

CHAPTER 3

CONTRACT STRATEGY

Contract Strategy means selecting organizational and contractual policies required for the execution of a specific project. The development of a contract strategy comprises a complete assessment of the choices available for management of design and construction in order to maximize the likelihood of achievement of key project objectives. The development of an integrated contract strategy is better than taking of a sequential set of isolated decisions.

Key Decisions for Contract Strategy

1. Project objectives and constraints
 - rank primary objectives
 - identify secondary objectives
 - identify constraints.
2. Organization of the project
 - choose appropriate design organization
 - select contract packages
 - select contractual arrangements suitable for involving the contractor in design.
3. Types of contract
 - select appropriate type of contract.
4. Contract Documents and conditions of contract
 - determine suitability of conditions of contract
 - identify any specific matters for inclusion in Contract Documents.
5. Tendering procedure
 - choose method of appointment of contractors
 - decide whether pre-qualification is required
 - prepare method of tender analysis.

3.1 Project Objectives and Constraints

The client will have a number of overall objectives for undertaking the project. The project manager should ensure that specific project management

objectives are compatible with the client's objectives. If not, this will have a detrimental effect on decision making. Consultants and contractors should be fully informed of the project objectives and constraints.

Primary Objectives

Functional Performance

An appropriate level of functional performance may be defined at the boundary of minimum acceptability to the client or society. Design change during construction may aim at the improvement of functional performance. It is helpful to be able to determine the effect on economic return of a given change in functional performance compared with the associated change in time and cost. The relative ranking of the objectives can then be the basis of decision making when faced with a change which affects time, cost and functional performance.

Time Objectives

There may be a need for an early start to the construction phase for political reasons, a need for minimum project duration to maximize economic return or a need for minimum construction time to phase in with other contracts or to meet a physical constraint.

Where a time objective is dominant it is likely to be so in combination with cost and functional performance. The extent to which additional cost can be incurred in order to sustain this dominance should be determined when identifying and ranking project management objectives.

Cost Objectives

There may be a need for minimum project cost to ensure an adequate economic return, a need for minimum total cost including operating and maintenance costs, which automatically involves functional performance, or a need for a fixed budget producing a maximum limit on expenditure.

Where a cost objective is dominant, flexibility in the time objective must be accepted and the limits to this should be controlled.

Secondary Objectives

These objectives could arise on a construction project and would exert a major influence over contract strategy decisions. Examples include:

- allocation and payment for risk
- training of the client's staff
- transfer of technology
- provision and/or retention of construction plant
- involvement of contractor in design
- involvement of client in contract management
- choice of labour-intensive construction
- use of local materials and resources
- protection of the environment.

Project Constraints

All construction projects will have constraints that influence the achievement of the project objectives and should therefore be considered when choosing an appropriate contract strategy. The project manager can use the following checklist to determine his project's constraints:

- freedom of choices of designer(s) and contractor(s)
- availability of funds
- availability of contractual incentives
- conditions of contract
- method of tender
- project size and duration
- project location
- relationship to other projects
- possession of land
- number of work packages
- target dates of the project
- possibility of phased construction
- possibility of design change
- availability of different construction resources
- need for labour-intensive construction
- adequacy of site investigation
- seasonal working
- access to the site
- number of contractors willing or able to tender
- inflation
- exchange rate.

3.2 Organizational Structures for a Construction Project

Having decided on the organization required for project management there are a number of choices available to the client and his project manager for the management of design and construction. It is preferable to consider the decision on organizational structure as separate from, but interrelated with, the decision on type of contract.

Factors Influencing the Choice

The choice of an organizational structure should be related to project objectives and constraints. It can be facilitated by considering the following decisions:

- size and nature of the work packages within the project
- appropriate number of design teams to suit the nature of the work
- selection of the design teams from in-house resources, external consultants or contractors
- extent to which construction is to be separated from or integrated with design
- process for supervision of construction
- restrictions upon using a combination of organizational structures within the project
- expertise which the client wishes to commit to the project.

Description of the Organizational Structures

The Traditional Approach

In the traditional approach to civil engineering, the consulting engineer is responsible for the design, the Engineer for supervision of construction and administration of the construction contract and the contractor(s) for construction.

In this approach, management of both the design and construction is divided between the parties. The input of the contractor to the design of the works (in order to contribute ideas for reducing actual costs) is limited. Design must be substantially complete prior to award of the contract, otherwise extensive claims and additional costs are likely to result.

The traditional approach is normally associated with an admeasurement contract. It is a well-established approach and has been used widely.

Turnkey / Package Deal Contracts

In turnkey or package deal contracts, both detailed design and construction are undertaken by a single organization; the contractor. Parts of the design may be sub-contracted to specialist consultants. Most of the design and construction risks are carried by the contractor. The client has to express his objectives and specifications precisely before detailed design has started and any small change is likely to prove expensive.

The use of a turnkey contract should be considered for work of a standard or repetitive nature, when contractors offer specialized design/construction expertise for the particular type of work or when design is strongly influenced by the method of construction.

Direct Labour / Force Account

The direct labour approach is used by large local authorities. They perform both their own design and construction with their own forces. In some cases they retain many of the management and conceptual design responsibilities, utilize consultants for some or all of the detailed design and depend upon construction contractors for hiring and supervision of the labour force.

Although the force account method does not pay overheads or profit to the contractor, it may result in a higher total cost than would have been the case if a contractor had done the job and had included overheads and profit as part of his tender price. This is because a contractor can do better than a newcomer to the construction industry.

Target and Cost-Reimbursable Contracts¹

In these contracts, the contractor is usually appointed earlier in the project life than in a traditional approach and he is encouraged to propose design changes in the context of value engineering. The client pays the actual cost incurred and this facilitates joint planning and decision making for using resources. The risks which would be allocated to the contractor under a traditional approach and are outside his control can be overcome in this approach by the involvement of the client.

The circumstances which lead to the adoption of these contracts are:

- inadequate definition of the work at time of tender

¹ This non-conventional approach of organizational structures is not being used in Egypt.

- work involving complex organization such as restricted access
- work involving exceptional technical complexity
- situations involving unquantifiable risks to the contractor such as work below ground level and effect of inflation
- client wishes to be involved in the management of his project.

Management Contracting¹

Management contracting is an approach where the client appoints an external organization, known as the management contractor or as the professional construction manager, to manage and co-ordinate the design and construction phases of a project. The design may be provided by specialist design firms and in some cases by the management contractor. The construction contracts will be awarded to construction contractors by the management contractor, probably as many small packages, offered immediately the relevant design is completed. This is referred to as "fast-track" contracting and its principal objective is to shorten construction time for the overall project. The management contractor aims to hold a friendly position similar to that of the consultants in the traditional approach.

The services offered by the management contractor overlap those traditionally performed by both the Engineer and the contractor. They may include:

- management and programming of design
- design input
- cost forecasting and financial arrangements
- preparation of Tender Documents
- tender analysis and selection of contractors
- selection of methods of construction
- recommendations on construction economies
- planning and scheduling construction works
- materials' procurement and delivery expedition
- provision for site security, clean up and temporary utilities
- supervision and control of construction contractors
- construction quality assurance
- cost control
- costing of variations and assessment of claims
- certification of interim and final payments to contractors.

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The incentive for performance by the management contractor is his reputation and his desire for future work. This could be augmented by the introduction of a bonus/penalty clause for timely completion.

This approach is likely to prove marginally more expensive than the traditional approach but offers greater guarantee of performance. Project risk which is carried by the client in this approach may be lowered due to the potential to avoid time over-runs and to reduce the incidence and cost of claims.

The payment to the management contractor is cost-reimbursable plus fee. Construction contracts will usually be lump sum or admeasurement. The use of management contracting should be considered when:

- there is a need for early start to construction or for an overall time saving
- flexibility for design changes is required
- client has insufficient management resources.

The following summary shows choices available to project management for the organizational structures of design and construction:

CHARACTERISTIC	TYPE OF ORGANIZATION
Divided management of design & construction:	- traditional approach
Integrated management of design & construction:	- turnkey contract - direct labour
Co-operative management of design & construction:	- cost-reimbursable - target contract
Special emphasis on management:	- management contracting

3.3 Types of Construction Contract

Construction contracts are classified according to the method of payment to the contractor. When payment is based on prices submitted by the contractor in his tender they are called price-based contracts, for example, Lump Sum and Admeasurement contracts; and when actual costs incurred by the contractor are reimbursed they are called cost-based contracts, for example, Cost-Reimbursable and Target Cost contracts.

Factors Influencing the Choice

The circumstances which favour the use of a particular type of contract are:

- the appropriateness for providing an adequate incentive for efficient performance by the contractor
- the ability to introduce changes which may be anticipated but not defined at the tender stage and consequently the ability for their systematic and equitable evaluation
- the allocation of risks between client and contractor; the contractor will include a risk contingency sum in his tender as protection against the risks he has been asked to carry
- the choice of dates for issue of Tender Documents and start of construction.

Description of Types of Contract

Lump Sum Contract

A single tendered price is given for the completion of a specified work to the satisfaction of the client by a certain date. Payment may be staged at intervals of time on the completion of milestones. The contract has a very limited flexibility for design change. The tendered price may include high level of financing and high undisclosed risk contingency. Where considerable risk has been placed with the contractor, this contract may lead to cost cutting, trivial claims, or bankruptcy. Contract final price is known at tender.

A lump sum contract would seem to prevent risks for the client where in fact it just changes them. An important risk is that of not receiving

competitive bids from desirable contractors who may avoid a high-risk lump sum contract. This contract might be used for a turnkey contract. It is appropriate when work is defined in detail, limited variation is needed, level of risk is low and quantifiable, and the client does not wish to be involved in the management of his project.

Admeasurement Contract

Items of work of the contract are specified with quantities, in the Bills of Quantities or Schedules of Rates and the contractors tender rates against each item. The rates include risk contingency. Payment is made monthly at billed or scheduled rates for all quantities of work completed during the month. The contract offers a facility for the client to introduce variations in the work defined in the Tender Documents. The contractor can claim additional payment for any changes in the work content of the contract, but claims resolution is very difficult because the client has no knowledge of actual cost or hidden contingency. Tender price is usually increased by variations and claims.

Bill of Quantities Contract

Tenderers enter rates against the estimated quantities of work. The quantities are remeasured during the course of the contract, valued at the tendered rates and the contract price adjusted accordingly.

Schedule of Rates Contract

It contains inaccurate quantities of work; possibly with upper and lower probable limits. Therefore it is common for separate rates to be quoted for labour, plant, and materials. The contract price is derived by measuring the man hours, plant hours and quantities of materials actually consumed, and then pricing them at the tendered rates. This contract is best suited for repetitive work.

The admeasurement contract is a well understood, widely used contract. It can be used when little or no change is expected, level of risk is low and quantifiable and when design and construction need to be overlapped.

Cost-Reimbursable Contract (Cost-Plus Contract)

The contractor is reimbursed for actual costs plus a specified fee for head office overheads and profit, no special payment for risk. Payment may either be made from a joint account funded by the client or monthly in advance, on the agreement of spending during the month. The contract involves a high level of flexibility for design changes. Final price depends on changes and extent to which risks materialize. The contractor must make all his records and accounts available for inspection by the client or by some agreed neutral third party. The fee may be a fixed amount or a percentage of actual costs.

This contract has no direct financial incentive for the contractor to perform efficiently. It may be used when the requirements of the client are vague, when it is desirable for design to proceed concurrently with construction and when the client wishes to be involved in contract management.

Target Cost Contract¹

Cost targets may be introduced into cost-reimbursable contracts. In addition to the reimbursement of actual cost plus a percentage fee, the contractor will be paid a share of any saving between target and actual cost, while the fee will be reduced if actual cost exceeds the target.

The target figure should be realistic and the incentive must be sufficient to generate the desired motivation. Specified risks can be excluded from the tendered target cost and when these risks occur the target cost is adjusted accordingly and the client pays the actual cost incurred by the contractor. The target may also be adjusted for major changes in work and cost inflation; it may be increased by variations but effective joint planning may reduce the costs to below the target figure. This contract can be used in the same circumstances as the cost-plus contract.

3.4 Contract Administration

Contract Documents

The contract is defined by the Contract Documents which are developed from the Tender Documents; see article 3.5. The Contract Documents in case of admeasurement contract will comprise:

¹ This type of contract is not being used in Egypt.

1. conditions of contract
2. specifications
3. working drawings
4. priced bills of quantities
5. a signed form of agreement which confirm the intent of the parties
6. pre-contract minutes or correspondence.

The main roles of the Contract Documents are:

- to enable fair payment for work done
- to facilitate evaluation of change
- to set standards for quality control.

Conditions of Contract

The basis of a successful contract can be established by the preparation of conditions of contract to clearly define the responsibilities of the parties. These conditions form much of the legal basis of the contract on which any decision by the courts would be made. The interests of all parties to a construction contract will be best served if the contractor is required to carry only those risks that he can reasonably be expected to foresee at the time of bidding. This will be less costly to the client and better suited to the efficiency of the construction industry.

Experience has led to the adoption of common forms of words. These are called Model forms of conditions of contract. The main advantage of model forms is familiarity for the parties. The following general conditions of contract are well-established model forms:

- The British ICE conditions of contract 5th edition. They constitute an admeasurement contract using bills of quantities.
- FIDIC conditions of contract which are widely-used for international contracts.

The general conditions of contract should prove suitable for the majority of conventional construction contracts but the client must satisfy himself that they are relevant to his particular job. Special conditions of contract can be added to fulfill the client's special requirements.

Legal Aspects of Construction Contracts

1. A signed "Form of Agreement" is a written evidence that a contract exists. When there is a need for an urgent start of the work a "Letter of Intent" or an oral agreement may be used. In this case the contractor has no certainty of cost recovery.

2. Contract period is the time specified by which the works must be executed in accordance with the contract. Some events entitle the contractor to an extension of time of the contract period. If the contractor fails to complete the works within the contract period he will pay for these liquidated damages. The payable sum must be a realistic estimate of the client's loss and must be stated in the contract. If liquidated damages are not specified, the client may become entitled to terminate the contract on the grounds of breaking an essential condition of contract.

3. Retention is a specified sum of money held back by the client from each certificate of payment due to the contractor. Its purpose is to provide against defective work and to ensure the contractor has an incentive to complete minor items of work. Its value equals 5% of each payment. The retention money is repaid at the end of the contract if the performance bond equals its specified percentage of actual contract price.

4. During the maintenance period of 52 weeks' duration, the contractor must remedy any faults or defects that may appear in the work completed by him under the contract.

5. Bonds with construction contracts are usually required in the form of letters of guarantee given by an approved surety; a bank or a company that agrees to discharge the legal duties of the contractor if he fails to discharge his duties. The two main types of bonds in common use on construction contracts are:

- A temporary bond (bid bond) :

It is a 1% of the tender price to ensure that the bidder will maintain his offer unaltered. If the tenderer defaults he will pay the client the full amount.

- A final bond (performance bond) :

The contractor, after awarded the contract, must truly and faithfully perform all his obligations under the contract. This bond covers programme, quality, bankruptcy and repair of defects during the maintenance period. In the event of default, the bond must be paid to the client. The bond may be 5% or 10% of the contract price. The bid bond may be a part of the performance bond.

Construction Claims

A construction claim is a request for payment or time extension to which the contractor, rightly or wrongly at that stage, considers himself entitled and in respect of which agreement has not yet been reached. There are three areas under which claims are developed:

- a) for extension of time only
- b) for additional cost which may or may not include overheads and profit
- c) for both a and b.

Reasons for Construction Claims

The main reasons for construction claims are:

- late possession of site or late provision of working drawings
- change of contract start time or activity schedule
- lack of access or difficult access to the site
- design change and variation
- delays in approval and examining work
- work acceleration by the client
- late delivery of materials supplied by the client
- different ground and/or site conditions
- incomplete design or inaccurate specifications
- work suspension or contract termination before work is complete
- unforeseen events and disasters.

The conditions of contract should carefully list clauses which explain valid claims. The contractor should read the conditions of contract to ascertain which category of claims is applicable. Construction managers are advised, immediately after the event which is likely to produce extra cost or delay, to negotiate with the client the basis for the claim.

3.5 The Tendering Process

Typical Stages of a Civil Engineering Tender

Figure 3.1 shows the typical stages of a civil engineering tender assuming that the traditional approach is used. Note that the shown times may be longer for complex contracts and shorter for simple ones.

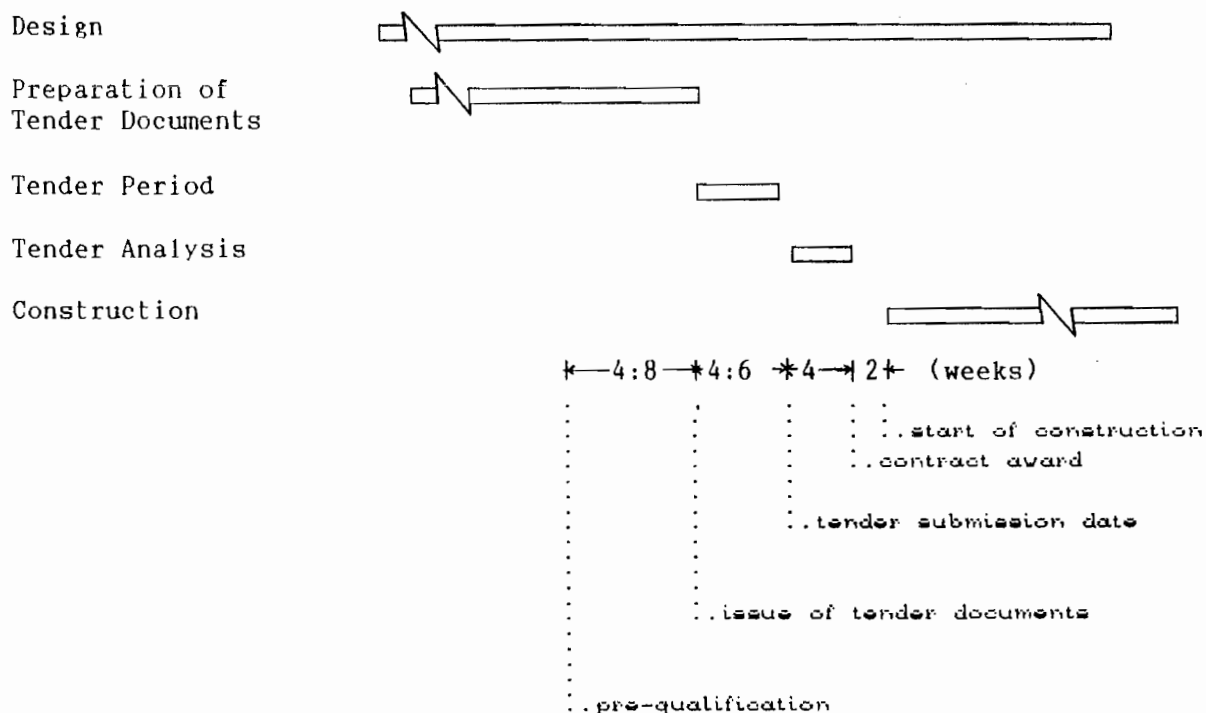


Figure 3.1 Typical Stages of a Civil Engineering Tender

Pre-tender Evaluation of Contractors

The purpose of this evaluation is to ensure that all contractors who bid are reputable, acceptable to the client and capable of undertaking the type of work and value of contract.

The most formal method of contractor evaluation in this stage is pre-qualification. The client may press an announcement requiring response from interested firms. He then gives a brief contract description including value, duration and special requirements. The willing contractors can then provide information including details of similar work undertaken, financial data on number and value of current contracts, turnover, and the management structure to be provided with names and experience of key personnel. The client can discuss with the contractor's key personnel and with other clients who have experience of the contractor.

Tender Documents

The main role of the Tender Documents is to provide a common basis on which contractors can bid and against which their bids are assessed. The Tender Documents usually comprise:

1. general and special conditions of the contract which define formally the duties, powers and obligations of the parties
2. specifications which indicate nature of the work, accuracy of construction and quality of the materials and workmanship
3. tender drawings showing the state of the design of the works at the tender stage
4. unpriced bills of quantities or schedules of rates which itemize and quantify the work to be done
5. form of agreement: a summary of main points of the contract to be signed before contract award
6. instructions to tenderers with regard to completing the tender, visiting site, ... etc. The method of tender analysis should be explained especially if it contains unusual features; all the variables to be considered should be known by the contractors.

Tendering Methods for Selecting Construction Contractors

Competitive Tendering

a. Open Tendering

The client invites interested contractors to apply for Tender Documents. A small sum of money should be deposited in order to reduce the number of enquiries. This method insures good competition and prevents contractors forming rings but the tender list may be long. On the other hand, it is sometimes difficult for the client not to accept the lowest offer although this choice has many disadvantages.

b. Selective Tendering

Many local authorities maintain lists of contractors who are willing to undertake work of a specific type, within certain cost limits. A short-list (4:6 contractors) can be drawn up by the client's advisers or alternatively an advert. The selected contractors receive Tender Documents and submit bids.

As all contractors are competent then the lowest tender may be accepted. Care should be taken to ensure that certain firms have not been excluded. On the other hand the composition of the list should be changed for each contract to prevent secret agreements.

Two-stage Tendering

A contractor is selected competitively early in the design process. The Tender Documents contain approximate quantities of the major value items. As design proceeds the final tender price is developed by negotiations between the client and the selected contractor. This method can be used when the contractor has special management skills, or can undertake particular works, or is capable of completing the works within the required period. The cost of work is likely to be higher than for the conventional method.

Negotiated Tenders

The client develops a tender by discussion with usually a single or sometimes a small number of contractors, without prior competition.

Direct Order Tenders

A direct order is given to a selected contractor to carry out the work on a certain basis. This type of tender reduces the incentive for competition between the contractors and facilitates change orders during contract execution.

Tender Preparation by the Contractor

The contractor has to prepare a realistic and competitive tender in a very short time period. He has to:

- choose method of construction
- plan the construction
- decide on required resources
- estimate construction costs
- decide on a margin to include, taking account of the market
- determine the price to bid
- translate the price into rates in the bill of quantities.

Tender Analysis (Pre-contract Evaluation of Contractors)

The Engineer will open the bids from the various contractors on a given date and time. A systematic evaluation of the bids would include examination of the following:

- compliance with contract terms and conditions
- correction of bid prices (if errors detected)
- analysis of bids for method of construction, planning and adequacy of resources
- selection of the best bid and recommendation to the client for contract award.

The purpose of this evaluation is to ensure that the contractor has fully understood the contract, that his bid is realistic and his proposed resources are adequate. The existence of a realistic estimate against which tenders can be compared is a vital factor in the quality of decisions made. On major construction contracts, additional time and effort expended at this stage can lead to much smoother contract execution and an easier claims environment.

Bid Evaluation Regimes

Evaluation of Bids with Financial Variables

This is the most commonly used regime where there is a tendency to concentrate effort on the price alone. It is applicable to lump sum and admeasurement contracts. It is rare for the award to be made to other than the low bidder. This approach fails to identify the inadequacy of resources and risk treatment.

Evaluation of Bids with Several Quantifiable Variables

If one of the following cases is encountered:

- the contractors are invited to specify their preferred contract duration
- the magnitude and timing of mobilization and advance payment are different from contractor to another
- the contractors are asked to submit a schedule of payments expected to fall due to them

then a single financial parameter which would represent these individual variables and take account of their relationship with time is the Net Present Value; see article 4.3. The successful bid should require the lowest present value of payments from the client, at a discount rate specified by the client.

Evaluation of Bids with Subjective Variables

In appointing contractors for one of the non-conventional approaches the tendered fee is usually a secondary factor compared with other qualitative factors such as quality of staff and experience of the contractual arrangements. On the other hand, in assessing bids for pre-qualifications all the factors need a qualitative consideration and therefore subjective judgment must be exercised.

One approach for evaluating similar decisions is to use a points system. Each variable to be considered is listed and may be weighted in recognition of its importance to the particular contract. The bids are ranked by allocating each bid a score against each variable.

Evaluation of Bids with both Quantifiable and Qualitative Variables

Methods to take account of both price and qualitative aspects when making the final selection are:

1. The points system is used to establish a minimum acceptable level. Decision could be based on price alone for all bids above this level.
2. The difference of x points is evaluated as a price.
3. Final decision may be based on a combination of weighted price and qualitative points, e.g. 66% price + 34% points.

