specifications and design drawings by the engineering contractor / owner.
- 5) Freight limitation on final sizes and weights which must be evaluated to coordinate local inland transportation.

It has been known that design finalization is delayed due to conflicting interpretation of basic specifications between employer’s engineer and contractor. Effective communication, mutual trust and understanding of requirements is essential to overcome this hurdle. Delayed final design will affect all activities to follow.

Procurement

The procurement of project materials and equipment constitutes 70 ~ 80 % of project cost. Correspondingly the timely availability of materials and equipment plays a vital role in the success of a project. A number of combinations for procurement contracting strategy have been exercised in recent projects to undertake this activity:

- 1) Procurement as part of engineering contractor's responsibility.
- 2) Procurement of critical items remains in owner's scope.
- 3) Procurement as part of construction contractor's scope.

In many cases the suppliers of proprietary items like compressors, pumps are selected on owners preference. The vendor pre-qualification facilitates in equipment supplier standardization. Further it reduces purchasing efforts and expediting costs. The objective remains availability of right material at desired time at competitive pricing. Sourcing has become less of an issue using internet and similar means of communication. However, close follow up of vendors and various processes remain necessary like:

- 1) Finalization of specifications and drawings.
- 2) Placement of order and Letter of Credit (L/C) opening.
- 3) Stage inspections at vendors work shops / facilities.
- 4) Import license / permits availability.
- 5) Shipment of goods.
- 6) Receipt of vendor's final documentation.
- 7) Port and custom clearances.
- 8) Co-ordination for heavy equipment transportation and offloading at site.

The above remain important steps that require special attention. The contractor responsible must have resources available to track, expedite and monitor procurement progress. This can happen only when activity cycle is fully understood by the buyers. The availability of local agents can assist in procurement and after sales service for proprietary items. The local manufacturing facilities are sufficiently developed to fabricate high pressure static equipment, such as slug catchers, knock-out drums, separators, heat exchangers and other pressure vessels. Similarly static parts of certain rotary equipment can also be locally fabricated. Such local expertise exists in Descon Engineering, Heavy Mechanical Complex and others. These facilities

are ASME certified to use their stamps. The Government of Pakistan also encourages local manufacturer's participation to supply oil and gas industry equipment. A number of SROs (Statutory Regulatory Ordinances) have been issued in this respect to encourage the same. Furthermore, it is in the E&P company's (owner's) interest to maximise equipment and materials manufactured locally. Indeed it is some times obligatory to achieve a prescribed level of 'local content' across the development.

Recently on Sawan and Zamzama Gas Field Development Projects several pieces of static equipment were locally fabricated. In the case of Zamzama complete Hydrocarbon Dew Point Control and Gas Dehydration skids were locally engineered, fabricated and installed at site.

The procurement of piping materials is often a significant purchasing element in oil and gas projects. The preparation for piping procurement is a joint effort of engineering and procurement departments. The timely availability of piping bulk items can facilitate early start of site construction works. The bulk materials procured can be used to fabricate piping spools for installation on pipe sleepers and racks. It has been experienced that finalization of piping design is one of the last activities in design cycle of process plants.

The success of a project is highly sensitive to material procurement and those responsible for this important function must have the necessary tools to monitor and track progress. Computerized material status and tracking systems are used for consolidation of latest information and sharing of the same with the users. If considered necessary suppliers are also visited to assess order fulfillment status.

Construction Management

If a project is proceeding well prior to initiation of the field program, a well-managed construction effort will secure the project. A poor effort will undo all past achievements and only sour taste of the final result will linger with the client company. On the other hand if the project is in trouble a good construction effort can bail it out. It is for this reason that construction is also referred as the "Last Bastion of Defense" in project execution business [1].

For the E&P company the selection of a good construction contractor is vital due to the risks involved. The contractor has to be a partner of the project team. The goals and objectives of a contractor must be fully

understood by the employer and vice versa. They are not only to complete the job within schedule and as per specifications it is also to secure financial returns for stakeholders. The construction contractors generally fail when they ignore or they do not possess basics elements of project management. The key factors that affect this skill are:

- 1) Relevant experience.
- 2) Requisite resources.
- 3) Project planning and risk management skills.

A number of local companies are available to be part of this pressure packed business of construction. Projects like Pak Arab Refinery, Sawan Gas Field and Bhit Gas Field are some of the major challenging jobs under taken by local contractors recently. However, most of the construction contractors suffer from lack of work continuity. It is both due to cyclic nature of this business and competition. Further an exodus of trained staff to Middle Eastern construction market also has its affect.

The estimation of a job is one of the vital components in project bidding and forecasting to completion. The contractor's estimation team must be able to understand and interpret project drawings and specifications. At the estimation stage a blue print of construction execution plan is prepared which is then implemented at construction stage. A good proposal demonstrates that the job has been well understood and is in line with requirements. It has been observed that with increased pressure for early returns, the project execution schedules are continuously being squeezed. Under the circumstances availability of experienced and trained estimators has become essential. Further, continuous feedback from projects for efficient work practices is important. The inherent risks involved in estimation include improper identification of resources, agreement to unrealistic schedules and unpractical construction procedures.

Construction interfaces with the final stage of a development namely commissioning are important. It is the responsibility of the E&P company to clearly define which party will conduct each activity at this interface as "mechanical completion" or pre-commissioning can mean different things to different parties. Unless there is a good understanding between each responsible, interface party, then much precious time can be lost when the "project completion" milestone has almost been achieved. Another key aspect at this stage is the quality of finishing. A leaking flange or incomplete instrument tubing can have dire effect on down stream activities. This can frustrate the client

company at a time when the construction contractor is looking for his invoices to be paid.

Resources

The resources required to successfully execute a project are manpower, equipment and cash flow. One of the major causes of a contractor failure is over commitment. Many contractors with attractive prices may not have the resources available to perform his work as per plan. Especially on large jobs, difficulties can be encountered with availability of skilled labor and lack of adequate experience in certain critical skills like welding of alloy materials for high pressure services. The other common source of problem is inadequate tools and equipment at site. Further, effective and quick mobilization to site is also a key success factor. The presence of highly skilled work force and abundance of tools and equipment cannot guarantee success, however. The non-availability of qualified field management organization can also be a stumbling block. Mostly contractors have a skeleton site organization. The field management has an important role to play. It gives direction to work force, implements project plans, translates project requirements, prioritizes work fronts and coordinates amongst various disciplines. Without good site management, the work place would be like a rudderless ship resulting in slower progress and excessive rework.

Client companies will always select the contractor with the best site manager and proven management team, even though they may be slightly more expensive. It is a good idea for the site manager to be involved in the tender process from day one as there are too many examples of breakdown between head office management undertaking the tendering process and site management executing the scope of work.

Project Management Systems

The fast track and complex nature of projects necessitate availability of computerized construction control systems. The important features of a construction project that require special attention are:

Document and Drawings Control System

One of the primary responsibilities of this system is to document receipt and issuance of current drawings, specifications and other documents. With ever demanding project schedules drawings and documents are continuously updated, even during execution phase. This is specially the case with piping design and piping isometrics drawings. In this scenario it is essential

to have a drawing and document control system in place that can issue latest revisions and ensure retrieval of older versions. It has been observed that not many local contractors have this control system available. The problems related to poorly managed document control start to appear when the job is nearing completion and quality control dossiers are prepared. It has been observed that equipment foundation levels are not as per latest drawing revision or piping spools do not fit at site. Such problems can result in lot of rework and material wastage. The availability of an updated drawing availability status can also help in planning the work fronts.

Material Management System

A contractor must have material control system at a construction site. Materials that may constitute a major part of a project cost are handled by the contractor. In certain cases some of these materials may also be supplied by the contractor. The availability of a program that dovetails with material procurement and delivery system becomes useful in tracking of the same. The system shall be able to track materials received, issued and return of surplus items. It shall also facilitate control over material wastage and loss. Further, in Pakistan, statutory regulations also demand that at end of a project material reconciliation be undertaken this can be facilitated by such a system.

Planning and Monitoring System

It is often quoted that if one fails to plan he plans to fail. This phrase is particularly true for the construction business. The ability of a contractor to plan a job and to execute it accordingly is a key to project success. It is important to understand, however, that planning is not the same as scheduling. It must precede scheduling.

The project plans are prepared prior to start of any ground activities. As indicated earlier initial planning blue prints are prepared by a contractor at bidding stage.

These are not static documents and will be revised over the project life. The updation must be done to avoid slippages from set targets of schedule and costs. Typically a project plan must focus on the following:

- 1) Work completion milestones.
- 2) Temporary facilities requirement.
- 3) Manpower requirement.
- 4) Tool and Equipment requirement.
- 5) Extent of sub-contracting and management thereof.
- 6) Site organization.
- 7) Working capital requirements.

- 8) Procurement Planning.
- 9) Quality control plans.
- 10) Logistic planning.
- 11) Project HSE plans.
- 12) Activities execution plans including work packs.

The planning efforts can be beneficial only when monitoring mechanism is also in place. It is a check to evaluate progress being made against the targets set. Usually this mechanism is based on schedules. Scheduling may be generated at a number of different levels each progressively breaking down an activity into more and more detail. Only when the detail has been identified can resources and necessary equipment be adequately determined and progress properly monitored. Generally local contractors do not have an effective monitoring system in place. Such systems are not off the shelf type. Contractor's commitment and experience is utilized in their development. The availability and utilization of the same are indicators of a contractor's capability. Where as for larger and more complex projects availability of such a system can accurately define adequacy of resources against progress targets. Both employer and contractor can benefit greatly from such a planning activity-effort spent up front will pay enormously down the construction line.

Risk Management

Risk management has become normal practice in E&P and contractor companies. It can be used in a number of different ways, for example, risks to a project can be identified such as reservoir, drilling, political, cost etc and mitigation can be undertaken to minimize the impact. The risks may be identified and entered into a register with individuals assigned to take responsibility to ensure the impact is minimized. A risk analysis can be undertaken of the schedule from which a probability curve may be generated giving a spread of possible completion dates.

Quality Control System

In parallel to meeting project milestones the other important challenge that a contractor has to face is to ensure compliance with specifications. This is necessary to minimise problems that may be faced during plant commissioning and operation. Typical problems encountered include settlement of foundations, poor alignment of rotary equipment, piping leakages and erroneous instrument leadings.

A quality control system has to be in place throughout the project life, more so, during construction and installation stage. A contractor must have a system to ensure that inspection and test plans are followed and records maintained. These records ultimately go into quality dossiers to be submitted to the project owner who takes responsibility for maintaining technical integrity of the plant for the duration of its existence.

Financial

As indicated earlier contracting business is cyclic in nature. A contractor may be forced to accept job at thin margins. Even these may be eroded due to receivable difficulties, such as delayed monthly progress payments. The labour and staff salaries have to be paid monthly and similarly lower tier sub contractors are also compensated before receipt of progress payment from employer. The construction contractors are usually cash flow negative and this has to be supported normally by bank borrowing.

The financial strength of a contractor therefore must be evaluated before award of a job. Having said this, the employer should also accept that he has certain responsibilities to uphold his share of the “partnership” these include:

- Uphold commitments made.
- Early resolution of disputes and claims at working level.
- Equitable enforcement of contract terms.
- Conducive payment terms.

The employers are ensuring project success for all concerned by facilitating the contractor.

It is a matter of national pride that the local contracting capabilities are now sufficiently developed to have bigger role in oil and gas development projects. The success of a project can be ensured by selecting contractors that fulfill a certain basic criteria. The onus lies with both employer and contractor to put joint efforts as a team to make things work and have a win-win situation.

REFERENCES

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Salman Zakaria – born in 1961, graduated from UET, Lahore and got Ph.D in Chemical Engineering from Imperial College of London. Over eighteen years of experience of being involved in process plant engineering, project planning, construction, modification and operation related activities. Currently working as Head of Business Development Department for Descon Engineering Limited, Lahore.



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Peter Crerar – born in Edinburgh, Scotland in 1947, Peter is a Chemical Engineer by training. Whilst currently working for OMV (Pakistan) as their Projects Manager, he has responsibility for the current Sawan Project and for the development work in the Miano Field and Kadanwari Plant. Following graduation, Peter worked for BP mainly on North Sea, Alaskan and Middle East projects. He then joined British Gas and has more recently consulted for Kvaerner and ENI/Lasmo.

