Project Management

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SEMESTER – I

PROJECT MANAGEMENT Code: 18KP1CO01

UNIT-I : INTRODUCTION

Project Management – Objectives - Classification and Benefits – Project Delays - Project Life Cycle.

UNIT-II : CAPITAL BUDGETING

Phases – Facts of Project Analysis – Portfolio Strategy scouting for Projects Ideas.

UNIT-III: MARKET AND DEMAND ANALYSIS

Steps – Uncertainties in Demand Forecasting – Marketing Plan - Choice of Technology -Project Charts, Layouts and Implementation.

UNIT-IV : SELECTION AND FINANCING

Project Cash Flow Elements – Principles – Biases in Cash Flow Estimation – Project Risk Analysis – Sources and Measures – Raising Capital in International Markets – Project Appraisal.

UNIT-V : PROJECT IMPLEMENTATION AND ITS TECHNIQUES

Project Organization Forms – Human Aspects of Project Management –Pre-requisites for successful Project Implementation – Development of Project Network.

PROJECTS

INTRODUCTION TO PROJECTS

Projects require performance of unique and non repetitive activities that must be executed in a specific order. clearly defined objectives ,schedules and budgets contribute to the success of project. construction of roads ,buildings, dams ,computerisation of a business.

Project require resources such as money, material, manpower, and time. Selection of the right project and executing it efficiently contributes to the success of the organisation.

Definition of project

According to Vasant Desai, A project is a scientifically evolved work plan devised to achieve a specific objective with in a specified period of time.

PROJECT MANAGEMENT

Project management is the process of planning, organising, monitoring, and controlling projects to achieve the desired outcomes. It involves application of knowledge ,skills, tools and techniques to project activities to achieve project objectives . It comprises of principles ,processes, tools and techniques that aid managers to effectively plan and control projects. It enables managers to plan and implement projects conforming to time ,cost, quality standards and constraints.

According to Richard P. Olsen ,

project management is “the application of a collection of tools and techniques to direct the use of diverse resources toward the accomplishment of a unique ,complex, one time task within time , cost ,and quality constraints.”

The project management of institute of U.S.A defines a project as an ONE SHOT time limited member directed major undertaking requiring the commitment of varied skills and resources.

Objective of project management

1. Setting objectives

The objectives in project mgt must be specific ,instead of being vague. Such specific objective will enhance the chance of achieving the desired outcomes of the project.

2.Performance and quality

The end result of a project must fit the purpose for which it were intended. At one time quality was seen as the responsibility of the quality control department. In more recent years the concept of total quality mgt.

3.Budget

The project must be completed without exceeding the authorized expending.Fiancial sources are not always inexhaustible and project might be abandoned altogether if the out before completion. If it happens the money and effort invested in the project would be forfeited and written off.

4.Time to completion

Actual progress has to match the planed progress. All the significant stages of the project must take place on later than their specified dates and completed on or before their respective latest completion times so that the entire project is completed on or before the planned finish date

BENEFITS OF PROJECT MANAGEMENT

1.Successful Achievement of project objectives

Project are planned funded and implemented for achieving pre determined objectives. Since they are undertaken in a changing environment ,achieving objectives is a difficult task.

2.Complexity of project

Projects require completion of multiple activities with each activity comprising of several tasks. Resources in terms of money ,manpower, equipment ,time etc,have to be allocated and spent. Planning and scheduling of activities and efficient allocation and usage of resources.

3.Risk management

Risk is inherent at all stages in the project right from initiation till its completion. Risk need to be properly estimated so that suitable mitigation plans can be prepared. They can be minimised through efficient project management.

4.Overcome competition

Projects are undertaken in a competitive environment. Products and services of a project should be of good quality and reasonably priced. They should be able to overcome competition in the market place.

5.Manage constraints

The basic project constraints are time, cost and quality. The other important constraints are demand, availability of raw materials, labour and other inputs.

6.Avoid Time Over runs and Cost Over runs

Time overrun occurs if the actual time taken for completing a project is more than the budgeted time .If the actual cost of a project is higher than the budgeted costs, it results in cost over run.

7.Adapt to Changing Environment

Projects are planned and executed in a dynamic environment. Assumption made during planning may prove faulty later due to environment changes. Project management helps to continuously monitor the environment, identify changes and adapt to it.

8.Project Evaluation and Control

Project control is essential to ensure that the project proceeds as per pre determined plans. It points out deviation in order to take corrective action.

Steps in project management

- Generation and screening of project ideas.
- Identifying project opportunities.
- Project design ,formulation and planning.
- Defining project scope and objectives.
- Determining the project budget and time frame of completion.
- Identifying activities to be performed and combining activities into work packages.
- Designing a suitable organisation structure to support project activities.
- Setting up control systems.
- Monitoring and evaluation of project performance .
- Project closure and project audit.

CLASSIFICATION OF PROJECTS

1.Based on location

a. **National projects**: Is one which is carried out with in one's own country

b**. International projects**: Refer to project that are under taken by on organisation or entrepreneur in another country or country.

2.Based on Type of activities

a. **Industrial activities**: It involves mechanical process relating to manufacturing, processing, fabrication or similar industrial activities.

b**. Service activities**: It involves providing services to customers.

3.Based on motive

a. **Commercial projects**: A business motive by firms to earn profits are commercial project.

b. **Social welfare**: A project under taken to promote the welfare of the society and uplift the community.

4.Based on type of technology

a**. Existing technology**: The technology projects are under taken based on existing knowledge and skills. They are less risky in nature and are comparatively easier to under take.

b .**New technology**: The exits technology and those requiring new technology. Their are certain hi tech project which are based on research innovation and new knowledge.

5.Based on size

a. **Small scale projects**: Small project require lesser investment and their plant capacity is less. They are under taken by new or small scale enterprises.

b. **Medium scale projects**: It involve higher investment then small scale projects and have moderate plant capacity. They are under taken by medium level firms.

C. **Large scale projects**: Are under taken by well established companies and they involve huge investment of resources.

6. Based on Ownership

a. **Public sector projects**: Project undertaken by the state government , central government or by both of them are known as public sector project.

b**. Private sector projects**: Project undertaken by the entrepreneurs and firms in the private sector are private sector projects.

C**. Joint sector projects**: They are undertaken by the government and the private sector.

7.Based on Factor intensity

a. **Capital intensity:** Project requires large investment in plant and machinery and production is by machines it is a capital intensive project.

b. **Labour intensity**: If a projects requires lesser investment in plant and equipment and depends on human labour it is a labour intensity projects.

8.Based on Investment Decisions

a. Independent projects:

b. Mutually exclusive projects

9.Based on Output

i. **Quantifiable projects**: Projects whose benefits can be measured are termed as quantifiable project. Most of the commercial projects undertaken by the private sector.

ii. **Non- quantifiable projects**: project are those whose benefit cannot be measured precisely social welfare project undertaken for the benefit of the community such as construction of public schools, roads, dams, are non-quantifiable projects.

10.Based on urgency of Execution

i. **Normal Project**: If the project is allowed adequate time for implementation it is a normal project.

ii. **crash projects**: Their are project with compressed time duration. They have to be completed much earlier then the normal time. The firm has to be spend additional resources to quickly complete the project.

TYPES OF PROJECT DELAYS

1. Internal Delays

(**I)Materials and subassemblies**: The project will require different types of materials and subassemblies which will be sourced from different vendors who are located in different places. The fact that the materials are sourced from different vendors, each vendor will be supplying the materials to different project of its customer.

(II) **Equipment:** In many projects several equipment costing lakhs of rupees installed. such equipment assembled/ produced by some supplier firms.

(III)**Manpower**: Almost all the project manpower – intensive projects. The manpower may be classified into technical and non technical grades.

(**IV)Money:** It is a vital aspect in any project. The project cycle time may be of several months or few year to source all other resources.

2. External Delays

(I)Political stability of the state

(II)Culture of the people

(III)Availability of water and electricity

(IV)Analyzing the tax benefits

PROJECT LIFECYCLE

Meaning:

A project is a unique work plan to achieve a particular outcomes within specified time and costs. Project life cycle is the logical sequence of activities that have to be performed to achieve the projects goals or objectives. It is the series of phase that a project passes through from its start till its completion.

Definition

Patel and Morris define project lifecycle as " the sequence of phase through which the project will evolve. It is absolutely fundamental to the management of project ,it will significantly affect how the project is structured.

PROJECT MANAGEMENT LIFE CYCLE

I. INITIATION OR IDENTIFICATION PHASE

II. The need for the project is identified through study of the environment or inputs from stakeholders .Demand supply gaps ,problems faced by customers. Unfulfilled needs ,emerging needs and profitable opportunities give rise to project ideas .

III. The feasibility of the project ideas are evaluated to identify those that can be implemented. The organisation has to decide whether it is prepared to undertake the risk of funding the project. In case of a positive decision the firm decides to invest resources.

IV. Well conceived projects contribute to successful implementation and provide benefits to the organisation .Poorly conceived projects result in failure and wastage of resources.

II. PLANNING OR FORMULATION PHASE

The next phase of the initiation phase is the planning or formulation phase .In this stage the project idea is developed in a detailed manner. The project scope is finalised .Based on this the work that needs to be done and the activities to be performed are determined.

A project plan is prepared containing the activities scheduling of activities, resources required , time frame , role and responsibilities and risks involved.

The Work Break Down Structure (WBS) is prepared which divides the entire project into specific actives .The time required for each activity mentioned in the work break down structure is estimated.

The Statement of work (SOW) which list the work to be done and the expected outcome of the project is finalised.

The Organisation Breakdown Structure (OBS) is prepared .It indicates the members of the organisation who would be involved in the project.

III. EXECUTION or IMPLEMENTATION PHASE

The initiation and planning stage the project moves to the execution stages. The execution of planned activities take place at this stage . Contracts are awarded to contractors and sub contractors orders for purchases of raw materials and components are placed with vendors.

Step to be taken to procure raw materials ,components ,equipment and manpower required for completion of project activities. The civil works related to factory buildings and other facilities are completed.

Iv CLOSEOUT OR COMPLETION PHASE

The last stage of a project life cycle is project termination or project close out. A project is terminated if it has achieved its objectives and the project has been accepted by the client. Project can also be terminated if there is no need or purpose in their continuation. The project team assesses the project status reviews the extent of achievement of goals and evaluates performance.

In the termination or close out stage the project is handed over to the client and supplier contracts are terminated. Stakeholders are informed of the closure of the project.

Questions

- What is project?
- Define project management.
- What do you understand by project life cycle?
- Write the objectives of project management.
- Bring out the benefits of project management.
- Describe the various types of project delays.
- Discuss the various classification of project management.
- Explain the various steps to be followed in the project management.
- Enumerate the different phases of project life cycle

UNIT – 2

Capital Budgeting

Capital budgeting is a method of analyzing and comparing substantial future investments and expenditures to determine which ones are most worthwhile.

Capital budgeting is the process of planning investment expenditure with the objective of maximizing long term profitability of the organization. It involves planning, generating, evaluating and following up of investment alternatives.

Capital budgeting decisions may relate to purchase of land, buildings, machinery, investment in research and development etc.

Definition of capital budgeting

Capital budgeting is the process to identify, analyze and select investment projects whose returns are expected to extend beyond one year.

James. C. Van Horne and J. M. Wachowiz.

Capital budgeting involves a current investment in which the benefits are expected to beyond one year in the future.

James. C. Van Horne

Capital expenditure decisions

Factors considered as make the capital expenditure decisions

- Expected Return on Investment should be equal and preferably higher than the cost of capital.
- Recurring costs such as insurance, depreciation, repairs and maintenance etc. should be taken into account
- Risk factors should be considered
- The investment decision should not affect the liquidity position of the organization.
- Before investment of funds, the investment proposal should be evaluated using appropriate appraisal techniques.
- Investment should result in higher earnings to the firm.

Principles of capital expenditure proposals

- **Principle of cash flow :**

  Cash Flows are the operating income generated by a company during a specific period. Cash inflows refers to EAT before depreciation. It is make to easy purchase and sales only on cash basis.
- **Incremental principle :**

  It suggest that sunk costs should be ignored while the opportunity costs should be considered. Only the incremental income and expenditure are considered.
- **Long term funds principle :**

  Capital expenditure should be undertaken only from the long term funds of the enterprise.
- **Interest exclusion principle:**

  while calculating cash flows the interest cost of long tem funds is excluded. It has already considered in the calculation of over all cost of capital
- **Post tax principle:**

  Cash flows are calculated after deduction of taxes

Objectives of capital expenditures decisions

- Use of suitable evaluation techniques to appraise the worth of projects and rank them
- Providing required fund to meet the investment
- Selection and investment projects which maximize the long term profitability of the firm
- Optimal allocation of the firm's resources among investment projects
- Ensuring close monitoring and control over capital investment projects
- Facilitate long range financial planning
- To enable ranking of capital investment projects

Features of capital expenditure decisions

- It involve purchase of new assets or increasing the earning capacity of existing assets.
- Current funds are exchanged for future benefits.
- Funds are invested for the long term.
- Benefits from capital investment proposals extend to the future.
- It involves forecasting of several years of profit or cash flows in advance.
- It involves high degree of risk.
- In some CED might be a long time gap between the investment and the generation of returns.

Phases of Capital Budgeting

The phases of the capital budgeting process include the following:

- **Idea generation :**

  Study of economic, social and demographic trends, technological development, market environment, identifying the customer need, analyzing the import export data, seeking ideas from vendors, suppliers and employees.

- **Evaluation :**

  It is based on the economic, technical, marketing, financial and ecological feasibility of the options and the relevant cash flows.

- **Selection :**

  Among the project that are feasible , the most suitable project have to be selected.

- **Financing :**

  Firms can decide on the type of financing either rely on ownership funds or debt

- **Execution and Review :**

  Proper planning of the project right from the conception stage is important. Technique such as network analysis and responsibility accounting can be used to avoid delays and wastage of resources

Types of investment

- Conventional investments : it involve Initial investment
- Non conventional investments : it involves not only initial stage but also at different stages over the life of the project

Types of capital expenditure

- Mutually exclusive investment proposals
- Independent investment proposals
- Contingent investment proposals
- Replacement proposals

Kinds of capital expenditure

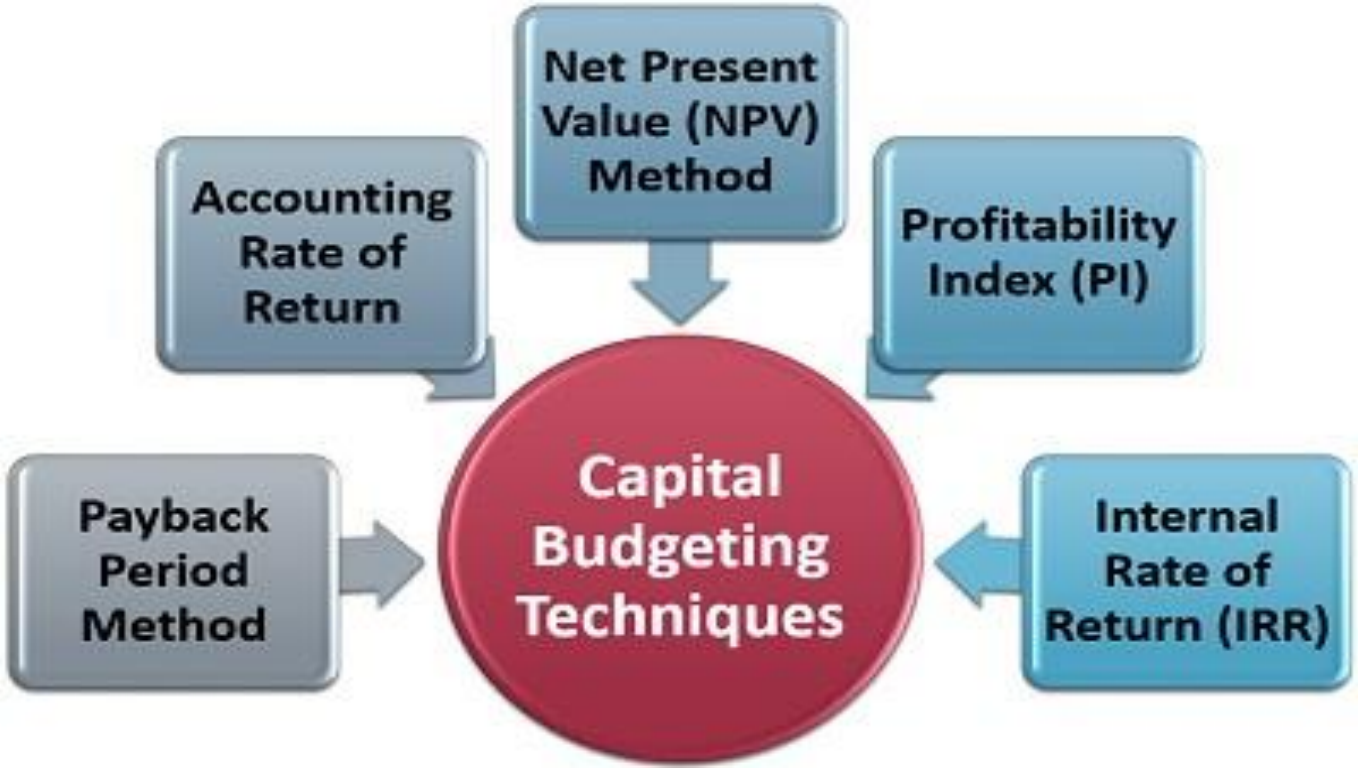
- Expansion
- Diversification
- Modernisation
- Repalcement decision
- Research and development
- Strategic investment decisions

Importance of capital expenditure decisions

- It affects future cost structure
- Influences the competitive position of the firm.
- Wealth maximization or destruction
- Cost reduction
- Facilitates long term planning

Techniques of capital budgeting

Capital budgeting is a complicated and tedious process. It involves a lot of financial expertise and calculations. Following are the various computations required to determine the capital budgeting of a new project:



Payback Period Method:

- The payback period method is the simplest of all. It defines the period in which the company can recover its investment value.
- The shorter is the payback period of the project, the more suitable it is for the company.

Accounting Rate of Return:

- The accounting rate of return depicts the future profitability of a project with the help of accounting information mentioned in financial statements.
- The higher is the ARR of the investment proposal, the more preferable it is for the company.

Net Present Value (NPV) Method:

- Net present value is the discounted cash flow method. It functions on the principle that the cash inflow from the project will be acquired in a future period when the value of money will change. Hence, the future cash flow needs to be discounted at present value to compare the estimate performance with the actual one.

Profitability Index (PI):

- Profitability index is the ratio which relates the present value of earnings with the investment value.
- To denote the Profitability Index in percentage, Profitability Ratio of a new project is calculated

Internal Rate of Return (IRR):

- The internal rate of return determines the rate at which the investment amount is recovered by the cash inflows. The net present value of the project is zero in this method. Also, the discounted cash inflow and outflow are the same.
- **Analysis:** If the IRR≥Co, the project is accepted; but if IRR<Co, the project is rejected.

Facts of project analysis

The important facts of project analysis are as follows

- Market analysis
- Technical analysis
- Financial analysis
- Economic analysis
- Ecological analysis

Market analysis

What would be the collective demand of the planned product / service in future?

What would be the market share of the project under evaluation?

- To answer the above questions, the market analyst needs a broad variety of information and suitable forecasting methods. The kinds of data required are:
  - Consumption trends in the past and the present expenditure level
  - Past and present supply situation
  - Production potential and constraints
  - Imports and exports
  - Formation of competition
  - Cost structure
  - Flexibility of demand
  - Consumer manners and conduct, intentions, motivations, attitudes, preference, and needs.
  - Allocation channels and marketing guidelines in use
  - Administrative, technical, and legal constrictions

Technical analysis

Examination of the technical and engineering characteristics of a project needs to be done repeatedly when a project is made. Technical analysis seek out to decide whether the fundamentals for the successful commissioning of the project has been considered and reasonably good options have been made with respect to location, size, process etc.

The important questions raised in technical analysis are the following

- Whether preliminary tests and studies have been done?
- Whether the availability of raw materials, power, and other inputs has been recognized?
- Whether the production method opted is suitable?
- Whether the equipment and machines chosen are suitable?
- Whether the supplementary equipments and auxiliary engineering works have been given for?
- Whether provision has been made for handling of effluents?
- Whether the planned layout of the site, building, and plant is sound?
- Whether work schedules have been reasonably drawn up?
- Whether the technology planned to be employed is suitable from the social plant of view?

Financial analysis

Financial analysis tries to ascertain whether the planned project will be financially feasible in the sense of being able to meet the saddle of servicing debt and whether the planned project will convince the return expectations of those who provide the capital. The feature that have to be looked into while conditioning financial appraisal are the following:

- Investment pay out and cost of project
- Means of financing
- Cost of capital
- Projected profitability
- Break-even point
- Cash flow of the project
- Investment worth while ness judged in terms of a variety of standards of merit
- Projected financial position
- Level of risk

Economic analysis

- Economic analysis is also referred to as social cost benefit analysis and is concerned with evaluating a project from the larger social point of view. In such a judgment the focus is on the social costs and benefits of a project which may usually be different from its economic costs and benefits. The questions sought to be answered in social benefit analysis are the following
  - What are the direct economic benefits and costs of the project measured in terms of efficiency prices and not in terms of market prices?
  - What would be the impact of the project on the allocation of income in the society?
  - What would be the outcome of the project on the level of savings and investment in the society?
  - What would be the involvement of the project towards the achievement of certain merit wants like self-sufficiency, employment, and social order?

Ecological analysis

In recent years, environmental concerns have assumed a great deal of importance – and rightly so. Ecological analysis should be done particularly for major projects which have significant ecological inference like plants and irrigation schemes, and environmental – polluting industries like bulk drugs, chemicals and leather processing. The key questions raised in ecological analysis are the following

- What is the likely harm caused by the project to the environment?
- What is the cost of reinstatement measures needed to make sure that the damage to the environment is contained with in acceptable limits?

Project ideas

- Project ideas are generated by scanning the environment and identifying the possible investment opportunities. The idea should :
- Meet the requirements of the organization
- Be possible to implement considering the resource constraints and
- Be viable

Obtaining or receiving project ideas from different sources is termed as generation of project ideas. This requires imagination, creativity, an open mind and foresight to envision future possibilities.

Sources of project ideas

Project ideas can emerge from any person, place or time. They can emerged from within the organization or from external sources. Some times project can emerge as a solution to problems being faced with existing products or services.

- Existing and potential customers and their needs.
- Products and services of competitors or other companies.
- Ideas from distribution channel members having good knowledge of market conditions and customer requirements.
- Technological development
- Research and development undertaken by company
- Government policies, regulations and changes in them or thrust areas of the government.
- Employees are an important source of project ideas
- Trade fairs and exhibitions.
- Market research reports of research agencies.
- Ideas and suggestions from development financial institutions.
- Usage of locality available resources to meet existing and potential market demand.
- Project profiles and surveys of industry and demand potential.
- Study of the input and output structure of industries.
- Study of materials being imported and exported.
- Study of economic, demographic and social trends

Screening of project ideas

- It is the initial evaluation of project ideas to select the best among them for further analysis and then investment.
- Project ideas are assessed predetermined criteria and those meeting them are selected.
- To screen the project ideas, a project screening matrix is prepared. The following criteria used for assessing projects are:

1) Strategic fit
2) Investment
3) Resource availability
4) Market size
5) Market attractiveness
6) Regulations
7) Government policy
8) Operational issues
9) Feasibility of the project
10) Profitability and rate of return
11) Operational issues
12) Environmental impact

Questions

- Define project.
- What is capital budgeting?
- Write the meaning of project idea.
- What are the types of investment?
- Bring out the main objectives of capital expenditure decisions.
- Write the features of capital expenditure decisions.
- Write the importance of capital expenditure decisions.
- What are the various types of capital expenditure?
- Explain the principles of capital expenditure proposals.
- Briefly explain the various factors of the capital expenditure decisions.
- Discuss the various kinds of capital expenditure.
- Enumerate the different phases of capital budgeting.
- Discuss the different techniques of capital budgeting.
- Describe the various facts of project analysis.
- Enumerate the different sources of project ideas in project management.
- How is screen the scout of project ideas in project management.

UNIT - 3

Market and Demand Analysis

Market analysis aims at assessing the potential sales revenue from a proposed project. It is also known as market-feasibility study. Approach for conducting a market-feasibility study would vary depending on the type of proposed product. For instance:

- A market-feasibility check has to be based on indicators of buyer behaviour (in terms of their response to 'new' or 'dream' products) for estimating potential demand.
- If a proposed product is new in an economy, but is successfully marketed in some other economy, its market feasibility is assessed through a meaningful comparison of some broad economic and cultural indicators in the two economies.
- Per-capita income, income disparity level, pattern-indicating shift in choice for consumption, literacy level and such other economic factors can indicate the potential of demand for a particular proposed product.
- If the proposed project is for addition in the capacity existing in the economy, the task of market-feasibility study will be historical data analysis and study of factors, which influence consumption trends.

General Economic Indicators

The demand potential of any product is likely to have some kind of association with some economic indicators. Changes in demand and changes in a particular or some economic indicators may take place simultaneously or with lead or lag. Some of the important economic indicators include gross domestic product, per capita income, income disparity, rate of urbanization, population growth rate, literacy rate, government spending, money supply and others.

Situational Analysis

Situational analysis is, especially, important if the project proposal is for enhancing the capacity. It is important where the project proposal involves production and sale of new products and services—new for the company but not new in the market.

Check Your Progress: What is the purpose of project initiation?

Which questions does the project initiation document answer?

The situational analysis framework is primarily designed for preparing marketing plan. It can also be used as a part of market analysis in project planning. Mere existence of a market is not enough for a company or a project to succeed. The company should also be able to sell the product. Situational analysis studies some internal factors in the light of some external factors with a view to judge whether the company can sell the product in the market.

The factors studied in situational analysis are called five Cs. These factors and a sample of items studied in each of them are as follows:

Company:

The assessment of a company can be done with an opinion-based evaluation of the following factors:

- Number of products
- Market perception of the company
- Company's strategic plans and goals
- Company's culture and values
- Company's current technology and technology gap, if any
- Overall financial position

No one else would know the company better than the internal management. However, a frank review is required. If one is in a mode of denial and attempts to justify everything, he is more likely to ignore the mistakes.

Collaborators (or partners):

A company's collaborators include:

- Major customers
- Distributors
- Major suppliers
- Joint ventures, management agreements and other alliances, if any

A lot of this information can be obtained without much difficulty from published or paid sources.

Customers:

This is about the potential markets for the product that will be produced as a part of the project.

- Size of the market along with segments
- Expected rate of growth of the market
- Current demand–supply gap
- Potential customers' expected behaviour and factors affecting their choice of product
- The decision-maker and the decision unit
- The current market of the product
- Method of product purchase (impulse buys, the Internet, etc.)
- Trends in consumer tastes
- Company's distributors

Industry data is available for existing products. For new products, one may need to conduct a survey and sometimes, test marketing. A lot depends on judgment too. For a foreign market, a country report can be used.

Competitors: Know your rivals:

- Who are your actual and potential competitors?
- What are their products, positioning, market shares, strengths, weaknesses and marketing strategies?
- Who competes indirectly with you, because they produce competing products?
- Is the quality of competition, healthy or unhealthy?

Those who keep their eyes open know their competitors well. One can hire a consulting firm too to get a balanced view of the competitive scenario.

Climate (or environment):

Economic environments, political scenario, regulatory system, all have effect on markets:

- What is the political environment like? Who is in the government? Is the Government and its policies stable? How does the bureaucracy work?
- What are the regulations and their implementations?
- What are the macroeconomic factors (like business cycle, inflation, interest rate) and which are likely to affect the market?

Demand and Supply Estimate

Demand projection is one of the most important steps in a project feasibility study. The following are the important points related to demand estimation:

A product may have different usages and different end-users. The total demand of a product is constituted by different end-users like government and non- government or urban and rural. For example, demand for cement can be divided into some broad categories, namely housing, business and rehabilitation activities and infrastructure projects. In case of plastic, a whole market of packaging is wide open with newer applications, which may affect and in fact, has affected the tinplate-packaging industry.

- Product demand may have influencing factors as well. The demand of some products may be direct, while for some others it may be derived. For example, demand of tyre depends upon the sale of automobiles, a fertilizer sale is dependent on monsoon and sales of steel and industrial growth have some association.
- The market potential of a product in different segments may be different for several reasons because there may be regional imbalances. For example, India has a large demand for electric power but due to inadequate infrastructure for its distribution, some states are power-surplus, whereas some others have power shortage. International relations, import and export barriers in respective countries and such other factors also affect demand.
- Infrastructure impacts market. For example, Indian cement's exportability is less due to high cost of transportation.
- Growth in demand in the past can be indicative of the future demand.

Supply estimate

The past trend of supply of goods can be studied and further extrapolated. Projections so made need to be adjusted with the help of additional information like new projects planned by businesses in the economy, import possibility as governed by import policy, import tariff and international prices. Information regarding entry barrier is also useful. Long gestation period and high capital to labour ratio in an industry may create natural entry barriers. Government licensing policy, non-availability of the required input like material and skilled labour also create entry barriers.

Estimating Demand–Supply Gap

Demand and supply estimates, fine-tuned with the changing factors, are now compared with each other for finding a gap. A demand–supply gap for a relevant geographical territory only is meaningful. Multiple-point forecast for demand–supply gap gives the most adverse, most likely and most favourable forecasts.

Demand Forecasting Techniques

A key aspect of any decision-making situation lies in being able to predict the circumstances that surround the decision and that situation. Business managers are expected to know and apply forecasting techniques in their decision-making process.

Two classes of demand forecasting techniques are:

1. Quantitative techniques find solution directly based on historical data and assume that the past trend and relationship will continue in the future.
2. Qualitative techniques aim at forecasting changes in a basic pattern such as forecasting an expected decline in the demand of a product that has touched maturity point.

Pattern-based Forecast

- Where one or few independent factors may not have explanatory power for demand, just the pattern of demand over time can be studied for forecasting purposes. Therefore, patterns are observed over a timeline. For that, let us first see various patterns of historical data.

Causal Model–based Forecast

- Forecasting methods can be aptly applied if all factors influencing the demand remain constant during the forecast period.
- Regression
- Coefficient of correlation
- Decomposition method

TECHNICAL ANALYSIS

- If there is ample market demand and not enough supply, the focus should shift to technology. The following inquiries must be made with respect to technical analysis.

Availability of Technology

- A task force will search for a commercially exploitable technology for the operations required for running the project. One must also look at of the technologies currently being used by businesses and study their experiences.
- Usually, in a cheap labour economy, less than the latest technology works fine from the labour-to-capital ratio angle. However, the choice has to depend on the effects of technology on the desired quality of product and cost of product, versus investment needed in a given technology.

Transferability

- The technology transfer issue has to be addressed in a dual fashion—(a) Whether the transfer of technology is possible from the political angle and (b) whether transfer of technology is possible from the operations (environment) angle.

Check Your Progress

- In today's World Trade Organization's regime, normally one cannot expect import restrictions (unless there is no political relationship between the two countries), but economic sanctions from the exporting nations are quite possible, making it impossible to transfer technology from one country to another. Sometimes, the technology owners may not be willing to transfer the technology.

- **Normal Capacity Utilization**

  Every technology has its own capacity and rate of normal utilization. In addition, a rated capacity is usually not available fully, depending upon the environment in which it is used. Capacity utilization has a direct impact on available production and cost of production. Therefore, an inquiry about a potential 'normal' capacity utilization of a given capacity assumes great importance.

- **Requirement of Plant and Equipment and Fabrication Facilities**
- Technology comes with knowledge. However, machines for operations have to be fabricated separately. The following questions are essential:
  - What type of plant, machines and equipment would be required for the operations?
  - Are there machine fabricators who can make the required machines as per specifications?
  - Can the fabricated machines be transported easily from the fabrication site to the project site?
  - Can the required sequencing of processes, synchronization of machines and balancing of machines be attained?
- **Production Process Needed**

  Efficiency of technology depends on process design. The following questions would be appropriate:
  - What type of process design will be required?
  - Can we build those processes in a desired sequence?
  - Are there any site limitations (in terms of size and existing design of building, etc.) and can the required processes be arranged with or without modifications?
  - Whether the company currently has one or more of the processes required in the new technology and if yes, can we use the same with expanded capacity?

- **Possible Product Mix**

  A project may involve production of goods and services in a particular range and therefore, the technology and processes should be able to produce them in an appropriate mix.

- **Possible Alternate Usage**

  A technology that has an alternate use is better because if the company is not able to achieve its sales target, it can always change the product and establish in a different market. For example, a company engaged in the business of manufacturing glass-lining equipment for chemical industry can use several of its processes to manufacture concrete- mixing machines.

- **Flexibility**

  The tastes of the customers change fast and the rate of change is becoming faster every day. If the product from the new project is closer to the consumer and has very little room for alternative use, then the processes must be flexible, so that the firm can adapt to changes quickly.

- **Rate of Change**
- It is important to know and estimate the rate of change in technology. For example, information technology changes fast, requiring firms to buy latest technologies as far as possible.
- **Waste Disposal Problems**
- Waste disposal is a legal as well as a moral issue. Some technologies have the problem of waste disposal and may prove costly, for example, nuclear power plants.
- **Resource Availability**
- Can we have access to the required quality of resources needed by the selected technology? For example, a cold-roll mill (CRM) technology in the steel industry requires high-quality coal with low moisture content and high carbon content. Long-term access to coal mines that have large reserves of coal at different levels of depth is essential.

Risk Implications

Every technology has its own consequential fixed and variable costs during operations. A technology that ensues in high fixed cost but low variable cost creates a higher degree of operating leverage. A higher degree of operating leverage would enlarge the effect of change in sales revenue on operating profits. High degree of operating leverage is still good if demand is increasing because increase in sales revenue will increase operating profit faster but if sales revenue declines, then operating profit will decline faster. Therefore, if there is any uncertainty about the sales revenue trend, then one must select a technology that has a low fixed cost even if its variable cost may be high.

Identifying Critical Success Factors

Success of a project depends on the actual outcome of some key variables called critical success factors. Inaccuracy and uncertainty surrounding these factors may render the project unattractive. Each industry has its own critical success factors identified from the experience of businesses.

ECONOMIC AND FINANCIAL ANALYSIS

Before any financial analysis is carried out, four basic decisions must be in place. These basic decisions are briefly explained as follows:

Period of analysis

The period of forecast is a matter of the company's policy based on the considerations of factors like product life cycle, business cycle, rate of change in technology, and taste, managerial ability to foresee in the future and database available to support the forecast.

At the stage of financing mix and cost

The firm might not have raised capital for financing the project. The financing mix decision has three purposes:

- Investigating the effect of new project financing on the company's capital structure.
- Approximating the cost of each type of new funds that will be raised for financing the new project.
- Approximating the weighted average cost of capital, which can be used in deriving the cut-off rate required for accepting the new project.

Cut-off criterion

- The cut-off decision is a benchmark against which the project cash flow stream is compared to determine whether the project would attain its financial goal.
- A cut-off rate is sometimes called a go-no-go criterion, hurdle rate or required rate of return.
- If time-value-based evaluation techniques are used, the cut-off rate will be determined on the basis of cost of capital.

Uncertainties in demand forecasting

Demand forecasts are subject to error and uncertainty which from three principal source.

Data about past and present market.

The analysis of past and present markets, which serve as the springboard for the projection exercise, may be vitiated by the following inadequacies of data:

Lack of Standardization:

Data pertaining to market features like product, price, quantity, cost, income, etc. may not reflect uniform concepts and measures.

Few observations:

observations available to conduct meaningful analysis may not be enough.

Influence of abnormal factors:

Some of the observations may be influenced by abnormal factors like war or natural calamity.

Method of forecasting.

Methods used for demand forecasting are characterized by the following limitations:

Inability to handle unquantifiable factors:

Most of the forecasting methods, being quantitative in nature, cannot handle unquantifiable factors which sometimes can be of immense significance.

Unrealistic assumptions:

- Each forecasting method is based on certain assumptions. For example, the trend projection method is based on the mutually compensating affects premise and the end use method is based on the constancy of technical coefficients. Uncertainty arises when the assumptions underline the chosen method tend to be realistic and erroneous.

Exercise data requirement:

- In general, the more advanced a method, the greater the data requirement. For example, to use an econometric model one has to forecast the future values of explanatory variables in order to project the explained variable.

Environmental Change.

- The environment in which a business functions is characterized by numerous uncertainties. The important sources of uncertainty are mentioned below:

Technological Change:

- This is a very important and very hard-to-predict factor which influences business prospects. A technological advancement may create a new product which performs the same function more efficiently and economically, thereby cutting into the market for the existing product. For example, electronic watches are encroaching on the market for mechanical watches.

Shift in Government Policy:

Government resolution of business may be extensive. Changes in government policy, which may be difficult to anticipate, could have a telling effect on the business environment.

Development on the International Scene:

Development on the International Scene may have a profound effect on industries.

Discovery of New Sources of Raw Material:

Discovery of new sources of raw materials, particularly hydrocarbons, can have a significant effect on the market situation of several products.

Vagaries of the Weather:

Weather plays an important role in the economy of a country, is somewhat unpredictable. Extreme weather influences, directly or indirectly, the demand for a wide range of products.

Coping with Uncertainties:

- Given the uncertainties in demand forecasting, adequate efforts, along the following lines, may be made to cope with uncertainties.
- Conduct analysis with data based on uniform and standard definitions.
- In identifying trends, coefficients, and relationships, ignore the abnormal and out-of-the-ordinary observations.

Marketing plan

- It refers to identifying and analyzing potential markets to select the target market.
- It involves deciding the market goals and objectives and steps to achieve them.
- It requires developing a marketing plans to decide the products to be marketed and pricing and promotional strategies.
- It is developed based on market feasibility study.
- It contains plans, strategies and the implementation road map to market a product.

Steps involved in market planning

- Identifying target markets and target buyers
- Conduct of market audit through study of macro and micro environmental factors.
- Identifying the SWOT analysis.
- Determining the market goals to be achieved.
- Identifying the Unique Selling Proposition
- Segmenting, targeting and positioning of the products.
- Decisions relating to market mix in terms of products, price, place and promotion.
- Deciding the market budget, allocation of resources and spending plan.
- Structuring the marketing organization to implement the market plan.
- Assignment of responsibilities and communication of schedule to achieve targets.
- Monitoring, evaluation and control of performance.
- Estimation of costs, sales and profits.

Elements of marketing plan

- **Situation analysis:** it is description of the market environment.
- **Opportunity and issue analysis:** it is an analysis of SWOT.
- **Goals and objectives:** it specifies the major objectives of the firm.
- **Marketing strategy:** it contains of details of target buyers.
- **Sales and marketing plan:** it details of the sales promotion to increase sales.

Market survey

Market survey is the systematic collection, analysis, interpretation and reporting of information relating to current market situation and future market trends.

Personal interviews, telephone interviews, mail interviews, e-mail interviews and questionnaires and some of the methods to collect information for market surveys.

Steps in market survey

- **Planning the survey:**

  1. Defining the problem
  2. setting of research objectives
  3. prepare a research design or research plan
  4. identifying the data to be collected.
  5. deciding whether data has to be collected.
  6. selecting the method of data collection.

- **Collection of data:**

  recruitment and training of data collection team.
  planning time schedule.
  monitoring the process of data collection.
  ensuring that responses are recorded in a proper manner.

- **Analysis and interpretation of data:**

  1. Editing of data
  2. Classification of data
  3. Coding and tabulation of data
  4. Analysis of data
  5. Application of statistical tools
  6. Interpretation of data.

- **Preparation of the market survey report:**

  Data is interpreted to arrive at findings, draw suitable conclusions and give suggestions for further action by the management.

Project layouts

A project layout is used to create a form where the project details are collected. You can create different project layouts based on your project requirements. Initially, all projects will be associated with the standard layout. If the standard layout is modified, the changes will be reflected in all the associated projects.

The project layout sheet shows the horizontal alignment sequence and numbering for the project. This is an optional sheet, to be included in the plans set at the discretion of the district. The project layout sheet can prove to be of great advantage for large or complicated projects involving large interchanges with a number of diverging routes. If included in the set of plans, this sheet should also show all survey reference points and list out all general notes applicable to the project.

Project section

A set of sections form a layout. Similar attributes are placed inside a section. Every project layout will have two default sections - Project Information and Budget

Project field

Customize fields to collect project details based on your project requirements. You can add a new field or an existing field to your layout.

The default fields can neither be edited nor deleted. They can only be reordered. The following are the default fields in Project Information and Budget sections of a project layout.

The fields - Start Date, End Date, Project Overview, Status, Group Name, and Completion Percentage are the default fields in the Project Information section.

The fields - Currency, Billing Method, Project Budget, and Default Billing Status are the default fields in the Budget section.

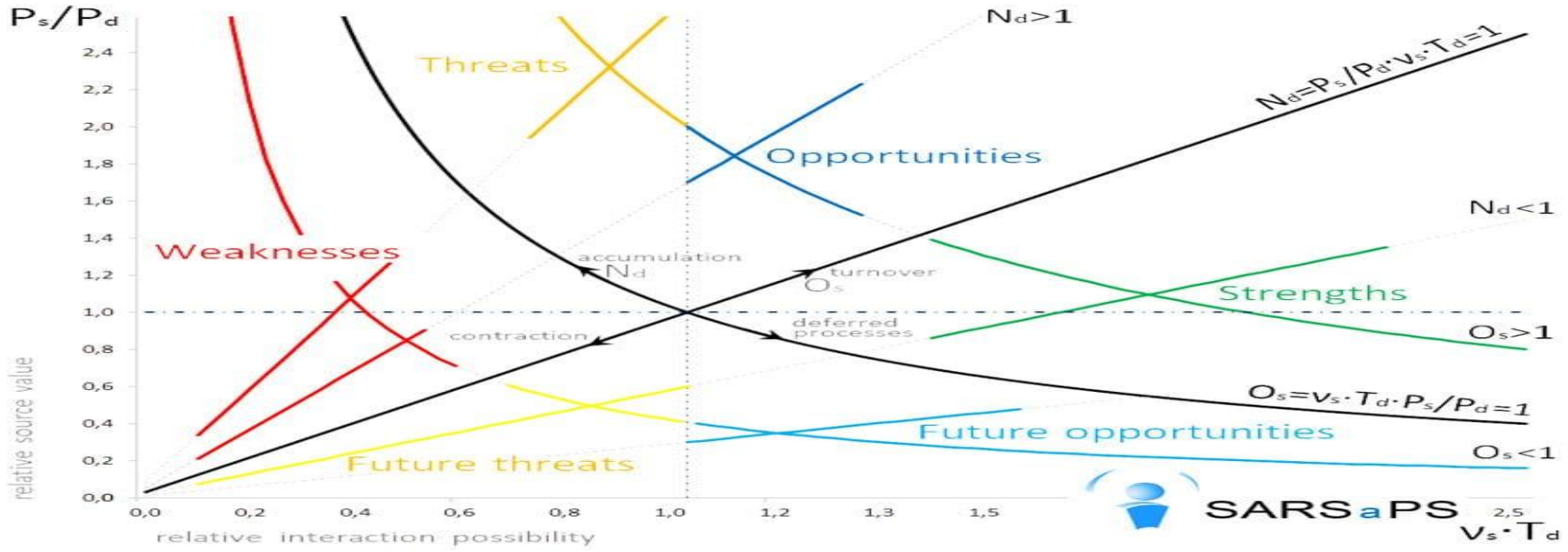
PROJECT CHART

Project management is a challenging but important task with certain complex responsibilities. To fulfill the complex and unique assignment within the constrained time and cost, various tools and techniques are employed. In other words, to accomplish and aptly manage them, number of applications or charts are used. These not only reduce the interruptions of regular business activities, but also organize resources and technologies such that the project is executed successfully.

There are many organizations who are still not aware of the data visualization tools that they can use in their presentation. Numbers are dumped on to the slide without any analysis. The presenters either do not make use of charts and graphs and if they do end up using the wrong ones.

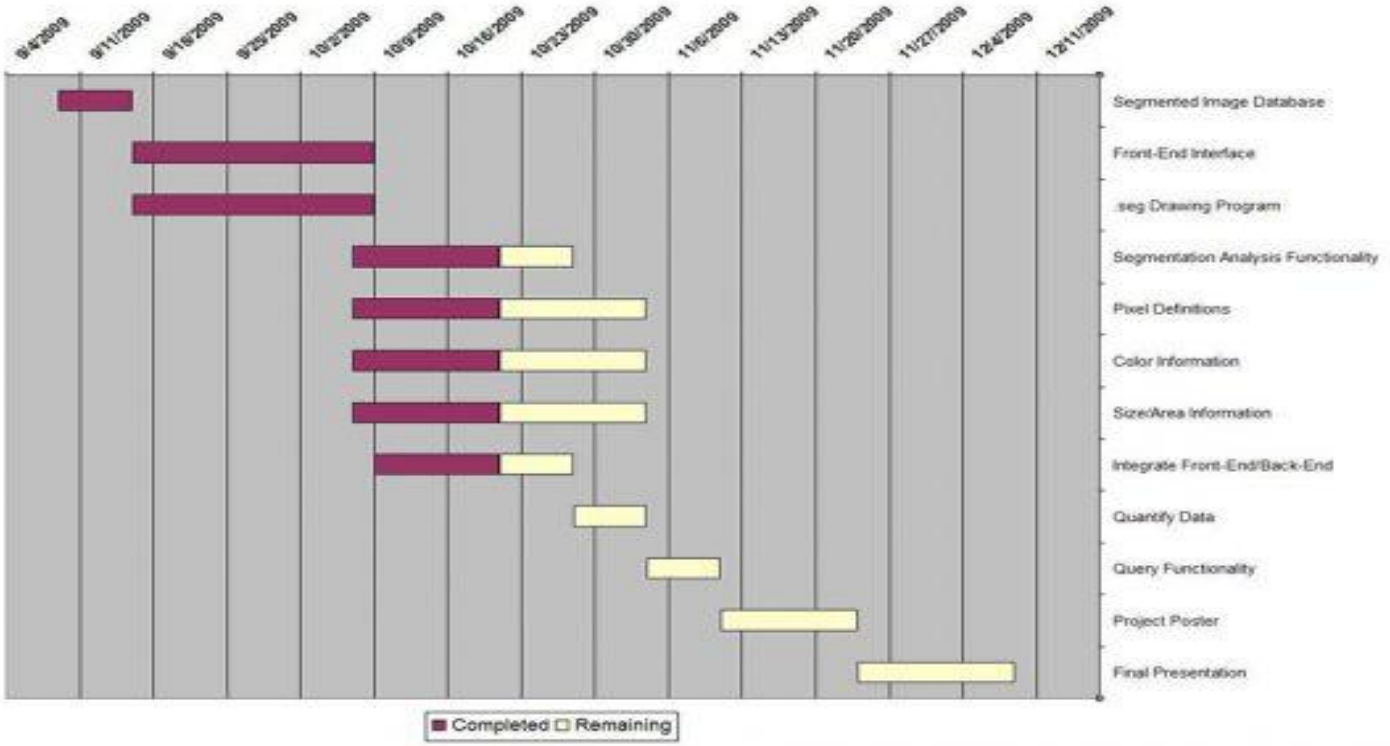
1. SWOT Analysis

- An analysis of Strength, Weakness, Opportunities, and Threat, SWOT is the best chart for stakeholders of an organization. It gives them an insight into all the potential risks and strengths of the project in the planning stage. By giving an overall picture of the project, it helps project managers plan to fulfill the requirements. SWOT analysis also gives the project manager an idea of what the competitors are doing and how their own strategies need to be competent. It is a simple yet effective process to improve overall project management. You can also use this method for individual tasks to gain better efficiency



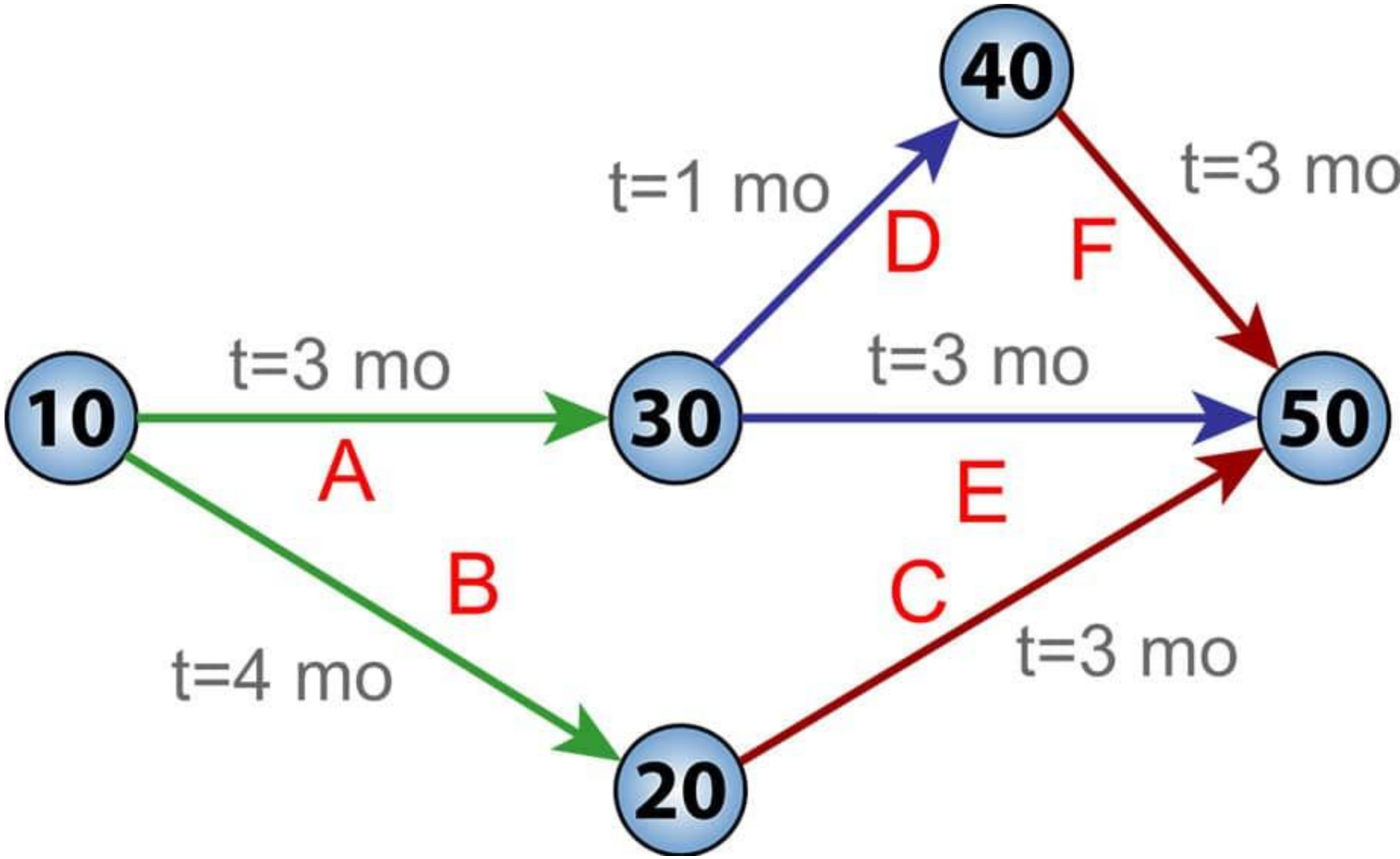
2. Gantt Chart

- It is one of the most popular chart diagrams for project planning and management. Gantt chart is a type of bar chart helps to display project schedule activities. It shows all the key stages involved in any project, thus giving the basic breakdown structure. Project managers generally use the Gantt chart to get a rough estimate of the necessary time for key tasks of a project. You can also use it to show dependencies between tasks. It offers a quick overview to project stakeholders. If the project in the discussion is complex with a lot of tasks, subtasks, and management, using Gantt Charts may become a little difficult. Project managers use Gantt charts to track results, increase communication, forecast timelines and increase productivity. To get a more clear idea, you can check some Gantt Chart templates.



3. Pert Chart

A PERT, Program Evaluation Review Technique, was designed in the 1950s by the US Navy. You can use these charts after the completion of project planning. After project planning, every module in the project is broken down into tasks. These tasks form the basis of a PERT diagram. The basic objective of this diagram is to organize and manage complex activities by dividing them into tasks. With this diagram, project managers can visualize how long it will take to complete each task and distinguish between critical and non-critical tasks. The best part about PERT charts is that it allows showcasing parallel activities and also recognizes the minimum time required. This is a multipurpose tool and used by several efficient companies across the world.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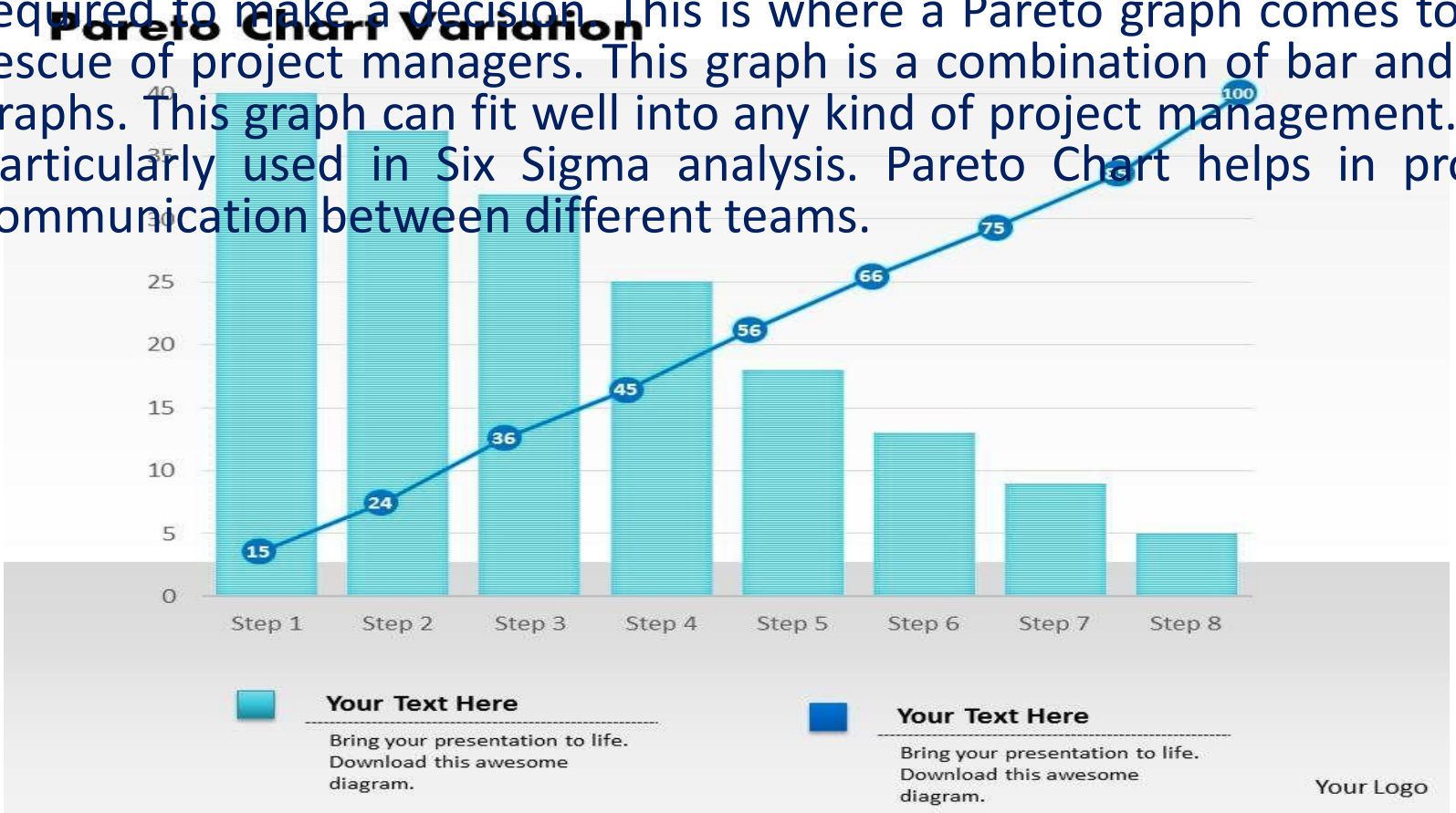
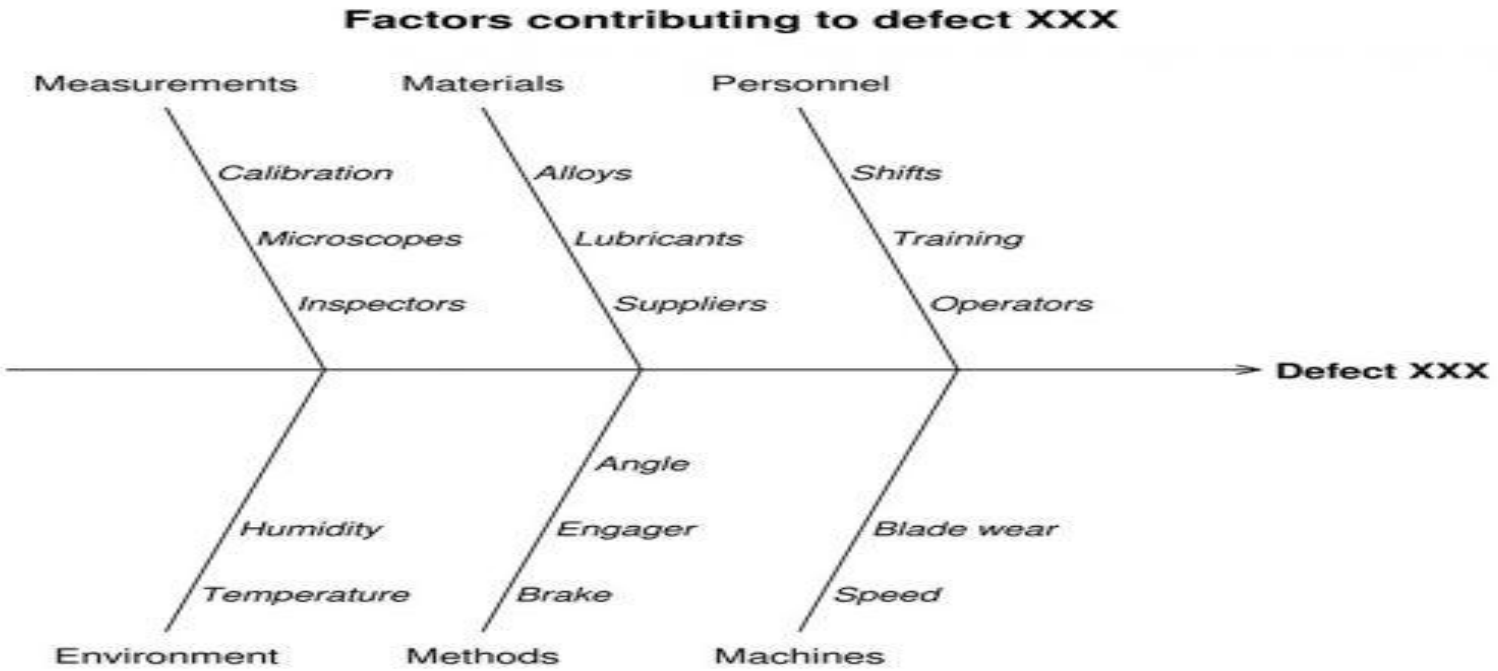
4. Pareto Chart

- Pareto chart is a chart containing both bar graph and line chart. Mostly used in six sigma analysis, but can fit in any project management. Analyze the frequency of problems in a process effectively. They help in visualizing the quality aspects of your processes. Also, Pareto diagram assists in focusing on vital causes. An individual can easily communicate the data with other team members. Most project managers use graphs to display and interpret data. But sometimes, simple graphs do not help in important decision making as they do not display all the information required to make a decision. This is where a Pareto graph comes to the rescue of project managers. This graph is a combination of bar and line graphs. This graph can fit well into any kind of project management. It is particularly used in Six Sigma analysis. Pareto Chart helps in proper communication between different teams.



5. Cause-Effect Chart

- In the project event, the root cause and effect analysis plays a significant role. Also called as Ishikawa diagram or Fishbone Diagram. With this, professionals arrange causes and effects graphically. Categorize ideas that the team gathers for a fruitful brainstorming session .Some people call a Cause and Effect Chart as the fishbone diagram. It is basically a visualization tool that you can use in problem-solving in a project. It categorizes the potential causes that can be responsible for a problem. By identifying potential causes, it becomes easier to identify the root cause. In this diagram, you can graphically arrange the causes along with the effects. You can also use it to collect & categorize all the different ideas in a brainstorming session of a team. By getting an in-depth look into the problems, it is possible to generate effective solutions in a lesser amount of time.

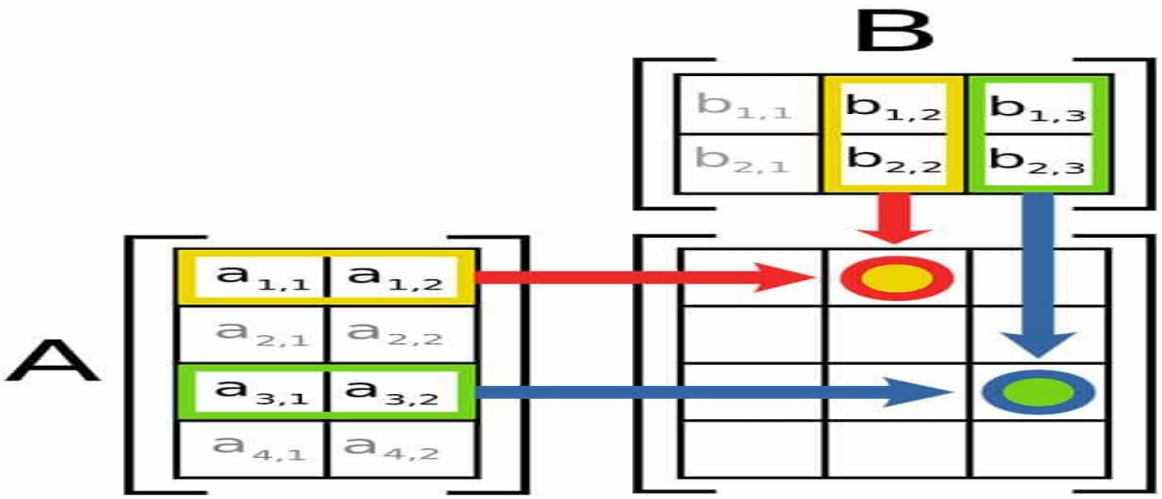


6. Control Chart

- The Control Chart or a Statistical Process Control Chart is a graph used in the project management. This chart shows the changes in the process over time. By getting an insight into the process changes, it is possible to spot problems and correct them. Project managers frequently use this chart in quality control processes. It also gives a way to control ongoing processes by searching for problems and correcting them. You can use this chart to determine the stability of the process. You can also use this chart to monitor the Schedule Performance Index (SPI) and Cost Performance Index (CPI). Know more about how to create a Control chart.

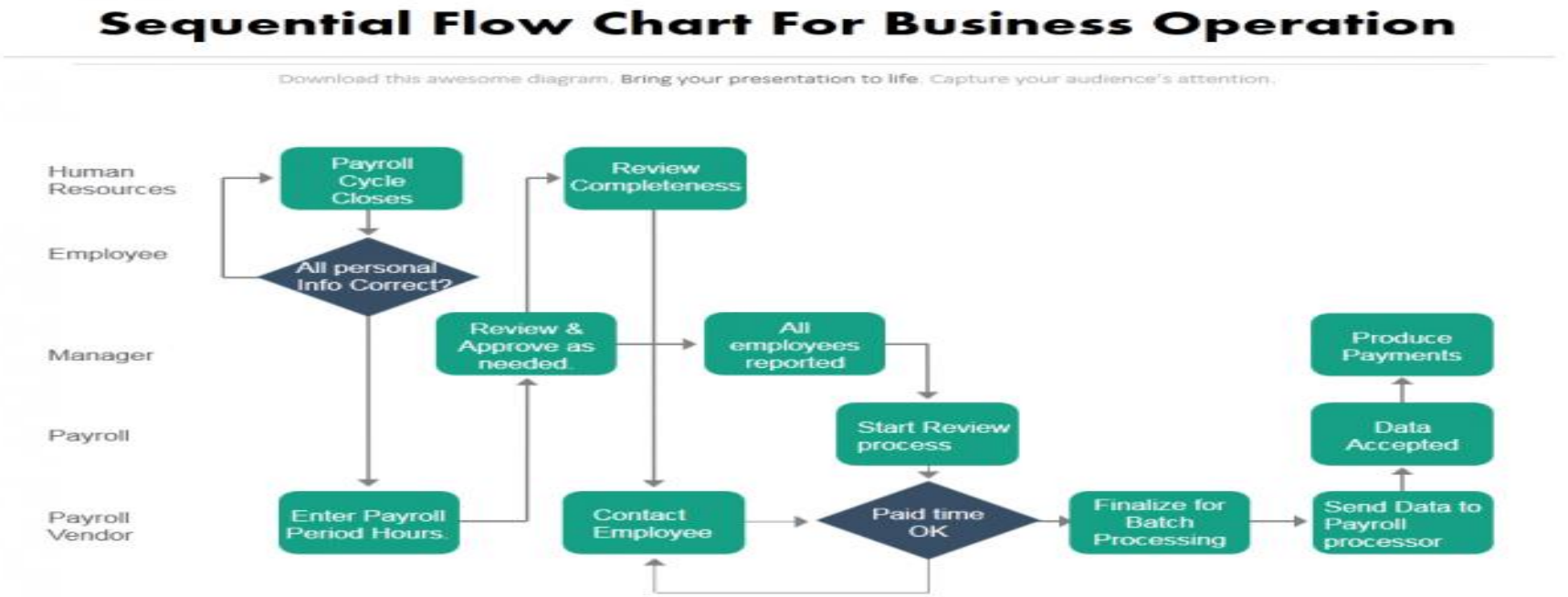
7. Matrix Diagram

- They represents the sequential steps taken in a process, workflow, or a task. Matrix shows the relationships between four groups of information. Discover who is keen and influencing in the task or project you are working on. With stakeholder analysis matrix you get information about the involvement of stakeholders. On the other hand, with RACI matrix (Responsibility Assignment Matrix) you are informed about the deliverables during the lifecycle of a project or person who is taking part in the task. These diagrams are used as a tool for quality management. The diagram represents the sequence of steps involved in a task, workflow or process. The diagram analyses data within a structure and shows the relationship between different information groups. This is one of the best ways to represent many-to-many relationships. It shows the relationship between groups of information, four groups maximum. It is possible to check which information groups are influencing a particular task. Matrix diagrams can be further classified into context diagrams, probability and impact matrix and more. As this diagram allows a comparison of information, it plays an important role in decision making.



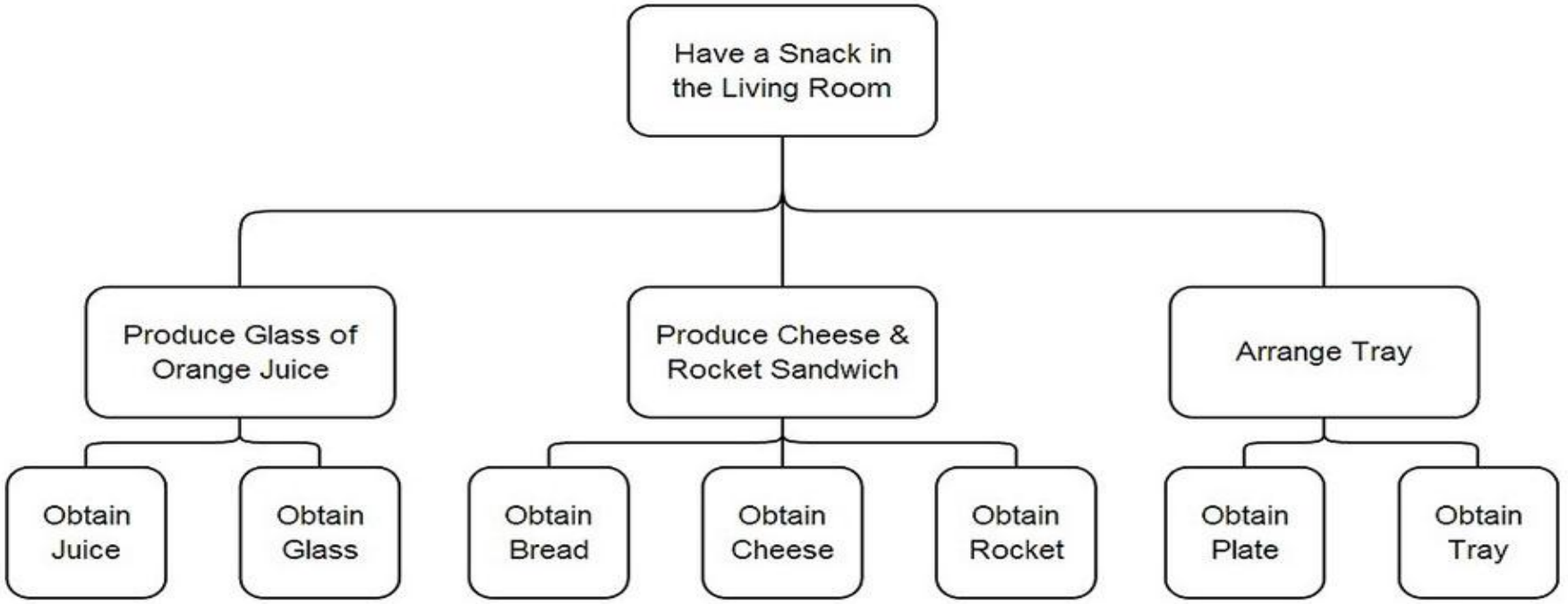
8. Flowchart

- Improving project efficiency is always a cause of concern for project managers. Flowcharts help them get a clear picture of processes and work to improve their efficiencies. This chart graphically displays the objectives of a project and activities involved in those. The primary objective of a flowchart is to strengthen interpersonal communication required in project planning and monitoring. These charts can also be used to represent a step-by-step sequence of events. The arrows in a flowchart give the direction of flow. Flowcharts can be used independently for project planning for small projects. In the case of management of complex projects, flowcharts can be used in combination with Gantt charts for proper planning and timeline distribution of tasks. You can check how to create a basic flowchart



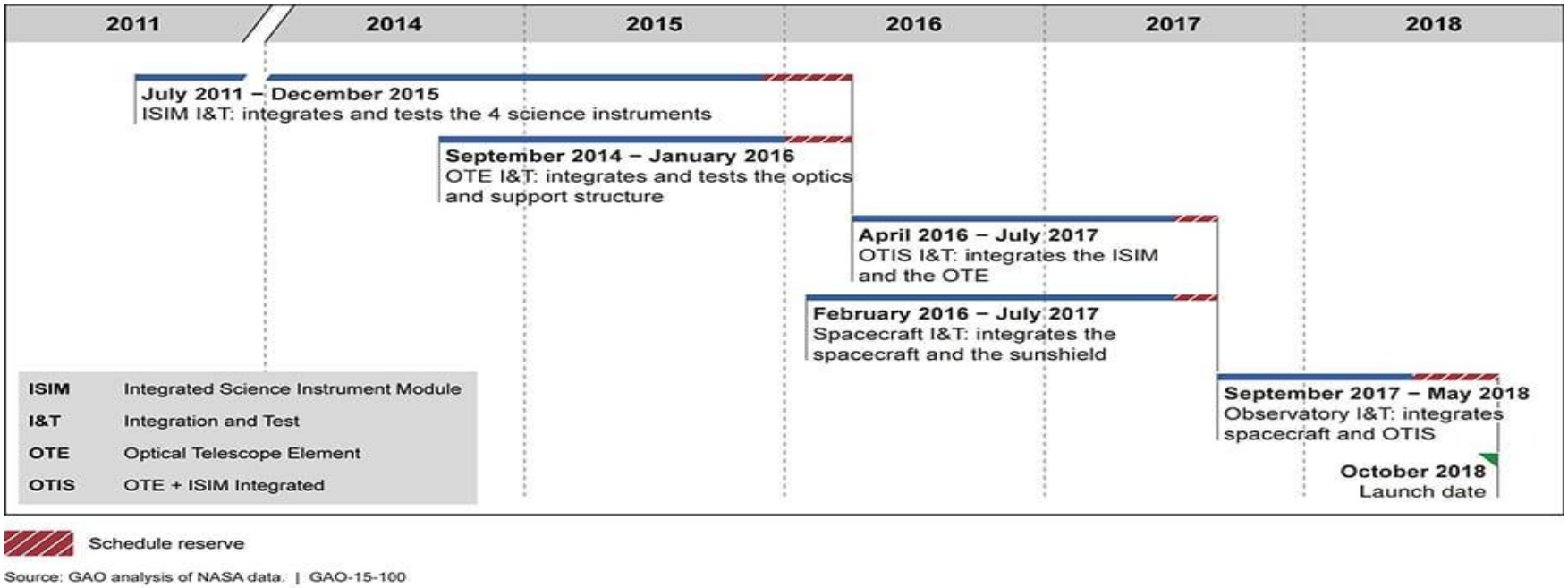
9. Work - Breakdown Structure

- Every project needs to be broken down into parts before execution is started by the team. This is basically what a Work Breakdown Structure (WBS) does. It organizes the work into manageable sections and helps in identifying the deliverables in a project. Large tasks are broken down into subtasks for ease of understanding and give a clear definition of project requirements. In a WBS, there is no provision of defining dependencies and timelines. It provides a hierarchy of tasks so that project managers can create a project plan. It is used to schedule the work, determine the resources required for a project and organize the project into parts.



10. Timeline Schedule

- As the name suggests, this chart diagram is used for graphically representing the project timeline. It is one of the tools that simplify complex information and helps teams to visualize it. Any person who is part of the team can monitor project progress anytime and also track deliverables. If there are any changes in project timelines, it is possible to update the diagram. This chart is one of the most required elements of any project. This chart is extremely useful in synchronizing tasks, identifying delays and setting deadlines. It is also possible to define projects in different timeframes like work-in-progress and planned time. This chart helps project managers in setting expectations for delivery times and deadlines. You can check the example of the event timeline template to get a clearer idea.



Project Implementation

- Project Implementation – also known as project delivery or execution of the project plan. The implementation phase involves putting the project plan into action. It's here that the project manager will co-ordinate and direct project resources to meet the objectives of the project plan.
- The implementation phase is the project team actually do the project work to produce the deliverables. The word "deliverable" means anything of the project delivers. The deliverables for the project include all of the products or services that the team are performing for the client, customer, or sponsor, including all the project management documents that put together.

Introduction to Project Implementation

Project Implementation Process whereby “project inputs are converted in to project outputs”. May be looked at as:

- Putting in action of the project.
- Putting into practice what was proposed in the project document (i.e. transforming the project proposal into the actual project.)
- Management of the project or executing the project intentions.

Project Implementation usually done by implementing agency (organization) that prepared the project and received funding for it. Other organizations that participate in the implementation of the project by way of collaboration, say by according good working relationship, extending technical advice or seconding their staff to the project are referred to as co-operating agencies.

Project Implementation phase

Project Implementation phase involves:

Project activation, and Project operation.

This means making arrangements to have the project started. It involves co-ordination and allocation of resources to make project operational.

This is practical management of a project. Here, project inputs are transformed into outputs to achieve immediate objectives.

Project operation and maintenance.

To attain value and maximum returns, the district /municipality or the beneficiaries organize for the facility to have the project properly managed and maintained regularly.

An operation and maintenance manual is prepared by the contractor and handed to the district / beneficiaries.

Approaches to project implementation

Top-down approach :

Implementation mainly done by agencies from outside the community with limited involvement by the beneficiaries.

Bottom-up approach:

Beneficiaries implement the project. Outside agencies may provide the financial resources and technical assistance. Collaborative participatory approach.

Both top-down and bottom-up approaches to project implementation are applied in the process.

Project implementation plan includes:

a) The project implementation schedule This is concerned with:

- What activities can produce expected project outputs?
- What is the sequence of these activities?
- What is the time frame for these activities?
- Who will be responsible for carrying out each activity?

b) The role of the implementing agency :

The specific responsibilities of the key staff during project implementation and monitoring are outlined.

c) Beneficiary participation :

The involvement of the beneficiaries in planning and implementation and what is expected of them is spelt out.

d) Organizational structure and staffing Here the following are sought:

- Project structure for purposes of management
- Qualifications and skills for the staff
- Job descriptions and specifications for the staff
- Technical assistance if needed

e) Financial management:

This looks at funds management, accounting period, financial reports and statements and how often they will be made?

f) Reporting system:

This looks at who will be reporting to whom and how often. There is need to design standard reporting formats.

g) Sustainability:

The concept of sustainability is based on belief that project should result in benefits that have lasting effect. Project should be sustained beyond the life of funding - especially if it is a grant. Project should not exhaust the available resources like raw materials and labour.

- Time control and remedial action Time taken to implement project activities is one measure of successfulness of supervision or monitoring of project implementation. Supervisor pays particular attention to time control measures, time scheduling and its supervision, time extension and postponement, damages for non-completion and defect or warranty period.
- Supervision of implementation of project schedule This involves a set of checks and balances to ensure that the schedule is being adhered to. To ensure that the time schedule is being adhered to, the project activity time listing can be of great importance.
- Practical Using the Project Activity Time Listing, develop a Project Activity Time Listing table in relation to the Identified project in project identification session, and fill it in.

Questions

- Write the meaning of demand forecasting.
- Define market planning.
- What is market survey?
- Explain – cause effect chart.
- What is choice of technology?
- What is work break down structure?
- Give short note on : PERT, Matrix chart, Fish bone chart, Gant chart, Pareto chart.
- Explain the various steps in market and demand analysis.
- Write short note on : project charts, project layout, and project implementation.
- Bring out the various steps in market planning.
- Describe the different factors of uncertainties demand forecasting.
- Briefly explain SWOT analysis in project management.
- Discuss the various types of project chart.

UNIT - 4
SELECTION AND FINANCING

Meaning of Cash Flow

A cash flow is a statement of changes in the financial position of a firm on cash basis. It reveals the net effects of all business transactions of a firm during a period on cash and explains the reasons of changes in cash position between two balance sheet dates.

According to Khan and Jain

"Cash Flow statements are statements of changes in financial position prepared on the basis of funds defined as cash or cash equivalents." The Institute of Cost and Works Accountants of India defines Cash Flow statement as "a statement setting out the flow of cash under distinct heads of sources of funds and their utilization to determine the requirements of cash during the given period and to prepare for its adequate provision."

Features of Cash Flow Statement:

1. It is a periodical statement as it covers a particular period of time, say, month or year.
2. It shows movement of cash in between two balance sheet dates.
3. It establishes the relationship between net profit and changes in cash position of the firm.
4. It does not involve matching of cost against revenue.
5. It shows the sources and application of funds during a particular period of time.
6. It records the changes in fixed assets as well as current assets.
7. A projected cash flow statement is referred to as cash budget.
8. It is an indicator of cash earning capacity of the firm.
9. It reflects clearly how financial position of a firm changes over a period of time due to its operating activities, investing activities and financing activities.

Objectives

- It shows the cash earning capacity of the firm.
- It indicates different sources from which cash been collected and various purposes for which cash has been utilized during the year.
- It classifies cash flows during the period from operating, investing and financing activities.
- It gives answers to various perplexing questions often encountered by management, such as why the firm is unable to pay dividend instead of making enough profit? Why is there huge idle cash balance in spite of loss suffered? Where have the proceeds of sale of fixed assets gone? etc.
- It helps the management in cash planning and control so that there are no shortage or surplus of cash at any point of time.
- It evaluates the ability of the firm to meet obligations such as loan repayment, dividends, taxes etc.
- A prospective investor consults the cash flow statement to ensure that his investment gets regular returns in future.
- It discloses the reasons for differences among net income, cash receipts and cash payments.
- It helps the management in taking capital budgeting decisions more scientifically.
- It ensures optimum use of funds for the maximum benefit of the enterprise.

Advantages of cash flow

1. Evaluation of Cash Position:

It is very helpful in understanding the cash position of a firm. Since cash is the basis for carrying on business operations smoothly, the cash flow statement is very useful in evaluating the current cash position of the business.

2. Planning and Control:

A projected cash flow statement enables the management to plan and coordinate the financial operations properly. The financial manager can know how much cash is needed, from where it will be derived, how much can be generated internally, and how much could be obtained from outside.

3. Performance Evaluation:

A comparison of actual cash flow statement with the projected cash flow statement will disclose the failure or success of the management in managing cash resources. Deviations will indicate the need for corrective actions.

4. Framing Long-term Planning:

The projected cash flow statement helps financial manager in exploring the possibility of repayment of long-term debts which depends upon the availability of cash.

5. Capital Budgeting Decision:

A projected cash flow statement also helps the management in taking capital budgeting decisions.

6. Liquidity Position:

Liquidity position of a firm refers to its ability to meet short-term obligations such as payment of wages and other operating expenses etc. From cash flow statement the financial manager is able to understand how well the firm is meeting these obligations.

At the same time the ability of the firm in cash earning can be known from cash flow statement. As a matter of fact, a firm's profitability is ultimately dependent upon its cash earning capacity.

7. Answers to Different Questions:

Cash flow statement is able to explain some questions often encountered by the financial manager such as, why is the firm not able to pay dividend in spite of making huge profit? Why there is huge cash balance in spite of loss etc.

Limitations of cash flow

1. Since cash flow statement does not consider non-cash items, it cannot reveal the actual net income of the business.
2. Cash flow statement cannot replace fund flow statement or income statement. Each of them has a separate function to perform which cannot be done by the cash flow statement.
3. The cash balance as disclosed by the projected cash flow statement may not represent the real liquid position of the business since it can be easily influenced by the managerial decisions, by making certain payments in advance or by post pending payments
4. It cannot be used for the purpose of comparison over a period of time. A company is not better off in the current year than the previous year because its cash flow has increased.
5. It is not helpful in measuring the economic efficiency in certain cases e.g., public utility service where generally heavy capital expenditure is involved.

Principles of Cash-flow Estimation

(1) **Separation Principle:** The Separation Principle is used to bring out the project cash flows of a particular project. It is an important part of capital budgeting. Before starting a new project, it is very important to estimate properly the inflow and outflow of cash. There are several methods that are used to bring out the exact figure of the project cash flow and Separation Principle is one of those methods.

(2) **Incremental Principle:** The incremental principle is used to measure the profit potential of a project. According to this theory, a project is sound if it increases total profit more than total cost.

(3) **Consistency Principle:** Carty Principle is one of the four major principles that are used for estimating the project cash flows. According to this principle, consistency in the cash flows is very necessary. At the same time, consistency in the applicable discount rates on the cash flows should also be maintained. There are two important factors that are related to the Consistency Principle These two are the investor group and the inflation.

(4) **Post Tax Principle:** Post Tax Principle is one of the basic principles of cash floss estimation. This is used to bring out the project cash flows with accuracy. After tax calculations are suggested by the Post Tax Principle for the project cash flow. There are some businesses that generally neglect the payment of tax while measuring the cash flow of a project. Next, these businesses try to cover the fault by using the discount rate. These discount rates are very hard to adjust and thus the after-tax rate of discount and after-tax cash flows are used jointly.

Project Risk Analysis

Meaning

Risk is the possibility of an outcome being different from an expected outcome . Risk is defined as the variability of the actual cash flows from the expected cash flows of a project. Project are appraised based on assumption of the future.

Risk analysis is the process of assessing the likelihood of an adverse event occurring within the corporate, government, or environmental sector. Risk analysis is the study of the underlying uncertainty of a given course of action and refers to the uncertainty of forecasted cash flow streams, the variance of portfolio or stock returns, the probability of a project's success or failure, and possible future economic states. Risk analysts often work in tandem with forecasting professionals to minimize future negative unforeseen effects.

Types of Risk Analysis

- **Economics Risk**

Economics environment is dynamic in nature and would increase the cost of raw materials and other inputs resulting in higher project costs.

- **Financial Risk**

Financial risk may arise due to (a) faulty financial appraisal of project (b) wrong financial projection of cost ,revenues and profit(c) rise in interest rates resulting in higher borrowing costs and (d) large borrowing and high debt- equity ratio.

- **Commercial Risk**

The customer for whom the project is being cannot carried out may become insolvent.

- **Operational Risk**

Decrease in operational efficiency results in operational risks. It would increase the time and cost of completion of the project.

- **Technological Risk**

Technological risks may arise due to (a) selection of unsuitable technology (b) technology not meeting performance standards (c) better technology developed by competitors.

- **Production Risk**

It arises because of shortage of raw materials and other inputs ,break down of machinery ,steep increase in input costs ,labour trouble.

- **Market Risk**

Changes in consumer tastes preferences and fashions affect the demand and sales of product causing market risks.

Steps for Managing Risks

1.Risk Identification

It involves identifying the different types of risks that may affect a project the sources of risk and likely impact .Risk identification should happen only after the work breakdown structure (WBS) has been prepared and project team members are aware of its contents.

2.Cause Analysis

The factor that cause risks should be identified in order to understand their impact and take remedial measures. To reduce in impact the firm can think of increasing ownership capital and retention of profits can be increased to reduce borrowing.

3. Quantification of Risk

The risks involved in the project are quantified under techniques such as Risk Adjusted Discount Rate (RADR)

4.Developing alternative for Reducing Risk

After quantifying the various risks the alternative methods to reduce them are identified . Risk reduction strategies can be analysed for specific risk factors.

5.Selection of Alternative

The alternatives chosen should be evaluated based on their costs and effectiveness.

Project Appraisal

When an organization wants to find a solution to a particular business problem and identify the best way for implementing that solution, it needs to plan and develop a project that might provide an effective action plan for addressing the problem through implementing the solution. This organization will need to give an appraisal of the potential project to make sure the project is really effective because it supports the right solution and solves the required problem. In this context, project appraisal management serves as the major process of analyzing and approving the project.

Methods of Project appraisal

Technical Appraisal

Determines whether the technical parameters are soundly conceived, realistic and technically feasible. Technical feasibility analysis is the systematic gathering and analysis of the data pertaining to the technical inputs required and formation of conclusion there from. The availability of the raw materials, equipment, hard/software, power, sanitary and sewerage services, transportation facility, skilled man power, engineering facilities, maintenance, local people etc., depending on the type of project are coming under technical analysis. This feasibility analysis is very important since its significance lies in planning the exercises, documentation process, risk minimization process and to get approval.

❖ Financial Appraisal

1. Total Cost
2. O & M Expenditure
3. Opportunity costs
4. Other costs
5. Returns on Investment over project life
6. NPV
7. CBR
8. IRR

❖ Institutional Appraisal

To determine whether the implementing agencies as identified in the report are capable for effective implementation, monitoring, and evaluation of the scheme. Managerial competence, integrity, knowledge of the project, the promoters should have the knowledge and ability to plan, implement and operate the entire project effectively. The past record of the promoters is to be appraised to clarify their ability in handling the projects.

- **Commercial Appraisal**

  The demand and scope of the project among the beneficiaries, customer friendly process and preferences, future demand of the supply, effectiveness of the selling arrangement, latest information availability on all areas, government control measures, etc. The appraisal involves the assessment of the current demand/market scenario, which enables the project to get adequate demand. Estimation, distribution and advertisement scenario also to be here considered into.

- **Environmental Appraisal**

  To see any detrimental environmental impacts and how to minimise the impacts. Environmental appraisal concerns with the impact of environment on the project. The factors include the water, air, land, sound, geographical location etc.

- **Economic Appraisal**

  How far the project contributes to the development of the sector, industrial development, social development, maximizing the growth of employment, etc. are kept in view while evaluating the economic feasibility of the project.

- **Legal Appraisal**

  To determine whether the project satisfies the legal issues related to land acquisition, title deed, environmental clearance etc.

Methodology Approach

- The cost and returns, estimated after discussions with concerned Engineers, are projected for its life period of ten to fifteen years for which the loan is taken. The Net Present Value (NPV) shows the percentage recovery of the capital cost within its project life period. The Internal Rate of Return (IIR) indicates the percentage returns of the individual projects over a fixed period for town.
- Once the cost estimate is made and the cost of construction is known, the annual returns are assessed. With the expenditure, construction period and the returns per annum are known, the financial appraisal of the project-including the annuity of loan repayment is assessed. Depending on the financial viability of the project.
- Appraisal involves a careful checking of the basic data, assumptions and methodology used in project preparation, an in-depth review of the work plan, cost estimates and proposed financing, an assessment of the project's organizational and management aspects, and finally the viability of project.

- The concerned Technical Section in consultation with other technical sections undertake the technical appraisal, wherever necessary. This covers engineering, commercial, organizational and managerial aspects, while the Economic Appraisal Section carries out the pre-sanction appraisal of the development projects from the financial and economic points of view. Economic appraisal of a project is concerned with the desirability of carrying out the project from the standpoint of its contribution to the development of the national economy. Whereas financial analysis deals with only costs and returns to project participants, economic analysis deals with costs and returns to society as a whole. The rationale behind the project appraisal is to provide the decision-makers with financial and economic yardsticks for investment in the projects.
- The techniques of project appraisal includes discounted techniques that takes into account the time value of money and include (a) Net Present Value (NPV), (b) Benefit Cost Ratio (BCR), (c) Internal Rate of Return (IRR) (d) Sensitivity Analysis. Economic viability of the project is invariably judged at 12 percent discount rate/opportunity cost of capital. However, in case of financial analysis, the actual rate of interest i.e. the rate at which capital is obtained is used. For the government-funded projects, the discount rate is fixed by the Government. In case the project is funded by more than one source, the financial analysis is carried out on the weighted average cost of capital (WACC) for each project. Normally, if the project is financed through foreign grants, the financial analysis is undertaken at zero discount rate. However, the economic analysis is undertaken at 12% discount rate.

Social Costs –Benefits Analysis

Social Cost-Benefit analysis is an appraisal system that helps selecting socially remunerative projects for implementation. Every project tends to use up resources preempting its allocation in other uses. The inputs used up in the projects constitute the social cost of the project. The process of Social Cost-Benefit Analysis consists of determining the social feasibility or profitability of a project by expressing its social benefits and social costs in terms of a common counting device or numeral. If the social benefits of a project exceed its social costs, it is qualified for implementation. Projects emanate from different sources, such as individuals, firms or institutions, and Governments at the state and the central levels.

Questions

- What is project cash flows?
- What are the elements of cash flows?
- Define project appraisal.
- What is cost benefit analysis?
- Briefly explain the various principles of cash flows estimation.
- List out the advantages and disadvantages of cash flows.
- Discuss the various bias of cash flows estimation.
- Explain the different types of risk analysis.
- Describe the various methods of project appraisal.
- What are the steps to be following the managing risk?

UNIT - 5

PROJECT IMPLEMENTATION AND ITS TECHNIQUES

PROJECT ORGANISATION FORMS

An organizational structure is a standard hierarchy of operations. It defines how you can divide, coordinate, and direct groups. More so, it defines the positions and describes the tasks required to achieve an organization's objectives and vision.

Organizational structures aren't set in stone and are tweaked as per the organization's size, needs, and their philosophy.

Features of an Organizational Structure

When choosing an organizational structure, certain features shouldn't be overlooked. The key elements that contribute to a proper organizational structure are as follows.

FEATURES OF AN ORGANIZATIONAL STRUCTURE

01

Centralization and Decentralization

Centralization is when the top management makes all the decisions and planning. This structure concentrates power at the top of the chain. While **decentralization** disseminates power from the top to other managers down the chain.

02

Span of Control

The number of individuals that report to a particular manager. So, if nine people work under you as a manager, your span of control is nine.

03

Work Specialization

In general terms, this is the division of labor. So as a manager, you can break down a complex project into smaller units. This division allows each individual to complete a specific task in a shorter time.

04

Departmentalization

In this process, you divide an organization into specialized groups or smaller departments. In other words, grouping individuals based on jobs or roles.

05

Chain of Command

Chain of Command deals with the organization's reporting hierarchy. This system ensures that every manager or supervisor is accountable for assigned tasks.

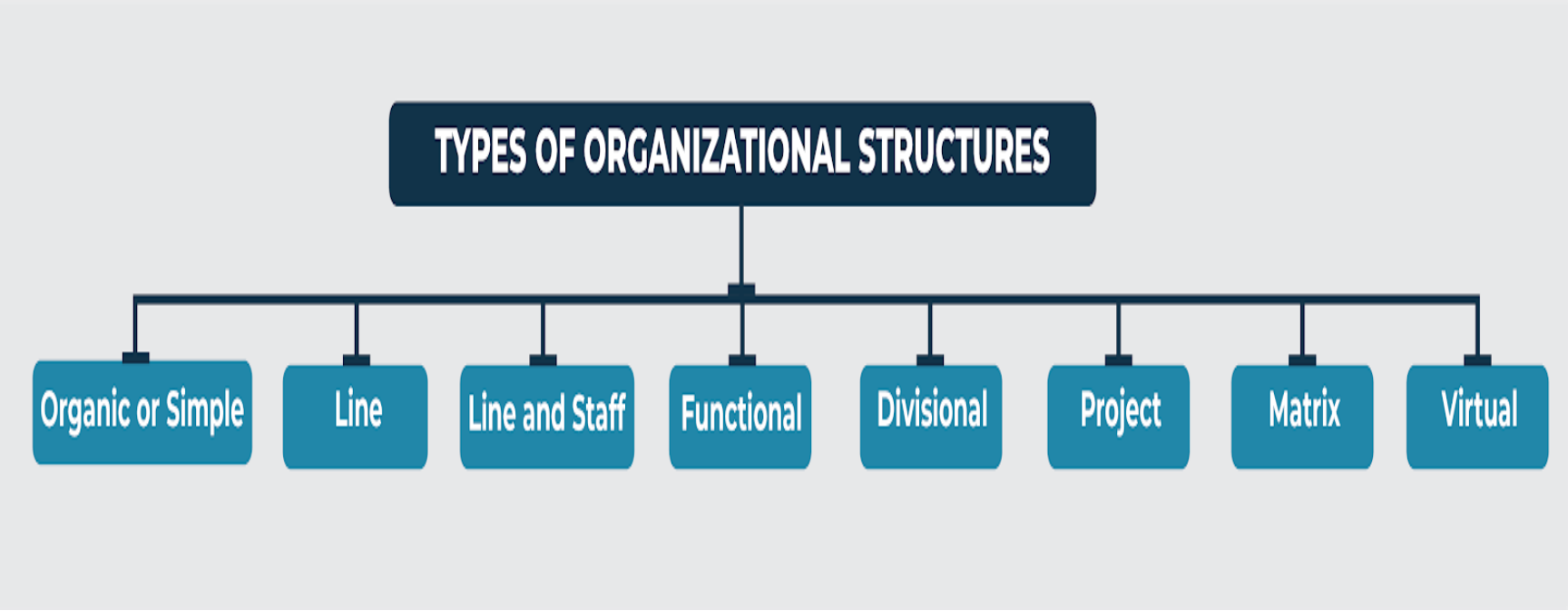
06

Formalization

In **formalization**, managers spell out rules, regulations, procedures, and responsibilities that help workflow. You can direct them to workers, teams, or even the whole organization.

Types of Organizational Structures

A common way to differentiate between business organizational structures is between ongoing operational work versus capital projects. Operational work maintains an existing sales channel, whereas projects are one-time, unique expenditures with a defined budget, beginning and end dates, and they accomplish a specific goal.

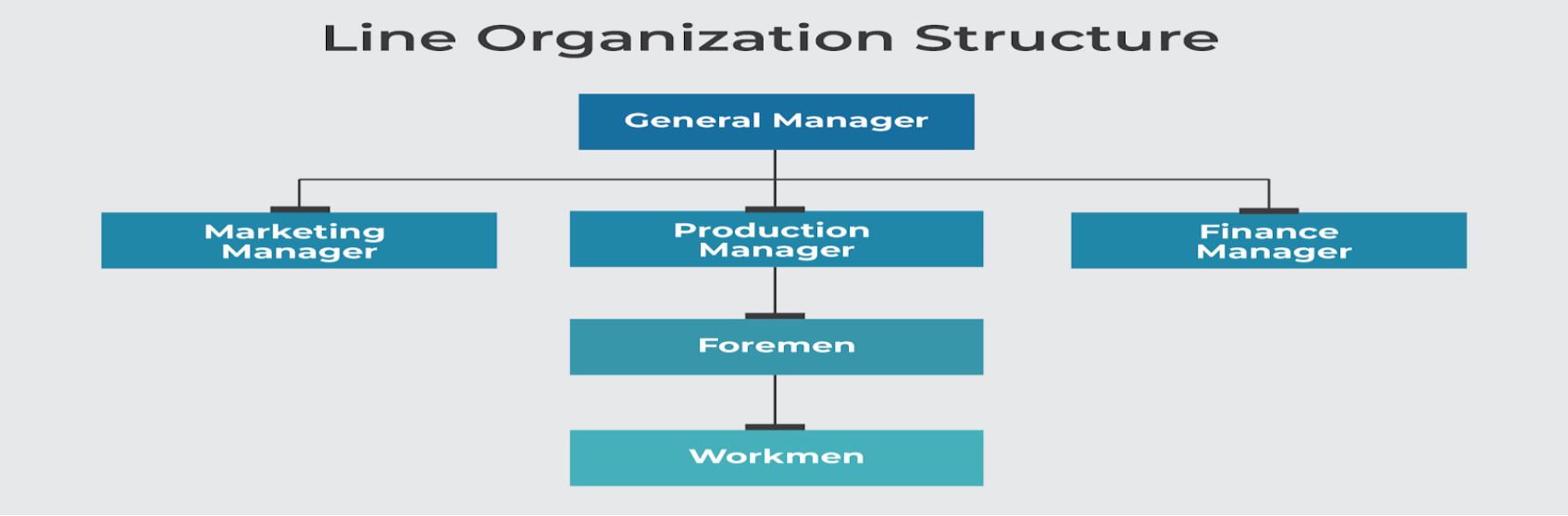


1. Organic or Simple Organization

- This type of organization is very flexible and able to adapt well to market changes.
- This structure is characterized by having few rules, regulations and management layers and a decentralized decision making a layout.
- The organic organization's design deals well with a rapidly changing environment. People work side-by-side to communicate quickly and often solving unforeseen problems, issues and requirements.
- Here, the project manager has very little or no authority, and may or may not have a designated job role.

2. Line Organization

- This is the simplest form of organizational structure commonly adopted by small companies. It has well-defined authority levels in the hierarchical structure. Power flows from the top down to different operational levels or workers.
- The hierarchical structure clearly defines authority, responsibility, and accountability at each level.
- Due to its simplicity, authority and responsibilities are transparent and easily traceable. Communication is fast and easy because employees get quick feedback and respond fast.
- The project manager performs duties based on position or authority in the hierarchy. Some organizations don't have this position, but when they do, they may have little or nothing to do.



3. Line and Staff Organization

- The Line and Staff Organization is a modification of the Line Organization. Here, functional specialists work with line managers to guide and advise them.
- This structure is more common in present-day, and most of the larger enterprises adopt this type of set up.
- The staff consists of two categories; the general and the specialized team.

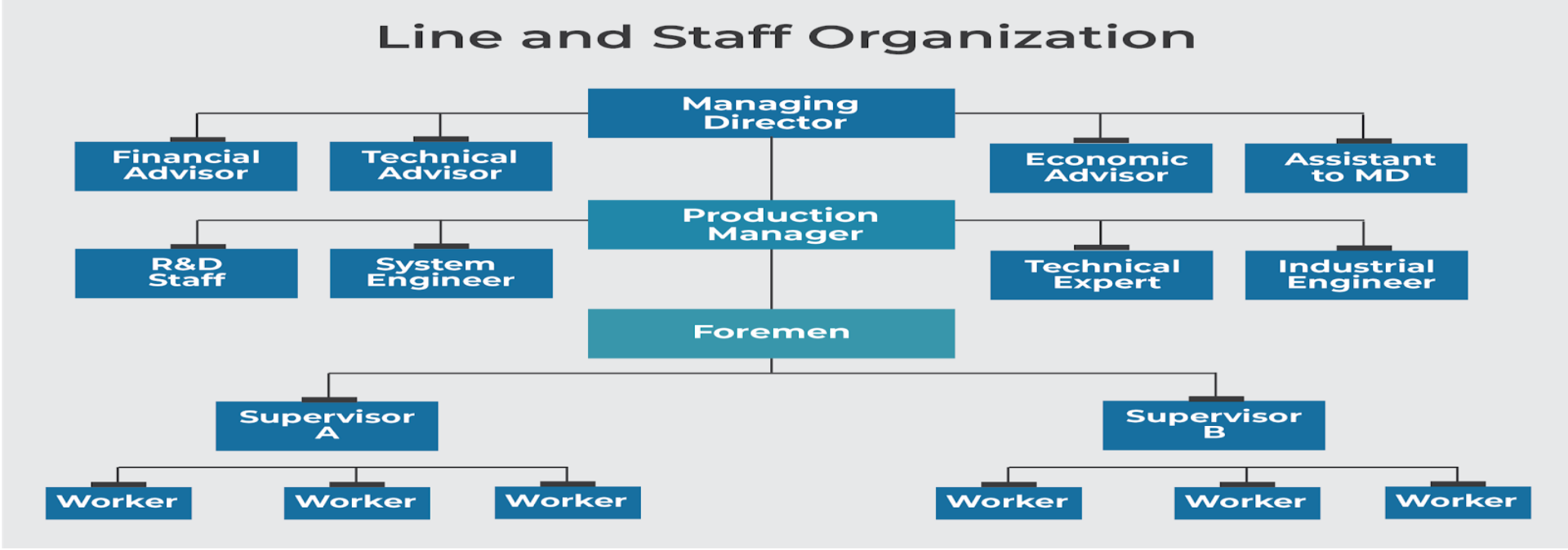
General Staff

The general staff consists of the ordinary employees that assist the top management. These staff aren't experts

Specialized Staff

This team consists of experts that offer services to the organization. Their roles can be advisory, control (as in quality control), or service (such as maintenance).

The Line and Staff Organization uses the expertise of specialists. So the line managers become better in several fields.



Advantages

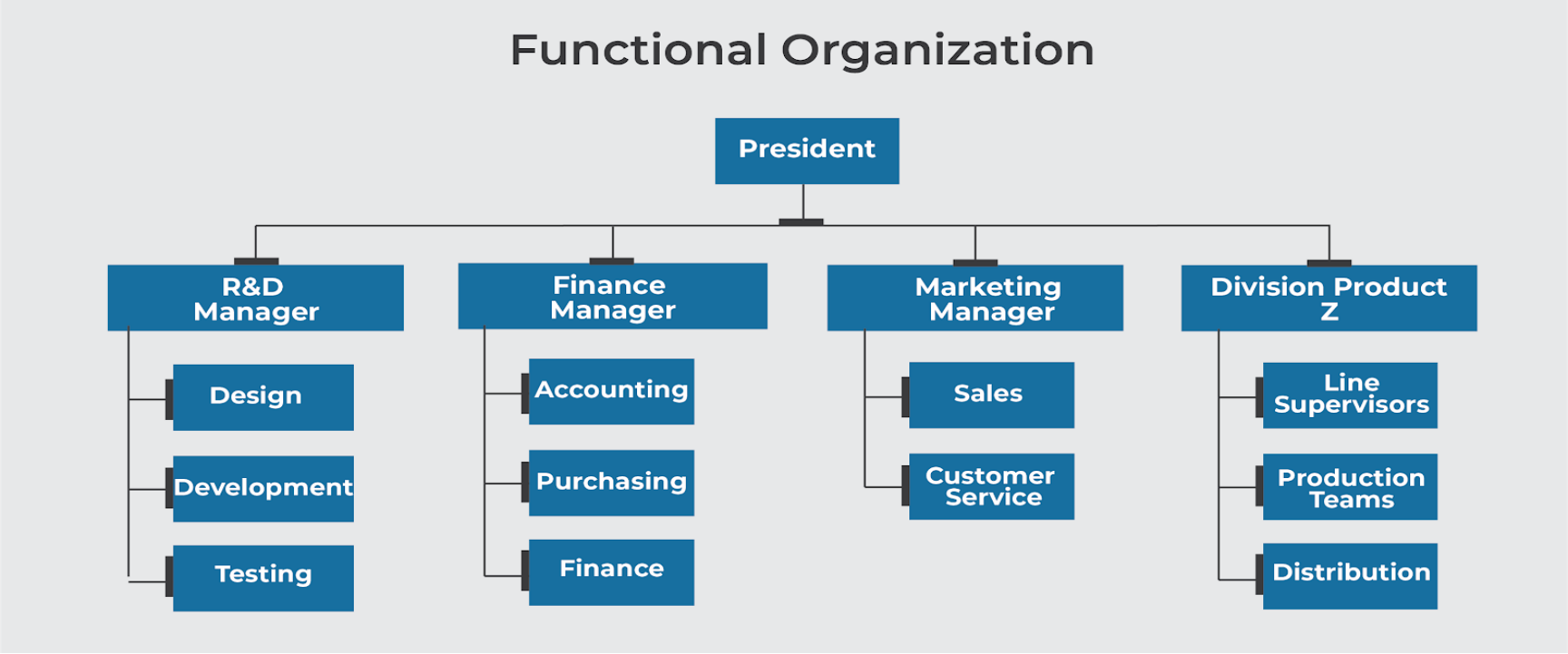
- Staff can make quality decisions, get support from specialists, and enjoy better coordination.
- Get training to enhance skills, get an opportunity to work in research & development.

Disadvantages

- Increased confusion and conflicts among the staff
- Higher costs on hiring specialist
- A tendency to develop personal image within the group

4. Functional Organization

- The Functional Organization groups workers based on their area of specialization. This structure is an extension of the Line Organization. The functional manager leads the team and manages all the operations or businesses.
- The Functional Organization manager enforces directives within a clearly defined scope of authority. This concept originated with Fredrick W. Taylor.
- Here you classify workers according to their functional roles and department. Some of the general departments under this are: Finance, HR, Sales, Customer service, Supply Chain, etc.
- The organization's head is the president, followed by the vice president, and the chain goes on. Furthermore, the leaders of departments foresee their departmental performance. So they collectively help the organization control quality and uniformity.
- The structure positions departments vertically and disconnected from others. Hence the name “silos.” The department heads manage communication between the top management and his subordinates.
- The project manager has a minimal role to play or may not have a designated position. Generally, you'll play the role of an expediter or work as a coordinator. While as a functional manager, you'll deal with - Budget allocation , Resource allocation, and Decision making.
- This type of organization is suitable for manufacturing or engineering companies. It supports ongoing operations and practices for producing standard products.



In the functional organizational structure, projects are initiated and executed by the divisional managers, who assume the project manager duties in addition to their regular, functional, roles. They are often given secondary titles such as "Coordinator of Project X."

•In this structure, project managers usually don't have a lot of authority to obtain resources or to manage schedules and budgets. They must obtain approvals to utilize resources from other departments, which can be a complex undertaking. This is because the functional organization is designed to focus on the provision of the divisional services rather than project deliverables.

Advantages

- Some of the main benefits of this type of organization are:
- It groups employees based on functional skills for a higher degree of performance.
- Employees have experience in the same field, resulting in higher output. Also, they deliver high-quality services and results.
- Accountability is evident, as the roles and responsibilities are clearly defined.
- Hierarchy is visible and no need for multiple reporting
- No duplication of work as each department is different. Also, the job description is clear.
- Career path for the staff is clear and visible

Disadvantages

- Employees get bored from the routine and lose enthusiasm.
- It limits the management skills of functional managers. Hence, they face restrictions on their growth path and remain specialists. So they're not prepared for top management posts.
- Departments are more concerned with their departmental goals. Hence may be less responsive to the organization’s overall objectives.
- Hiring costs are too high as high-skilled employees cost more.
- It causes conflicts in making critical decisions as a result of bureaucratic hierarchy. Functional managers have full authority and may make arbitrary decisions.

5. Divisional Organization

This type of organization often resembles a Functional Organization. The team members work in different departments. This setup splits the employees into segments based on products, markets, or services.

Albeit, the divisional organization's segments or division are autonomous. Functional units that support this structure include:

- Operations,
- Marketing,
- R & D department, and
- Personnel, etc.

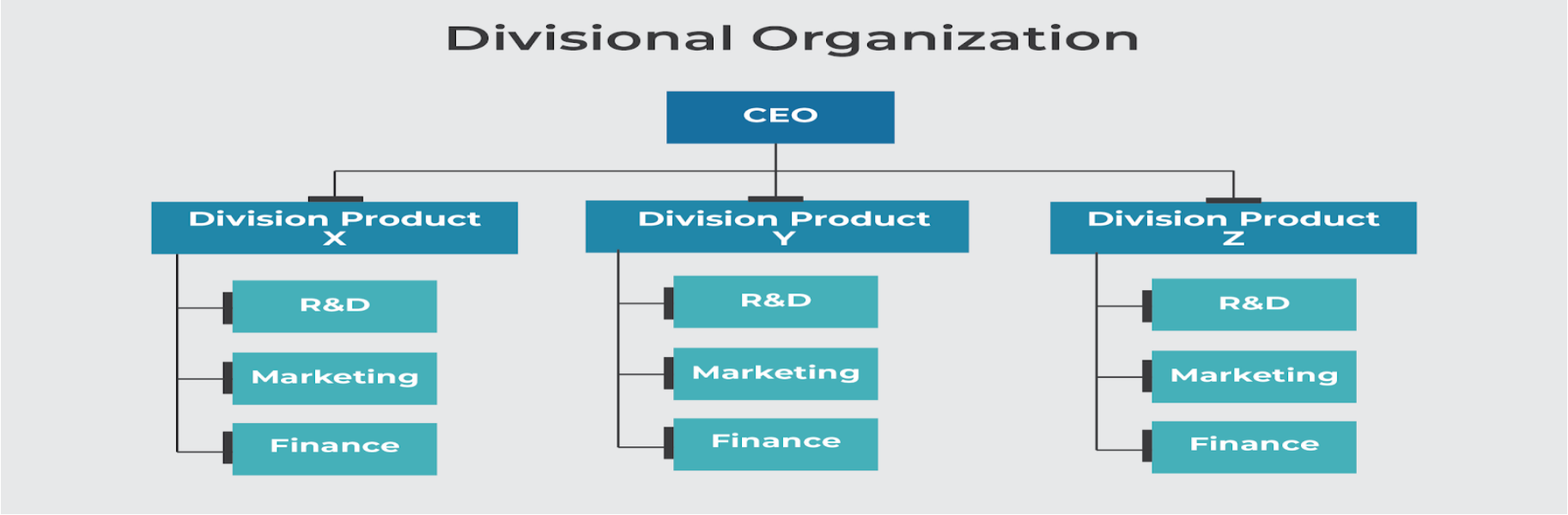
This design focuses on service lines like products, customers, area, and time. Since they operate as small organizations, they're called “self-contained structures.”

So they work independently on divisional goals. But all divisions collectively meet the organizational policies and business objectives.

This type of organization is suitable for companies that

- Operate in different geographical locations,
- Have chain stores with subsidiaries, and
- Banking and insurance business

Here, the project managers may or may not exist or may be hired on temporary assignments.



Advantages

People work in different geographical locations and enjoy different work environments.

Share ideas and enhance skills, thereby creating a collaborative work culture. Thus enhancing overall productivity.

Disadvantages

This structure affects the integration of the organization as a whole.

The autonomous nature often results in duplication of functions and resources.

Segmentation creates boundaries among divisions and may lead to poor inter-unit coordination

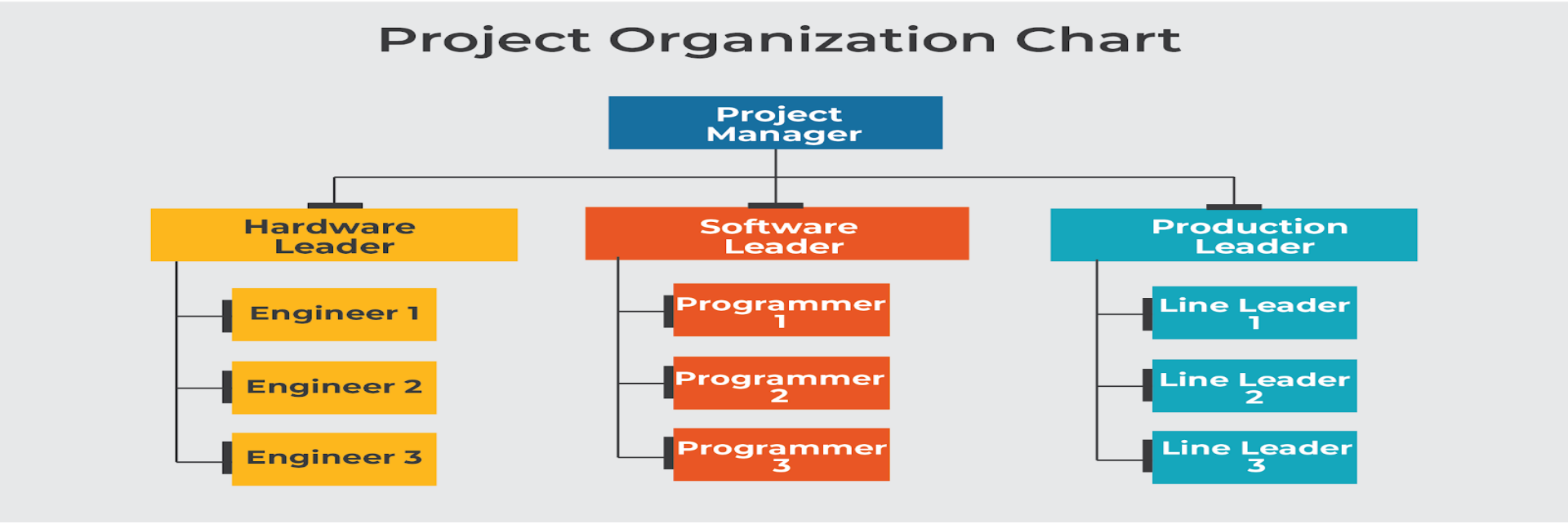
6. Project-Oriented

- On the other end of the scale is the project-oriented organization. These companies do most of their work on a project basis and are therefore structured around projects. This includes construction contractors, architectural firms, and consultants. Project organization is a temporary setup formed for specific projects. It's also called “Projectized organizational structure.” The project manager assigned for the project is the head of this structure.
- Once the project is complete, you may choose to dismantle this setup or move it to form a new project. In the case of a new project, the project manager might have to reshuffle the staff to fit the new plan. You’ll hire resources or specialists from different functional departments.
- As a project manager, you can use allotted resources until completion and closeout. Albeit you're accountable for all the activities and timely completion of the project. In other words, you must spend based on the project budget. The manager assigns clearly defined tasks to each of the team members, along with the complete schedule.

  These types of organizations are useful when:

- - The project scope is complete, and objectives are clearly defined
- - Project is unique and independent

- Project managers are usually full time in the role, and for small projects they might manage several projects at once.
- In this structure project managers usually have a great deal of independence and authority. They are able to draw on resources with little required approval.
- In fact, most of these types of organizations have some form of functional divisions which are placeholders for resources that can be utilized by all projects. They are usually called "departments."
- For example, at an engineering firm the geotechnical department is available as an expert resource to all projects within the firm.



Advantages

- Easy to communicate, hence can stay up to date
- The team can have a strong sense of identity as all are working together to achieve a common goal
- Manage resources efficiently and effectively

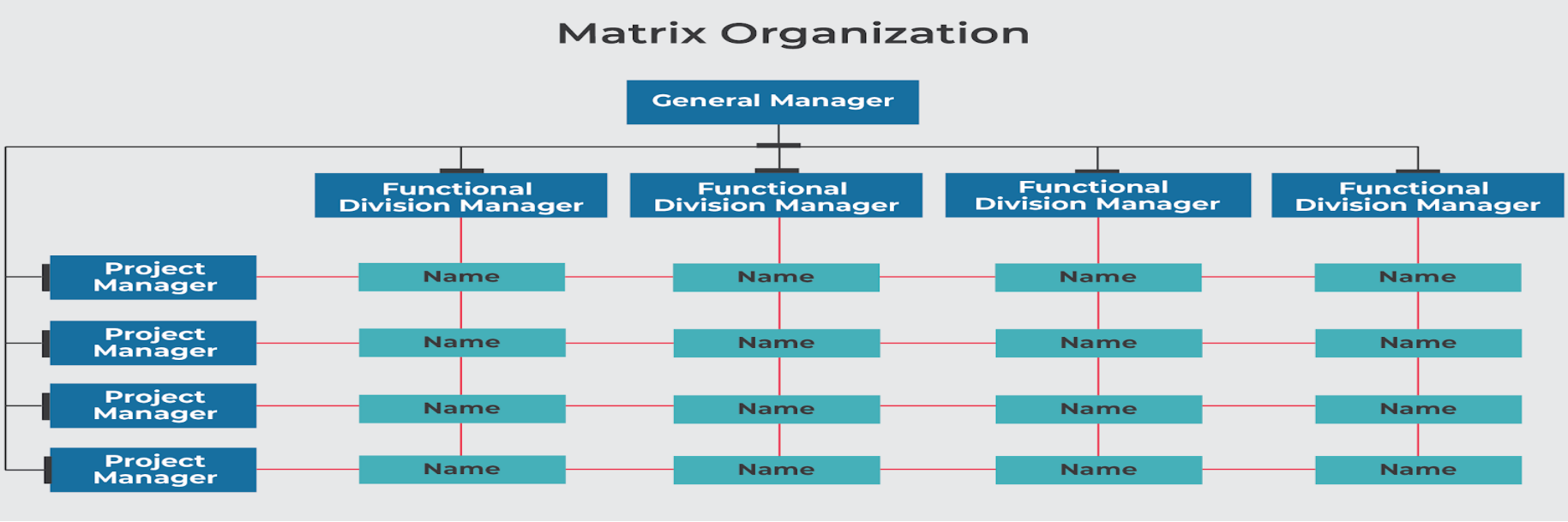
Disadvantages

- No clear growth path for the team once the project gets completed
- It's expensive because the organization dedicates all the specialists for one single project.

7. Matrix organization

This one is the combination of a projectized and functional organization. This hybrid organization overcomes the limitations of each organization. Here, both the functional and project managers share their respective authorities.

- Project managers are generally responsible for
- - Overall integration
- - Project planning
- - Execution of the project, and
- - Completion of project activities.
- All activities must be done using the assigned resources.
- The functional managers are concerned with the operational aspects of the project. They're also responsible for providing technical guidance.
- The functional staff specializes in the skills required for the project. Though project managers manage the project staff, functional managers control the process.
- This type of organization is most useful when workers must share available resources. The combination achieves high efficiency and better usage of available resources. Also, they adapt better to the changing trends.
- You can further classify the Matrix Organization into – Balanced, Strong and, Weak.
- The authority level that both functional and project managers share determines its strength.



Advantages

It helps in sharing resources efficiently

Decision making is balanced and flexible

Staff members can communicate with each other across boundaries

Pleasant environment

It has a clear career graph and job security; hence, members would be more loyal to the organization

Disadvantages

The dual reporting structure add confusion and results in conflicts

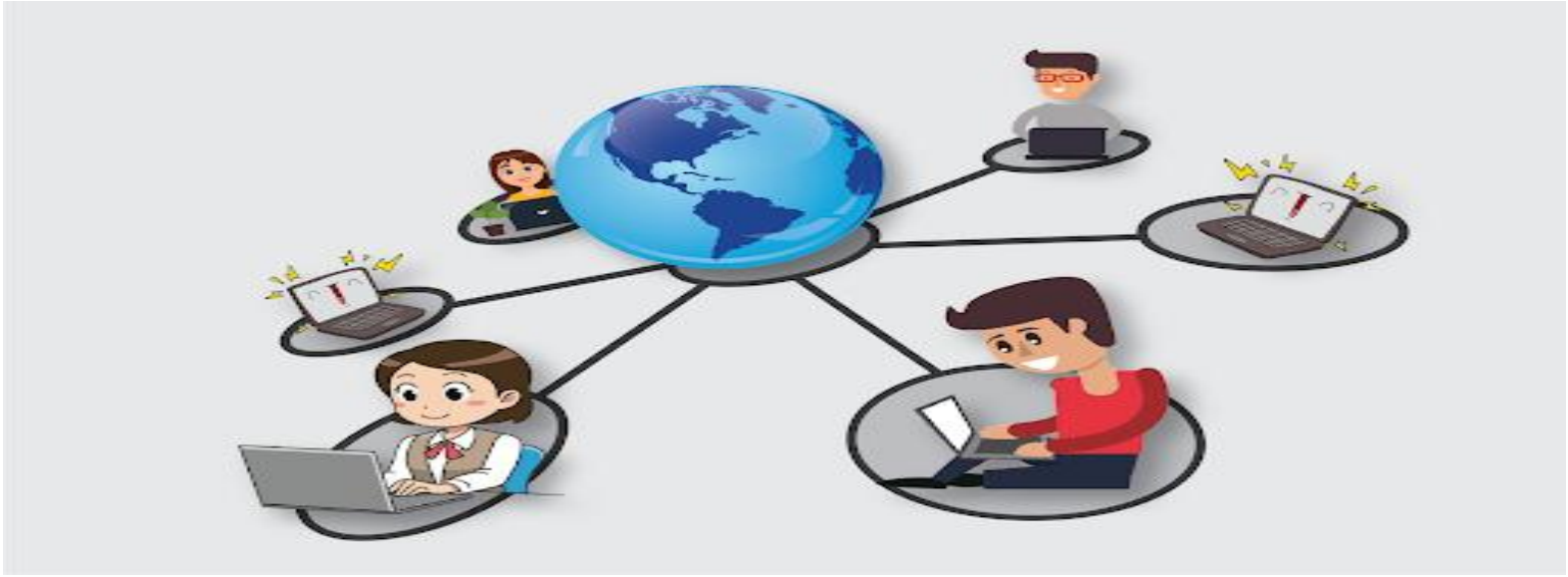
Create issues when there is no coordination between functional and project managers

Resources may be under-utilized if you don't assign them with skill-related tasks

Costly to maintain as it has many managers

You need to maintain resources throughout the project, no matter how long it takes

8. Virtual Organization



A virtual organization is a recent development that involves different locations. When your team executes a project in one area, you can manage it from any other place. So you can distribute resources to your project team regardless of location.

You can connect all the locations virtually. The other names for this organizational structure are:

- Digital organization
- Network organization, or
- Modular organization

- ICT (Information and Communication Technology) is the backbone of virtual organizations. This organization is a social network without vertical and horizontal boundaries.
- Resources aren't tied to a particular workstation (desk). Also, you can work from any mobile device. You can manage every project activity, including meetings, virtually.
- The team reports digitally except on a few occasions that need physical meetings. Hence, it's common to hear of virtual offices, virtual teams, and virtual leadership
- This setup is most suitable for software or IT companies.

Advantages

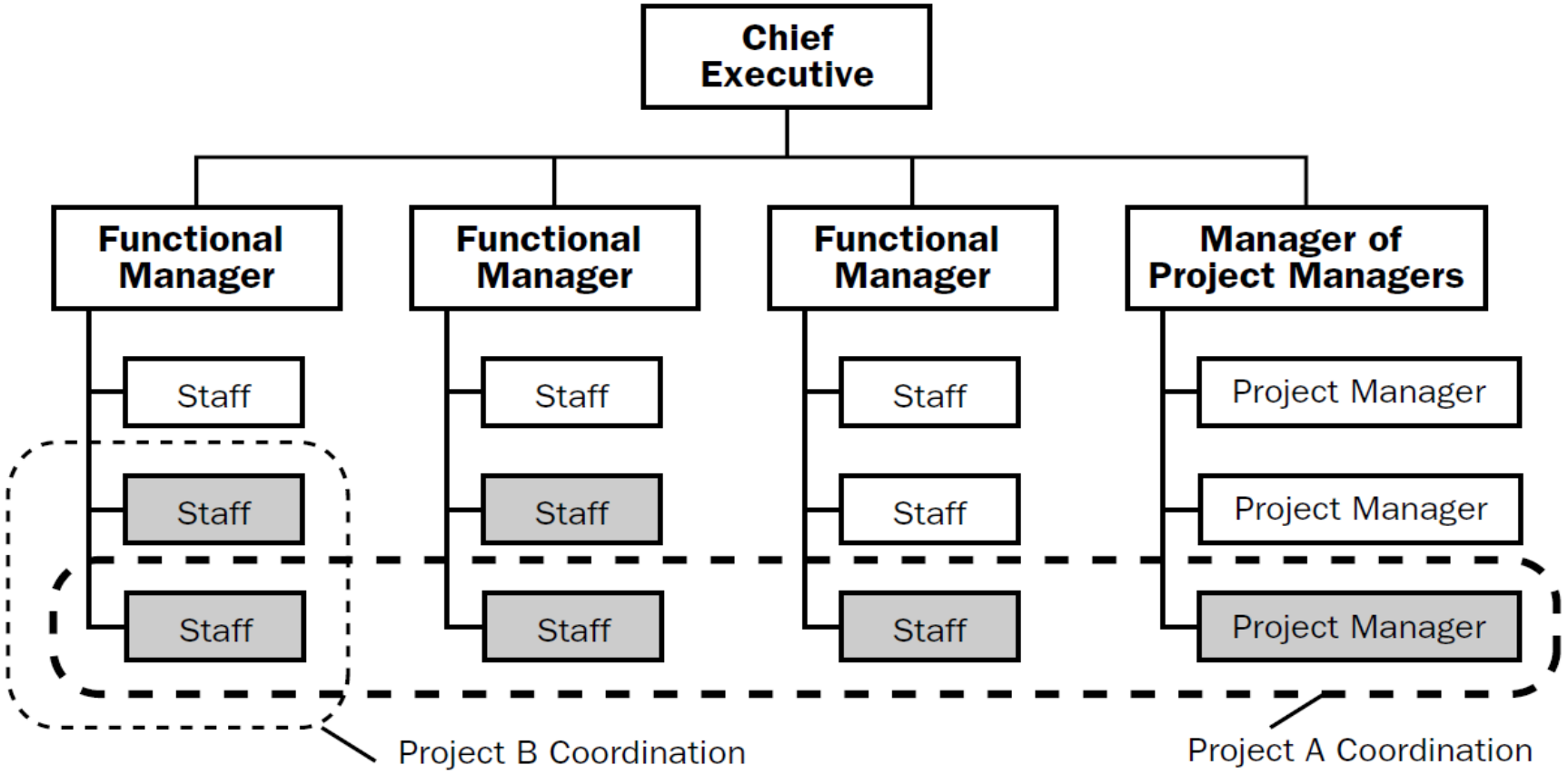
- Faster and cost-effective as there are no boundaries to work and communication.
- Lower operating costs as no permanent set up required (no need for office premises)
- Have several options like flexi time, part-time work, job-sharing, and home-based working, hence increased
- Employee satisfaction and efficiency
- Can have a larger talent pool

Disadvantages

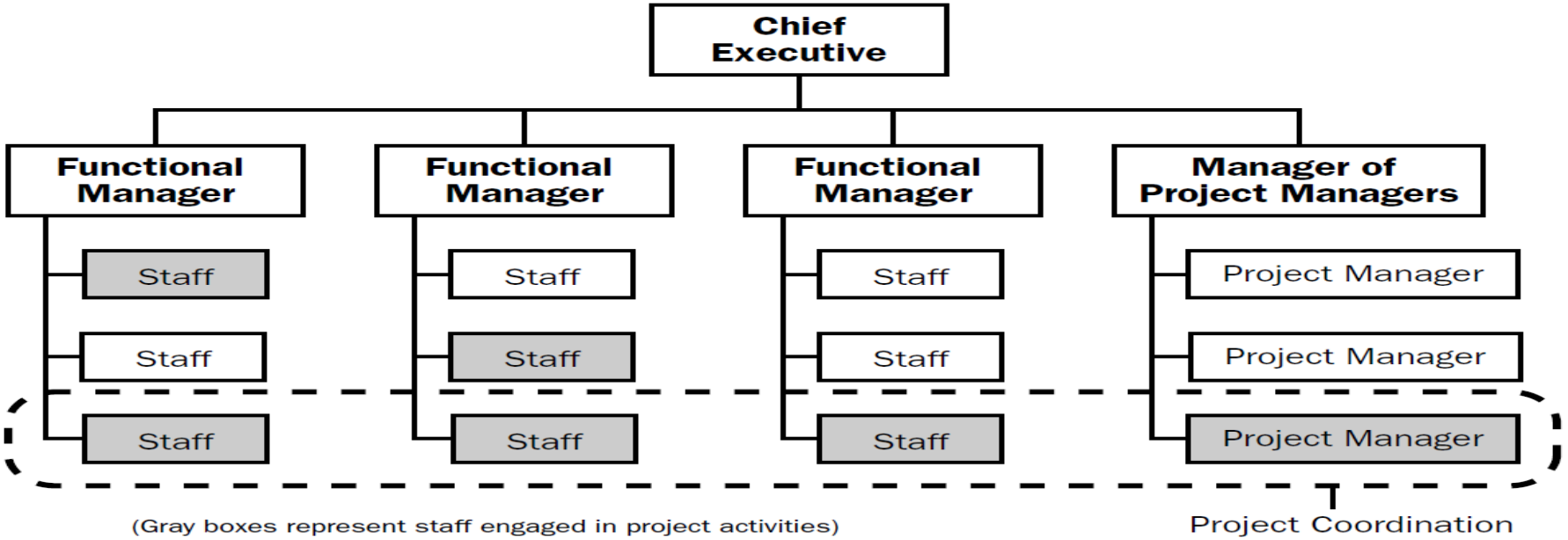
- No physical contact or communication, thus, lacks team integrity
- Difficult to restrict information sharing as your locations are different
- You have to spread resources across various locations and time zones
- Resources require training for virtual interaction
- Different time zones cause delayed responses

9. Composite

Functional organizations and project-oriented organizations are at opposite ends of the spectrum and matrix organizations fall somewhere in between. But it is possible to utilize ***both*** structures at the same time. Therefore, there is a fourth option that requires mention, the composite structure.



(Gray boxes represent staff engaged in project activities)



- This project management arm often takes the form of a Project Management Office, or PMO.
- In spite of its name, the terms strong and weak matrix are not meant to imply a level of desirability to the organization. The names have been coined by the project management industry which has studied the role of projects within organizations, and hence they correspond to strength or weakness in achieving project success. But if that comes at the expense of poorer delivery of functional services, the organizational goals are not necessarily being achieved. Hence, the correct project organizational structure is one which achieves the organization's goals, and this can fall anywhere along the project/functional spectrum according to the specific needs of the organization and/or project.

- This occurs when a project structure and a functional structure both report to a central executive.
- For example, a state government department of transportation has a maintenance division which seeks to maintain the level of service of the state's roads and bridges, and a capital projects division which builds new roads and bridges. The maintenance division and the capital projects
- division are located side by side, reporting to the executive. This is a ***composite*** organizational structure (A matrix structure would require new construction to occur within one of the maintenance departments – the project manager would report to a functional manager rather than the executive).
- Most organizations lean one way or the other rather than using both structures, because of the drastically different management styles necessary to perform each of the roles well.

Examples

- A car dealership wants to initiate a new sales process. It assigns the design and implementation to the sales manager, who utilizes some of the sales as well as maintenance personnel to develop the necessary documents and implement the plan. This is a ***functional*** organizational structure.
- A web design firm has a user interface design department, which is available for project work when necessary. The UI department supports the firm's projects and doesn't otherwise carry out much work on its own. This is a ***project-oriented*** organizational structure.
- A vehicle manufacturing firm sets up a project to modernize its assembly line, whereby the project manager is dedicated full time to the project and reports to the executive. The project manager chooses their project team from the design, production, and maintenance departments, who must balance their time between their regular duties and achieving their project work. This is a ***strong matrix*** organization.

Human Aspects of Project Management

Introduction

One of the biggest challenges project managers face is balancing, organizing, winning, overcoming, placating, supporting, guiding, leading, and as appropriate, modifying the human aspects involved with the project.

Project management is built around structured methodology usually and best practices. There are processes to follow, procedures to implement and documentation to create and deliver.

But if we just follow a rigid process, will we really be successful? How does the human element apply to project management? it centers around a few concepts or activities such as communication, organization, ambition and control. While we don't all have those traits, I think most individuals who would be categorized as some what normal have something within their being that, under the right circumstances, strives to achieve those traits.

The key areas to be addressed include:

- Project sponsorship and leadership
- The organization structure and culture
- The project team
- Communication

Human Issues – General

Human Issues can be classified in many ways. Two of these are lateral and based on occurrence.

Lateral classification

Laterally, Human issues could be categorized into four types: expectation issues, behavioral issues, operational issues and personal issues.

Expectation issues:

Expectation issues could arise due to the flow of information across and around the project chain and expectation due to this information flow. For example, project team members expect salary/grade revision every year end per the company's declared compensation policy.

Behavioral issues:

Behavioral issues could arise due to temperament and cultural background of the human elements. This could influence the communication, attitude and behavior. This is especially important during change management. For example, the expected behavior for changes is quite predictable. Certain amount of resistance creeps in for change, as also certain amount of slack in the vigor shown to progress.

Operational issues:

- Operational issues could arise when Human resources of unbalanced skill levels try to come together or when work allocation tends to show imbalance. Even factors like mutual competition can initiate operational issues. Operational issues have almost a direct bearing on the Project progress and performance. In fact this issue would extend beyond just the Human resources to all of the Project resources.

Personal issues:

- Personal issues have more to do with the happenings in personal lives of the individuals. This may or may not be concerning the organization. It is difficult to find individuals without personal issues in any aspect of life, although a Project would not much be influenced due to this aspect.

Occurrence classification

In terms of the occurrence Human issues can be classified as team related, project related, stake holder related or project lead related.

Team related issues:

These could arise due to mutual conflicts within members of a project team. When the team blend takes a beating due to differences, the teamwork as a whole could suffer. This could happen due to unbalanced skill levels, cultural differences, or personality differences.

Project related issues:

These arise due to the misunderstandings or misfits with respect to projects. This could happen due to a few people overloaded and it is not acceptable to the respective individuals.

Stakeholder related issues:

When the stakeholders develop differences with respect to anything related to the project, such issues arise. For example, seemingly unreasonable comments given by key stakeholders could lead to demoralization of the project members.

Project lead related issues:

Such issues come up due to differences arising between to the project lead and the team. This could arise, due to a number of factors, like cost/budget overruns, miscommunications, ineffective change management, or bad team relations handling. Each project is a new experience for a project manager no matter however experienced he/she is.

Project implementation

Factors affecting project implementation

- Factors that lead to success of projects
- Political Commitment
- Simplicity of Design
- Careful preparation
- Good management
- Involvement of beneficiaries/community

Factors and problems that lead to failure of projects

- Financial Problems
- Management problems
- Technical problems
- Political problems

Factors affecting project implementation Other typical implementation problems

- Poor scheduling of projects leading to delays in implementation.
- Misallocation of funds
- Delay and sometimes lack of counterpart funding
- Lack of accountability and transparency
- Bureaucracy in decision-making.
- Selfishness/nepotism/favoritism by some project managers.
- Weak monitoring systems
- Natural calamities like drought, earthquakes, landslides, and hailstorms.
- Policy changes
- Migration of beneficiaries
- Lack of team work
- Lack of incentives for implementers. etc.

Pre-requisites for successful project implementation

What can be done to minimize time and cost over-runs and thereby improve the prospects of the successful completion of the project? While a lot of things can be done to achieve this goal, the more important ones appear to be as follows –

Adequate formulation:

often project formulation is deficient because of one or more of the following shortcoming:

- Superficial field investigation;
- A cursory assessment of input requirements;
- Slip-shod methods used for estimating costs and benefits;
- An omission of project linkages;
- Flawed judgments because of the lack of experience of expertise;
- Undue hurry to get started;
- Deliberate over-estimation of benefits and under-estimation of costs.

Sound project organization:

A sound organization for implementing the project is critical to its success. The characteristics of such an organization are:

- It is led by a competent leader who is accountable for the project performance;
- The authority of the project leader and his team is commensurate with their responsibility;
- Adequate attention is paid to the human side of the project;
- Systems and methods are clearly defined;
- Rewards and penalties to individuals are related to performance.

Project implementation planning:

Once the investment decision is taken and often even while the formulation and appraisal are being done, it is necessary to do detailed implementation planning before commencing the actual implementation. Such planning should seek to:

- Develop a comprehensive time plan for various activities like land acquisition, tender evaluation, recruitment of personnel, constriction of the building, erection of plant, arrangement for utilities, trial production run, run, etc.
- Estimate meticulously the resources requirements (manpower, materials, money, etc.) for each period to realize the time plan;
- Define properly the inter-linkages between various activities of the project;
- Specify cost standards.

Advance action:

When the project appears prima facie to be variable and desirable, advance action on the following activities may be initiated:

- a) Acquisition of land,
- b) Securing essential clearance,
- c) Identify technical collaborators/consultants,
- d) Arranging for infrastructure facilities,
- e) Preliminary design and engineering, and,
- f) Calling of tenders.

Timely availability of funds:

Once a project is approved, adequate funds must be made available to meet its requirements as per the plan of implementation, it would be highly desirable if funds are provided even before the final approval to initiate advance action.

Judicious equipment tendering and procurement:

To minimize time over-runs, it may appear that a turnkey contract has obvious advantages. Since these contracts are likely to be bagged by foreign suppliers, when global tenders are floated, a very important question arises. How much should we rely on foreign suppliers and how much should we depend on indigenous suppliers?

It should focus sharply on the critical aspects of project implementation. It must lay more emphasis on physical milestones and not on financial targets.

Project network

A project network (or *project activity network*) is a graphical depiction (very similar to a flow chart) that shows the sequence in which the project's *terminal elements* must be completed. Each terminal element represents an *activity* that relates to a work package at the lowest level of the *work breakdown structure* (WBS).

However, whereas the WBS does not attempt to identify the sequence of events or the duration of any activity, the project network seeks to identify the sequence in which activities occur and the other activities (if any) on which a particular activity depends.

There are a number of techniques used to create a project activity network. Some of the more commonly used techniques include *Gantt charts*, *Critical Path Management* (CPM) and the *Project Evaluation and Review Technique* (PERT). In some techniques, each terminal element (or activity) is represented by a *node* on a graph, while in others it is represented by an *edge* (the line connecting two nodes). Each terminal element should lie on only one path through the network.

A graphic or tabular schedule

The project network diagram displays the duration of activities in the project, their chronological order and logical dependencies between the activities graphically or in tabular form.

Unlike the work breakdown structure (WBS), a network diagram also takes into account the chronological order of activities according to their dependencies, and not just the logical order of the project activities. Bar charts such as Gantt Charts are a special form of the network diagram.

Main functions of a network diagram are:

Determination of the total duration of the project

Representation of the logical and chronological order in the project

Risks: Where is the critical path? Where are potential bottle necks in the project process?

Opportunities: Where can the project process be streamlined?

Network Construction

Activity:

A project consists of several activities or operations, and the project is said to be completed when all such activities are completed. Activity is the actual performance of a task. This consumes resources i.e., time, manpower, space, material, money etc.

Event:

It is a start or completion of task. In other words, an event is an instantaneous point of time at which activity or activities start or finish. This does not consume time or resources.

Following example will clarify the difference between an event and activity:

Start Machine Installation: An event

Machine Installation: An activity

Completion of Machine Installation: An event

C.P.M. Systems:

- Mainly there are two systems:
- 1. AOA system i.e., ‘Activity on the Arrow system’.
- 2. AON system, i.e., ‘Activity on the Node system’.

1. AOA System:

In the ‘Activity on the Arrow system’ (Arrow Diagram Method) is an activity graphically represented by an arrow as shown on the left side

Fig. 28.10. Representation of activities and event in AOA system.

- The tail end of the arrow represents the start and the head of the arrow represents the finish or end of the
- activity. The description of the activity is written above the arrow. Events are represented by circles or nodes at the beginning and the end of activity arrow as shown on the right hand side.

Rules for Network Construction:

1. The length of the arrow bears no relationship to the time which the activity takes or the resources which the activity consumes.
2. The arrow in a network identifies the logical conditions of dependency. The geom-etry of arrow diagram is of no significance except that it should be aesthetically pleasing.
3. The direction of the arrow indicates the direction of work flow. The normal convention is to go from left to right.
4. All networks are constructed logically on the principle of dependency.
5. No event can be reached in a project before the activity which immediately proceeds is completed. Similarly no activity can be started until the event which immediately precedes it has been reached.
6. Every activity in the network should be completed to reach the objectives of the end event.
7. No set of activities can form a circular loop.

2. AON System of Network Representation:

In the ‘Activity on the Node’ System, activities are represented by the circles or nodes and arrows are used to show only the dependency relationship between the activity nodes.

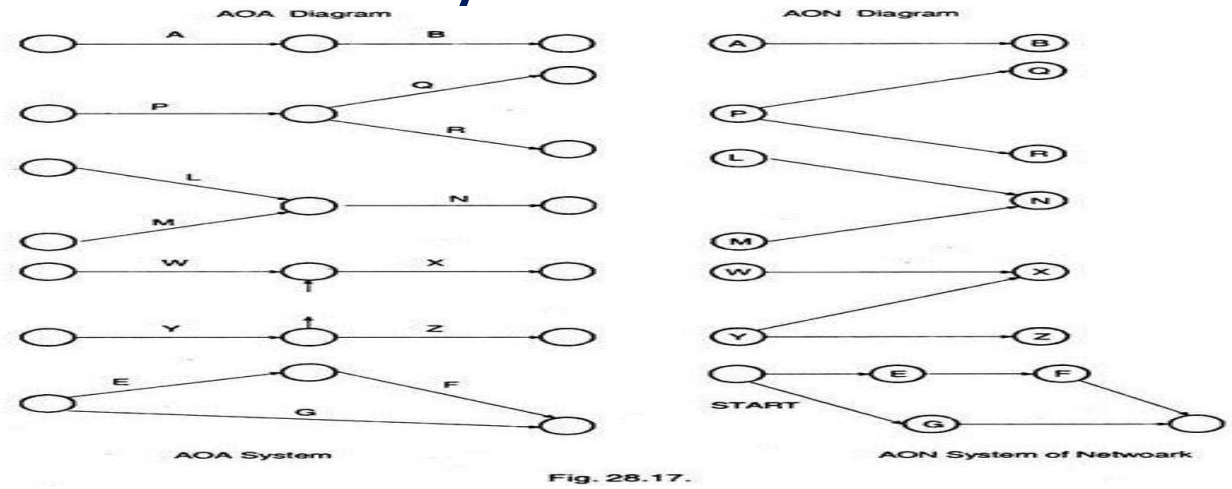


Fig. 28.17.

The above figure gives some AOA networks against which corresponding networks in the AON system are shown. It can be noticed that dummy arrows are eliminated in the AON system.

Network Development:

In developing a network diagram, the following questions must be asked for each operation:

(i) What activity must immediately precede this operation?

(ii) What activity should immediately follow this operation?

(iii) What activities can take place concurrently with this operation?

Based on these questions, each activity is connected with one or several of the ways

Network Representation | *Interpretation*

Fig 28.23. Sequential

Activity B can not start before activity A is completed or activity B follows activity A or activity A precedes B.

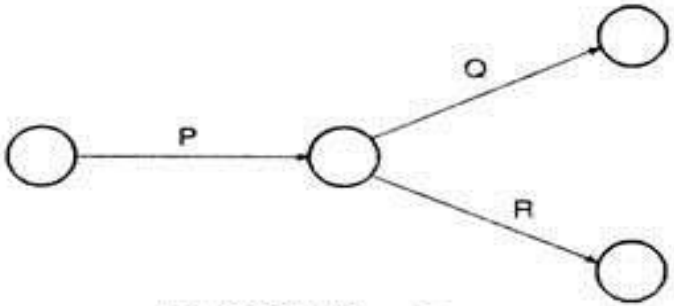


Fig 28.24. Diverging

Activity Q and R can not start before the completion of activity P. Activity Q and R could begin at the same time.

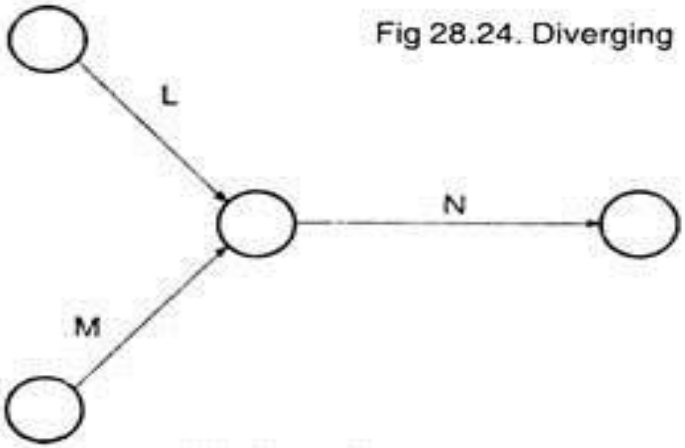


Fig 28.25. Coverging

Activity N cannot start before both the activities L and M are completed.

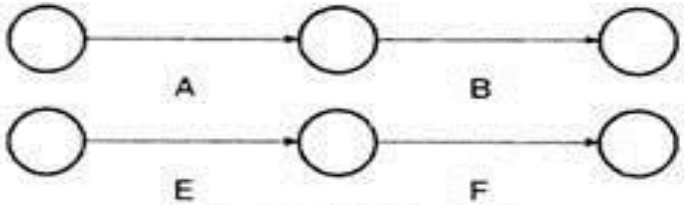


Fig 28.26. Parallel

In these activity chains, B follows A and F follows E but the activity chains are completely independent of each other.

Example to illustrate Network Development:

The following are the activities and the logic for a project:

1. U and R can be carried out at the same time. They represent the beginning of the job.
2. After E follows K.
3. X depends on Q and K.
4. Neither F nor G can be started before R is completed, but they can be concurrently performed.
5. E and Q follow U.
6. Q must be carried out before J.
7. C depends on the completion of F and G.
8. E and Q can be executed at the same time.
9. H can only be started when C, X and J are finished.
10. H is the last activity.

Steps 1 to 7 in Figure 28.27 illustrate the development of net-work for the above logic

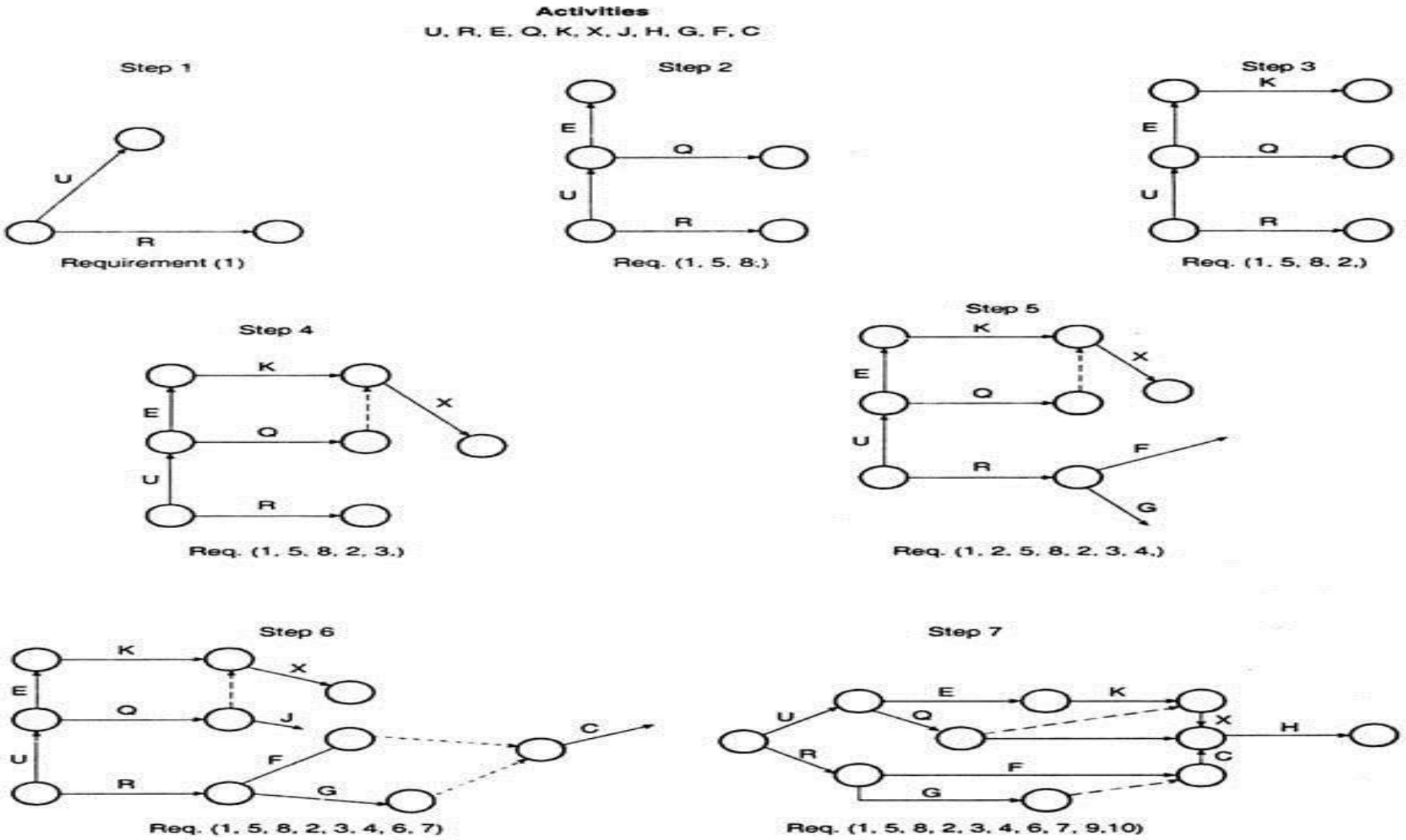


Fig. 28.27.

Questions

- What is project organization structure?
- What is composite organization?
- What is AOR and AON system?
- What do you understand by CPM.
- Write the meaning of net work structure.
- Write short note on – CPM and PERT.
- Explain the features of organization structure.
- Briefly explain the general issues of human aspect in project management.
- Describe the classification of occurrence human issues in project management
- How is construct the network system in the method of CPM.
- Discuss the different types of organization structure.

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