

# **Organizational Structures for Engineering Projects**

**Organizing:** The process of determining the responsibilities and scope of authority of each position in the company structure and defining how each company segment interrelates with the others.

## **Organizational Types**

Six principal structures of contractual relationship between the project participants:

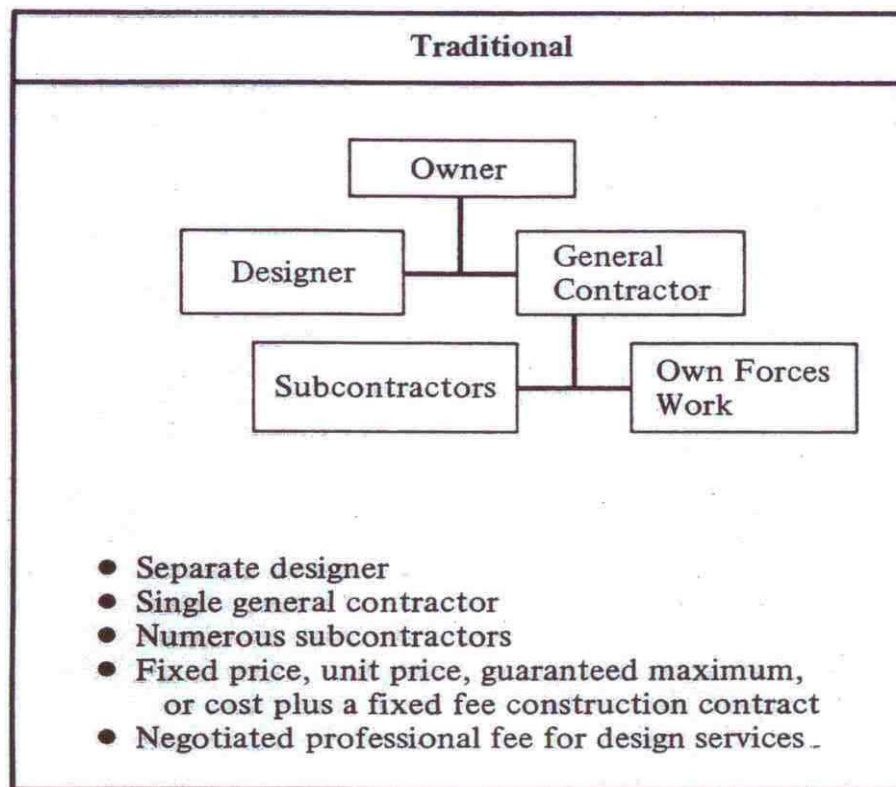
- 1. Traditional**
- 2. Package Deal Contracts / Design-Build / Turnkey**
- 3. Direct Labor / Owner- Builder / Force Account**
- 4. Management Contracting**
- 5. Design/ Build/ Operate (DBO)**
- 6. Design/ Build/ Finance / Operate**

## **1. Traditional Linear Approach**

The traditional linear approach refers to the procedure of design, bidding and building (**DBB**) following one another in consecutive order.

### **Main Aspects of Traditional Linear Approach**

1. The owner selects a designer (A/E) who is responsible for the design of the project and preparing the complete bidding documents.
2. The owner then receives bids based on tendering documents from contractors and awards a contract to the lowest responsible bidder.
3. The contractor builds the project, and upon completion, the owner assumes the responsibility for the operation and maintenance of the project.
4. The Engineer or A/E supervises, inspects, monitors, and controls the construction works.
5. Construction itself may be the responsibility of a single general contractor under contract to the owner or multiple prime contractors.
6. Management of both the design and construction is divided between the parties.



### Advantages of Traditional Linear Approach

1. The approach is accepted, well-established and has been used widely.
2. The owner may benefit from price competition in a competitive situation.

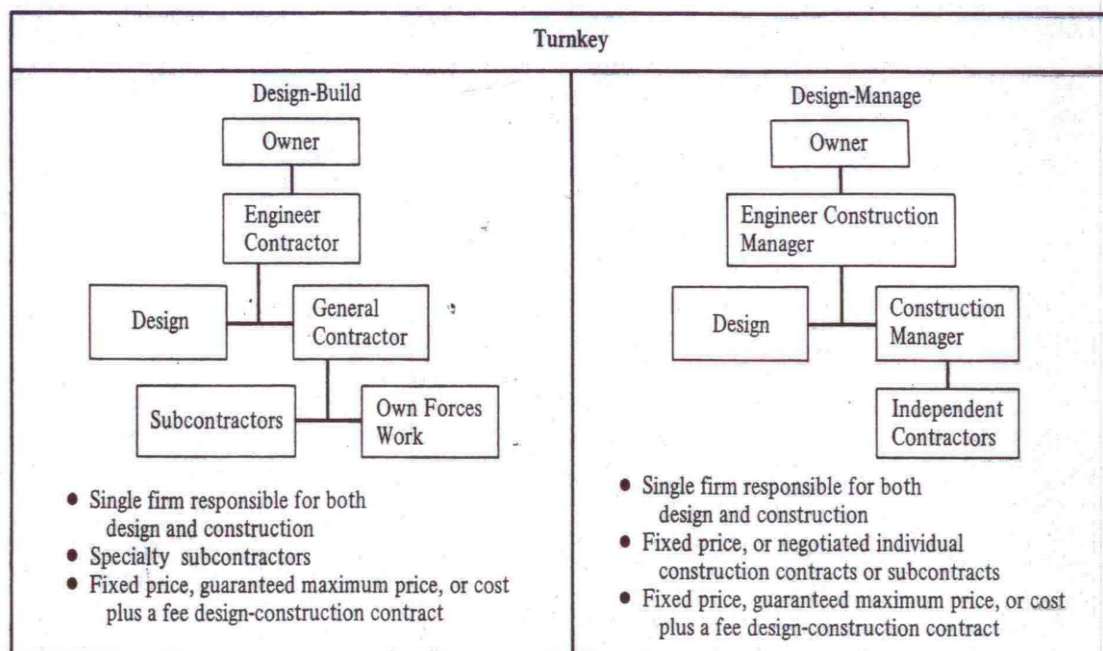
### Disadvantages of Traditional Linear Approach

1. Design usually does not benefit from construction expertise.
2. Overall design-construct time is usually the longest. Design must be substantially complete prior to award of the contract.
3. Changes to the work or unforeseen difficulties will often end in disputes and litigation that can drive up costs in spite of the fixed-price concept.

## 2. Package Deal Contracts / Design-Build / Turnkey

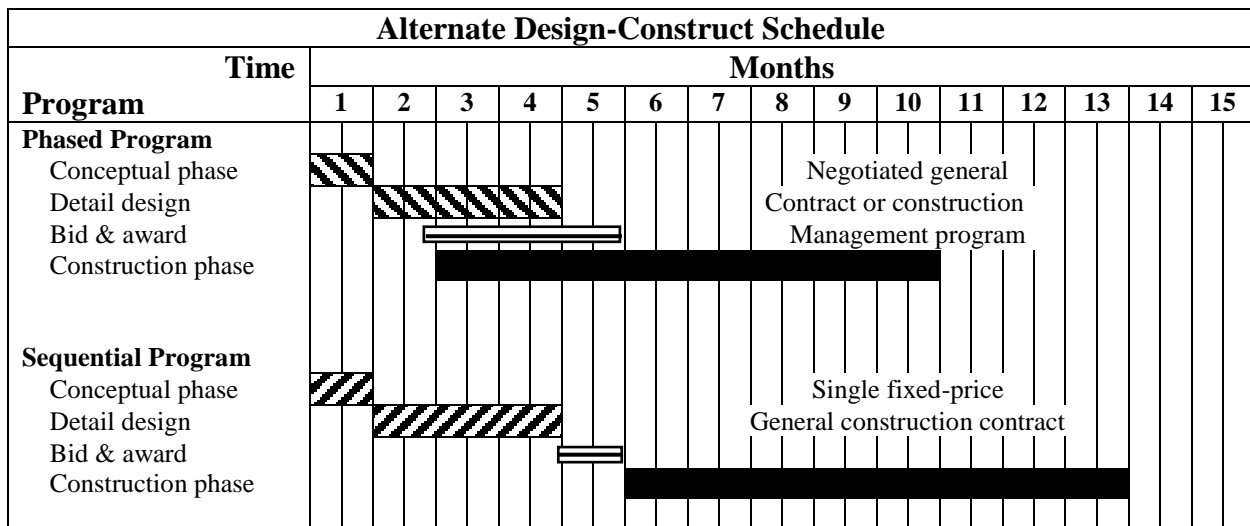
### Main Aspects of Design-Build (Turnkey)

1. The owner selects a single contractor to both (detailed) design and building of the project.
2. Parts of the design may be sub-contracted to specialist consultants.
3. Most of the design and construction risks are carried by the contractor.
4. Upon completion of construction, the owner assumes responsibility for its operation and maintenance.
5. 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.



## Advantages of Design-Build (Turnkey)

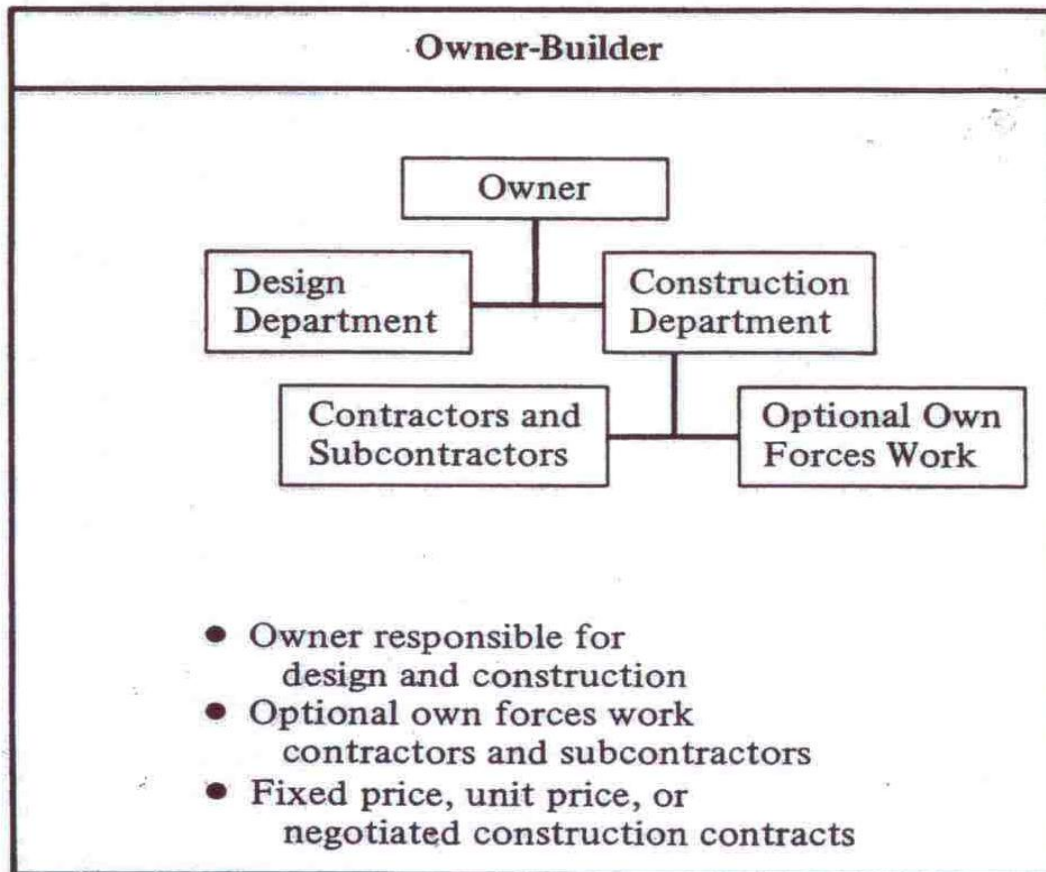
1. Melding the two functions of design and construction, and injecting contractor expertise and advice into the design process offers the possibility of achieving both time and cost savings for the owner.
2. Because phased construction (also known as Fast-Tracking), refers to the overlapping accomplishment of project design and construction, can be utilized under a design-construct contract, design-construct time can be reduced.



### **3. Direct Labor / Owner- Builder / Force Account**

1. The owner-builders perform both their own design and some or all of the actual construction with their own forces.
2. 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 labor force.

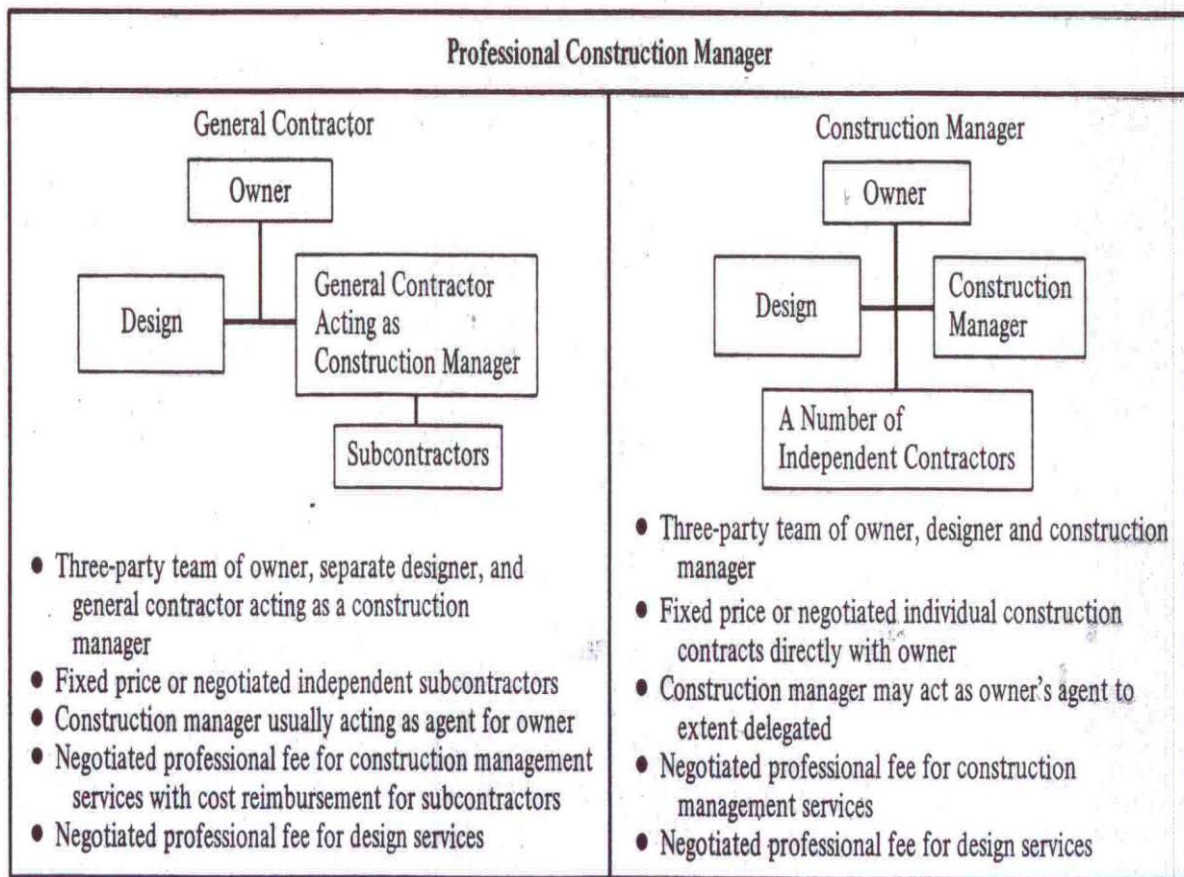
3. Some successful construction companies have themselves turned into owner-builders, constructing apartment houses, office buildings, and other rental or leaseback facilities.
4. The approach may result in a higher total cost than would have been the case if a contractor had done the job.



#### 4. Management Contracting

1. The client appoints an external organization, known as the management contractor or as the professional construction manager, to manage and coordinate the design and construction phases of a project.

2. The design may be provided by specialist design firms and in some cases by the management contractor.
3. The construction contracts will be awarded to construction contractors by the management contractor, probably as many small packages.
4. Phased construction that may be used in this approach can reduce the total time required to achieve project completion.
5. 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 services.
6. The services offered by the management contractor may include:
  - Management and programming of design
  - Cost forecasting and financial arrangement
  - Preparation of tender documents
  - Tender analysis and selection of contractors
  - Planning and scheduling of the construction works
  - Management of construction works
  - Construction contracts administration.



## 5. Design/ Build/ Operate (DBO)

1. A project delivery method that integrates operation with the tasks of design and construction.
2. The owner selects a single contractor to design, build, and operate the project for a specified period of time.
3. Maintenance and repair responsibilities during the operations period are normally delineated in the contract.
4. At completion of the contract, the owner assumes operation and maintenance responsibilities itself or recompletes this task through another procurement process.



## **6. Design/ Build/ Finance / Operate**

1. Similar to DBO, except that the responsibility for financing the project is assumed completely by the contractor, typically at the contractor's risk.
2. Financing relies upon projections of future user fees.

## **Factors Influencing the Choice of an Organizational Structure**

1. Size and nature of the work packages within the project
2. Resource availability by the client organization
3. Management ability of the client