

STUDENT'S NAME _____

UNIT-I : PROJECT MANAGEMENT

* Project : Project is a one shot, time limited and goal oriented major undertaking, requiring commitment of varied skills and resources.

" A project is a combination of human and non-human resources pooled together in a temporary organisation to achieve a specific purpose".

* Basic Characteristics of project :

- Project is temporary activity
- " big work
- One time & unique
- It involves various dimension (cost, time, material, etc)
- " tasks & uncertainty
- It's a process of working towards attaining the set of objectives
- The various works that constitute the whole are inter-related & are performed to serve a common purpose.

* Characteristic features of a project :

- 1) Objectives - A project has a fixed set of objectives. Once the objectives have been achieved, the project ceases to exist.
- 2) Life span : It has to come to an end
- 3) Single entity : A project is one entity
- 4) Team work : A project calls for a team work
- 5) Life cycle : A project has a life cycle reflected by growth, maturity & decay.
- 6) Uniqueness : No two projects are exactly similar
- 7) Change : The project sees many changes throughout its life.
- 8) Successive Principle : What is happened during the life cycle of a project is not fully known at any stage, it

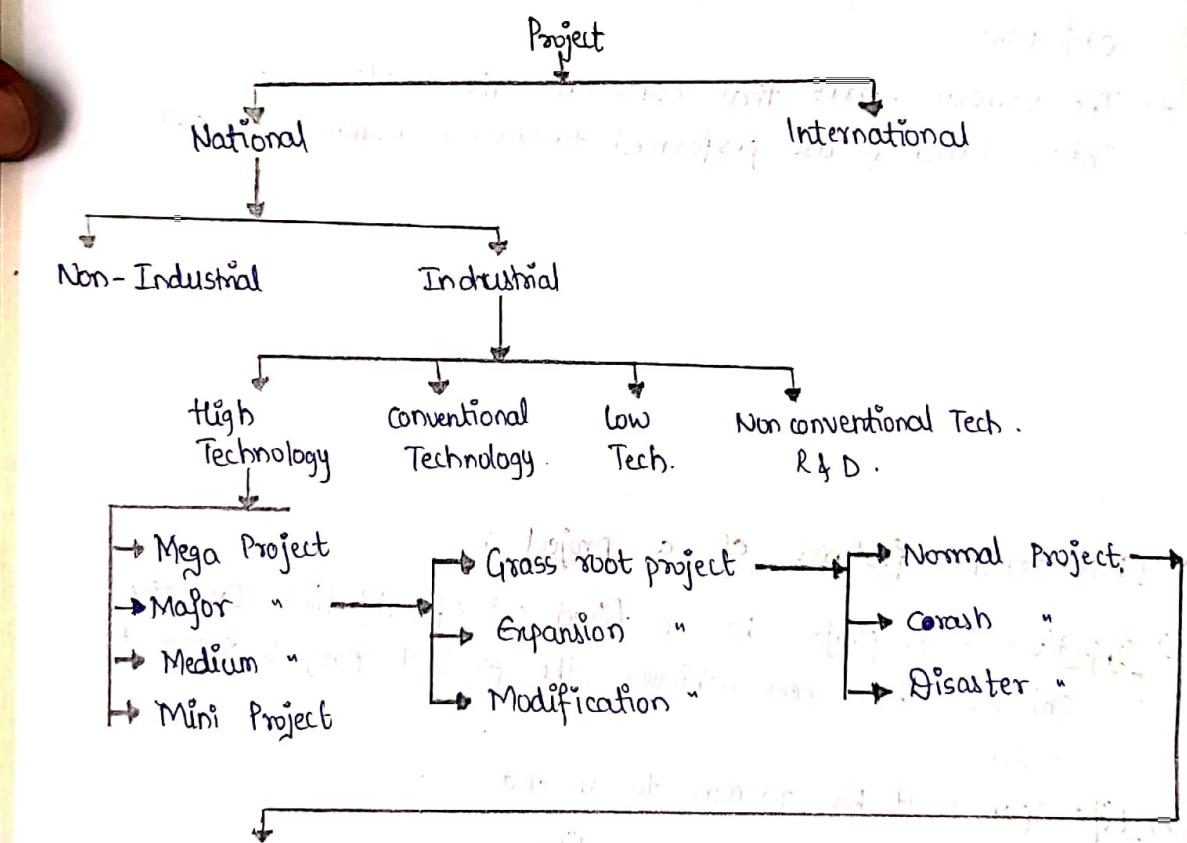
has to be completed in all stages.

- 9) Made to Order: A project is always made to order of its customer.
- 10) Unity in Diversity: A project is a complex set of thousands of varieties.
Ex: Technology, equipment, materials, machineies, etc.
- 11) High Level of subcontracting: High percentage of work in a project is done through contractors.
- 12) Risks & Uncertainties: Every project has Risks & Uncertainty associated with it. It depends on type of project.

* Project Management:

"PM is the planning, organizing, directing & controlling of company resources for a relatively short term Objectives that has been established to complete specific goal & objectives".

* Categories of Project:



* Normal Projects:

- In this type of projects adequate time is allowed for implementation of the project.
- All the phases in a project are allowed to take the time they should normally take. This type of project will require minimum capital cost.
- No sacrifice in terms of quality.

Crash Projects :

- In this category of projects additional capital costs are incurred to gain time. Maximum overlapping of phases is encouraged & compromised in terms of quality are also not ruled out.
- Savings in time are normally achieved in procurement & construction where time is brought from the vendors & contractors by paying extra money to them.

Disaster Projects :

- Anything needed to gain time is allowed in this project. Vendors who can supply "yesterday" are selected, irrespective of the ~~cost~~.
- Round-the-clock-work is done at the construction site. Naturally, capital cost will go up very high, but project time will get drastically reduced.

Project Life Cycle Phases :

• A project is a one shot time limited major undertaking. A project live b/w two cut-off points & therefore, this time span is known as "Project Life Cycle".

• A project passes through the various phases in the life of a project. ~~Very~~ & large, all projects have to pass through the following 5 phases.

1) Conception Phase

2) Definition

3) Planning & Organizing Phase

4) Implementation Phase

5) Project Clean-up phase

1) Conception Phase :

- This is the " during which the project idea germinates.
- The ^{idea} may first come to the mind to overcome certain problems
- The problems may be non-utilization of available fund, expertise, plant capacity are simply unfulfilled aspiration.
- Whatever may be the case, the idea need to be put in black & white and given some shape before they can be considered & compared with competitive idea.
- If this phase is avoided or truncated, the projects will have defects & may become a liability for investor. A well conceived project will go a long way for successful implementation & operation of a project.

2) Definition Phase:

- " " of the project will develop the idea germinated during the conception phase & produce a document describing the project with sufficient details covering all aspects necessary for the customer & financial institutions to make up their mind on project ideas.
- If this phase is not done properly, it will increase the risk content of the project. To avoid risk, it is required to examine some areas thoroughly.

3) Planning and Organizing Phase:

- This phase is involved with preparation for project to take-off smoothly. It does not limit itself to paper work & thinking.
- Many activities are undertaken during this phase. This phase overlaps so much with the definition & implementation phase that no formal recognition is given to this by most organization.
- Some organization prepare document such as project execution plan.
- Organizations deal with the following
 - Organization & man-power
 - Identification of project manager
 - Schedules & budgets
 - Licensing & governmental clearances
 - Finance
 - Systems & procedures
 - System Design & basic engineering packages
 - Work packaging
 - Project infrastructure & enabling services
 - Site preparation & investigations
 - Construction resources & materials
 - Design basis, general cond's for purchase & contracts

4) Implementation Phase:

- This is a period of hectic activity for the project. Bulk of work in a project is done during this phase.
- As far as the volume of work concerned, 80-85% of project work is done in this phase only. ∵ People want to start this phase as early as they can.
- All techniques of project mgmt. are applied to this area essentially. This phase itself being more or less the whole project, every attempt is made to fast-track.

- This phase has a high need of co-ordination & control.

5) Project clean-up Phase:

- This is a transition phase in which the hardware built with the active involvement of various agencies is handed over ~~for~~ to the production to a different agency, who was not so involved earlier.
- Drawing, documents, files, manuals are handed over to the customer.
- The customer has to be satisfied with guarantee test run.
- Project accounts are closed, outstanding (balance) payments made, dues are collected during this phase.
- The most important issue during this phase is planning of the staff & workers involved in execution of the project.

*. Tools and Techniques for Project Management:

There are several tools & techniques, which would be contributed significantly towards effective project management. This can be broadly grouped under the following head.

1) Project Selection Techniques

- Cost benefit Analysis
- Risk & sensitivity "

2) Project Execution Planning Techniques

- Work Breakdown Structure (WBS)
- Project Execution Plan (PEP)
- Project Responsibility Matrix (PRM)
- " Management Manual (PMM)

3) Project Scheduling and Co-ordinating techniques

- Bar - chart
- Life - cycle curves
- Line Balance
- Networking techniques - (PERT, CPM)

4) Project Monitoring and Progressing Techniques

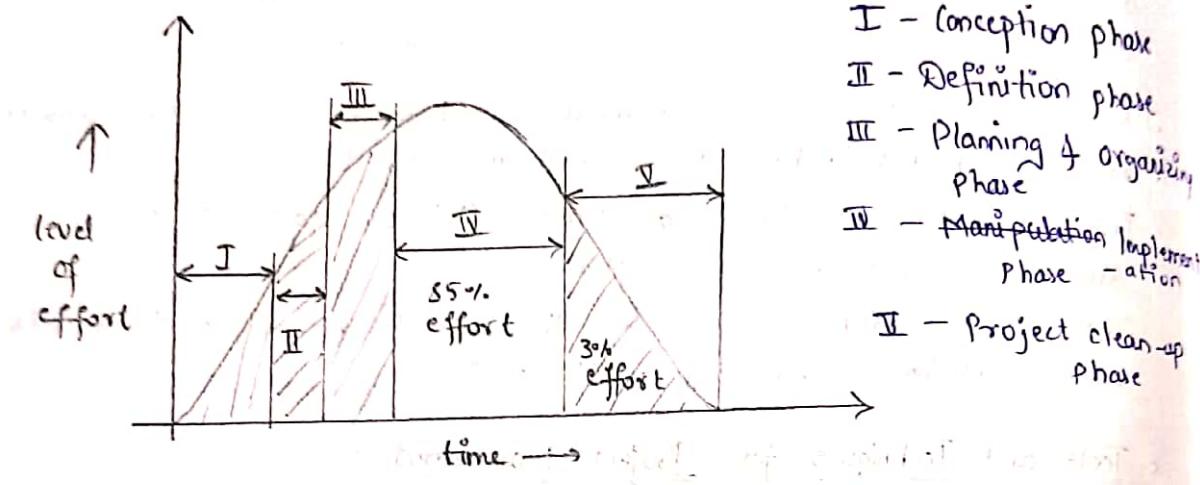
- Progress Measuring Techniques
- Performance Monitoring Techniques
- Updating, Reviewing and Reporting Techniques

5) Project cost and productivity control Techniques

- Productivity Budgeting Technique
- Value Engineering
- COST - WBS

6) Project Communication and Clean-Up Techniques

- a) Control Room
- b) Computerized Info. System



* Roles and Responsibility of Project Manager :

- Defining and maintaining the integrity of project
- Development of project execution plan
- Organization for execution of the plan
- Setting of targets & development of system & procedures for accomplishment of project objectives and targets.
- Negotiation for commitments
- Direction co-ordination & control of project activities
- Contract mgmt.
- Non human resource mgmt. & fiscal matters
- Projectising and problem solving
- Man mgmt.
- Satisfaction of customer, govt. and the public
- Achievements of project objectives, cash surplus & higher productivity

* Feasibility Report : is prepared to present an indepth technology - commercial analysis carried out on project idea for consideration of financial institutes & other authorities empowered to take investment decision.

According to the guidelines published by the planning commission, a feasibility report should include,

- 1) Raw material survey
- 2) Demand survey
- 3) Technical Study - Product Pattern
 - Process Pattern
 - Plant size
 - R.M. requirements for plant)
- 4) Location Study
- 5) Project capital cost estimates & source of finance
- 6) Profit & cashflow analysis
- 7) Cost benefit analysis.

* Raw Materials Survey :

- The R.M. may belong to any of the following category.
 - 1) Available in Natural form as deposits, either on the surface or underground, in one part or different part of country.
 - 2) The size & life of the plant depends on availability of quantity of raw materials & quantity of R.M. com already committed for different plant in operation.
 - 3) Available as finished product or bi-product are available in near future
 - 4) Not available in the country, but to be imported. It may be in natural form or as finished product or bi-product

* Demand Study :

- normally would establish the following:
 - 1) Demand - It covering uses of the proposed product, prospective consumers, present consumption, expected consumption, possibility of export.
 - 2) Supply : Covering assessment of existing capacity, present level of production, capacity utilization, expected consumption, extent of import.
 - 3) Distribution : It covering channel of distribution, mode of transport, mode of packing, cost of distribution, govt. policies
 - 4) Prices : Covering both domestic & international price trends, control on price as imposed by the govt., prevailing duties & taxes.

- Most of the info. is available in published literature, however an independent survey may needed.
- Some of the documents that are usually referred for demand study are as follows.
 - 1) Plan documents : Issued by the planning commission, provides info. on plan proposals & growth targets that are both physical and fiscal.
 - 2) Guidelines to Industry : Published by the dept. of Industrial development, Ministry of Industry. It provide info. about licensed & installed capacity, present production, import & export,

design & fabrication, future scope, etc.

- 3) Economic Survey: Published by the Ministry of finance, it provides data on Industrial production, prices, exports, etc.
- 4) Annual Survey of Industries: It is published by central statistical organization, it provides data on production, no. of units installed, capacity for several industries.
- 5) Import & Export Statistics: Published by the Ministry of commerce, it provides data on imports & exports of a very large no. of items.
- 6) Monthly bulletin of RBI: Provides info. on production & cost indices for various industrial items.
- 7) Survey reports of various Institutions: Publications of Industrial bank of India (IDBI), National Council of Applied Economic Research, Times of India Economic Division, etc.

These documents provide info. relating to production, consumption, import-export & prices.

*. Technical Study:

- 1) Product Pattern: Demand survey, R.M. survey. Economic Scale should be sufficient to select plant capacity. The selected process also determines the various co-products & bi-products that are possible.
- 2) Total Spectrum of products, co-products & bi-products represents i.e. product pattern.
- 3) Process Pattern: Detailed evaluation including the economics of operations of alternative operation scheme is necessary for selecting an optimum process.

*. Location Study:

To meet targets relating to time and cost it is necessary that the site has been properly selected & possession taken before the zero date. Normally, financial institutions will depute a team of experts to inspect the site before they sanction any loan.

- The project sites are selected on several considerations i.e.
- a) Availability of land, soil characteristics, cost of land
 - b) Approach to site
 - c) Source of R.M. & transportation requirement
 - d) Transportation & marketing of finished products
 - e) Source & availability of water
 - f) Availability of power & source
 - g) " " skilled man power
 - h) Social amenities
 - i) Availability of Tax incentives
 - j) Facilities for drainage & effluent disposal
 - k) Availability of engineering & maintenance facilities
 - l) Acceptance of project by the local bodies.

* Types of Cost Estimates:

There are roughly 5 to types of cost estimates i.e made during the life cycle of a project. These are

- 1) Order of magnitude estimate
- 2) Study estimate
- 3) Preliminary estimate
- 4) Definitive "
- 5) Detailed "

1) Order of magnitude estimate:

- This estimate is made when a project has been identified & the entrepreneur wants to get a rough idea of the investment, so as to decide whether to perceive the project or not.
- At this stage the entrepreneur knows the description of the project with the capacity of the plant of the product of the same. Even this info. it is possible to estimate with the accuracy of about ± 60%.
- Ratio methods used to find order of magnitude estimates

ii) Investment to per annual form of capacity :-

→ If installed cost of plant P_1 of annual capacity C_1 tonn. is R_1 . Then installed cost R_2 of plant P_2 of annual capacity C_2 tonn. is $R_2 = \frac{R_1 C_2}{C_1}$.

$$R_2 = \frac{R_1 C_2}{C_1}$$

ii) Turn-over Ratio & Capital Ratio: Ratio b/w annual sales & investment expressed in rupee's is known as Turn-over Ratio.

- The ratio b/w plant investment in ₹ & annual sales in ₹ is known as Capital Ratio.

iii) Six-tenth factor: In this method, plant investment is assumed to vary as 0.6 power of the plant size.

$$R_2 = R_1 \times \left(\frac{C_2}{C_1}\right)^{0.6}$$

iv) Inflation Index: This index can be used to work out an estimate if the capacity for the new units remains the same as that of one for which installed cost data are available.

$$\text{Installed cost (new)} = \text{Installed cost (past)} \times \frac{\text{cost index (new)}}{\text{cost index (past)}}$$

v) Location Index: Knowing a plant cost in USA or any other country, the cost of similar plant in India can be estimated using this index. The index can be developed, if the data related to productivity of country involved are available.

2) Study Estimate:

- This estimate is for studying the economic viability of project & also for arranging funds for the project.
- Overall plant cost is estimated by multiplying that the total equipment cost by a factor known as Long Factor.
- Long Factor takes care of civil, electrical, piping, instrumentation, installation & other cost.
- Accuracy of estimate @ this stage is about $\pm 30\%$. The project approved with this estimate.

3) Preliminary Estimate:

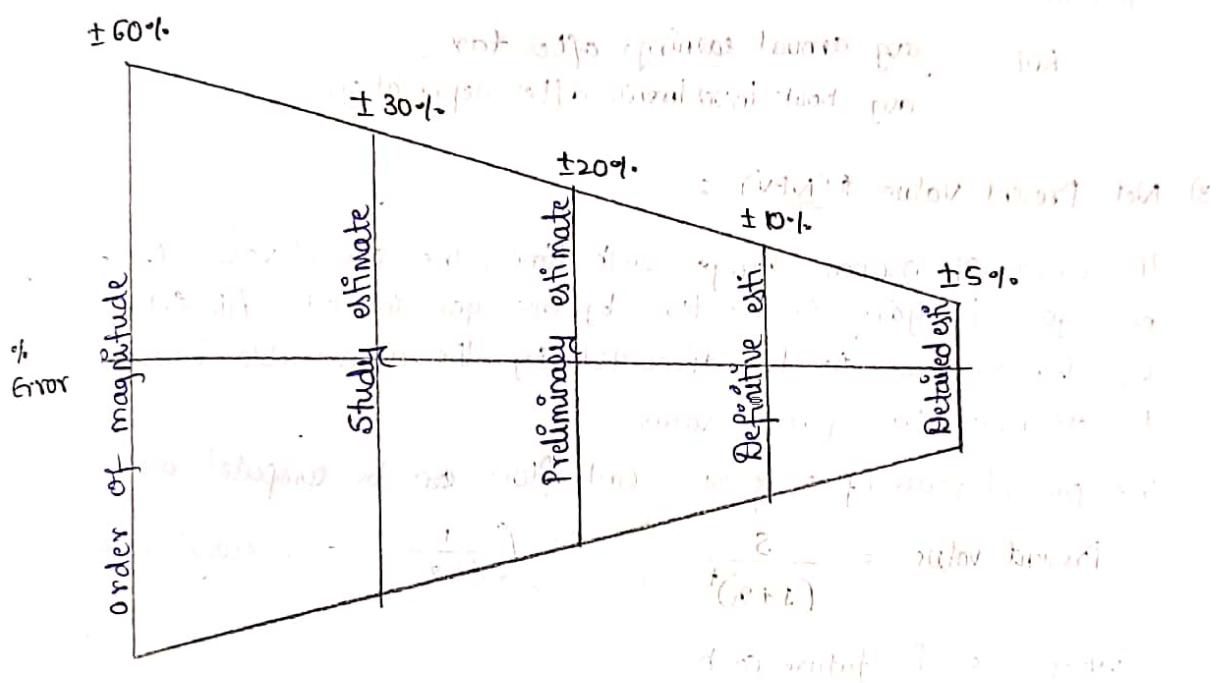
- This estimate is prepared, when the technology package is frozen & the firm implementation schedule is available.
- This estimate can be made with acceptable accuracy. The accuracy even @ this stage is about $\pm 20\%$.

4) Definitive cost estimate:

- This estimate is prepared after the zero date when the detailed engineering of a project is in an advanced stage.
- At this stage additional info. which will add further accuracy to the estimate are likely to be available.
- This estimate may have an accuracy of $\pm 10\%$.

5) Detailed Estimate:

- This estimate may be made on completion of engineering, ordering of equipment & machinery & award of major field contracts.
- At this stage, head office work of a project is mostly complete. The estimate at this stage may have an accuracy of $\pm 5\%$.



8. Evaluation of the project profitability:

- Economic viability of a project can be assessed by the following methods.

→ Payback Period (PBP)

→ Return on Investment (ROI)

→ Net Present Value (NPV)

→ Internal Rate of Returns (IRR)

→ Cost Benefit Ratio (CBR)

2) Payback Period (PBP) :

- PBP is the time required to recover the original investment through incomes from the project. Assuming that the annual income from the project before depreciation but after taxes is uniform. Then the PBP is

$$PBP = \frac{\text{Original investment} (\text{₹})}{\text{Annual income} (\text{in ₹})}$$

3) Return on Investment (ROI) :

The ratio relates earnings to investment. There are several variants in this ratio, but the one most commonly used compute, return on investment as

$$ROI = \frac{\text{avg. annual earnings after tax}}{\text{avg. book investment after depreciation}}$$

3) Net Present Value (NPV) :

- The value of money changes with time. The present value of a ₹ of next year is going to be less by one-year interest. All future amounts will be required to be discounted by the appreciable interest rate to determine their present value.
- The present value of a future cash flow can be computed as

$$\text{Present value} = \frac{S}{(1+r)^t} \quad \left(\frac{1}{(1+r)^t} = \text{discount factor} \right)$$

where, S is future cash

$$\text{Net present value} = \sum_{t=1}^n \frac{S_t}{(1+r)^t} - I$$

where I is initial investment or Original capital investment

S_t is cash flow

4) Internal Rate of Returns (IRR) :

- IRR is a discount rate that makes the NPV of future cash flows exactly zero. The high RR estimates a project break-even discount rate (IRR) which indicates the project's potential for profitability.
- Based on IRR, a project company will decide to either accept or reject a project.

$$NPV = \sum_{t=1}^n \left[\frac{S_t}{(1+IRR)^t} \right] - I = 0,$$

5) Cost - Benefit Ratio :

This method is modified form of NPV. The benefit cost ratio is computed as the ratio of aggregate present values of all future cash flows to initial capital investment.

$$BCR = \frac{\sum_{t=1}^n \left[\frac{s_t}{(1 + r_{\text{risk-free}})^t} \right]}{I}$$

UNIT - II

* Skills requirement for project manager:

- Team building skill
 - Leadership skill
 - Conflict resolution skill
 - Technical expertise
 - Planning skill
 - Organizing skills
 - Entrepreneurship skills
 - Administrative skills
 - Management, support skills
 - Resource allocation skill.

→ Team Building skill: It involves in a whole spectrum of mgmt. skills required to identify, commit and integrate the various task group from the traditional, functional organization into single program mgmt. system.

→ Leadership Skills: An absolutely essential pre-requisite for program success is program manager's ability to lead team within a relatively unstructured environment.

→ Conflict resolution skills: Conflict is fundamental to complex task mgmt. understanding the determinants of conflicts is imp. to program manager's ability to deal with conflicts effectively.

→ Technical skills: It is essential to project manager to understand the technology, market and the environment of business to participate effectively in the search for integrated sol² & technical innovation.

- ~~> Planning skills : Project plan is the roadmap that defines how to get from the start to the final results, planning skills are helpful for any understanding. They are essential for successful mgmt. of large complex project.
 - ~~> Organizing skills : These skills are imp. during project formation and start-up. When project manager establishes the project orgⁿ by integrating people from many different disciplines into an effective work team.
 - ~~> Entrepreneur skills : Project manager needs general mgmt. perspective. These skills are developed through actual experience. However, training, seminars & cross-functional training program can help to develop the entrepreneur skill.
 - ~~> Administrative skills : Project manager must be experienced in planning, staffing, budgeting, scheduling & other control techniques. Helpful tools to manager are the meeting, report, review etc.
 - ~~> Mgmt. Support building skills : Project manager is surrounded by the no. of organizⁿ that either supporting or control his activity. An understanding of these interfaces is imp. to project manager as it enhances their ability to build favourable relationship with senior mgmt.
 - ~~> Resource allocation skills : The allocation of company resources to various activities of project is an essential skill to the project manager for effective utilization of company resources and complete the project with economical way.
- * Authority required for PM is for dealing with
- Project scope → Project technical performance
 - " goals → " schedules & budgets
 - " execution mode → Fund & other resources
 - " organization → Project Personnels
 - " Purchase → Public & share holders
 - Contracts and consultant → Project environment

- Management system & Procedures
- Project performance reviews

Ques. Delegation :

In some situations Project manager has to be at more than one place and doing more than one thing simultaneously.

A manager at his individual level can achieve this by entrusting some task to the care or management of his sub-ordinates. This is called Delegation.

In P.M., delegation has to take place not only at individual level but also @ the institutional level.

Delegation is required due to the following reasons:

- To help internally or externally.
- To reduce the burden on the manager.
- Time constraints.
- Where there is no technical know-how.
- In absence of proper infrastructure.
- If it is routine work.
- When other person can do the work with a better quality.

The issues relating to Delegation are:

- What to Delegate?
- When to " ?
- How to " ?

What to Delegate?

- Delegation doesn't go ahead with a project without authority. The project manager is being merely asked to do a task and not to manage a task.
- He cannot be expected to assume responsibility nor held accountable for results. He has nothing to sub-delegate, nor can he demand results from others.

When to Delegate?

- When one is simply overburdened and cannot handle all the tasks in the required time though one has the know-how?
- When one doesn't have the know-how
- When someone can do better qualitatively, economically & on-time

- When the work is not secret or when the delegation will not cause problem even it is secret.
- When the work is routine & delegator's time can be more profitably utilised by diverting his attention ^{from} ~~when routine areas~~

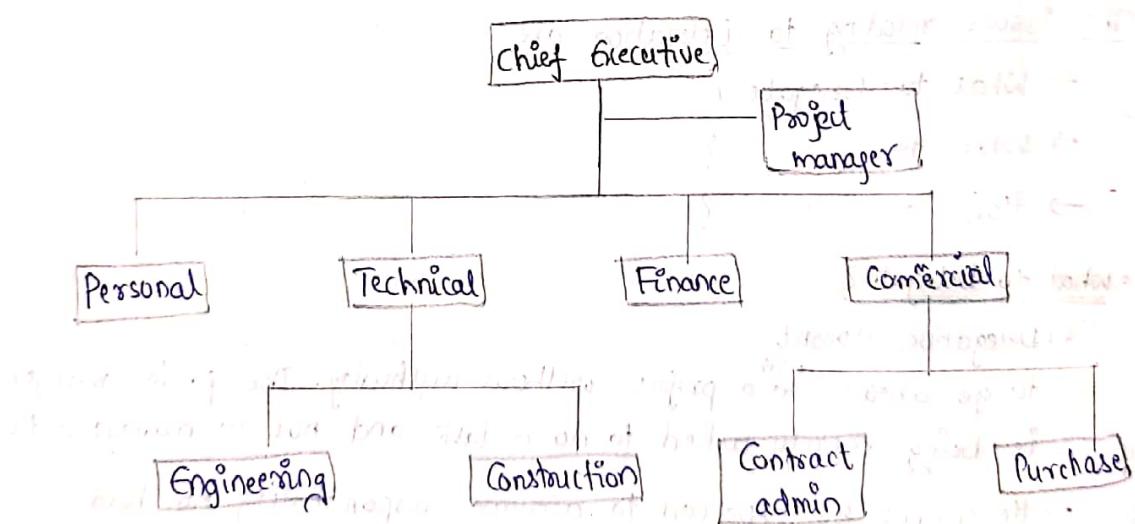
- How to Delegate?

- To get most from delegation, the delegatee must be given a complete picture of what he has to do, how to do it & how much authority he has to get it done.
- It is also necessary that the entire thing is put on record, as otherwise the delegatee would not know what the delegator has in mind. & also

- * Project Organisation:

- An organisation chart is the simplest & quickest way to demonstrate the project manager's authority. The details such as where a project manager is positioned, to whom he reports, those with whom he communicates & all those who report to him, will tell much about a project manager's authority.

~~4. Imp~~ → Project manager as a staff assistant to the chief executive:



- Chief executive cannot devote much time to track project activities in this type of organisation.
- This organisation may work for small projects
- The above figure shows one arrangement in which project manager virtually has no authority. He serves as a staff assistant to the chief executive. The project manager doesn't make any decision for the project, nor does he provide any staff service to the functional department.

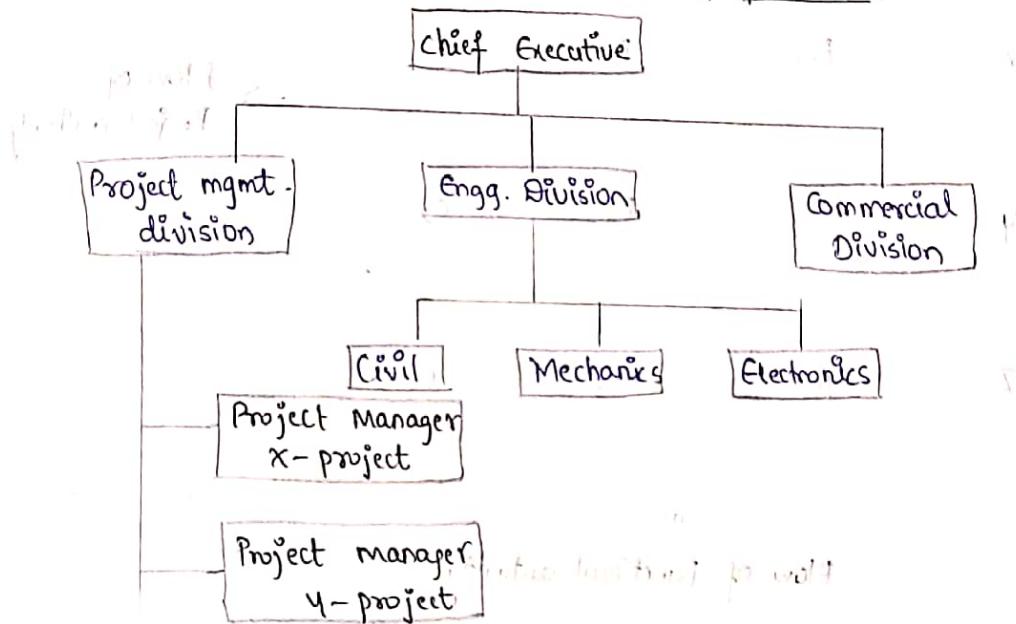
- The project manager collects information and communicate the same to the chief executive.

Consultant's point of view:

- Consultant as Project manager:

- The project manager, has consultant, would be an outsider without any authority.
- The project manager acts as ^{only} consultant to the chief executive in project implementation. He will be definitely able to influence the decisions to the chief executive & also those of the functional executives, But he doesn't take decisions for others to execute.
- This task would be to collect information, collate & communicate to the chief executive & may had his own recommendations!

- Project management as specialized staff function:



- Project Manager provides schedules, budgets & information to the various functional departments who will execute the project.
- The project manager will be a specialist in project mgmt. tools & techniques & in view of this superior knowledge relating to scheduling, budgeting & info. system. He is in the best position to advise other func^{ns}.
- A project manager can also carry out service activities like collection & transmission of data, follow-up one functional group to service another group, maintain records, measure progress, analyse progress and prepare progress reports. He may also acts as a single focal point regarding communication b/w various participating func^{ns} & b/w his company & other interacting company.

* Matrix Organization :

- In " ", the sharing of authority b/w a project manager & other functional manager is formulated.
- A matrix is a concept borrowed from algebra where an individual will abide by the decisions made by 2 superiors, one belonging to the project & other to the specialized funcⁿ. One will be his direct line boss & other is project Boss. Both are responsible for successful completion of the project.

~~Functional Manager~~ → A B C
 Project Manager ↓
 X A₁ B₁ C₁

Y A₂ B₂ C₂

Z A₃ B₃ C₃

→ Flow of Project authority

↓
 Flow of Functional authority

	A	B	C
X	A ₁	B ₁	C ₁
Y	A ₂	B ₂	C ₂
Z	A ₃	B ₃	C ₃