

II MBA

FINANCE ELECTIVE

SUBJECT NAME: PROJECT MANAGEMENT

SUBJECT CODE: P16MBA4EF4

B: FINANCE
ELECTIVE COURSE - IV: PROJECT MANAGEMENT

Objectives: This course enables the students to get enrich in the concepts of project management and to help the students in project planning and scheduling.

Unit I

Concepts of Project Management; Project – Meaning – Nature – Types of project and project life cycle – Project management – Nature and scope of project management – Project management as a profession – Role of project manager.

Unit II

Project Identification and Formation: Project environment – Identification of investment opportunities – Projects screening – Prefer ability study – Project selection – Project formulation – Stages in project formulation – Project report preparation – Planning Commission's guidelines for project formulation.

Unit III

Project appraisal: Objectives, essentials of a project methodology – Market appraisal – Technical appraisal – Financial appraisal – Socio – economic appraisal – Management appraisal

Unit IV

Project Planning and Scheduling: Objectives – Process or Planning Components or good planning – Project designing and project scheduling and time estimation – Scheduling to match availability of man power and release of funds – Cost and time trade cost.

Unit V

Project Execution and Administration – Project contracting: Contract pricing, types – Project organization: Forms of organization – Project direction – Project communication – Project co-ordination – Factors influencing effective project management – project time monitoring and cost monitoring – Project over runs. Project Control: Control techniques – PERT, CPM - Proper review – Project audit.

UNIT - I

PROJECT MANAGEMENT – AN OVERVIEW

Learning Objectives

- ✓ To understand the concept, characteristics and elements of projects.
- ✓ To understand the stages in Project Life Cycle.
- ✓ To know the classification of projects on various bases.
- ✓ To appreciate the importance of project management.
- ✓ To understand the importance of integrated approach in project management.

I. CONCEPT OF PROJECT

What is a project?

Project is defined as temporary but interrelated tasks undertaken to give a unique product or service or result.

- ❖ A temporary endeavor
- ❖ A defined beginning and end
- ❖ Unique goals and objectives
- ❖ Beneficial change or added value

A project is made on a package of interrelated

- ❖ An investment
- ❖ Time bound activities.

Every project has two phases basically;

- ❖ The first is preparation and construction, and
- ❖ The second, its operation.

Preparation and construction: —————→Project planning deals with

- ❖ Specified tasks,
- ❖ Operations or activities which must be performed to achieved the project goals.

Operation: —————→It has to be operated within a given

- ❖ Set of rules,
- ❖ Regulations,
- ❖ Constraints and
- ❖ Restrictions.

Implementation

❖ **A project needs resources or inputs.** A project can be defined as a complex of non-routine activities that must be completed with a set amount of resources and within a set time limit. The following figure explains the basic tenets of project management.

- ❖ Time
- ❖ Scope
- ❖ Cost
- ❖ Quality

II. NATURES AND CHARACTERISTICS OF A PROJECT

- ❖ Temporary
- ❖ Definite Beginning and Completion
- ❖ Definite Objective/Scope and Unique
- ❖ Defined Time and Resources
- ❖ Multiple Talents

a) Temporary

Projects are temporary in nature. (The word 'temporary' here may refer to an hour, a day or a year.) Every project has a beginning and end. Operational work is an ongoing effort which is executed to sustain the business (But projects are not ongoing efforts). It is considered to end when the project's objectives have been achieved or the project is completed or discontinued. It is also may often have intended and unintended social, economic and environmental impacts that long last.

b) Definite beginning and completion

Project is said to be completed when the project's objectives have been achieved. When it is clear that the project objectives will not or cannot be met the need for the project no longer exists and the project is terminated. Thus, projects are not ongoing efforts. Thus, every project has a definite beginning and end.

c) Definite objective/scope and unique

All the projects have their own defined scopes/objectives for which they are carried out. Every Project is undertaken to create a unique product, service, or result.

d) Defined time and resources

As the projects have definite beginning and end, they are to be carried out within the time and resources constraints. Each project will have defined time and resources for its execution.

e) Multiple talents

As projects involve many interrelated tasks done by many specialists, the involvement of people from several departments is very much essential. Thus, the use of multiple talents from various departments (sometimes from different organizations and across multiple geographies) becomes the key for successful project management.

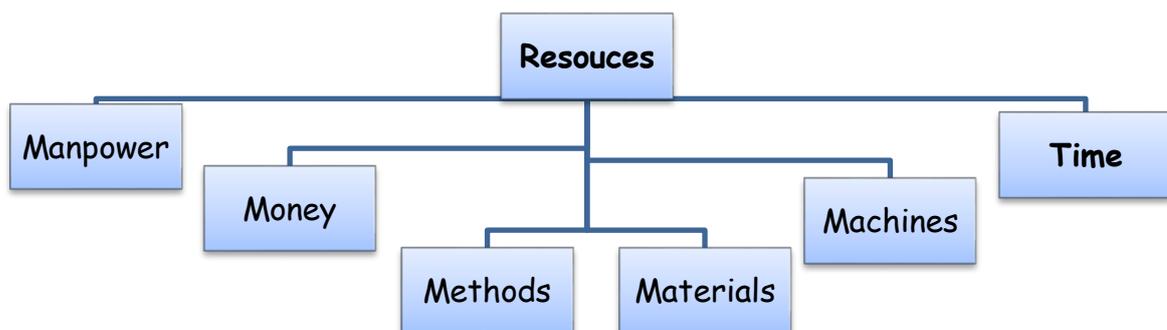
III. BASIC ELEMENTS OF PROJECT:

There are three basic elements which must be considered in a project cycle. These are discussed below:

- ❖ Operations
- ❖ Resources
- ❖ Conditions or Restraints

A. Operations

Operations are the activities or jobs which must be performed to meet the project objectives. These activities should be identified and arranged in a logical sequence. After determining the job sequence, the method of performing each operation must be determined in advance. The method, in turn, predetermines the time and cost required to perform each activity.

B. Resources The second of the project elements, resource can be classified under:

Time & cost → estimates are associated with the *method of performance*, where the *cost estimate* relates *resource expenditure* to a common measure of cost in money alone and the time estimate defines the *expected duration* of the resource use.

C. **Conditions or Restraints**

The third project element refers to externally imposed conditions or restraints, like:

- ❖ **Supply of materials,**
- ❖ **Machines, and**
- ❖ **Designs by outside agencies**

The delivery system should be planned carefully in co-ordination with the activities to be undertaken.

The **two basic activities** → which normally get completed before undertaking the installation of equipment in any project are:

- ❖ **Land acquisition, and**
- ❖ **Infrastructural development**

IV. **STAGES IN PROJECT LIFE CYCLE:**

The project life cycle typically passes through five stages, viz.,

- ❖ Conception stage
- ❖ Project initiating,
- ❖ Project planning,
- ❖ Project executing and
- ❖ Project closure

The following figure shows the Project Life Cycle.

The starting point begins the moment the project is given the go-ahead. Project efforts starts slowly, build to a peak and then declines to delivery of the project to the customer. The stages in the project life cycle are discussed below:

I. **Conception Stage:** It includes

- ❖ Generation of the project idea
- ❖ An idea may come from

- ✓ Employees,
- ✓ Market source,
- ✓ Consultant or entrepreneur

A. Project Initiation Stage:

In this stage, the specifications of the project are defined along with the clear cut project objectives. Project teams are formed and their major responsibilities are assigned. More specifically, this stage defines the goals, specifications, tasks and responsibilities.

- ❖ Starting up of project development of a detailed project report
- ❖ Undertaking a feasibility study and
- ❖ Establishing a project team

B. Project Planning Stage:

In this stage, the effort level increases and plans are developed to determine what the project will entail, when it will be scheduled, whom it will benefit, what quality level should be maintained and what the budget will be. More specifically, this stage will include **planning schedules, budgets, resources, risks and staffing.**

C. Project Execution Stage:

In this stage, a major portion of the project work takes place. The physical product is produced

(**For Example**, house, bridge, software program, report, etc) Time, cost and specification measures are used for control. More specifically, this stage will take care of status reports, changes, quality and forecasts.

D. Project Closure stage:

This is the final stage which includes two activities, viz.,

- ❖ Delivering the outcome of the project to the customer and
- ❖ Redeploying the project resources.
 - ✓ **Delivery** of the project might include **customer training and transferring documents.**
 - ✓ **Redeployment** usually involves **releasing project equipment/ materials** to other projects and finding new assignments for team members.

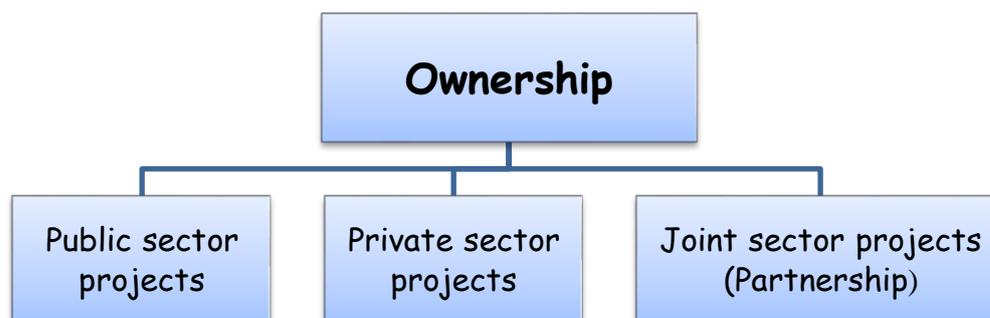
- ✓ More specially, this stage will undertake activities relating to **training the customer, transfer of documents, releasing resources, releasing staffs and learning lessons.**

II. CLASSIFICATION OF PROJECTS

The projects can be classified into various types:

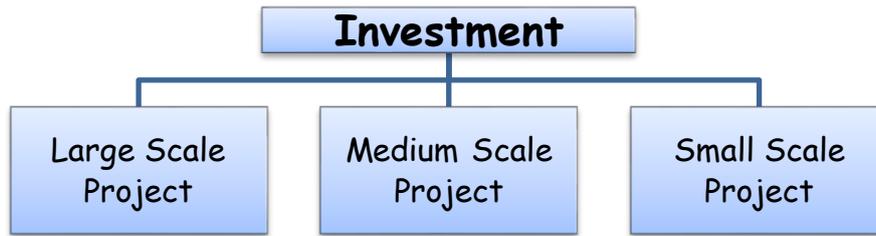
- ❖ Based on Ownership
- ❖ Based on Investment
- ❖ Based on Research in Academia
- ❖ Based on Sector
- ❖ Based on Objective
- ❖ Based on Nature
- ❖ Based on Time
- ❖ Based on Functions
- ❖ Based on Risk
- ❖ Based on Investment Decisions
- ❖ Based on Output
- ❖ Based on Techno-Economic Characteristics
- ❖ Based on Financial Institutions' Classification

A. BASED ON OWNERSHIP



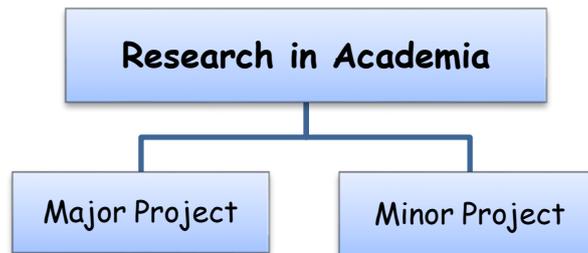
1. **Public sector Projects:** These are the projects which are done by public projects.
2. **Private Sector Projects:** These are the projects which are undertaken by private enterprises.
3. **Public Private Partnerships:** These projects which are undertaken by both government and private enterprises together

B. BASED ON INVESTMENT



- a) **Large Scale Project:** These projects involve a huge outlay or investments, say, crores.
- b) **Medium Scale Project:** These projects involve medium level investment and are technology oriented.
- c) **Small Scale Project:** These projects involve only a lesser investments.

C. BASED ON RESEARCH IN ACADEMIA



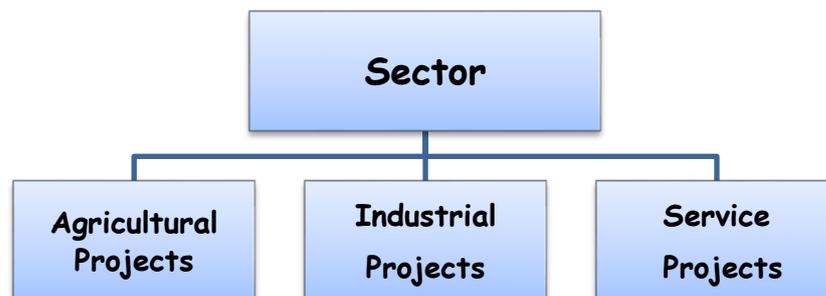
a) Major Projects:

In academia, the major projects are those projects which involve more than one year to 3 or 5 years and minimum funding of “3 lakhs in case of social sciences” and “5 lakhs in case of sciences”.

b) Minor Projects:

The minor projects in academia are those projects which will be completed within a year and have a maximum funding of “1 lakh in social science” and “3 lakhs in case of sciences”.

D. BASED ON SECTORS



a) Agricultural Projects:

These are the projects which are related to agricultural sector like irrigation projects, well digging projects, maturing projects, soil upgrading project, etc.

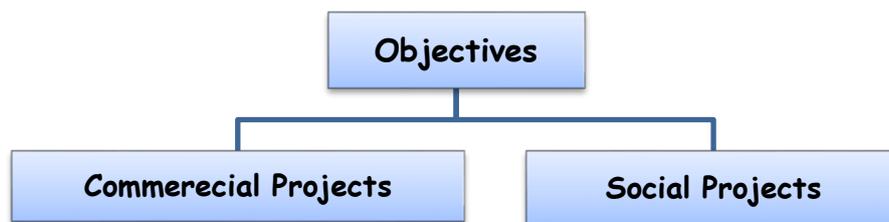
b) Industrial Projects:

These are the projects which are related to the industrial manufacturing sectors like cement industry, steel industry, textile industry, etc.

c) Service Projects:

These are the projects which are related to the services sectors like education, tourism, health, public utilities, etc.

E. BASED ON OBJECTIVE



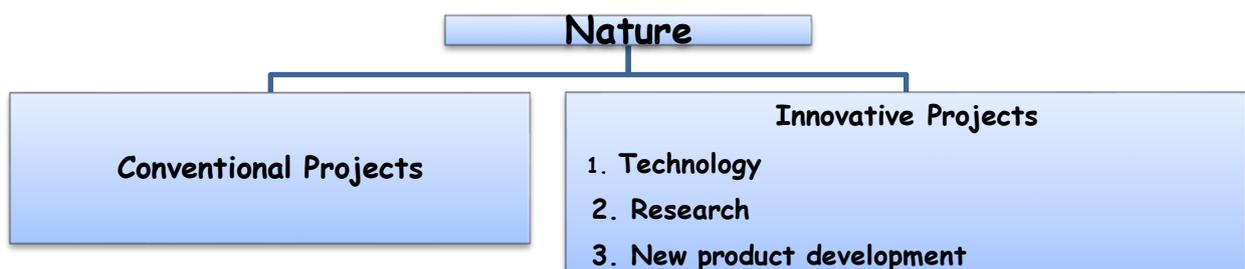
a) Commercial Projects:

These projects are undertaken for commercial purpose and return on investment is expected out these projects.

b) Social Projects:

These projects are undertaken for social purposes and welfare of the people is the aim of these projects. These projects are undertaken either by the Government or Service oriented Non-Governmental Organizations.

F. BASED ON NATURE



a) Conventional Projects:

These projects are traditional projects which do not apply any innovative ideas or technology or method.

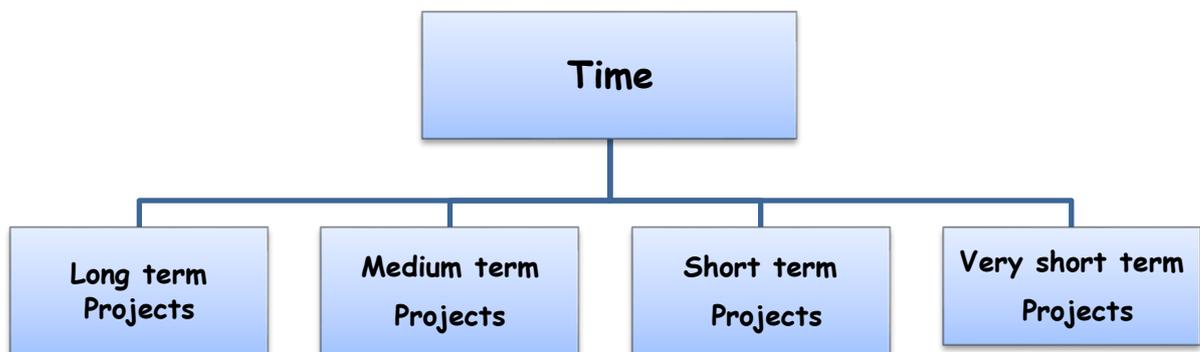
b) Innovative Projects:

These projects involve the use of technology, high R&D, development of new products and services. These innovative projects can be further classified into:

- ❖ **Technology:** Depending on the level of technological uncertainty at the time of initiation of projects, the projects can be classified into:
 - ✓ **Low-Tec projects** which rely on the existing and well-established base technologies;
 - ✓ **Medium-Tech projects** which rest mainly on existing base technologies but incorporate some new technology or feature;
 - ✓ **High-Tec projects** in which most of the technologies employed are new, but existent, having been developed prior to the project's initiation; and
 - ✓ **Super High-tech projects** which are based primarily on new, not entirely existent technologies.
- ❖ **Research:** Based on the type of research, projects can be classified into:
 - ✓ **Exploratory research projects** which may generate novel idea in the domain of knowledge;
 - ✓ **Constructive research projects** which are mainly done by many technological corporate to find new or alternative solutions to any particular crisis or problems,
 - ✓ **Empirical research projects** are very impressive observational type of research in which testing on real life data or analysis of pattern of some specific events in order to identify the nature or the class of trend that specific phenomenon maintains.
- ❖ **New product development:** These projects are undertaken in the life cycle of a product. These projects can be classified into:
 - ✓ **Advance development projects** which aim at inventing new science or capturing new know-how for the organization;

- ✓ **breakthrough development projects** which create the first-generation of an entirely new product and involve significant change in the product and process technology;
- ✓ **Platform or next generation development projects** which provide a basis for a product and process family and thus establish the basic architecture for follow-on derivative projects; and
- ✓ **Derivative development projects** which refine and improve selected performance dimensions.

E. BASED ON TIME



a) Long term projects:

These projects take a very long duration to complete. These projects are run for many years till the objectives reached.

b) Medium term projects:

These projects take medium term duration like 3 to 5 years.

c) Short term projects:

These projects are executed within a short period, normally within a year.

d) Very short term projects:

By very name you can understand that these projects are completed within a very short period, say, within day. For example, product launch project.

F. BASED ON FUNCTIONS

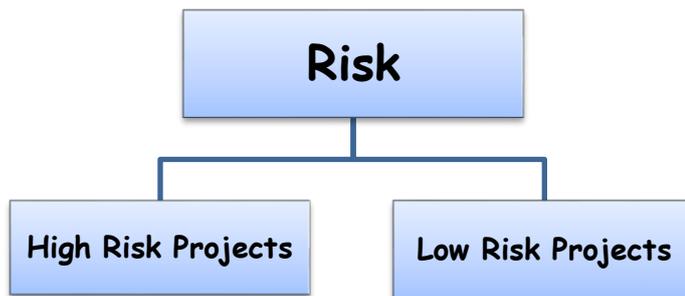
Based on the functional area of management, the projects can be classified into:

a) **Marketing Projects** which are taken up in the area of marketing a product or service of an organization.

b) **Financial Projects** are undertaken to raise finance or restructure capital structure.

- c) **Human Resources Projects** are undertaken in the area of human resources of an organization,
- d) **IT and Technology Projects** which are undertaken in the area of IT related requirement of any organization,
- e) **Production Projects** are undertaken in the area of production or operations.
- f) **Strategic Projects** are taken by the organizations to execute strategy,

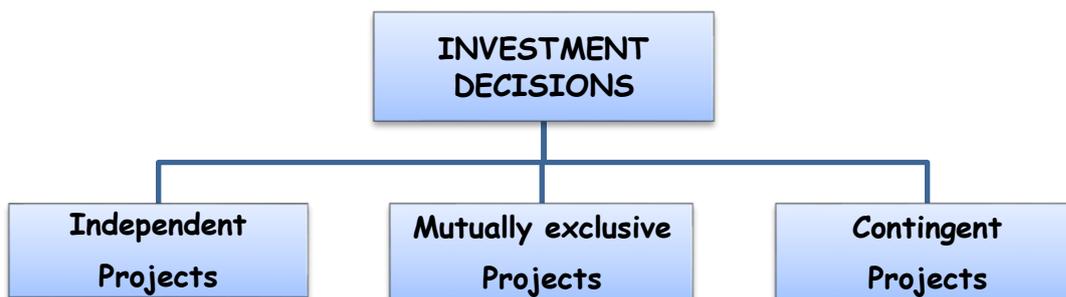
G. BASED ON RISK



- a) **High Risk Projects:** These projects involve a very high degree of risk.
- b) **Low Risk Projects:** These projects do not involve risk and they are carried out in the normal course of action.

H. BASED ON INVESTMENT DECISIONS

On the basis how the projects influence the investment decision products, project can be classified into:



a) Independent Projects:

An independent project is one, where the acceptance or rejection does not directly eliminate other projects from consideration or affect the likelihood of their selection.

b) Mutually exclusive Projects:

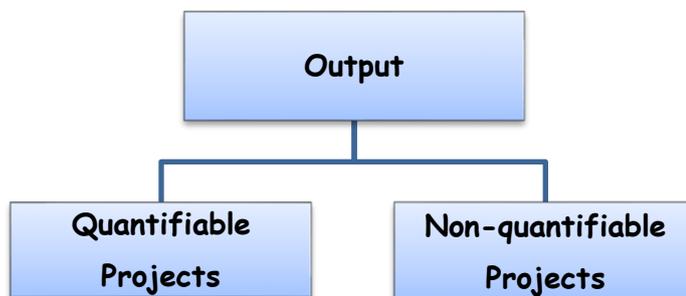
The mutually exclusive projects are projects that cannot be followed at the same time. The acceptance of one prevents the substitute proposal from accepting.

c) Contingent Projects:

A contingent project is one where the acceptance or rejection depends on the decision to accept or reject multiple numbers of other projects. Such projects may be complementary or substitutes.

I. BASED ON OUTPUT

Based on output, projects are classified into quantifiable and no quantifiable ones.



a) Quantifiable projects:

In these projects, the benefits / goals of which are amenable for measurement. Quantitative expression of the outcomes is possible. It is easy to understand and appreciate quantitative projects as it is easy to communicate them.

b) Non-quantifiable projects:

In these projects quantification of the benefits / outcome may not always be possible as the impact of the project is spread over a longer period. The benefits accrue to the intended beneficiaries in the long run. Projects concerning health, education, and environment fall under this category.

J. BASED ON TECHNO-ECONOMIC CHARACTERISTICS

On the basis of Techno-economic factors projects can be further classified into

- ❖ Factor Intensity Oriented;
- ❖ Causation Oriented and

❖ Magnitude Oriented

For instance, the United Nations Organization (UNO) and its various developmental agencies use the Standard Industrial Classification of all economic activities in collection and compilation of economic data regarding projects.

a) Factor Intensity Projects: —————> More Technology Intensive and Less Labour Intensive

It is anybody's knowledge that some projects are capital intensive while some are labour intensive.

- ✓ **Technological advancements** are taking place in every sector in a big way, many projects is becoming more technology intensive and less labour intensive. The gestation period of some of the projects also is quite long.
- ✓ **Large scale** investments are made in the plant and machinery.
- ✓ **Economies of scale** and the associated cost competitiveness also prompt the establishment of large scale organizations.

b) Causation-Oriented Projects:

The availability of a particular raw material in abundance in a particular region could be the reason for conceiving projects at times.

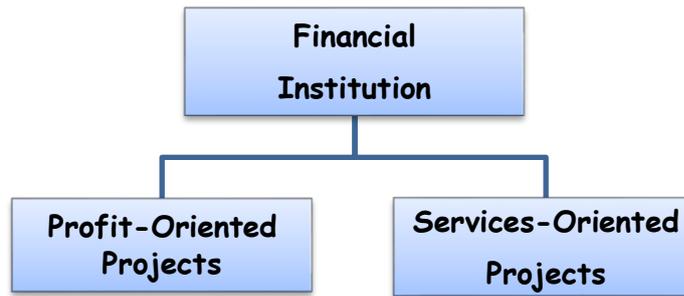
To make use of the locally available raw material, skilled workforce and to promote development of a backward region, some projects are conceived and formulated.

c) Magnitude Oriented Projects:

Based on the size of the project, projects may be classified under large, medium and small scale projects. The size of the investment, gestation period, employment generation, etc. is some of the factors that influence the size of the project.

f) BASED ON FINANCIAL INSTITUTIONS' CLASSIFICATION

Financial institutions – both central and state level have classified projects into profit-oriented projects and service-oriented projects.



a) Profit-Oriented Projects: They are classified into

- ❖ New Projects;
- ❖ Expansion Projects or Development projects;
- ❖ Modernization Projects or Technology Projects and
- ❖ Diversification Projects.

b) Service-Oriented Projects: They are classified into

- ❖ Welfare Projects;
- ❖ Service Projects;
- ❖ Research and Development Projects and
- ❖ Educational Projects.

III. PROJECT MANAGEMENT

Project Management Institute's A Guide to the Project Management Body of Knowledge (PMBOK® Guide) identifies its recurring elements. They are several meanings defined the PM:

- ❖ **Project management processes** fall into five groups such as initiating, planning, executing, monitoring, controlling and closing.
- ❖ **Project management is the discipline** of planning, organizing, securing and managing resources to bring about the successful completion of specific project goals and objectives.
- ❖ **Project managements the application** of knowledge, skills and techniques to execute projects effectively and efficiently.

- ❖ **Project management knowledge** draws on nine areas, viz., integration, scope, time, cost, quality, procurement, human resources, communications and risk management. All management is concerned with these, of course.
- ❖ **Project management deals** with planning, scheduling, controlling and monitoring the complex non-routine activities that must be completed to reach the predetermined objectives of the project.
- ❖ **The elements of project management control** include programmed objectives, policy restrictions, resource constraints, government regulations, process implementation, and review of output, feedback, and revision of objectives.
- ❖ **Project management involves** the coordination of group activity, wherein the manager plans, organizes staffs, directs, and controls to achieve an objective, with constraints on time, cost and performance, of the end product.

IV. IMPORTANCE OF PROJECT MANAGEMENT

1. Reduction in the Product Life Cycle
2. Global Competition
3. Knowledge Explosion
4. Corporate Downsizing
5. Increased Customer Focus
6. Managing Small Projects
7. Upsurge of Third World and Closed Economies

Project management includes:

- Identifying requirements,
- Establishing clear and achievable objectives,
- Balancing the competing demands from the different stakeholders and
- Ensuring that a commonality of purpose is achieved.

a) Reduction in the Product Life Cycle

The product life cycle is one of the most significant driving forces behind the demand for project management. As the lives of the products are shortened, time to market for new products with short life cycles has become increasingly important.

Innovation & invention becomes the key for success and speed to innovate or invent becomes a competitive advantage. More and more organizations are depending on cross functional project teams to get new products and services to the market as quickly as possible.

b) Global Competition

In the globally competitive today's market, customers want cheaper products and services with better quality at cheaper prices. This had led to the emergence of the quality movement across the world in International Standards Organization Certification requirements for doing business. Quality management & improvement essentially requires project management. As the basic elements of project management concentrate on time, cost and quality, project management has become style of managing business.

c) Knowledge Explosion

The knowledge explosion world over has increased the complexity of managing projects. Product complexities have increased and demanded integration of divergent technologies. To manage all this, project management is the only way.

d) Corporate Downsizing

Restructuring of organizations in the recent years has resulted into the downsizing or rightsizing. Downsizing and sticking to core competencies have become essential for survival for many organizations.

e) Increased Customer Focus

Increased competition has increased the expectation of customers. Customers expect customized products and services instead of generic ones. The customization of products and services required better understanding of the customers' needs by project team members. The customers are more aware and their changing needs are to be taken into account to survive in the market.

f) Managing Small Projects

In today's competitive world, a situation has emerged in the organizations that many projects are run concurrently. This resulted into the multi-project environment and

also plethora of new problems. Sharing and prioritizing resources across a portfolio of projects is a major challenge for top management.

g) Upsurge of Third World and Closed Economies

The gradual opening of emerging economies has created an explosion of demand for goods and services within these economies for their development.

STEPS IN PROJECT MANAGEMENT

Planning → Analysis → Selection → Financing → Implementation → Review

1. Planning

It involves generation of project idea and screening of project proposals. Feasibility studies are conducted to determine whether a project will be profitable or not.

2. Analysis

A detailed analysis of the selected projects is conducted and all relevant market, technical, financial and economic aspects are taken into consideration.

- i. Economic Analysis** – It is also called social-cost benefit analysis. It is conducted to determine the impact of the project on the society in terms of income distribution, level of savings and investment, employment, social and cultural order.
- ii. Ecological Analysis** – An ecological analysis may also be conducted in case of big industrial projects like dams, power projects, nuclear plant, production of drugs and chemicals etc. It helps in determining any damage, threat or loss to the environment due to the project and the restoration measures and cost related to it.
- iii. Market Analysis** – It involves estimating the potential market and future market share related to the project.
- iv. Technical Analysis** – It involves analysis of the technology available and technical viability and feasibility of the project.
- v. Financial Analysis** – It involves analysis of risks and returns associated with the project.

3. Selection

The most attractive project in terms of profitability and feasibility is chosen by the company.

Capital budgeting techniques are used to appraise

That appraise can each project and various discounting and non-discounting techniques are used to determine the most profitable one in terms of –

	Accept Project	Reject Project
Payback Period	PBP less than <Target Period	PBP>Target Period
Accounting Rate of Return	ARR>Target Rate of return	ARR<Target Rate of return
Net Present value	NPV>0	NPV<0
Internal Rate of Return	IRR>Cost of Capital	IRR<Cost of Capital
Benefit-cost Ratio	BCR>1	BCR<1

4. **Financing**

All short term and long term needs of the project are considered before preparing a budget for the project. Margin money for contingencies is also added to the total budget. Various sources of short and long term funds are explored and the selected project is financed with an optimum mix of debt and equity.

5. **Implementation**

It involves the actual execution of the project in a systematic manner according to the project plans and guidelines.

6. **Review**

The project has to be reviewed periodically to compare to actual performance with the projected performance, for this purpose a feedback mechanism is developed which helps in future decision making and taking corrective measures to improve performance.

V. **BENEFITS OF PROJECT MANAGEMENT**

Project management is not rocket science, yet it often gets dressed up that way. At its foundation lies bedrock of basic organizational skills, which – come to think of it – might as well be rocket science the way some managers grapple with the concept.

When Project Management Is Done Right

The benefits of project management are ten-fold: the manager actually gets to manage (easier said than done at times, but allow me to wax poetic here) as they lead their team and institute a strategy that will see a specific project reach fruition. The client benefits because he/she is

allowed to provide feedback, while relishing in the knowledge that their input really means something.

1. Better Efficiency in Delivering Services:

Project management provides a “roadmap” that is easily followed and leads to effective performance project completion and people coordination.

2. Improved / Increased / Enhanced Customer Satisfaction:

The project manager gets a whenever project done on time and under the budget, the client walks away happy. And a happy client is once seeing again. Smart project management provides the tools that enable this company/client/project manager relationship to continue.

3. Enhanced Effectiveness in Delivering Services:

The project manager same strategies that allowed to successfully completing one project will serve to many times over.

4. Improved Growth and Development Within a Group /Team:

Positive results not only command respect but more frequently than not inspire within a team to continue to look for ways to perform more efficiently.

5. Greater Standing and Competitive Edge:

This is not only a good benefit of project management within the workplace but outside of it as well; word travels fast and there is nothing like superior performance to secure your place in the marketplace.

6. Opportunities to Expand project Services:

A project manager must understand the effective performance when achieved the successful completion of the proposal a by-product of greater standing. Great performance leads to more opportunities to succeed.

7. Better Flexibility:

Perhaps one of the greatest benefits of project management is that it allows for flexibility. People coordination is very important for the better relationship to continue. Because of

the project management allows the manager to map out the strategy manager want to take see the project completed. But the beauty of such organization is that if you discover a smarter direction to take, you can take it. For many small-to-midsize companies, this alone is worth the price of admission.

8. Increased Risk Assessment:

When all the players are lined up and project strategy is in place potential risks will jump out. And that's the way it should be. Project management provides a red flag at the right time: before you start working on project completion.

9. Increase in Quality:

It is goes to hand-in-hand exchange with enhanced effectiveness.

10. Increase in Quantity:

The project manager must to be saved the best for last. An increase in quantity is often the result of better efficiency, and getting order from different proposal for different places. A simple reminder regarding the benefits of project management

VI. AN INTEGRATED APPROACH TO PROJECT MANAGEMENT

Many project managers have tried many tools, techniques and systems to manage projects. Thus, today's project management environment requires an integrated approach.

Meaning of Integrated project management

Integrated project management process focuses all project efforts towards the strategic plan of the firm and reinforces mastery of both the project management tools or techniques and interpersonal skills necessary to achieve successful project completion.

Integration of project management has two key areas.

A successful project manager must simultaneously manage the four basic elements of a project: **Resources, time, money, and most importantly scope.**

- ❖ Integration of Projects with Strategic Plan
- ❖ Integration within the Process of Managing Actual Projects

a) Integration of Projects with Strategic Plan

- ✓ Strategic plans are written by one group of managers,
- ✓ Projects are selected by another group and
- ✓ The projects are implemented by another group.

- *This resulted in unsatisfied customer.*

Thus, integration of projects with the strategic plans is very essential. Strategies are implemented through projects.

The key is selecting from the many proposals those projects that make the largest and most balanced contribution to the objectives and strategies of the organization. This means prioritizing projects so that scarce resources are allocated to the right projects.

b) Integration within the Process of Managing Actual Projects

The integration within the process of managing projects has two dimensions.

1. The first dimension ----- Technical side

- ✓ It is the technical side of the management process
- ✓ Which consists of the formal, disciplined, pure logic part of the process
- ✓ It relies on the formal information system and it includes planning, scheduling and controlling of projects.

2. The second dimension ----- Socio-cultural side

It is the **socio-cultural side** and this centre on creating a temporary social system within a larger organizational environment that combines the talents of a divergent set of professionals working to complete the project.

VII. PROJECT PORTFOLIO MANAGEMENT SYSTEM AND STRUCTURE

Term used

It is a term used by project managers and project management (PM) organizations, (or PMO's), to describe methods for analyzing and collectively managing a group of current or proposed projects based on numerous key characteristics.

Fundamental objective

To determine the optimal mix and sequencing of proposed projects to best achieve the organization's overall goals.

The overall goals

Typically expressed in terms of hard economic measures, business strategy goals, or technical strategy goals while honoring constraints imposed by management or external real-world factors

Typical attributes of projects

Being analyzed in a PPM process include

- ✓ Each project's total expected cost,
- ✓ Consumption of scarce resources (human or otherwise) expected timeline and schedule of investment,
- ✓ Expected nature,
- ✓ Magnitude and timing of benefits to be realized, and
- ✓ Relationship or interdependencies with other projects in the portfolio.

This way the organization can ensure they stay focused on delivering a strategy, goal or other benefit, and that resources are used where they will offer the best return.

Project portfolio management asks the following questions:

- Are we doing the right things?
- Are we doing them the right way?
- Are we doing them well?
- Are we getting the benefits?

If the answer to any of these questions is no, immediate action is needed to bring the portfolio back on track.

Need for an effective project portfolio management system

There are three problems or reasons why we need project portfolio management system. They are:

- ❖ Implementation Gap
- ❖ Organizational Politics
- ❖ Resource conflicts and multitasking

a) Implementation Gap

In many organizations, **top management formulates strategy and functional management implements**. For implementation ---- the functional managers develop objectives based on the strategies.

The **strategies and objectives** are developed at different levels by top management and executive management respectively, implementation gap arises. It may lead to frequent conflict among functional managers, conduct of frequent meetings to establish or renegotiate priorities, people frequently shifting from one project to another, depending on current priority and employees getting confusion about which projects are important. As clear linkages do not exist, the organizational environment becomes dysfunctional, confused and ripe for ineffective implementation of organization strategy and hence, projects.

The **implementation gap** refers to the lack of understanding and consensus of organization strategy among top and middle level managers. Hence, project portfolio management system will help the organization to minimize the implementation gap.

b) Organizational Politics

- ❖ When **criteria and processes** for selecting projects are ill-defined and non-aligned with the mission of the firm, projects suffer from not getting priority and resources.
- ❖ The term '**sacred cow**' is used to refer to the worthless projects which are advocated by higher officials.
- ❖ Similarly, **project sponsor** can play a significant role in the selection and successful implementation of projects.
- ❖ **Politics** can play a role not only in project selection but also in the aspirations behind the projects.
- ❖ **Individuals** can enhance their powers within the organization by managing extraordinary and critical projects.
- ❖ As a result, **project portfolio management system** will help in reducing the organizational politics.

c) Resource conflicts and multitasking

- ❖ When more projects are carried out, it leads to resource **conflicts and multitasking**.
- ❖ **Resource sharing** also leads to multitasking.
- ❖ People working on several projects concurrently are found to be inefficient.
- ❖ **Multitasking** adds to delay and costs, i.e., both time and cost over-runs.
- ❖ **As a result**, project portfolio management system will help in optimum allocation of scarce resources.

VIII. Design of Project Portfolio Management System

Design of project portfolio management system should include the following:

- ❖ Classification of Project
- ❖ Selection Criteria
- ❖ Sources of Project Proposals
- ❖ Evaluation and Selection of Project Proposals
- ❖ Managing the Project Portfolio System
- ❖ Balancing the portfolio for risks and types of projects

a) Classification of Project

Most of the organizations may have three kinds of projects in their portfolio, viz., compliance and emergency projects, operations projects and strategic projects.

- ❖ **Compliance and emergency projects** are compulsory in nature to meet the regulatory conditions.
- ❖ **Operational projects** are those that are needed to support operations and are designed to improve efficiency of delivery system, reduce product costs, and improve performance.
- ❖ **Strategic projects** are those that are directly support the organizations' long run mission.
 - ✓ The **strategic value of a project** should be determined before it is placed in the project portfolio.
 - ✓ But, **compliance projects** may also be undertaken to avoid regulatory problems.

b) Selection Criteria

Selection criteria for projects may be divided into **financial and nonfinancial**.

❖ **Financial criteria** are the most preferred method to evaluate projects. Common financial methods include:

✓ **Payback method, and**

✓ **Net present value method**

- **Payback method** is a method in which the projects which pays back the original investment in a shorter period are given priority.
- **Net present value method**, the project which gives positive NPV is selected. NPV is the excess of present value of cash inflows over present value of cash outflows.

❖ **Non-financial criteria** may include the following:

✓ **Restoring corporate image or**

✓ **Enhancing brand image**

Many organizations are committed to corporate citizenship and support community development projects. Thus, the social desirability of the projects is also equally important as financial viability.

c) Sources of Project Proposals

Projects should originate from anyone who believes their project will add value to the organization. Many organizations restrict proposals from specific levels or groups within the organization. This could be an opportunity lost. Thus, project ideas should be solicited from all internal and external sponsors.

d) Evaluation and Selection of Project Proposals

Evaluating many project proposals and selecting the projects which add value to an organization is important. Data and information are collected to assess the value of the project to the organization. Given the selection criteria and current portfolio of projects, the priority team rejects or accepts the project. If the project is accepted the priority team set implementation in motion.

e) Managing the Project Portfolio System

- **Managing portfolio takes the selection system** one step higher in that the merits of a particular project are assessed within the context of existing projects.
- At the same time, it **involves** monitoring and adjusting selection criteria to reflect the strategic focus of the organization.
- **The priority system** can be managed by a small group of key employees in a small organization or in a large organizations, it can be managed by the project office or enterprise management group.
- Management of a portfolio system requires two major inputs from senior management, viz.,
 - a) Senior management must **provide guidance** in establishing selection criteria that strongly align with the current organizational strategies; and
 - b) Senior management must **annual decide** how they wish to balance the available organizational resources among the different types of projects.

Given these inputs, the priority team or project office can carry out its many responsibilities, which include supporting project sponsors and representing the interest of the total organization.

f) Balancing the portfolio for risks and types of projects

A major responsibility of the priority team is to balance projects by type, risk and resource demand. This requires a total organization perspective.

David and Jim Matheson developed a project portfolio matrix for R&D Organizations, based on technical feasibility and commercial potential, which contains four quadrants, viz.,

- ✚ **Bread and butter** (high technical feasibility with low NPV),
- ✚ **Pearl** (high technical feasibility with high NPV),
- ✚ **Oyster** (low technical feasibility with high NPV) and
- ✚ **White elephants** (Low technical feasibility with low NPV).

Organizations often have too many white elephants and too few pearls and oysters.

IX. PROJECT MANAGEMENT STRUCTURES

Organizational structure consists of activities such as task allocation, coordination and supervision, which are directed towards the achievement of organizational aims. It can also be considered as the viewing glass or perspective through which individuals see their organization and its environment. An organization can be structured in many different ways, depending on their objectives.

a) Organizing Projects within the Functional Organization

Employees within the functional divisions of an organization tend to perform a specialized set of tasks. This leads to operational efficiencies within that group.

The **functional organization** is also commonly used when, given the nature of project, one functional area plays a dominant role in completing the project or has a dominant interest in the success of the project.

The advantages in using the existing functional organization include

- ❖ No change in the design and operation of parent organization.
- ❖ Maximum flexibility in the use of staff.
- ❖ In-depth expertise of the functional department can be used for projects
- ❖ Post-project transition is easy.

The disadvantages in using the existing functional organization include

- ❖ Lack of focus on the part of functional departments as they have their own routine work.
- ❖ Integration across functional units is very difficult.
- ❖ Projects may take longer time due to slow response by functional departments.
- ❖ Motivation level among the people assigned to the project is very weak as they lack ownership.

b) Organizing Projects as Dedicated Teams

- ✚ In this structure, a dedicated independent project teams are created.
- ✚ These teams operate as separate units from the rest of the parent organization.
- ✚ Usually, a full time project manager is designated to pull together a core group of specialists who work full time on the project.

- ✚ The project manager recruits necessary personnel from both within and outside the parent company.
- ✚ Project managers get maximum freedom in this structure.
- ✚ The following figure shows how projects are organized with dedicated teams.

The advantages of dedicated team structure include

- ❖ It is very simple to establish.
- ❖ Fast completion of the projects is ensured.
- ❖ High level cohesiveness would emerge.
- ❖ Cross functional integration is possible.

The disadvantages of dedicated team structure include It is expensive

- ❖ It creates internal strife in the organization.
- ❖ It is referred as Project it is (a gap gets created between the project teams and the people in the parent organization and project members feel they are only important for the organization).
- ❖ Sometimes, the technological expertise of the specialized project teams may be very limited and that will affect the project outcomes.
- ❖ Post project transition is very difficult as after the completion of the project, a dilemma of what to do with personnel arises.

c) Organizing Projects within a Matrix Structure

- ❖ **Matrix management** is a **hybrid organizational form** in which a horizontal project management structure is overlaid on the normal functional hierarchy.
- ❖ **In matrix system**, there are **two chains of command**, one along **functional lines** and the other along **project lines**.

There are different forms of matrix systems depending on the relative authority of the project and functional manager.

- ❖ **Functional, lightweight or weak matrix** is titles given to matrices in which the balance of authority strongly favours the functional manager.
- ❖ **Balanced or middleweight matrix** is used to describe the traditional matrix arrangement.

- ❖ **Project, heavy weight, or strong matrix** is used to describe a matrix in which the balance of authority is strongly on the side of the project manager.

d) Organizing projects within network organizations

There have been a lot of changes in the organizational structures and the recent one being the network structure.

- ❖ **Corporate downsizing** and cost control have combined to provide what we call network organizations.
- ❖ **Network organization** is an alliance of several organizations for the purpose of creating products or services for customers. This collaborative structure typically consists of **several satellite organizations** be hived around a hub or core firm.

Phases of Project, Project Life Cycle Stages and Constraints

Project Constraints Defining Project Constraints

To prioritize and define the scope of the application deployment project, gather information about the constraints of your project. Constraints often include:

Resources: Identify the equipment, software, staff, and space that are available for the project.

Time: Identify the date by which the application deployment project must be completed, and how the application testing process fits into the larger deployment project.

Organizational issues: If the project will not involve the entire organization, identify which groups in your organization will be affected by it. Additionally, determine if a particular group in the organization needs the new operating system sooner than others. If so, you might decide to perform a staged rollout.

Access to developers: Identify applications that were developed in-house or especially for your organization. Access to the developers of these applications is critical during the testing and issue resolution phases of the project. Such access also can be an invaluable aid with retail applications. The primary impact of project constraints is the likelihood of delaying the completion of the project.

There are three types of project constraints: technological, resource and physical.

- ❖ **The technological constraints** relate to the sequence in which individual project activities must be completed. For example, in constructing a house, pouring the foundation must occur before building the frame.
- ❖ **Resource constraints** relate to the lack of adequate resources which may force parallel activities to be performed in sequence. The consequence of such a change in network relationships is delay in the completion date of the project. We will examine the nature of resource constraints in much greater detail in the next section.
- ❖ **Physical constraints** are caused by contractual or environmental conditions. For example, due to space limitations an activity such as painting a wall may have to be performed by only one person.

Method of Project Evaluation under Certainty

There are several methods for evaluating and ranking the capital investment proposals. In case of all these methods the main emphasis is on the return which will be derived on the capital invested in the project.

Following are the main methods generally used:

1) Traditional Methods

- ❖ Pay-back Period Method
- ❖ Accounting Rate of Return Method.

2) Sophisticated/Discounted Cash Flow Methods

- ❖ The Net Present Value Method
- ❖ Present Value Index Method/Benefit-Cost Ratio Method
- ❖ Internal Rate of Return (IRR)

a) Pay-back Period Method

In Case of Even Cash Flows

The term pay-back (or pay-out or pay-off) refers to the period in which the project will generate the necessary cash to recoup the original investment.

$$\text{Pay-back period} = \frac{\text{Initial Investment}}{\text{Annual Cash Flow}}$$

Annual Cash Inflow

The annual cash inflow is calculated by taking into account the amount of net income on account of the asset (or Project) before depreciation but after taxation. The income so earned, if expressed as a percentage of initial investment, is termed as “**unadjusted rate of return**”. In the above case, it will be calculated as follows:

$$\text{Unadjusted rate of Return} = \frac{\text{Annual Return}}{\text{Initial Investment}} \times 100$$

In Case of Uneven Cash Inflows

In case the cash flow is not even, i.e., if each year's cash inflows are different, cumulative cash inflows will be calculated and by interpolation, the exact pay-back-period can be calculated.

Project Management as a Profession

Project management is all about setting and achieving reasonable and attainable goals. It is process of planning, organizing and overseeing how and when these goals are met. Project management is treated as a like **marketing, IT, and human resources**.

Example: Every **practices** project management. To some degree like, farmers plan what, when, and how they're going to take care of their crops as they grow; and how and when they're going to harvest those crops.

In Business, Project management is an art, a skill, and a demanding full time job. Project managers are key employees in such industries as construction, engineering, manufacturing, and real estate areas.

In, Project management, management is only through system approach. Project managers are system integrations, it is the synergy with which they work with discipline or specialization required for accomplishment of work assigned.

Project Management Institute (PMI)

- Founded in 1969
- Advocacy for the profession, setting professional standards, conducting research and providing access to a wealth of information and resources.
- Promotes career and professional development and offer certification, networking and community involvement opportunities
- PMP ® credential is the most globally-recognized certification in the profession.

PMP

- The PMP certification is the most widely recognized and respected certification in the field of project management. The purpose and goal of this certification program is the development, maintenance, evaluation, promotion, and administration of a rigorous, examination-based, professional certification program of the highest caliber.
- Worldwide there are 669,688 PMPs all over the world (Aug 31st, 2014).
- Around 3,000 PMPs in Egypt

What is profession?

Profession is paid occupation, especially one that involves training and formal qualification. The service strength is rendered for limited segment of the population or for a limited period of time or phase of life.

Ethics in Project Management

- Ethics is an important part of all professions
- Project managers often face ethical problems
- In order to earn PMP certification, applicants must agree to the PMP code of professional conduct

The Project Management Profession

- ❖ The job of IT Project Manager is in the list of the top ten most in demand IT skills
- ❖ Professional societies like the Project Management Institute (PMI) have grown tremendously
- ❖ Project management research and certification programs continue to grow

Content of Professions of PM

1. Project Failures
2. Project Successes
3. What is Project Management?
4. Key Functional Areas of Project Management
5. Project Life Cycle

Project Failure:

- ⊙ Identify reasons that project fail

Reasons for Project Failure

1. Poor project and program management discipline
2. Lack of executive-level support
3. No linkage to the business strategy
4. Wrong team members
5. No measures for evaluating the success of the project
6. No risk management
7. Inability to manage change

Project Success Criteria

- ⊙ On time
- ⊙ On budget
- ⊙ Meeting the goals that have been agreed upon

Iron Triangle

Triple Constraints

- **Time:** Finish on time
- **Cost:** Complete within budget
- **Quality:** Meet performance requirements and quality targets.
- **Scope:** All deliverables are completed.



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PROJECT MANAGEMENT KNOWLEDGE AREAS

1. Integration management
2. Scope
3. Schedule
4. Cost
5. Quality
6. Resources
7. Communications
8. Risk
9. Procurement
10. Stakeholder

Project Management Knowledge Areas

Knowledge areas describe the key competencies that project managers must develop

- 4 core knowledge areas lead to specific project objectives (scope, time, cost, and quality)
- 5 facilitating knowledge areas, means to achieve project objectives (human resources, stakeholders, communication, risk & procurement management)
- 1 knowledge area (project integration management) affects & is affected by all of the other knowledge areas
- All knowledge areas are important!



Project Scope Management



- Project scope identifies project boundaries.
 - Project scope statement describes project scope, major deliverables, assumptions, constraints and acceptance criteria.
 - The scope has to be managed to avoid scope creep (deviation from agreed scope).
-
- Split in groups of 4-5
 - Each group will select any project and describe its scope

Project Schedule Management

- Identify the activities necessary to complete the project.
- Estimate effort and duration
- Decide dependencies (sequence) of activities
- Identify critical path



Project Schedule

Project Cost Management

- Ensure the project is completed within approved budget
- Earned Value Management: a project performance measurement technique that integrates scope, time and cost data.

Project Quality Management

- Ensure the project will satisfy quality needs – commitment to deliver the project output that meet the stakeholders' requirements.
- Quality Control is concerned with project deliverables – conformance to requirements and fitness for use
- Quality Assurance is concerned with the process used all over the project.



Project Team Management

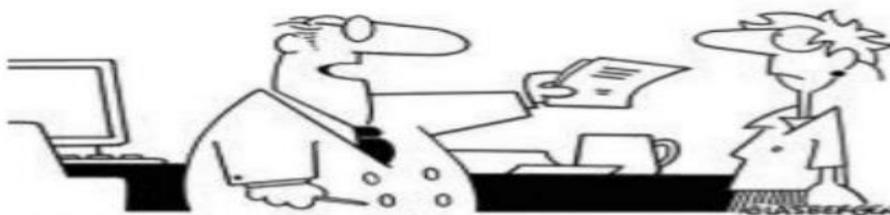
- Identify and acquire the project human resources needs.
- Identify roles and responsibilities
- Conflict Resolution
- Team Building
- Motivation

RACI Chart	Person				
Activity	Ann	Ben	Carlos	Dina	Ed
Define	A	R	I	I	I
Design	I	A	R	C	C
Develop	I	A	R	C	C
Test	A	I	I	R	I

R = Responsible A = Accountable C = Consult I = Inform

Figure 9-5. Responsibility Assignment Matrix (RAM) Using a RACI Format

No Resources ... No Results



"This is a major project of utmost importance, but it has no budget, no guidelines, no support staff, and it's due in 15 minutes. At last, here's your chance to really impress everyone!"

Project Communications Management

- Determine and execute stakeholders' information needs.
- Overcome communication barriers
- Formal communication vs. Information Communications
- Verbal Communications vs. Written Communications



Project Risk Management

- Risks are uncertain positive or negative events
- Identification and evaluation (probability & impact).
- Risk response planning
- Contingency



Risk Management Register

Project Procurement Management

- Processes required to acquire goods or services (sub-contracting)
- Bidding
- Types of contracts
 - Fixed Price
 - Cost reimbursable
 - Time and Material



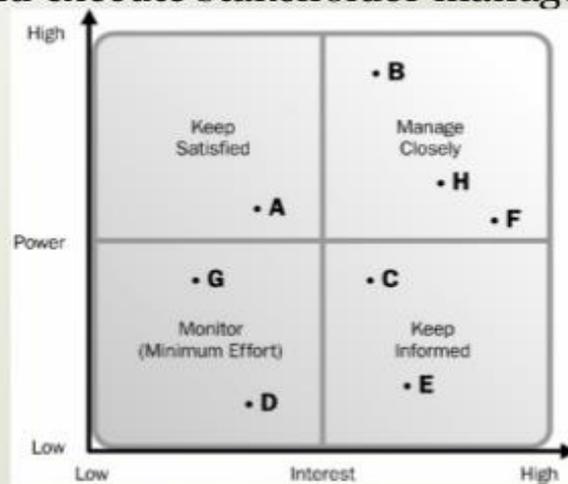
Project Stakeholder

Project Life Cycle and Organization



Project Stakeholders Management

- Identify project stakeholders
- Identify and execute stakeholder management strategy



Project Integration Management

- Integration of all the 9 processes to provide consistent project management plan, execution and control processes.



What helps Project Success

- Executive support
- User involvement
- Skilled and experienced project team
- Clear business objectives
- Well-defined scope
- Formal methodology
- Reliable estimates
- Other criteria, such as small milestones, proper planning, competent staff, and ownership

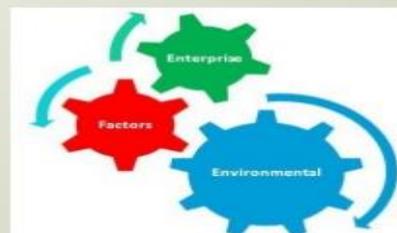
Project, Program and Portfolio

Program: A group of related projects managed in a coordinated way.

Portfolio Management: managing a group of programs to achieve a specific strategic business goal. The programs may not be related other than the fact that they help in reaching a common business goal.

Environmental Factors

- Organizational culture and processes
- Government, industry laws and standards
- Infrastructure
- Existing human resources
- HR policies and procedures
- Stakeholder risk tolerance
- Political and Economical factors



What is a Project Manager?

Ultimately responsible for the Project's Success, plan and act focus on the project's end be a manager & leader.

Seven Traits of Good Project Managers

- Trait 1 Enthusiasm for the project
- Trait 2 Ability to manage change effectively
- Trait 3 A tolerant attitudes toward ambiguity
- Trait 4 Team – building and negotiating skills
- Trait 5 A customer-first orientation
- Trait 6 Adherence to the priorities of business
- Trait 7 Knowledge of the industry or technology

A PROJECT MANAGER CAN UNDERSTAND THE PHASES OF PROJECT LIFE CYCLE



Project management, in a broad sense, can be defined as a set of tools, skills, techniques, and knowledge that can be applied to a project in order to fulfil that project's requirements. Project management consists of a loosely defined process for completing projects successfully. This process generally consists of **five phases**:

1. **Project Initiation** - Deals with selecting and starting a project
2. **Project Planning** - Once a project is initiated, it must be planned. This is by far the largest and most important phase of project management. Without a good project plan, the project is doomed to failure.

3. **Project Execution** - Once the plan is in place, the project team needs to execute the plan to reach the project goals.
4. **Project Control** - Throughout the execution phase, a level of control needs to be in place to manage potential problems and monitor progress.
5. **Project Closure** - This phase is often times overlooked, but is very important. This phase describes how to officially close out a project with a client or sponsor.

Functions of project manager

1. Leading:

A project manager is expected to be an able leader of a chosen group of people working for a common objective. These people may belong to various functional disciplines who are guided by the leader.

Some key duties for leading projects include:

- Setting team direction
- Coordinating activities across different organizational function
- Motivating team members

2. Planning:

Planning is an essential duty of a project manager. Determining what needs to be done, who is going to do it, and when it needs to be done are all part of the planning process. Keeping in mind, that planning is an iterative process that takes place throughout the life of the project.

Some key planning duties include:

- Define and clarify project plan.
- Develop the project plan
- Develop the project schedule

3. Organizing:

Organizing is about setting up the project team's structure. A major driver in this aspect is the company's existing structure. The manpower from either existing or external sources must be recruited and arranged into a structure showing all the operating levels according to assigned responsibilities.

Some of the key organizing duties include

- Determine the organizational structure of the project term
- Identify roles and positions
- Identify services to be provided by external companies

- Staff project positions

4. Staffing:

The process of placing proper staff in their positions is called staffing. It is one of the important duties of management to appoint the right type of personnel for various disciplines.

5. Controlling:

Controlling is all about keeping the project on track. A plan, while it is being implemented, encounters various problems.

For example, a supplier may not deliver goods on time; or a machine fails in the preliminary test, etc.

Some key controlling functions include

- Defining project baselines
- Tracking project progress
- Project status reporting
- Determining and taking corrective actions

ROLE OF PROJECTMANAGER

- ❖ Technical Role
- ❖ Transactional Role
- ❖ Transformational Role

1. TECHNICAL ROLE:

The project manager absolutely does not need to know how to do everyone's tasks within the project, but needs to appreciate all the processes being carried out and be able to confidently challenge others at a level of informed understanding. These Technical aspects of the project management role would include those activities needed to develop.

2. TRANSACTIONAL ROLE:

The Transactional dimension refers to the traditional project management activities associated with managing the project's work flows and performance. During the project implementation stage, transactional activities would include all those project management control and reporting activities carried out regularly, needed to demonstrate control of the project.

3. TRANSFORMATION ROLE:

The Transformational dimension refers to activities associated with leadership. Here, the project manager is acting as the project leader. Relationship and communication skills need to put to work, seeking to get the best performance from the project team. This is where it is believed that project managers should be at their most effective.

RESPONSIBILITIES OF A PROJECT MANAGER

1. The project manager is the person responsible for managing the project.
2. The project manager is the person responsible for accomplishing the project objectives within the constraints of the project. He is responsible for the outcome of the project.
3. The project manager is involved with the Planning, Controlling and monitoring, and also managing and directing the assigned project resources to best meet project objectives.
4. The project manager controls and monitors project scope, time and cost in managing project requirements.
5. The project manager examines the organizational culture and determines whether project management is recognized as a valid role with accountability and authority for managing the project.
6. The project manager is responsible for identifying, monitoring and responding to risk.

1. What is a Stakeholder?

Stakeholders are people or organisations:

- With an interest in the project
- Who can affect a project
- Who may be affected by a project

Stakeholders may be within the organisation, or external to it.

- Internal stakeholders may be managers, staff, other dept. heads, your own team, subject matter experts
- External stakeholders may be from anywhere – other companies, public bodies, legislative bodies, competitors

2. What do Stakeholders Do?

“Sponsors, stakeholders and champions link the team to the management power structure across locations & organisational boundaries”

3. How can Stakeholders Affect a Project?

They can pull their support, which may be:

- Political
- Financial
- Resource Provider
- Influencer – political, media, morale
- Not buying the product (customers)
- Advocate against the project / product (pressure groups

(McDonald’s protesters, Greenpeace, lobby groups)Or they can support in all the above ways.

4. How can we classify Stakeholders?

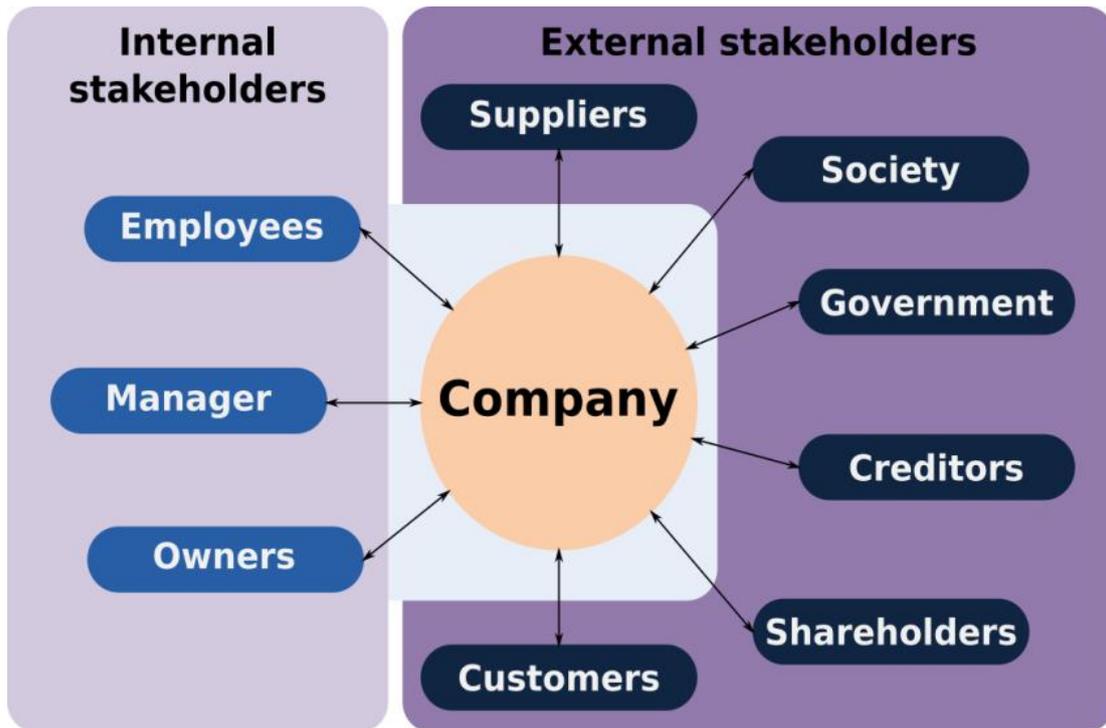
In various ways:

- Positive, negative or neutral to the project
- By the degree of influence they may wield:
 - Strong, Medium, Weak, None
- By their ability to stop or veto the project
- Decision maker, Influencer, Consenter, Interested

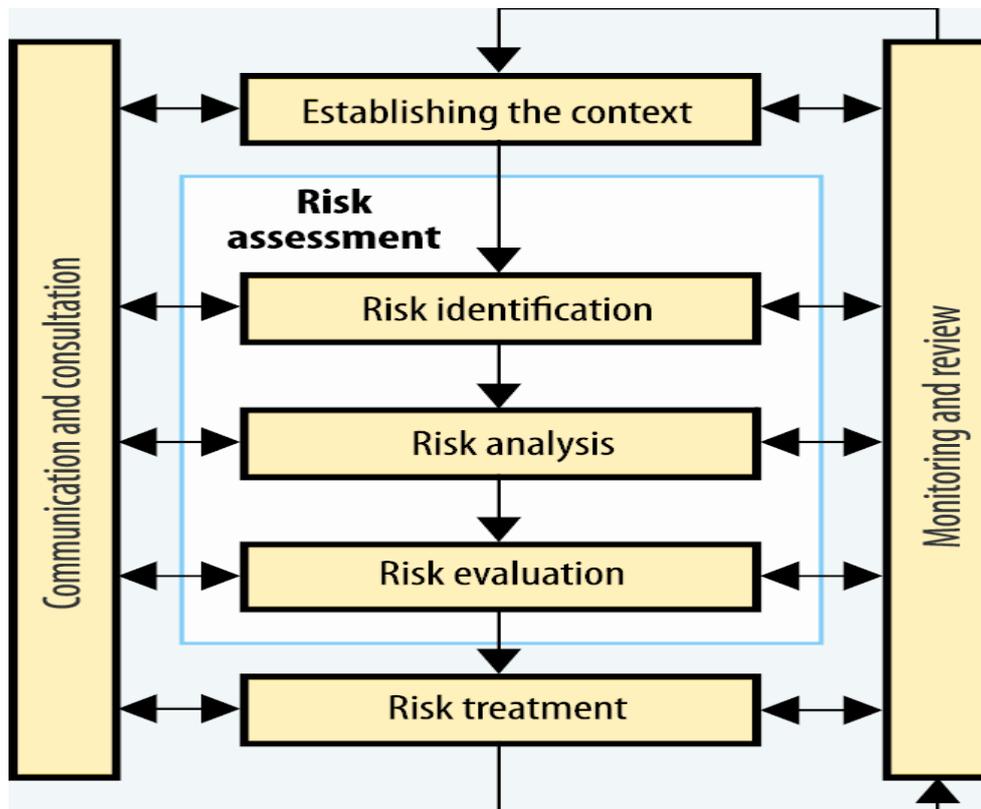
Key point:

Stakeholder influence may well change as the project develops, so this analysis should be done at the start then revisited periodically

Stakeholder Context:



Risk Management Process



Risk identification:

The first step is to identify the risks that the business is exposed to in its operating environment.

There are many different types of risks – legal risks, environmental risks, market risks, regulatory risks, and much more. It is important to identify as many of these risk factors as possible. In a manual environment these risks are noted down manually.

Risk analysis:

Once a risk has been identified it needs to be analyzed. The scope of the risk must be determined. It is also important to understand the link between the risk and different factors within the organization.

When a risk management solution is implemented one of the most important basic steps is to map risks to different documents, policies, procedures, and business processes. This means that the system will already have a mapped risk framework which will evaluate risks and let you know the far reaching effects of each risk.

Risks evaluate or Rank:

Risks need to be ranked and prioritized. Most risk management solutions have different categories of risks, depending on the severity of the risk. A risk that may cause some inconvenience is rated lowly, risks that can result in catastrophic loss are rated the highest. It is important to rank risks because it allows the organization to gain a holistic view of the risk exposure of the whole organization.

The business may be vulnerable to several low level risks, but it may not require upper management intervention. On the other hand, just one of the highest rated risks is enough to require immediate intervention.

Risk monitoring:

To all risks can be eliminated – some risks are always present. Market risks and environmental risks are just two examples of risks that always need to be monitored. Under manual systems monitoring happens through diligent employees.

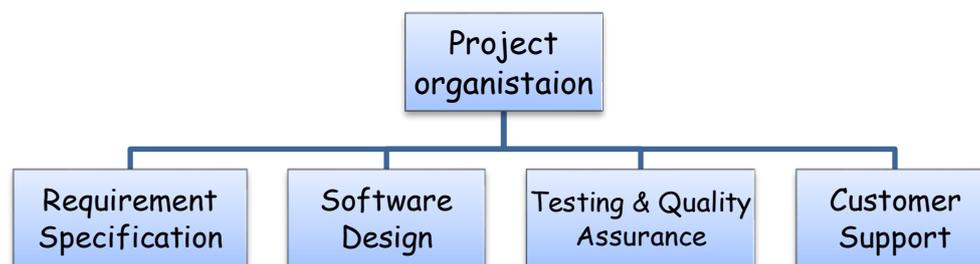
These professionals must make sure that they keep a close watch on all risk factors. Under a digital environment the risk management system monitors the entire risk framework of the organization. If any factor or risk changes, it is immediately visible to everyone. Computers are also much better at continuously monitoring risks than people. Monitoring risks also allows your business to ensure continuity.

Project Organization

1. Team members are organized in ways that enhance the completion of quality products

2. The choice of an appropriate structure for your project depends on several things
 - The backgrounds and work styles of the team members
 - The number of people on the team
 - The management styles of the customers and developers
3. **Comparison of Organizational Structures:**
 - Highly or Loosely Structured
 - High Certainty of Uncertainty
 - Repetition or New techniques (or Technology)
 - Large or Small Projects
4. **f Examples of Organizations**
 - Functional Organizations
 - Matrix Organizations
 - Integrated Product Development Teams (IPDTs)
5. **Project Organization: Functional**
 - basic hierarchical organization
 - project organized by disciplines and functions
 - **Characteristics:** Narrow set of work methods, deep technical expertise, Develops skills and morale; Service-oriented, Communication responsibility on group manager
 - **Problems:** Elitism within expertise areas, Communication difficult, no project “ownership”

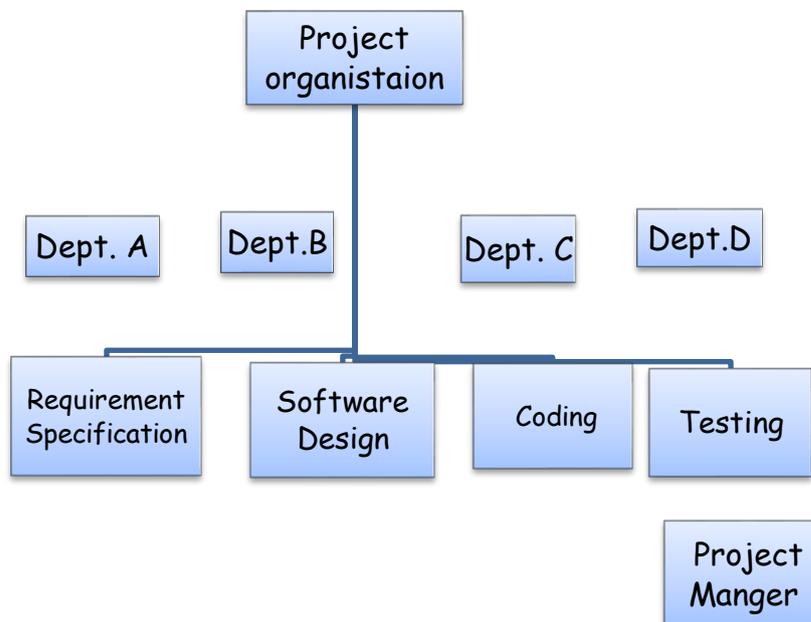
Project Organization: Functional structure



6. **Project Organization: Matrix**
 - Based on a specific project; Experts are borrowed, but not removed
 - **Strong Matrix:** team leader is the principal authority, Control of schedule and budget, Acquire personnel, Perform reviews

- **Weak Matrix:** team leader is only a coordinator, Spokesperson to higher management, Steering committee has ultimate authority
- **Characteristics:** Specialists work on part-time basis for several projects, Top management selects project manager and staff Good for short-lived projects “Task force” Mentality.
- **Problems:** Staff attention fractured Conflicting obligations large amount of communication Strong top management involvement; Reporting to home “base” is difficult.

Project Organization: Matrix



UNIT – II

PROJECT IDENTIFICATION AND FORMATION

Introduction:

A project may be seen as an investment activity where financial resources are expended to create capital assets that produce benefits over extended period of time. Project identification is the initial phase of the project development cycle. It begins with the conceiving of ideas or intentions to set up a project. These ideas are then transformed into a project.

Meaning of Project Identification

It is a **Collection compilation and analysis of data to locate potential opportunities** for starting business and development of such opportunities. **Opportunity** is a business concept which if turned into **a tangible product or service by the enterprise** will result into profit. It is all about creating values.

Define Project Identification

“Project Identification” is a process to assess each project idea and select the project with the highest priority. Concerned with collection, compilation and analysis of economic data for the eventual purpose of locating possible opportunities for investment

Tools used in project identification:

- ❖ Situational and Environmental Analysis
- ❖ SWOT Analysis
- ❖ Problem and Opportunity Studies
- ❖ Resource Analysis

i. SITUATION ANALYSIS

If we talk about “Situation Analysis” we also talk about “market audits” Basically “Situation analysis” is same meaning with “market audits”.

An audit is the means by which a company can:

- (a) Understand how it relates to the environment in which it operates.
- (b) Identify its own strengths and weaknesses as they relate to external opportunities and threats. Thus, it is a way of helping management to select a position in that environment based on known factors.

A **market analysis** will be made up of a range of factors relevant to the particular situation under review, but would normally include the following areas:

- i. Actual and potential market size
- ii. Trends
- iii. Costumer
- iv. Costumer segment
- v. Distribution channel

Understanding the Project Environment

The project environment is made up of internal and external factors that influence a project. When managing a project, the project manager must consider more than just the project itself. Proactively managing a project involves understanding the environment in which the project must function.

ii. ENVIRONMENTAL ANALYSIS

Environmental analysis refers to the monitoring, evaluating and disseminating of information from the external environment with the objective of identifying threats and opportunities and assessing their impact given the company's internal strengths and weaknesses.

According to Business Environment: Managing in a Strategic Context, An environment is defined as: "anything outside an organization which may affect an organization's present or future activities. Thus, the environment is situational – it is unique to each organization" (Kew and Stared wick 2005).

ENVIRONMENTAL VARIABLES

A. Industry Environment

- ❖ Customers
- ❖ Suppliers
- ❖ Labor unions
- ❖ Creditors
- ❖ Competitors
- ❖ Government
- ❖ Community

B. Organizational Environment

– Macro Environment

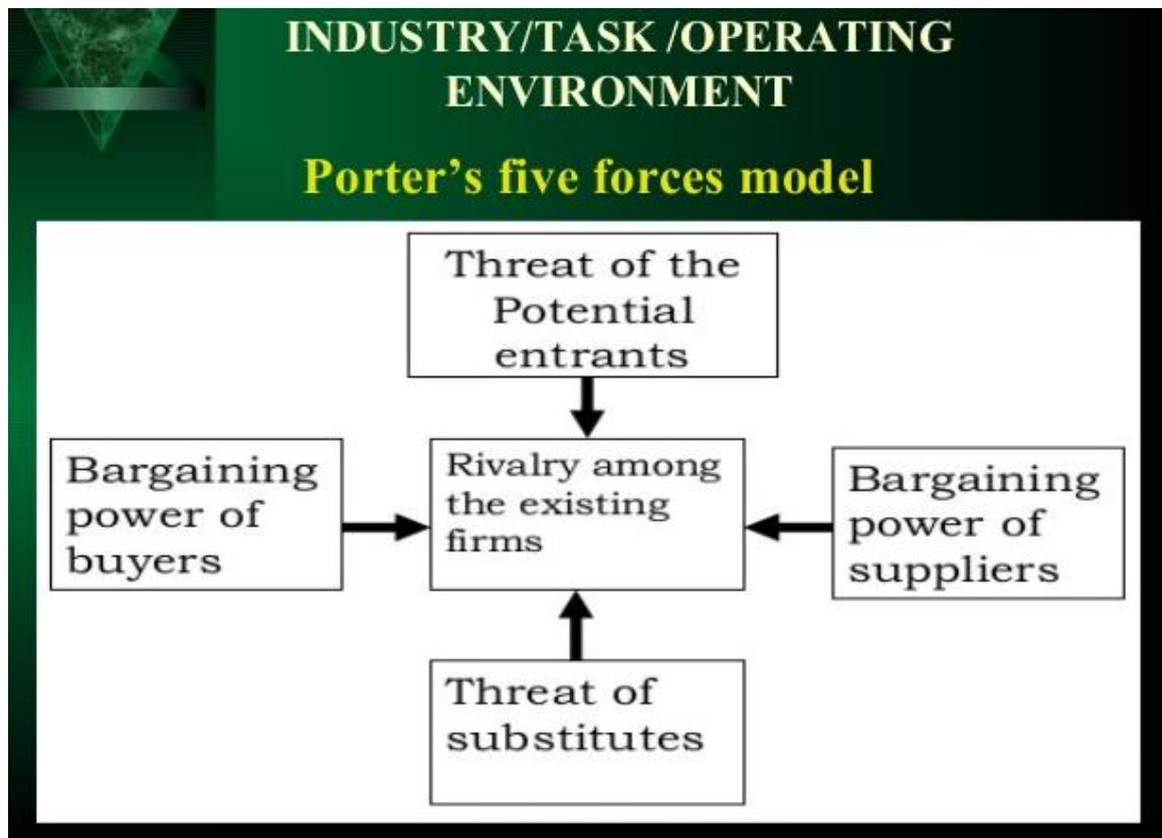
- ❖ Demographic

- ❖ Social
- ❖ Economic
- ❖ Technological
- ❖ Political/Legal

INDUSTRY/TASK /OPERATING ENVIRONMENT

This includes those elements or groups in the immediate environment of a company that directly affect the corporation and in turn are affected by it.

According to Michael Porter the nature and the degree of competition in an industry hinge on five forces that drive competition in the industry.

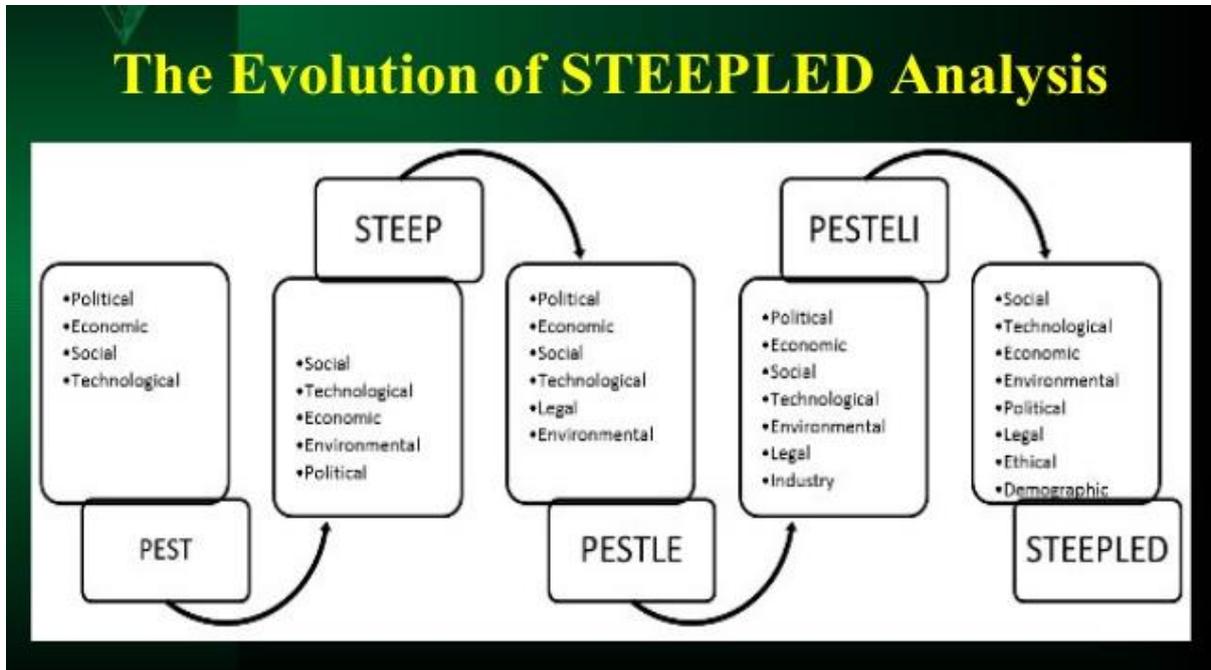


MACRO/SOCIETAL / EXTERNAL ENVIRONMENT ANALYSIS

STEEPLED Analysis is used for identifying attributes of keystone variables that make up an organization's external environment, in terms of current and future operations.

- ❖ Social Factors
- ❖ Technological Factors
- ❖ Economic Factors
- ❖ Environmental (Ecological) Factors
- ❖ Political Factors
- ❖ Legal Factors

- ❖ Ethical Factors
- ❖ Demographic Factors



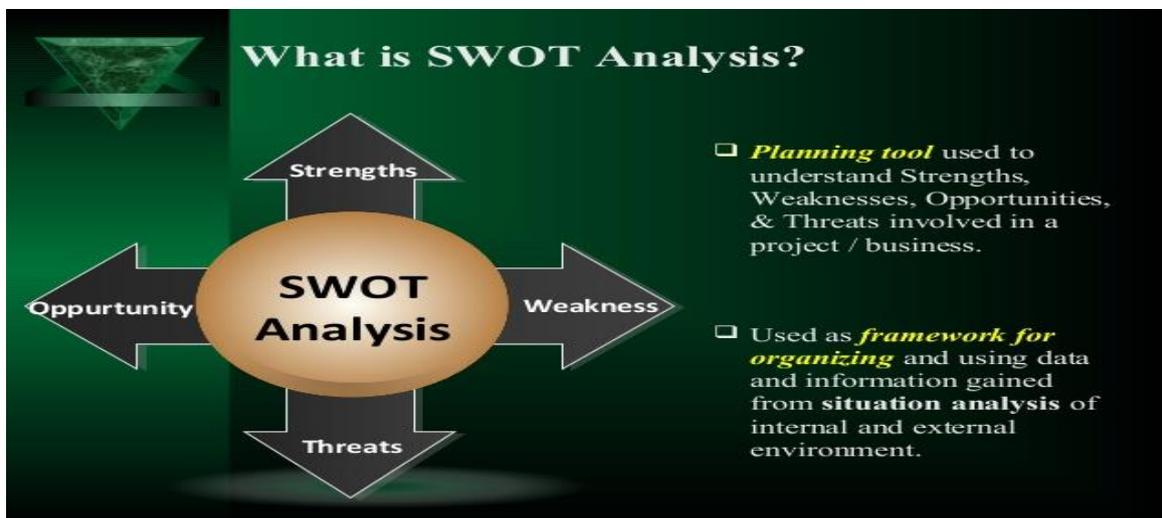
iii. SWOT ANALYSIS

Planning tool used to understand Strengths, Weaknesses, Opportunities, & Threats involved in a project / business.

Used as framework for organizing and using data and information gained from situation analysis of internal and external environment.

What is SWOT Analysis?

Threats Strengths Weakness Opportunity SWOT Analysis



Strengths

- ✓ What advantages (for example, skills, education or personal industry connections) do they have that others don't have?
- ✓ What makes company stand out from its competitors?
- ✓ What positive aspects does the company enjoy in the current environment ?

A strength can be a competitive advantage like... - Superior product quality - Lowest price - Best expertise – Location

Weaknesses

- ✓ Which areas are causing concerns?
- ✓ Which issues can be avoided?
- ✓ Company's reputation among its customers

A weakness can be a disadvantage such as...

- A tired brand
- Inferior location
- High overheads
- A lack of R&D

Opportunities

- ✓ How can the company be more innovative?
- ✓ Which are the new markets or consumers that can be tapped?
- ✓ Which area has the company not ventured?
- ✓ What are the upcoming trends that are catching up in the market?

An opportunity can be...

- A regulatory or tax change
- A high-profile event (marketing opportunity)
- An untapped market
- A gap left by a failed competitor

Threats

- ✓ Are there any new competitors emerging in the industry?
- ✓ What are the issues that threaten the company's position?
- ✓ Is there any significant change(s) in the industry of operation?

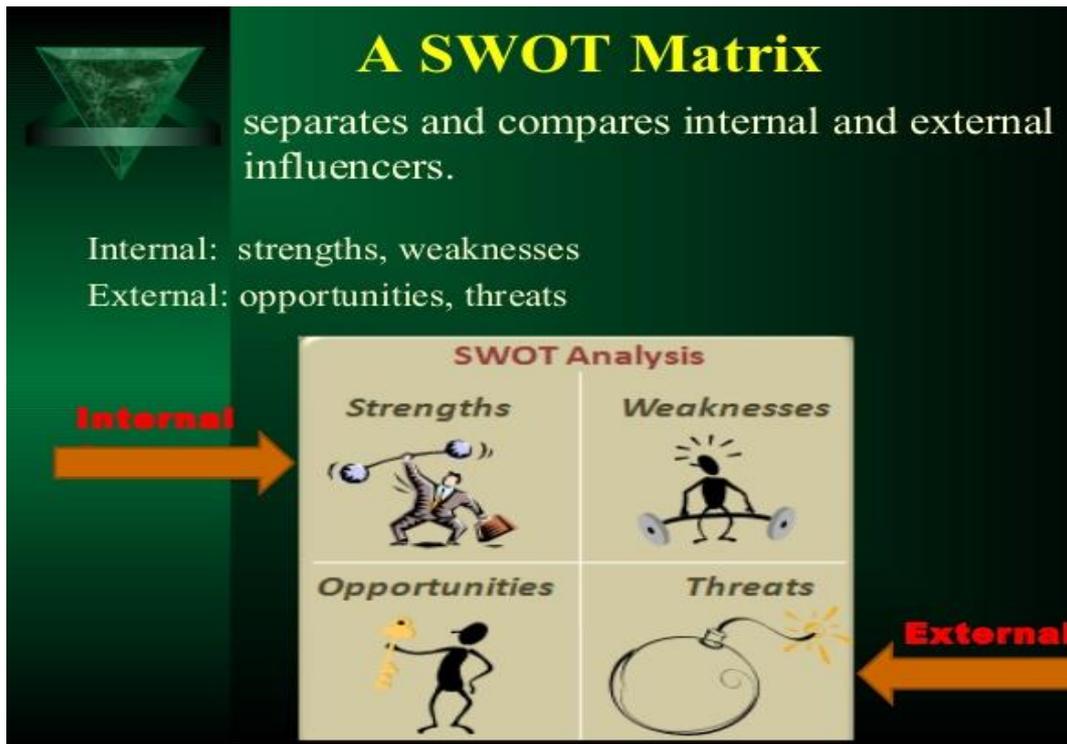
A threat can be...

- Unfavorable regulation changes
- A new entrant into the market

- Problems with the economy
- Market shrinkage

Creative Use of SWOTs

- ✓ How can we use each strength?
- ✓ How can we stop each Weakness?
- ✓ How can we use each Opportunity?
- ✓ How can we defend against each Threat?



iv. STRATEGY FORMULATION

Strategies that can come from SWOT Analysis

- ✓ **SO Strategies:** Use strengths to take advantage of opportunities (Maxi – Maxi Strategy)
- ✓ **WO Strategies:** Overcome weaknesses to take advantage of opportunities (Mini – Maxi Strategy)
- ✓ **ST Strategies:** Use strengths to avoid threats (Maxi – Mini Strategy)
- ✓ **WT Strategies:** Minimize weaknesses and avoid threats (Mini – Mini Strategy)

v. PROBLEM AND OPPORTUNITY STUDIES

- **Opportunity** – favourable position or a range for advancement Opportunity
- **Identification** – identify the technologies that could be successfully turned into commercial products.

- **Opportunity Study Generate Ideas answer the question:**

- ✓ “What can be brought to the market?”
- ✓ “How can it be brought to the market?”

Scan & Understand the needs & wants of people Project Management Plans in Project Environment

Identifying Opportunities & Threats in the Environment

- ❖ Socio-Cultural
- ❖ Technological & Technical
- ❖ Economic
- ❖ Natural
- ❖ Political
- ❖ Peace & Order
- ❖ Population Trends
- ❖ Government Program
- ❖ Global Environment



SOURCES OF POSITIVE NET PRESENT VALUE

Meaning:

- ✓ Net present value is the present value of net cash inflows generated by a project including salvage value. When inflows exceed outflows and they are discounted to the present, the NPV is positive. The investment adds value for the investor.

- ✓ Projects with a positive NPV would create shareholder wealth, and should be undertaken. Projects with a negative NPV will destroy shareholder wealth, and should be avoided.

Value Of Cash Inflows = LESS: Present Value of Out Flow NET PRESENT VALUE

SOURCES OF POSITIVE NET PRESENT VALUE

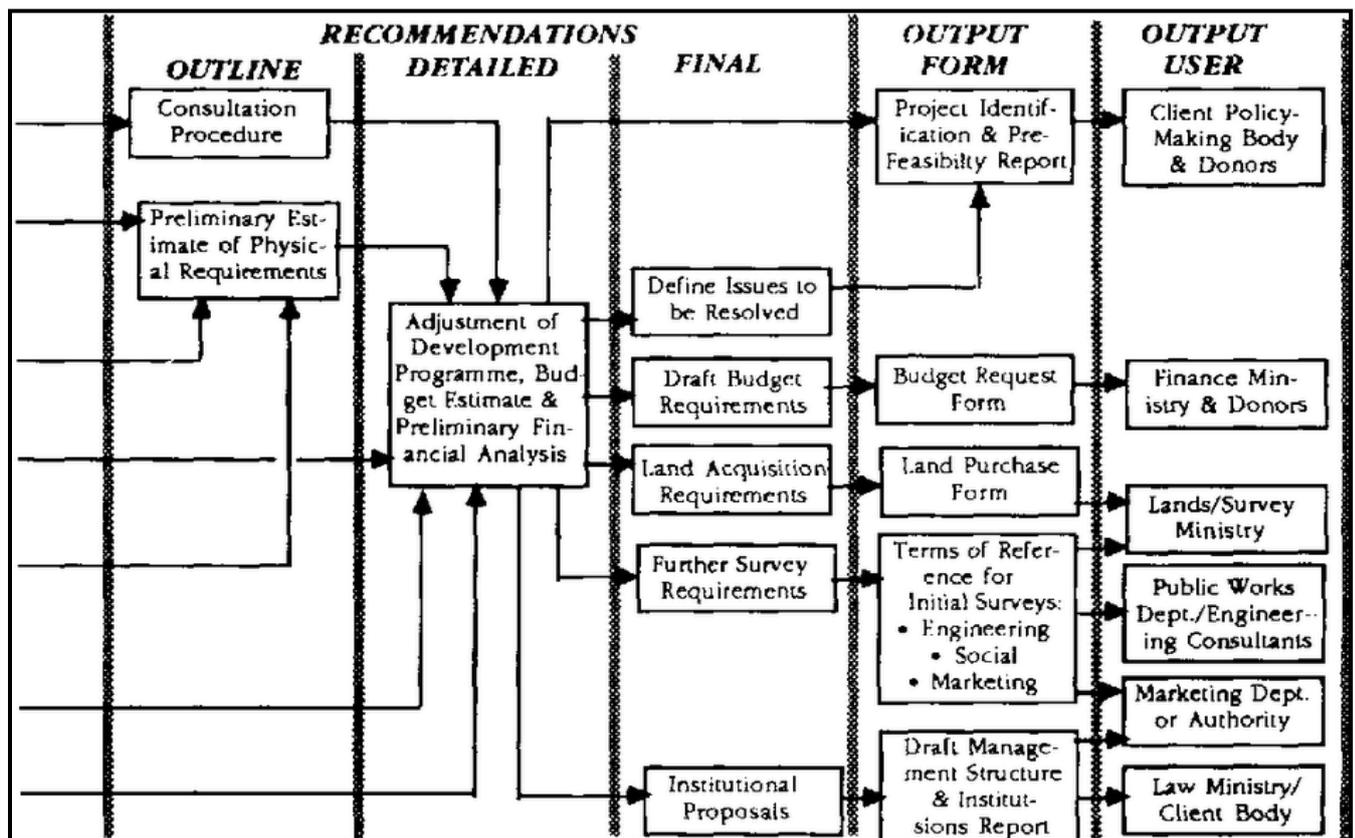
- ❖ Economies of Scale.
- ❖ Product Differentiation.
 - Effective Advertising and Superior
 - Marketing Exceptional Service
 - Innovative Product Features
 - High Quality and Dependability
- ❖ Cost Advantage
 - Accumulated Experience and Comparative Advantage on the Learning Curve
 - Monopolistic Access to Low Cost Materials
 - A Favourable Location More Effective Cost Control and Cost Reduction
- ❖ Marketing Reach.
- ❖ Technological Edge.
- ❖ Government Policy.
 - Restrictive Licensing
 - Import Restrictions
 - High Tariff Walls

Unit II

Project Identification and Formation: Project environment – Identification of investment opportunities – Projects screening – Prefer ability study – Project selection – Project formulation – Stages in project formulation – Project report preparation – Planning Commission’s guidelines for project formulation.

PROJECT IDENTIFICATION AND PRE-FEASIBILITY

The first stage in project preparation is to undertake an identification and pre-feasibility study. The purpose of this is to identify if there are problems with the existing marketing system which might be solved by a planning and infrastructure project. An initial analysis should be made of facilities and accommodation requirements, alternative site development scenarios should be considered and an outline master plan and action programme prepared.



Figures: 1 - Project identification and pre-feasibility

Project context and data collection

Information will be required on the general planning context, the levels of agricultural production, marketing channels and the existing consumption of fruits and vegetables and, if applicable, poultry, fish and livestock. This will be largely a desk study, assembling information from published sources.

Information sources will include the following:

- National marketing and agricultural policies and strategies, contained in government sector plans (typically from a ministry of agriculture) and district reports;
- Records of previous and current development activities and existing commitments, compiled by planning and public works departments;
- Local and regional demographic and planning studies, including those undertaken by consultants and universities;
- Official maps and air photos and,
- Legislation and regulations on the institutional and legal framework for markets, including public health and safety regulations.

Problem definition

Reviewing and analyzing data collected on the general institutional and management context and on the existing site conditions and facilities should allow the overall shortcomings of the present system to be identified. The types of analysis that can be attempted will be limited by the availability of data, but should include, at least, a description of the existing market channels and an overall idea of the volume of trade that is passing through an existing market or might pass through a proposed market.

Typical problems: The typical problems that might be identified at this stage include economic and institutional problems, such as the existence of monopolies and unfair trading practices, financial constraints, inadequate market management and lack of staff training. Other problems might include seasonality of demand and lack of storage space, high produce losses and other costs associated with physical constraints, such as, poor infrastructure, inadequate space in relation to through-put, traffic congestion and lack of modern equipment.

With an existing market the major problem will be whether to relocate the market and, if so, whether the existing market should also be retained. It does not always follow that one market per city is necessarily the optimum solution, particularly for those with high-density centres.

Definition of project goals and beneficiaries: On the basis of the problems that have been identified with the existing marketing system an attempt should then be made to define the project's goals and the likely beneficiaries. At this stage this will tend to be a very simple statement of national or regional policy.

A typical example capacity be as follows: to improve marketing facilities, so that producers of fruits and vegetables in area "x" can obtain a ready market for increased horticultural production and a wider range of fruits and vegetables, in greater quantities and at competitive prices, can be available to consumers in city "y".

Alternatively, the project-goals could be specified in terms of the benefits that might accrue to a particular market authority by, for example, improved efficiency gained from the upgrading of present facilities or additional revenues created from the development of a new market.

Initial project formulation

The next step will be to formulate an overall programme which will meet the project's goals and solve the problems that have been identified. Simple methods for making projections of space requirements are discussed in I-Unit.

The main difficulty at this stage will be how to match any budget limits against the physical facilities that strength be needed to improve the marketing situation. even though probably only limited survey data is available it is necessary to define a simple procedure that can help to conceptualism the problems. This can be refined later when further surveys are undertaken.

Physical requirements: A first approximation of the physical requirements and budget costs for the development should always be attempted, as this will form a basis for discussion with all the interested parties. It may not be possible to prepare even a diagrammatic layout at this stage. The basic design parameters on which the projections should be based do not need to imply any preconceived notion about the other organization of a market. They should assume, however, that the market would be a modern facility, organized with minimum obstacles in the system and a maximum grouping of functions. It is likely to allow very little relation, therefore, to a traditional market. Different approaches should be adopted for secondary wholesale markets than that for deadly urban wholesale markets.

Terminal wholesale markets: The fundamental issue to address with a terminal wholesale market will be whether an existing site is suitable and the degree to which outside planning forces should be allowed to influence any decision to relocate to a new site. Basic estimates of demand and trade volumes are essential at an early stage in order that sensible decisions can be made about whether the existing market site and size are adequate, particularly if institutional and traffic management improvements could be made which might allow it to

remain at its present location. These estimates will be tentative and need to be adjusted later when more reliable survey data on consumption patterns becomes available. The location factors that should be considered in the selection of a new market site are discussed in Chapter 13. Critical to this selection process is that a new site is chosen in consultation with all interested parties.

Secondary wholesale markets: Improvements to secondary wholesale markets, particularly those serving large hinterlands, may be similar in nature to those for terminal markets. Often, however, they are part of a programme for changes to a network of local assembly markets and collection centres. The programmes are frequently based on the development of packages of facilities for each market, the range of facilities provided being based on the overall site area of the market yards. There are major limitations to using this approach as the sole criterion as it is often an arbitrary figure, based on historical events, not necessarily reflecting the present level of economic activity. It is important not to over-simplify the problem and ignore other criteria which may be more reliable indicators.

A simple ranking system can be evolved which compares the existing physical conditions of the markets to a list of "basic needs". This approach assumes that the first priority of a market development plan will be to make up the deficiency in the present provision, rather than impose a standardized package of improvements. Almost invariably this will mean that the main part of any budget should be allocated to the provision of key infrastructure, particularly roads and paving, including off-site facilities, rather than to the construction of new buildings.

Project evaluation

At this early stage in design there will probably not be sufficient information to undertake even a preliminary financial analysis. The project will have to be evaluated on the basis of its overall global impact.

Project Impact: A project's major impact is likely to be on the system of marketing of fruits and vegetables. It may lead to higher production and more stable consumer prices. The potential benefits are, therefore, to producers and consumers. It is usually possible to accurately define the target beneficiaries of a project, based on production and demographic data.

Other aspects of a project's impact should also be identified. A typical impact would be a significant reduction in produce losses and an efficiently operating market for both producers and traders. This will serve to reduce marketing costs which will ultimately benefit consumers. On a broader front, by incorporating the development of a market information system a project may have an influence on the overall price mechanism, which might have a national impact on marketing efficiencies. The effect of a project on any possible private enterprise efforts in market development should be assessed to see whether it would deter or encourage these initiatives. A negative effect could be unnecessary competition for private markets, while a positive effect would be the growth of small-scale traders and wholesalers.

Project benefits: It is important in assessing a project's impact to be clear how benefits might arise. The mere provision of new or improved physical facilities will not guarantee any benefits, if not accompanied by appropriate institutional and management changes. In many cases, the operating performance of markets can be improved with virtually no physical change, other than, possibly, the provision of new equipment or the application of a traffic management scheme.

Project risks: Risks which could influence the overall design of a project need to be identified at this stage. These risks should to be described, and an estimate made of their probability (high, medium or low) and whether they are of a short or medium-term nature, or are long- term strategic problems.

A typical short-term risk is that agreement has not been reached on the market's institutional framework and management method, including the establishment of a project advisory committee or management board. This may lead to potential delays in the appointment of consultants to undertake surveys and feasibility studies and to prepare detailed designs and tender documents. Other common problems are that action is delayed because of difficulties in purchasing suitable land and that the source of funding or loans is not clarified.

Where an existing market is to be improved or extended, problems may also arise if it is not possible for the construction operations at the market site to be phased in a way that enables the market to continue to operate during the construction period.

Further actions

The definition of project risks will provide the basis for clarifying the issues that will need to be resolved before progress can be made with project development. The intention should be

that, before proceeding further, the risks are either eliminated or are reduced. The typical types of issues that will need to be resolved are:

- Management and institutional;
- Financial and loan requirements; and
- Provision of land.

Initial surveys to be undertaken: The main conclusion that will be drawn at the end of the project identification stage is almost certainly that the collection of further data will be required. In order to refine the preliminary estimates of throughput, data will need to be collected on the number and size of existing markets, their daily trading patterns and the variations in trade between seasons, both in terms of the type of produce and the quantities marketed.

Ideally data should be available before any further detailed design development occurs, but the timing of surveys will also be influenced by factors such as the need to collect data during peak production seasons or to avoid logistic problems caused by working in a wet season. It is essential, however, that design should be based on adequate data and it will be necessary, if they have not already been undertaken, to carry out surveys of:

- Volumes and types of produce transacted at different times in the year;
- Surveys of traders and market channels;
- Traffic modes and volumes; and
- Investigations of a site's engineering and physical characteristics.

PROJECT FAMILY TREE

A project normally originates from a plan, national plan or corporate plan. In normal scheme of things, the family tree for a project would be as given below

- **Plan** = National/Corporate plan with target for growth.
- **Programme** = health programme, educational programme, R&D programme.
- **Project** = Power plant, hospital, housing project etc.
- **Work Package** = Water supply, power supply and distribution package.
- **Task** = Award of water supply contract, construction & foundation.
- **Activity** = Excavation, laying of cable, preparation of drawing.

Realizing the usefulness of these guidelines, we now are presenting these guidelines in a summarized manner hereunder:

In order to process investment proposals and arrive at investment decisions, the Planning Commission of India has also issued some guidelines for preparing/ formulating realistic business plans/industrial projects. So far as feasibility report is concerned, it lies in between the project formulating stage and the appraisal and sanction stage. The project formulation stage involves the identification of investment options by the enterprise and in consultation with the Administrative Ministry, the Planning Commission and other concerned authorities.

PROJECT REPORT

In simple words project report or business plan is a written statement of what an entrepreneur proposes to take up. It is a kind of course of action what the entrepreneur hopes to achieve in his business and how he is going to achieve it. In other words, project report serves like a road map to reach the destination determined by the entrepreneur.

Contents of Project Report

- General Information
- Promoter
- Location
- Land and Building
- Plant and Machinery
- Production process
- Utilities
- Transport and communication
- Raw material
- Manpower
- Product
- Market

Unit III

Project appraisal: Objectives, essentials of a project methodology – Market appraisal – Technical appraisal – Financial appraisal – Socio – economic appraisal – Management appraisal

PROJECT APPRAISAL

Project appraisal means the assessment of a project. Project appraisal is made for both proposed and executed projects. In case of former project appraisal is called ex-ante analysis and in case of latter 'post-ante analysis'. Here, project appraisal is related to a proposed project.

Project appraisal is a cost and benefits analysis of different aspects of proposed project with an objective to adjudge its viability. A project involves employment of scarce resources. An entrepreneur needs to appraise various alternative projects before allocating the scarce resources for the best project. Thus project appraisal helps select the best project among available alternative projects. For appraising a project its economic, financial, technical market, managerial and social aspect is analysed. Financial institutions carry out project appraisal to assess its creditworthiness before extending finance to a project.

Method of Project Appraisal

Appraisal of a proposed project includes the following analyses:

- 1. Technical analysis**
- 2. Economic & Financial analysis**
- 3. Market analysis**
- 4. Administrative/ Management analysis**
- 5. Ecological analysis**

Economic Analysis:

Under economic analysis the aspects highlighted include

- ✓ **Requirements for raw material**
- ✓ **Level of capacity utilization**
- ✓ **Anticipated sales**
- ✓ **Anticipated expenses**
- ✓ **Proposed profits**
- ✓ **Estimated demand**

It is said that a business should have always a volume of profit clearly in view which will govern other economic variable like sales, purchase, expenses and alike.

Financial Analysis

Finance is one of the most important prerequisites to establish an enterprise. It is finance only that facilitates an entrepreneur to bring together the labour, machines and raw materials to combine them to produce goods. In order to adjudge the financial viability of the project, the following aspects need to be carefully analysed:

- ✓ Cost of capital
- ✓ Means of finance
- ✓ Estimates of sales and production
- ✓ Cost of production
- ✓ Working capital requirement and its financing
- ✓ Estimates of working results
- ✓ Break-even point
- ✓ Projected cash flow
- ✓ Projected balance sheet.

The activity level of an enterprise expressed as capacity utilization needs to be well spelled out. However the enterprise sometimes fails to achieve the targeted level of capacity due to various business vicissitudes like unforeseen shortage of raw material, unexpected disruption in power supply, instability to penetrate the market mechanised.

Market Analysis

Before the production actually starts, the entrepreneur needs to anticipate the possible market for the product. He has to anticipate who will be the possible customer for his product and where his product will be sold. This is because production has no value for the producer unless it is sold. In fact, the potential of the market constitutes the determinant of possible reward from entrepreneurial career.

Thus knowing the anticipated market for the product to be produced become an important element in business plan. The commonly used methods to estimate the demand for a product are as follows. :

1 Opinion polling method

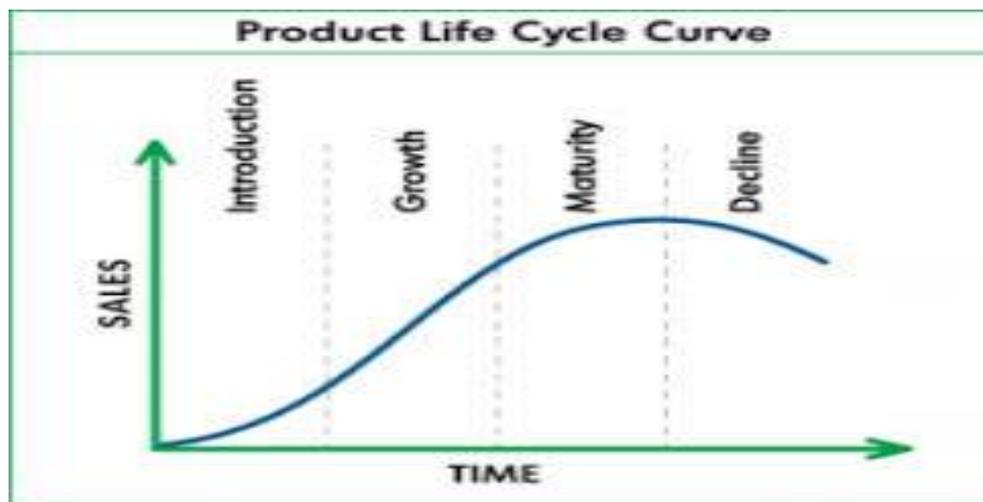
In this method, the opinion of the ultimate users. This may be attempted with the help of either a complete survey of all customers or by selecting a few consuming units out of the relevant population.

2. Life Cycle Segmentation Analysis

It is well established that like a man, every product has its own life span. In practice, a product sells slowly in the beginning. Barked by sales promotion strategies over period its sales pick up. In the due course of time the peak sale is reached. After that point the sales begins to decline. After sometime, the product loses its demand and dies. This is natural death of a product. Thus, every product passes through its lifecycle. The product life cycle has been divided into the following **five stages**:

- ✚ Introduction,
- ✚ Growth,
- ✚ Maturity,
- ✚ Saturation and
- ✚ Decline.

The sales of the product varies from stage to stage as shown in figure No. 1.4



Considering the above five stages of a product life cycle, the sale at different stages can be anticipated.

Technical Analysis

Technical analysis implies the adequacy of the proposed plant and equipment to prescribed norms. It should be ensured whether the required know how is available with the entrepreneur. The following inputs concerned in the project should also be taken into consideration.

- ✚ Availability of Land and site
- ✚ Availability of Water Power, transport, communication facilities.
- ✚ Availability of servicing facilities like machine shop, electric repair shop etc.
- ✚ Coping with anti pollution law

- ✚ Availability of work force
- ✚ Availability of required raw material as per quantity and quality.

Management Competence

Management ability or competence plays an important role in making an enterprise a success. In the absence of Managerial Competence the project which is otherwise feasible may fail. On the contrary, even a poor project may become a successful one with good managerial ability. Hence, while doing project appraisal, the managerial competence or talent of the promoter should be taken into consideration.

Ecological Analysis

In recent years, environmental concerns have assumed great deal of significance. Ecological analysis should also be done particularly for major projects which have significant implication like power plant and irrigation schemes, and environmental pollution industries like bulk-drugs, chemical and leather processing. The key factors considered for ecological analysis are:

- ✚ Environmental damage
- ✚ Restoration measure

TOOLS AND TECHNIQUES FOR PROJECT MANAGEMENT

There are several tools and techniques which would contribute significantly towards effective project management these can be broadly grouped under the following heads :

1. Project selection techniques

- (a) Cost benefit analysis and
- (b) Risk and sensitivity analysis

2. Project execution planning techniques

- (a) Work breakdown structure (WBS)
- (b) Project execution plan (PEP)
- (c) Project responsibility matrix and
- (d) Project management manual

3. Project scheduling and coordinating techniques

- (a) Bar charts
- (b) Life cycle curves
- (c) Line of balance (LOB) and
- (d) Networking techniques (PERT/CPM)

4. Project monitoring and progressing techniques

- (a) Progress measurement technique (PROMPT)
- (b) Performance monitoring technique (PERMIT) and
- (c) Updating, reviewing and reporting technique (URT)

5. Project cost and productivity control techniques

- (a) Productivity budgeting techniques
- (b) Value engineering (VE) and
- (c) COST/WBS

6. Project communication and clean-up techniques

- (a) Control room and
- (b) Computerized information systems

THE PROJECT MANAGER'S ROLES & RESPONSIBILITIES

As things stand today, none of the present generation project manager, including the very successful ones, comes from any of our management schools. They were just given the job-some succeeded and others did not. Those who succeeded are not many, because only a handful of projects in India were ever completed on time, within budget and performed to expectations. While the failures of these projects had been analysed in many seminars and workshops, the role of project managers and their development did not form the subject of any serious discussion. There could be two reasons for this:

- (a) Perhaps no one thinks that success or failure of a project depends on the project manager; and
- (b) It may also be that no one considers them as a special breed of managers. Surprisingly, even some of the practising project managers themselves subscribe to these views. The basic roles and responsibilities of a project manager that we are referring to could be grouped under twelve heads:

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 and targets;

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

QUESTIONS

1. Define Project Management and outline its features clearly.
2. Discuss the process of generating and screening the project ideas.
3. What can a firm do to stimulate the flow of Project Ideas?
4. Discuss the concept of project life cycle.
5. What factors influence the project ideas? Discuss their implications.
6. Define the term 'Project'. How will you classify the projects?
7. What do you understand by project identification? Discuss, with examples, the process involved in project identification.
8. How would you use SWOT analysis to identify and select a project for SSI?
9. How are projects classified? In your view which criterion seems to be more rational and acceptable for classification of a project?

REFERENCE AND SUGGESTED READ

1. Parana Chandra: Projects-Planning Analysis, Selection, Implementation & Review, Tata McGraw Hill, New Delhi.
2. Parana Chandra : Financial Management, Tata McGraw Hill, New Delhi.

Administered / management appraisal analysis

A performance **appraisal** is a formal process used to assess an employee's effectiveness and productivity and serves both **administrative** and developmental purposes. Administratively, it

helps guide decision-making regarding **employment** actions, personnel planning and training and development.

Nature of Performance Management

- Performance Management
 - Processes used to identify, encourage, measure, evaluate, improve, and reward employee performance
 - ❖ Provide information to employees about their performance.
 - ❖ Clarify organizational performance expectations.
 - ❖ Identify the development steps that are needed to enhance employee performance.
 - ❖ Document performance for personnel actions.
 - ❖ Provide rewards for achieving performance objectives.



Difference Between Performance Management and Performance Appraisals

- **Performance Management**
 - Processes used to identify, encourage, measure, evaluate, improve, and reward employee performance.
- **Performance Appraisal**
 - The process of evaluating how well employees perform their jobs and then communicating that information to the employees.

Performance Management ⇒ Performance Appraisals ⇒ Performance Feedback ⇒ Performance Rewards and Development



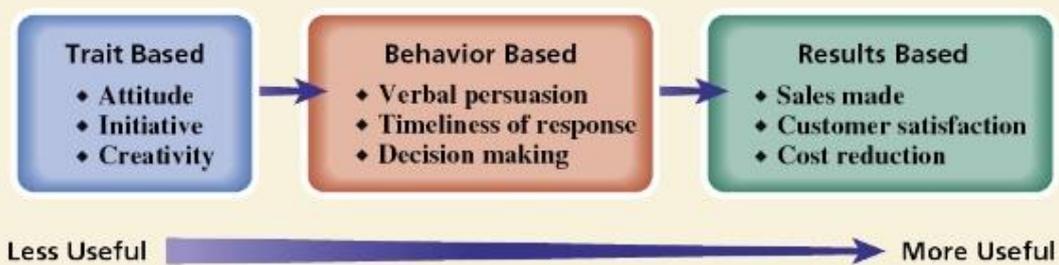
Components of Effective Performance Management

Identifying and Measuring Employee Performance

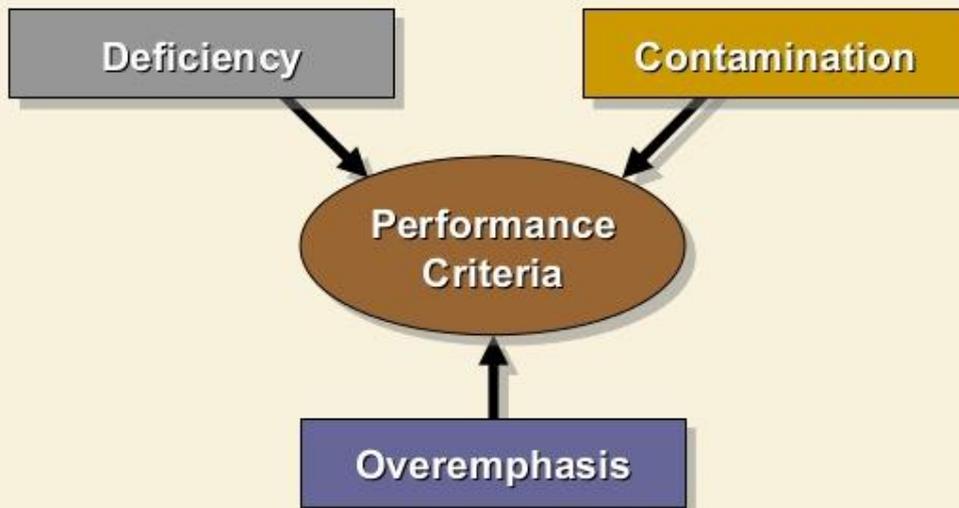
- Performance
 - What an employee does and does not do.
 - ❖ Quantity of output • Quality of output
 - ❖ Timeliness of output • Presence at work
 - ❖ Cooperativeness
- Job Criteria
 - Important elements in a given job

Management Job Criteria at Sample Firm	Weight
Revenue increase	40%
Cost control	30%
Employee development	30%
Total Management Performance	100%

Types of Performance Information



Relevance of Performance Criteria



Performance Standards

- Performance Standards
 - Expected levels of performance
 - ❖ Benchmarks, goals, and targets
 - Characteristics of well-defined standards
 - ❖ Realistic
 - ❖ Measurable
 - ❖ Clearly understood

Job Criterion: Keep current on supplier technology.

Performance Standards: 1. Every four months, invite suppliers to make presentation of newest technology. 2. Visit supplier plants twice a year. 3. Attend trade shows quarterly.

Job Criterion: Do price or cost analysis as appropriate.

Performance Standard: Performance is acceptable when employee follows all requirements of the procedure "Price and Cost Analysis."

UNIT – IV

PROJECT PLANNING

Introduction

Planning is a general term that sets a clear road map that should be followed to reach a destination. The term, therefore, has been used at different levels to mean different things.

Planning involves the **breakdown of the**

- **Project into definable,**
- **Measurable, and**
- **Identifiable tasks/activities, and then establishes the logical interdependences among them.**

Generally, planning answers three main questions:

- What is to be done?
- How to do it?
- Who does it?

All these plans involve four main steps:

- Performing breakdown of work items involved in the project into activities.
- Identifying the proper sequence by which the activities should be executed.
- Activities representation.
- Estimating the resources, time, and cost of individual activities.

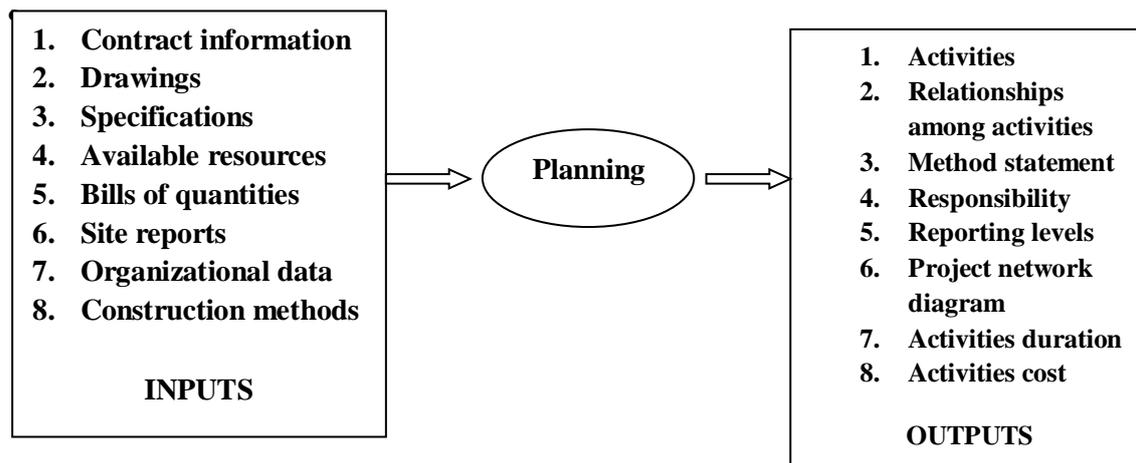


Figure 1.1: Planning inputs and outputs

It s a Project planning-estimation

Project Planning – Why?

Some consider planning to be miraculous

✓ Why do planning?

- Time constraints
- Budget constraints
- Personnel constraints
- Process/ Organization Constraints
- Legal Constraints
- Any and all of above

✓ Provides structure to “think the problem through” increasing likelihood of project success



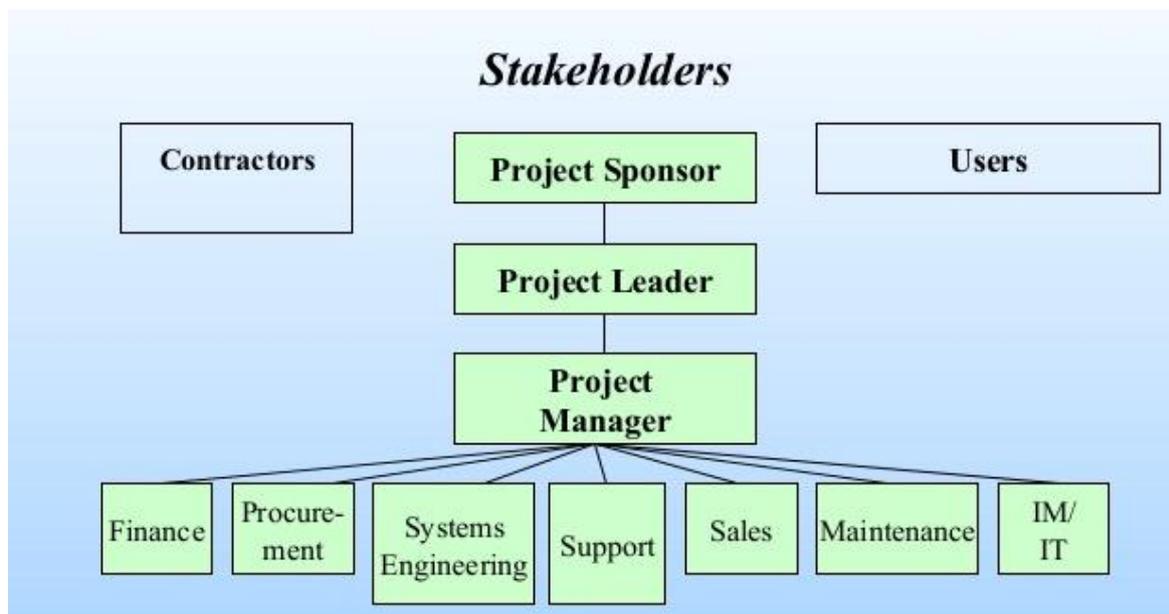
Project Planning (Effort to Duration)

If Estimate was Effort, must convert it to Duration

Duration = Effort/Resources (sometimes)

Taking into account:
 Resource availability
 Desire
 Skill
 Productivity

Project planning: Set expectations of stakeholders



Project Planning

1. The structure of the project plan:

- Introduction (objectives, constraints)
- Project organization (team structure, personnel involved, and roles)
- Risk analysis (types of risk, probabilities, and solutions to prevent or reduce the risk)
- Hardware and software resources needed (prices, delivery schedule)
- Work breakdown (activities, milestones, and deliverables)
- Project schedule (dependencies between activities/tasks, work assignments, time allocated per task)
- Monitoring and reporting mechanisms (reports, dates)

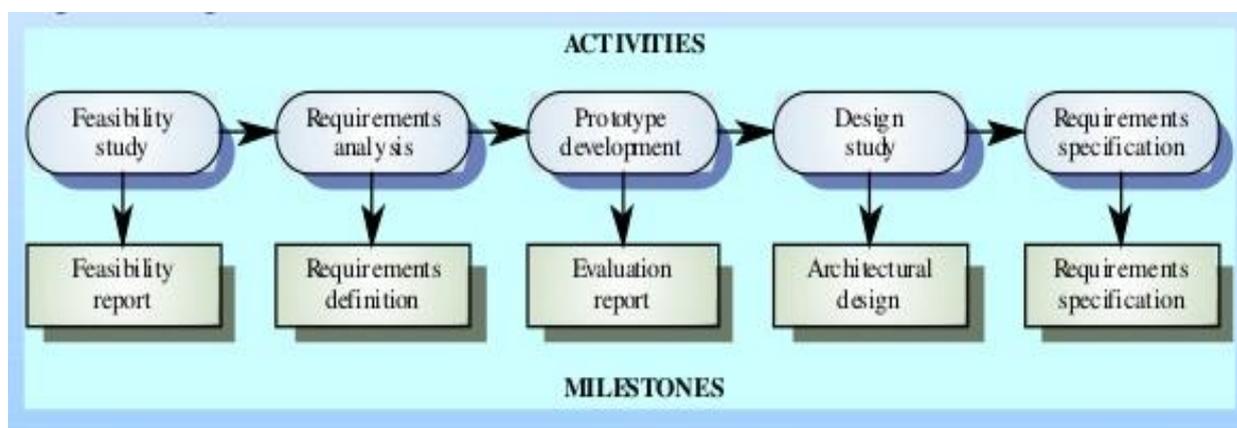
2. A project plan should be drawn at the start of the project.

- This plan drives the project and needs to be continuously adjusted
- Role of the project manager is to anticipate possible problems and be prepared with solutions for these problems

3. Other plans that need be developed:

- Quality plan
 - Validation and verification plan
 - Configuration management plan
 - Change Management Plan (Scope Management Plan)
 - Risk Management Plan
 - Maintenance plan
 - Staff development plan
- ✓ **Milestone** = end-point of a specific, distinct software process activity or task (for each milestone a report should be presented to the management)
- ✓ **Deliverable** = project result delivered to the client
- ✓ In order to establish milestones, the phases of the software process need be divided in basic activities/tasks.

Example for requirements engineering



✓ Project Planning Steps

- Work Breakdown Structure (WBS)

- Project Activities
 - Activities Relationships
 - Drawing Project Network
- ✓ **Estimating Activity Duration and Direct Cost**

Planning requires a rigorous effort by the planning team. A planner should know the different categories of work and be familiar with the terminology and knowledge used in general practice. Also, the planning team should seek the opinion of experts including actual construction experience. This helps produce a realistic plan and avoids problems later on site.

Objectives of planning

1. Introduce project planning
2. Examine the stages of project planning:
 - Scoping
 - Estimation
 - Risk Analysis
 - Scheduling
3. Focus on some of the tools and techniques available to a project planner

Planning

- Estimation of tasks
- Cost and time
- Planning and risk
- Scheduling and why projects are late
- Scheduling and planning tools
- Project tracking

Steps in Project Planning

1. **Scope** — understand the problem and the work that must be done.
2. **Estimation** — how much effort? How much time?
3. **Risk** — what can go wrong? How can we avoid it? What can we do about it?
4. **Schedule** — how do we allocate resources along the timeline? What are the milestones?
5. **Control strategy** — how do we control quality? How do we control change?

STEP 1- Scope

1. A bounded description of the data and control, function, performance, constraints, interfaces and reliability
2. Sufficient to determine project feasibility and create an initial plan
3. Scoping Techniques:
 - FAST (Facilitated Application Specification Technique),
 - QFD (Quality Function Deployment),
 - Use-Cases
4. **Scope is affected by:**
 - Customers' needs
 - Business context
 - Project boundaries
 - Customers' motivation
 - Likely paths for change
5. **Estimating Resources**
 - **Human Resources:** Select skills required (both position and specialty, e.g. database software engineer). Requires an effort estimate
 - **Reusable Software Resources:** Off-the-shelf components (existing software acquired from 3rd party with no modification required)
 - **Full-experience components** (previous project code is similar and team members have full experience in this application area)
 - **Partial-experience components** (existing project code is related but requires substantial modification and team has limited experience in the application area)
 - **New components** (must be built from scratch for this project)
 - **Environmental Resources:** The hardware and software tools required to develop the project. Planner needs to provide a time window for booking them.
6. **Estimating Cost and Effort**
 - Project scope must be explicitly defined. If not, the project may be infeasible
 - Task and/or functional decomposition is necessary
 - Historical measures (metrics) are very helpful
 - **Triangulation:** At least two different techniques should be used. Can be reconciled if they are within 20%
 - Remember that uncertainty is inherent in early estimates
 - **Viable Techniques:**

- Delay estimation until later in the project (**XP – Extreme programme approach**)
- Base estimates on similar projects that have already been completed
- Use relatively simple decomposition techniques (**LOC-Line of code or FP-functional point analysis**)

7. Risk Analysis and Management

- **Definition of Software Risk:**
- **Concerns future happenings:** What risks might cause the project to go astray?
- **Involves change:** How will changes in customer requirements, development technologies, target computers, and other entities affect timeliness and success?
- **Requires choice:** What methods and tools should be used, how many people should be involved to reduce risk?

Project Planning Process or components

The process of creating your project plan components is essential to each project and is a procedure that may be performed several times through the life cycle of a project. But, what are the key components of a project plan? In simple words, they are the combination of the Core and the Facilitating processes of a project, all of which are focused on the development of a consistent, coherent document that includes all the tasks that need to be executed throughout the project's phases.

Key Project Management Plan Components

Core processes are usually interrelated and intertwined with each other and need to be performed in the same order on the majority of projects. They include three essential procedures for **developing the project plan**:

1. **Planning and Defining the Scope:** The first thing to do is to develop a clear scope statement as the project's foundation. The whole project will be built upon this and after that you can subdivide the major project objectives into clear and manageable deliverables.
2. **Developing the Schedule:** This requires a series of several procedures in order to create the project schedule that involves: **Identifying and cataloguing the activities** that must be performed to produce the various project deliverables, **analyzing the sequence of activities** and documenting any interactivity dependencies. **Estimating all the work periods** needed and how long it will take to complete individual activities. It is also useful to design a Milestone List, which lists the most important deliverables as way points, which will help you to evaluate the progress of a project.

3. **Resource Planning:** This includes the **determination of resources** (people, equipment, materials, etc.) and the quantities necessary to carry out the project activities, the **development of a cost approximation** of the resources required to complete the project and the **cost budgeting** and the allocation of the overall cost estimation to individual work packages.

The **facilitating processes** are general interactions among the planning processes that are dependent on the nature of each project. Although these processes are performed intermittently and in no particular sequence during project planning and execution, they are not optional and include six additional components of a project plan:

1. **Quality planning:** You should identify the quality standards relevant to the project and determine how to achieve them.
2. **Organizational Planning – WBS (Work Breakdown Structure):** Here, you should identify, document and assign project roles and responsibilities among the staff and set the reporting relations. The next step is **Staff Acquisition**, or getting the needed human resources assigned to and working on the project. A useful tip is to form clear and manageable **work packages** that correspond to the individual work performed by each of the staff and create a document which will serve as a reference point for managing project progress.
3. **Setting a Communications plan:** This involves configuring the information and communications needs of all the stakeholders (who needs what information, when will they need it and how they will get it).
4. **Risk Management Planning** is one of the most important components of a project plan and decides the approach and plan for risk management in a project. In other words, it is the safety net of each project and involves the following processes: **Identifying key risks** likely to affect the project and documenting the characteristics of each. **Performing a Qualitative Risk Analysis** of the project's risks and conditions in order to prioritize their effects on the project objectives. **Running a Quantitative Risk Analysis**, measuring the probability and impact of each of the risks and estimating their impact on the project's objectives. **Develop a Risk Response Plan**, building up a mechanism to strengthen contingencies and reduce any threats to the project's objectives from risk.
5. **Procurement Planning:** Defining what to procure, how much to procure and when.
6. **Solicitation Planning:** Documenting product requirements and identifying potential sources.

Project schedule

Meaning:“The discipline for stating how-to complete a project within a certain timeframe, usually with defined stages, and with designated resources.”

“I have always found that **plans are useless**, but **planning is indispensable.**”

Why do plan?

Think deeply

- ✓ Objective
- ✓ Problems
- ✓ Paths

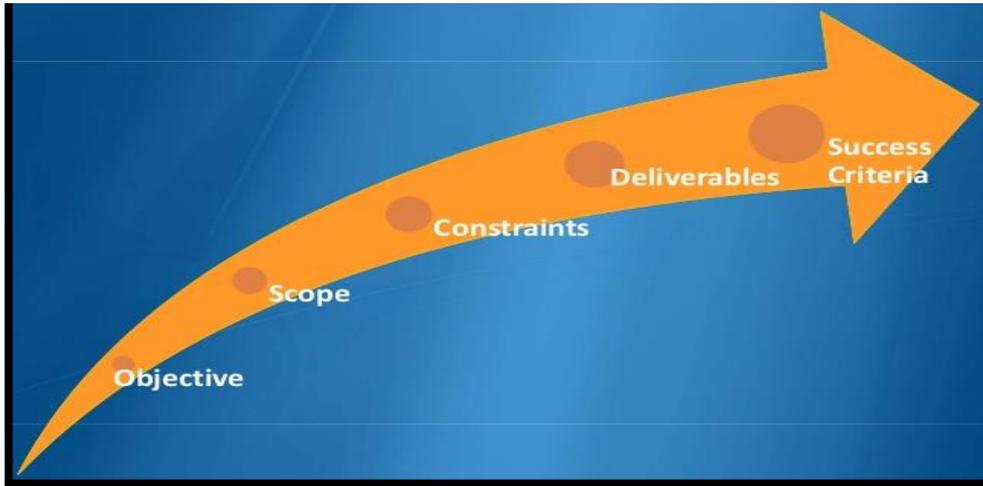
Helps

- ✓ Calculate Cost
- ✓ Set Expectations
- ✓ Plan & Coordinate
- ✓ Track & Report

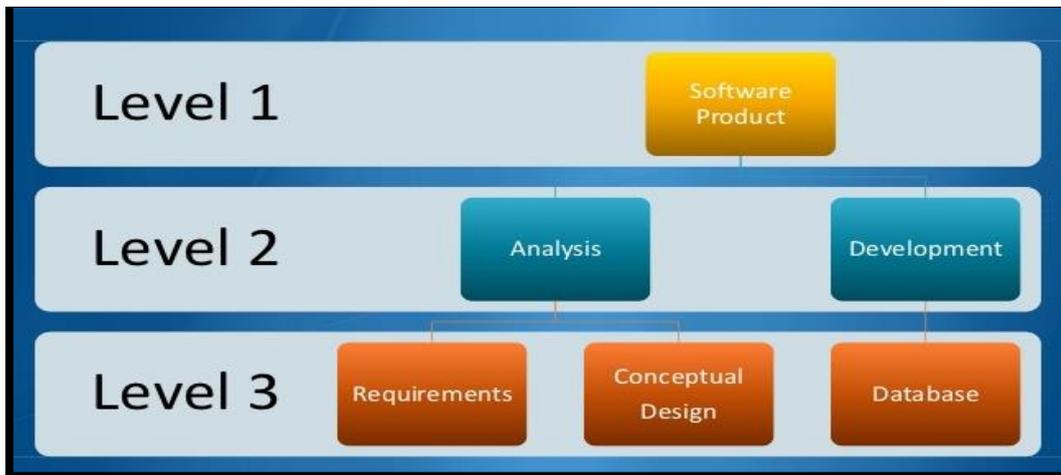
How to make a schedule?



Review the project charter

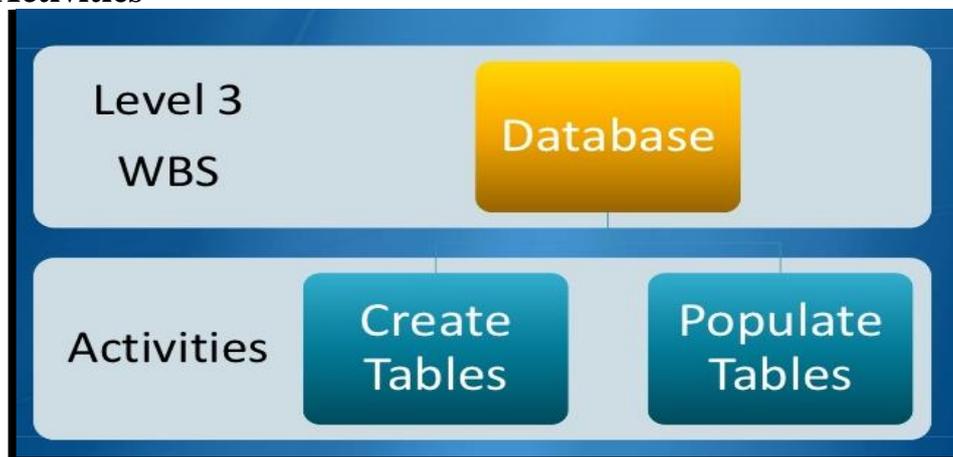


Create a WBS and capture all deliverables

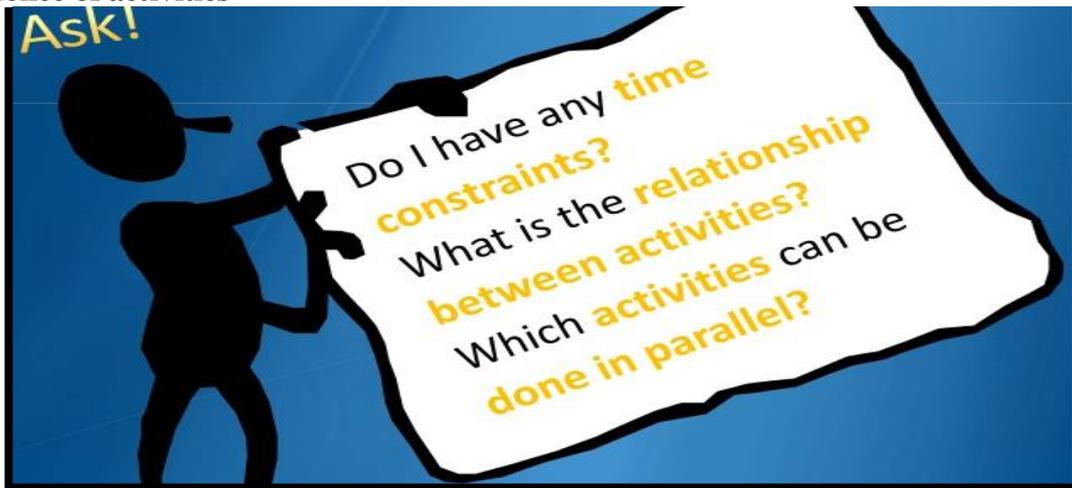


- ✓ “WBS is organized around the primary products instead of the work needed to produce the products.”
- ✓ “100% Rule – WBS includes 100 % of the work & deliverables.”

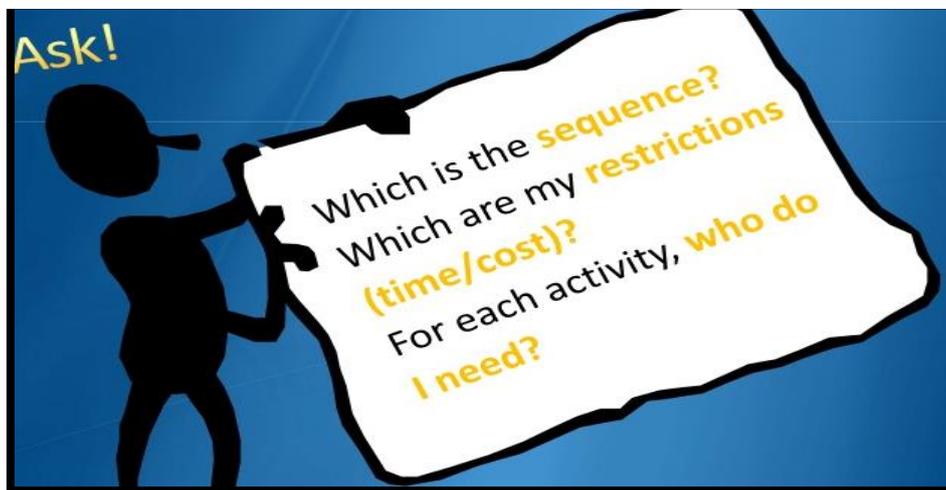
Define Activities



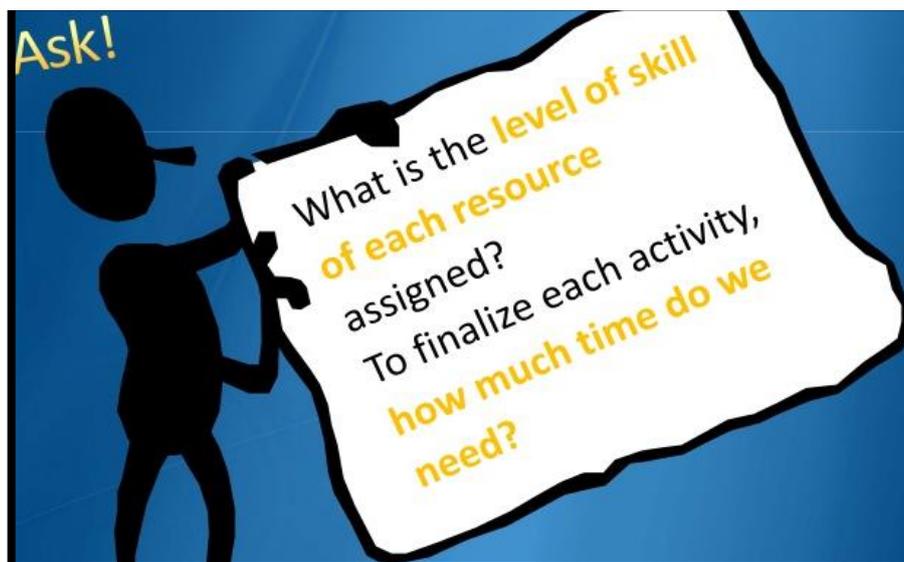
Sequence of activities



Estimate resources

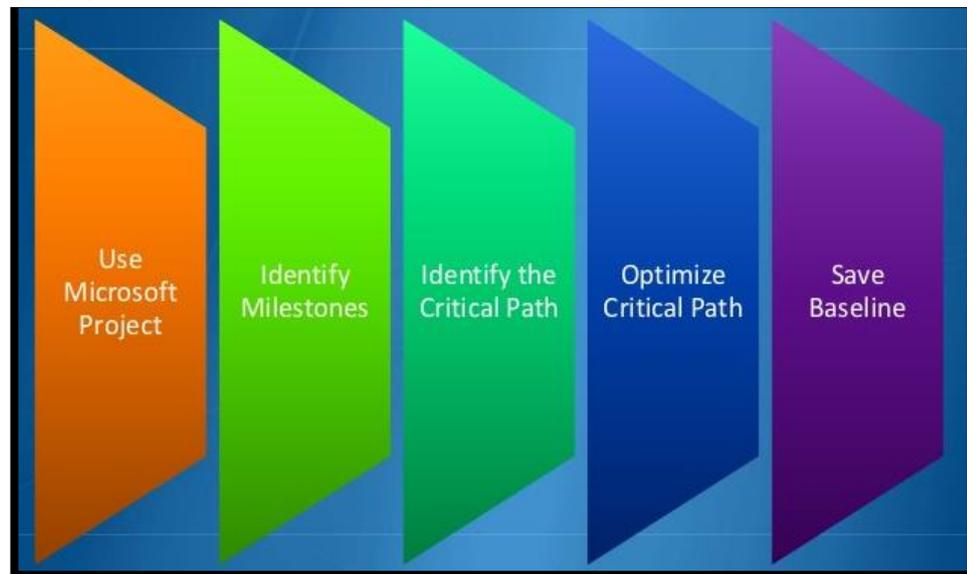


Estimate duration



Plan time buffers at task level

Develop schedule



- ✓ Planning requires team participation.
- ✓ Another implementation of the same product doesn't mean the same project plan
- ✓ Plans always change and reprioritize with situations

whatis.com Wikipedia PMBOK, 4th Edition

Project Scheduling.....

Write a Plan Containing

1. Steps required to accomplish the project objectives
2. Tasks needed to be done at each step (using Work Breakdown Structures)
3. Estimate of how much effort each task requires
4. The resources required for each task
5. (Given 3. and 4.) Calculation of how long each task/step will take
6. (Given 4. and 5.) Calculation of task, step and project costs
7. The inter-dependencies of tasks
8. The schedule for each task and the whole project (Milestones, Deliverables, payments)

Scheduling: Requires Duration and Precedents

Two Graphical tools for Scheduling:

1. Network Diagrams

a) *PERT(Program Evaluation and Review Technique) Chart*

b) *CPM (Critical Path Method) Chart*

2. Gantt Chart

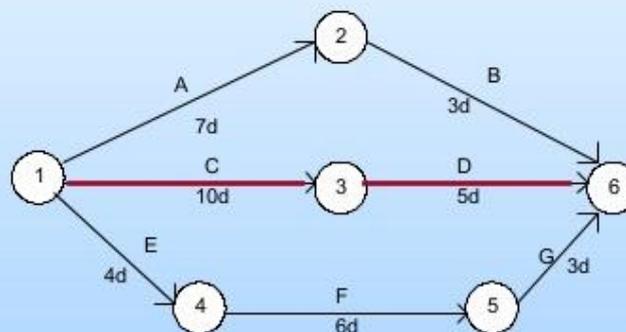
Plan (from WBS)

<u>Task</u>	<u>Precedent</u>	<u>Duration</u>
A	-	7d
B	A	3d
C	-	10d
D	C	5d
E	-	4d
F	E	6d
G	F	3d

Scheduling

Ordering the Activities: PERT Chart/ CPM Network

Arrow Diagramming Method (ADM)



CAPITAL EXPENDITURE DECISION

MEANING AND FEATURES OF CAPITAL EXPENDITURE OR BUDGETING DECISIONS

A capital budgeting decisions may be defined as the firm's decision to invest its current funds most efficiently in the long-term assets in anticipation of an expected flow of benefits over a series of years. In other words, "capital budgeting is used to evaluate the expenditure decisions such as acquisition of fixed assets, changes in old assets and their replacement." Activities such as change in the method of sales distribution or undertaking an advertisement campaign or a research and development programme have long-term implication for the firm's expenditure and benefits and therefore, they may also be evaluated as investment decisions.

Features of Capital Budgeting Decisions

- ✓ Following are the features of investment decisions
- ✓ Investment of fund is made in long-term assets.
- ✓ The exchange of current funds for future benefits.
- ✓ Future profits accrue to the firm over several years.
- ✓ These decisions are more risky.

It is significant to emphasise that expenditure and benefits of an investment should be measured in cash. In the investment analysis, it is cash flow which is important, not the accounting profit. It may also be pointed out that investment decisions affect the firm's value. The firm's value will increase if investments are profitable. Investment should be evaluated on the basis of criteria on which it is compatible with the objective of the shareholder's wealth maximisation. An investment will add to the shareholder's wealth if it yields benefits in excess of the minimum benefits as per the opportunity cost of capital.

2.3 IMPORTANCE OF CAPITAL EXPENDITURE DECISION

Investment decisions require special attention because of the following reasons:

1. Growth: - The effects of investment decisions extend into the future and have to endured for a longer period than the consequences of the current operating expenditure. A firm's decisions to invest in long-term assets have a decisive influence

on the rate direction of its growth. Wrong decisions can prove disastrous for the continued survival of the firm.

2. Risk: - A long-term commitment of funds may also change the risk complexity of the firm. If the adoption of an investment increases average gain but causes frequent fluctuations in its earnings, the firm will become very risky.

3. Funding: - Investment decisions generally involve large amount of funds. Funds are scarce resource in our country. Hence the capital budgeting decision is very important.

4. Irreversibility: - Most investment decisions are irreversible

5. Complexity: - Investment decisions are among the firm's most difficult decisions. They are concerned with assessment of future events which are difficult to predict. It is really a complex problem to correctly estimate the future cash flow of investment.

Objectives of Capital Budgeting Decision

Capital budgeting helps in selection of profitable projects. A company should have system for estimating cash flow of projects. A multidisciplinary team of managers should be assigned the task of developing cash flow estimates. Once cash flow have been estimated, projects should be evaluated to determine their profitability. Evaluations criteria chosen should correctly rank the projects. Once the projects have been selected they should be monitored and controlled. Proper authority should exist for capital spending. Critical projects involving large sum of money may be supervised by the top management. A company should have a sound capital budgeting and reporting system for this purpose. Based on the comparison of actual and expected performance, projects should be reappraised and remedial action should be taken.

KINDS OF CAPITAL EXPENDITURE DECISIONS

Capital expenditure decisions are of following types:

Expansion and diversification

A company may add capacity to its existing product lines to expand existing operations.

For example, a fertilizer company may increase its plant capacity to manufacture in more areas. Diversification of an existing business requires investment in new products and a new kind of production activity within the firm. Investment in existing or new products may also be called as revenue-expansion investment.

Replacement and modernisation

The main objective of modernisation and replacement is to improve operating efficiency and reduce costs. Assets become out dated and obsolete as a result of technological changes. The firm must decide to replace those assets with new assets that operate more economically. If a cement company changes from semi-automatic drying equipment to fully automatic drying equipment, it is an example of modernisation and replacement.

Yet another useful way to classify investment is as follows:

- ✓ Mutually exclusive investments
- ✓ Independent investments
- ✓ Contingent investments

Mutually exclusive investment

Mutually exclusive investment serves the same purpose and competes with each other. If one investment is selected, the other will have to be rejected. A company may, for example, either use more labour-intensive, semi-automatic machine or employ a more capital intensive, highly machine for production.

Independent Investment

Independent investment serves different purposes and do not compete with each other.

For example a heavy engineering company may be considering expansion of its plant capacity to manufacture additional excavators and adding new production facilities to manufacture a new product - Light commercial vehicles. Depending on their profitability and availability of funds, the company can undertake both investments.

Contingent Investment

Contingent investment is dependent projects. The choice of one investment necessitates under taking one or more other investments. For example, if a company decided to build a factory in a remote backward area, it may have to invest in houses,

road, hospitals, schools etc. The total expenditure will be treated as one single investment.

CAPITAL BUDGETING PROCESS

Capital budgeting is a complex process which may be divided into five broad phases.

These are:-

- ✓ Planning
- ✓ Analysis
- ✓ Selection
- ✓ Implementation
- ✓ Review

Planning

The planning phase of a firm's capital budgeting process is concerned with the articulation of its broad strategy and the generation and preliminary screening of project proposals. This provides the framework which shapes, guides and circumscribes the identification of individual project opportunities.

Analysis

The focus of this phase of capital budgeting is on gathering, preparing and summarising relevant information about various project proposals which are being considered for inclusion in the capital budget. Under this a detail analysis of the marketing, technical, economic and ecological aspects is undertaken.

Selection

Project would be selected in the order in which they are ranked and cut off point would be reached when the cumulative total cost of the projects become equal to the size of the plan funds. A wide range of appraisal criteria have been suggested for selection of a project. They are divided into two categories viz, non-discounting criteria and discounting criteria.

CRITERIA OF CAPITAL BUDGETING

There are two broad criteria of capital budgeting:

1. Non discounting criteria

The method of capital budgeting are the techniques which are used to make comparative evaluation of profitability of investment.

The non-discounting methods of capital are as follows:

- ✓ Payback period method (PBP)
- ✓ Accounting rate of return method (ARR)

2. Discounting Criteria

- ✓ Net present value method (NPV)
- ✓ Internal rate of return method (IRR)
- ✓ profitability index method (PVI)

Non-discounting criteria

Payback period method:

Under this method the payback period of each project investment proposal is calculated. The investment proposal which has the least payback period is considered profitable. Actual pay back is compared with the standard one if actual payback period is less than the standard the project will be accepted and in case, actual payback period is more than the standard payback period, the project will be rejected. So, payback period is the number of years required for the original investment to be recouped.

For example, if the investment required for a project is Rs. 20,000 and it is likely to generate cash flow of Rs. 10,000 for 5 years. Payback Period will be 2 years. It means that investment will be recovered in first 2 years of the project. Method of calculating payback period is

$$\text{Payback period} = \frac{\text{Investment}}{\text{Annual Cash in Flow}}$$

Accounting Rate of Return:

This method is also called average rate of return method. This method is based on accounting information rather than cash flows. It can be calculated as -

$$\text{ARR} = \frac{\text{Average annual profit after taxes}}{\text{Average Investment}} \times \frac{\text{Total no. of after but profit it of all the years}}{\text{Number of years}}$$

$$\text{Average Investment} = \frac{\text{Original Investment} + \text{Salvage value}}{2}$$

2

Discounted Criteria

Under these methods the projected future cash flows are discounted by a certain rate called cost of capital. The second main feature of these methods is that they take into account all the benefits and costs accruing during the life time of the project.

Discounted cash flow method is briefly described as follow:-

Net Present Value Method (NPV): In this method present value of cash flow is calculated for which cash flows are discounted. The rate of discount is called cost of capital and is equal to the minimum rate of return which must accrue from the project. NPV is the difference between present value of cash inflows and present value of cash outflows.

NPV can be calculated as under:-

$$0 = CF_0 + \frac{CF_1}{(1 + IRR)} + \frac{CF_2}{(1 + IRR)^2} + \frac{CF_3}{(1 + IRR)^3} + \dots + \frac{CF_n}{(1 + IRR)^n}$$

Or

$$0 = NPV = \sum_{n=0}^N \frac{CF_n}{(1 + IRR)^n}$$

Where:

CF_0 = Initial Investment / Outlay

$CF_1, CF_2, CF_3 \dots CF_n$ = Cash flows

n = Each Period

N = Holding Period

NPV = Net Present Value

IRR = Internal Rate of Return

Internal rate of return method (IRR) : Under this method initial cost and annual cash inflows are given. The unknown rate of return is ascertained. In other words “The internal rate of return is that rate which equates the present value of cash inflows with the present value of cash outflows of an investment project.” At the internal rate of return NPV of a project is zero. Like NPV method IRR method also considers time value of money. In IRR method, the discount rate (r) depends upon initial investment expenditure and the future cash inflows.

IRR is calculated as follows:

$$C = \frac{A_1}{(1+r)^1} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \dots + \frac{A_n}{(1+r)^n}$$

$$C = \sum_{i=1}^n \frac{A_i}{(1+r)^i} \neq C$$

$$0 = \sum_{i=1}^n \frac{A_i}{(1+r)^i} - C$$

C = initial cash outflow

n = number of years

r = rate of return which is to be calculated.

$A_1 A_2 A_3 \dots A_n$ are cash inflows in various years.

Profitability index/ Benefit-cost ratio:

It is the ratio of value of future cash benefits discounted at some required rate of return to the initial cash outflows of the investment. PI method should be adopted when the initial costs of projects are different. NPV method is considered good when the initial cost of different projects is the same.

PI can be calculated as under:-

$$PI = \frac{\text{Present value of Cash inflows}}{\text{Present value of Cash outflows}}$$

Implementation

Every entrepreneur should draw an implementation scheme or a time table for his project to ensure the timely completion of all activities involved in setting upon enterprise. Timely implementation is important because if there is delay it causes, among other things, a project cost overrun. In India delay in project implementation has become a common feature. Implementation phase for an industrial project, which involves settings up of manufacturing facilities, consists of several stages

These are:-

- ✓ Project and engineering design
- ✓ Negotiation and contracting
- ✓ Construction
- ✓ Training
- ✓ Plant and commissioning

Translating an investment proposal into a concrete projects is a complex, time-consuming and risky task. Delays in implementation, which are common, can lead to substantial cost overruns. For expeditious implementation at a reasonable cost

Following are useful:

- ✓ Adequate formulation projects
- ✓ Use of the principle of responsibility accounting
- ✓ Use of network techniques

Hence, there is a need to draw up an implementation schedule for the project and then to adhere. Following is a simplified implementation schedule for a small project.

Review

Once the project is commissioned, the review phase has to be set in motion. Performance review should be done periodically compare actual performance with projected performance.

A feedback device is useful in several ways.

- ✓ It throws light on how realistic were the assumption underlying the project.
- ✓ It provides a documented log of experience that is highly valuable in future
- ✓ Decision
- ✓ It suggests corrective action to be taken in the light of actual performance.
- ✓ It helps in uncovering judgmental basis.

INTRODUCTION

Projects are successful if they are completed on time, within budget, and to performance requirements. Management of any project involves planning, coordination and control of a number of interrelated activities with limited resources, namely men, machines, money and time. Furthermore, it becomes necessary to incorporate any change from the initial plan as they occur, and immediately know the effects of the change. Therefore the managers are compelled to look for and depend on a dynamic planning and schedule system which will not only produce the best possible initial plan and schedule, but will also sufficiently dynamic to react instantaneously to change in the original plan and schedule. The question of such a dynamic system/ technique led to the development of *network analysis*.

It provides a framework which:

- ❖ Defines the job to be done,
- ❖ Integrates them in a logical time sequence and finally,

- ❖ Affords a system of dynamic control over the progress of the plan.

Network analysis is a generic name for a number of associated project planning and control procedures that are all based on the concept of network.

- PERT, an acronym for **Program Evaluation and Review Technique** and
- CPM, an acronym for **Critical Path Method**

These are the two widely used techniques of project management that were developed, independently and simultaneously, during the 1950s.

The network analysis underlying PERT and CPM helps to support the three phases of effective project management.

Planning

- ❖ Identify the distinct activities,
- ❖ Determine their durations and interdependencies,
- ❖ Construct a network diagram,
- ❖ Determine minimum overall project duration (using the network diagram), and
- ❖ Identify the tasks critical (i.e. Essential) to this minimum duration.

Scheduling

- ❖ Construct schedule ('time chart'),
- ❖ Schedule contains start and finish times for each activity, and
- ❖ Evaluate cost-time trade-offs (evaluate effects of putting extra money, people or machines in a particular task in order to shorten project duration).

Controlling

- ❖ Monitor/control project by use of network diagram,
- ❖ Follow progress of the various activities ; and
- ❖ Make adjustment where appropriate.

UNIT - V

Project Contract

Introduction

In the world of business, contracts are used for establishing business deals and partnerships. The parties involved in the business engagement decide the type of the contract.

Usually, the type of the contract used for the business engagement varies depending on the type of the work and the nature of the industry.

The contract is simply an elaborated agreement between two or more parties. One or more parties may provide products or services in return to something provided by other parties (client).

The contract type is the key relationship between the parties engaged in the business and the contract type determines the project risk.

A proper contract strategy for a project involves five key decisions:

- Setting the project objectives and constraints
- Selecting a proper project delivery method
- Selecting a proper contract form / type
- Contract administration practices

What is a Contract

A contract is defined as: "an agreement made between two or more parties which is enforceable by law to provide something in return for something else from a second party".

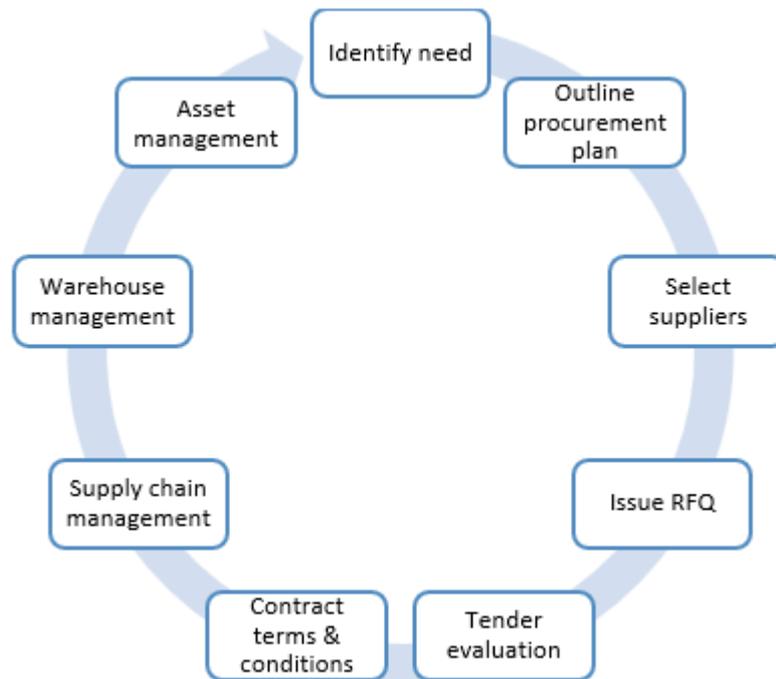
These elements are:

- **Competent Parties:** For an agreement to be a contract there must be two or more competent parties. In order to be considered competent, a part must have a certain legal standing.
- **Proper Subject Matter:** For the subject matter of a contract to be proper, the first requirement is that it was be clearly defined as to the rights and obligations of each party. Second, the purpose of the contract must not violate the law.
- **Consideration:** There must be a lawful and valuable consideration given b both parties. A consideration often called "Something for something." A consideration must, also, be possible.
- **Agreement:** For valid contract, there must be a mutual agreement. An agreement is considered to have been reached when an offer made by one party is accepted by the second party. Both parties must wish and intend their bargain to be enforceable by law.

- **Proper Form:** The terms of a contract must be written so that both parties are very sure of what their rights and responsibilities are.

- **Consent of the Parties:** The agreement must be free from: Misrepresentation, Duress Undue influence, etc.

Steps of contracting process



Project objectives

The client will have a number of overall objectives. These objectives may be of primary and/or secondary importance. Primary objectives include functional performance, time objectives, and cost objectives.

a. Project Scope (performance): The project scope defines the extent or the area that the contract covers. Any additions or omissions during the life of the project will increase or decrease the quantity of work involved. Likewise, any changes in design must be discussed carefully to establish whether or not they are likely to affect the scope of the project.

b. Time: The scope and time are closely interrelated. Decisions must often be made on the effect of increasing or decreasing scope on time. If the completion date of a project is critical, then increasing scope will call for an accelerated program. The extra cost associated with this acceleration must be quantified.

c. Price: The cost of a project is closely related to scope and time. The effect of the contract on price, and the various incentives and penalties that can help to keep price steady must be discussed and clearly defined.

On the other hand, secondary objectives could arise on a construction project and would exert a major influence over contract strategy decisions. Examples of secondary objectives are:

- Allocation and payment for risk.

- Training of the client's staff.
- Transfer of technology.
- Involvement of contractor in design.
- Involvement of client in contract management.
- Choice of labor-incentive construction.
- Use of local material and resources.
- Protection of the environment.

Project constraints

All construction projects have constraints that influence the achievement of the project objectives. These constraints should therefore, be considered when choosing an appropriate contract strategy. There are a variety of constraints and these are examples:

- Availability of funds.
- Availability of contractual incentives.
- Method of tendering.
- Project location.
- Target dates of the project.
- Possibility of design changes.
- Availability of resources.
- Seasonal working.
- Number of contractors willing or able to tender.
- Inflation.

Factors influencing contract choice

Three main factors influence the choice of a given contract including:

- ❖ The incentive,
- ❖ Risk sharing and
- ❖ The flexibility.

Project Delivery Methods

The project delivery method translates what project parties are involved in the project and how they interact with each other and called also project organizational structure. The choice of an organizational structure should be related to project objectives and constraints. It can be facilitated considering the following factors:

- Size and nature of the work packages within the project.

- Selection of the design team from in-house resources external consultants or contractors.
- Process of supervision of construction.
- Restrictions upon using combination of organizational structures within the project.
- Expertise which the client wishes to commit to the project.

Traditional approach

This is the most common approach in civil engineering projects in which the design has to be completed before construction can start. Design and construction are usually performed by two different parties who interact directly and separately with the owner.

The pros and cons of this approach are summarized as follow:

Advantages:

- Price competition
- Total cost is known before construction starts
- Well documented approach used in most government projects.

Disadvantages

- Long time
- Design does not benefit from construction expertise
- Conflict between owner, contractor and A/E

Direct labor

In this approach, owner organization performs both the design and construction using its in-house labor force.

- Used by large authorities
- The owner performs both the design and the construction
- May use consultants for some specialized designs
- Most suitable for small projects
- Can be used when expertise are available
- Low risk projects
- Inadequate scope definition

Design-build

In this approach, a single organization is responsible for performing both design and construction and, in some cases, providing certain “know-how” for the project. The pros and cons of this approach are summarized as follow:

Advantages:

- One contract that may include know-how
- Minimum owner involvement
- Used for fast-track projects in order to reduce time
- Co-ordination between design and construction and easier in implementing the changes

Disadvantages

- Cost may not be known until end of the construction
- High risk to contractor and more cost to owner
- Design-build company may reduce quality to save cost

Turnkey

This approach is similar to the design-build approach but with the organization being responsible for performing both design, construction, know-how (if any), and project financing. Owner payment is then made at the completion (when the contractor turns over the “key”).

Build-operate-transfer (BOT)

In this approach, a business entity is responsible for performing the design, construction, long-term financing, and temporary operation of the project. At the end of the operation period, which can be many years, operation of the project is transferred to the owner. This approach has been extensively used in recent years and is expected to continue.

Professional construction management (PCM)

In this approach, the owner appoints a PCM organization (also known as Construction Management organization) to manage and coordinate the design and construction phases of a project using a Teamwork approach. The design may be provided by specialist design firms and in some cases by the PCM organization.

Contractual relationships

Within each project delivery method, the contractual relationships among the project participants can take various arrangements and the owner needs to make a decision regarding the proper arrangement that suits the project and the parties involved.

TYPES OF CONTRACTS

There are many types of contracts that may be used in the construction industry. Construction contracts are classified according to different aspects. They may be classified according to the method of payment to the contractor. When payment is based on prices which submitted by the contractor in his tender, they are called cost-based contracts. Examples are cost-reimbursable and target cost contracts. Contracts may be classified in

the point of view of the risk involved. The range of risk runs from a fixed price contract to a totally non-risk cost-reimbursable contract at the other end.

Fixed Price (Lump Sum)

This is the simplest type of all contracts. The terms are quite straightforward and easy to understand.

To put in simple, the service provider agrees to provide a defined service for a specific period of time and the client agrees to pay a fixed amount of money for the service.

This contract type may define various milestones for the deliveries as well as KPIs (Key Performance Indicators). In addition, the contractor may have an acceptance criteria defined for the milestones and the final delivery.

The main advantages of this type of contract are that the contractor knows the total project cost before the project commences.

Unit Price

In this model, the project is divided into units and the charge for each unit is defined. This contract type can be introduced as one of the more flexible methods compared to fixed price contract.

Usually, the owner (contractor/client) of the project decides on the estimates and asks the bidders to bid of each element of the project.

After bidding, depending on the bid amounts and the qualifications of bidders, the entire project may be given to the same service provider or different units may be allocated to different service providers.

This is a good approach when different project units require different expertise to complete.

Cost Plus

In this contract model, the services provider is reimbursed for their machinery, labour and other costs, in addition to contractor paying an agreed fee to the service provider.

In this method, the service provider should offer a detailed schedule and the resource allocation for the project. Apart from that, all the costs should be properly listed and should be reported to the contractor periodically.

The payments may be paid by the contractor at a certain frequency (such as monthly, quarterly) or by the end of milestones.

Incentive

Incentive contracts are usually used when there is some level of uncertainty in the project cost. Although there are nearly-accurate estimations, the technological challenges may impact on the overall resources as well as the effort.

This type of contract is common for the projects involving pilot programs or the project that harness new technologies.

There are three cost factors in an Incentive contract; target price, target profit and the maximum cost.

The main mechanism of Incentive contract is to divide any target price overrun between the client and the service provider in order to minimize the business risks for both parties.

Retainer (Time and Material - T&M)

- This is one of the most beautiful engagements that can get into by two or more parties. This engagement type is the most risk-free type where the time and material used for the project are priced.
- The contractor only requires knowing the time and material for the project in order to make the payments. This type of contract has short delivery cycles, and for each cycle, separate estimates are sent of the contractor.
- Once the contractor signs off the estimate and Statement of Work (SOW), the service provider can start work.
- Unlike most of the other contract types, retainer contracts are mostly used for long-term business engagements.
- **Percentage of Construction Fee**
- This type of contracts is used for engineering projects. Based on the resources and material required, the cost for the construction is estimated.
- Then, the client contracts a service provider and pays a percentage of the cost of the project as the fee for the service provider.

As an example, take the scenario of constructing a house. Assume that the estimate comes up to \$230,000. When this project is contracted to a service provider, the client may agree to pay 30% of the total cost as the construction fee which comes up to \$69,000.

Conclusion

Selecting the contract type is the most crucial step of establishing a business agreement with another party. This step determines the possible engagement risks.

Therefore, companies should get into contracts where there is a minimum risk for their business. It is always a good idea to engage in fixed bids (fixed priced) whenever the project is short-termed and predictable.

If the project nature is exploratory, it is always best to adopt retainer or cost plus contract types.

Contract Administration

As it was discussed in the previous sections, there is variety of types of contracts used in civil engineering projects. Each type has its specific characteristics. Contracts may be prepared under the heading of one type but could include characteristics of more than a single type. Many professional societies and government agencies have done a great deal toward the standardization of construction contracts such that the general form and content are well established for the various types of construction that may arise.

Contract documents

The contract is defined by the contract documents, which are developed from the tender documents. In a logical order, these documents refer to the following subjects:

- Input from the client (task description).
- Output of the contract (specifications, results to be achieved).
- Prices for the contractor's contribution.
- Responsibilities and procedures (liability, resources provided, time schedule, payment conditions, change procedures, etc).

Contract documents are usually arranged according to the following sequence:

- General (for any project).
- Special (for a specialty area of the project).
- Supplementary (unique to a given project).
- Additional (during bidding or negotiation).
- Agreement form (for signing very important and particular clauses).
- Modifications (during contract fulfillment).

The complete contract agreement usually consists of the following documents:

- Conditions (general, special, supplementary).
- Drawing and specifications.
- Addenda.
- Agreement form.
- Modifications.

The second part contains the elements of contract and defines the work to be undertaken.

1. A short introductory paragraph.
2. Scope of the work.
3. Time of completion.
4. Contract documents.
5. Performance bond.
6. Contractor's insurance.
7. Owner's insurance.
8. Laws, regulations and permits.
9. Payments.
10. Extensions of time.
11. Changes in the work.
12. Owner's right to terminate the work.
13. Contractor's right to terminate the work.
14. Confirmation and signatures.

Conditions of contract

The conditions of a contract are rules by which the execution of the contract is to be governed. They set-out the responsibilities, rights, and liabilities of the two parties.

Conditions: They are terms expressing matters basic to the contract. A failure to perform the requirements of a condition is a fundamental breach of an essential obligation giving the aggrieved party the right to:

1. End the contract and claim damages, or
2. Continue the contract and claim damages.

Warranties: They deal with matters not of the essence of the contract, being subsidiary to the main purposes for which the parties contracted.

The standard (general) forms of conditions of contract

Standard forms are prepared jointly by professional bodies and organizations representing contractors or by large organizations and public bodies to suit their own circumstances. The intention is that a common approach by the parties to all contracts will be achieved and standard interpretations of risks and responsibilities involved. There are a number of standard forms of conditions of contract used in civil engineering.

Special conditions of contract

Special conditions are new clauses to augment the general conditions of a standard form. Usually they deal with subjects not touched on by the standard form. It is often simpler to introduce a special condition than to amend a standard form condition. After a new clause is written, it must be ensured that no conflict or ambiguity is being introduced. The range of possible subjects for special conditions is large.

Construction claims

A construction claim is a request for payment or time extension to which the contractor considers him/herself entitled. There are three types under which claims are required:

- Extension of time only.
- Additional cost.
- Both extensions of time and additional cost.

The main reasons for construction claims may include:

- Late possession of site or late provision of working drawings.
- Change of contract start or activities schedule.
- Design change and variation.
- Delays in approval and examining work.
- Work acceleration by the client.
- Late delivery of materials supplied by the client.
- Different ground and/or site conditions.
- Unforeseen events and disasters.

PERT/CPM: BACKGROUND and DEVELOPMENT

PERT and CPM- both techniques use similar network models and methods and have the same general purpose. They were developed during the late 1950s. PERT was originally developed by the U S Navy's Special Product Office in cooperation with the consulting firm of Booz, Allen and Hamilton. It was developed as a network flow chart to facilitate the planning and scheduling of the Polaris Fleet Ballistic Missile Project, a massive project with about 250 contractors and about 9000 sub-contractors and its application is credited with

saving two years from the original of five years required to complete the project. Designed to handle risk and uncertainty, PERT is eminently suitable for research and development and programmes, aerospace projects, and other projects involving new technology. In such projects the time required for completing various jobs or activities can be highly variable. Hence the orientation of PERT is 'probabilistic'. CPM, is akin to PERT. It was developed (Independently) in 1956-57 by the Du Pont Company in the US to solve scheduling problems in industrial settings. CPM is primarily concerned with the trade-off between cost and time. It has been applied mostly to projects that employ fairly stable technology and are relatively risk free. Hence its orientation is 'deterministic'.

Methodologically, PERT/CPM were developed from traditional GANTT Charts used for scheduling and reviewing the progress of activities. Developed by Harry Gantt in 1916, these charts give a time line for each activity. They are used for planning, scheduling and then recording progress against these schedules.

Basically there are two basic types of Gantt Charts:

- ✓ Load Charts and
- ✓ Project Planning Charts.

Load Charts:

This type of chart is useful for manufacturing projects during peak or heavy load periods. The format of the **Gantt Load Chart** is very similar to the **Gantt Project Planning Chart**, but, **Load Chart** uses time as well as **departments, machines or employees** that have been scheduled.

Project Planning Chart

It addresses the time of individual work elements giving a time line for each activity of a project. This type of chart is the predecessor of the **PERT**. As it can be seen in the Figure, it is really easy to understand the graph, but in developing it you need to take into consideration certain precedence relationship between the different activities of the project.

DEVELOPMENT OF PROJECT NETWORK

Basic to network analysis is the networks diagram. Both the methods of PERT and CPM graphic representation of a project that it is called "Project Network" or "Project Diagram" or "CPM Diagram", and it is used to portray graphically the interrelationships of the elements of a project and to show the order in which the activities must be performed. A simple network chart for a 'Seminar Planning Project' is shown in **Figure 8.1 as an example.**

Figure 8.1 Project Network

In order to represent a project network, two basic elements are used:



A circle called “**node**”, represents an event. An event describes a checkpoint. It does not symbolize the performance of work, but it represents the point in time in which the event is accomplished.



An arrow, called “**arc**”, represents an activity—a recognizable part of the project involving mental or physical work and requiring time and resources for its completion. The network will try to reflect all the relationships between the activities.

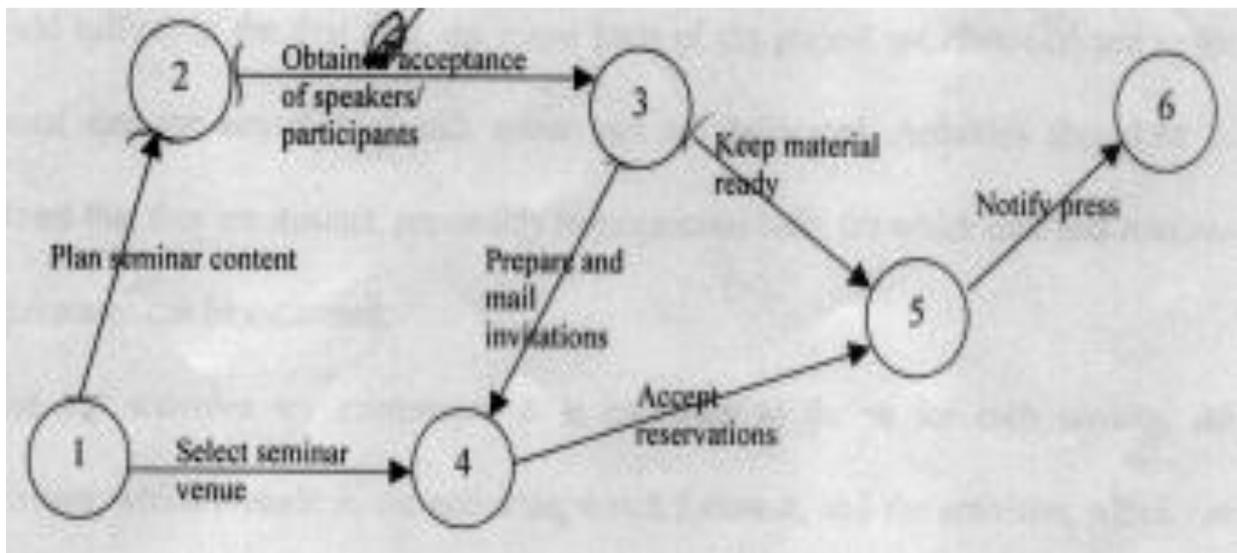
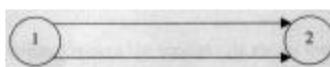


Figure 8.1 Project Network

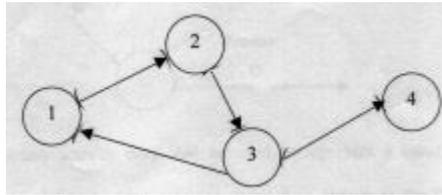
Rules for constructing a project network:

Three simple rules govern the construction of a project network:

- 1) Each activity must be represented by only one directed arc or arrow.
- 2) No two activities can begin and end on the same two nodes circle. A situation like the one shown in the following figure is not permissible.



3) There should be no loops in the network. A situation like the one shown in the figure given below is not permissible.



Another element to represent a project network is a “*dummy activity*”.

TIME ANALYSIS

Once the logic and details of the project network have been established, time estimates must be assigned to each activity. With this representation we can determine the minimum completion time for the project i.e. the critical path and the critical activities and the slack or float of other activities, so that we can find the activity schedule i.e. when each activity should start and when it may be completed. For discussing these aspects of network analysis we will use the simple project.

1. Time Estimation

Assigning time to individual activities is essential in order to analyze a network. Therefore an estimate must next be made how long each activity will take for its completion. This is done by discussing with the people responsible for the completion of the specific activities.

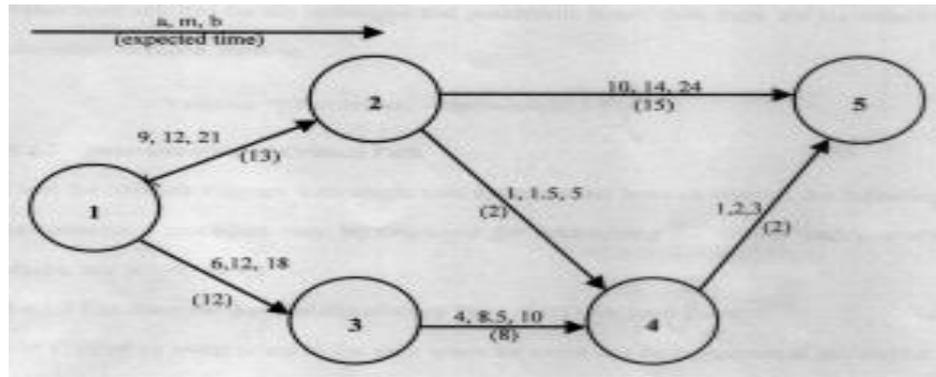
In **CPM analysis** the activity time estimates are deterministic i.e. time of various activities are known so we have only one time for each activity.

A **distinguishing feature of PERT** is its ability to deal with uncertainty in activity completion times. For each activity, the model usually includes three times estimates:

Optimistic time (a) - generally the shortest time in which the activity can be completed under ideal, favorable conditions. It is common practice to specify optimistic times to be three standard deviations from the mean so that there is approximately a 1% chance that the activity will be completed within the optimistic time.

Most likely time (m) - the completion time under the normal conditions, having the highest probability. Note that this time is different from the expected time.

Figure 8.3 Network with Three Time Estimates (in weeks)



Pessimistic time (b) - the longest time under worst, externally unfavorable conditions, which an activity might require. Three standard deviations from the mean is commonly used for the pessimistic time.

PERT assumes a beta probability distribution for the time estimates. For a beta distribution, the expected time for each activity can be approximated using the **following weighted average**:

Expected time = (Optimistic + 4 x Most likely + Pessimistic) / 6

$$te = (a + 4m + b) / 6$$

This expected time might be displayed on the network diagram

Determination of Critical Path

Once the network diagram with single time estimates has been developed, the following computational procedure may be employed for determining the critical path/s, events/lacks, and activity floats.

Calculate the Earliest Occurrence Time (EOT) for each Event.

The EOT of an event refers to the time when the event can be completed at the earliest.

Looking at event 4 we find that since the paths leading to it, viz, (1-2-4) and (1-3-4) take 15 weeks and 20 weeks, respectively, the EOT of event 4 is 20 weeks.

Time (EST) and the Earliest Finishing Time (EFT).

The general formula for EOT is:

$$EOT(i) = \text{Max} [EOT(k) + d(k-i)]$$

Where EOT (i) = earliest occurrence time of event i

EOT (k) = earliest occurrence time of event k (k precedes i and there may be several

k's) d (k-i) = duration of activity (k-i)

The maximization shown is done considering all activities (k-i) leading to event node I has been completed.

The formulae for EST and EFT are:

$$\mathbf{EST (i-j) = EOT (i)}$$

$$\mathbf{EFT (i-j) = EST (i-j) + d(i-j)}$$

Where EST (i-j) = earliest starting time for activity (i-j)

EOT (i) = earliest occurrence time of event (i)

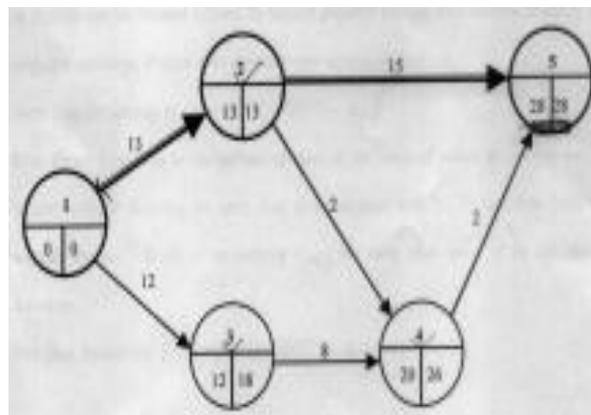
EFT (i-j) = earliest finishing time for activity (i-j)

d(i-j) = duration of activity (i-j)

Calculate the Latest Occurrence Time (LOT) for each Event.

The LOT for an event represents the latest allowable time by which the event can occur, given the time that is allowed for the completion of the project (occurrence of end event).

Figure 8.4 Networks with EOT and LOT of Events



The general formula for LOT is :

$$\mathbf{LOT(i) = \text{Min} [LOT(j) - d(i-j)]}$$

where LOT(i) = latest occurrence time of event i

LOT(j) = latest occurrence time of event j (j follows i & there may be several j's)

d(i-j) = duration of activity (i-j).

Latest Starting Time (LST) for various activities

The formulae for LFT and LST are :

$$\mathbf{LFT (i-j) = LOT (j)}$$

$$\mathbf{LST (i-j) = LFT (i-j) - d (i-j)}$$

where LFT (i-j) = latest finishing time for activity (i-j)

LOT (j) = latest occurrence time of event (j)

LST (i-j) = latest starting time for activity (i-j)

d (i-j) = duration of activity (i-j)

Calculate the Activity Floats

Activity float analysis provides the information on the margin or allowance available for the commencement and completion of various activities. Activities with zero slack value represent activities on the critical path. Three types of activities floats are identified:

- ✓ Total float
- ✓ Free float
- ✓ Independent float

Total Float: Total float usually referred to as simply float or slack, is the amount of time an activity can be delayed beyond its earliest possible starting time without delaying the project completion, if other activities take their estimated duration.

Total float for activity (i-j) = $LOT(i) - EOT(i) - d(i-j)$

Free Float: Free float is the amount of time on the basis of which an activity can be delayed without delaying the early start of a successor activity. To find free float, we subtract the early finish of an activity from the early start times of its succeeding activities.

Free float for activity (i-j) = $EOT(i) - EOT(i) - d(i-j)$

Independent Float: This indicates the time span by which the activity (i-j) can be expanded or shifted if, for the event (i) the LOT and for the event (j) the EOT shall be maintained. A shifting of activity in this area has no influence on the further progress of the project. Independent float is taken as zero or negative.

Independent float for activity (i-j) = $EOT(i) - LOT(i) - d(i-j)$.

Scheduling

Scheduling the project is the act of producing a time-table of work for the project showing when each activity is to begin and finish. The critical activities schedule themselves, but it is necessary to decide when all the non-critical activities are to take place. In other words there is no flexibility in scheduling the critical activities, but floats available with non-critical activities provide flexibility in scheduling them. The choice available in this respect is bounded by **two schedules**:

- ❖ Early Start Schedule and
- ❖ Late Start Schedule

Early Start Schedule

The early start schedule refers to the schedule in which all activities start as possible.

Late Start Schedule

The late start schedule refers to the schedule arrived at when all activities started as late as possible.

PERT Analysis Variability in Time Estimates:

So far, we have discussed the procedure for determining the project completion time, the earliest and latest times for the start and completion of activities and the occurrence of events.

In CPM analysis, activity duration are assumed to be known whereas, in

PERT, the activity duration is given by probability distributions.

PERT calculates the expected duration of an activity as a weighted average of the three time estimates-optimistic (a), most likely (m) and pessimistic (b) The PERT network provides a measure of the probability of completing the project by the scheduled date.

RESOURCE ANALYSIS AND ALLOCATION

In our discussion on the scheduling of activities in determining the scheduling timings, we have considered only the technological restriction, which lay that an activity in a project cannot start unless all its predecessors have been scheduled and ignored the question of resource required the performing various activities. Now we will consider the question of resource requirement for different activities, the availability of resources and their allocation.

8.5.1 Scheduling in view of Resource Constraints

In real life situations, there may be restrictions on the availability of resource.

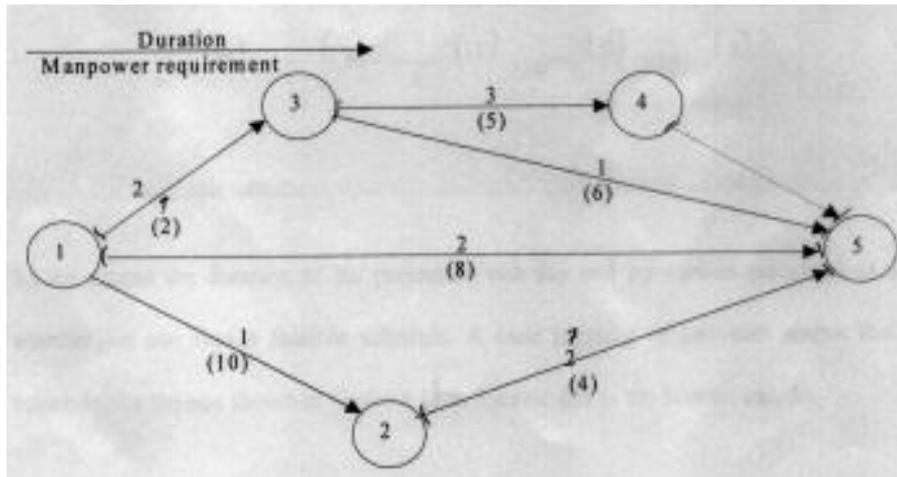
For example, manpower supply may be limited or funds made available period wise may be rigidly budgeted. When restrictions exist various schedules may have to be considered to find out which one is most appropriate in the light of these restrictions. We shall discuss two examples to indicate the broad approach to scheduling in the face of resource constraints.

Example 1: Scheduling to Match Availability of Manpower

Let us consider a small project for which the network diagram is shown in Figure 8.9.

In this project network, activity duration is shown above the activity arrow and manpower requirement is shown below the activity arrow.

Network with Manpower Requirement of Activities



Early Start Schedule and Manpower Requirement

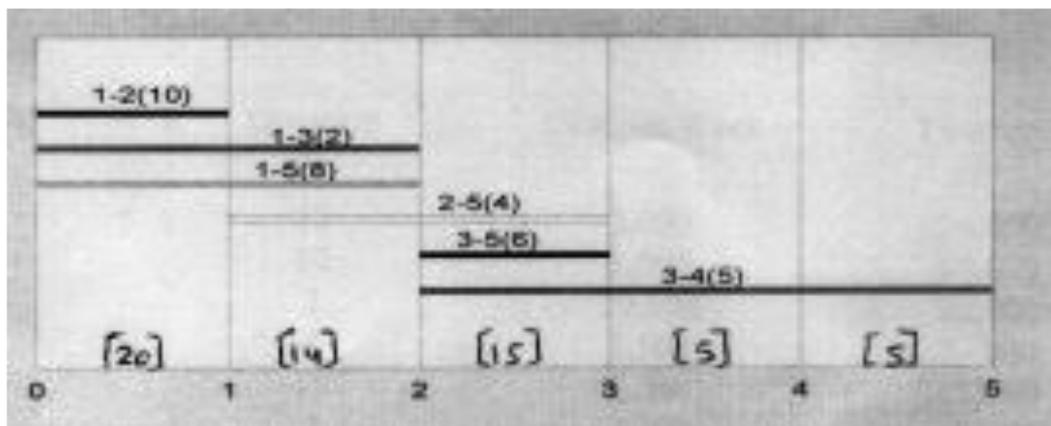
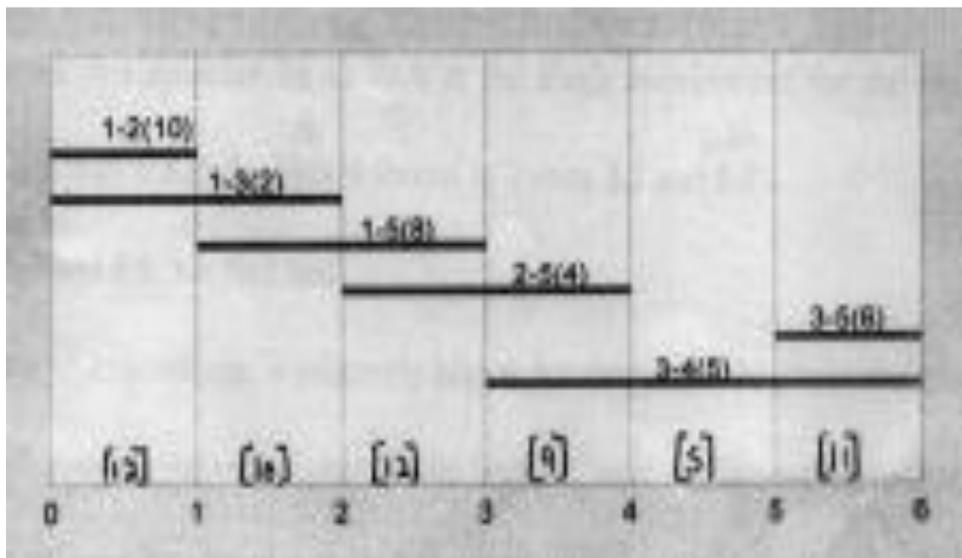


Figure 8.11 Schedules to Match Manpower Supply



Project Crashing and Time-Cost Trade-offs: CPM Analysis

The project manager is confronted with having to reduce the scheduled completion time of a project to meet a deadline. Project duration can often be reduced by assigning more labor

to project activities, in the form of over time, and by assigning more resources, such as material, equipment, etc. However, the additional labor and resources increase the project cost. So, the decision to reduce the project duration must be based on analysis of the trade-off between time and cost.

Project crashing 'is a method for shortening the project duration by reducing the time of one or more of the critical project activities to less than its normal activity time. Crashing may become necessary because of many reasons, such as

- ❖ To reduce the scheduled completion time to reap the results of the project sooner.
- ❖ As project continuous over time, the team consumes indirect costs.
- ❖ There may be direct financial penalties for not completing a project on time.

The Time-Cost trade-off analysis comprises the following steps.

Step 1

The first step is to identify and crash the critical activity that has the minimum incremental cost of crashing. In the event of multiple critical paths, an activity from each such path is chosen. Of the various combinations available, the one with the least cost is selected. In particular, it may be economical to consider joint critical activities that are common to two or more critical paths.

In each case, the crashing is done for one time unit-by a day if the activities times are given in days.

Step 2

In the second step, the network is revised by adjusting the time and the cost of the crashed activity. The critical path (s) is identified again, and we revert to the step1. This process is continued till no more crashing of the project is possible.

Proper review – Project audit

An audit is a monitoring system that uses quantitative and qualitative assessments tools to measure performance outcomes. Risk management is built into the audit process in that it enables project managers to identify and evaluate concerns, problems and challenges that may have surfaced during the course of the project. When inefficiencies are identified, root cause analysis can be performed, and corrective or preventive recommendations can be included in audit reports for future reference.

Change Management

The project management function is used to drive enterprise change. A company's goals and objectives might be pursued through a series of strategic projects designed to facilitate

systemic changes. Audits of strategic projects assess whether they have succeeded in meeting specific and measurable goals and objectives. For example, an audit evaluation might reveal that a goal related to sales projections was not met and the deficiency was due to insufficient training of project team members in skills required to perform core project duties. This information might be used to drive change in employee development initiatives.

Time Management

Audits are used to evaluate project schedules and timetables established for a project, as well as its tasks and activities. This generally includes a comparison of timetable and schedule estimates against actual performance. Milestone reports may reveal overestimations or underestimations on specific tasks and activities during the course of the project. External or internal factors might be identified as the cause of the delay. For example, supplier delays are one type of external factor that can impact project schedules.

Resource Guidance

Project audits might identify excesses or shortfalls in resource allocations associated with a project. For example, project audits may reveal whether project performance deficiencies were tied to insufficient resource allocations. It might also reveal overbudgeting in allocating resources in certain areas for a project -- assessments that are important when developing future project budgets.

Vendor Assessments

Project management includes the use of third-party suppliers and vendors for certain products or services. While supplier performance is generally audited as an independent assessment, it can also be performed as part of a project management audit. The results might impact future contracting and procurement decisions.

Regulatory Compliance

A project audit might be required to satisfy regulatory requirements. For example, the Sarbanes-Oxley Act of 2002, or SOX, was the U.S. federal regulator's response to a number of major accounting scandals. It aims, in part, to increase the public trust relating to general reporting and accounting practices. Generally, SOX applies to U.S. publicly traded companies and public accounting firms, and touches on matters such as auditor independence and enhanced financial disclosure. Companies that must comply with such regulations might gain a significant amount of data through the auditing process. Consult with legal counsel to determine your company's governmental reporting requirements.

Project Audit

- A formal review of any aspect of a project.
- An audit is a **systematic, independent, documented assessment** using standards and set criteria.

12-2

Purpose & Goals

- Efficiency in meeting both the budget and the schedule
- Customer impact/satisfaction
- Business/direct success
- Future potential

12-3

The Project Audit- Approach

- The main purpose of an audit is to help achieve the goals of the project
- All facets of the project are studied
- The strengths and weaknesses are identified
- Recommendations are prepared to help current and future projects

MEANING PROJECT AUDITING

Project auditing

- **Project auditing** can be defined as the process of detailed inspection of the management of a project, its **methodology**, its **techniques**, its **procedures**, its documents, its properties, its **budgets**, its **expenses** and its level of completion.
- Project auditing can help you assess the current state of a project, and tells you if your project management processes are being followed.

Benefit of Project Audits

Project audits can help identify when a project is about to go off-course. In addition, a project audit can provide the following benefits:

- Improve project performance.
- Increase customer and stakeholder satisfaction.
- Save costs.
- Control scope and avoid scope creep.
- Provide early problem diagnostics.
- Clarify performance/cost/schedule relationships.

- Identify future opportunities for improvement.
- Evaluate performance of the project team.
- Inform client of project status/prospects.
- Reconfirm feasibility of/commitment to project.

The benefits of project audits become especially evident in large organizations running large projects. Multi-million dollar projects can easily derail due to poor management techniques causing the investors millions of dollars. In this scenario, the cost of not performing periodic project audits can be much higher than the cost of performing it. Multiple audits, perhaps one per phase, are recommended for large projects.

Preparing for the Project Audit

The aim is to ensure that the audit team receives full and uninterrupted access to all required information, people and facilities during their audit. This includes, but is not limited to, emails, and documents developed by the project team. Having everything at your fingertips makes it easy to answer questions when they arise.

When auditing the project, interview the PM as a starting point and review the project library to ensure you know where to find the information you are looking for.

When you conduct an audit, determine whether the PM has addressed the key items in each phase of the project lifecycle. This includes, but is not limited to:

1. Initiation Phase

- Identify the main objective of the project.
- Write the project charter.
- Get sign-off on the project charter.

After you complete reviewing the Initiation Phase, review the actual project plan or Work Breakdown Structure (WBS). You should focus on how well defined the WBS is and how well tasks and dependencies have been scheduled. A Visio or flow diagram is also a good alternative. Ask the PM what software has been used to create the required documents. Make sure the planning is sound. Failing to plan is planning to fail. Again, the key items that must be reviewed after initiation are:

2. Planning Phase

- Create a Project Management Plan.
- Establish project deliverables.
- Write a scope statement.

- Determine a project budget.
- Distinguish project activities.
- Work out a schedule.
- Determine special skills needed to complete planned tasks.

Once the planning phase has been reviewed, the execution phase review takes place. Many projects suffer from scope creep during this phase. Has the project team stuck to their scope? Poor communication, misunderstandings and lack of information may have caused issues. Some of the tasks to review are listed below.

3. Execution Phase

- Put together the project team.
- Administer and guide the project team.
- Conduct status review meetings.
- Communicate project information.
- Implement quality assurance measures.

Make sure the control measures are sound and the correction procedures are well described.

4. Controlling Phase

- Measure performance against the plan.
- Evaluate the corrective measures.
- Manage change requests.

Once most of the work of the project is done, we approach to closing phase. Has the project been documented and closed properly?

5. Closing Phase

- Manage acceptance of project deliverables.
- Document lessons learned during the project.
- Archive project records.
- Formalize the closing of the project.
- Release project resources.
- Write final Status Report.

Moving Forward

Strong project management practices are critical to the successful execution of any kind of project, and consequently, to the overall competitiveness of any organization. Periodic audits of the project management process ensure that systemic flaws are identified and fixed and the

process is improved. Every aspect of the project management life cycle can introduce problems if not done properly, therefore must be reviewed thoroughly.