

## Unit I - Concepts of Project management

Project : A project is defined as one shot, time limited and goal oriented major undertaking [big work] work.

It is also defined as "combination of human and non human resources pooled together in a temporary organization to achieve specific purpose".

Basic characteristics :-

One time and unique.

Temporary activities

Major undertaking.

Involves various dimensions [cost, time, performance]

Involves risk and uncertainties.

Process of working towards attaining a set of objectives

Performance

Various works that constitute the whole or the inter-related and are able to perform to serve, common purpose.

Characteristic Features of Project :-

1 Objectives

A project is said to have fixed number of objectives; once objectives have been achieved, the project ceases to exist.

2 Life Span

When a project comes to an end.

3 Single entity

#### 4 Teamwork

A project calls for teamwork

#### 5 Life Cycle

A project has a life cycle which is reflected by growth, maturity and decay.

#### 6 Uniqueness

No two projects are exactly similar.

#### 7 Change

A project sees many changes throughout its life

#### 8 Inclusive Principle - what happens during life cycle of a

project; when it's not fully known at any stage

#### 9 Made to order

A project is always made to order by its customer.

#### 10 Unity in Diversity

A project is a complex set of various varieties, such as technology, equipment, materials, machinery, etc.

#### 11 High level of subcontracting

High % of work in any project is done through contractors.

#### 12 Risk & Uncertainty

Every project has risk and uncertainty associated with it. It depends on type of project.

## Project Management :

It is the planning, organizing, directing, and controlling of company's resources for a relatively short term objective that has been established to complete specific goal, and objectives.

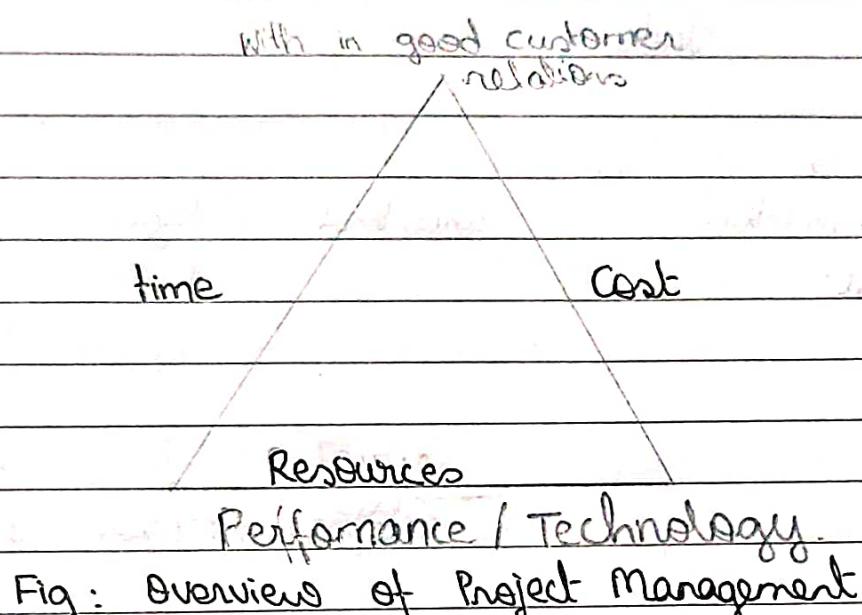


Fig: Overview of Project Management

## Categories of a Project :-

Project

National ex - Government Project

International.

ex - an Italian organization  
constructing a hospital in  
Australia with funding from  
their company

Non-  
Industrial

Industrial

missing  
power generation

High-  
Tech

Low  
Tech

migration

Educational

Non conventional

conventional

R&D

Major  
Mega

Medium

Mini

Mega

trans Post Expansion modification

Normal

Crash

Disaster

min capital cost  
no sacrifice in  
terms of quality →

exhaustive  
activities

max overlap  
of activities

capital cost will go  
up very high.  
round the clock work

### Normal Project :

In this type of projects, sufficient time is allowed for implementation of projects.

All the phases in a project are allowed to take the time, they should normally take.

This type of project requires minimum capital cost and no sacrifice in terms of quality.

### Crash Project :

In this type of project, additional capital costs have incurred to gain time; maximum overlapping of phases is encouraged and compromises in terms of quality are also not ruled out. Savings in time are normally achieved in procurement and construction where time is bought from vendors and contractors by paying extra money to them.

### Disaster

Anything needed to gain time is allowed in these projects. Vendors who can supply "yesterday" are selected irrespective of their cost.

Round-the-clock work is done at construction site.

Normally capital costs go up very high, reduced project time.

### Project Life Cycle Phases

A project is initiated to achieve a mission; a project is completed as soon as the mission is fulfilled.

The project lives between two cut-off points and therefore, this time span is called "Project life cycle".

The project passes through various phases in the life of a project. By enlarge all the projects; need to pass through phases.

- 1 Conceptual Phase
- 2 Definition Phase
- 3 Planning and Organising Phase
- 4 Implementation Phase
- 5 Project Clean Up Phase

### Conceptual Phase

This is the phase during which the project idea germinates/originates.

The idea may first come to mind to overcome certain problems.

The problems may be non utilization of either the available fund, plant capacity, expertise and simply unfulfilled aspirations.

Whatever may be the case, the ideas need to be put in paper and given ~~some~~ some shape before they can consider and compare with competitive ideas.

If this phase is avoided the project will have common defects and become a liability for the investor.

A well conceived project will go a long way for successful implementation and operation of a project.

### Definition Phase

The definition phase of a project will develop the idea generated during the conceptual phase and produce a document describing the project's sufficient details covering all aspects necessary for the customer and financial institutions to make up their minds on the project idea.

If this phase not done properly, it will

increase the risk content of the project.

To avoid risk, it is required to examine some areas thoroughly.

### Planning & Organizing Phase

This phase involves preparation for the project to take off smoothly.

It does not limit itself to paper work and thinking. Many activities are undertaken in this phase; this phase overlaps so much with definition and implementation phase; no formal recognition is given to this by most organizations.

Some organizations prepare documents such as project execution plan, to mark this phase.

- To mark this phase organization deals with
- Licensing and governmental clearances.
- Project infrastructure and enabling services
- System Design

Basic Engineering Packages

Identification of Project Manager

Organization & man power

Schedules & Budgets

Finance

Systems & Procedures

Design Basis

General Conditions for purchase and contracts

Site Preparations and investigation

Resources

Materials

Work Packaging

### Implementation Phase

Period of hectic activity for the project.

Bulk of work in a project is done in this phase.

As far as volume is concerned; 80-85% of the project work is done in this phase only.

People would want to start this phase as early as possible.

All techniques of Project Management 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 for coordination and control.

### Project Clean Up Phase.

This is the transition phase in which hardware built with the active involvement of various agencies is handed over for production to a different agency who was not so involved earlier.

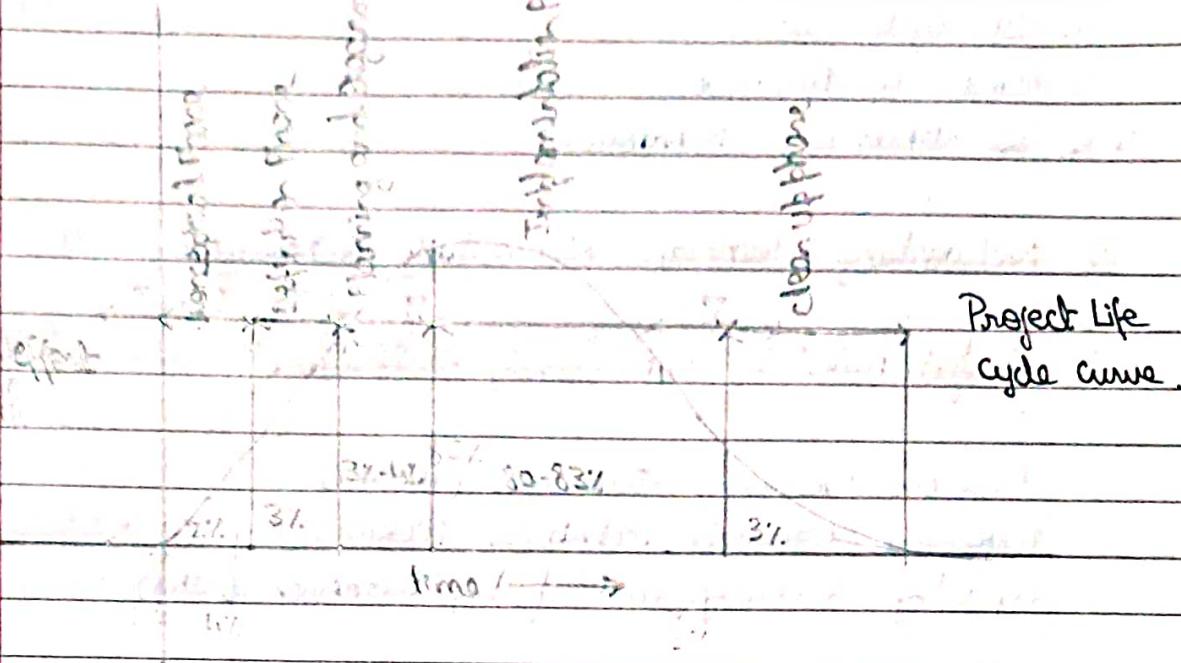
Drawings, documents, files, manuals, are handed over to customer.

The customer has to be satisfied with a guaranteed test run.

Project's accounts are closed, outstanding payments are made and dues are collected during this phase.

The most important issue during this phase is planning of staff and workers involved in execution of a project.

Role of project personnel will be taken by customer's engineers who maybe either for production or maintenance.



## Tools and Techniques for Project management

There are several techniques which would contribute significantly towards effective project management.

This can be broadly grouped under the following heads

### I Project Selection Techniques.

1 Cost Benefit Analysis

2 Risk and Sensitivity Analysis

### II Project Execution Planning Techniques.

1 Work Breakdown structure.

2 Project Execution Plan.

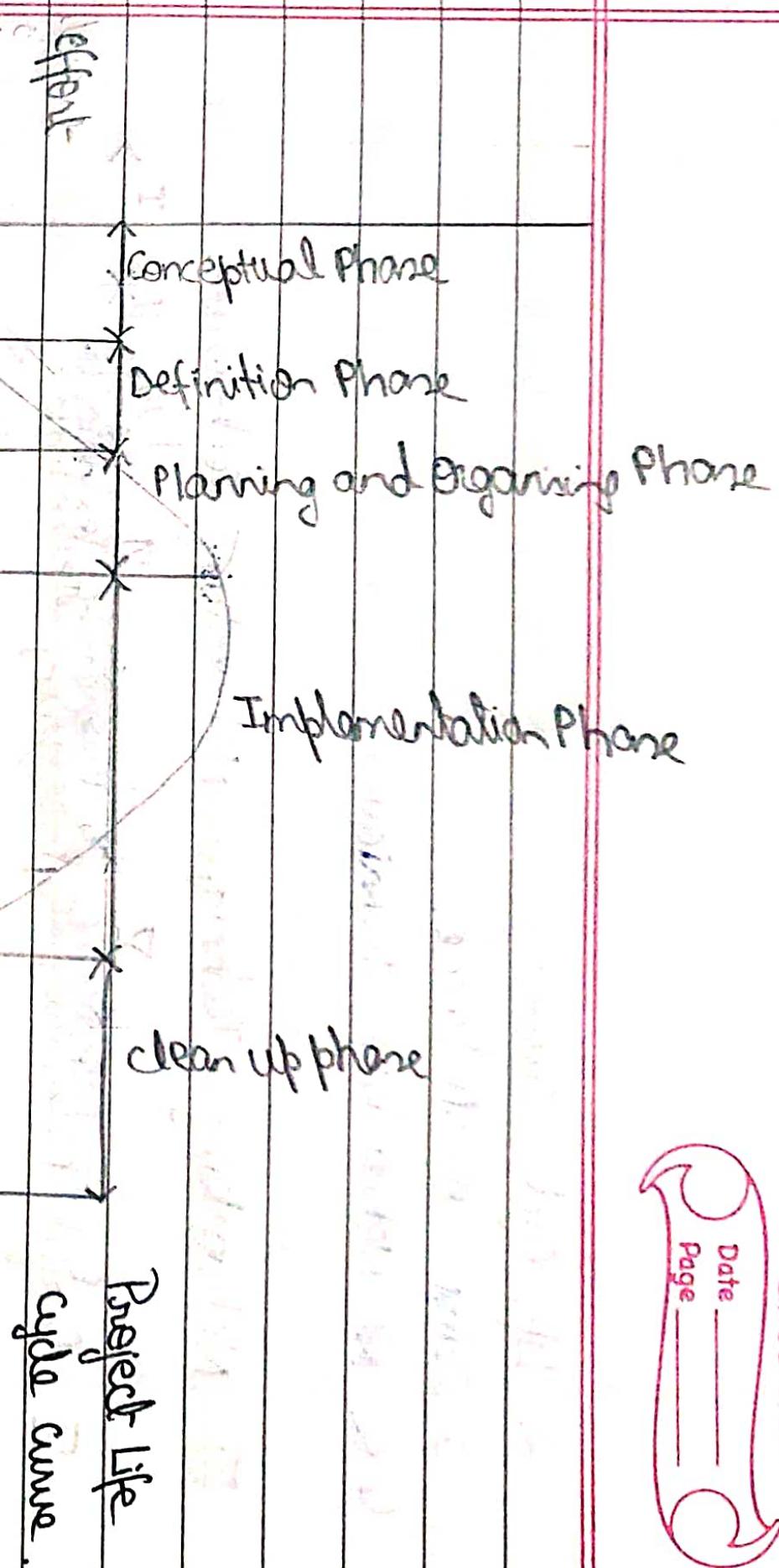
3 Project Responsibility matrix.

4 Project management Manual.

### III Project Scheduling and Coordinating Techniques

1 Bar chart

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2. Life Cycle Curve
3. Line Of Balance.
4. Job Networking Techniques

#### IV Networking Techniques, Job networking Techniques.

##### Project monitoring & Progressing Techniques

Progress measuring Techniques (PROMPT)

Performance monitoring Techniques (PERMIT)

Updating, Reviewing and Reporting Techniques (URT)

#### V Project cost & Productivity control Techniques

1 Productivity Budgeting

2 Value Engineering

3 Cost and WBS (WBS) Work Breakdown Structure

#### VI Project Communication and Clean Up Techniques

1 Control Room

2 Computerized Information Systems

\* Roles & Responsibilities of Project Manager.

Defining and maintaining integrity of the project.

Development of Project Execution Plan.

Organisation for execution of a plan.

Setting of Targets, Development of systems and procedures for accomplishment of project objectives and targets.

Negotiation for commitments.

Direction, coordination and control of project activities.

Contract management.

Non Human Resource management and Fiscal matters.

Projectizing, and Problem solving.

Man management

Satisfaction of customer, government and public.

Achievement of Project Objective, surplus, Higher Productivity

## Project Planning and Estimating

### Feasibility Report

Feasibility Report is prepared to present an in-depth techno-commercial analysis carried out on the project idea for considerations of the financed institutes and other authorities empowered to make take investment decisions.

According to guidelines published by the Planning Commission, a Feasibility Report should include

Raw material survey

Demand survey.

Technical study

- a) Project Pattern
- b) Process selection.
- c) Plant size.
- d) Raw material requirement

Location study

Project Capital cost Estimates, and Source of Finance  
Profitability and Cash Flow Analysis

Cost Benefit Analysis

Raw Material Survey.

Raw materials may belong to any of the following

Available on natural form as deposits, either on the surface or underground, in one spot or different parts of country.

Size and life of plant depends on availability of raw materials.

Qty of raw materials and qty Availability of quantity and quantity already committed for different plants in operation.

Available as finished products.

Available near future.

Not available in the country; to be imported may be in natural or as finished product or by-product.

### Demand Study.

I Demand study would normally establish the following

1) Demand covering the uses of proposed product.

2) Prospective consumers

3) Present consumption

4) Expected consumption, possibility of export

II Supply covering 1) assessment of existing capacity, 2) present level of production ; 3) capacity utilization ; 4) expected consumption ; 5) extent of import

III Distribution covering 1) channels of distribution, 2) mode of transport, 3) mode of packing, 4) cost of distribution, 5) government policies

IV Prices covering 1) both domestic and international price trends  
2) most of control on prices as imposed by the governments.

3) prevailing duties and taxes

most of the information is available from published literature; however an independent survey may be needed.

Some of the documents that are usually referred for demand study are as follows.

1) Planned Documents : Issued by Planning Commission; provides information on plan proposal, growth targets which are both physical and fiscal.

2) Guidelines to Industry : Published by Department of

Industrial Development, ministry of Industry  
It provides information about licensed and installed capacity, present production, imports and exports, indigenous capacity design, design and fabrication, future scope.

3 Economic Survey : Published by ministry of finance  
Provides data on Industrial Production, prices, exports etc.

4 Annual Survey of Industries : Published by Central Statistical Organisation

Provides data on production, number of units installed, capacity etc for several industries.

5 Import and Export Statistics : Published by ministry of commerce.

Provides data on import, exports of a very large number of items.

6 Monthly Collection of RBI : Provides information on production and cost in indices for various industrial items.

Survey Reports of various institutions

7 Survey Reports of various institutions : Publications of Industrial Development, Bank of India, National Council of Applied Economic Research.

These documents provide information of products, services, import, exports and prices.

### Technical Study.

#### Product Pattern

#### Process selection.

Demand survey, Raw material survey, Economic scale

should be sufficient to plan plant capacity

selected process also determines various co-products and by-products that are possible.

Total spectrum of products, co-products and by-products represents the product pattern.

#### Process selection.

The product pattern is selected; and the availability of raw material will govern the processing scheme.

But detailed evaluation including the economics of operating operation of alternative processing schemes is necessary for selecting an optimum process.

### Location Study.

To meet the targets relating to time and cost, it is necessary that site has been properly selected and decision taken before the zero date.

Normally financial institutions will depute a team of experts to inspect the site before the sanction of any loan.

Project sites are selected on several considerations

Basic considerations are

- 1 Availability of Land, soil characteristics and cost of land.
- 2 Approach to site.
- 3 Source of Raw material & Transportation Requirement
- 4 Transportation & marketing of finished products.

5. Source and Availability of water.
6. Availability of Power.
7. Availability of skilled man power.
8. Social amenities in area.
9. Availability of Tax, Incentives.
10. Facilities for drainage and effluent disposal.
11. Engineering and Maintenance Facilities availability.
12. Acceptance of Projects by Local bodies.

### Type of Project cost

#### Capital cost

All the costs incurred in the plant before it becomes <sup>ready</sup> to produce planning will be treated as capital costs.

Therefore capital costs includes not only expenditure, on assets, such as land, plant, machinery, township, but also software costs such as design engineering, management and supervision and even pre-operative expenses.

#### Working Capital

The fund required for maintaining various inventories in the form of raw materials, operating supplies, intermediate products, finished products and meeting miscellaneous - requirements for maintenance of a level of production is treated as working capital.

#### Operating costs

These are the costs which are incurred on a regular basis for production, maintenance and marketing.

It also include interest on loans, taken for financing the project.

## Source of Financing

There are two sources available.

Find Requirements Internal  
External.

External

Capital costs are financed through equity.  
working capitals are financed through short term financing.

Term of Finance	Source	Expenditure to be Financed
Long Short Term Financing	Trade Credits; Loan from commercial banks, commercial papers accounts receivable financing	working Capital.
Intermediate Term	Term Loans, Hire Purchase, Lease Financing; Fixed Deposits, from Public, Central Government Subsidy,	Capital costs.
Long	Common stock; Debt; Preferred stock,	Capital costs.

For the company, dead capital is cheaper as compared to equity, because interest on debt is considered before taxes.

The profits on equity will come after the taxes but debt capital is risky; if creditors are not paid on time.

The situation is not so risky; with equity capital.

The stakeholders are to receive profits at the discretion of the company.

If the company increases its profit; the tax burden will increase, but a new company it will be difficult to rise the profit.

Balance has to be struck between debt and profit - Debt & Profit Ratio.

A company with a high proportion of debt, is said to be "high leverage".

A high leverage company can make large profit when the demand is pitched high.

But at time of recession it will incur high losses.

Keeping this logic in view; the controller of capital issue does not permit debt equity ratio to exceed certain safe values depending on the type of industry.

### Types of Cost Estimates.

There are roughly 5 types that are made during lifecycle of the project.

- 1 Order of magnitude Estimate
- 2 Study Estimate.
- 3 Preliminary Estimate
- 4 Definitive Estimate
- 5 Detailed Estimate.

## 1 Order of magnitude

This estimate has been identified and the entrepreneur wants to get a rough idea of the investment are to decide whether to purchase the project or not.

At this stage, the company knows the description of the product, the capacity of the plant for production of the same.

Even with this information, it is possible to prepare an estimate with an accuracy of about  $\pm 60\%$ .

The ratio methods are used to find such estimates.

### Various Ratio methods

#### 1 Investment per Annual Tonne Capacity.

If the installed cost of the plant  $P_1$  of annual capacity  $C_1$  tonne is  $\mathbb{E}R_1$ , then installed cost is  $\mathbb{E}R_2$  of plant  $P_2$  having annual capacity  $C_2$  can be estimated as

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

#### 2 Turn Over Ratio & Capital Ratio

Ratio between annual sales and investment expressed in  $\mathbb{E}$  is known as turn over ratio.

Ratio between investment ( $\mathbb{E}$ ) and annual sales ( $\mathbb{E}$ ) is known as capital ratio.

$$R_2 = C * V_1 * P_1$$

$V_1$  is projected annual sales/revenue.

$P_1$  is price

$C$  is plant size.

### 3 Six-Ten/0.6 Factor.

In this method the plant investment is assumed to vary as 0.6 power of the plant size.

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

### 4 Inflation Index.

This index is used to workout an estimate if the capacity for the new unit remains the same as that of one for which the installed cost data are available.

$$\text{Installed cost (now)} = \text{Installed cost (past)} * (\text{cost index}_{\text{now}} / \text{cost index}_{\text{past}})$$

### 5 Location Cost Index

Knowing a plant cost in the US or any other country, the cost of a similar plant in India can be estimated using this index.

The index can be developed if the data is related to productivity of country involved or available.

## 2 Study Estimate

It is used for studying the economic viability of the project and for arranging funds for the project.

Overall plant cost is estimated by multiplying total equipment cost by a factor known as "Long-Factor".

Long-Factor takes care of civil, electrical, piping, instrumentation, installation, costs.

Accuracy of the estimate at this stage is about  $\pm 30\%$ .

Project is approved with this estimate.

### 3 Preliminary Estimate.

This estimate is prepared when the technology package is frozen and a firm implementation schedule is available; the estimate can be made with acceptable accuracy even in this stage.

It is about  $\pm 20\%$ .

#### 4 Definitive cost Estimate.

This estimate is prepared after the zero date and when the detailed engineering of a project is in an advanced stage.

Additional information which will add further accuracy to the estimate.

May have an accuracy of about  $\pm 10\%$ .

#### 5 Detailed cost 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 for a project is mostly complete.

The estimate at this stage may have an accuracy of  $\pm 5\%$ .

## Evaluation of Project Profitability.

The economic viability of the project can be assessed / calculated by the following methods

Payback Period [PBP]

Return on investment [ROI]

Net present value [NPV]

Internal rate of return

Benefit cost ratio.

### Payback Period

It is the time required to recover the original investment the incomes from the project.

Assuming that the annual income from the project before depreciation but after the taxes is uniform, then the Payback Period is

$$\text{PBP} = \frac{\text{Original investment (Rs)}}{\text{Annual income (Rs) year}} = \text{no of years}$$

## Return on Investment

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

Net present  
Value

It is the aggregate present value of net cash flow over the operating value of the present.

Present Value =  $S \times \frac{1}{(1+g_i)^t}$

$\frac{1}{(1+g_i)^t}$  - discount factor

$S$  - cash flow at  $t$ ' years

$$\text{Net Present Value} = \sum_{t=1}^N \frac{S_t}{(1+g_i)^t} - I$$

$S_t$  - net cash flow

$N$  - operating life of project

$I$  - original capital investment

The value of money changes with the time  
It is considered in this method i.e. present value  
of a rupee of the next year is going to be  
less than 1 year interest.

All future amounts will be required to be  
discounted by the appropriate interest rate to  
determine the present value.

### Internal Rate of Return

This is the discount method, in this case instead of  
assuming a fixed discount rate, the discount rate  
is varied till Net Present Value becomes zero.

Discount Rate at which the Net Present Value  
becomes zero is known as Internal Rate of Returns.

## Benefit Cost Ratio

It is the ratio of aggregate present values of all future cash flow to the initial capital investment.

$$BCR = \frac{\sum_{t=1}^n St}{I}$$

Benefit Cost Ratio is a modified form of Net Present Value method.