Management Basics

What is Management ???

- Is the process of using what you have { RESOURCES }, to do what you want to do …. {GOALS}

Resources {Assets}

7 categories of resources:

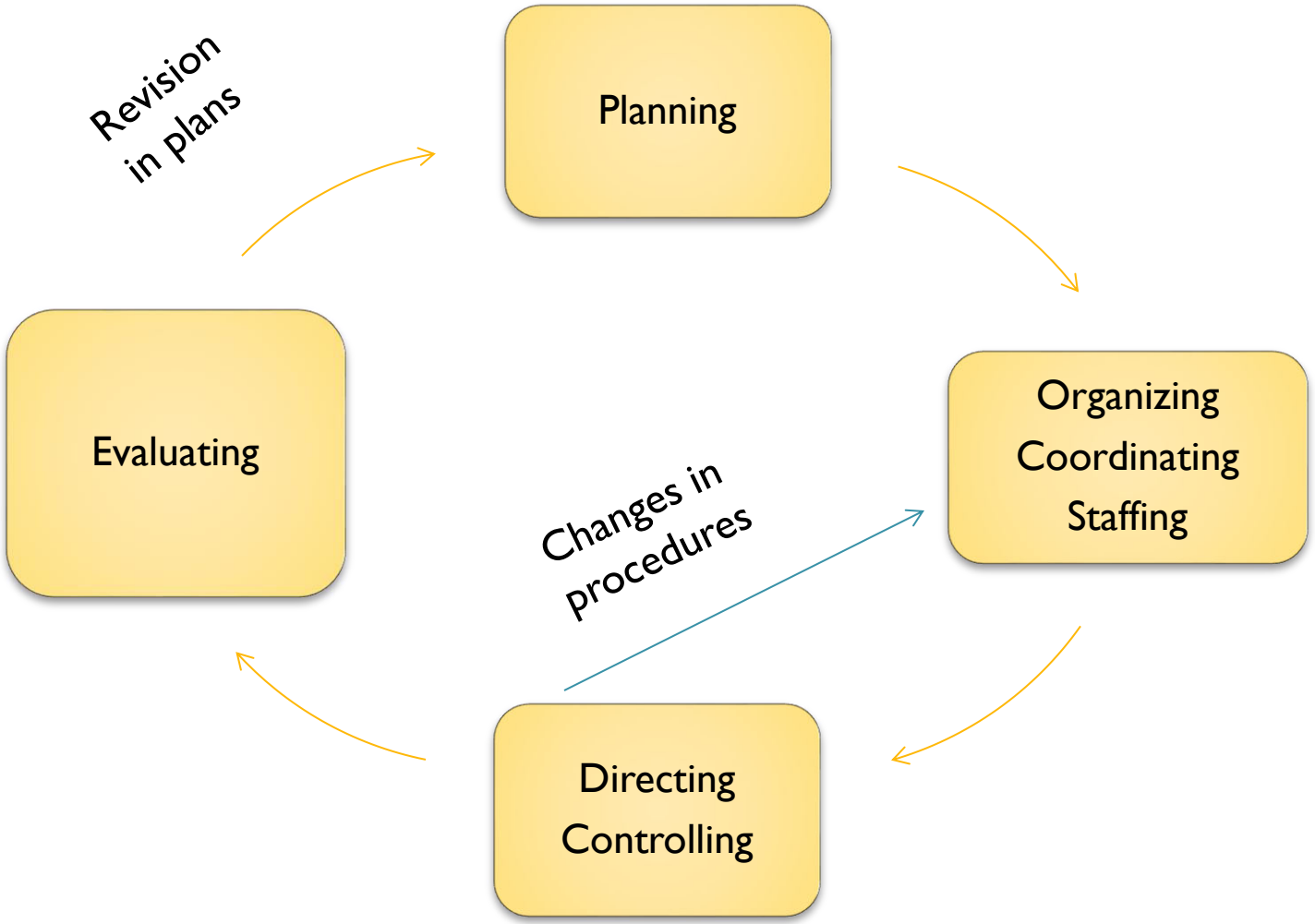
- People
- Money
- Time
- Work Procedures
- Energy
- Materials
- Equipment

Goals

- Profit Levels or Maximum cost levels
- Maintenance or growth of financial strength
- Quality standards
- Guest employee & management concerns
- Professional obligations
- Societal concerns

It is a multipurpose organ that manages business & manages managers & manages worker & work.

The Management process…..

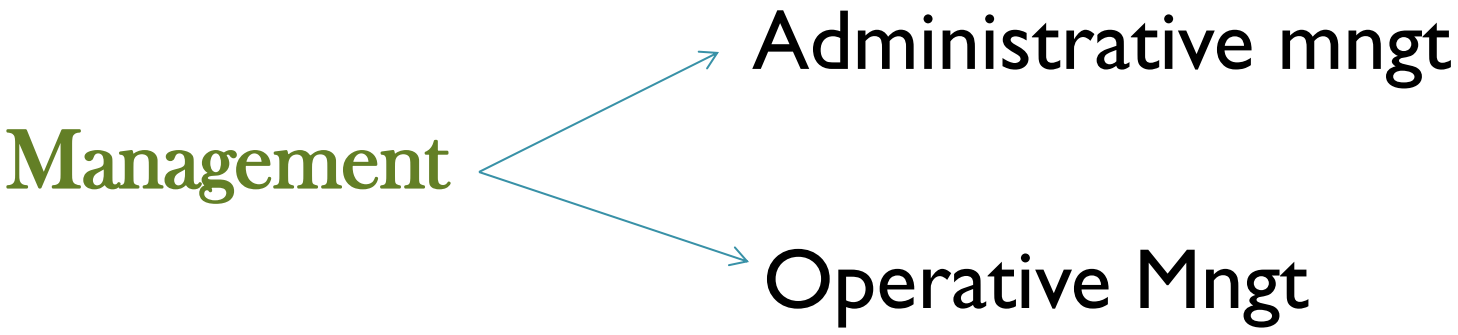


- ADMINISTRATION
- MANAGEMENT
- ORGANIZATION

Confusion …….????

- Organization determines network or structure establishes or relationships among individuals.

- Administration refers to management functions of planning & control

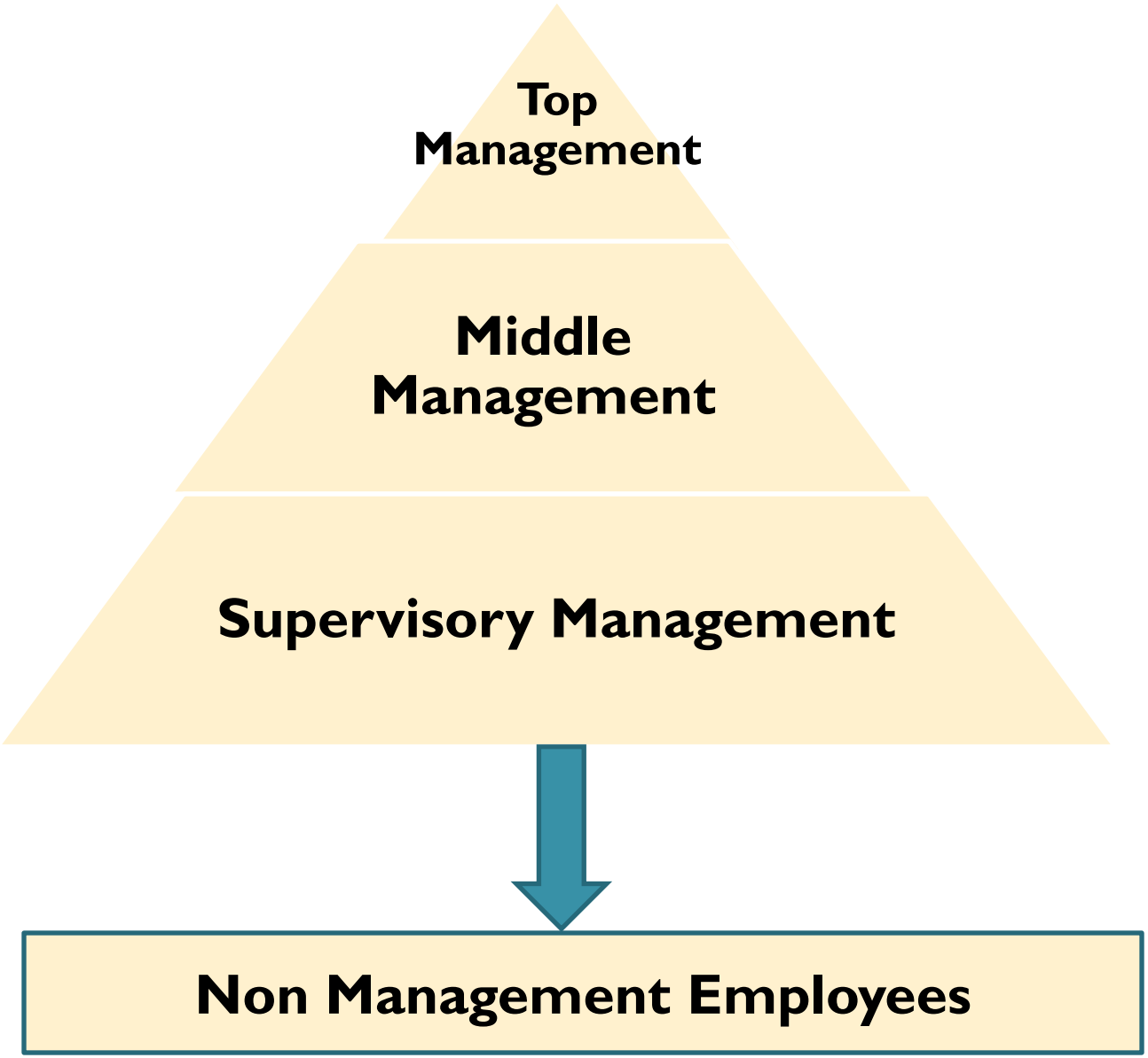


- Administration: Concerned with laying down of corporate policy, obtaining finance, production & distribution.

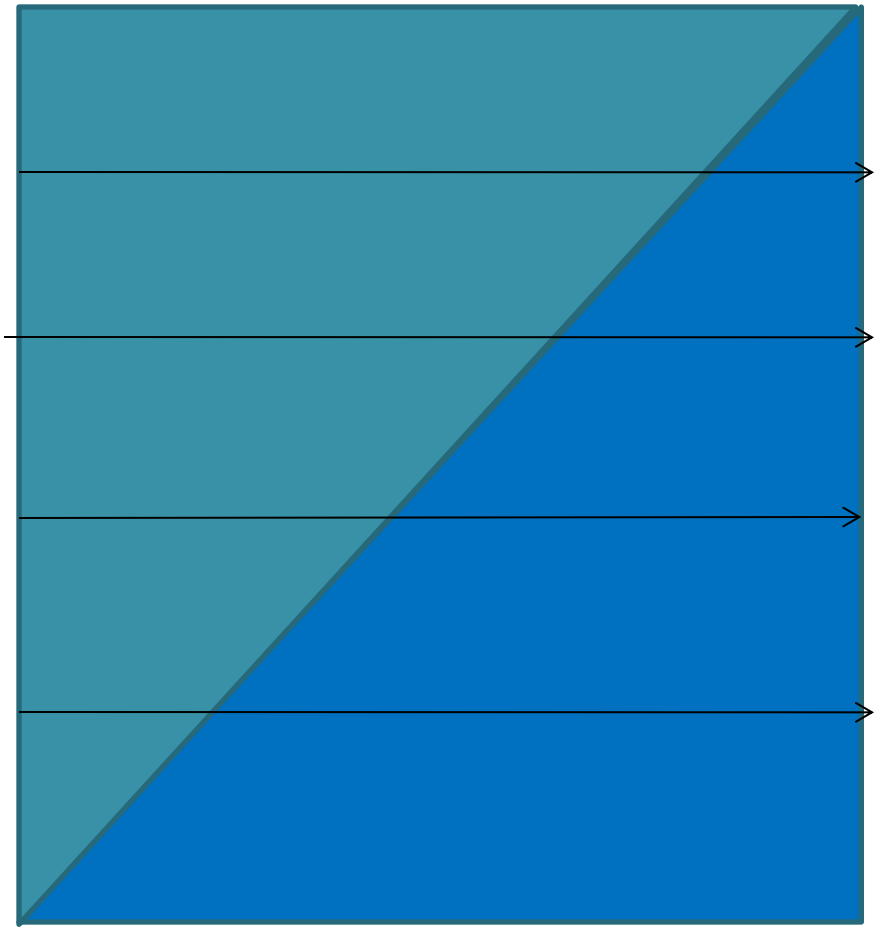
- Management: Concerned with actual execution of policies within limits set by administration.

- Organization: Combines the work in such a way with individuals/groups that duties formed provide best possible application of available effort

Levels of Management



Administrative



Board of directors

CEO

Functional Top Execs

Middle Level Execs

First Line Supervisors

Management

Traits of a manager

- Best Traits

  Fair/just in decisions

  Trusting/trusted at the same time

  Caring & analytical in thought

  Empowering & capable/responsible

  Always punctual

- Worst Traits

Deceitful

Dishonest

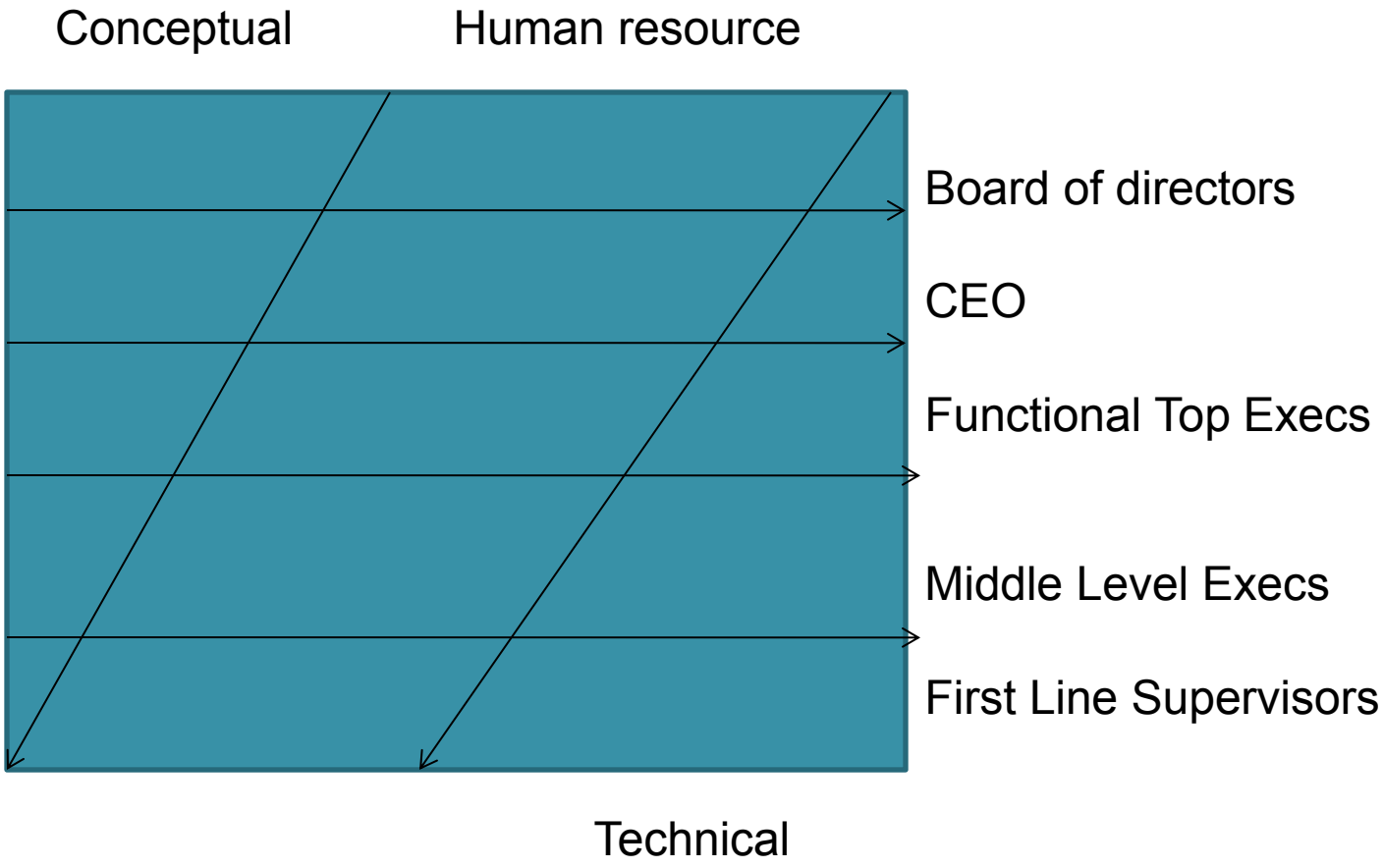
Shows favouritism

Lazy

Unorganized

Skills of a manager ……..

- Human Resource Skills
- Technical Skills
- Conceptual Skills


Conceptual
Human resource
Board of directors
CEO
Functional Top Execs
Middle Level Execs
First Line Supervisors
Technical

IS management an art or science ?

- ART: Because it depends on the skills, aptitude & creativity of the manager

- SCIENCE: Because there is considerable knowledge in the field of management with basic principles for guidance of basic activities.

Pioneers in management

- Assignment 1 20mks
- Last date of submission 28th of JULY 2009
- A4 size sheets ruled/blank
- Neatly presented in a file
- Handwritten

Development Stages in management thought

- The scientific management stage
- The organizational stage
- The management process stage
- The general management theory stage

Scientific Management stage :

- Concerned with :
  - setting work standard
  - planning work
  - Experimenting
  - maintaining the standards
  - Management research
  - Co-operation between managers & workers

1920's

Organizational Stage : {1930's}

Concerned with :

- Organization as a structure
- Administration

Management's main task hence, was to ensure proper work performance within the organization structure

Management process stage {1940's}

- Setting objectives & goals
- Formulating policies as guidelines
- Organizing & staffing
- Directing & motivating

General management theory stage :

- Based on a framework created by previous management concepts
- Affected by : communications & information technology

SWOT :

SWOT Analysis is a strategic planning method used to evaluate the **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats involved in a project or in a business venture.

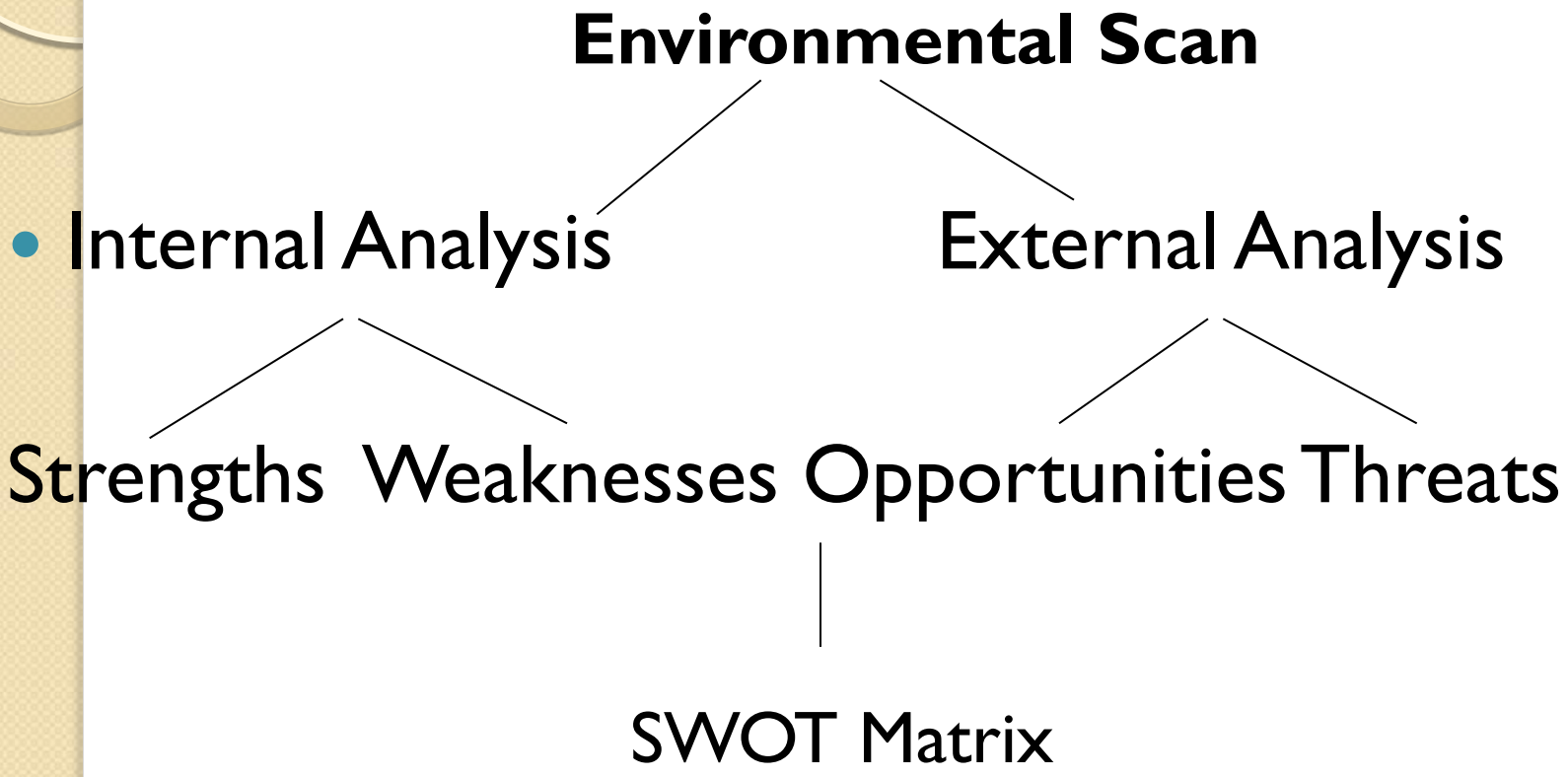
It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favorable and unfavorable to achieving that objective

- **S**trengths: attributes of the person or company that are helpful to achieving the objective.
- **W**eaknesses: The absence of certain strengths maybe considered a weakness.
- **O**pportunities: *external* conditions that are helpful to achieving the objective.
- **T**hreats: changes in the *external* conditions which could do damage to the objective.

Creative use of SWOT

- How can we Use and Capitalize on each Strength?
- How can we Improve each Weakness?
- How can we Exploit and Benefit from each Opportunity?
- How can we Mitigate each Threat ?

SWOT analysis framework



Strengths :

- Strong brand name
- Good reputation among customers
- Exclusive access to high grade natural resources
- Favourable access to distribution networks

Weakness:

- A weak brand name
- Poor reputation among customers
- High cost structure
- Lack of access to best natural resources

Opportunities:

- An unfulfilled customer need
- Arrival of new technologies
- Loosening of regulations
- Removal of international trade barriers

Threats:

- Shift in consumer tastes away from the firm's products
- Emergence of substitute products
- New regulations
- Increased trade barriers

SWOT MATRIX

	Strengths	Weakness
Opportunities	S-O Strategies	W-O Strategies
Threats	S-T Strategies	W-T Strategies

- S-O Strategies: Pursue opportunities that are a good company's fit to the company's strengths
- W-O Strategies: Overcome weaknesses to pursue opportunities
- S-T Strategies: Identify ways to use strengths to reduce vulnerability to external threats
- W-T Strategies: Establish a defensive plan to prevent the firm's weaknesses from making it highly susceptible to external threats

Planning

Requires decisions on …..

- What should be done
- How it should be done
- Who will be responsible
- Where the action is to be taken
- Why is it done

Planning is the first step of management process concerned with the establishment of objectives and analysis of present limitations for attaining such goals

Advantages

- Increases the organization's ability to adopt future eventualities
- Helps crystallize objectives
- Ensures a relatedness among decision
- Helps the company remain more competitive in its industry
- Reduces unnecessary pressures of immediacy
- Reduces mistakes and oversights
- Ensures a more productive use of resources
- Makes control easier
- Increases effectiveness of a manager
- Helps the organization progress in a manner considered most suitable

Limitations

- Effectiveness depends upon correctness of assumptions
- Planning is expensive
- Planning delays actions
- Encourages a false sense of security

Guidelines for effective planning:

- Involve top management only at key points in the planning process
- Involve line execs in developing the plans
- Do not look for the perfect answer
- Planning should provide realistic targets & alternatives ways to achieve them
- Plans should start on a small scale and e expanded only when the execs have learned the technique & have become convinced of their usefulness

Steps ….

- Crystallizing the opportunity
- Securing and analyzing necessary information
- Establishing planning promises and constraints
- Ascertaining alternative courses of action or plans
- Selecting the optimum plan
- Determining derivative plans
- Fixing timing of introduction
- Arranging future evaluation of effectiveness of the plan

Types of plans

According to time dimension:

- Short term: Upto one year
- Medium Term: >1 yr but <5yrs
- Long term : >5yrs

Types of plans

- Objectives/goals
- Strategies & tactics
- Standards
- Budgets
- Policies
- Procedures
- Programmes
- Rules
- Methods

Goals /objectives

- End results to be achieved
- They give direction to activities
- Require creative thinking and foresight

Strategies and tactics

- Strategies are aimed at counteracting the actions of the opponents

- Tactics are immediate decisions based on the executive's judgement and experience whilst facing an actual situation

Standards

- Measure of level of achievement
- Very helpful in evaluating deviations from the plan

Budgets

- Used as both- planning and control device
- May be expressed in units of product, finance etc

Policies

- General statements aimed at guiding thinking whilst making decisions

Eg: “promotions should be from within the company or the existing staff”

Procedures

Involves a selection and establishment of a logical series of tasks within the framework of predetermined policies and objectives

Programmes

- Programme integrates policies, procedures etc required for effecting a certain course of action

Rules

- Rules are related to procedures as they guide action but there Is no time sequence involved

  Eg: Procedure for handling mail may require a rule “all letters received should be replied to on the same day”

Methods:

- Prescribes specifically and in detail how a task is to be done
- Constitutes the best method of performing a task

Organizing

A FUNCTION OF MANAGEMENT .....

- The word ‘organise’ means placement of ideas, objects or people in a correct order so that they are easily available whenever required.

- In management, it represents all those activities that result in the formal assignment of tasks, authority & responsibility to groups and individuals.

Organizing

- **It involves:**

- Classification of work
- Designing of different work units
- Assigning different tasks.
- Establishing co-ordination and relationship amongst the different units and positions.

Organizing Process

- Step I: Review of Strategic and Operational Plans
- Step II: Determination of the activities to be performed to implement the Plans
- Step III: Creation of a job
- Step IV: Departmentation
- Step V: Organization Structure
- Step VI: Determination of Authority

Organization

- Organization involves two or more people with ideas and resources, working together in a structured, formal environment to achieve common goals.

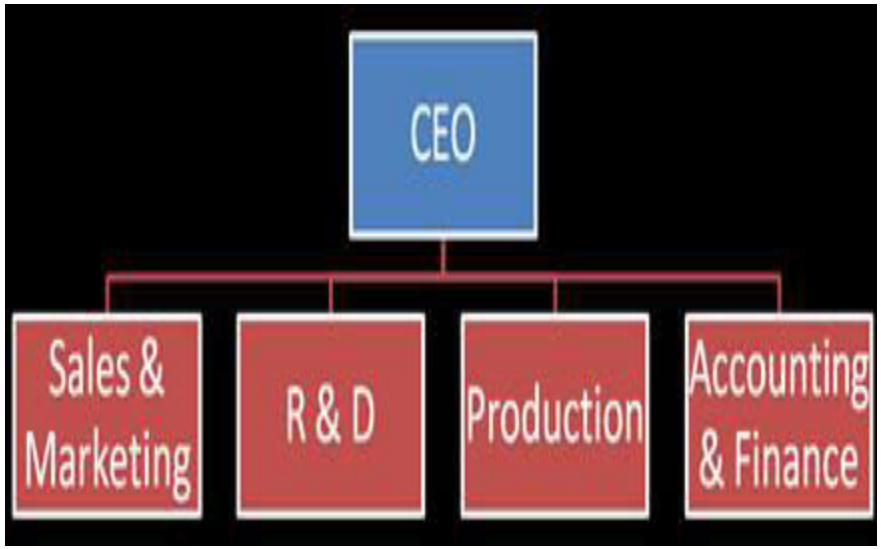
- It is a social and managerial system with a clearly defined boundary, which pursues collective goals through planning, hiring the human resources, directing their effort and controlling the performance.

Basic Organizational Designs:

- Functional Organization
- Divisional Organization
- Matrix Organization
- Strategic business Unit. (SBU)
- Virtual Organization

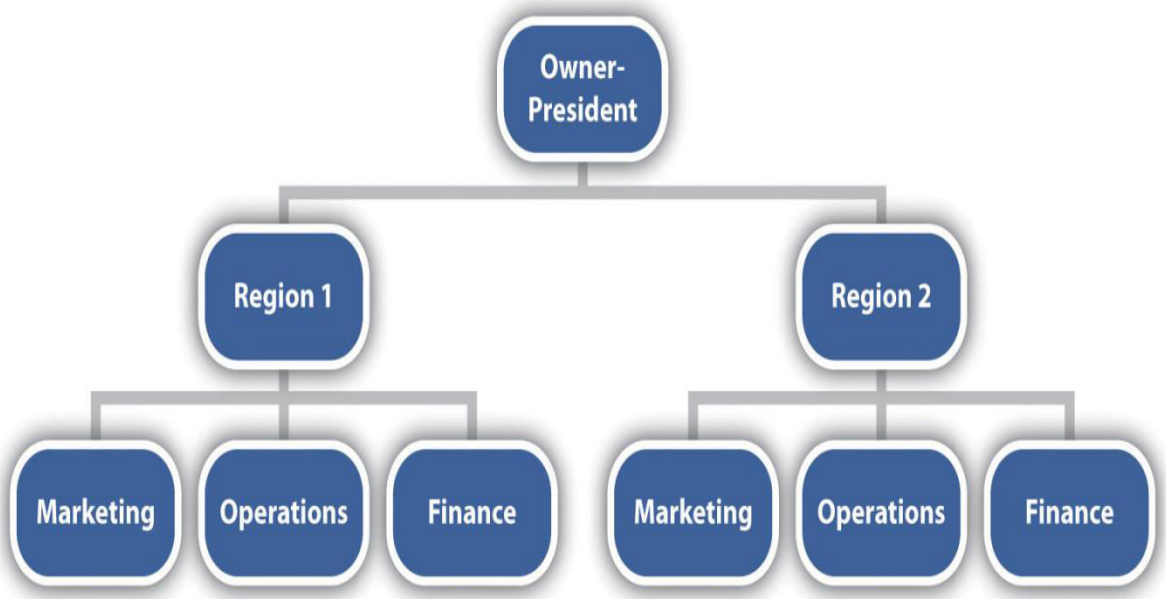
Functional Organization

- This structure is based on occupational specialisation.
- Finance, manufacturing, marketing, accounts, research etc.
- It leads to efficiency and economy.



Divisional Organization

- In this design, the corporate house or group is divided into different divisions.
- These divisions are relatively autonomous.

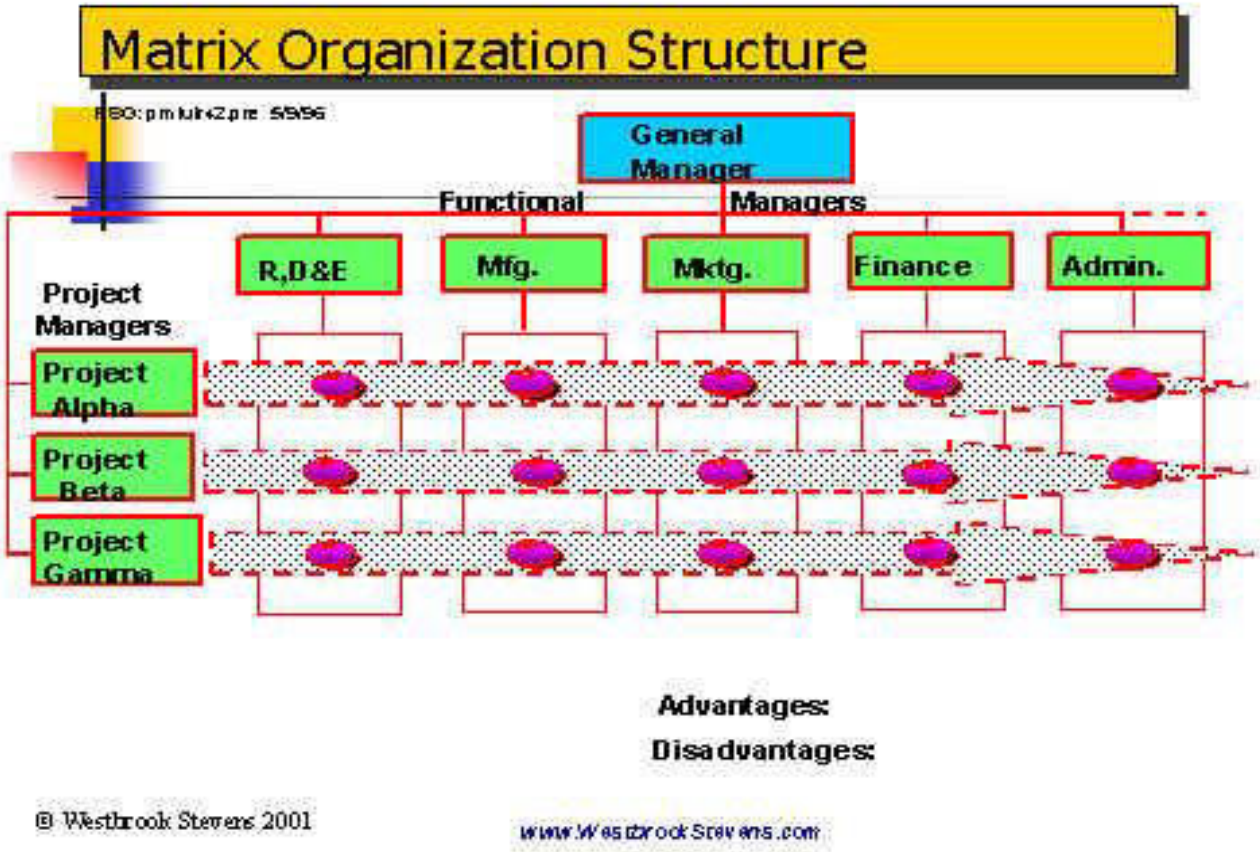


Divisional Organization

- These operate as self contained business units.
- Various divisions can be totally unrelated but work under the single corporate umbrella.
- The central headquarter focuses on all the divisions.

Matrix Organization

- This structure utilises both the functional and divisional chains of command simultaneously in the same part of the organisation.



Matrix Organisation

- This structure assigns specialists from different functional units to work together on a project as a cross functional team.
- The team is led by a project manager.
- Project managers have the authority over activities geared towards achieving organisational goals while functional managers have authority over tasks related to their department.

Strategic business Unit. (SBU)

- SBUs are distinct business units within a large company.
- They are treated as separate business as they have adequate size and mission.
- A manager is appointed to head an SBU and made fully accountable for its profitability and operations.
- The main advantage here is that SBUs can be provided with specific focus and their heads can manage them with entrepreneurial zeal.

Virtual Organization

- This comprises of a group of independent people or organisations that come together to execute a project and then disperse.
- This is made possible by telecommuting and customer organisation linkages.

Virtual Organisation

- Virtual organisations appear for the execution of tasks and disband after the successful execution of the task.
- The only disadvantage is that the focus is specific on the task and there is little sense of belongingness and ownership.

Line Authority

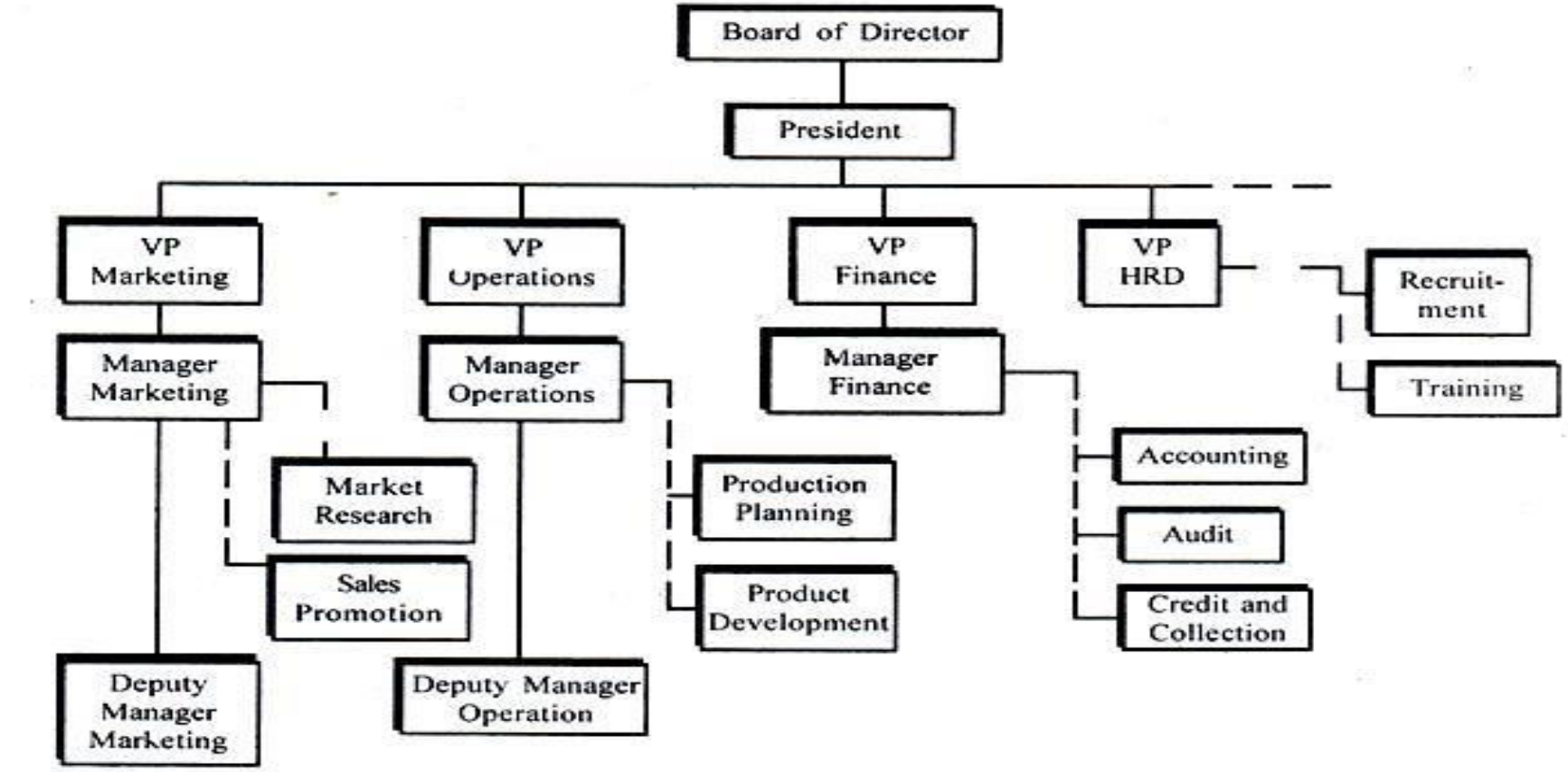
- Line authority represents superior-subordinate relationships for functions, which are directly responsible for accomplishing the key objectives of the enterprise.

- The line identifies those positions that possess command and authority to make decisions.

Staff Relationship

- Staff identifies those positions in an organisation that do not command a decision making authority.
- These are support positions providing services, advice, assistance and support to the line authority to enable them to perform their duties.
- It is for the line managers to decide whether to take some decision with respect to the given advice.

Line & Staff Relationship



Departmentation

- A department is a distinct area or a branch of the organisation which handles tasks of similar nature.

- The process of grouping of activities into units for the purpose of administration is called departmentation.

Types/Basis of Departmentation

- Departmentation by Function
- Departmentation by Product
- Departmentation by Geographical Regions
- Departmentation by Process
- Departmentation by Customer Group

1. Departmentation by Function

- In this type, similar occupational specialties are grouped together under functional system units of finance, manufacturing, marketing, accounts, research etc.

2. Departmentation by Product

- This form assembles different activities of an organisation in accordance with different product types that it manufactures.
- This form of departmentation enables organisations to focus on different products simultaneously which sell a large number of products simultaneously.
- Eg: Cosmetics, Clothing etc

3. Departmentation by Geographical Regions

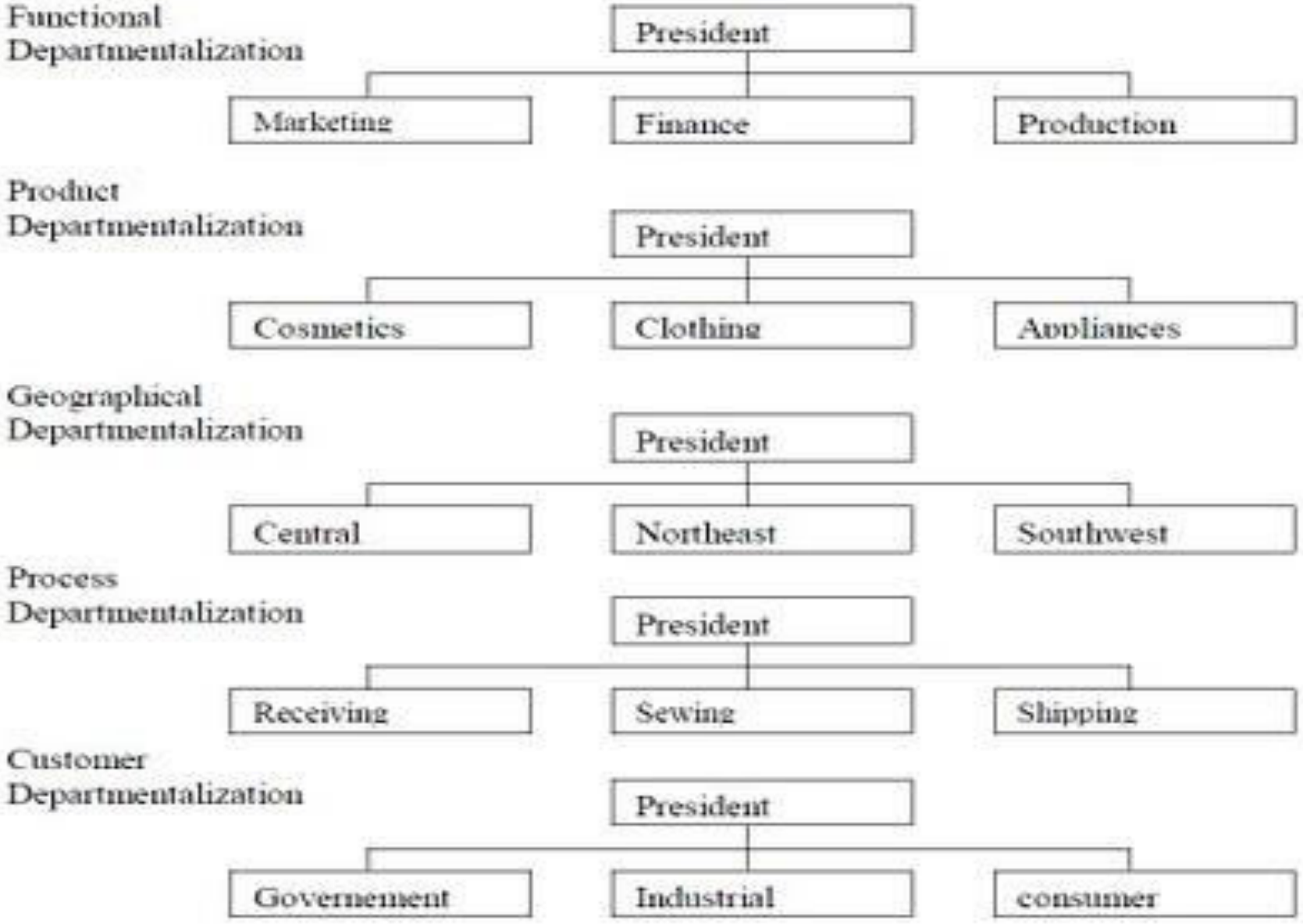
- In this form, different jobs are grouped on the basis of territory.
- South Asia, Europe, North America etc.

4. Deparmentation by Process

- Activities are grouped on the basis of different steps involved in the process of manufacturing.
- Eg. Bottling, capping, labeling, filling etc.

5. Departmentation by Customer Group

- Some organisations serve different market segments by offering different types of products.
- These markets or customers can be served effectively with different channels.
- This forms of departmentation groups jobs on the basis of a common set of needs or problems of specific customers

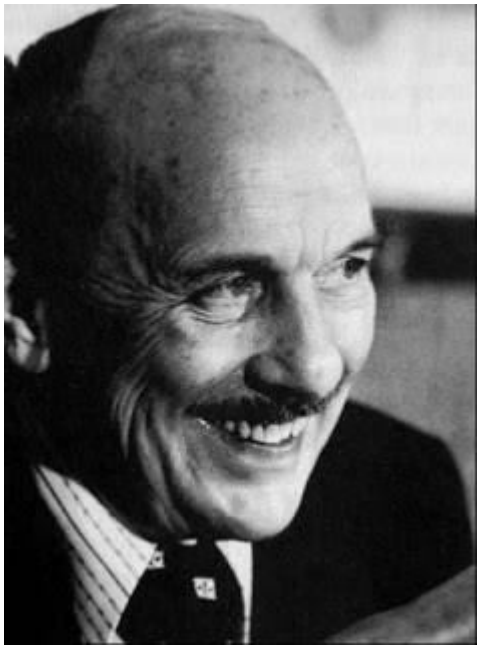

Functional Departmentalization
President
Marketing
Finance
Production
Product Departmentalization
President
Cosmetics
Clothing
Appliances
Geographical Departmentalization
President
Central
Northeast
Southwest
Process Departmentalization
President
Receiving
Sewing
Shipping
Customer Departmentalization
President
Government
Industrial
consumer

STAFFING

- Introduction
- Staffing Process
- Systems approach to Staffing
- Manpower Planning
- Obstacles in manpower planning
- Types of Recruitment
- Employee Selection Process
- Recruitment versus Selection
- Orientation and Placement
- Training of Employees
- Employee Remuneration
- Case Study

Introduction

The managerial function of staffing involves manning the organization structure through proper and effective selection, appraisal and development of the personnel to fill the roles assigned to the employers/workforce.



Harold Koontz

"Staffing means filling and keeping filled, positions in the organisation structure."

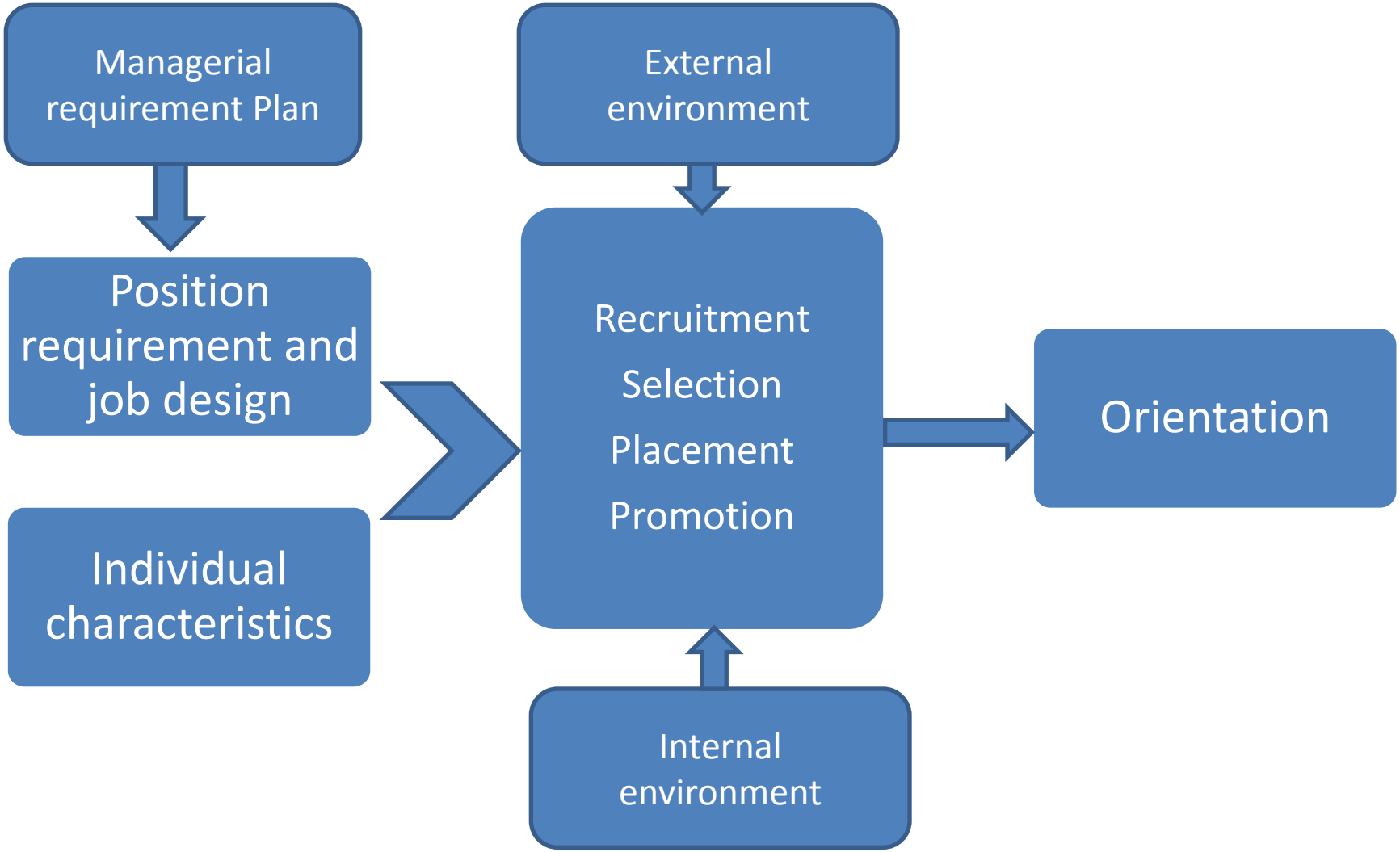
Nature of Staffing

- Staffing is an important managerial function.
- Staffing is a pervasive activity.
- Staffing is a continuous activity.
- The basis of staffing function is efficient management of personnel.
- Staffing helps in placing right men at the right job.
- Staffing is performed by all managers .

Factors Affecting Staffing

INTERNAL ENVIRONMENT	EXTERNAL ENVIRONMENT
Promotion policy	Labor Laws
Future Growth plans of Organization	Pressure from Socio-political group
Technology Used	Competition
Support from Top Management	Educational Standards
Image of the Organization	Other external factors

Systems Approach



Staffing Process

- Manpower
- Recruitment
- Selection
- Orientation and Placement
- Training and Development
- Remuneration
- Performance Evaluation
- Promotion and transfer

Manpower Planning

- Manpower Planning which is also called as Human Resource Planning consists of putting right number of people, right kind of people at the right place, right time, doing the right things for which they are suited for the achievement of goals of the organization

Steps in Manpower Planning

- **Analysing the current manpower**
  - Type of organization
  - Number of departments
  - Number and quantity of such departments
  - Employees in these work units
- **Making future manpower forecasts-**
  - Expert Forecasts
  - Trend Analysis
  - Work Load Analysis
  - Work Force Analysis
- **Developing employment programmes**
- **Design training programmes**

Importance of Manpower Planning

- Key to managerial functions
- Efficient
- Motivation
- Better human relations
- Higher productivity

Obstacles in Manpower Planning

- Under Utilization of Manpower
- Degree of Absenteeism
- Lack of Education and Skilled Labour
- Manpower Control and Review
  - Productivity = Output / Input.
  - Employee Productivity = Total Production / Total no. of employees

Types of Recruitment

1. Internal Recruitment- is a recruitment which takes place within the concern or organization. Internal sources of recruitment are readily available to an organization.

    a)Transfers

    b)Promotions

    c)Re-employment of ex-employees

Continued..

2. External Recruitment- External sources of recruitment have to be solicited from outside the organization. But it involves lot of time and money.

    a)Employment at factory level

    b)Advertisement

    c)Employment exchanges

    d) Employment agencies

    e)Educational Institutions

    f)Recommendations

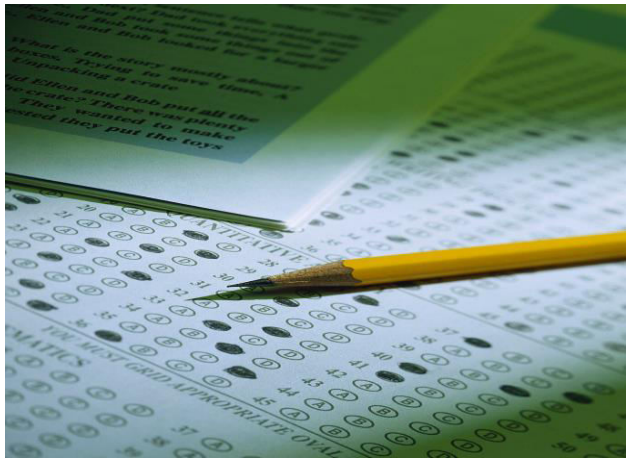
    g)Labor contractors

Employee Selection Process

Employee Selection is the process of putting right men on right job. It is a procedure of matching organizational requirements with the skills and qualifications of people.

Different Process

Interviews



Tests

Assessment Centers

Interviews

- Every manager hired or promoted by a company is interviewed by one or more people.

- Techniques used to improve the interviewing process-
  - -Interviewer-What to look for?
  - -Should be prepared to ask the right questions
  - -Conducting multiple interviews
  - -Just one aspect of selection

Tests

- Primary aim of testing is to obtain data about applicants that help predict their probable success as managers.

- Some of the commonly used tests-

✓ Intelligence tests

✓ Proficiency and aptitude tests

✓ Vocational tests

✓ Personality tests

Assessment Centers

- A technique for selecting and promoting managers.
- The usual center approach is to have candidates take part in a series of exercises.
- During this period, they are observed and assessed by psychologists or experienced managers.
- A typical assessment center-

  a)Various psychological tests

  b)Management games

  c) “In-basket” exercises

Difference between Recruitment and Selection

Recruitment	Selection
It is an activity of establishing contact between employers and applicants.	It is a process of picking up more competent and suitable employees.
It encourages large number of Candidates for a job.	It attempts at rejecting unsuitable candidates.
The candidates have not to cross over many hurdles.	Many hurdles have to be crossed.
It is a positive approach.	It is a negative approach.
It proceeds selection.	It follows recruitment.

Placement

- Once the candidates are selected for the required job, they have to be fitted as per the qualifications.
- Placement is said to be the process of fitting the selected person at the right job or place, i.e. fitting square pegs in square holes and round pegs in round holes.
- Once he is fitted into the job, he is given the activities he has to perform and also told about his duties.

Orientation

- During Orientation employees are made aware about the mission and vision of the organization
- Generally the information given during the orientation programme includes-

✓ Employee's layout
✓ Type of organizational structure
✓ Departmental goals
✓ Organizational layout
✓ General rules and regulations
✓ Standing Orders
✓ Grievance system or procedure

Training of Employees

- Training of employees takes place after orientation takes place. Training is the process of enhancing the skills, capabilities and knowledge of employees for doing a particular job.
- Training process moulds the thinking of employees and leads to quality performance of employees. It is continuous and never ending in nature.

Importance of Training

- Training is crucial for organizational development and success.
- It is fruitful to both employers and employees of an organization. An employee will become more efficient and productive if he is trained well.
- It also-

✓ Improves morale of employees

✓ Less supervision

✓ Chances of promotion

✓ Increased productivity

Employee Remuneration

- Employee Remuneration refers to the reward or compensation given to the employees for their work performances.
- Remuneration provides basic attraction to a employee to perform job efficiently and effectively.
- There are mainly two types of Employee Remuneration
  - ✓ Time Rate Method
  - ✓ Piece Rate Method

Any Questions?


obrigado
Dank U
Merci
mahalo
Köszi
спасибо
Grazie
Thank you
mauruuru
Takk
Gracias
Dziękuję
Děkuju
danke
Kiitos

Directing

Learning Objectives

- Definition
- Functions of Directing
- Elements of Directing

Directing

- Direction is a function of management performed by top level management in order to achieve organizational goals. It is very important and necessary function of management.
- Management has to undertake various activities like, guide people, inspire and lead them as well as supervision of their activity is required in order to achieve desired results.

Defenition

- Direction consists of the process and techniques utilized in issuing instructions and making certain the operations are carried as originally planned.

Functions of Directing

- It guides and helps the subordinates to complete the given task properly and as per schedule.
- It provides the necessary motivation to subordinates to complete the work satisfactorily and strive to do them best.
- It helps in maintaining discipline and rewarding those who do well.
- Directing involves supervision, which is essential to make sure that work is performed according to the orders and instructions.

Directing involves

- ✓Telling people what is to be done and explaining how to do it.
- ✓Issuing instructions and orders to subordinates.
- ✓Inspiring them to contribute towards the achievement of objectives.
- ✓Supervising their activities; and
- ✓Providing leadership and motivation.

Elements of Directing

- Supervision
- Leadership
- Motivation
- Communication

Elements of Directing

- Supervision- implies overseeing the work of subordinates by their superiors. It is the act of watching & directing work& workers.

- Motivation- means inspiring, stimulating or encouraging the sub-ordinates with passion to work. Positive, negative, monetary, non-monetary incentives may be used for this purpose.

- Leadership- may be defined as a process by which manager guides and influences the work of subordinates in desired direction.

- Communications- is the process of passing information, experience, opinion etc from one person to another.

Supervision

- Refers to day to day relationship between manager / **Superior** and his **Subordinate.**
- It should **NOT AIM** primarily at fault finding but at education and guidance.
- **Definition:**
- *It's a management activity which is carried out by **SUPERVISORS** to oversee the productivity and progress of employees who report directly to the supervisors.*
  - It's essentially an **Educational Process**.
  - Educate less qualified or less experienced by better qualified and better experienced ones.
  - Supervisors are the key people among managers at different levels. They are the link between the top and middle management and the workers

Differences between Direction / Supervising

Directing (Wide)	Supervising (Narrow)
▪It include motivation, communication, supervision, training & leadership.	▪It is only one of the elements of direction.
▪ Direction is generally at top level.	▪ It is restricted to the lower level management.
▪ Generally, direction is related to supervision which is the intermediate link between the workers and management	▪ He has to deal, guide and lead workers directly under his commands.
▪ Direction being at the top level, formulates polices and takes important decision.	▪ Supervision at lower level only for implementation.
▪ Financial & non financial incentives.	▪ It cannot provide incentives but if can only recommend rewards in special case.
▪ Leads the efforts of medium and lower Level executives.	▪ Efforts of employee under his commands.

Communication

- helps employees to understand their role clearly and perform effectively.
- It helps in achieving co-ordination and mutual understanding which in turn, leads to industrial harmony and increased productivity.
- Communication improves managerial efficiency and ensures cooperation of the staff.
- Effective communication helps in molding attitudes and building up employees' morale.
- Communication is the means through which delegation and decentralization of authorities successfully accomplished in an organization.

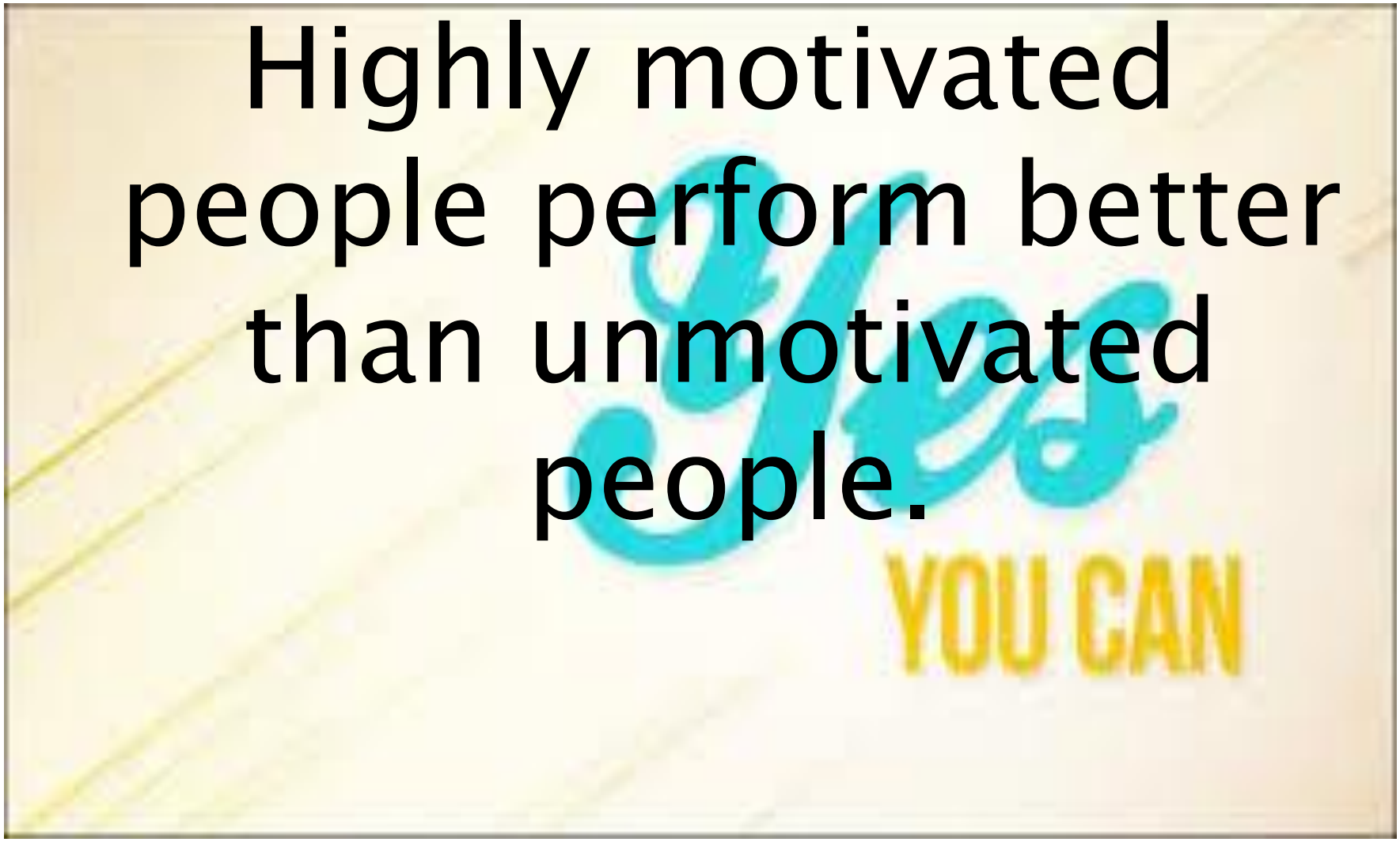
Leadership

- leadership improves the performance of the employees.
- Leaders can motivate the followers to work and thereby increase their performance level.
- with continuous support and guidance, leaders are able to build confidence among the followers, thereby increasing speed and accuracy and decreasing wastage.
- with friendly and cooperative efforts the leader is able to build employees' morale which in turn contribute to higher productivity.

Motivation

- with proper motivation there can be maximum utilization of the factors of production like men, money, material etc.
- if employees are motivated it will reduce employee turnover and absenteeism.
- motivation fosters a sense of belongingness among the employees towards the organization and also improves their morale.
- motivation helps in reducing the number of complaints and grievances.

Highly motivated people perform better than unmotivated people.



HOW CAN THE ORGANIZATION ENHANCE MOTIVATION?

1. **Providing Financial Rewards:**

- In most health services, the major part of the current budget is spent on salaries and staff benefits.
- Even though, most health staff feel unpaid.
- Better financial rewards can be allowed through:
  - Increasing other benefits (as: House Allowance)
  - Providing more supportive services (as: free travels, child care center,….)
  - Creating opportunities for merit awards (as: training)

HOW CAN THE ORGANIZATION ENHANCE MOTIVATION?

2. Meeting the Needs for Recognition and Status:

- Provision of status symbols; office size, furnishing, vehicle use, …… etc.
- A leave for staff who have satisfactorily completed the hard work.
- Praise for good work and use words like “Thank you”, “You did a good job” …… etc.
- Permission to attend training or conferences.

HOW CAN THE ORGANIZATION ENHANCE MOTIVATION?

3. Encourage Team Work & Friendships:

- Team learning during training.
- Create work team within organizational units.
- Reward group performance.
- Encourage social activities.

Engineering Economics

- Interest – the rate that sets this cost
- Time value of money – the resultant of capital investment
- Evaluating economic alternatives – the tool we use to justify project decisions
- Breakeven economics – and in production too (what fundamental decisions do we take to consider alternative 'up front')

When Addressing Economic Issues:

- Ask the Client what their MARR is
  - Typically it is Prime rate + 5%
  - In these extraordinary times they may desire a better return!
- Ask the Client how quickly they desire a payback
  - Often 1 year is desired
  - This short term thinking has lead to unsustainable businesses and off-shoring of manufacturing

When Addressing Economic Issues:

- Ask the client if they want to consider Before Tax or After Tax cash flows
  - We live in a Capitalist Society – take advantage of the incentive for investment
  - For most organization the composite tax rate (Federal + State + Local) is up to 35%
  - This would consider book worth depreciation and salvage values
- Find out what planning horizon is appropriate for the company
  - Typically 5 years but can be more or less

Interest: The capitalists fuel to lend!

Interest = total amount owed – principal amount

$$\text{interest rate}\,(\%) = \frac{\text{interest}}{\text{principal}} \times 100$$

Interest = (principal)(number of interest periods)(interest rate)

= *Pni*

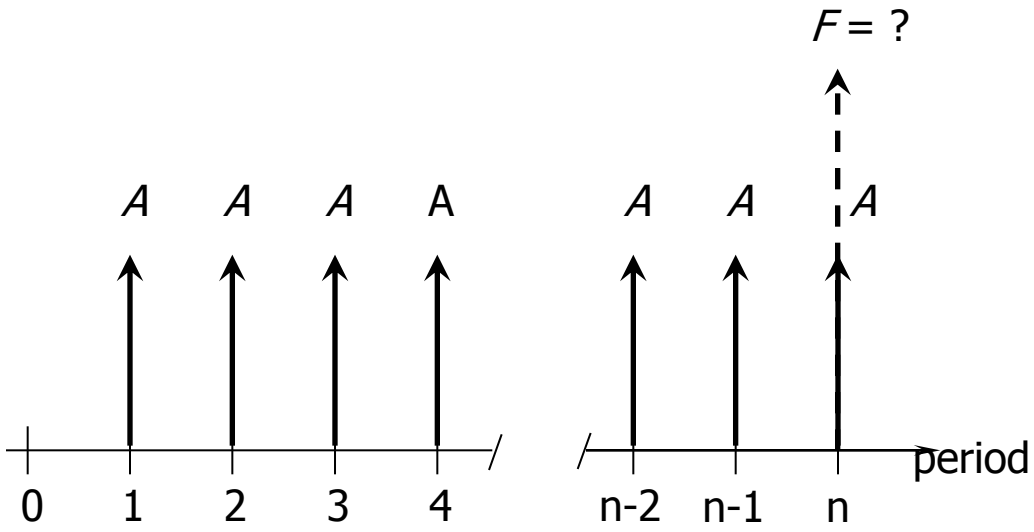
Nominal interest

i = effective interest rate
r = nominal interest rate
m = interest periods per year
y = number of years
n = number of interest periods during compounding

$$i = r / m$$

$$n = my$$

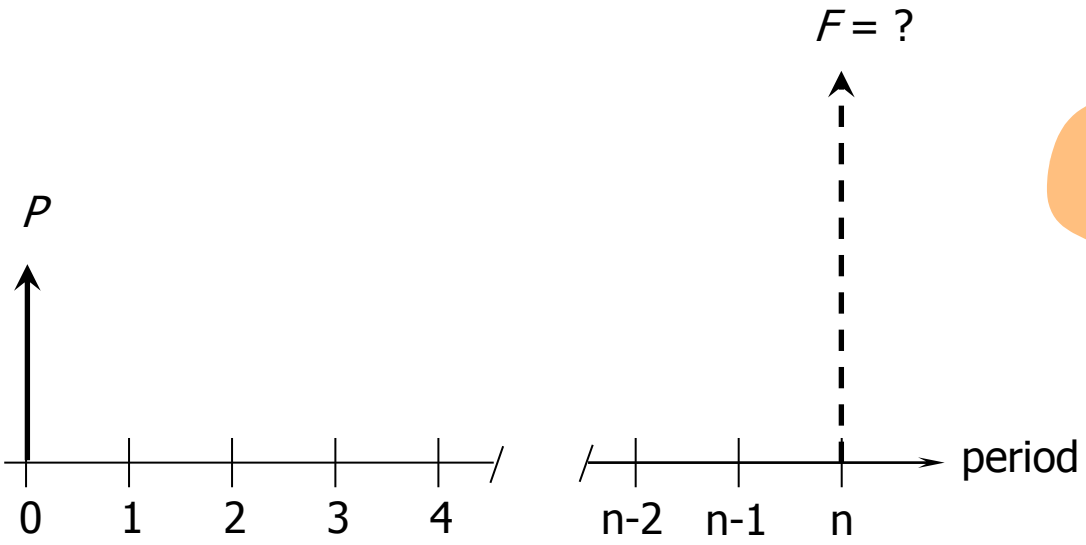
Uniform series compound amount



$$F = A\frac{(1+i)^n - 1}{i}$$

$$F / A = \frac{(1+i)^n - 1}{i}$$

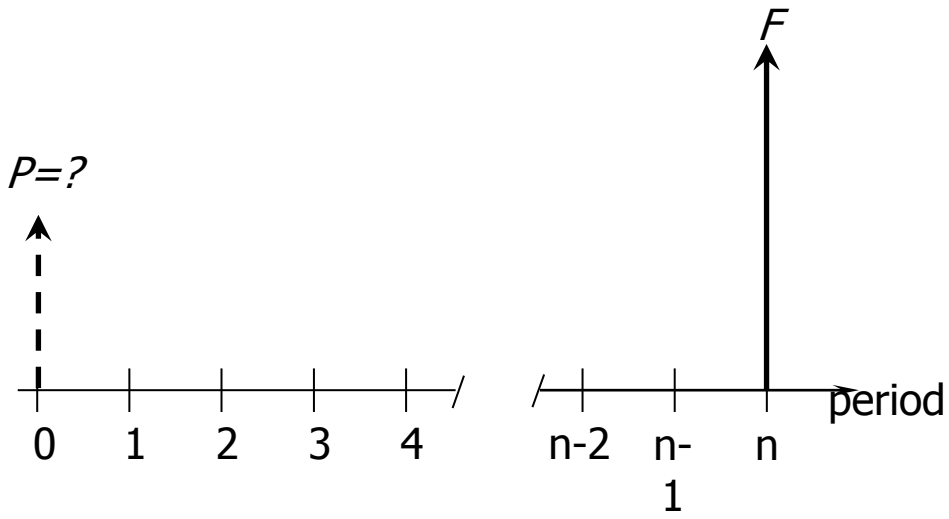
Single payment compound amount



$$F = P(1+i)^n$$

$$F / P = (1+i)^n$$

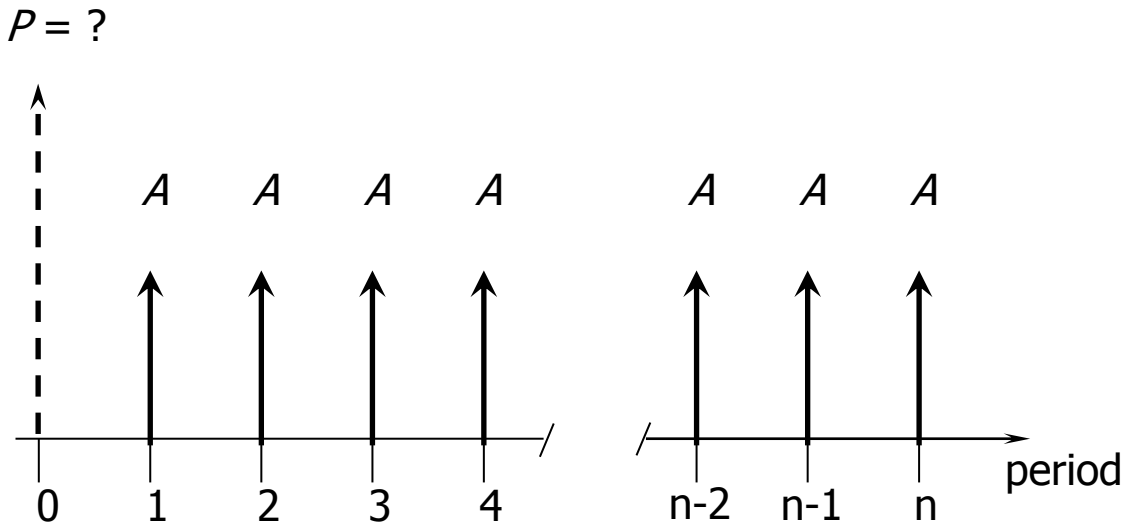
Single payment present worth



$$P = F(F/P)^{-1} = F(1+i)^{-n}$$

$$P/F = (F/P)^{-1} = (1+i)^{-n}$$

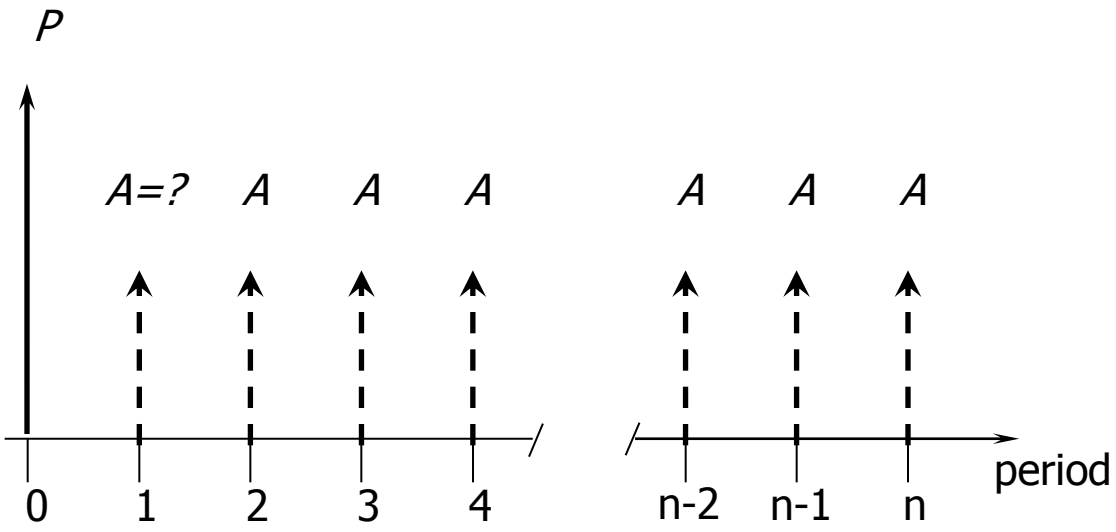
Uniform series compound amount



$$P = A\frac{(1+i)^n - 1}{i(1+i)^n}$$

$$P/A = \frac{(1+i)^n - 1}{i(1+i)^n}$$

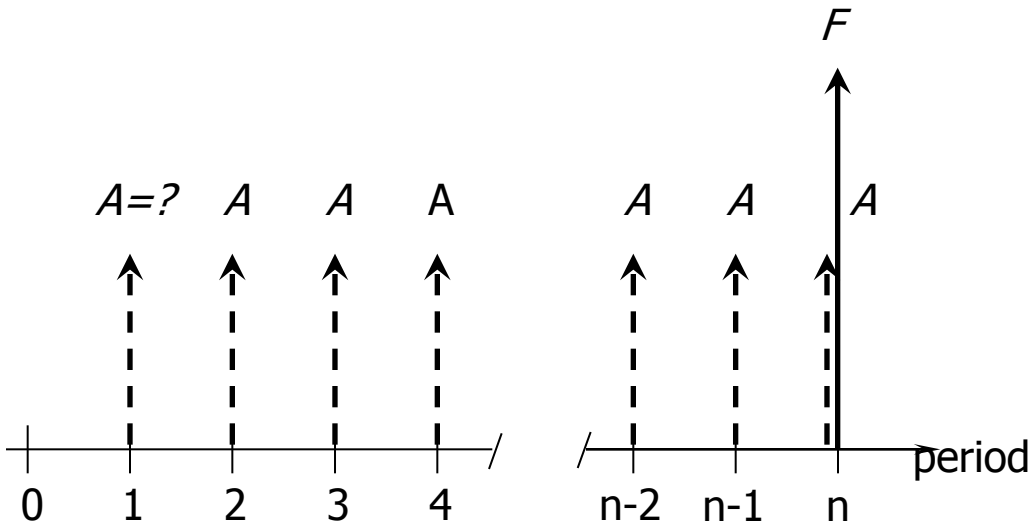
Capital recovery



$$A = P\frac{i(1+i)^n}{(1+i)^n - 1}$$

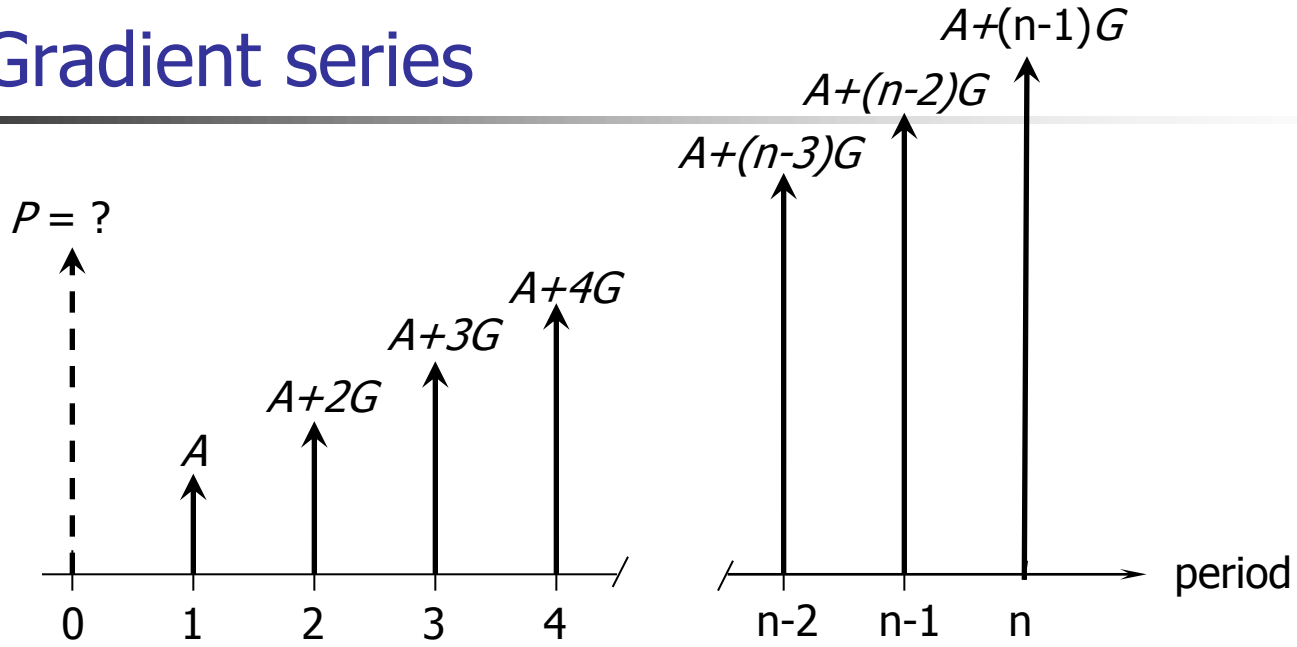
$$A/P = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Uniform series sinking fund



$$A/F = \frac{i}{(1+i)^n - 1}$$

Gradient series



$$P/G = \frac{(1+i)^n - 1}{i^2 (1+i)^n} - \frac{n}{i(1+i)^n}$$

$$F/G = \frac{(1+i)^n - 1}{i^2} - \frac{n}{i}$$

$$A/G = \frac{1}{i} - \frac{n}{(1+i)^n - 1}$$

Tools to Select from Alternatives – using Cash Flow Diagrams

- Methods that Use a MARR:
  - PW
  - FW
  - EUAW
- Return on Investment, Methods that calculate a "fictitious" interest rate to compare to MARR
  - IRR
  - ERR
- Payback Methods
  - Simple Methods
  - Discounted Methods

Present worth method

$$PW = CF_0 + CF_1(P/F, i\%, 1) + CF_2(P/F, i\%, 2) + \ldots + CF_n(P/F, i\%, n) \quad (12.17)$$

$$PW = \sum_j CF_j(P/F, i\%, j) \quad (12.18)$$

Future worth method

$$FW = CF_0(F/P, i\%, n) + CF_1(P/F, i\%, n-1) + \ldots + CF_n \quad (12.19)$$

$$FW = \sum_j CF_j(F/P, i\%, n-j) = PW(F/P, i\%, n) \quad (12.20)$$

$$FW = PW(F/P, i\%, n) \quad (12.21)$$

Equivalent annual worth method

$$EUAW = PW(A/P, i\%, n) = \sum_j CF_j (P/F, i\%, j)(A/P, i\%, n) \quad (12.22)$$

$$EUAW = PW(A/P, i\%, n) - SV(A/F, i\%, n) \quad (12.23)$$

Rate of return method

$$PW = CF_0 + CF_1(P/F, i*\%, 1) + \ldots + CF_n(P/F, i*\%, n) = 0.0 \quad (12.24)$$

Simple payback period

$$SPP = \frac{investment}{annual\ savings} \qquad (12.25)$$

Discounted payback period

$$0 = -P + \sum_1^j CF_j (P/F, i\%, j) \qquad (12.26)$$

I Hate to say it BUT!

- We still are driven by profitability
- The ideas of Competitiveness and LEAN Mfg. need to be balanced against Quality results in Production
- We find (in a Capitalist economy) that these competing(?) demands often can increase profitability if we let the factory move toward them
  - not first to volume production – the first to rational volume production is key!

An example from Engineering Economy – Machine Replacement analysis – After Tax Basis

- Current Equipment "The Defender" (purchased a few years ago before Company started rational Quality Management system and JIT system)
  - Design Capacity: 310 molds/hr (620 parts/hr)
  - Part Tolerance: ±0.030" across parting line
  - Average Quality: 2.9% defectives
  - Average Maintenance: $12000/yr

Machine Replacement analysis – After Tax Basis

- When purchased, average "Lot Size" was 7500 molds and pattern change took 45 minutes
- Currently, production lot size has fallen to 375 molds (and without significant investment) pattern change is still 45 minutes
  - Indicates 375/310 = 1.25 hr/pattern 'run' or 375 molds every 2 hours (with pattern change time)
  - Real Production rate is: 188 molds/hr (375 parts/hr)! (the horrors of JIT!)

Machine Replacement analysis – After Tax Basis

- Quality/Maintenance "Downtime" consume 1 hour/shift
  - The plant operates two 10 hour shifts (20 planned hours)
    - but with downtime actual productive time is 18 productive hours/day on this machine
  - Good Castings/day = 375*.971*18 = 6555 (1,645,300/251day-year)
  - Scrap Castings/day = 375*.029*18 = 195 (48945/251day-year)

Quality Costs Are Like Icebergs! Sometimes Only 10% Are Visible The Rest Sink The Ship!

- Visible Costs:
  - Scrap
  - Rework
  - Warranty Claims
- Hidden Costs:
  - Eng/Mgt Time
  - Downtime
  - Increased Inventory
  - Decreased Capacity
  - Customer Dissatisfaction
  - Lose of Market Share

Machine Replacement analysis – After Tax Basis

- Quality Cost Issues:
  - Eng/Mgt time: = 20400
    - 8 hr/wk*51wks/yr@$50/hr
  - Inspect time: = 63750
    - 50hr/wk *51wk/yr@$25/hr
  - Warranty Claims 85@$200 = 17000
  - "Goodwill Costs" = 8000
- Total These Costs $109150

Machine Replacement analysis – After Tax Basis

- "Product Issues"
  - Prod Costs (labor/mat'l/etc.) = 7.00
  - Avg. Sale Price = 8.00
  - NOTE: in most JIT (LEAN) systems cost must drop 5 to 10% annually to customer!!!!
- Annual Income Defender (Rev – Costs)
  - Costs:
    - Pr. Cost (All Castings) + Qual. Costs + Maint. Costs
      7*(1645300 + 48945) + 109150 + 12000 = $11,980,865
  - Revenue:
    - Price * # Good Parts = 8*1645300 = $13,162,400
  - Income: 13,162,400 - $ 11,980,865 = $1,181,535

Machine Replacement analysis – After Tax Basis

- Challenger Equipment
  - Design Capacity: 235 molds/hr (470 parts/hr)
  - Part Tolerance: ±0.010” across parting line
  - Average Quality: 0.5% defectives
  - Average Maintenance: $8500/yr
- This machine has ‘built-in’ quick change pattern technology so change is about 5 minutes (0.083 hours)
  - 750 parts takes (1.6 hrs + 0.083hr) = 1.68 hrs on this unit
    - This machine has an effect production rate of: 445 parts/hour

Machine Replacement analysis – After Tax Basis

- Company does Preventative Maintenance so this machine works 20 hr/day
  - # Good Castings: 445*20*.995 = 8855*251= 2,222,730/yr
  - # Scrap Castings: 445*20*.005 = 44*251 = 11170/yr
- Quality Costs:
  - Eng/Mgt time: NONE!
  - Insp. Time (spot Check) 5hr/wk*51 = $6375
  - Warranty Costs 5/yr@$125 = $625
  - Goodwill Costs NONE!
- Total Q. Costs: =$7000

Machine Replacement analysis – After Tax Basis

- Product Issues:
  - Production Costs: $7.10
  - Avg Selling Price: $8.15
    (higher due to improved tolerances but will have to achieve continuing 5 – 10% reduction annually)
- Annual Income Challenger (Rev – Costs)
  - Costs:
    - Pr. Cost (All Castings) + Qual. Costs + Maint. Costs
      7.1*(2222730 + 11170) + 7000 + 8000 = $15,875,690
  - Revenue:
    - Price * #Good Parts = 8.15*2222730 = $18,115,250
  - Income = $18,115,250 - $15,875,690 = $2,239,560

Machine Replacement analysis – Depreciation Issues

- Defender (7yr MACRS asset now 3 yrs old)
  - Initial Cost: $1.5 Million
  - Present Mkt. Value: $650,000
  - Pr. Book Value (1.25M – (.143 + .245 +.175)*1.25M) : $546,250
  - Salvage Value (5 yrs): $220,000
- Challenger (7yr MACRS asset)
  - Initial Cost: $1 Million
  - Salvage Value (5 yrs): $425,000

Machine Replacement analysis – After Tax Basis – Depreciation Schedule

YR	% Red.		Chal. Depr.
1	.143		143000
2	.245		245000
3	.175	Def. Depr.	175000
4	.125	156250	125000
5	.089	111250	89000
6	.089	111250	Bk Value after 5 years:
7	.089	111250	223000 (Chal)
8	.045	56250	0 (def.)

Machine Replacement analysis – After Tax Basis: 38% C. Tax rate, 12% MARR

Defender ATCF:

YR	BTCF	Deprec.	Tax. Inc	Taxes	ATCF	NPV at 12%
0	-650000	na	-103750	39425	-610575	-610,575.00
1	1181535	156250	1025285	-389608	791926.7	707,111.35
2	1181535	111250	1070285	-406708	774826.7	617,691.85
3	1181535	111250	1070285	-406708	774826.7	551,521.65
4	1181535	111250	1070285	-406708	774826.7	492,402.37
5	1181535	56250	1125285	-427608	753926.7	427,778.01
5	220000		220000	-83600	136400	77,393.36
				PV@12%		$2,263,323.58

Potential Cap. Gain not taken by keeping Defender

Long Term Cap. Gain -- Taken

Saving in Income Tax Burden for not getting Cap. Gain of Selling Defender at > Bk Value

Machine Replacement analysis – After Tax Basis: 38% C. Tax rate, 12% MARR

Challanger ATCF						
YR	BTCF	Deprec.	Tax. Inc	Taxes	ATCF	NPV at 12%
0	-1000000	na	na	na	-1000000	-1000000.00
1	2239560	143000	2096560	-796693	1442867	1288336.12
2	2239560	245000	1994560	-757933	1481627	1181153.20
3	2239560	175000	2064560	-784533	1455027	1035688.36
4	2239560	125000	2114560	-803533	1436027	912595.29
5	2239560	89000	2150560	-817213	1422347	807039.80
5	425000		202000	-76760	348240	197591.38
				PV at 12%		$4,422,404.15

Long Term Cap. Gain Taken {since salvage value ($425K) exceeds Bk. Value ($223K)}

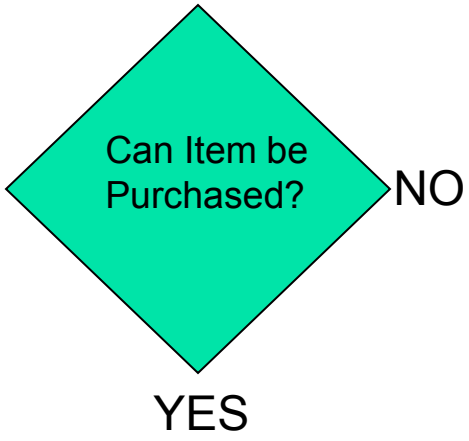
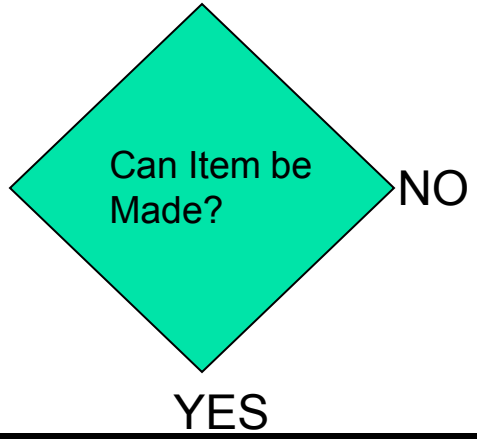
Defender "Followup"

- You're the Engineer – think about what to do?
  - Q 1: How much can this company spend to add 'Quick-Change' technology to existing machine?
  - Q2: Just by 'Fixing' Quality Issues, could the defender be kept? Show why or why not.
- These are Typical Reasons that motivate Projects such as ours!

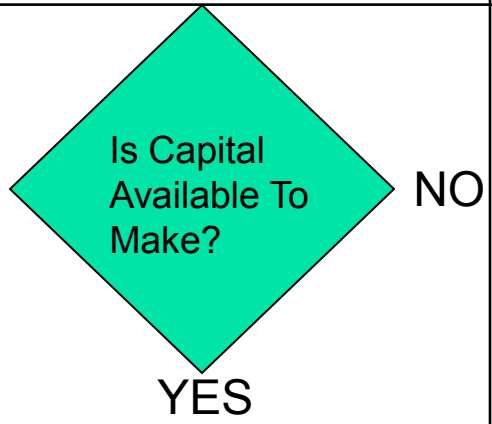
Make-Buy Decisions

- A difficult problem addressed by the M-B matrix
- Typically requires an analysis of the issues related to People, Processes, and Capacity
- Ultimately the problem must be addressed economically

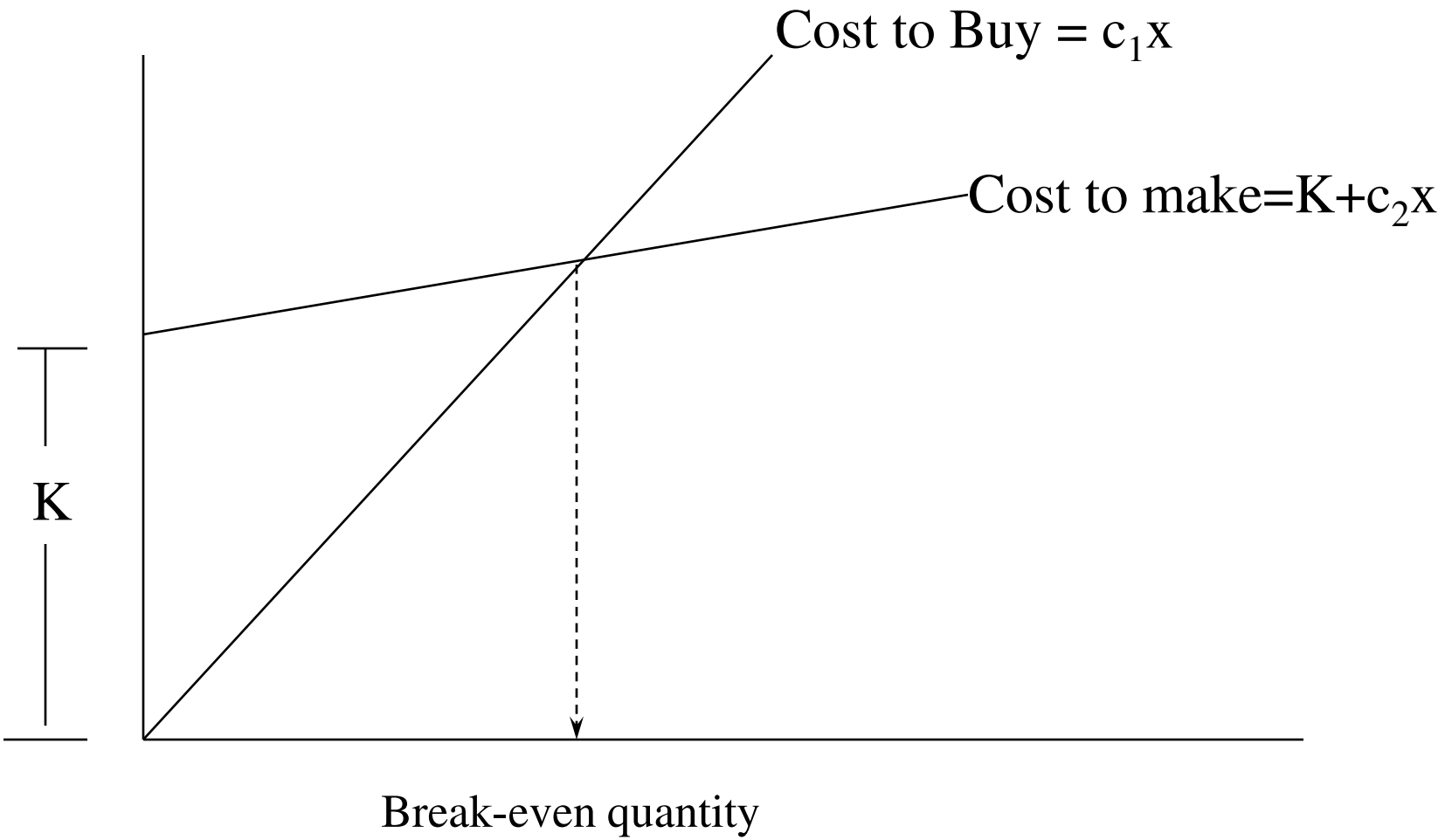
Make – Buy Decision Process

Secondary Questions	Primary Question	Decision
1. Is the Item Available? 2. Will our Union Allow us to buy? 3. Is outside Quality Acceptable? 4. Are Reliable Sources Available?		NO = MAKE (if yes continue down)
1. Is Manufacturing Consistent with our objectives? 2. Do we have Technical Expertise? 3. Is L & MFG capacity available? 4. Must we MFG to utilize existing capacity?		NO = Buy (if yes continue down)

Make – Buy Decision Process

Secondary Questions	Primary Question	Decision
1. What Alternatives are available to MFG? 2. What is future demand? 3. What are MFG costs? 4. What are Reliability issues that influence purchase or MFG?		NO = Buy (if yes continue down)
1. What other opportunities are avail. For Capital? 2. What are the future investment implications if item is MFG? 3. What are costs of receiving external Financing?		NO = Buy YES = MAKE

Break-even Curves for the Make or Buy Problem



Example M-B Analysis

- Fixed Costs to Purchase consist of:
  - Vendor Service Costs:
    - Purchasing Agents Time
    - Quality/QA Testing Equipment
    - Overhead/Inventory Set Asides
- Fixed Costs to Make (Manufacture)
  - Machine Overhead
    - Invested $'s
    - Machine Depreciation
    - Maintenance Costs
  - Order Related Costs (for materials purchase and storage issues)

Example M-B Analysis

- BUY Variable Costs:
  - Simply the purchase price
- Make Variable Costs
  - Labor/Machine time
  - Material Consumed
  - Tooling Costs (consumed)

Example M-B Analysis

- Make or Buy a Machined Component
- Purchase:
  - Fixed Costs for Component: $4000 annually ($20000 over 5 years)
  - Purchase Price: $38.00 each
- Make Using MFG Process A
  - Fixed Costs: $145,750 machine system
  - Variable cost of labor/overhead is 4 minutes @ $36.50/hr: $2.43
  - Material Costs: $5.05/piece
  - Total Variable costs: $7.48/each

Example M-B Analysis

- Make on MFG. Process B:
  - Fixed Cost of Machine System: $312,500
  - Variable Labor/overhead cost is 36sec @ 45.00/hr: $0.45
  - Material Costs: $5.05
- Formula for Breakeven:

$$F_a + V_aX = F_b + V_bX$$

X is Break even quantity
F_i is Fixed cost of Option i
V_i is Variable cost of Option i

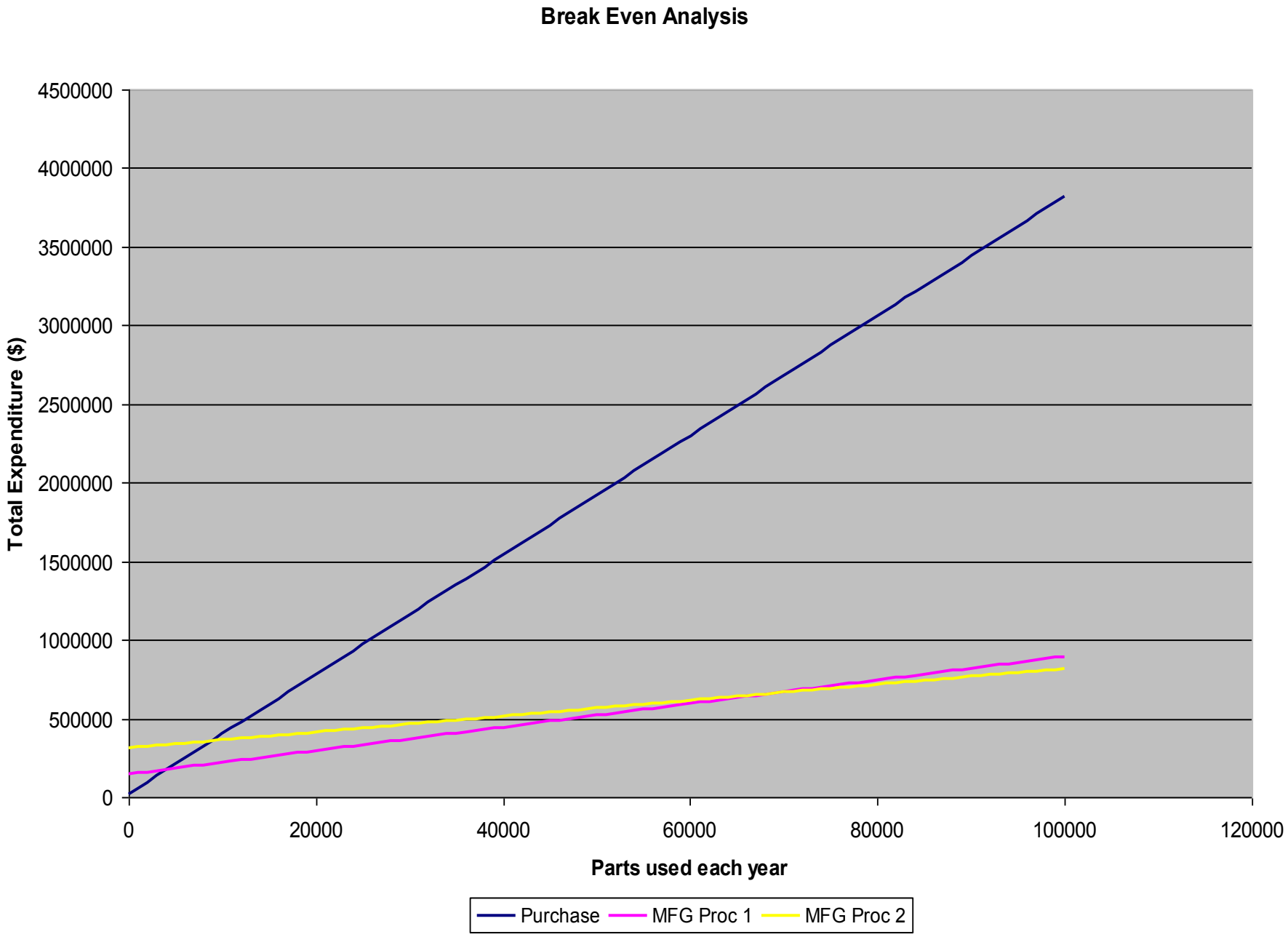
Example M-B Analysis

$$F_a + V_a X = F_b + V_b X$$

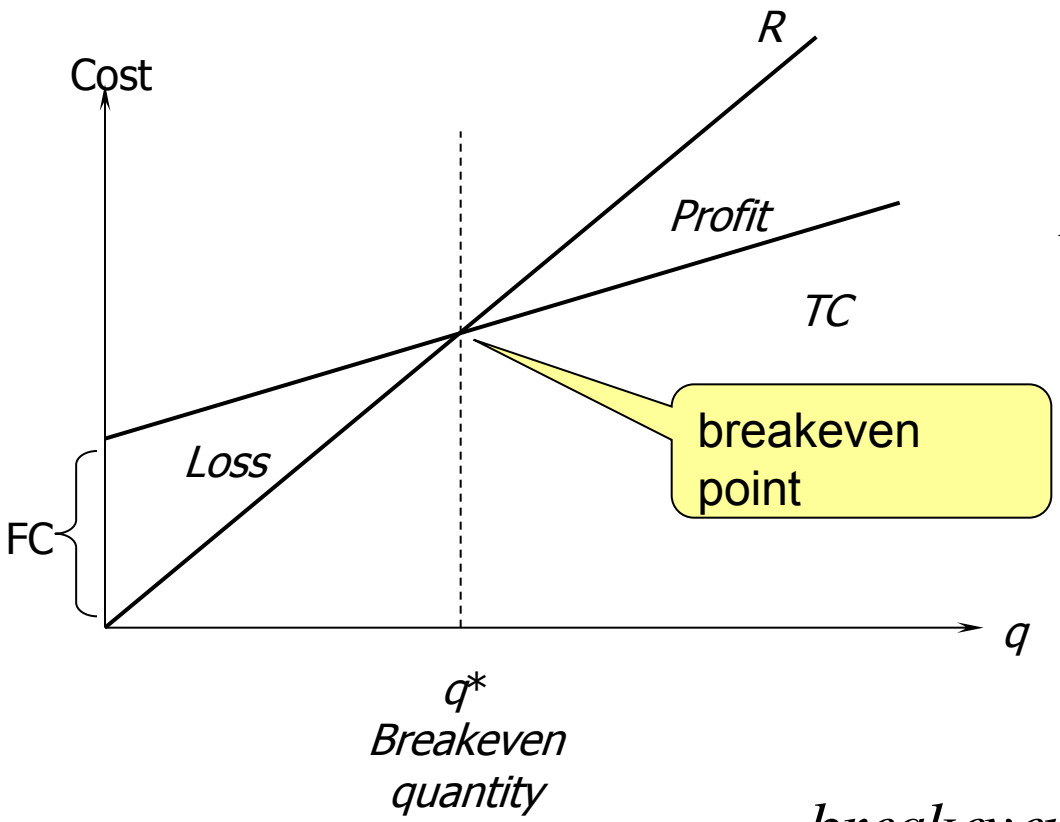
Break Even is X that satisfies this equation or:

$$X = \frac{F_b - F_a}{V_a - V_b}$$

- Buy vs MFG1: BE is {(145750-20000)/(38-7.48)} = 4120 units
- Buy vs MFG2: BE is {(312500-20000)/(38-5.5)} = 9000 units
- MFG1 vs MFG2: BE is {(312500-145750)/(7.48-5.50)} = 68620 units


Break Even Analysis
Total Expenditure ($)
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
0
20000
40000
60000
80000
100000
120000
Parts used each year
Purchase
MFG Proc 1
MFG Proc 2

Breakeven analysis



$$TC = FC + VC$$

$$TC = FC + vq$$

$$profit = rq - FC - vq$$

$$breakeven\ profit = rq - FC - vq = 0$$

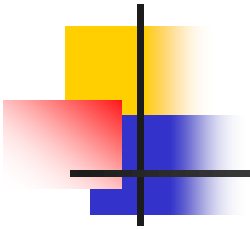
$$q^* = \frac{FC}{r - v}$$

Summary

- Engineering economic analyses should consider the time value of money
- Interest factor formulas and tables are useful in evaluating alternatives – remembering that interest it the cost of capitol and the fuel that makes capitol available!
- The PW and FW methods (often used because they can easily accommodate Before and After Tax valuations) can be used to evaluate alternatives having different lives by using the least common multiple of years.

Summary, Cont.

- The EUAW method is preferred because it has the advantage of not requiring the use of the least common multiple.
- Companies typically use short payback period methods since future returns are very difficult to reliably model
- The breakeven point is that level of production (and sales) that results in a zero profit which helps companies in making difficult make vs. buy decisions



Depreciation

Definition

- HKSSAP defines depreciation as the ‘allocation of the depreciable amount of an asset over its estimated life’.

The Objective of Depreciation

- According to the matching concept, revenues should be matched with expenses in order to determine the accounting profit.
- The cost of the asset purchased should be spread over the periods in which the asset will benefit a company.

Depreciable Assets

- The assets are acquired or constructed with the intention of being used and not with the intention for resale.
- HKSSAP regards assets as depreciable when they
  - Are expected to be used in more than one accounting period.
  - Have a finite useful life, and
  - Are held for use in the production or supply of goods and services, for rental to others, or for administrative purposes.

Non-Depreciable Asset

- Freehold Land
  - It has an indefinite useful life, and it retains its value indefinitely.
- Leasehold Land (Long Lease)
  - It has an unexpired lease period not less than 50 years
- Investment Property
  - Which construction work and development have been completed
  - Which is held for its investment potential, any rental income being negotiated at arm's length.

Depreciation Methods

- (A) Straight Line Method
- (B) Reducing Balance Method/Diminishing Balance Method
- (C) Revaluation Method
- (D) Sum of Digits Method/Sum of The Years' Digits Method
- (E) Production Output Method/Units of Production Method

(A) Straight Line Method

- Depreciation is computed by dividing the depreciable amount of the asset by the expected number of accounting periods of its useful life.

$$\text{Depreciation} = \frac{\text{Cost of Asset} - \text{Estimated Residual Value}}{\text{Estimated Useful Economic Life}}$$

Useful Economic Life

- Useful economic life is not equal to physical life
- It is the period over which the present owner intends to use the asset

Residual Value

- It is the amount received after disposal of the asset

Cost of asset - Residual value = Total amount to be depreciated

Example

Cost of asset $1200

Residual/scrap/salvage value $200

Estimated useful life 4 years

Annual charge for depreciation

$$= \frac{\$1200-\$200}{4}$$

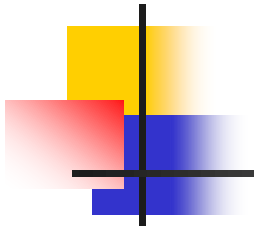
$$= \frac{\$1000}{4}$$

=$250

- Additional capital expenditures are made to increase the value of a fixed asset
- Depreciation of those extra capital expenditures should be charged over the remaining useful life of the asset

Example

- A company bought a machine for $1,000 on 1 January 1996
- Estimated life of 4 years, no scrap value
- 1 January 1997, an additional motor of $90 was fitted into the machine
- Expected that the useful life of the machine would not be affected



Depreciation for 1996

$$= \frac{\$1000}{4}$$

$$= \$250$$

Annual depreciation from 1997 onwards

$$= \frac{\$1000}{4} + \frac{\$90}{3}$$

$$= \$280$$

(B) Reducing Balance Method / Diminishing Balance Method

- Reason
  - Greater benefit is to be obtained from the early years of using an asset
  - Appropriate to use the reducing balance method which charges more in the earlier years.

Annual Depreciation = Net Book Value x Depreciation Rate

= (Cost – Accumulated Depreciation) x Depreciation Rate

Example

Cost of assets	$10,000
Residual value	$256
Useful life	4 years

Depreciation Rate

$$= \left(1 - \sqrt[4]{\frac{256}{100{,}000}}\right) \times 100\%$$

$= (1 - 0.4) \times 100\%$

$= 60\%$

Annual Depreciation

Annual Depreciation

= Net Book Value x Depreciation Rate

= (Cost – Accumulated Depreciation) x Depreciation Rate

Year 1	**10,000 x 60%**	**= $6,000**
Year 2	**(10,000 – 6,000) x 60%**	**= $2,400**
Year 3	**(10,000 – 8,400) x 60%**	**= $ 960**
Year 4	**(10,000 – 9,360) x 60%**	**=$ 384**

(C) Revaluation Method

- For some small-value assets such as loose tools

Depreciation

= Value at the beginning of the year (Opening balance) + Purchases in the year – Value at the end of the year (Closing balance)

Asset

Balance b/f	opening	P & L – Depreciation	X
Bank	purchases	Balance c/f	closing
	X		X

Depreciation for the year is the balancing figure.

Example

The value of the loose tools changes during 1996 as shown below:

1996		
Jan 1	**Value of loose tools**	**$2,000**
Dec 31	**Purchases in the year**	**$ 500**
Dec 31	**Value of loose tools**	**$1,000**

Loose Tools

1996	$	1996	$
Jan 1 Balance b/f	2,000	Dec 31 P & L	1,500
Dec 31 Bank-purchases	500	Dec 31 Balance c/f	1,000
	2,500		2,500

Depreciation for the year = $1,500

(D) Sum of Digits Method / Sum of The Years' Digits Method

- It provides higher depreciation to be charged in the early years, and lower depreciation in the later periods.

Sum of digits = n(n+1) / 2

Where n = Useful economic life (number of years)

Depreciation should be charged as follows:

Year 1 (Cost – Residual value) x n / Sum of digits

Year 2 (Cost – Residual value) x (n-1) / Sum of digits

Year 3 (Cost – Residual value) x (n-2) / Sum of digits

Year 4 (Cost – Residual value) x (n-3) / Sum of digits

⋮

Year n (Cost – Residual value) x 1 / Sum of digits

With diminishing years of life to run

Example

Cost of asset **$9,000**

Estimated useful life **5 years**

No scrap value

Sum of digits = 5(5+1) / 2 = 15

Depreciation charge:

Year 1 $9,000 x 5/15 = $3,000

Year 2 $9,000 x 4/15 = $2,400

Year 3 $9,000 x 3/15 = $1,800

Year 4 $9,000 x 2/15 = $1,200

Year 5 $9,000 x 1/15 = $ 600

Production Output Method / Units of Production Method

- **Depreciation is computed with reference to the use or output of the asset in that period.**

Example

- A company bought a machine at $10,000 and expects that the machine would run for 2,000 hours during its life. It is expected to have no scrap value.

Depreciation charge:

Year 1	**800 hours**
Year 2	**600 hours**
Year 3	**350 hours**
Year 4	**250 hours**

Depreciation charge:

Year 1 $10,000 x 800/2,000 = $4,000

Year 2 $10,000 x 600/2,000 = $3,000

Year 3 $10,000 x 350/2,000 = $1,750

Year 4 $10,000 x 250/2,000 = $1,250

Accounting for Depreciation

Accounting Treatment

Dr.	Fixed Asset	**Purchase price and other capital expenditure**
Cr.	Bank/Vendor	
Dr.	Profit and Loss	
Cr.	Provision for Depreciation	

Example

In a business with financial years ended 31 December. A machine is bought for $2,000 on 1 January Year 1. The estimated useful life is 5 years.

- You are to show:
  - (a) Machinery account
  - (b) Provision for depreciation
  - (c) Profit and loss account for the year ended 31 Dec Year 1, 2, and 3.
  - (d) Balance sheet as at those date
- (1) Using **straight line method** and **reducing balance method**, at the rate of 20%.

Straight Line Method

Year 1

Machinery

Year 1		$	Year 1		$
Jan 1	Bank	2,000	Dec 31	Bal c/d	2,000

Provision for dep. – Machinery

Year 1		$	Year 1		$
Dec 31	Bal. c/d	400	Dec 31	P/L (2000/5)	400

Profit and Loss for the year ended 31 Dec

	Year 1
Less: Expenses	$
Depreciation - Machinery	400

Balance Sheets as at 31 Dec

	Year 1
Fixed Asset	$
Machinery at cost	2,000
Less: Provision for Dep.	400
	1,600

Year 2

Provision for dep. – Machinery

Year 1		$	Year 1		$
Dec 31	Bal. c/d	400	Dec 31	P/L	400
Year 2			Year 2		
Dec 31	Bal. c/d	800	Jan 1	Bal. b/d	400
			Dec 31	P/L	400
		800		(2000/5)	800

Profit and Loss for the year ended 31 Dec

	Year 1	Year 2
~~Less: Expenses~~	$	$
Depreciation - Machinery	400	400

Balance Sheets as at 31 Dec

	Year 1	Year 2
Fixed Asset	$	$
Machinery at cost	2,000	2,000
Less: Provision for Dep.	400	800
	1,600	1,200

Year 3

Provision for dep. – Machinery

		$			$
Year 1			Year 1		
Dec 31	Bal. c/d	400	Dec 31	P/L	400
Year 2			Year 2		
Dec 31	Bal. c/d	800	Jan 1	Bal. b/d	400
			Dec 31	P/L	400
		800			800
Year 3			Year 3		
Dec 31	Bal. c/d	1,200	Jan 1	Bal. b/d	800
			Dec 31	P/L	400
		1,200			1,200

Profit and Loss for the year ended 31 Dec

	Year 1	Year 2	Year 3
~~Less: Expenses~~	$	$	$
Depreciation - Machinery	400	400	400

Balance Sheets as at 31 Dec

	Year 1	Year 2	Year 3
Fixed Asset	$	$	$
Machinery at cost	2,000	2,000	2,000
Less: Provision for Dep.	400	800	1,200
	1,600	1,200	800

Reducing Balance Method

Year 1

Machinery

Year 1		$	Year 1		$
Jan 1	Bank	2,000	Dec 31	Bal c/d	2,000

Provision for dep. – Machinery

Year 1		$	Year 1		$
Dec 31	Bal. c/d	400	Dec 31	P/L (2000*20%)	400

Profit and Loss for the year ended 31 Dec

	Year 1
Less: Expenses	$
Depreciation - Machinery	400

Balance Sheets as at 31 Dec

	Year 1
Fixed Asset	$
Machinery at cost	2,000
Less: Provision for Dep.	400
	1,600

Year 2

Provision for dep. – Machinery

		$			$
Year 1			Year 1		
Dec 31	Bal. c/d	400	Dec 31	P/L	400
Year 2			Year 2		
Dec 31	Bal. c/d	720	Jan 1	Bal. b/d	400
			Dec 31	P/L	320
		720		(2000-400)*20%	720

Profit and Loss for the year ended 31 Dec

	Year 1	Year 2
~~Less: Expenses~~	$	$
Depreciation - Machinery	400	320

Balance Sheets as at 31 Dec

	Year 1	Year 2
Fixed Asset	$	$
Machinery at cost	2,000	2,000
Less: Provision for Dep.	400	720
	1,600	1,280

Year 3

Provision for dep. – Machinery

		$			$
Year 1			Year 1		
Dec 31	Bal. c/d	400	Dec 31	P/L	400
Year 2			Year 2		
Dec 31	Bal. c/d	720	Jan 1	Bal. b/d	400
			Dec 31	P/L	320
		720			720
Year 3			Year 3		
Dec 31	Bal. c/d	976	Jan 1	Bal. b/d	720
			Dec 31	P/L	256
		976	(2000-720)*20%		976

Profit and Loss for the year ended 31 Dec

	Year 1	Year 2	Year 3
Less: Expenses	$	$	$
Depreciation - Machinery	400	320	256

Balance Sheets as at 31 Dec

	Year 1	Year 2	Year 3
Fixed Asset	$	$	$
Machinery at cost	2,000	2,000	2,000
Less: Provision for Dep.	400	720	976
	1,600	1,280	1,024

Disposal Account

- Should be opened when
  - The asset is sold, or
  - The asset is disposed of due to an accident.

Accounting Treatment

Dr. Disposal Cr. Fixed Asset	Cost price of the asset sold
Dr. Provision for Depreciation Cr. Disposal	Depreciation already charged on the assets concerned
Dr. Cash / Vendee Cr. Disposal	Proceeds received / receivable on the disposal
In case of loss on the disposal (Debit side greater than credit side)	
Dr. Profit and Loss Cr. Disposal	With any loss on the disposal
In case of profit on the disposal (Credit side greater than debit side)	
Dr. Disposal Cr. Profit and Loss	With any profit on the disposal

Example

In a business with financial years ended 31 December. A machine is bought for $2,000 on 1 January Year 1. The estimated useful life is 5 years. In Year 4, the machinery has been sold for $1,070. Show the accounting entries:

- You are to show:
  - (a) Machinery account
  - (b) Provision for depreciation
  - (c) Disposal account
  - (d) Profit and loss account and Balance sheet as at 31 Dec Year 4

Machinery

Year 4		$	Year 4		$
Jan 1	Bal. b/d	2,000	Dec 31	Disposal	2,000

Pro. For Dep.

Year 4		$	Year 4		$
Dec 31	Disposal	976	Jan 1	Bal. b/d	976

Disposal

Year 4		$	Year 4		$
Dec 31	Machinery	2,000	Dec 31	Pro. For Dep.	976
Dec 31	P/L – gain	46	Dec 31	Bank	1,070
		2,046			2,046

Profit and Loss for the year ended 31 Dec

		Year 4
	$	$
Gross profit		X
Add: Gains on disposal		46
Less: Expenses		
Loss on disposal	X	

E.g. if the machinery was sold for $ 900.

Disposal

Year 4	$	Year 4	$
Dec 31 Machinery	2,000	Dec 31 Pro. For Dep.	976
		Dec 31 Bank	900
		Dec 31 P/L- loss on disposal	124
	2,000		2,000

Depreciation on monthly/full-year basis

- Fixed assets can be purchased and sold at any time during the accounting year.
  - Depreciation on a monthly basis:
    - Based on the fraction of the year in which the asset is held.
  - Depreciation on a full-year basis:
    - Full year's depreciation in the year of purchase and none in the year of disposal irrespective of the period in which the asset is held.
- **In an examination, it is necessary for the students to follow the approach required by the question. Where no indication is given, the monthly basis approach is recommended.**

Example

- A company bought two motor vehicles for $2,400 each on 1 July 1996. One of the vehicles was sold for $1,500 on 1 April 1998.
- Depreciation is to be charged:

1. At 20% on the straight line basis (monthly basis)
2. At 20%, using the straight line method,and bases on assets in existence at the end of each year, ignoring items sold during the year

- Prepare the following accounts:

Motor vehicle account

Provision for depreciation,

Disposal account for the year ended 31 Dec 1996,1997 and 1998.

(1.)

Motor Vehicles

1996		$	1996		$
July 1	Bank	4,800	Dec 31	Bal. c/d	4,800

Provision for dep. – Motor Vehicles

1996		$	**1996**		$
Dec 31	Bal. c/d	480	Dec 31	P/L	480
			($4,800 x 20% x 6/12)		

Motor Vehicles

1996		$	1996		$
July 1	Bank	4,800	Dec 31	Bal. c/d	4,800
1997			1997		
Jan 1	Bal. b/d	4,800	Dec 31	Bal. c/d	4,800

Provision for dep. – Motor Vehicles

1996		$	1996		$
Dec 31	Bal. c/d	480	Dec 31	P/L	
				($4,800 x 20% x 6/12)	480
1997			1997		
Dec 31	Bal. c/d	1,440	Jan 1	Bal. b/d	480
			Dec 31	P/L	
				($4,800 x 20%)	960
		1,440			1,440

Motor Vehicles

		$			$
1996					
July 1	Bank	4,800	Dec 31	Bal. c/d	4,800
1997			Year 2		
Jan 1	Bal. b/d	4,800	Dec 31	Bal. c/d	4,800
1998			1998		
Jan 1	Bal. b/d	4,800	Apr 1	Disposal of MV	2,400
			Dec 31	Bal. c/f	2,400
		4,800			4,800

Provision for dep. – Motor Vehicles

1996		$	1996		$
Dec 31	Bal. c/d	480	Dec 31	P/L	
				($4,800 x 20% x 6/12)	480
1997			1997		
Dec 31	Bal. c/d	1,440	Jan 1	Bal. b/d	480
			Dec 31	P/L	
				($4,800 x 20%)	960
		1,440			1,440
1998			1998		
Dec 31	Disposal [$2,400		Jan 1	Bal. b/d	1,440
x 20% x (6/12 + 1 + 3/12)]		840	Dec 31	P/L ($2,400 x 20%	
Dec 31	Bal. c/f	1,200	x 3/12 + $2,400 x 20%)		600
		2,040			2,040

Disposal of Motor Vehicle

1998	$	1998	$
Dec 31 Machinery	2,400	Apr 1 Pro. For Dep.[$2,400	
		x 20% x (6/12 + 1 + 3/12)]	840
		Apr 1 Bank	1,500
		Dec 31 P/L – loss	60
	2,400		2,400

(2.)

Motor Vehicles

1996		$	1996		$
July 1	Bank	4,800	Dec 31	Bal. c/d	4,800

Provision for dep. – Motor Vehicles

1996		$	**1996**		$
Dec 31	Bal. c/d	480	Dec 31	P/L	960
			($4,800 x 20%)		

Motor Vehicles

1996		$	1996		$
July 1	Bank	4,800	Dec 31	Bal. c/d	4,800
1997			1997		
Jan 1	Bal. b/d	4,800	Dec 31	Bal. c/d	4,800

Provision for dep. – Motor Vehicles

1996		$	1996		$
Dec 31	Bal. c/d	960	Dec 31	P/L ($4,800 x 20%)	960
1997			1997		
Dec 31	Bal. c/d	1,920	Jan 1	Bal. b/d	960
			Dec 31	P/L ($4,800 x 20%)	960
		1,920			1,920

(2.)

Motor Vehicles

1996		$	1996		$
July 1	Bank	4,800	Dec 31	Bal. c/d	4,800
1997			Year 2		
Jan 1	Bal. b/d	4,800	Dec 31	Bal. c/d	4,800
1998			1998		
Jan 1	Bal. b/d	4,800	Apr 1	Disposal	2,400
			Dec 31	Bal. c/f	2,400
		4,800			4,800

Provision for dep. – Motor Vehicles

1996		$	1996		$
Dec 31	Bal. c/d	960	Dec 31	P/L ($4,800 x 20%)	960
1997			1997		
Dec 31	Bal. c/d	1,920	Jan 1	Bal. b/d	960
			Dec 31	P/L ($4,800 x 20%)	960
		1,920			1,920
1998			1998		
Apr 1	Disposal ($2,400		Jan 1	Bal. b/d	1,920
x 20% x 2)]		960	Dec 31	P/L ($2,400 x 20%)	480
Dec 31	Bal. c/f	1,440			
		2,400			2,400

Disposal of Motor Vehicle

1998	$	1998	$
Dec 31 Machinery	2,400	Apr 1 Pro. For Dep.($2,400	
Dec 31 P/L – gain	60	x 20% x 2)	960
		Apr 1 Bank	1,500
	2,460		2,460

Trade-in-allowance

- The assets being trade in for a new assets
  - Accounting entries:
    - Dr. Fixed Assets
    - Cr. Disposal
  - With the trade-in value of disposed asset

Example

- A company purchased machine for $2,500 each on 1 Jan. Year 1.
- It is the company's policy to provide for depreciation on its machinery at a rate of 20%, with a full year's depreciation made in the year in which a machine is purchased, but none in the year of sale.
- One machine was traded in and a new machine for $4,000 was purchased on 1 Feb. Year 2.
- The trade-in value of the old machine was $1,000.

Machinery

Year 1		$	Year 1		$
Jan 1	Bank	2,500	Dec 31	Bal. c/d	2,500

Provision for dep.-Machinery

Year 1		$	Year 1		$
Dec 31	Bal. c/d	500	Dec 31	P/L	500
			(2500*20%)		

Machinery

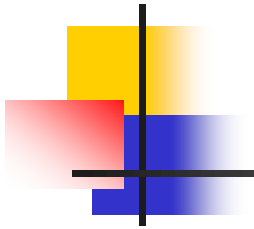
		$			$
Year 2			Year 2		
Jan 1	Bal. b/d	2,500	Feb 1	Disposal	2,500
Feb1	Disposal: trade-in-allowance	1,000	Dec 31	Bal. c/d	4,000
Feb1	Bank	3,000			
		6,500			6,500

Provision for dep.-Machinery

		$			$
Year 1			Year 1		
Dec 31	Bal. c/d	500	Dec 31	P/L	500
Year 2			Year 2		
Feb 1	Disposal	500	Jan 1	Bal b/d	500

Disposal

			$			$
Year 2				Year 2		
Feb 1	Machinery	2,500		Feb1	Dep.	500
				Feb 1	Machinery: trade-in-allowance	1,000
			2,500			2,500



Factors Determining the Amount of Depreciation

The Carrying Amount of Assets

- Cost
  - Purchase price
  - Production cost
- Revalued Value

Purchases Price

- Acquisition cost of a fixed asset:
  - Invoice price (after deducting any trade discounts)
  - Expenditures incurred in bringing the asset to a location and condition suitable for its intended use.
    - E.g. Import duty, freight charges, insurance, etc.
  - Expenditures incurred in improving the asset. They increase the expected future benefit from the existing fixed asset.
    - E.g. Additional motor for machinery, the extension of a factory, etc.

Example

- A company purchased a machine for $50,000.
- In addition, an import duty of $5,000, landing charges of $2,000 and installation costs of $1,000 were paid.
- A service contract was entered into for the life of the machine at a cost of $800 per annum.
- The depreciation is charged at 10% of the cost per annum.

Expenditure items	Capital expenditure	Revenue expenditure
	$	$
Invoice price	50,000	
Import duty	5,000	
Landing charges	2,000	
Installation cost	1,000	
Service charges		800
	58,000	800

Cost of the machine = $58,000

Annual depreciation charge = $58,000 x 10% = $5,800

Example

- The supplier's invoice for a machine was as follows:

	$	$
List price		200,000
Less Trade discount	10,000	
Trade-in value	50,000	60,000
		140,000
Delivery charges	2,000	
Adaptation and testing	3,000	
Maintenance	1,500	
Spare components	1,000	7,500
		147,500

**The depreciation is charged at 10% of cost per annum.

Expenditure items	Capital expenditure	Revenue expenditure
	$	$
Invoice price ($200,000 - $10,000)	190,000	
Delivery charges	2,000	
Adaptation and testing	3,000	
Maintenance		1,500
Service charges		1,000
	195,000	2,500

Cost of the machine = $195,000

Annual depreciation =$195,000*10% = $1,950

Production cost

- An asset is produced by the firm itself, the following expenditures should be included in the cost of the asset:
  - Cost of raw materials
  - Direct cost of production, e.g. direct labour, royalties, etc.
  - A Reasonable proportion of factory overhead expenses / indirect production costs, e.g. indirect raw materials, indirect labour, indirect expenses and interest on borrowed capital to finance the production of the asset.

Example

- A company constructed a machine. The related costs are as follows:

	$
Drafting and design	8,000
Construction:	
Materials and components	120,000
Assembling wages	5,000
Other expenses	2,000
Testing and Adaptation	3,000

** Depreciation is charged at 10% of cost per annum

Cost of the machine = $8,000 + $12,000 + $5,000 + $2,000 + $3,000

= $30,000

Annual depreciation = $30,000*10% = $3,000

Revalued value

- Where assets are revalued in the financial statements, the provision for depreciation should be based on the revalued amount and the current estimate of the remaining useful life.

Example

- A company purchased a machine for $1,000 on 1 January 1996.
- It is assumed that the useful economic life of the machine is 4 years.
- Depreciation has been provided at 25% per annum on cost.

Balance Sheet as at 31 December 1996 (Extract)

	$
Machinery, at cost	1,000
Less Provision for Dep. ($1,000 x 25%)	250
	1,250

- E.g. The machine was revalued on 1 January 1997 at $1,500. There is no change in its estimated remaining useful life.

Value of the machinery = $1,500

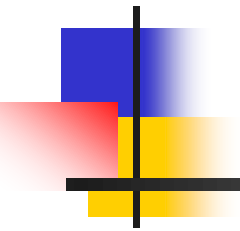
The remaining useful economic life = 4-1 = 3 years

Depreciation for 1997 = $1,500 ÷ 3 = $500

Balance Sheet as at 31 December 1997 (Extract)

	$
Machinery, at valuation	1,500
Less Provision for Dep.	500
	1,000

Capital and Revenue Expenditure



Expenditure

- It is the amount of economic resources given up in obtaining goods and services.

Capital Expenditure

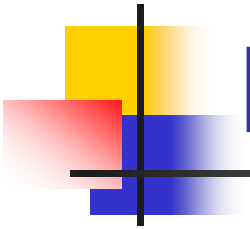
- It is an expenditure to:
  - Get a long-term benefit,
  - Buy fixed assets, or
  - Add to the value of an existing fixed asset.

Example

- Acquiring fixed asset, such as premises, equipment, fixtures and furniture, etc.
- Expenditure which is spent to prepare the asset for its intended use, such as freight charges, legal cost, installation cost, landing charge, import duty of buying the asset.

Revenue Expenditure

- It is an expenditure for:
  - The acquisition of assets for resale, or
  - For the purpose of earning revenue income.



Example

- Buying trading stock
- Administrative expenses, selling expenses, or financial expenses

Accounting Treatment

- Capital Expenditure
  - On acquiring assets,

  Dr. Asset accounts

  Cr. Bank / Cash / Creditors
- At the year end, the balances go to the Balance Sheet
- Revenue Expenditure
  - When there are expenses,

  Dr. Expenses accounts

  Cr. Bank / Cash / Creditors
- At the year end, the balances will be debited to the Profit and Loss Account, or Trading Account.

Example

- On acquiring premises, how do we distinguish between capital and revenue expenditures?

Expenditure	Benefit	Nature of Expenditure	Accounting Treatment
(a) Buying a house	Long-term benefit ▪ fixed asset acquired	Capital	Dr. Premises Cr. Bank/Cash/ Creditor
(b) Legal cost of buying a house	Long-term benefit ▪ extending beyond current accounting period	Capital	Dr. Premises Cr. Bank/Cash/ Creditor

Expenditure	Benefit	Nature of Expenditure	Accounting Treatment
(c) Installation of partition walls and lighting system in preparing the flat for use as an office	Long-term benefit ■ to prepare the asset for intended use	Capital	Dr. Premises Cr. Bank/Cash/ Creditor

Expenditure	Benefit	Nature of Expenditure	Accounting Treatment
(d) Renting a house	Short-term benefit ■ consumed within current accounting period	Revenue	Dr. Rent Cr. Bank/Cash/ Creditor
(e) Management fee	Short-term benefit ■ consumed within current accounting period	Revenue	Dr. Management fee Cr. Bank/Cash/ Creditor

Capital Income

- It is the income from the sale of a fixed asset or asset which was not acquired for resale.
- Example
  - Profit on disposal of machinery
  - Realization of goodwill

Revenue Income

- It is the income form the sale of trading stock or goods acquired for resale.
- Example
  - Sale of trading goods
  - Rental income of a property company

Accounting Treatment

- Revenue Income
- This is normal trading income, and will be credited to Trading Account.

Trading Account

		$
	Sales	X

Capital Income

- This is non-trading income, and will be credited to Profit and Loss Account.

Profit and Loss Account

	$
Gross Profit b/f	X
Profit on Disposal	X

Revaluation

- A fixed asset should be recorded at cost less depreciation.
- The value of an asset in reality is increasing as a result of inflation, which may be significantly greater than its historical cost stated in the balance sheet.
- Revaluation of assets is not common in Hong Kong, because he market value of an asset is very subjective.

Revaluation Profit

- When the market value of an asset is greater than its historical cost, the increase in value should be:

Dr. Fixed Asset Cr. Revaluation Reserve	With the rise in value

It is NOT to be treated as an income in the Profit and Loss Account

Revaluation Loss

- When the market value is smaller than the historical cost, the decrease in value can be treated in two ways:
- If the asset had been revalued before, and a revaluation reserve has been established:

Dr. Revaluation Reserve Cr. Fixed Asset	With the decrease in value

- If the loss cannot be covered by any reserve arising from the previous revaluation of the same asset:

Dr. Profit and Loss Account Cr. Fixed Asset	With the decrease in value

Model Question Paper (CBCS) with effect from 2015-16

USN | | | | | | | | | | |

15ME51

Fifth Semester B.E. Degree (CBCS) Examination

Management and Economics

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

MODULE – I

1	**a**	Briefly Explain the roles of a Manager.	(08 Marks)
	b	Explain the contributions made by F.W.Taylor under Scientific Management.	(08 Marks)
		OR	
2	**a**	What are single use and standing plans? Explain them with examples.	(08 Marks)
	b	List & Explain the steps involved in Decision making.	(08 Marks)

MODULE – II

3	**a**	Define Motivation. Explain McGregor's Theory X & Theory Y	(08 Marks)
	b	Explain in Brief various types of Organization.	(08 Marks)
		OR	
4	**a**	Define Leadership. Explain the Types of Leadership.	(08 Marks)
	b	What is communication & explain the types of communication.	(08 Marks)

MODULE – III

5	**a**	Explain the Scientific approach of problem solving and decision making.	(10 Marks)
	b	Find the effective interest rate if the rate of interest is 8% when compounded (i) Yearly (ii) Biannually (iii) Quarterly (iv) Monthly (v) Daily. Compare the results.	(06 Marks)
		OR	
6	**a**	An inventor has been offered Rs.12,000 per year for next 5 years and Rs.6,000 annually for the following 7 years for the exclusive rights to an invention. At what price could the inventor afford to sell the rights to earn 10% disregarding taxes.	(10 Marks)
	b	Explain the law of Demand and Supply with suitable example	(06 Marks)

MODULE – IV

7	**a**	Define the following terms: (i) Service Life (ii) Accounting Life (iii) Economic Life	(06 Marks)
	b	Compare the alternatives below using present worth analysis at i = 10% per year and a 3 year study period	(10 Marks)

Particulars	Machine A	Machine B
First cost	Rs.20,000	Rs.30,000
Annual cost	Rs. 9,000	Rs. 7,000
Salvage / Market value	Rs. 4,000	
Life	3 Years	6 Years

OR

8 **a** Explain future worth comparison method. How is it different from present worth comparison method (06 Marks)

b First cost of an asset is Rs 5,00,000/-. The annual maintenance in the first year is Rs 2,000/- and increase by Rs 1,000/- every year up to 10^{th} year. The annual income is expected to be Rs 50,000/- in the first year with increase of Rs 25,000 every year up to 10^{th} year. The operating cost is Rs 6,000/- per year. The salvage value is Rs 30,000/- at the end of 10^{th} year. Find the equivalent annual cost of the machine at 12% interest rate. (10 Marks)

MODULE – V

9 **a** Explain the following terms (08 Marks)
(i)Prime cost (ii) Factory Cost (iii) Office cost (iv) Total Cost

b A small firm is producing 1000 pens per day. The cost of direct material is Rs.1600 and that of direct labour is Rs.2000. Factory overheads chargeable to it are Rs.2500. If the selling on cost is 40% of the factory cost, what must be the selling price of each pen to realize a profit of 20% of the selling price. (08 Marks)

OR

10 **a** Explain the causes of depreciation (08 Marks)

b Determine the weight and the cost of following component shown in fig. Take density of material 8.5g/cc. cost of each Kg of material is Rs.100. (08 Marks)