

IMO E02:
PROJECT MANAGEMENT
Credits: 4:0:0:

Unit I

Concepts of Project Management: Concepts of projects, characteristics of project, Phases of project life cycle, Tools and techniques for project management, Computer based project management.

Project planning and estimating: Feasibility report, Preparation of cost estimation, Evaluation of the project profitability, fixing the zero date.

CONCEPTS OF PROJECT MANAGEMENT



Concept of a Project

Examples of projects- Cement projects, refinery projects, methods improvement projects, Lok Sabha election, etc

Organization continuously looks for new business ideas which are technically feasible, economically viable, politically suitable and socially acceptable

To execute these ideas, investment proposal is made, approved and the project begins

Project is initiated to achieve a mission & is completed as soon as the mission is fulfilled

This time span is known as project life cycle

Definition of a project

- One shot, time-limited, goal-directed, major undertaking, requiring the commitment of varied skills and resources
- A combination of human and non-human resources pooled together in a temporary organization to achieve a specific purpose

Definition of Project Management

- Project
 - Series of related jobs or tasks focused on the completion of an overall objective.
- Project Management
 - Planning, directing, and controlling resources to meet the technical, cost, and time constraints of the project.
- Program
 - Synonym for a project, although it also can consist of several interrelated projects.

Project Management - Basics

What is ...?

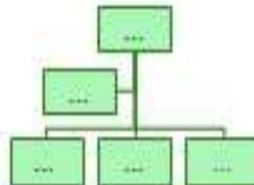


What is project management?

- » Tasks
- » Success factors

» Definition

Who ...?



Who is responsible/involved?

- » Organizational structure

» Project roles

How to structure ...?



How to structure a project?

- » Operational structure

» Project stages

How to manage ...?



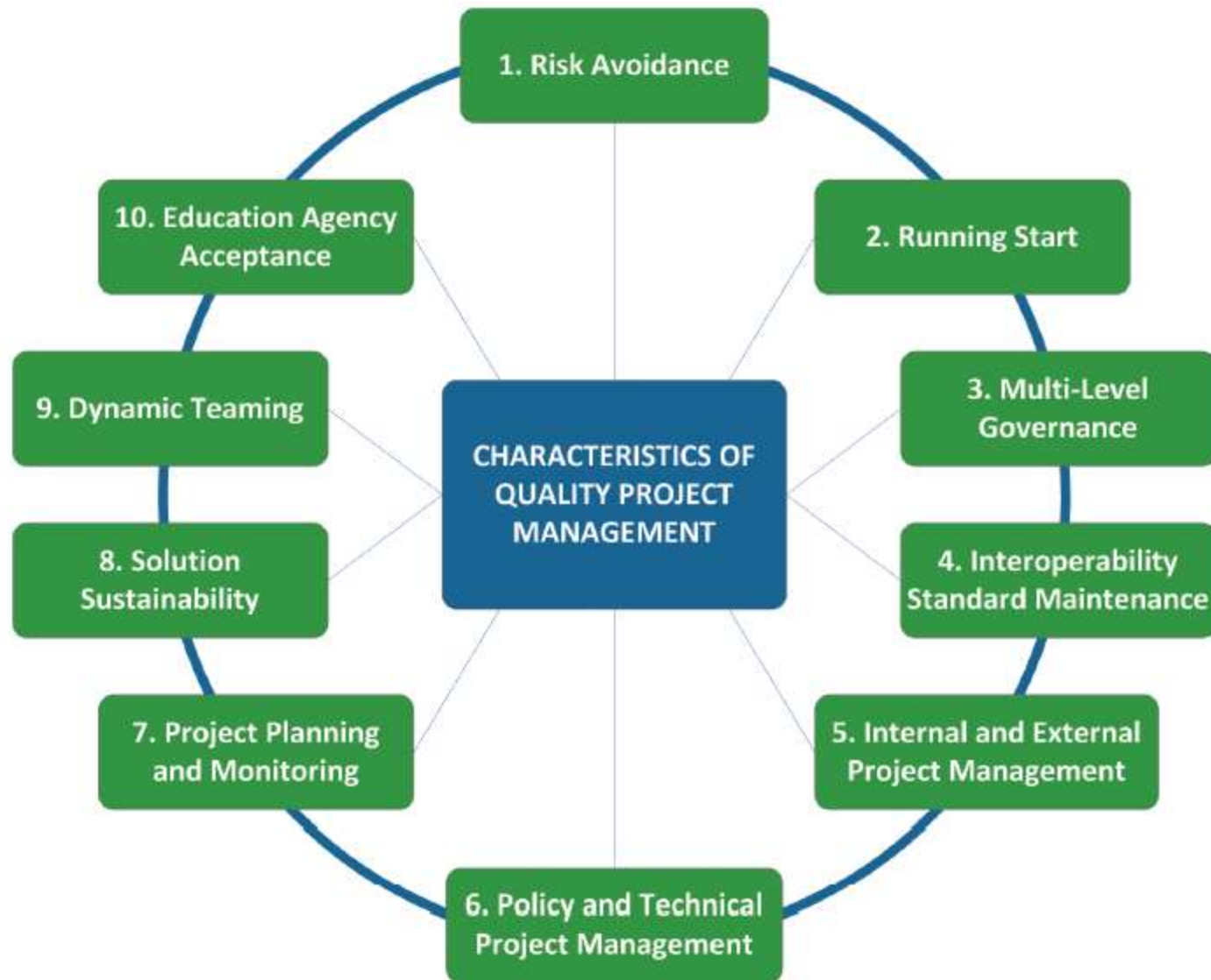
How to manage a project?

- » Templates and checklists

» Project templates



CHARACTERISTICS OF A PROJECT



Characteristics of Project

1. Objectives
2. Single entity
3. Life span
4. Require funds
5. Life cycle
6. Team Spirit
7. Risk and uncertainty
8. Directions
9. uniqueness
10. Flexibility
11. Sub-Contracting
12. Cost

The 5 phases of the project life cycle

01

Initiation

Initiation is the project kick-off phase. This is when you collect all the information needed from key stakeholders. This phase defines the problem and details what needs to be done.

02

Planning

The planning phase is the foundation for the project. This is when you detail all the work, how you plan on doing it, and what resources you'll need to meet project goals.

03

Execution

The execution phase is when you get stuff done. This is where you put everything you planned into motion and complete deliverables to achieve the project objectives.

04

Monitoring

The monitoring phase goes hand-in-hand with the execution phase. It's about monitoring the project's overall progress to see if you're meeting project objectives and are on track.

05

Closure

The closure phase wraps things up. You'll hand over documentation, release final deliverables, terminate contracts, and inform everyone that the project is complete.

Project Family Tree

Plan : National / Corporate with targets for growth



Programme: Health programme, educational programme,
science



Project: Power Plants, schools, housing projects



Work Package: Water supply & distribution package, power
supply & distribution package



Task: Award of water supply contract, construction of
foundations



Activity: Excavation, Laying of cable, preparation of drawing
/ specifications

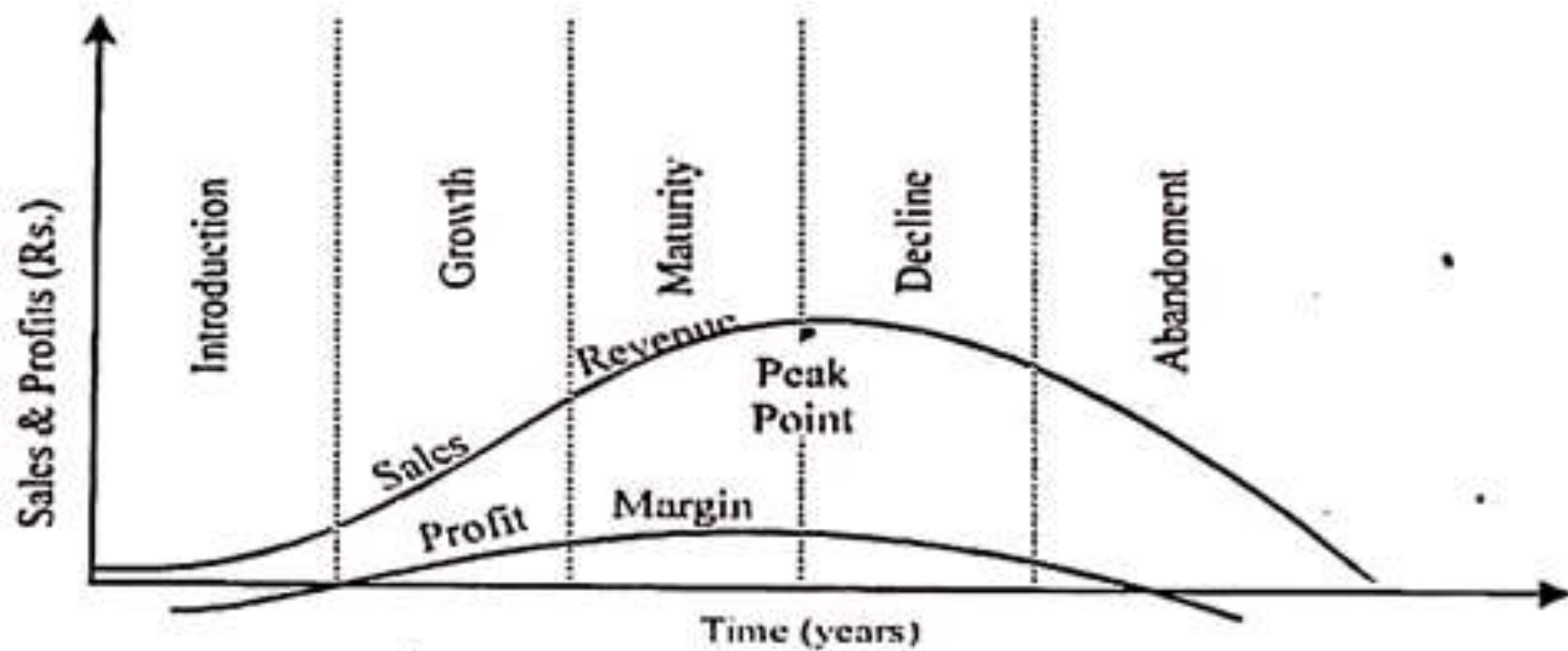
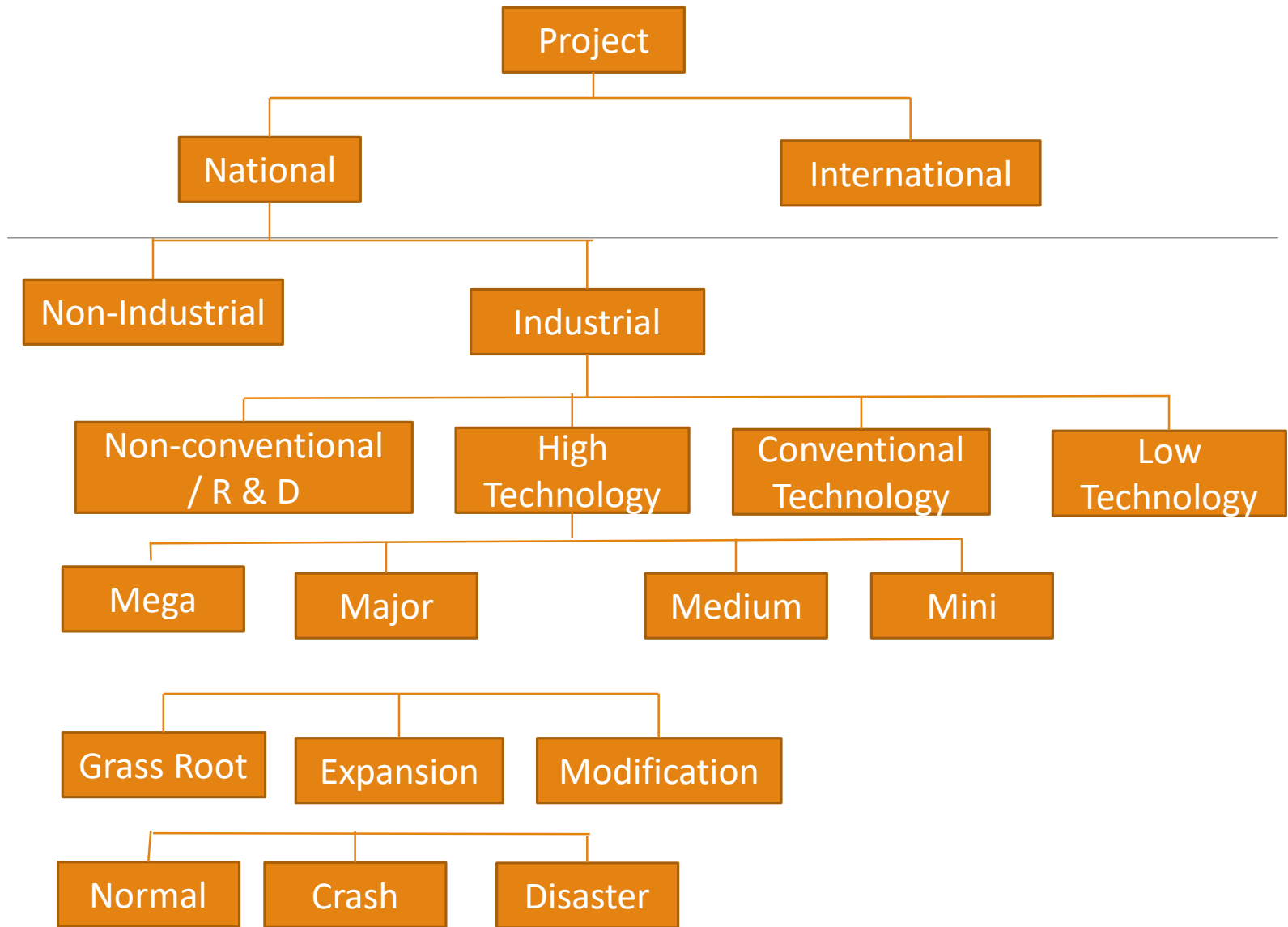


Fig. 15.2 : Product Life-Cycle



Categories of Project

The location, type, technology, size, scope and speed are normally the factors which determine the effort needed in executing a project

Though the characteristics of all the projects are the same, they cannot be treated alike

Categorization based on speed of implementation

➤ Normal Projects

➤ Crash Projects

➤ Disaster Projects

Normal Projects

- Minimum capital cost and no sacrifice in terms of quality

Crash Projects

- Additional capital costs are incurred to gain time
- Maximum overlapping of phases
- Compromise on quality may not be ruled out

Disaster Projects

- Anything needed to gain time is allowed
- No competitive bidding
- Very high capital cost, project time drastically reduced

Project Life Cycle Phases

- 1) Conception Phase
- 2) Definition phase
- 3) ~~Planning & organizing phase~~
- 4) Implementation phase
- 5) Project clean-up phase

Conception Phase

- ▶ Project idea germinates
- ▶ While trying to overcome problems
- ▶ If this phase is avoided or truncated, the project will have innate defects & may eventually become a liability for the investors

Definition Phase

➤ Develop the idea generated during the conception phase and produce a document describing the project in sufficient details covering all aspects necessary for the customer/financial institution to make up their minds on the project idea

Areas to be examined during this phase:

Raw Materials

Plant Size /Capacity

Location & site

Technology/process selection

Plant layout

Plant & Machinery

Electrical and instrumentation

Civil engineering works

Utilities – fuel, power and water

Manpower and organizational pattern

Financial analysis

Implementation Schedule

- Clears some the ambiguities and uncertainties associated with the formation made during the conceptual stage
- Establishes the risk involved in going ahead with the project
- A project can be accepted or rejected at this stage
- A project is said to be born only after it has been cleared for implementation at the end of this phase

Planning and Organizing Phase

➤ Usually overlaps with definition & implementation phases

➤ Project Execution Plan

Activities:

Project infrastructure and enabling services

System design and basic engineering package

Organization and manpower

Schedules & budgets

Licensing and governmental clearances

Finance

Systems and procedure

Identification of project manager

Design basis, general conditions for purchase and contracts

Site preparation and investigation

Construction resource and materials

Implementation Phase

➤ People for the first time can see the project

Common activities

Preparation of specifications for equipment and machinery

Ordering of equipment

Lining up construction contractors

Issue of construction drawing

Civil construction & Equipment foundations

Equipment & machinery erection

Plant electricals

Piping

Instrumentation

Testing, checking, trial run & commissioning

- Has a high need for co-ordination and control
- Every attempt is made to fast track

Project Clean-up Phase

- Transition phase
- Drawings, documents, files, operation & maintenance manuals are handed over to customer
- Project accounts are closed, material reconciliation carried out, payments are cleared
- Project personnel leave the site

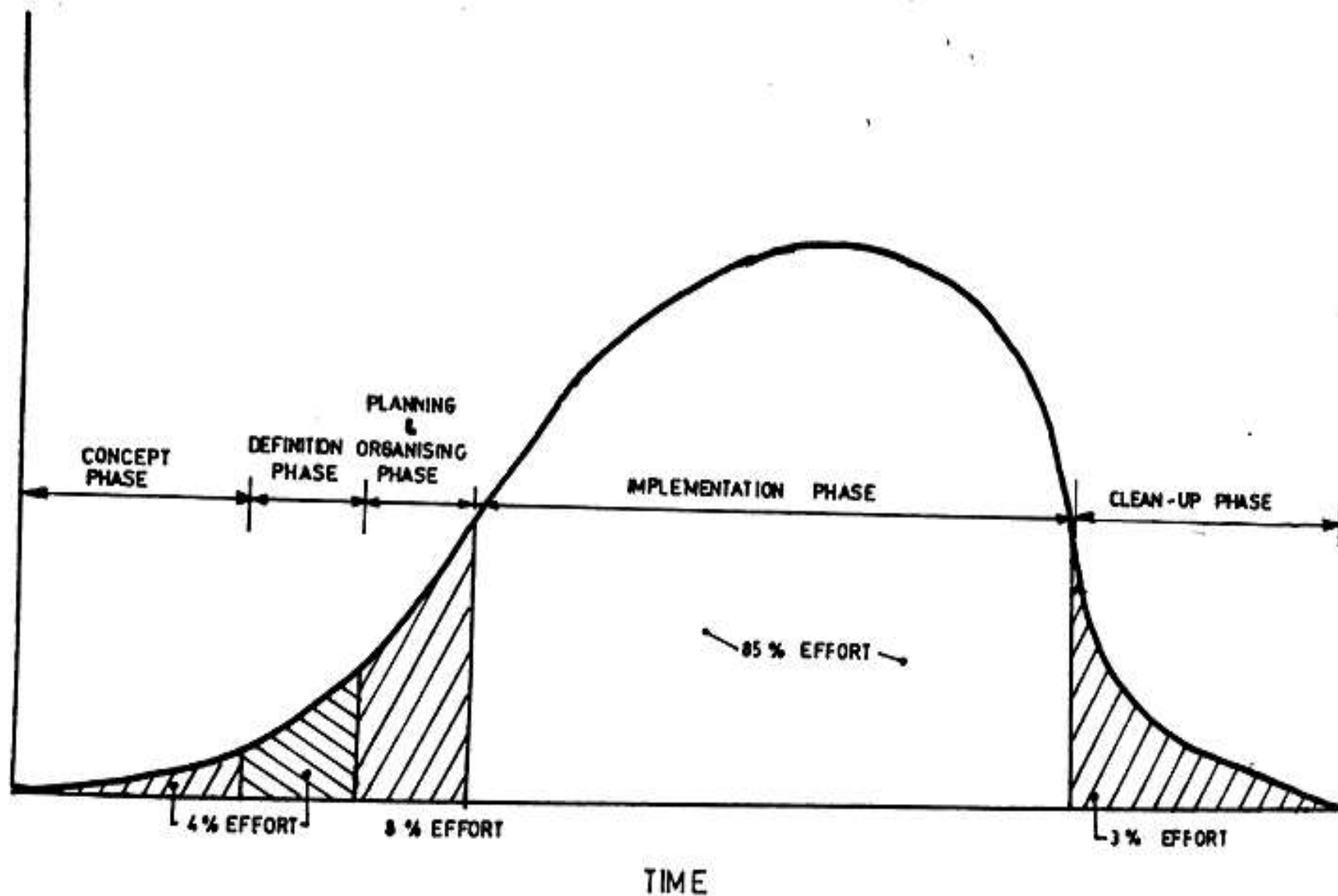
SUB PHASE NO	SUB-PHASE DESCRIPTION	MONTHS											
		1	2	3	4	5	6	7	8	9	10	11	12
I	DETAILED ENGINEERING												
II	ORDERING												
III	DELIVERY												
IV	CONSTRUCTION & ERECTION												
V	START-UP												

Sub-phases of project implementation for an engineering project

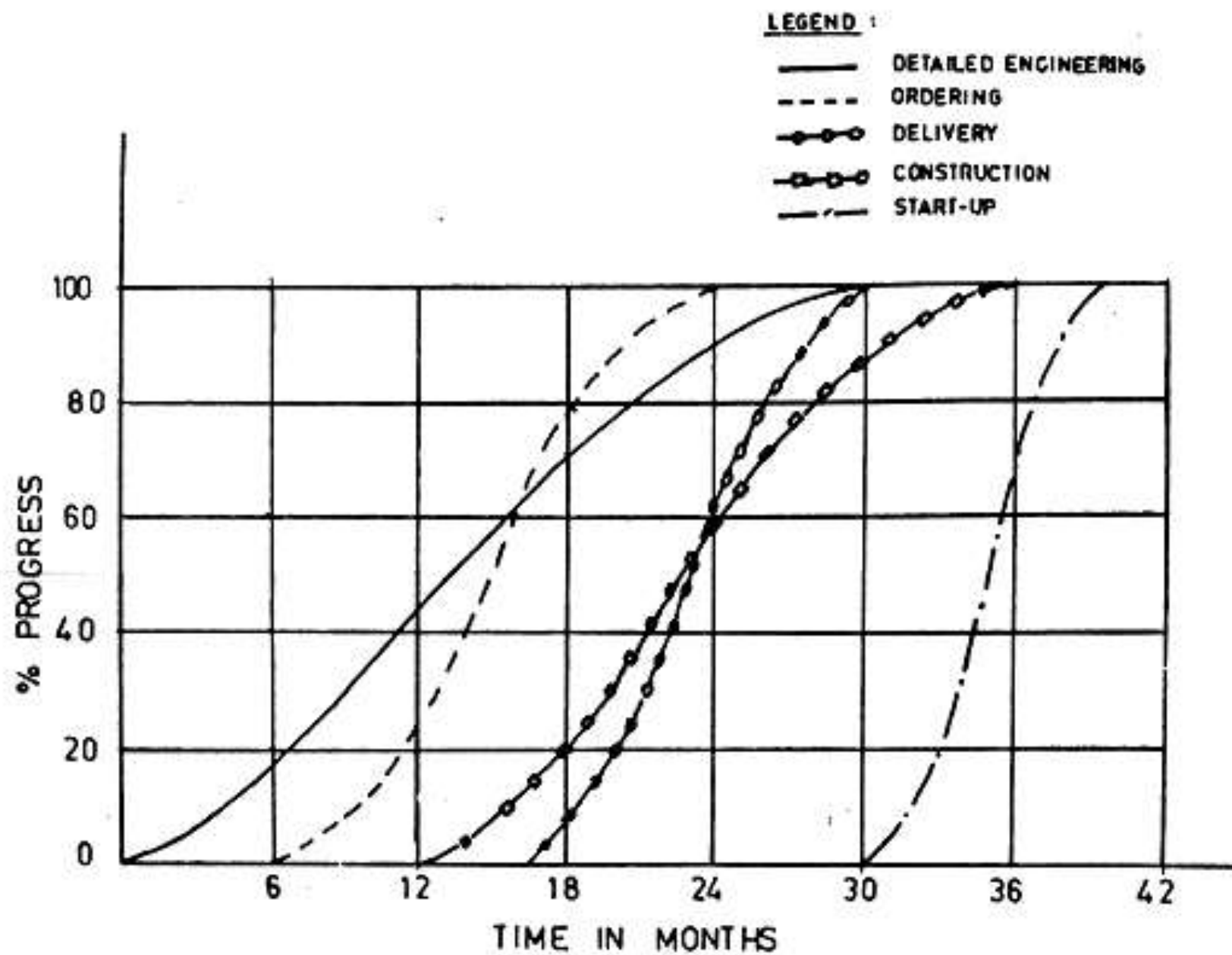
Project Life Cycle Curves

- Growth, maturity & decay
- Life cycle curve shows the various phases in sequence and the approximate effort involved in each phase
- Effort build-up in a project is very slow but effort withdrawal is very sharp
- Time taken in the formative & clean-up stages together is more than the implementation stage
- The life cycle curve may represent a class of project

LEVEL
OF
EFFORT



TIME
Project life cycle curve



(a)

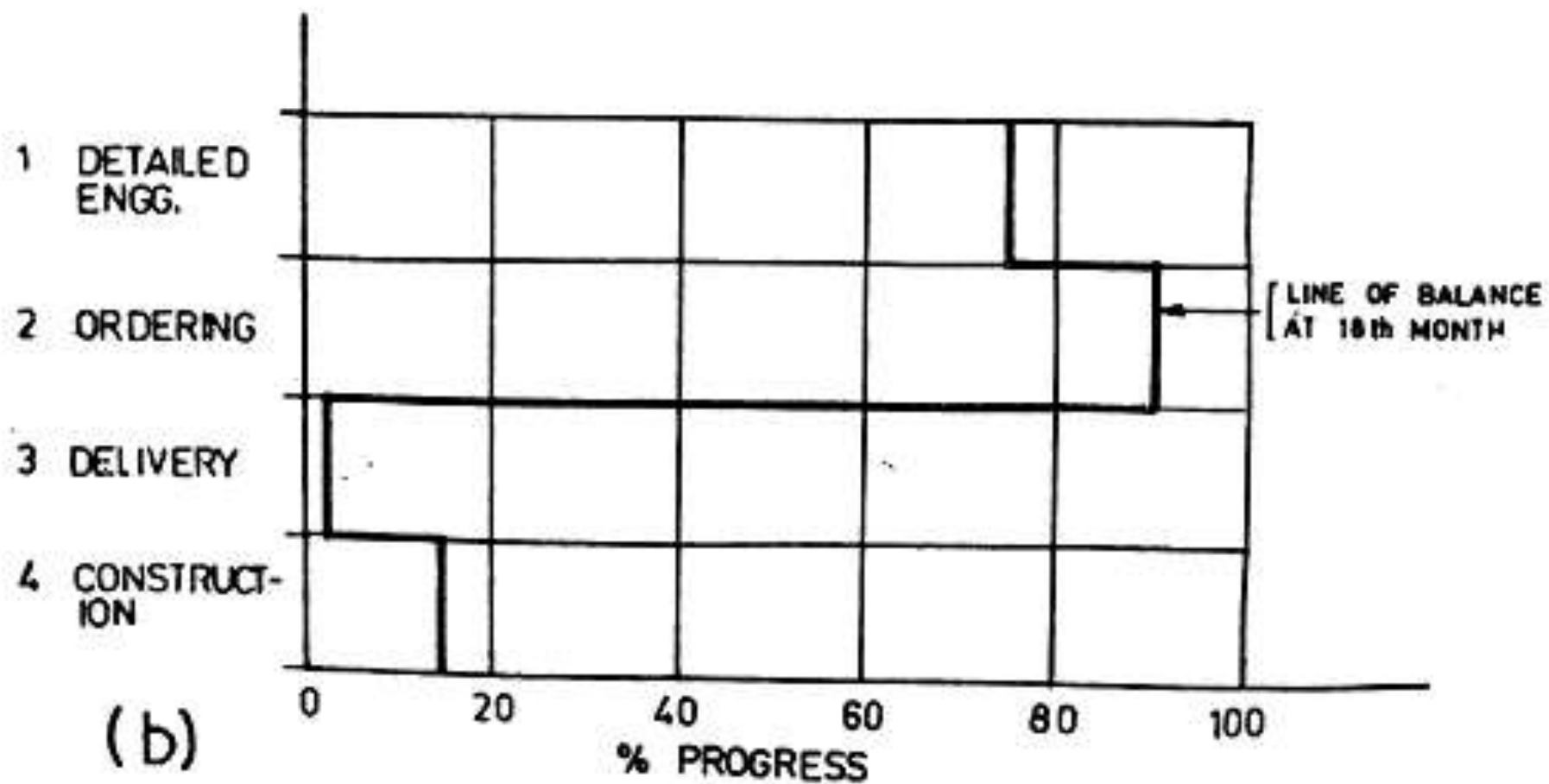
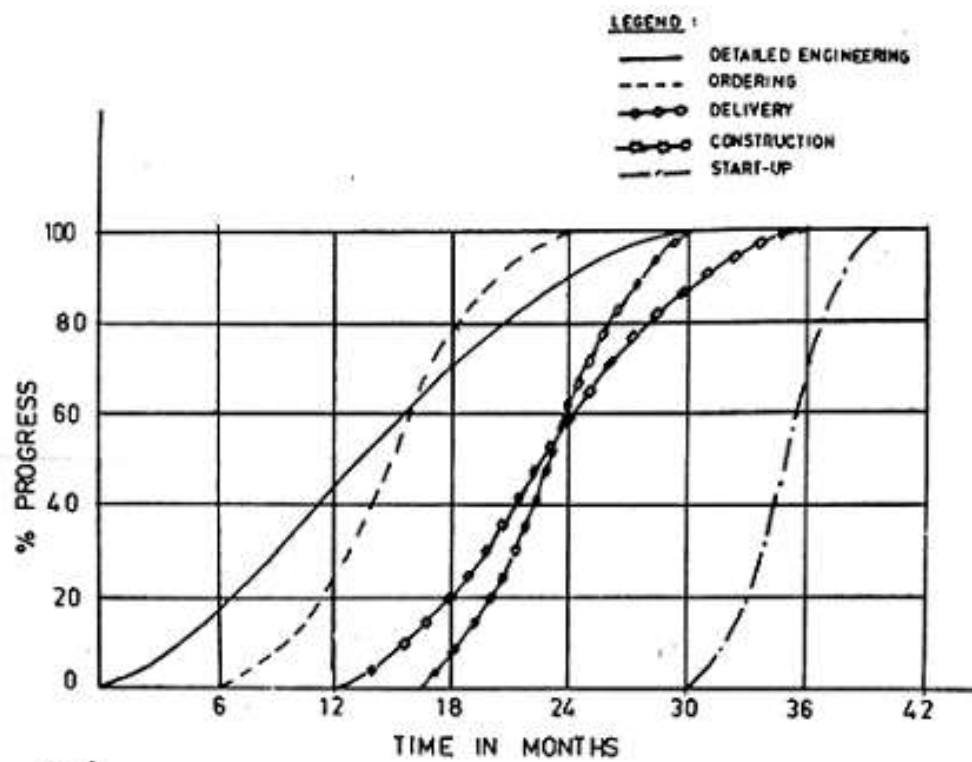
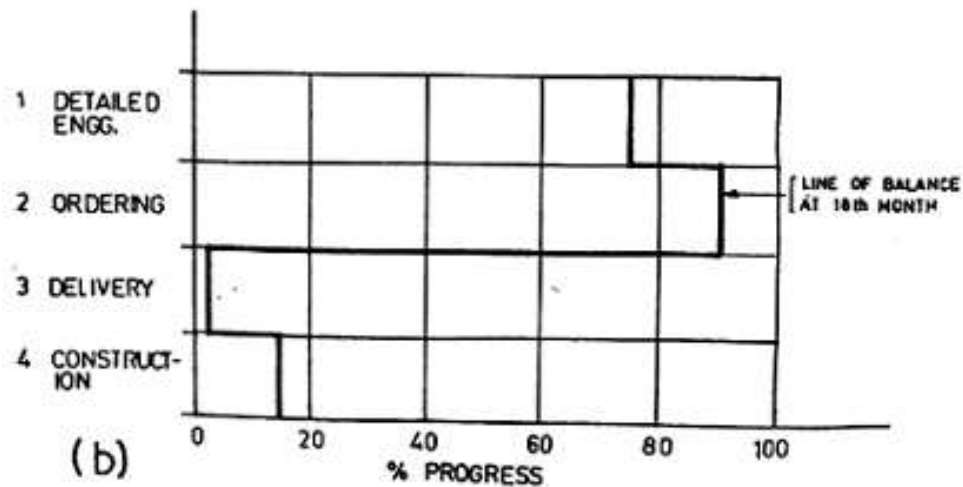


FIG. 1.5 Life cycle curve: (a) Cumulative growth chart (b) Line of balance



(a)



(b)

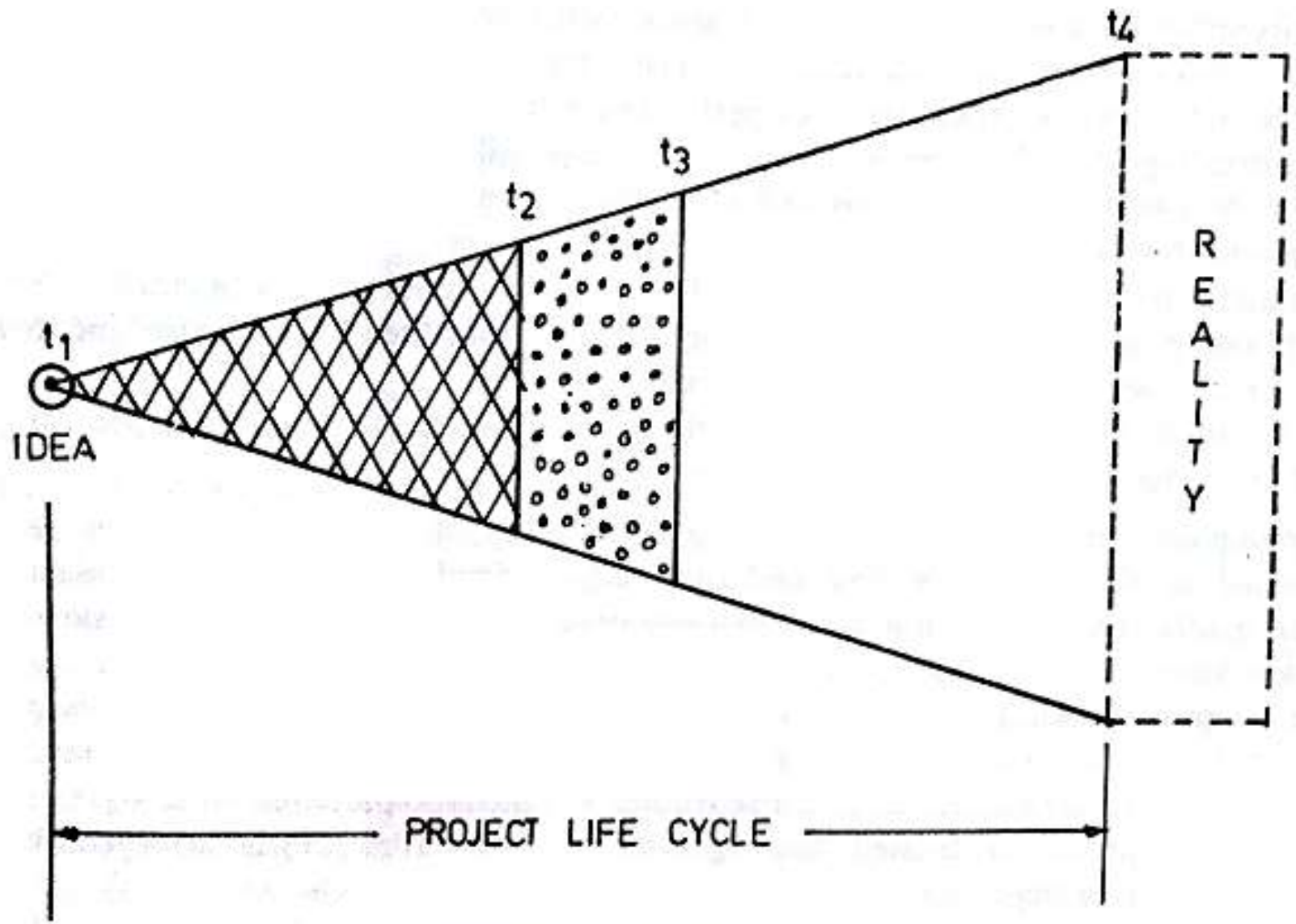
Life cycle curve: (a) Cumulative growth chart (b) Line of balance

The knowledge of a characteristic life cycle curve enables a project manager to ascertain the state of health of any project at any point of time

Life cycle curve with line of balance

'S' curve form represent cumulative growth at any time

If the curves are drawn to indicate the minimum growth required for a sub-phase at any point of time to meet the targeted completion date of a project, then a line of balance can be drawn to indicate the state of health of the project



Project conceptual model

Project Visibility

Cannot be seen for most of its life time

Is vague and fluid, shows no concrete benefits for almost half of the life span

This causes problems for its management

The passage of time will give it a concrete shape

At any point in the life cycle something will be clearly visible, something nearly visible and rest has to be imagined

The full value of the project is realised only at the end

Project Management Concepts

Project is a success if it:

- ▶ Gets completed
 - ▶ Gets completed within budget
 - ▶ Gets completed within allocated time
 - ▶ Performs to satisfaction
-

Steps in Project Management

- 1) Grouping work into packages which acquires the properties of a project
- 2) Entrusting the whole project to a single responsibility known as the project manager
- 3) Supporting and servicing the project internally & externally
- 4) Building up commitment
- 5) Ensuring adherence to goals

Defining what is to be done, maintaining its integrity, and ensuring that it is done and performed as desired, within time & cost budgets fixed for it through a modular work approach, using organizational and extra-organizational resources is what project management has to achieve

Project Management Vs Functional Management

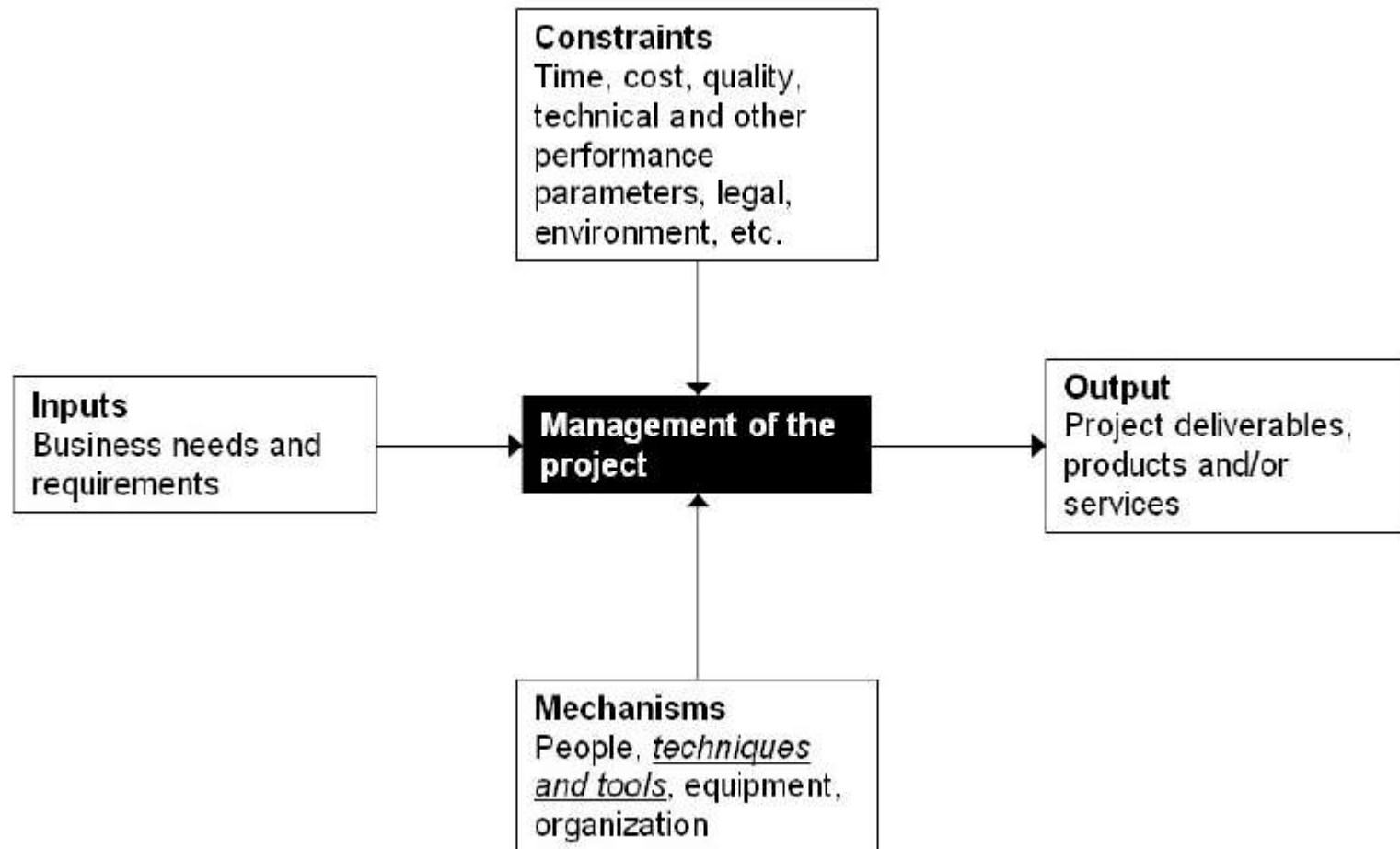
Tools and Techniques for Project Management

Computer Based Project Management System

The Project Manager

Problems of a Project Manager

- The scope comes to be clearly known after a passage of long time
- No guarantee that the project will maintain its shape and size as it has come to be known



- Those who are to complete the project, are almost strangers
- Regarding the success criteria there is no previous experience

Roles and Responsibilities of Project Manager

- 1) Defining and maintaining the integrity of a project
- 2) Development of project execution plan
- 3) Organization for execution of the plan
- 4) Setting of targets and development of systems and procedures for accomplishment of project objectives & targets

- 5) Negotiation for commitments
- 6) Direction, co-ordination and control of project activities
- 7) Contract management
- 8) ~~Non-human resource management including fiscal matters~~
- 9) Projectising and problem solving
- 10) Man management
- 11) Satisfaction of customer, Government and the public
- 12) Achievement of project objectives, cash surplus and higher productivity

Tools and Techniques for Project Management

Project Selection Techniques:

Cost Benefit Analysis

Risk and sensitivity analysis

Project execution planning techniques:

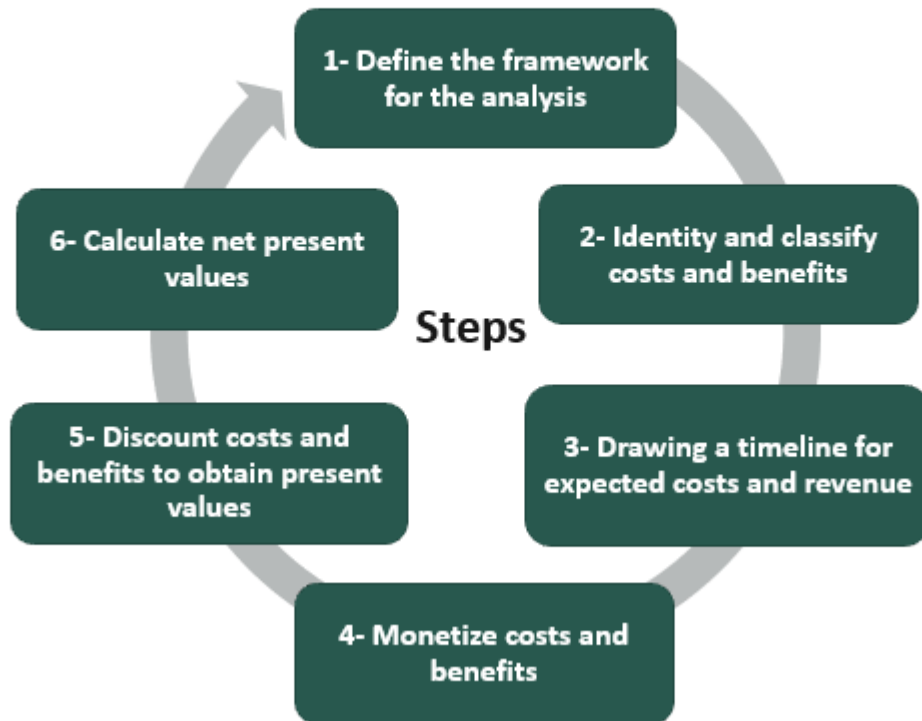
Work breakdown structure (WBS)

Project execution plan (PEP)

Project responsibility matrix

Project management manual

Cost-Benefit Analysis

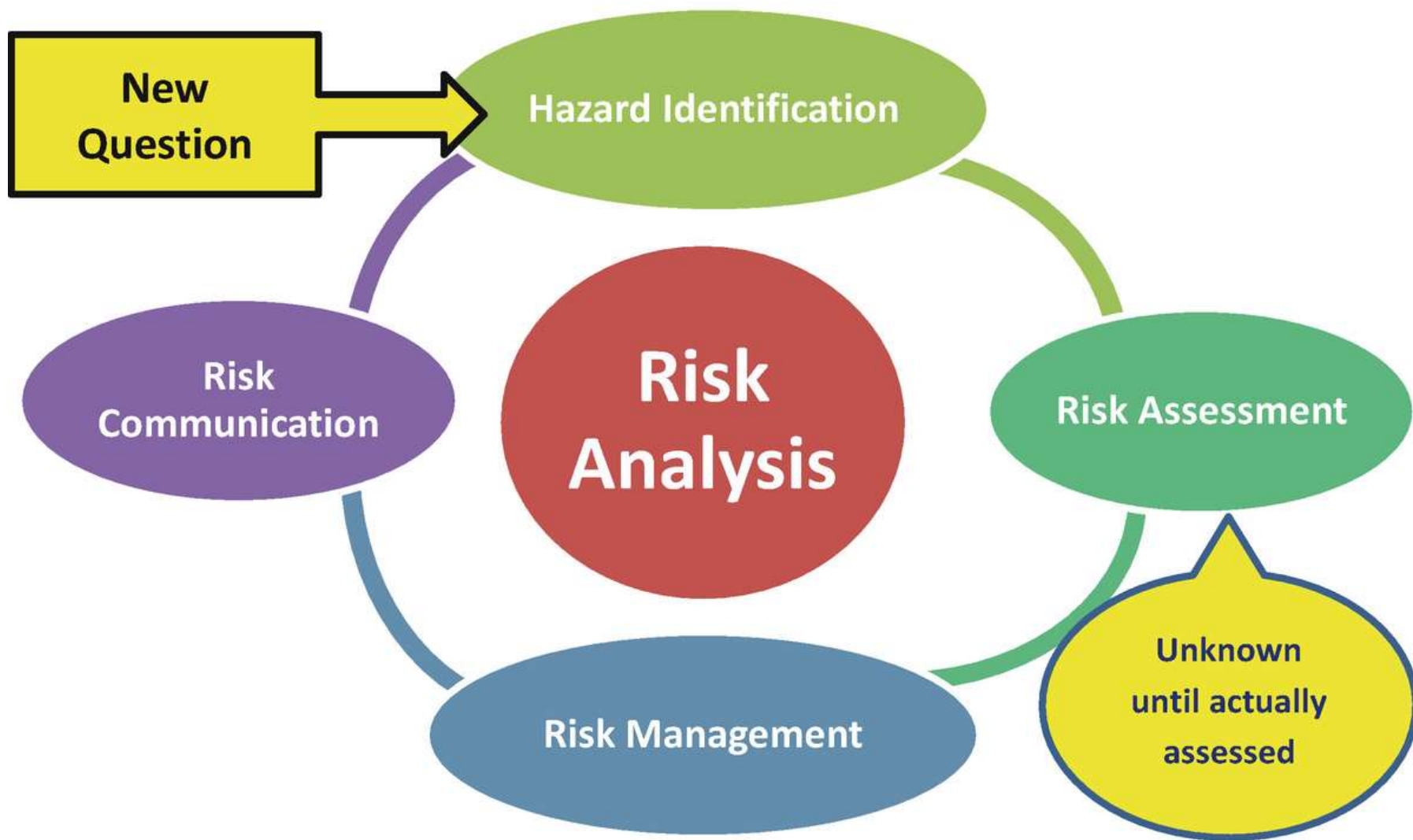


10 Steps to the Process of **Cost Benefit Analysis**

1. Project goals and objectives
2. Note alternatives
3. List stakeholders
4. Choose which metrics to use
5. Determine the outcome of costs and benefits
6. Use a common currency
7. Figure out the discount rate
8. Find the net present value of the product
9. Do sensitivity analysis
10. Make decisions







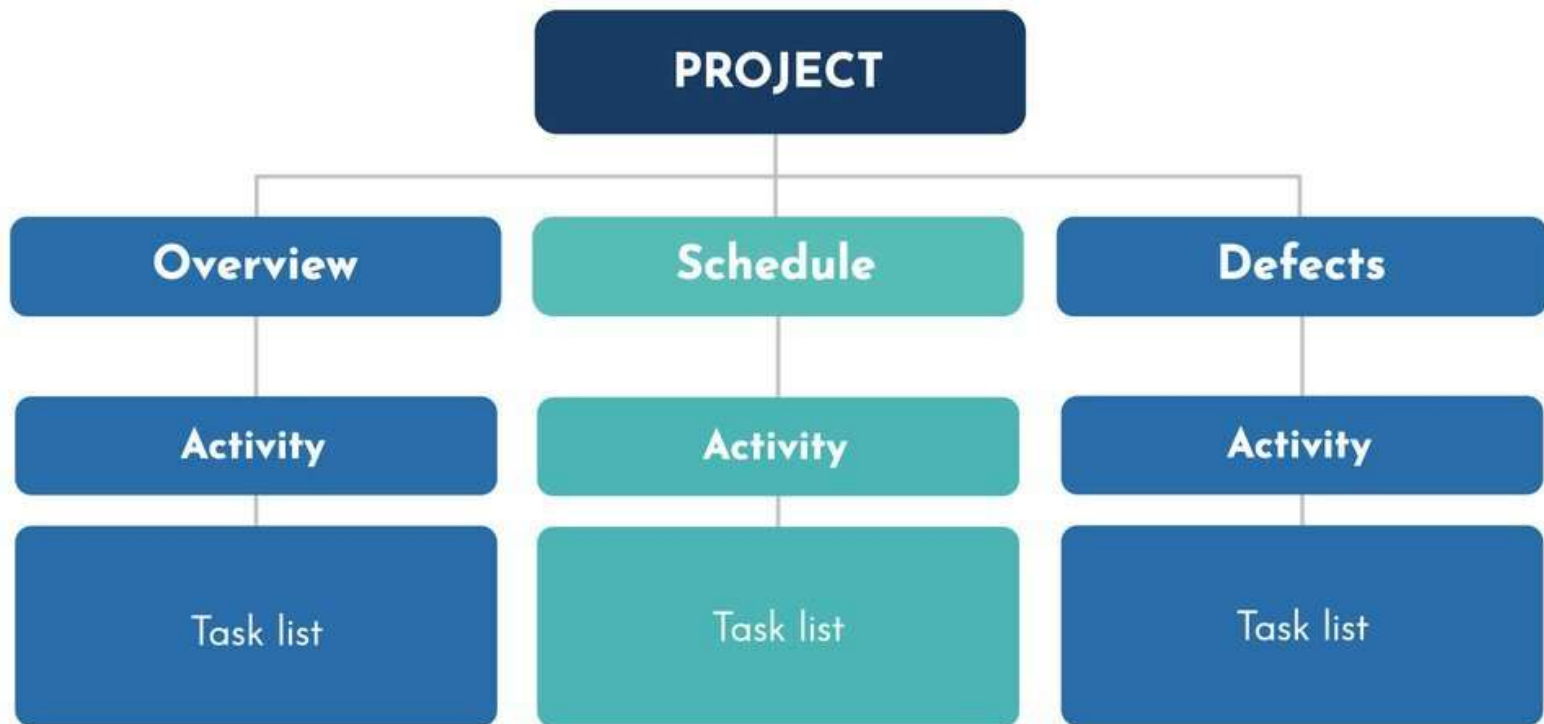


What is Sensitivity Analysis?

Sensitivity analysis is an investigation that is driven by data. It determines how independent variable of a business can have an impact on the dependent variables. This ultimately leads to change in the output and profitability of the business.

How to Interpret Sensitivity Analysis

- Create Experimental Design
- What are the Parameters
- Observe



WORK BREAKDOWN STRUCTURE

More editable templates
online at [EDIT.org](https://www.edit.org)



Project Scheduling and coordinating Techniques:

- Bar charts

- Life cycle curves

- Line of Balance (LoB)

- Networking techniques (PERT/CPM)

Project monitoring and progressing techniques:

- Progress measurement technique (PROMPT)

- Performance monitoring technique (PERMIT)

- Updating, reviewing and reporting technique

Project Cost and productivity control techniques:

Productivity budgeting technique

Value engineering (VE) and

COST/WBS

Project communication and clean-up techniques:

Control room

Computerized information system

Project Planning & Estimation

Feasibility Report

- ▶ Feasibility report is prepared to present an in-depth techno-commercial analysis carried out on the project idea for consideration of the financial institutions and other authorities empowered to take the investment decision.

Feasibility report should include:

Raw material survey

Demand survey

Technical study – Product pattern, Process selection, Plant size, Raw material requirements

Location study

Project capital cost estimates and source of finance

Profitability and cash flow analysis

Cost benefit analysis

Raw Material Survey:

Available in natural form

Available as finished product or by-product

Not available in the country

Demand Study:

Demand

Supply

Distribution

Prices

Documents that are usually referred:

Plan documents

Guidelines to industries

Economic survey

Annual survey of industries

Import and export statistics

Monthly bulletin of RBI

Survey reports of various institutions

Technical Study

Product Pattern

Process Selection

Location Study

Availability of Land, Soil Characteristics and Cost of Land

Approach to site

Source of raw material and transportation requirement

Transportation and marketing of finished products

Source and availability of water, power, skilled labour

Tax incentives

Drainage and effluent disposal Facilities

Engineering and maintenance facilities

Acceptance of local bodies



Financing Arrangements

Capital Costs

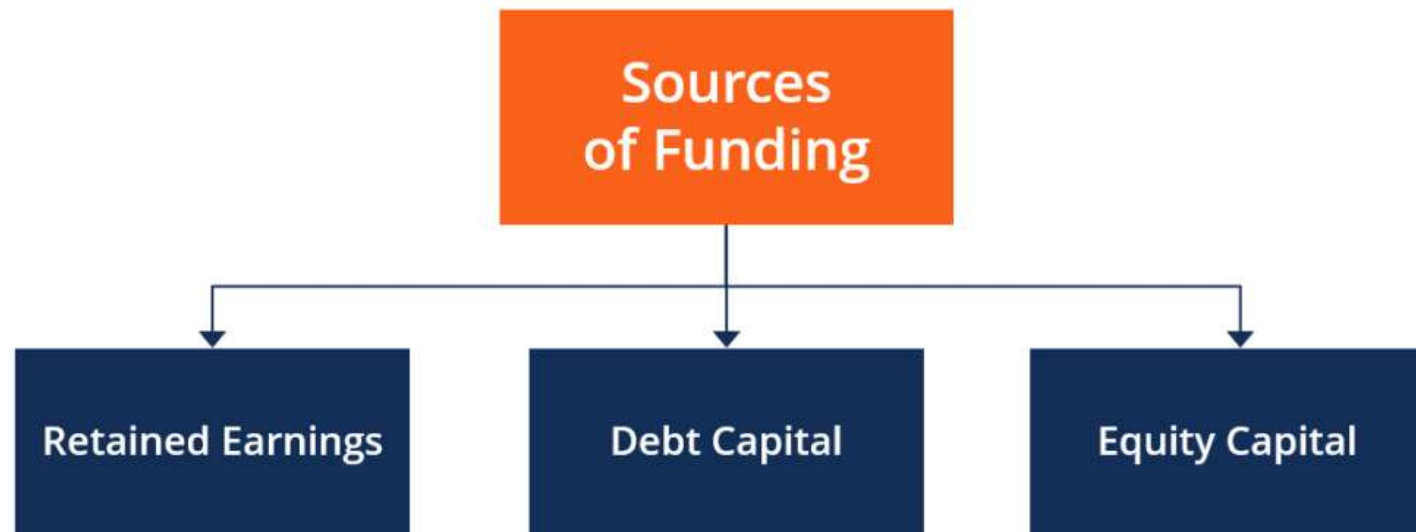
- Costs incurred in the project before it becomes ready to start commercial production
-

Working Costs

- Fund required for maintaining various inventories in the form of raw materials, operating supplies, etc.

Operating Costs

- Recurring costs for production, maintenance and marketing, interest on loans



Source of Financing

- Internal Sources & External Sources
- Short-term financing
- Intermediate-term financing

- Long-term financing

Financial Structure

- Debt capital & Equity capital
- Debt equity ratio
- A company with high debt is said to be high leverage

Financial Institutions

National Financial Institutions

1. Industrial Development Bank of India (IDBI)
2. Industrial Finance Corporation of India (IFCI)
3. Industrial Credit and Investment Corporation of India (ICICI)
4. Industrial Reconstruction Corporation of India (IRCI)
5. State Financial Corporation (SFC)
6. Life Insurance Corporation (LIC)
7. Unit Trust of India (UTI)
8. The Export-Import Bank of India (Exim Bank)

9. The State Industrial Development Corporation (SIDC)

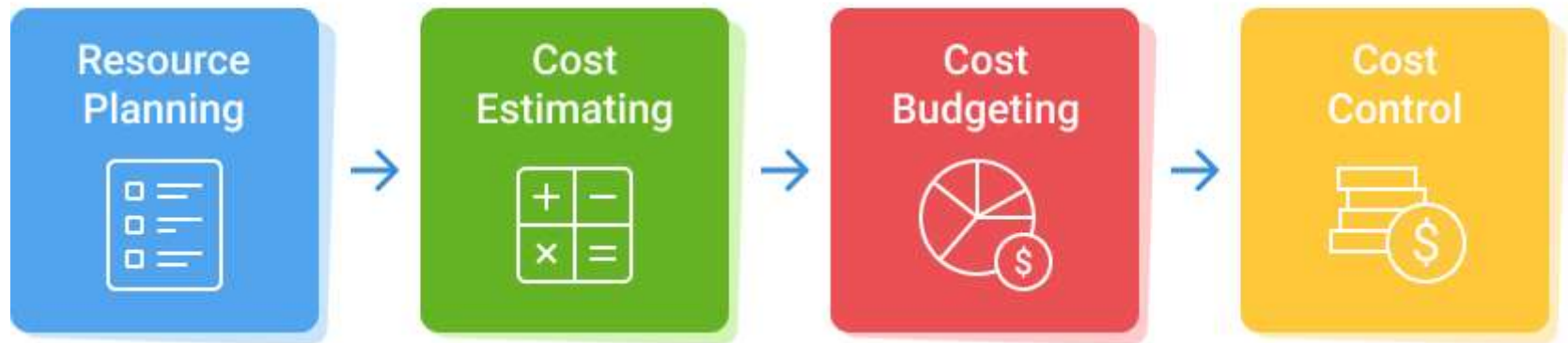
Foreign Financial Institutions

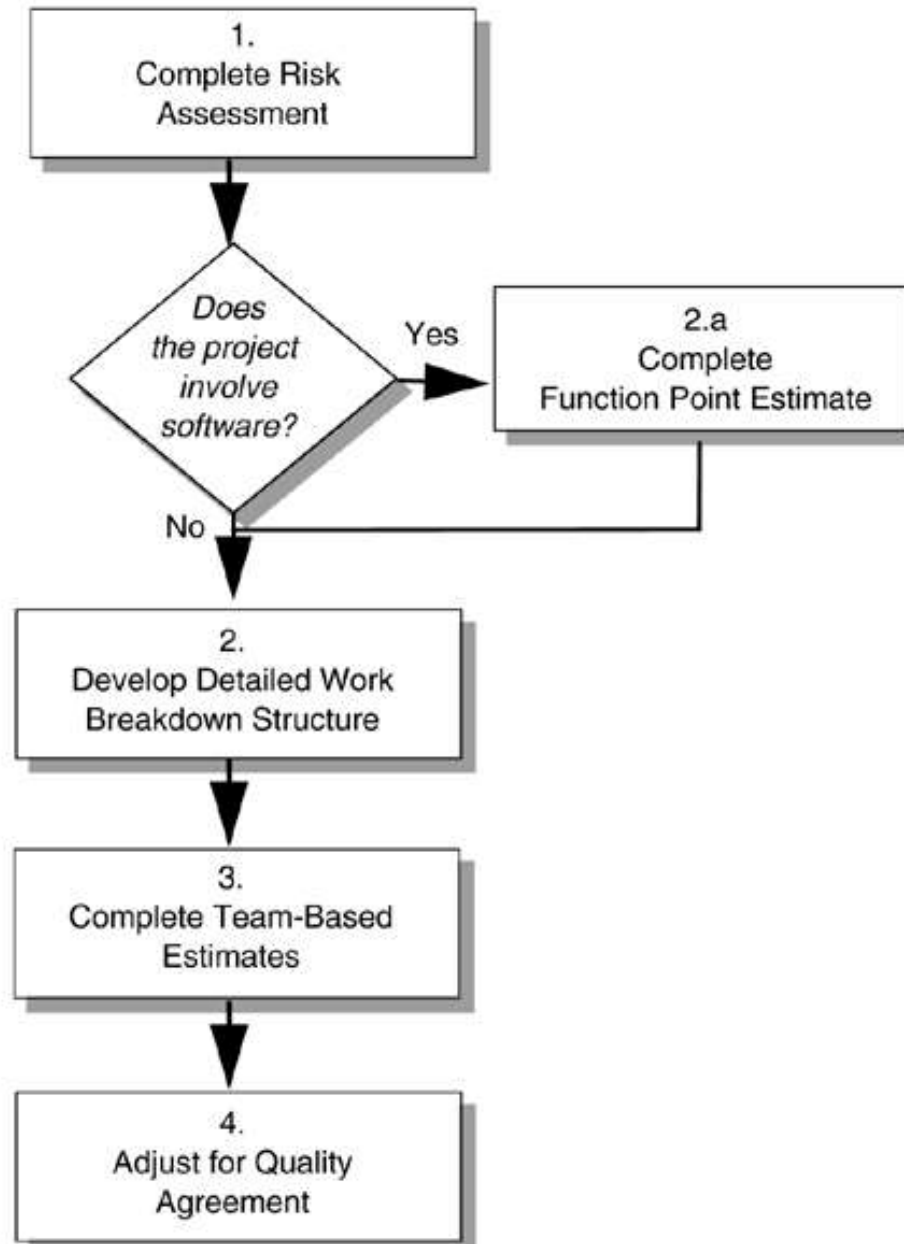
1. World Bank (International Bank for Reconstruction & Development)
 2. International Finance Corporation (IFC)
 3. International Development Association (IDA)
 4. United Nations Development Programme (UNDP)
 5. International Monetary Fund (IMF)
 6. Asian Development Bank (ADB)
 7. Non-resident Indians (NRI)
-

Preparation of Cost Estimates

- Assessing fund requirement but also for ascertaining the economic viability of the project
- One has to repeated estimates at different stages of the project life-cycle so that a workable estimate with reasonable accuracy is available for the purpose for which the estimate is required

Cost Management: Four Primary Phases



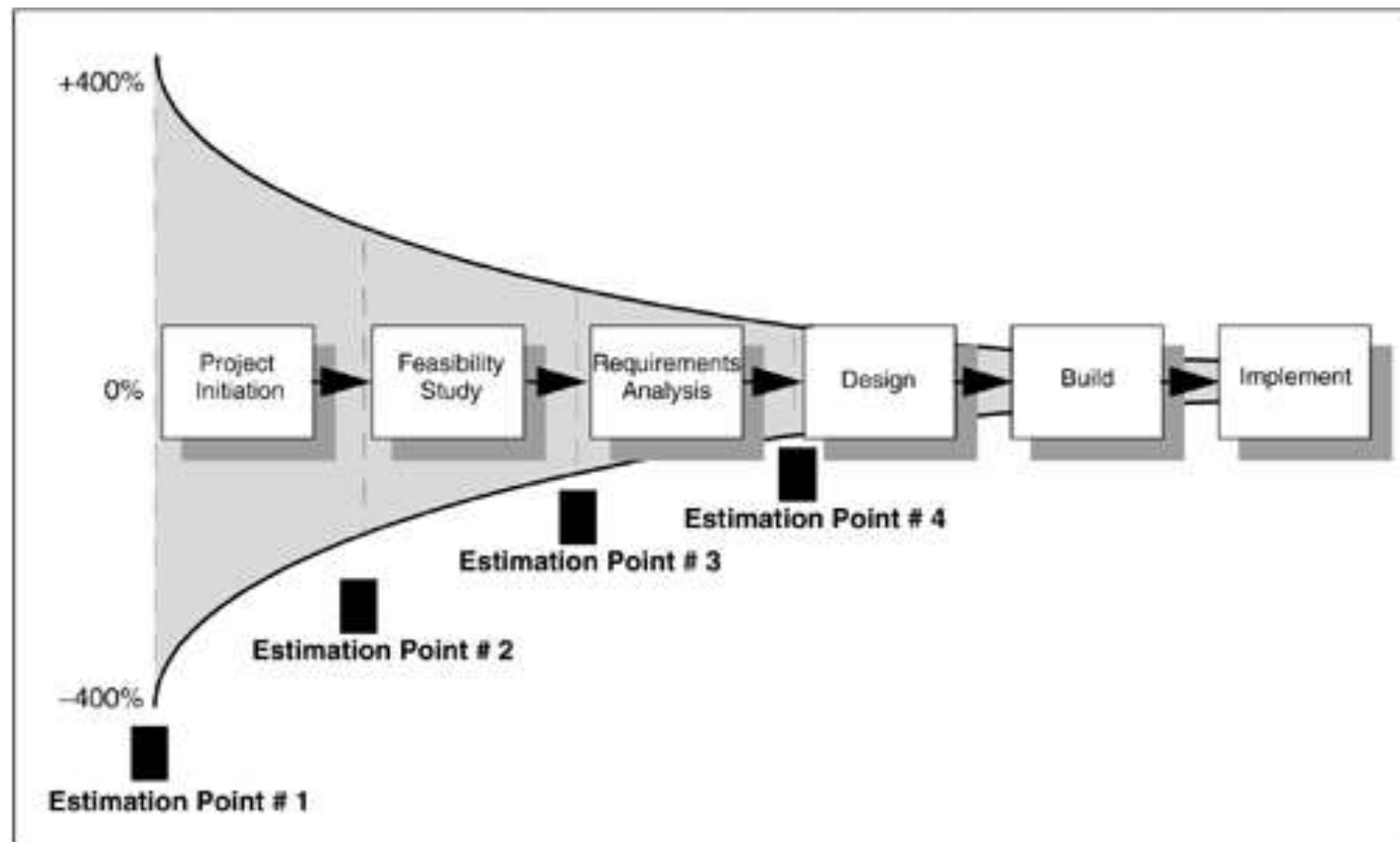


Types of Estimates

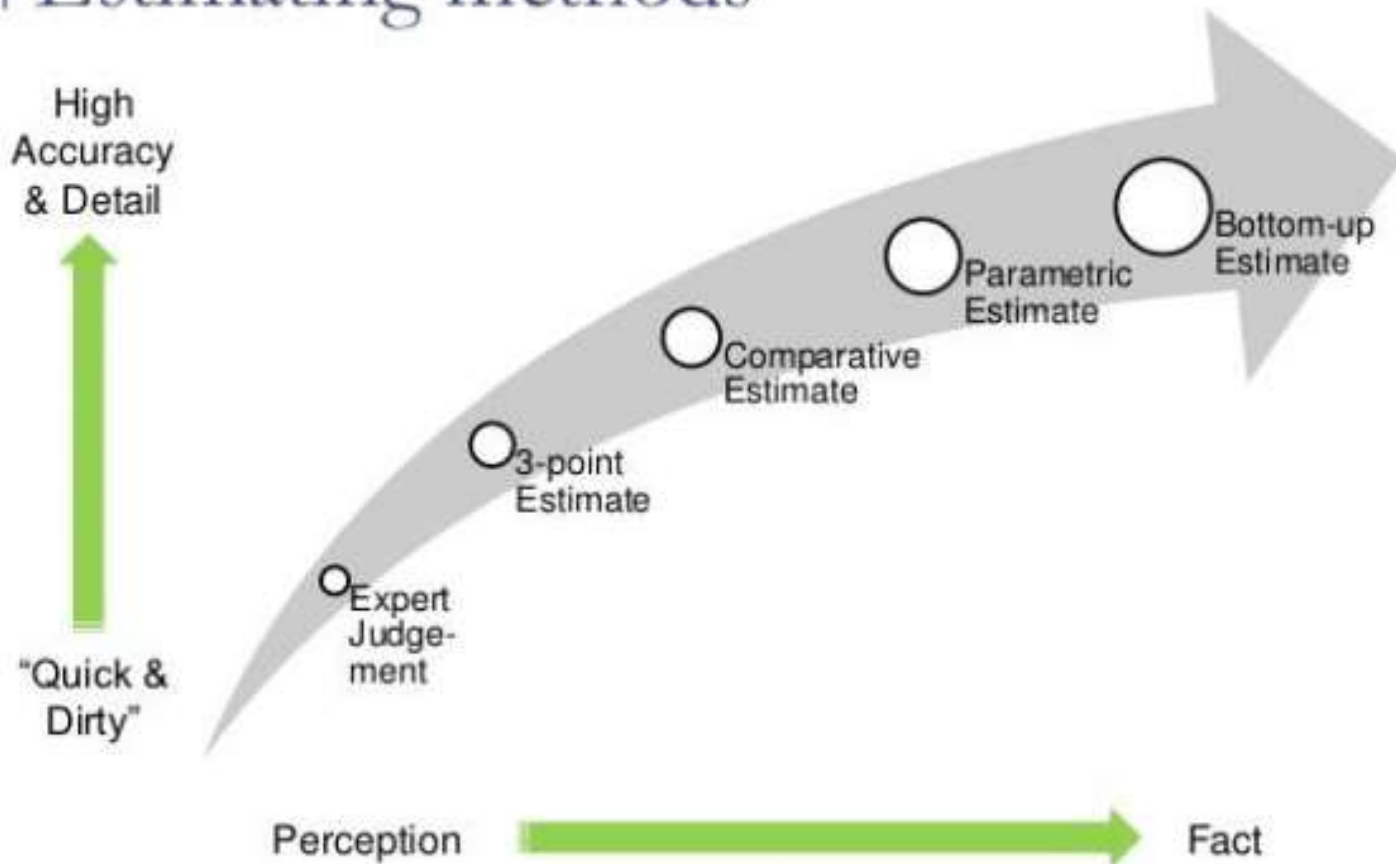
1. Order of magnitude estimate
 2. Study estimate
 3. Preliminary estimate
 4. Definitive estimate
 5. Detailed estimate
-

Order of Magnitude Estimate

- i. Investment per annual tonne capacity
- ii. Turn-over ratio and capital ratio
- iii. Six-tenth factor
- iv. Inflation index
- v. Location index



Estimating methods



Study Estimate

- For studying the economic viability of the project
- For arranging funds for the project
- Preliminary flow sheets, listing of major process equipment with specifications are obtained
- Lang Factor: Overall plant cost is estimated by multiplying the total equipment cost by this factor
- Error $\pm 30\%$

Preliminary Estimate: Error \pm 20%

- Cost estimates are made successively whenever adequate information, which will ensure further accuracy, is available
- This is done when the technology package is frozen and a firm implementation schedule is available
- This point of time is considered as an effective start date of zero date of the project

Definitive cost estimate: Error \pm 10%

Detailed Estimate: Error \pm 5%

Finalization of Project Implementation Schedule

Basis of Time Estimate

- Making a work breakdown of the project
- Estimating the time schedules for each work
- Putting them in proper sequence
- Matching their build-up on a time scale with the available resources
- The total stretch on the time scale corresponding with the resources sets the target

- i. Time study approach
 - ii. Previous project data
 - iii. Guestimating approach
 - iv. ~~Range estimates~~
 - v. Time taken vs time required
 - vi. Estimates from vendors and contractors
 - vii. Allocated and committed time
-

Evaluation of the Project Profitability

▶ The economic viability of the project can be assessed by the following methods:

1. Pay Back Period (PBP)
2. Return on Investment (ROI)
3. Net Present Value (NPV)
4. Internal Rate of Return (IRR)
5. Benefit Cost Ratio (BCR)

Pay Back Period (PBP)

- ▶ Time required to recover the original investment through incomes from the project
-

- ▶
$$PBP \text{ in Years} = \frac{\text{Original Investment (Rs.)}}{\text{Annual Income (Rs.)}}$$
 Assuming that the annual income from the project before depreciation but after taxes is uniform

Return on Investment (ROI)

The ratio relates earnings to investment

-
- ROI = $\frac{\text{Average annual earnings after tax}}{\text{Average book investment after depreciation}}$
- ▶ ROI must be greater than
 - ▶ Bank borrowing rate
 - ▶ Minimum acceptable profitability rate of the company

Net Present Value (NPV)

- ▶ Previous methods did not consider time value of money
 - ▶ The present value of a future cash flow can be computed as:
-

- ▶ Where, PV=present value

S=Cash flow at t year

r=interest rate, also known as discount rate

$$PV = S \times \frac{1}{(1+r)^t}$$

The factor $\frac{1}{(1+r)^t}$ is known as discount factor

NPV for any project is the aggregate present value of net cash flows over the operating life of the project

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

Where, NPV = Net present value
 S_t = net cash flow for the year t

t=operating year

n=operating life of the project

I=original capital investment

r=interest rate

Higher the NPV, better is the project

Internal Rate of Return (IRR)

- ▶ This is a discounting methods, where instead of assuming a fixed discount rate, the discount rate is varied till the NPV becomes zero
- ▶ The discount rate at which the net present value becomes zero is know as internal rate of return
- ▶ Projects with highest IRR will be considered as the best

Benefit Cost Ratio (BCR)

- ▶ Modified form of the NPV method
 - ▶ It is computed as the ratio of aggregate present values of all future cash flows to initial capital investment
-

- ▶ Higher the BCR, better is the project

▶ Projects to be accepted must have $BCR > 1$

$$BCR = \frac{\sum_{t=1}^t \frac{St}{(1+r)^t}}{I}$$

Fixing the Zero Date

- ▶ The project completion period will be counted from this point of time
 - ▶ Pre-project activities
 - ▶ Advance Actions
 - ▶ Infrastructural facilities
 - ▶ Approach road
 - ▶ Power
 - ▶ Water
 - ▶ Railway Siding
 - ▶ Port and Jetty
-

<https://www.youtube.com/watch?v=BOU1YP5NZVA>