

# Construction Management Notes

## Lecture 1:

### Construction projects:

- Public Utilities: Power, water telecoms.
- Public Works: Major roads, dams, irrigation and drainage
- Transport: Minor roads, ports, waterways
- Other: Housing schools, hospitals.

### Projects:

- A series of tasks and activities that have a specific objective, defined start and end dates, funding and dedicated resources.
- A temporary endeavour undertaken to create a unique product, service or result.
- A project must have a definite beginning and end.

### Project Aims:

- To satisfy a defined need, demand or provide a solution to a defined problem.
- To achieve the desired goals and objectives within the specified time frame and budget.

### Project Characteristics:

- To address a specific need or problem
- A start and finish point
- A number of interrelated and interdependent activities
- A set life cycle
- A budget
- Requires resources.
- Unique and requires a defined set of activities
- Completed within a time frame
- Requires management

### Project Stakeholders:

- Owners
- Users
- Financiers
- Operators
- Interest groups (Public, environmental activists, land owners etc)
- Constructors

### Project Management:

- The overall planning, control and coordination of a project
- From inception to completion
- The project needs to be completed on time within authorised cost and the required quality standard.

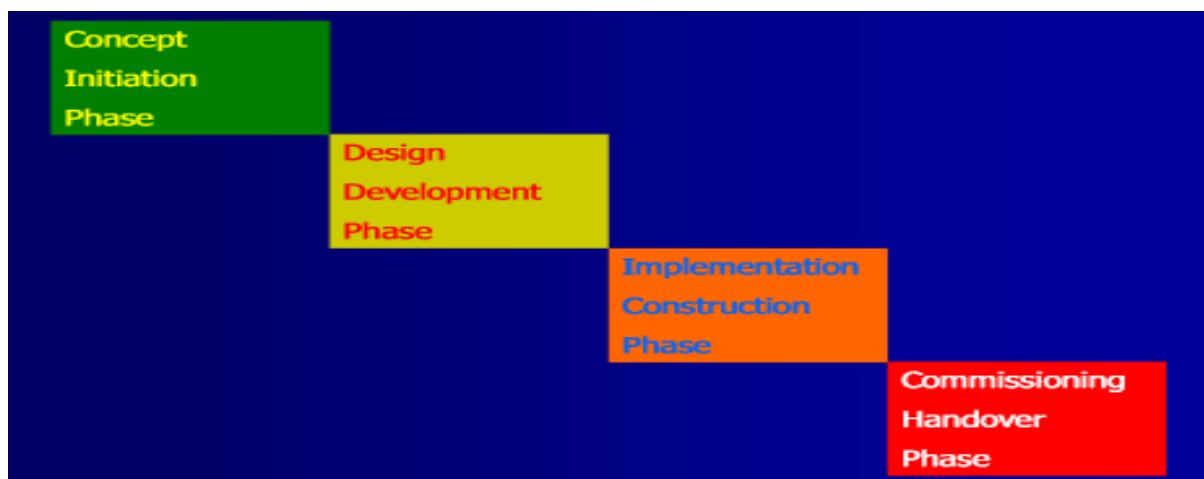
### Project Manager Properties:

- Leadership
- Communication
- Team Selection and Team management
- Problem solving
- Decision making
- Planning
- Negotiation

### Classic Management vs PM:

- Classic management is a continuous process that passes from year to year whereas project management has a defined start and end point. Classic management is concerned with the long term management of a business whereas PM has specific objectives for usually unique projects. Pm also have finite resources.

### The Project Development Life Cycle



### Concept/ Initiation Phase:

- Define goals and objectives
- Identify stakeholders
- Feasibility study
- Select team members

### Design/development Phase:

- Prepare Work Breakdown Structure (WBS)
- Project Plan
- Project Schedule
- Resource Schedule
- Procurement and contracts
- Risk management plan
- Quality management plan

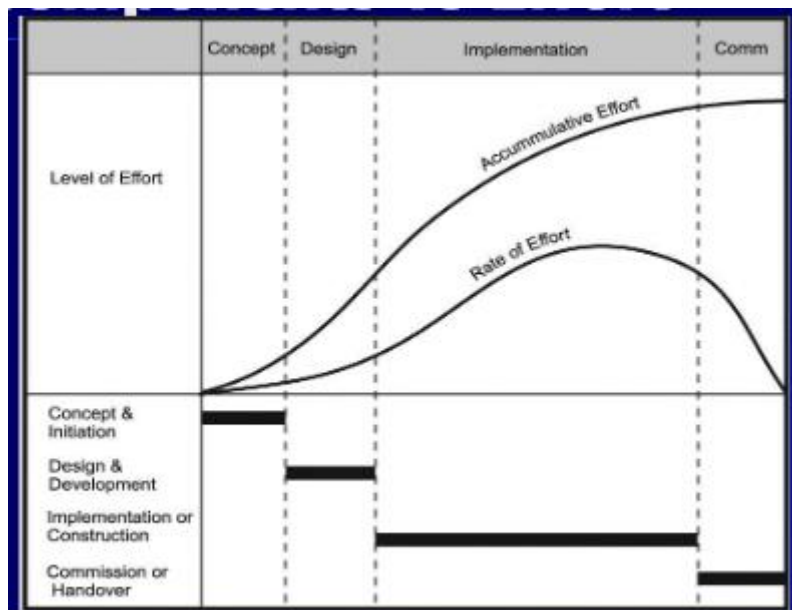
## Implementation/construction Phase

- Maintain budget time and quality during construction.

## Commissioning/Handover Phase

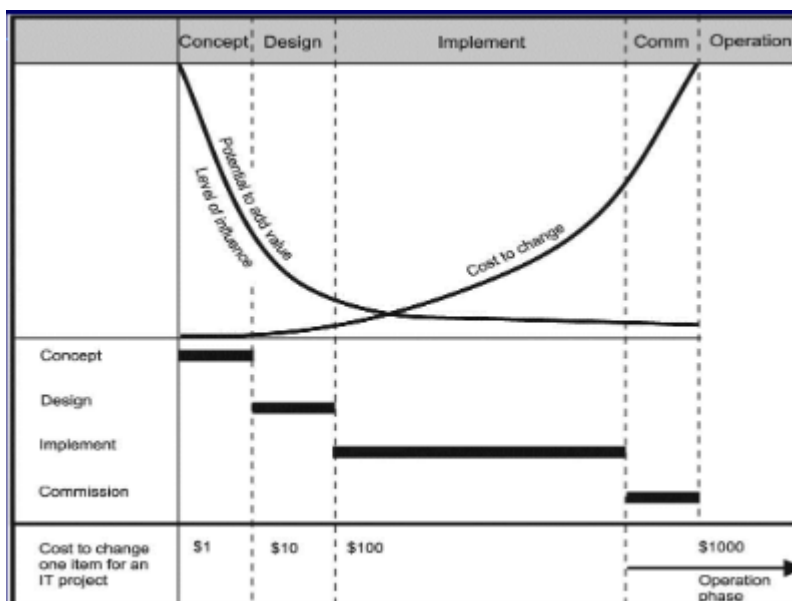
- As built drawings
- User manual
- Maintenance schedule
- Evaluate project

## Components vs Effort of a project:



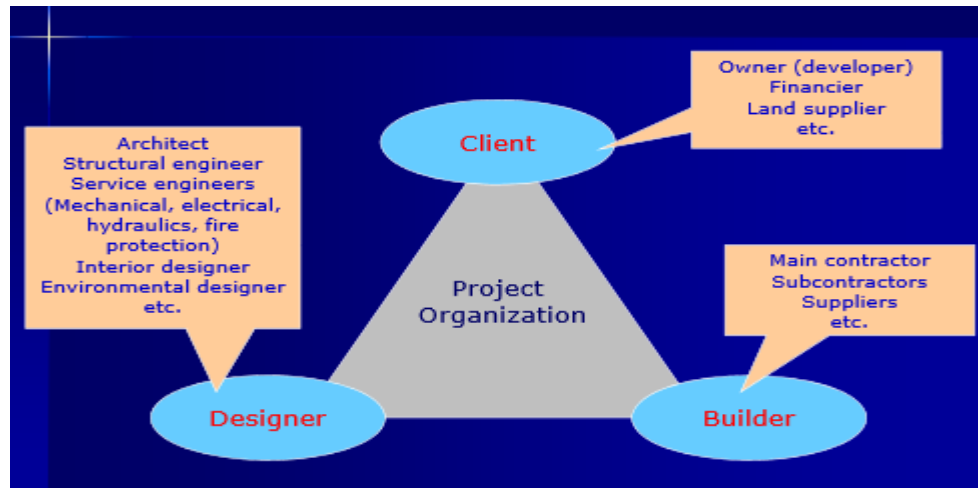
## Influence vs Cost:

- Projects are much easier to change at the front end, before real construction has been completed. This is because positions have not become entrenched and less money has been spent.



## Lecture 2: Project Delivery

### Project Participants:



### Clients:

- Requirements:
  - Ideally they want low cost, high quality work that is completed rapidly.
  - Generally there is discrepancies related to the handover of a project due to factors such as inclement weather, drawing revisions and other factors.

### Project Delivery System and Contractual Arrangement Relationship:

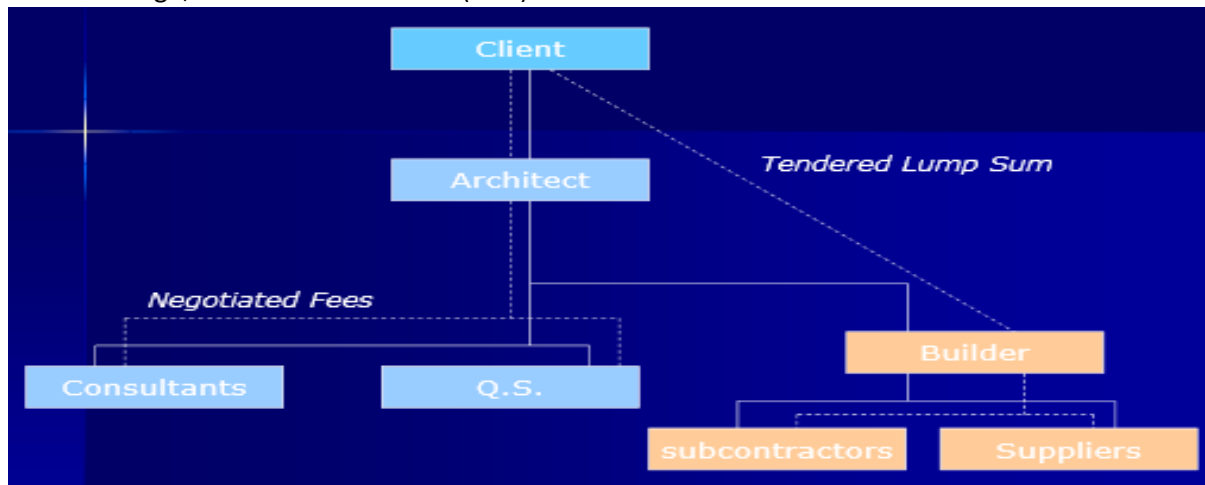
- The interrelationship between the major parties collectively is referred to as the Project Delivery System.
- It presents the contractual structure and compensation arrangement that the owner uses to acquire a completed facility
- The contractual arrangement is the details of the project delivery system in contractual form.
- Contractual arrangements and functional arrangements (Determine who is responsible for overseeing the performance of each party in the PDS) are major parameters pertaining to PDSs.

### Options for Contract Price:

- Follows on from the options made in regard to the type of delivery system that will be used.
- The price payable can either be lump sum, fixed price (based on schedule of rates) or cost plus (determined once a project is completed).

### Traditional PM System:

- Design, Bid and Build method (DBB)

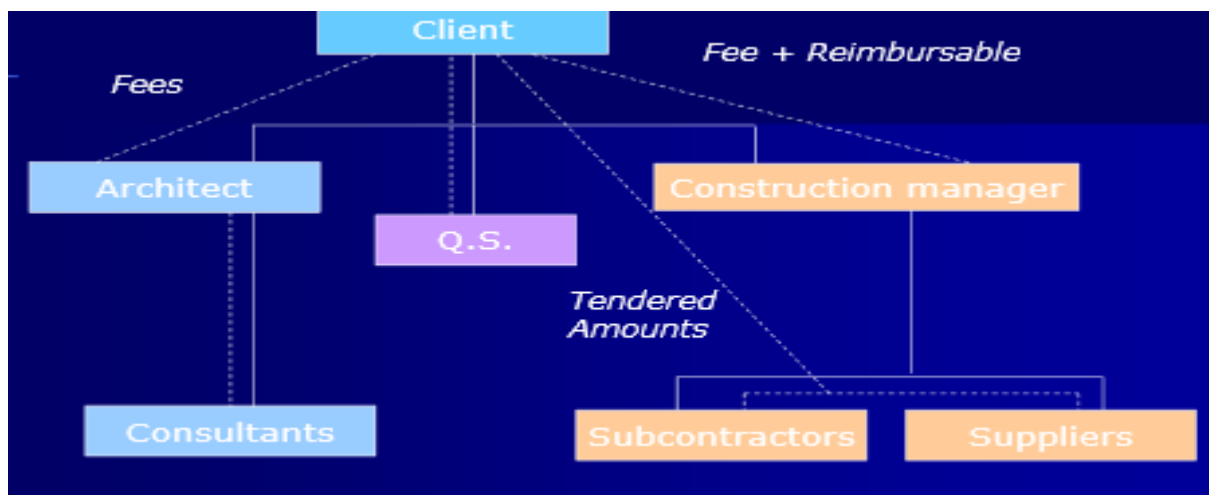


- The Client:
  - Acquires land and arranges finance.
  - Appoints architect to prepare the design and a builder to organise construction.
- The Architect
  - The architect carries out the conceptual and detailed designs as well as selecting the design team (engineers, interior designers, surveyors etc). They also have contractual links with the design team and act as a PM hence they administer the tender process and help the client appoint a builder.
- The Builder
  - The builder appoints the subcontractors and material suppliers within their contractual arrangements regard budget. They also accept liability for construction performance and coordinate this performance. Their link is to the architect rather than the client directly.
- Risk Sharing:
  - Client=Low risk
  - Contractor is responsible for the construction quality hence takes the risk of the subcontractors.
- Advantages:
  - Accurate estimate of cost and construction time
  - Risk associated with design changes is expected to be low.
  - Clients financial risk associated with construction stage is relatively low
  - The availability of full documentation is expected to ensure the highest level of quality control.
  - Selection of the low bidder ensures that the lowest responsible price is obtained.
  - All bidders are treated equally
- Disadvantages:
  - Construction cannot start until project is fully designed and documented. This extends the period of the project which ups the risk for the client
  - There is a high potential of conflict between the architect and the builder
  - Variations can be costly
  - Lack of input from the builder can weaken the constructability of the project.

- Contract Strategies:
  - Because the design of the project is established without consultation from the prospective general contractor it is assumed that the design team have broad site experience in regard to things like the availability of resources and knowledge of constructability.
  - If they do not, then a consultant must be hired.
  - The client requires the architect to provide advice and monitoring the project through design.

### Construction Management:

- A managed delivery system which is characterised by a more active role for the client as a member of the project team.
- Aims to unite the client with the architect with the builder in a non-adversarial, cohesive contractual relationship.
- Agency/Non agency construction management:

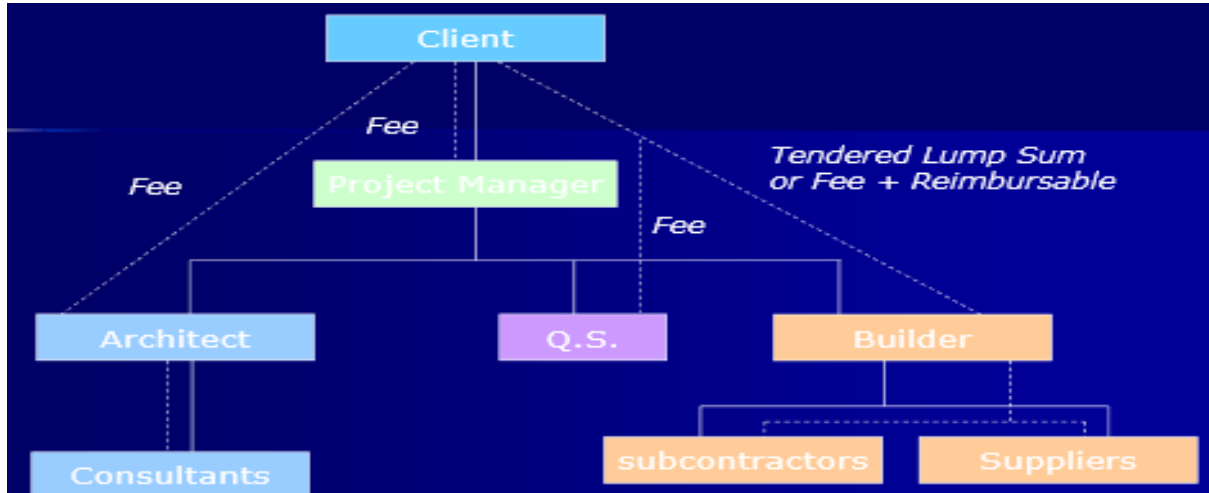


- Client:
  - Acquires land and arranges finance.
  - Appoints and architect to prepare and coordinate the design and documentations
  - Appoint construction manager to organise construction and input on the design
  - Appoint subcontractors based on advice from PM
  - Work in the project team actively and is involved in the day to day occurrences of the project.
- Architect:
  - Carry out conceptual and detailed design.
  - Organise a design team including structural engineer, service engineer, interior designer and surveyors.
  - Help construction manager arrange documentation and administer the tender process.

- Construction Manager
  - Can be appointed via agency CM or non-agency CM
    - Agency CM: CM can be a contractor, design consultant or any other type of consultant so long as they have knowledge and experience managing a project.
      - CM also helps the client prepare documentation, separate the construction work into trade packages and select subcontractors.
      - CM has no contract to build
    - Non-agency CM: Undertakes much of the same tasks as the agency CM pre construction. After the commencement of construction, non CM is contracted to manage the construction of the project.
    - Construction work will not be divided into trade packages, and the CM prepares documentation and selects subcontractors directly.
    - Normally the CM does not undertake construction tasks himself.
- Risk Sharing:
  - Client takes most of the risk (especially under agency CM)
  - In non-agency construction the CM takes the risk of the construction
  - Architect takes risk of the design
- Advantages:
  - Fast track and improved constructability
  - Non adversarial climate therefore improved efficiency.
  - The project is less reliant on risk contingencies since the client assumes more risk,
  - Greater flexibility to make design changes.
  - Can attract more competitive prices from separate contractors
  - Information flow is enhanced.
  - Breaking up work into packages allows the client to control the budget and change, omit or postpone work where the budget may be exceeded.
- Disadvantages
  - Total construction cost is unknown until the project is complete
  - The client carries more risk and is more exposed to the adverse impact of risk.
  - Client's involvement in the design process can have a detrimental effect on cost.
  - There may be no incentive for the CM to contain costs
  - Liquidated damages are almost impossible to enforce because of the difficulty of proving who is to blame.
- Contract Strategies:
  - Depending on the extent of work and risk the architect may be engaged on a lump sum or percentage fee contract.
  - Under agency CM the Cm is contracted with lump sum management fees with a guaranteed maximum price. If the max price is breached then the CM may need to pay the excess.
  - Under non-agency CM, The CM is contracted with cost-plus with a payment of a lump-sum management fee.
  - Subbies are contracted on a competitive lump sum.

## Project Management

- Refers to a unique organisation structure with the PM as a leader of the team for the procurement of the project.
- More refined form of the agency CM method where PM assumes total responsibility of managing the project from inception to completion.



- Client:
  - Acquire land and arrange finance
  - Appoint and empower a PM to represent the clients interest
  - Act as a member of the project team but fully represented by the project manager.
  - Have only contractual relationship with architect and builder
- PM:
  - Have contractual relationship with client
  - Manage the project from start to finish
  - Responsible for the development of a strategic plan, organisation of resources, coordinating activities and control of the entire process.
  - Make recommendations to the client about architect and builder.
  - Do not have contractual relationship with architect and builder.
- Architect:
  - Appointed by the client but overseen by the PM
  - Carry out conceptual and detailed designs
  - Organise team including struct engineer etc.
  - Have contractual links with these specialist consultants.
  - Reports to the PM and has communication link with the builder.
- Builder/Contractor
  - Appointed by the client with a lump sum contract or fee+ reimbursement.
  - Appoint subcontractors and material suppliers within budget constraints
  - Fulfill all obligations under the contract
  - Accept liability for construction performance and coordinate subcontractors.
  - Report to the PM