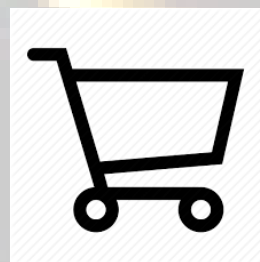


STRATEGIC COST MANAGEMENT
THEORY

Important Links to connect with faculty:**About the faculty:**

- ❖ Dinesh Jain is a Chartered Accountant and is currently working in India's premier credit rating agency
- ❖ Rank holder in all three levels of Chartered Accountancy – CA Final (Rank 3), CA IPCC (Rank 9) and CA CPT (Rank 24)
- ❖ He takes classes for both CA Inter and CA Final. Enriches student's knowledge on Cost Accounting and Str. Has an experience of eight years in teaching.
- ❖ Focuses extensively on conceptual clarity which has enabled multiple students securing exemption in his subjects

SFM Classes (Youtube mode) [<http://www.instamojo.com/bharadwajinstitute>]

Fees	Rs.4,000 + GST
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No of views	Unlimited views.
Validity	Validity of one year with possibility of extension based on requirement
Doubt solving	The student would be added to telegram group wherein the doubts of the students would be clarified. Students can call the faculty on +91 86678 45561 after 7 PM

Feedback of SFM Classes:

Aashif Basha	Thanks a lot sir after watching your videos I got huge grip on SFM. I am sure I will get exemption in May 19 on this subject because of you. Once again thanks a lot sir
Devadoss Sabari	Wonderful Teaching also Your English is Outstanding, please continue this style in future also. Keep the English style for ever.
Shiva Ram Marri	Thank you very much sir. Your classes helped me alot in preparation
Nidhin Jose	Sir , thank you so much for uploading International Finance lectures. I struggled a lot with International Finance before and after watching your videos I am very comfortable with International Finance. Your explanation is very clear and covered more than 100 problems in International Finance altogether. Thank you so much
Sai Gopal	Thank you very much Sir for explaining such complex topics in easy & lucid manner
Nisha Goyal	Everyone are born with an intent and i feel you are here to Decipher SFM as Simple for Millions.Thanks for these lectures
Anju Rajain	Best lectures on derivatives .. too good sir !
Sangita Patil	Sir, you have excellent way of teaching. I was badly struggling with international finance topic .Your lectures are very helpful. I don't think anyone can teach in such an excellent way. Thank you so much .
Lokesh Kumar	Dear Dinesh Jain sir I have seen all the 6 parts I sincerely apply my thanks to you sir Now I could do most of the sums in this topic because of you sir
Abirami A	Thanks a lot sir.... Yesterday I had 100 marks test on forex and surprisingly Im able to do correctly maximum number of questions even though I complete your videos up to part 8. Once again thanks a lot for your timely help....
Neha Yadav	Hi Sir.....Amazing videos , style of teaching and everything...I liked it alot.....Thankyou sir.....Also kindly let me know If your books are available online
Yuvaraj	Sir, your class super, really very helpful for me.
Krishna Joshi	our way of teaching is very good. Sir..I have enjoyed your lectures very much specifically factoring and forex

TABLE OF CONTENTS

Chapter 1 -Introduction to strategic cost management	5
Chapter 2 - Modern Business Environment	14
Chapter 3 - Lean System and Innovation.....	29
Chapter 4 - Cost Management Techniques	42
Chapter 5 - Cost Management for Specific Sector	56
Chapter 6 - Decision Making	61
Chapter 7 - Pricing Decision.....	71
Chapter 8 - Performance measurement and evaluation	78
Chapter 9 - Divisional Transfer Pricing	92
Chapter 10 - Strategic Analysis of Operating Income	96
Chapter 11 - Budgetary Control	106
Chapter 12 - Standard Costing	111
Chapter 13: Linear Programming	125
Chapter 14: Learning Curve Theory	128



Traditional cost management (TCM):

- ❖ Traditional cost management involved allocation of costs and overhead and focused largely on cost control and cost reduction
- ❖ TCM focused on comparing actual results with standard expectations (typically budgets or standard costs) and analyzing the difference. This process was also known as variance analysis

Limitations of TCM:

- ❖ Ignores competition, market growth and customer requirement
- ❖ Excessive focus on cost reduction
- ❖ Ignore dynamics of marketing and economics
- ❖ Limited focus on review and improvisation
- ❖ Reactive approach
- ❖ Short-term outlook

Strategic cost management (SCM):

- ❖ Strategic cost management (SCM) is the application of cost management techniques to improve the strategic position of business as well as control costs
- ❖ SCM involves integrating cost information with decision -making framework to support the overall organizational strategy
- ❖ SCM advocates that cost management techniques should be such that they improve strategic position of a business apart from controlling costs
- ❖ SCM aims to help the organization to achieve sustainable competitive advantage through product differentiation and cost leadership

Examples:**Preventive maintenance versus break-down maintenance:**

A manufacturing company does not carry out preventive maintenance of its machineries on a regular basis to save costs. Repairs of machinery is carried out as and when a machinery breaks down. This is a traditional approach to cost management where the focus is on cost reduction and cost saving. This is a short- term approach to manage costs. When machinery breaks down, the company loses more in terms of loss time production and idle labour time. Lack of regular preventive maintenance and planned shutdown time also reduces the life of the machinery and has a longer- term impact. If the loss of production is significant, the company might lose market share to its competitors. Hence, it is important to look at cost management with a strategic focus.

Decision on closure of service Centre:

A telecom company closed down some of its customer service centres as a cost cutting measure. This led to overcrowding of customers at other centres and longer waiting time for the customers. The volume of work at other centres increased impacting the performance of employees. Both the customers and employees, two of the key stakeholders, were not happy with the company's decision. This type of business decision can impact the reputation and brand image of the company and impact the sales and profitability in the longer run.

Cost reduction can be good and bad:

- Good cost reduction is one wherein we can reduce costs as well as maintain or improve quality
- Bad cost reduction is one wherein a company cut costs without considering the impact of employees, customers and overall loyalty
- SCM focuses on only good cost reduction whereas TCM can involve both good and bad cost reduction

Stages of strategic management (Formulation, Communication, Implementation and Control)

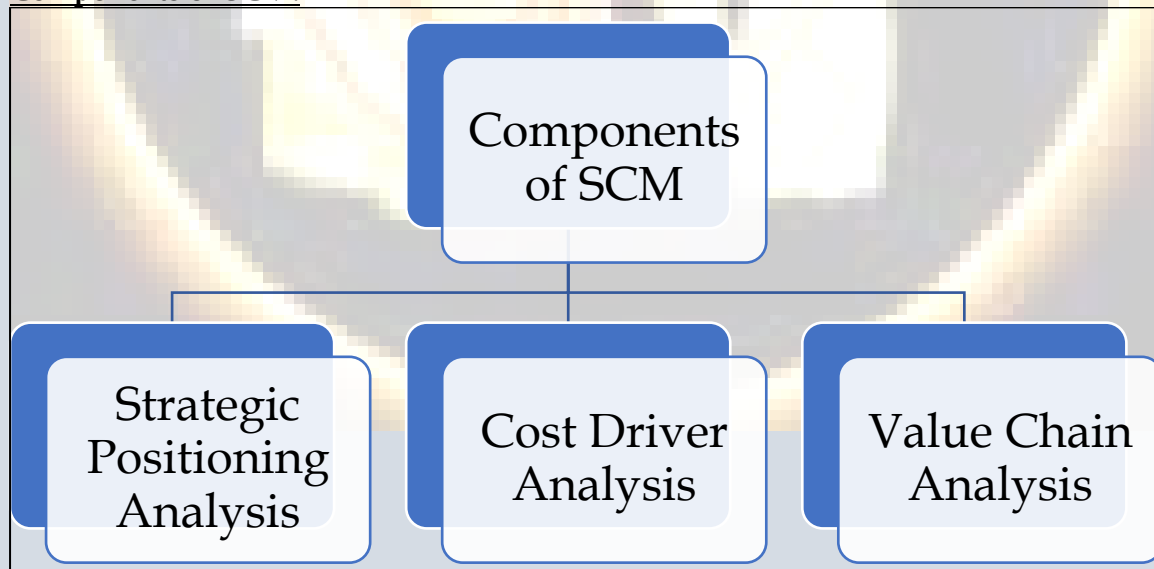
- ❖ **Stage one:** Formulating strategies
- ❖ **Stage two:** Communicating those strategies throughout the organization
- ❖ **Stage three:** Developing and carrying out tactics to implement the strategies
- ❖ **Stage four:** Developing and implementing controls to monitor the success of objectives

Necessity of SCM:

- ❖ SCM gives a clear understanding of the company's cost structure in search of **sustainable competitive advantage**
- ❖ SCM can help in **four stages of strategic management** – formulation, communication, implementation and control
- ❖ Cost data is analyzed and used strategically to **develop alternative measures in search of sustainable competitive advantage**

Traditional versus strategic cost management:

	TCM	SCM
Time span	Short term concept	Long term concept
Focus	Internal	Both internal and external
Cost driver concept	Based on volume of the product	Each activity has a separate cost driver
Objective	Score keeping, attention directing and problem solving	Cost leadership or product differentiation
Cost reduction	Primary objective is cost reduction	Primary objective is cost containment – cost reduction and value improvement at the same time
Approach	Risk-averse	Risk taking and ability to adapt to changing environment

Components of SCM:Strategic Positioning Analysis (SPA):

- ❖ SPA analysis the **company's relative position** within an industry for its performance
- ❖ It reflects choices a company makes **about the kind of value it will create and how the value be created differently than rivals**

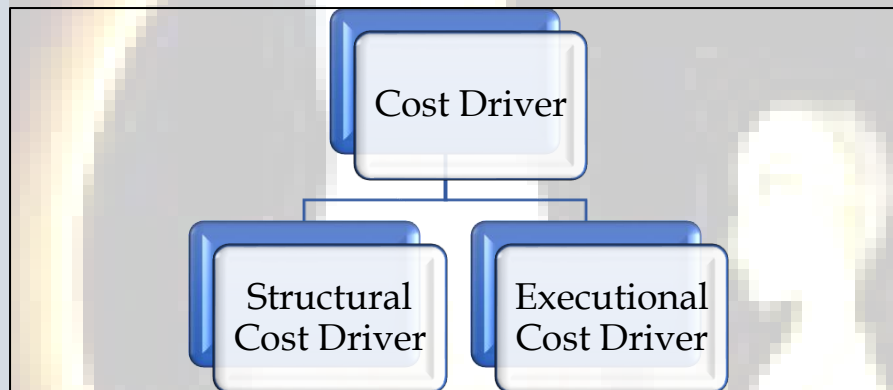
- ❖ SPA is concerned with the **impact of external and internal environment** on the overall strategy of a company
- ❖ Following factors impact the strategic position of a company:
 - Organization values, culture and systems
 - External environment (Analysed through PESTEL and Porter's 5 forces)
 - Internal environment (Resources and competencies)

Example:

Consider the coffee war that erupted between Starbucks and Dunkin' Donuts. Several years ago, Starbucks positioned itself as a provider of high-end café beverages. Their strategic position wasn't based on Price but based on the quality of the products and the experience itself. In response, Dunkin Donuts staked out their own strategic position based on price, targeting a different market segment with a different value proposition. **In this case Starbucks has positioned itself as a unique product provider (product differentiation strategy) whereas Dunkin has positioned itself as a cost leader (low cost strategy).**

Cost Driver Analysis:

- ❖ Cost is caused or driven by various inter-related factors and is not simply driven by volume or output



- ❖ Structural and executional cost drivers **involve strategic and operational decisions** that affect the relationship between cost drivers and total cost
- ❖ Structural cost drivers **facilitate strategic decision making because they involve plans and decisions that have long term effects**. It involves choices by the firm that drive product cost. Scale, experience, technology and complexity are considered to improve a firm's competitive position.
- ❖ **Executional cost drivers facilitate operational decision making by focussing on short-term effects**. These are the determinants of a firm's cost position that hinge on its ability to execute successfully. Workforce involvement, design of production process, efficiency of plant layout, importance of TQM, supplier relationships among others are considered in an attempt to reduce costs

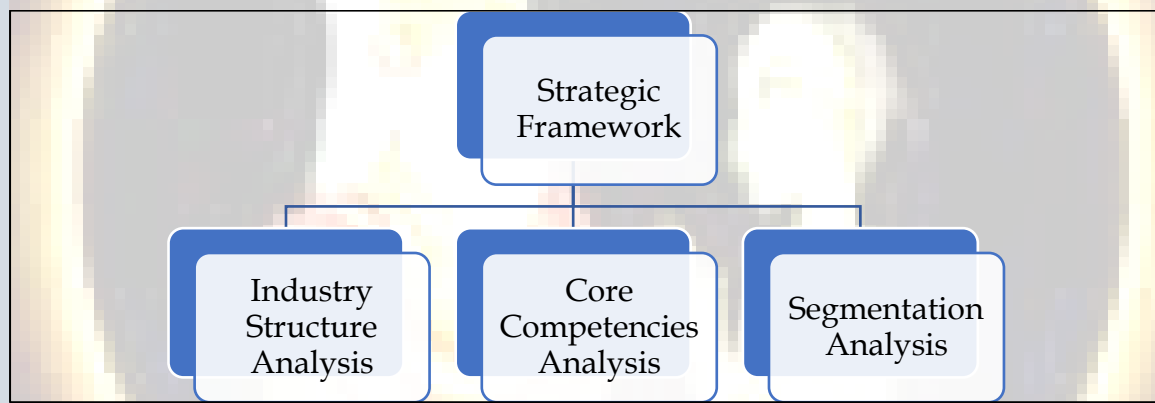
Value Chain Analysis (VCA):

- ❖ VCA is a process by which firm **identifies & analyses various activities** that add value to the final product.
- ❖ VCA focuses on identifying those activities that **do not add value to the final products/services and eliminate such non-value added activities**
- ❖ Michael Porter was the first to suggest the idea of value chain in 1985. **Michael Porter has classified the activities into Primary and Support activities**

- ❖ Value chain has been defined as the internal processes or activities a company performs to **design, produce, market, deliver and support its product.**

Primary Activities	Support Activities
• Inbound Logistics (Raw Materials, Handling and Warehousing) • Operations (Machining, Assembling, Testing Products) • Outbound Logistics (Warehousing and Distribution of Finished Products) • Marketing & Sales (Advertising, Promotion, Pricing, Channel Relations) • Service (Installation, Repair Parts)	• Firm Infrastructure (General Management, Accounting, Finance, Strategic Planning) • Human Resource Management (Recruiting, Training, Development) • Technology Development (R&D, Product and Process Improvement) • Procurement (Purchasing of Raw Materials, Machines & Supplies)

Strategic Frameworks for Value Chain Analysis:



Industry Structure Analysis [Porter's 5 forces Analysis]

Bargaining Power of Buyers	✓ Bargaining power of buyers <u>determines the ability of buyer to push the price down.</u> This happens when the buyers are concentrated or when the volume purchased by buyers is very high ✓ Buyer also have higher bargaining power if the cost of switching suppliers is very low ✓ Higher <u>bargaining power results in lower profitability</u>
Bargaining Power of Suppliers	✓ Bargaining Power of Suppliers is <u>relatively higher when the input is important to the buying firm</u> or when there are few suppliers of the input ✓ Suppliers also dictate terms if the input supplied is not replaceable or when an alternate input is not available ✓ <u>Profitability of the companies can shrink if suppliers have a higher bargaining power</u>
Threat of substitute products or services	✓ <u>Multiple and closer substitutes can make customers to switch the suppliers easily.</u> Hence a firm should resort to competitive pricing to retain its customers

	✓ When few substitutes exist for a product, consumers are willing to pay a potentially high price. If close substitutes for a product exist, then there is a limit to what price customers are willing to pay ✓ <u>A company should strive to build its brand and customer loyalty to prevent the threat of substitutes</u>
Threat of new entrants	✓ <u>Threat to new entrants largely depends on the barrier to entry and perceived profitability</u> in an industry ✓ Some examples of barriers to entry are intensive capital equipment, sophisticated technology, legal factors, limited access to raw material and labour ✓ <u>An industry where threat of new entrants is low is more profitable than an industry where new entrants can easily enter the industry</u>
Intensity of competition / rivalry amongst firms	✓ In Highly competitive markets, <u>firms resort to cut-throat competition to win more customers</u> ✓ The competitive rivalry is higher when an industry has high number of firms and lower when there are few large players dominating the market ✓ Intensity of competition is influenced by number of firms, existence of extra capacity, difficulty in differentiation of products, high exit barriers and higher fixed costs

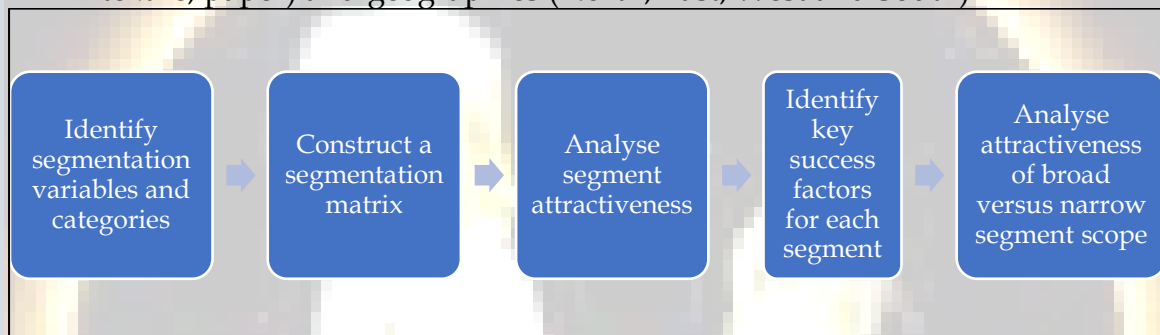
Core Competencies Analysis:

- ❖ Core competency is a **distinctive or unique skill** that creates distinctive customer value
- ❖ Core competencies are a **function of the collective skillset of people, organisation structure resources & technological knowhow**
- ❖ Core competence is the **primary source of an organization's competitive advantage**. The competitive advantage could result from cost leadership or product differentiation
- ❖ **Loss of core competence can prove disaster for firms. Example: Nokia** was a leader in feature phone segment till smart phones were introduced. The changing dynamics of industry meant that Nokia lost top position in mobile phone market
- ❖ Core competencies stem from two sources:
 - **Resources** – Resources **are factors that enable a company to create value for customers. They can be tangible** (land, buildings, inventory, machinery, money) **or intangible** (employee's skills, brand, patent, technology)
 - **Capabilities** – **Capabilities refer to the company's ability to co-ordinate resources and put them to productive use**. Availability of resources does not guarantee core competency and success. Capabilities stem from organisational structure, processes and control systems
- ❖ **Value chain approach can be applied to core competencies for creating competitive advantage** using the following steps:
 - **Validate** core competencies in **current businesses**
 - **Leverage competencies** to the value chains of **other existing businesses**
 - Use core competencies to **reconfigure the value chains** of existing businesses

- Use core competencies to create new value chains

Segmentation Analysis:

- ❖ A single industry might be a collection of different market segments.
Example: Motor Vehicle industry can be seen as a composite of tyre, glass, battery, metals among others
- ❖ Segmentation analysis involve analysis structural characteristics of different industry segments
- ❖ A firm can use the segmentation analysis information to decide to exit the segment, to enter a segment, reconfigure one or more segments, or embark on cost reduction/differentiation programs
- ❖ Market segmentation can be done on the basis of demographics (Age, Gender, Marital Status, Income, Education), Geographic, Lifestyle, Benefit (convenience, status, value, quality) among others. Example: ITC could create a segmentation matrix on the basis of nature of products (cigarettes, hotels, textile, paper) and geographies (North, East, West and South)



Superior Performance and Competitive advantage:

- ❖ A company's profitability is improved with superior performance which leads to the maximisation of shareholder's wealth
- ❖ A company needs to do the following in order to survive and prosper in an industry
 - They must supply what customers want to buy and
 - They must survive competition
- ❖ Distinctive competencies can take any of the following two forms:
 - An offering or differentiation advantage – Example: Apple
 - Relative low-cost advantage – Example: Xiaomi

Differentiation advantage (Product Differentiation):

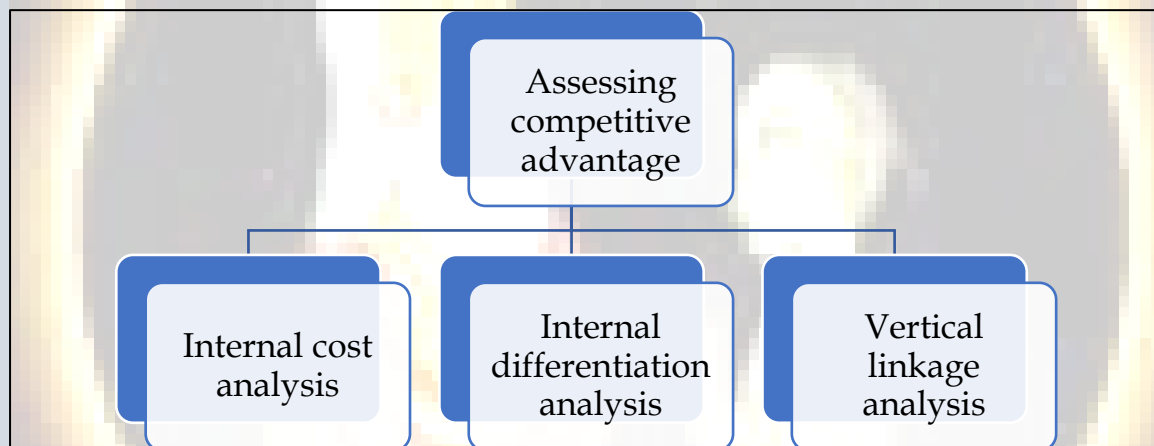
- ❖ Differentiation advantage occurs when customers perceive that a business unit's product offering is of higher quality, involves fewer risks and/or outperforms products offered by competitors
- ❖ Differentiation may include a firm's ability to deliver goods and services in a timely manner, to produce better quality, to offer the customer a wider range of goods and services and other factors that create unique customer value
- ❖ Differentiation advantage can be achieved by adopting the following techniques:
 - Superior Quality
 - Superior Innovation
 - Superior customer responsiveness

- ❖ Differentiation can help the company in charging a higher price while maintaining its current market share or charge a price below the “full premium” in order to build market share

Low cost advantage (Cost leadership):

- ❖ A firm enjoys relative cost advantage if its total costs are lower than those of its competitors
- ❖ Cost leadership can help the company in charging the same price as competitor to maintain its market share while improving profitability. It can also help the firm to charge a lower price than its competitors to increase its market share
- ❖ Low cost advantage can arise from access to low-cost raw materials, innovative process technology, low-cost access to distribution channels or customers and superior operating management
- ❖ Disadvantage of this strategy is that competitors can find ways to reduce cost and hence the company should continuously find ways to reduce its cost. Company can do value chain analysis to find ways to reduce costs.

Value-chain approach for assessing competitive advantage:



Internal cost analysis:

- ❖ Identify the firm's value creating processes: The companies should identify their value creating processes and their contribution to the firm's competitive advantage.
- ❖ Determine the proportion of the total cost of the product or service attributable to each value creating process: The next step would be to calculate the cost of the various processes. The company should also allocate costs of various support activities to primary activities using suitable basis
- ❖ Identify the cost drivers for each process: Company identify the factors which drive costs. A change in cost driver leads to change in total cost. Companies are currently using ABC system to gain a better understanding of the resources consumed and costs incurred for certain activity
- ❖ Identify the links between processes: Value chain analysis consider activities as separate and discrete. However the individual activities are interdependent and hence the linkages between processes is to be understood. Cost improvement programs in one value chain may lower or increase the cost in other processes.

- ❖ **Evaluate the opportunities for achieving relative cost advantage:** Traditionally firms have adopted across the board cost reduction under all heads. However a forceful reduction in some activities like marketing can impact sales. Value chain analysis involves understanding of various activities and attempts to lower cost and improve efficiency within each value creating process.

Internal differentiation analysis:

- ❖ **Identify the firm's value creating processes:** Companies must identify the various activities in its value chain which are undertaken to deliver product/service. Differentiation can come from the way various activities are performed and the way in which value chains is structured.
- ❖ **Evaluate differentiation strategies for enhancing customer value:** The companies can implement the following to enhance customer value
 - Superior features in product
 - Effective marketing and distribution channels
 - Excellent customer service
 - Superior brand image
 - Better quality product at competitive prices
- ❖ **Determine the best sustainable differentiation strategies:** Company must identify various activity which can enhance differentiation and select the strategy which can create sustainable product/service differentiation

Vertical Linkage Analysis:

- ❖ A company **can earn competitive advantage** not only through linkage between various **internal activities but also through linkages between a firm's value chain and that of suppliers or users**
- ❖ Vertical linkage analysis **includes all upstream and downstream activities throughout the industry**
- ❖ A company might **not carry out all activities in the entire value chain of an industry**. Hence it might not be in a position to obtain information relating to costs or revenues for each process. However it is necessary to **carry out a vertical linkage analysis to identify the sources of competitive advantage**
- ❖ **Example:** A company manufactures cars using various components like chassis, steering wheel, tyres, axles etc. The company does not manufacture all components and assembling is its core competency. However certain parts which are critical are manufactured in-house

Vision, Mission and Objectives:

Mission Statement	✓ Mission statement seeks to answer the question as to <u>"Why does the company exist"?</u> ✓ It can include a statement of organisation values and major goals ✓ Company's mission statement must be customer focussed and not product focussed
Vision Statement	✓ Vision statement <u>what the company would like to achieve</u> ✓ Vision statement must be challenging and generally state an ambitious future
Objective or goal	✓ Objective or goal is a <u>precise and measurable future state that the company wants to achieve</u>

	✓ Purpose of objective or goal statement is to specify what needs to be done in order to attain the company's mission and vision
--	--

Value shop model or Service Value Chain:

- ❖ Value shop model aims to serve companies from service sector. This model best applies to telecommunication companies but can also be used for insurance companies and banks
- ❖ In value shop principle, no value addition takes place. It only deals with the problem, figure-out the main area requires its service and finally comes with the solution
- ❖ Value shop model is designed to solve customer problems rather than creating value by producing output from an input of raw materials
- ❖ Value shop model has the same support activities as Porter model but the primary activities are described differently
- ❖ Management in a value shop focuses on areas like problem and opportunity assessment, resource mobilization, project management, solutions delivery, outcome measurement and learning

Primary Activities	Support Activities
• Problem finding and acquisition • Problem solving • Choosing among solutions • Execution and control/evaluation	• Infrastructure • Human Resource Management • Technology Development • Procurement

Modern Business Environment (MBE):

- ❖ MBE has changed drastically and shaped entirely in a different manner and hence it has become a challenge for business managers to understand the business environment and formulate business plans and policies
- ❖ Main revolution of the current business environment **is the transition from a seller's market to a buyer's market**

Seller's market to buyer's market

- ❖ Today's business environment is that of a **buyer's market**. This result is the trend of **international transitions and macroeconomic, technological**, political and social changes
- ❖ Challenge of today's environment is to **satisfy the customer** with exceptional performance of the processes
- ❖ MBE is characterized by
 - Globalization of the world economy
 - Fierce competition
 - Global excess capacities in production, services
 - New managerial methods
 - Availability and accessibility of data and knowledge
 - Timely availability of materials and services
 - Ease of global travel and transportation

Cost of Quality (COQ)

- ❖ Quality is concerned with **conformance to specifications** and ability to satisfy customer expectations and value for money
- ❖ **COQ = Cost of control/conformance + Cost of failure to control/non-conformance**

Views regarding Cost of Quality:

- ❖ **View 1:** Higher quality means higher cost
- ❖ **View 2:** Resultant savings due to improving quality are greater than the cost of improving quality
- ❖ **View 3:** Quality costs are those incurred in excess of those that would have been incurred if product was built or service performed exactly right the first time

Components of Cost of Quality:

Prevention costs	✓ Costs incurred for <u>preventing the poor quality</u> of products and services are termed as prevention costs ✓ These are <u>planned and incurred before actual operation</u> and associated with the design, implementation and maintenance of the quality management system ✓ <u>Examples:</u> Quality Planning, Quality assurance, Supplier evaluation, New Product review, Error Proofing, Capability evaluations, Quality improvement team meetings, Quality improvement projects, Quality education and training
Appraisal costs	✓ Appraisal costs are cost <u>associated with measuring and monitoring activities related to quality</u> ✓ Appraisal costs are incurred to <u>determine the degree of conformance</u> to quality requirements ✓ <u>Examples:</u> Verification, Quality audits, Supplier rating, Checking and testing purchased goods and services, In-process and final inspection/test, Field testing, Product or process audits, calibration of equipment
Internal failure costs	✓ Internal failure costs are <u>associated with defects found before the customer receives the product or service</u> ✓ These costs occur when the <u>product is not as per design quality standards</u> and they are detected before they are transferred to the customer ✓ <u>Example:</u> Waste, Scrap, Rework, Rectification, Failure analysis, Delays, Re-designing, Shortages, Re-testing, Downtime
External failure costs	✓ External failure costs are <u>occurred to rectify defects discovered by customers</u> ✓ These costs occur when products or services that fail to reach design quality standards <u>are not detected until their transfer to the customer</u> ✓ <u>Example:</u> Repairs and servicing, Warranty claims, Complaints, Returns, Losses due to sales reduction,

Optimal COQ:

- ❖ **Increase expenditure in prevention and appraisal** will result in **substantial reduction in failure costs**. Because of this relationship, there can be an optimum level at which the **combined cost is at minimum**
- ❖ Hence it is **not necessary to get to a zero defect** through a program of continuous improvement **as the combined cost may not be minimum**

Prevention, Appraisal and Failure (PAF) Model:

- ❖ PAF Model is the most widely used method for **measuring and classifying quality costs**. Following are its five-steps:
 - Gather some basic information about the **number of failures** in the system
 - Apply **some assumptions** to that data in order to quantify the data
 - Chart the data **based on the four elements** and study it
 - **Allocate resources** to combat the weak-spots
 - Do this **study on regular basis** and evaluate your performance

Total Quality Management (TQM):

- ❖ TQM is a management philosophy that seeks to integrate all organizational functions (marketing, finance, design, engineering, production, customer service) to focus on meeting customer needs and organizational objectives
- ❖ TQM aims at improving the quality of organizational outputs through continual improvement of internal practices
- ❖ TQM's objectives are to eradicate waste and increase efficiency
- ❖ CIMA defines 'Total Quality Management' as "Integrated and comprehensive system of planning and controlling all business functions so that products or services are produced which meet or exceed customer expectations. TQM is a philosophy of business behaviour, embracing principles such as employee involvement, continuous improvement at all levels and customer focus, as well as being a collection of related techniques aimed at improving quality such as full documentation of activities, clear goal-setting and performance measurement from the customer perspective."
- ❖ TQM focuses on doing things right the first time and that defects and waste are eliminated from operations

Six C's of TQM:

Commitment	✓ <u>Quality improvement</u> should become a <u>normal part</u> of everyone's job ✓ There should be a <u>clear commitment toward quality</u> from the top ✓ Quality improvement <u>should not be delegated to a single person but the same should form part of everyone's work</u>. Management should provide necessary training and support for this achievement
Culture	✓ <u>Training lies at the centre of effecting a change in culture and attitudes</u> ✓ Everyone must be encouraged to do individual contributions and to make quality a part of everyone's job
Continuous improvement	✓ TQM <u>is a process and not a programme</u>. Hence we <u>should be committed in the long-term to the never-ending search</u> for ways to do job better
Co-operation	✓ <u>Total Employee Involvement (TEI) principle</u> is of paramount importance ✓ <u>On-the job experience of employees must be fully utilized</u> and their cooperation sought in the development of improvement strategies
Customer focus	✓ <u>TQM should focus on meeting the need of the external customer</u> as well as <u>internal customer</u> ✓ Perfect service with zero defects should be acceptable both at internal or external levels
Control	✓ <u>Documentation, procedures and awareness</u> of current best practice are essential if TQM implementation is to take place appropriately ✓ <u>Some organization over-look need for control mechanism</u> in wake of customer focus. <u>However procedures should be developed to monitor the extent of improvement and correct the deficiencies if required</u>

Contribution by Deming to TQM:

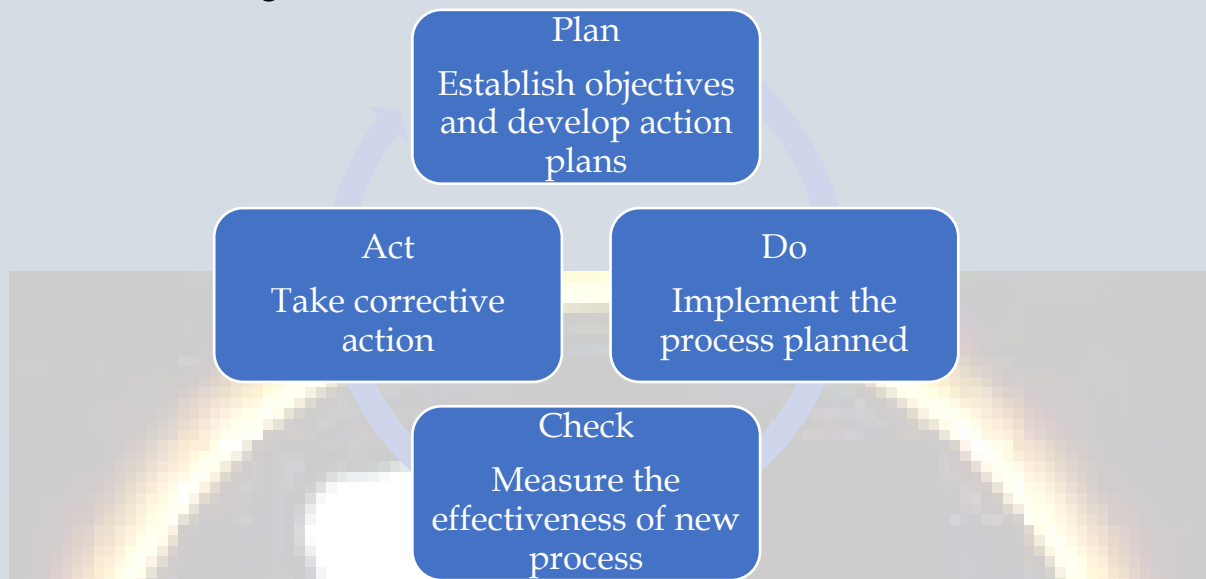
- ❖ William Edwards Deming is **considered as the father of Quality Control**. A number of elements of Deming's philosophy depart from traditional notions of quality
- ❖ **Historically poor quality was blamed on workers**. However Deming pointed out that only **15 percent of quality problems are actually due to worker error** and the balance 85 percent are caused by processes and systems

Deming's 14 points methodology:

1. **"Create constancy of purpose towards improvement"**. Replace short-term reaction with long-term planning
2. **"Adopt the new philosophy"**. The implication is that management should actually adopt his philosophy rather than merely expect the workforce to do so
3. **"Cease dependence on inspection"**. If variation is reduced, there is no need to inspect manufactured items for defects, because there won't be any
4. **"Move towards single supplier for any one item"**. Multiple suppliers mean variation between feedstock
5. **"Improve constantly and forever"**. Constantly strive to reduce variation
6. **"Institute training on the job"**. If people are inadequately trained, they will not all work the same way, and this will introduce variation
7. **"Institute leadership"**. Deming makes a distinction between leadership and mere supervision. The latter is quota and target-based
8. **"Driver out fear"**. Deming sees management by fear as counter-productive in the long term, because it prevents workers from acting in the organization's best interests
9. **"Break down barriers between departments"**. Another idea central to TQM is the concept of the 'internal customer' that each department serves not the management, but the other department that uses the outputs
10. **"Eliminate slogans"**. Another central TQM idea is that not people who make most mistakes - it's the process they are working within. Harassing the workforce without improving the processes they use is counter-productive
11. **"Eliminate management by objectives"**. Deming saw production targets as encouraging the delivery of poor-quality goods
12. **"Remove barriers to pride of workmanship"**. Many of the other problems outlined reduce worker satisfaction
13. **"Institute education and self-improvement"**
14. **"The transformation is everyone's job"**

Plan-Do-Check-Act (PDCA) Cycle:

- ❖ PDCA cycle describes the activities a company needs to perform in order to **incorporate continuous improvement** in its operation. This cycle is also known as **“Deming Wheel”**

Criticisms of TQM:

- ❖ TQM focuses **extensively on documentation** of process and ill-measurable outcomes
- ❖ TQM **emphasizes on quality assurance** rather than improvement
- ❖ TQM **emphasizes on internal focus** which is at odds with alleged customer orientation
- ❖ TQM **may not be appropriate for service based industries**, because the standard based approach of ‘industry best practice’ ignores the culture of the organization

Business Excellence Model:

- ❖ **Business Excellence (BE) is a philosophy for developing and strengthening the management systems** and processes of an organization to improve performance and create value for stakeholders
- ❖ **Essence of BE is to develop quality management principles that increase the overall efficiency of the operation, minimize waste** in the production of goods and services, and help to increase employee loyalty as a means of maintaining high standards throughout the business **by achieving excellence in everything that an organization does**
- ❖ Business excellence models **consider various management thoughts** as core concepts and structures quality management in a manner that can be adapted by any enterprise. Most common business excellence models are
 - EFQM Excellence Model
 - Balridge Criteria for Performance Excellence
 - Singapore BE Framework
 - Japan Quality Award Model
 - Australian Business Excellence Framework

EFQM Excellence Model:

- ❖ EFQM Excellence Model **provides an all-round view of the organization** and

it can be used to determine how different methods can fit together and complement each other

- ❖ EFQM Model presents set of three integrated components:
 - The Fundamental, concept of excellence
 - The Criteria, conceptual framework
 - The RADAR, logic assessment framework

Fundamental concepts of Excellence:

- ❖ Fundamental concepts are the basic principles that describe the essential foundation for any organization to achieve sustainable excellence.

Fundamental concepts are

- Sustaining outstanding results
- Adding value for customers
- Creating a sustainable future
- Developing organization capability
- Harnessing creativity and innovation
- Leading with vision, inspiration and creativity
- Managing with agility
- Succeeding through the talent of people

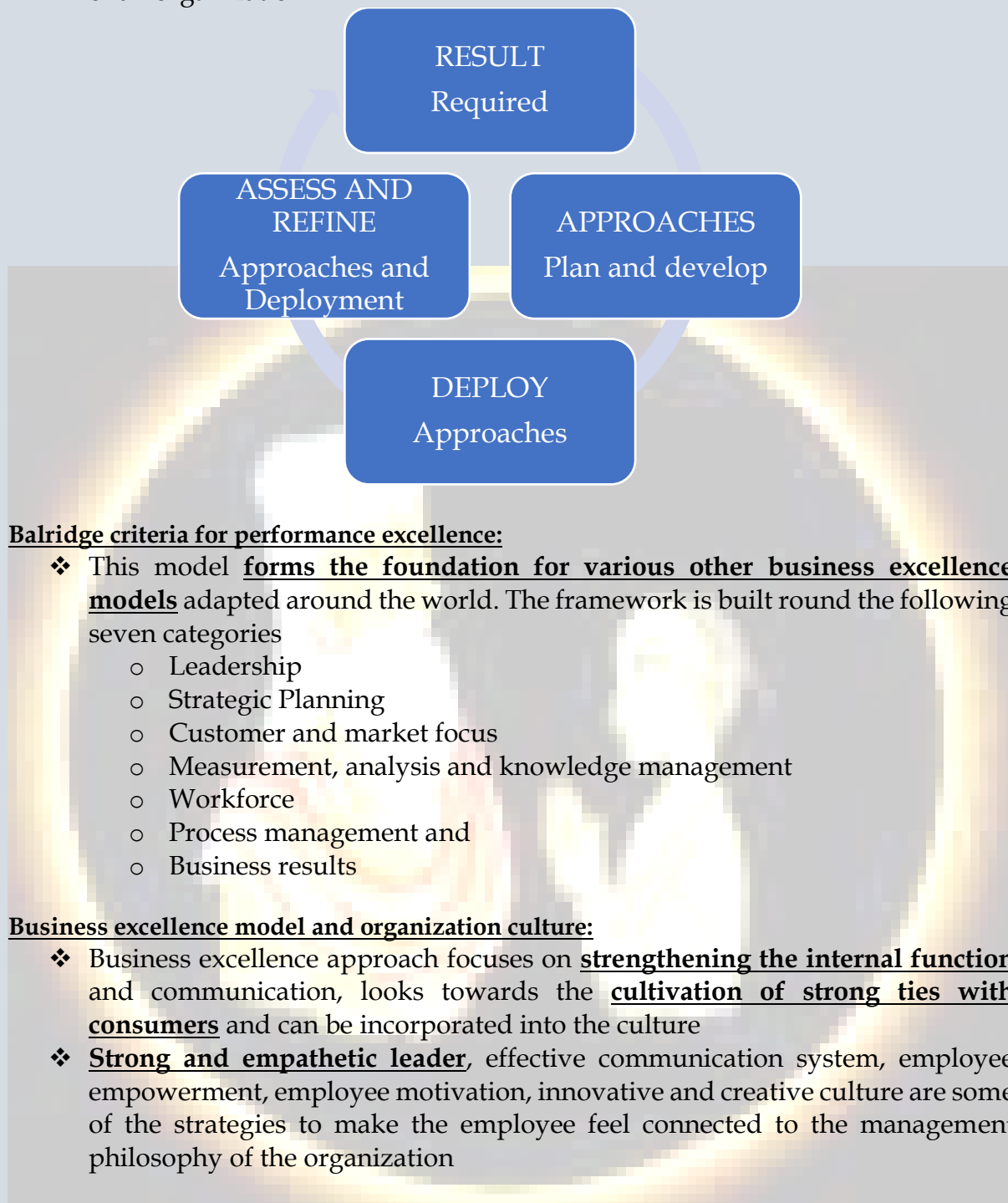
Criteria:

- ❖ EFQM criteria model focuses on what an organization does and the result it achieves. There are five Enablers (what an organization does) and four Results (what an organization achieves)

Enablers (What an organization does)	Results
• Leadership • People • Strategy • Partnership & Resources • Processes, products and services	• People results • Customer results • Society results • Business results
Enablers should focus on innovation, learning and creativity to improve results	

RADAR (results – approaches – deploy – assess – refine) logic:

- ❖ RADAR is a **management and evaluation tool** for analysing the performance of an organization

**Balridge criteria for performance excellence:**

- ❖ This model **forms the foundation for various other business excellence models** adapted around the world. The framework is built round the following seven categories
 - Leadership
 - Strategic Planning
 - Customer and market focus
 - Measurement, analysis and knowledge management
 - Workforce
 - Process management and
 - Business results

Business excellence model and organization culture:

- ❖ Business excellence approach focuses on **strengthening the internal function** and communication, looks towards the **cultivation of strong ties with consumers** and can be incorporated into the culture
- ❖ **Strong and empathetic leader**, effective communication system, employee empowerment, employee motivation, innovative and creative culture are some of the strategies to make the employee feel connected to the management philosophy of the organization

Theory of Constraints (TOC):

- ❖ TOC **focuses on revenue and cost management** when faced with bottlenecks. It advocates the use of three measures
- ❖ The objective of management can be expressed as **increasing throughput, minimizing investment and decreasing operating expenses**

Throughput

- Measures rate of generating money in an organization through sales
- $\text{Throughput} = (\text{Sales} - \text{unit level variable expense}) / \text{Time}$
- Direct labour cost is viewed as fixed cost and hence is not included while calculating throughput

Investment

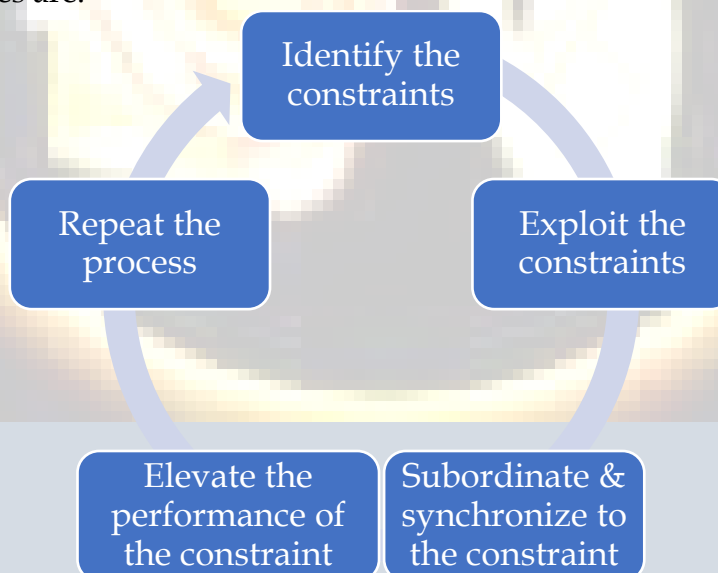
- Money associated with turning materials into throughput and do not have to be immediately expensed
- Includes assets such as facilities, equipment, fixtures, computers and Research & Development expense

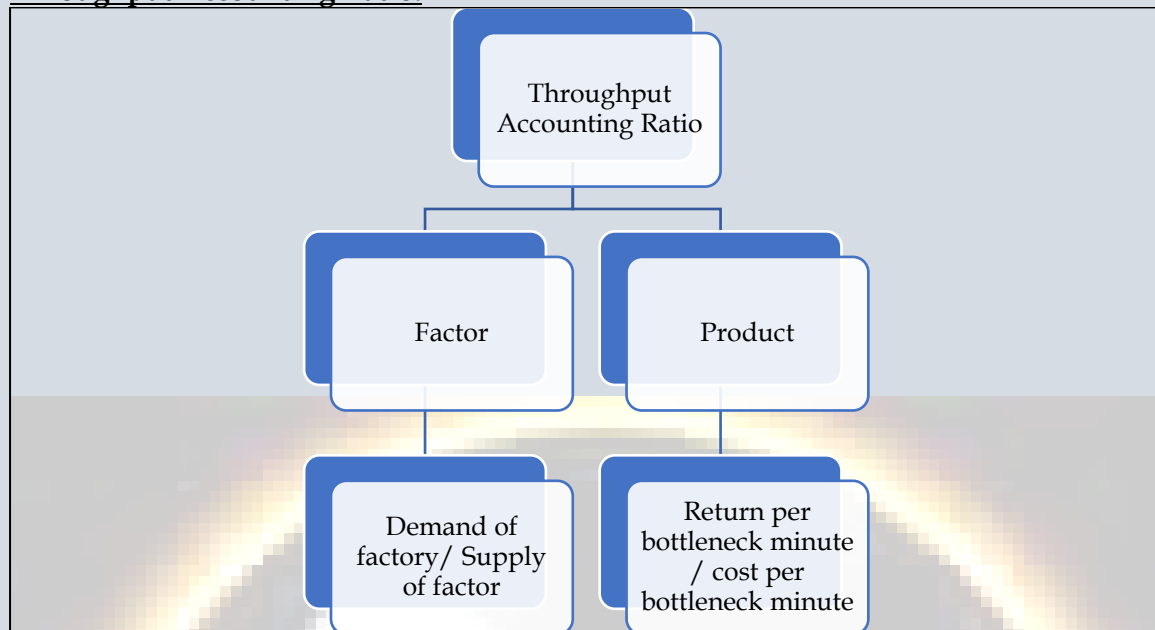
Operating expense

- Money spent in turning investment into throughput and therefore represent all other money that an organization needs
- Includes direct labour and all operating and maintenance expense

Goldratt's five step method for improving performance:

- ❖ TOC describes the **process of identifying** and taking **steps to remove the bottlenecks** that restrict output. The key steps in managing bottleneck resources are:



Throughput Accounting Ratio:**Note:**

- ❖ TA ratio of more than 100 percent for an input factor indicates bottleneck resource
- ❖ TA ratio of more than 100 percent for a product indicates profitable product

Advantages and disadvantages of TOC:

Advantages	Disadvantages
• Reduction in inventory • More productive machines • Ability to meet shorter lead times • More flexible • Better customer service • Better product mix • Better customer relationship	• Focus on short-term goals • Main emphasis on increasing sales and volume, not quality as opposed to TQM • Might result in loss of overall picture • Focuses on push approach as opposed to pull approach of JIT • Valid only if applied to total supply chain process including management, production, resources and support

Supply Chain Management:

- ❖ Supply chain comprise of vendors that supply raw materials, producers who convert the material into products, warehouses that store, distribution centers that deliver to the retailers and retailers who sell the product to the ultimate user
- ❖ Supply chain can be referred as the entire network of organizations working together to design, produce, deliver and service products
- ❖ Supply chain includes production planning, purchasing, material management, distribution, customer service and forecasting
- ❖ The Global Supply Chain Forum (GSCF) defines Supply chain management as the "integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders".

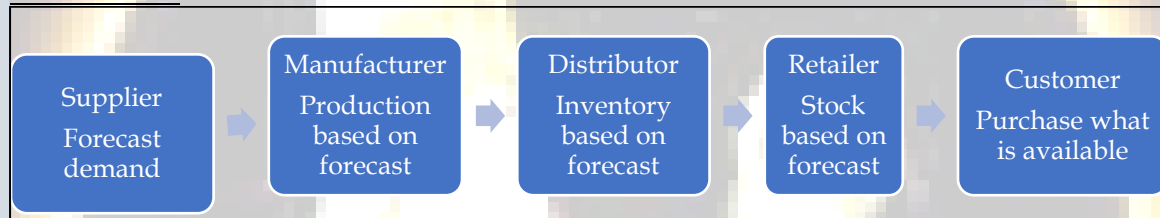
❖ Supply chain management consist of the following eight processes:

- Customer relationship management
- Supplier relationship management
- Customer service management
- Demand management
- Order fulfillment
- Manufacturing flow management
- Product development and commercialization
- Returns management

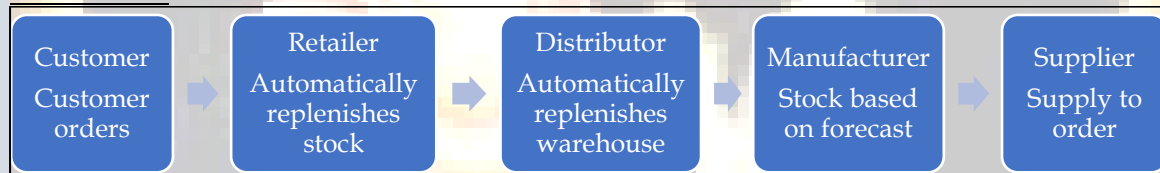
Push versus Pull Supply Chain:

Push Model	Pull Model
Under Push Model <u>stocks are produced on the basis of anticipated demand</u> . Demand forecasting can be done via a variety of sophisticated techniques such as operations research or data mining	Under Pull Model <u>stocks are produced on the basis of actual demand</u> . This new business model is less product centric and more directly focused on the individual consumer – a more marketing oriented approach

Push Model:



Pull Model:



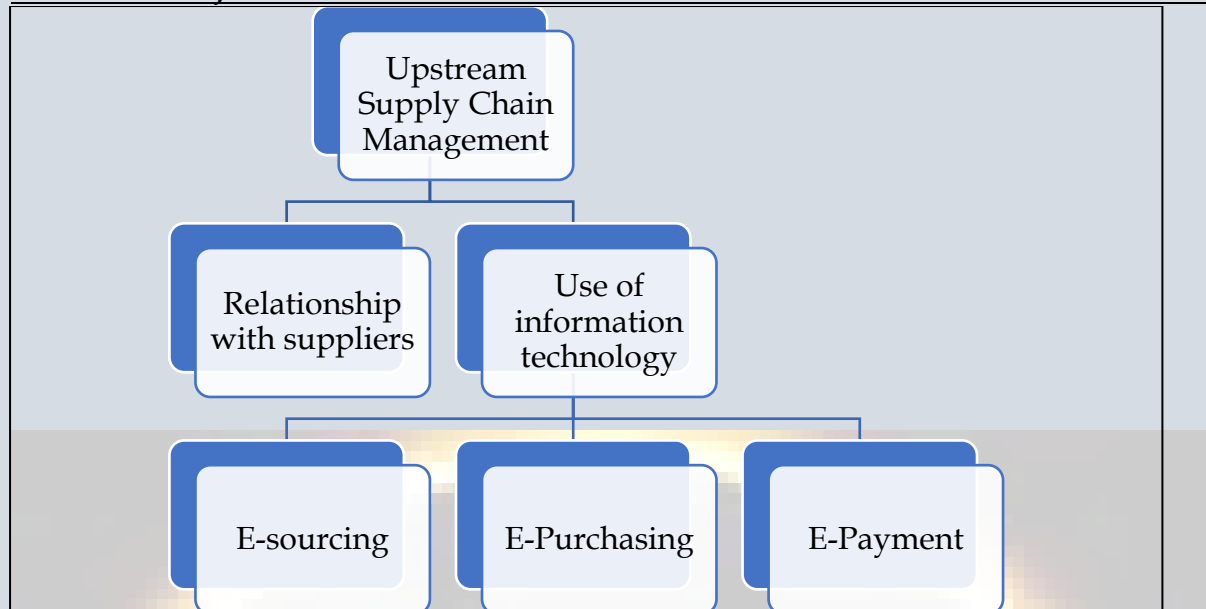
Role of e-commerce in supply chain:

- ❖ Supply chain created through e-commerce can benefit both customer and manufacturer. **It facilitates the companies to fulfill customer needs, carry fewer inventories, and send products to market very quickly**

Upstream and downstream supply chain:

Basis	Upstream supply chain	Downstream supply chain
Meaning	When the flow <u>relates to supplier</u> it is termed as upstream supply chain	When the flow <u>is with customers</u> it is named as downstream supply chain
Material	Returns, Repairs, After-sales service	Products, Parts
Information	Orders, Points of sale data	Capacity, Delivery schedules
Capital/finance	Payments	Invoices, Pricing, Credit terms

Management of upstream supply chain (Management of transactions with suppliers):

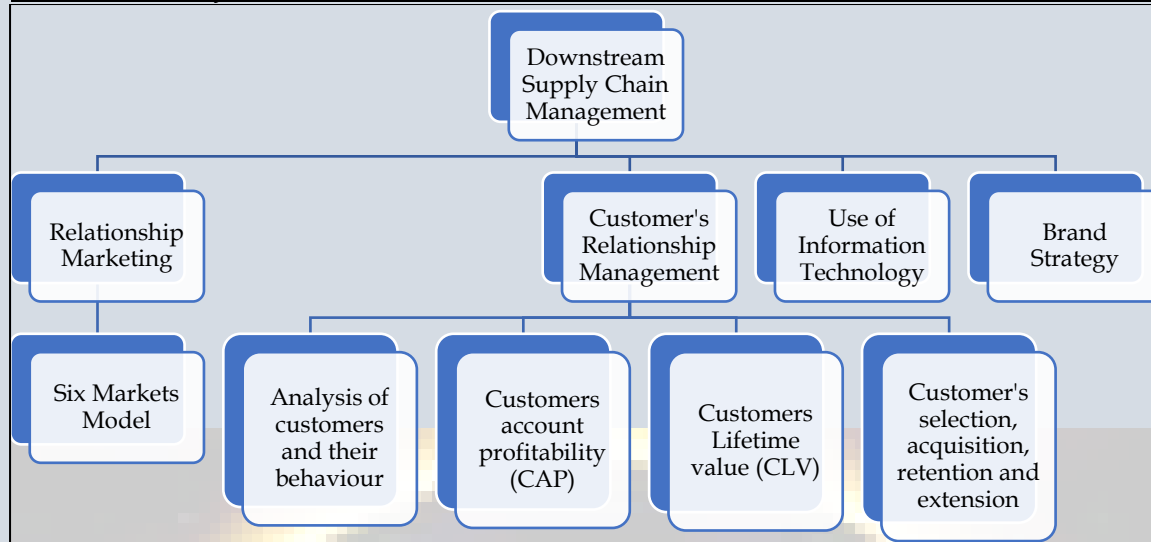
**Relationship with suppliers:**

- ❖ Supplier Relationship Management (SRM) is undergoing a major transition. There are **lot of factors in choosing a supplier such as innovation, quality, reliability, and costs/price reductions and agility to reduce risk**
- ❖ SRM can create greater value for both businesses, something that would be difficult to achieve if operating independently
- ❖ The company should adopt a **suitable supplier strategy** to ensure the whole upstream supply chain is managed. The strategy should take into account sources, number of suppliers, cost, quality and speed of delivery, Make or Buy and outsourcing

Use of information technology:

- ❖ Main activities of upstream supply chain are **procurement and logistics**. The companies can use information technology for **E-sourcing, E-purchasing and E-payment**
- ❖ **E-sourcing**: Organization provides electronic invitation to tenders and requests them to submit their quotations. This can help to find out the best supplier among others
- ❖ **E-purchasing**: Usage of technology has resulted in lesser time, lower cost and better result in product selection and ordering. E-Purchasing system include electronic catalogues, recurring requisitions/shopping lists, electronic purchase orders and detailed management information
- ❖ **E-Payment**: Payment can also be made in electronic mode (invoicing and fund transfer). E-payment results in faster payment with zero error which is expected in manual form

Downstream Supply Chain Management (Management of transactions with customers)



Relationship Marketing:

- ❖ Marketing plays a **pivotal role to successfully handle** the downstream supply chain management
- ❖ Relationship marketing helps the **organization to keep existing customer and to attract new customers**
- ❖ Companies can use **“Six Market Model”** to identify the markets where company can direct their marketing initiatives

Internal Markets	✓ Internal markets include internal departments and staff . Staff have the ability to determine customer oriented corporate culture
Referral Markets	✓ Referral markets are of two categories: Existing customers who refer their suppliers to others and referral sources such as consultancy firm which may refer work to a law firm
Influence Markets	✓ Influence markets represent entities and individuals, which have the ability to influence marketing environment of a firm. This may include financial analysts, shareholders, business press, Government and consumer groups
Recruitment's markets	✓ Recruitment markets include commercial recruitment agencies , universities and agencies who have access to potential employees for the company
Supplier's markets	✓ Supplier markets refer to traditional suppliers as well as organizations with which the firm has some form of strategic alliance to gain benefits such as better quality, faster reach among others
Customer's markets	✓ Customer Markets represent all existing and prospective customers as well as intermediaries. In today's environment, the way firms provide services affect the market and helps in gaining customers

Customer's relationship management (CRM):

- ❖ CRM focuses on **knowing the needs of the customers** and providing them with the best solution
- ❖ Customers **under different channels are compiled through CRM**. The staff dealing with customers get a detailed information about customer's personal information, purchase history, buying preferences and concerns

Analysis of customers and their behavior:

- ❖ Analysis of customers is necessary based on **geographical location** or **purchasing characteristics**
- ❖ Companies should consider safety need, social need, physiological need, status/ego need and self-fulfillment need of existing and future customers

Customers Account Profitability (CAP):

- ❖ CAP involves **calculation of the profitability at customer level**. It includes the following five-steps:
 - Analyze the customer base and split it into segments
 - Calculate the annual revenues earned from the customer
 - Calculate the annual costs of serving the segment
 - Identify and retain quality customers
 - Re-engineer/ eliminate the unprofitable segments
- ❖ Customer profitability analysis is best conducted with a technique called as **Activity Based Costing**
- ❖ Post completion of CAP customers can be categorized into four types:
 - Platinum customers – Most profitable
 - Gold customers – Profitable
 - Iron customers – Low profit but desirable
 - Lead customers – Unprofitable and undesirable
- ❖ A company would always give the **best service to the first two customers**. It will at the same time try to **convert Iron customers to Platinum or Gold customers**. Finally, these companies will have systems in place to **avoid lead customers** completely
- ❖ Major challenge in CAP analysis is **calculation of right cost**. Time spent with each customer is different and therefore the cost is different. Furthermore there are several non-customer related costs too. If these costs are ignored, then the profitability calculation can be wrong

Customers Lifetime Value (CLV):

- ❖ Customers lifetime value is the **present value of net profit** that we derive from a customer over the entire lifetime of relationship with a particular customer
- ❖ This is an **essential tool in marketing to focus on more profitable customers** and stop servicing non-profitable customers
- ❖ We need to use **ABC technique** to calculate the customer profitability and then project the future revenues and costs. These cash flows are discounted at firm's cost of capital to arrive at CLV

Customer's selection, acquisition, retention and extension:

- ❖ **Customer selection:** Type of customer which the company needs to target has to be selected
- ❖ **Customer acquisition:** Relationship needs to be developed with new customers. It can use off-line techniques such as advertising, direct mail or on-line techniques such as search engine, online marketing
- ❖ **Customer retention:** The company can keep its customer intact by emphasizing on meeting customer needs, ensuring ongoing service quality and using e-techniques
- ❖ **Customer extension:** The Company needs to increase the products sold to

customers. It can re-sell similar products, cross-sell closely related products and up-sell more expensive products

Use of Information Technology in Downstream Supply Chain Management:

- ❖ Organizations are increasingly **linking their sales system to the purchasing system of the customer through Electronic Data Inter-change (EDI)**
- ❖ Intelligence gathering is used to monitor the online customer transactions. Use of IT results in quick action, reduction in associated time and cost

Brand Strategy:

- ❖ Branding of product **makes a huge difference in its appeal** to customers
- ❖ Branding can be usage of logo or specific color or any other means by which product/service is distinguished from others

Service Level Agreements:

- ❖ An **agreement between the customer and service provider** is termed as a service-level agreement.
- ❖ This can be a legally binding formal or an informal "contract".
- ❖ The agreement may be between separate organisation or within different teams of the organisation.
- ❖ SLAs commonly include many components, from a definition of services to the termination of agreement.
- ❖ To ensure that SLAs are consistently met, agreements are often designed with specific lines of differentiation and the parties involved are required to meet regularly to create an open forum for communication.
- ❖ **Providers rewards and penalties are specified. There is always place left for revisiting in most SLA.**

Benefits of supply chain:

- ❖ Inventory reduction
- ❖ Personnel reduction
- ❖ Productivity improvement
- ❖ Order management improvement
- ❖ Financial cycle improvement
- ❖ Information visibility
- ❖ New/improved processes
- ❖ Customer responsiveness
- ❖ Standardization
- ❖ Flexibility and globalization of performance

Gain-sharing arrangements:

- ❖ Gain sharing is an approach to the review and adjustment of an existing contract, or series of contracts, **where the adjustment provides benefits to both parties.**
- ❖ A **fundamental form of gain-sharing is where a supplier agrees to perform its side of the contract with no guarantee of receiving a payment.**
- ❖ Instead, any payment received is based upon the benefits that emerge to the customer as a result of the successful completion of the supplier's side of the bargain. **This is clearly a risky stance for the supplier, because it could spend a fortune and walk away with nothing.**

- ❖ Alternatively, if the benefits to the customer are substantial, the supplier could find itself rewarded with a large return. In this situation, the supplier could almost be described as taking an equity stake in the customer rather than entering into a contract with it.
- ❖ There must be no rewards for the suppliers to achieve a higher return through adversarial behaviour or by hiding behind the contract. Gain-sharing deals are, on the face of it, a win-win situation for suppliers and their customers.

Outsourcing:

- ❖ Outsourcing (also sometimes referred to as "contracting out") is a business practice used by companies to reduce costs or improve efficiency by shifting tasks, operations, jobs or processes to another party for a span of time.
- ❖ Outsourcing is a cost- saving measure, and practising this can have a significant impact on manufacturing.
- ❖ Outsourcing is not limited to manufacturing. Giving services to customer such as those in a call center, and computer programming jobs are also outsourced by companies seeking ways to reduce costs.
- ❖ The component can be purchased for a lower cost than it would be for the company to manufacture that component themselves, and the component may be of higher quality.
- ❖ Outsourcing is often an integral part of downsizing or reengineering.

Advantages of Outsourcing

- ❖ Outsourcing helps in cost savings. The lower cost of operation and labour, and Reduction in overhead costs makes it attractive to outsource.
- ❖ It frees an organization from investments in technology, infrastructure and people that make up the bulk of a back-end process capital expenditure.
- ❖ It gives businesses flexibility in staffing, manpower management, helps in cost savings.

Disadvantages of Outsourcing

- ❖ One of the biggest disadvantages is the risk of losing sensitive data and the loss of confidentiality.
- ❖ Control of operations and deliverables of activities outsourced.
- ❖ Inexperienced worker or improper process can lead to quality problems.

Lean System:

- ❖ Lean system is an **organized method for waste minimization** without sacrificing productivity within a manufacturing system
- ❖ Waste is any step or action in a process that is not required to complete a process successfully (**called Non-value adding**)
- ❖ Following are the seven types of wastes:
 - Over-production
 - Inventory – Having more inventory than what is required
 - Waiting – Waiting includes products waiting on the next production step
 - Motion – Movement of people or equipment more than what is required
 - Transportation – Moving products that is not actually required to perform process
 - Rework from defects
 - Over-processing
- ❖ Many large companies are **employing lean manufacturing**. Lean manufacturing involves a shift in traditional thinking, from batch and queue to product-aligned pull production. Following are some of the techniques of lean manufacturing:
 - Just-in-Time
 - Kaizen Costing
 - 5 S
 - Total Productive Maintenance (TPM)
 - Cellular Manufacturing/one-piece Flow Production Systems
 - Six Sigma (SS)

Principles and characteristics of Lean Manufacturing:

Principles	Characteristics
• Perfect first-time quality • Waste Minimization • Continuous improvement • Flexibility	• Zero waiting time • Zero inventory • Pull processing • Continuous flow of production • Continuous finding ways of reducing processing time

Just-In-Time (JIT):

- ❖ **“Just-in-time (JIT):** System whose objective is to produce or to procure products or components as **they are required by a customer** or for use, rather than for stock. It is a Pull system, which responds to demand, in contrast to a push system, in which stocks act as buffers between the different elements of the system such as purchasing, production and sales”.
- ❖ **“Just-in-time production:** Production system which is **driven by demand for finished products**, whereby each component on a production line is produced only when needed for the next stage”.

- ❖ **"Just-in-time purchasing:** Purchasing system in which **material purchases are contracted so that the receipt and usage of material, to the maximum extent possible, coincide"**

- ❖ Following are some of the steps in JIT system:

Spare Parts/ Materials from suppliers on <u>the exact date and at the exact time</u> when they are needed	<u>Straight delivery</u> to the production floor for immediate use in manufactured products	<u>Visit of engineering staff at supplier sites</u> to examine supplier's premises
<u>Installation of EDI system</u> that tells suppliers exactly how much of which parts are to be sent	Dropping off <u>products at the specified machines</u>	<u>Shorten the setup times</u>
<u>Eliminating the need for long production runs/</u> Streamlined flow of parts from machine to machine	<u>Training to employees</u> how to operate a multitude of different machines, perform limited maintenance	Several alterations in the <u>supporting accounting systems</u>

Features of JIT System:

- ❖ Organize production in manufacturing cells, a grouping of all different types of equipment used to make a given product. Materials move from one machine to another where various operations are performed in sequence. **Material-handling cost is reduced.**
- ❖ Hire and retain workers who are multi-skilled so that they are capable of performing a variety of operations, including repairs and maintenance tasks. **Thus, labour idle time gets reduced.**
- ❖ Apply TQM to eliminate defects. As, there are tight link stages in the production line, and minimum inventories at each stage, defect arising in one stage can hamper the other stages. **JIT creates urgency for eliminating defects as quickly as possible.**
- ❖ Place emphasis on reducing set-up time which makes production in smaller batches economical and reducing inventory levels. **Thus, company can respond to customer demand faster.**
- ❖ Carefully selected suppliers capable of delivering high quality materials in a timely manner directly at the shop - floor, **reducing the material receipt time.**

Pre-requisites of JIT System:

- ❖ Low variety of goods
- ❖ Vendor reliability
- ❖ Good communication
- ❖ Demand stability
- ❖ TQM
- ❖ Defect free materials
- ❖ Preventive maintenance

Impact of JIT System:

- ❖ **Waste costs:** Characteristic of the JIT system is its continuous focus on eliminating all waste from a system. **It can reduce waste of material, time, unused assets, obsolete inventory, defective products, rework among others**
- ❖ **Overhead costs:** Cost of material handling, facilities, quality inspection are significantly reduced in JIT System. **Furthermore there is a reduction of space**

requirement for maintaining inventory and hence all costs related to warehouse is also significantly reduced

- ❖ **Product prices:** When a company achieves a higher level of product quality, along with its ability to deliver products on the dates required, customers may be willing to pay a premium. Hence JIT can present an opportunity to increase prices. However if customers do not pay major importance to timely delivery and quality, then there will be no scope for price increase.

Performance Measurements in JIT System versus Traditional System:

Measure	Traditional system	JIT System
Machine utilization	Machine utilization refers to the rate at which every asset is utilized. <u>In the traditional system, companies will focus on ensuring maximum capacity utilization.</u> However this will lead to higher production and consequently higher inventory	JIT focuses on producing only what is needed. <u>Hence machine utilization measurement is discarded in JIT System</u>
Piece rate	<u>Companies pay a higher piece rate when the efficiency exceeds 100%.</u> Employees would be motivated to produce more as their earnings is proportionate to units produced	<u>Concept of Piece rate system is scrapped in JIT System.</u> JIT focuses on producing what is needed and hence employee performance is measured with factors such as number of suggestions for improving system/quality
Labour efficiency	Traditional system <u>pays utmost importance on measuring labour efficiency</u> to ensure maximum production	<u>JIT system does not focus on how fast an employee works.</u> It focuses on the quality of the products manufactured. Furthermore labour efficiency calculation would need time-keeping and time-booking techniques which are considered as non-value added activity

Performance measures of JIT System:

Inventory turnover	✓ Companies installing JIT system should <u>experience extraordinarily high inventory turnover</u>
Setup time reduction	✓ <u>Shortest possible setup times</u> are crucial for the success of short production runs and so this is a major JIT measurement
Customer complaints	✓ JIT is based on premise that <u>product quality is superb</u> . Hence any customer suggestion of a product issue should be greeted with gravest concern and investigated immediately
Scrap	✓ Little waste should be generated by JIT system, which means that <u>material scrap should be driven down to exceedingly low levels</u>
Cost of quality	✓ Focus of JIT is <u>to produce high-quality products</u> and hence the managers would like to track the full cost of quality. The company should take-up measures to reduce quality cost
Customer service	✓ This has various sub-measures such as <u>delivering products on the dates prescribed by customer, shipping full orders, not having returns due to poor quality</u>
Ideas generated	✓ <u>JIT system works well when employees pitch in with hundreds of suggestions for improvement.</u> It can be measured as ideas per worker, total number of ideas generated, number of ideas

	implemented of the proportion of ideas suggested that are implemented
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Back-flushing in a JIT System:

- ❖ Backflushing requires **no data entry of any kind until a finished product is completed**. At that time the total amount finished is entered into the computer system, which multiplies it by all the components listed in the bill of materials for each item produced.
- ❖ This yields a **lengthy list of components that should have been used in the production process and which are subtracted from the beginning inventory balance** to arrive at the amount of inventory that should now be left on hand.
- ❖ Given the **large transaction volumes associated with JIT, this is an ideal solution to the problem.**
- ❖ Companies should consider the following before implementing a back-flushing system:
 - **Production reporting** – Employees must be trained to report accurate production. In case the reporting is incorrect, it will lead to wrong component types and quantities being deducted from stock
 - **Scrap reporting** – All abnormal scrap must be diligently tracked and recorded; otherwise these materials will fall outside the back-flushing system and will not be charged to inventory
 - **Lot tracing** – Lot tracing is impossible under back-flushing system. It is required when a manufacturer need to keep records of which production lots were used to create a product in case all the items in a lot must be recalled
 - **Inventory accuracy** – Inventory balance may be very high at all times because the transactions are recorded only once in a day, during which time other inventory is sent to production premises. Hence it is not possible to maintain accurate inventory

Kaizen Costing:

- ❖ Lean manufacturing is founded on the idea of **kaizen, or continual improvement**. Continuous improvement is the **continual examination and improvement of existing processes** and is very different from approaches such as business process re-engineering (BPR), which seeks to make radical one-off changes to improve an organization's operations and processes.
- ❖ This philosophy **implies that small, incremental changes routinely applied and sustained over a long period result in significant improvements.**
- ❖ Some of the activities in the kaizen costing methodology include the elimination of waste in the production, assembly, and distribution processes, as well as the elimination of work steps in any of these areas.
- ❖ Though these points are also covered in the value engineering phase of target costing, the initial value engineering may not uncover all possible cost savings. **Thus, kaizen costing is really designed to repeat many of the value engineering steps for as long as a product is produced, constantly refining the process and thereby stripping out extra costs.**
- ❖ The cost reductions resulting from kaizen costing are much smaller than those achieved with value engineering but are still worth the effort since competitive

pressures are likely to force down the price of a product over time, and any possible cost savings allow a company to still attain its targeted profit margins while continuing to reduce cost.

Kaizen Costing Principles

- ❖ The system seeks gradual improvements in the existing situation, at an acceptable cost.
- ❖ It encourages collective decision making and application of knowledge.
- ❖ There are no limits to the level of improvements that can be implemented.
- ❖ Kaizen involves setting standards and then continually improving these standards to achieve long-term sustainable improvements.
- ❖ The focus is on eliminating waste, improving systems, and improving productivity.
- ❖ Involves all employees and all areas of the business.

5S:

- ❖ 5S is the name of a workplace organization method that uses a list of five Japanese words: seiri, seiton, seiso, seiketsu, and shitsuke. They can be translated from the Japanese as "sort", "set in order", "shine", "standardize", and "sustain"
- ❖ It explains how a work space should be organized for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order.

Sort (Seiri)

- ❖ Make work easier by eliminating obstacles and evaluate necessary items with regard to cost or other factors.
- ❖ Reduce chances of being disturbed with unnecessary items.
- ❖ Prevent accumulation of unnecessary items.

Set In Order (Seiton)

- ❖ Arrange all necessary items into their most efficient and accessible arrangements so that they can be easily selected for use and make workflow smooth and easy.
- ❖ Ensure first-in-first-out FIFO basis, so that it is easy to find and pick up necessary items.
- ❖ Place components according to their uses, with the frequently used components being nearer to the work.

Shine (Seiso)

- ❖ Clean your workplace on daily basis completely or set cleaning frequency.
- ❖ Keep workplace safe, easy to work, clean and pleasing to work in.
- ❖ In an unfamiliar environment, people must be able to detect any problems within 50 feet.

Standardize (Seiketsu)

- ❖ Standardize the best practices in the work area.
- ❖ Maintain high standards, orderliness, everything in order and according to its standard.
- ❖ Every process has a standard.

Sustain (Shitsuke)

- ❖ **Not harmful to anyone, training and discipline, to maintain proper order.**
- ❖ Also translates as “do without being told”.
- ❖ Training is goal-oriented process. Its resulting feedback is necessary monthly.

Total Productive Maintenance (TPM):

- ❖ Total Productive Maintenance (TPM) is a **system of maintaining and improving the integrity of production and quality systems.**
- ❖ TPM helps in keeping all equipment in **top working condition so as to avoid breakdowns and delays in manufacturing processes.**

Four stages of TPM:

- ❖ **Preparation Stage:** Establish a suitable environment and conducting programme awareness.
- ❖ **Introduction Stage:** Initialization of TPM, information to suppliers, customers, and other stakeholders.
- ❖ **Implementation Stage:** This is done with the help of eight activities referred as eight pillars of TPM.
- ❖ **Institutionalizing stage:** This is the stage of getting TPM awards.

Foundation and 8 Pillars of TPM (TPM Goals - Zero defect, zero breakdown and zero accident)

Foundation & Pillars	About	Techniques
Foundation: 5S	TPMS starts with 5S. It deals with organizing a <u>workplace which helps to recognize the uncover problems</u>	Seiri (Sort), Seiton (Set in order), Seiso (Shine), Seiketsu (standardize), Shitsuke (sustain)
P-1: Autonomous Maintenance	<u>Operation of equipment without any breakdown and eliminating defects</u> through active employee participation	Cleaning, Lubricating, Visual Inspection, Tightening of Loosened Bolts
P-2: Focussed improvement (Kaizen)	<u>Minor improvement</u> made on continuous basis	Kaizen register, Kaizen summary sheet, Why-why analysis, summary of losses
P-3: Planned Maintenance	Proper maintenance system adopted for <u>improvement in reliability and maintainability of equipment</u>	Preventive maintenance, breakdown maintenance, corrective maintenance
P-4: Early management	<u>Shortening the time required</u> for product and equipment development	Engineering and re-engineering process
P-5: Quality maintenance	Customer satisfaction through <u>delivery of highest quality product</u>	Root cause analysis, customer data analysis
P-6: Education & Training	<u>Improve knowledge/skills</u> and enhance morale of employees	Training calendar, Policies for education and training, On-site training
P-7: Office TPM	Application of TPM techniques in administration to <u>improve productivity and efficiency in functions</u>	Increased office automation
P-8: Safety, Health and Environment	<u>Safety of the worker is of utmost importance.</u> It aims to have zero accidents and zero health damages	Drama, safety slogans, Quizzes, Posters making to

Foundation & Pillars	About	Techniques
		create awareness related to safety

Performance measures in TPM:

- ❖ Most important approach to the measurement of TPM is **Overall Equipment Effectiveness (OEE)**. Calculation of OEE takes into account the following six losses:
 - Equipment failure/breakdown
 - Set-up/adjustments
 - Idling and minor stoppages
 - Reduce speed
 - Reduce yield and
 - Quality defects and rework
- ❖ First two losses are time related, next two losses are related to performance and the last two losses are related to quality
- ❖ **OEE = Performance * Availability * Quality**
- ❖ **OEE cannot be at 100% and the ideal values for various parameters are: Performance (>95%), Availability (>90%), Quality (>99%)**

Connection between TQM and TPM:

- ❖ TQM and TPM **make company more competitive** by reducing costs, improving customer satisfactions and slashing lead times
- ❖ **Involvement of workers** in all phases of TQM and TPM is necessary
- ❖ Both processes **need fundamental training and education** of participants
- ❖ TPM and TQM take **long time to notice sustained tangible benefits**
- ❖ **Commitment from top management are necessary** for the success of the implementation

Cellular Manufacturing/one piece flow production system:

- ❖ Cellular manufacturing is a system **where multiple cells are used**. Each cell comprise of one or more machines which accomplish a certain task. **The product moves from one cell to the next with each cell completing part of the manufacturing process**. U-shaped design is given to these cells because this allows the supervisor to move less and have the ability to watch over the entire process
- ❖ Goals of cellular manufacturing are to **move as quickly as possible, make a wide variety of similar products and making as little waste as possible**
- ❖ A cell is created by consolidating the processes used to create a specific output, such as part or set of instruction. Reduction in steps is done wherever possible. **Flexibility in operations, quick identification of problems, improved communication of employees are some of the benefits of cellular manufacturing**
- ❖ It also gives massive gains on implementation in productivity and quality while reducing inventory, lead time, space and hence this is also known as **"the ultimate in lean production"**

Implementation of Cellular Manufacturing:

- ❖ First, the **parts to be made must be grouped by similarity** (in design or manufacturing requirements) into families.

- ❖ Then a systematic analysis of each family must be performed; typically in the form of production flow analysis (PFA) for manufacturing families, or in the examination of design/product data for design families. There are also a number of mathematical models and algorithms to aid in planning a cellular manufacturing center.
- ❖ Once these variables are determined with a given level of uncertainty, optimizations can be performed to minimize factors such as, "total cost of holding, inter-cell material handling, external transportation, fixed cost for producing each part in each plant, machine and labor salaries."

Difficulties in creating flow:

- ❖ Exceptional elements
- ❖ Machine distances
- ❖ Bottleneck machine and parts
- ❖ Machine location and relocation
- ❖ Part routing
- ❖ Cell load variation
- ❖ Inter and intracellular material transferring
- ❖ Cell reconfiguring
- ❖ Dynamic part demands and
- ❖ Operation and completion times

Benefits and costs of cellular Manufacturing:

- ❖ Scattered processes are merged to form short focused paths in concentrated places. So constructed, by logic a cell reduces flow time, flow distance, floor space, inventory, handling, scheduling transactions, and scrap and rework (the latter because of quick discovery of nonconformities).
- ❖ Production and quality controls are facilitated. Cells that are underperforming in either volume or quality can be easily isolated and targeted for improvement.
- ❖ There are also a number of benefits for employees working in cellular manufacturing. The small cell structure improves group cohesiveness and scales the manufacturing process down to a more manageable level for the workers.
- ❖ Workers can more easily see problems or possible improvements within their own cells and tend to be more self-motivated to propose changes.
- ❖ There are a number of possible limitations to implementing cellular manufacturing. Some argue that cellular manufacturing can lead to a decrease in production flexibility. Cells are typically designed to maintain a specific flow volume of parts being produced. Should the demand or necessary quantity decrease, the cells may have to be realigned to match the new requirements, which is a costly operation, and one not typically required in other manufacturing setups.

Six Sigma:

- ❖ Six Sigma is quality improvement technique whose objective to eliminate defects in any aspect that affects customer satisfaction.
- ❖ The premise of Six Sigma is that by measuring defects in a process, a company can develop ways to eliminate them and practically achieve "zero defects"

- ❖ Primary focus of Six Sigma is:
 - Customer satisfaction
 - Decision based on data driven facts
 - Management, improvement and processes
 - Proactive management team
 - Collaboration with in the business
 - Goal for perfection
- ❖ **Sigma is a statistical team that measures how far a process deviates from the perfection. The higher the sigma number, closer the process is to perfection**
- ❖ Six Sigma is 3.4 defects per million or getting things right 99.99966% of the time. The same is explained in the below table:

Sigma Level	Defects per million opportunities (DPMO)	Defective percentage (%)	Percentage yield (%)	Quality/profitability
One	6,91,462	69%	31%	Loss
Two	3,08,538	31%	69%	Non-competitive
Three	66,807	6.7	93.3	Average industries
Four	6,210	0.62	99.38	Above average
Five	233	0.023	99.977	Below maximum productivity
Six	3.4	0.0034	99.99966	Near perfection

Implementation of Six Sigma:

DMAIC Implementation:

- ❖ This method is very robust. It is used **to improve existing business process.** This method has five phases
- ❖ DMAIC is possible under the following circumstances:
 - Product or process exists
 - **Project is part of on-going continuous improvement process**
 - Only single process needs to be altered
 - Competitor's actions are **stable**
 - Technology is stable
 - Customer's behaviour is **unchanging**
- ❖ Five phases of DMAIC is explained below:

Define

- Define the problem, the project goals and customer requirements

Measure

- Measure the process to determine the current performance

Analyze

- Analyze the process to determine the root causes of variation and poor performance (defects)

Improve

- Improve the process by addressing and eliminating the root causes

Control

- Control means maintaining the improved process and future process performance

DMADV Implementation:

- ❖ DMADV is aimed at creating a **high-quality product keeping in mind customer requirements at every stage of the product**. This is used to develop new product or processes.
- ❖ DMADV is used when a **customer or process is not in existence, project have strategic importance, multiple process needs to be altered, competitor's performance/customer's behaviour is changing**

Define

- Define the project goals and customer deliverables

Measure

- Measure and determine customer needs and specifications

Analyze

- Analyze the process options to meet customer needs

Design

- Design the detailed process to meet customer needs

Verify

- Verify the design performance and ability to meet customer needs

Similarities between DMADV and DMAIC:

- ❖ Both of these six sigma methodologies are based on **defects per million opportunities (DPMO)**
- ❖ Both DMADV and DMAIC **use same kind of six sigma quality management tools**
- ❖ **Customer's needs are the basic parameter** for both six sigma methodologies

Difference between DMAIC and DMADV:

DMAIC	DMADV
<u>Review the existing process</u> and fix problems	<u>Emphasis on the design of the product</u> and process
<u>More reactive process</u>	<u>Proactive process</u>
<u>Increase the capability</u>	<u>Increase the capacity</u>
Benefits can be quantified easily	Benefits are more difficult to quantify and tend to be much more long term
<u>Examples of DMAIC:</u> ❖ Reduce the cycle time to process a patent ❖ Reduce the number of errors in sales list ❖ Improve search time for critical information	<u>Examples of DMADV:</u> ❖ Add a new service ❖ Create a real-time system ❖ Create a multi-source lead tracking system

Quality-management tools under six sigma:

- ❖ **Control chart** – Monitors variance in process and alerts the business to unexpected variance
- ❖ **Histogram** – Helps in prioritizing factors and identify areas which needs utmost attention
- ❖ **Pareto diagram** – Revolves around the concept of 80:20 rule
- ❖ **Process mapping** – Work-flow diagram which reduce cycle time and defects
- ❖ **Root cause analysis** – Root cause is a non-conformance and should be permanently eliminated
- ❖ **Statistical process control** – Helps in analysing data, study and monitor process capability and performance
- ❖ **Tree Diagram** – Shows key goals, their sub-goals and key tasks
- ❖ **Cause and effect diagrams** – Helps in identifying the cause for various problems

Limitations of six sigma:

- ❖ Focuses on **only quality**
- ❖ Does not work well **with intangible results**
- ❖ **Substantial infrastructure investment** is required
- ❖ Complicated for some tasks
- ❖ Not all products need to meet six sigma standards
- ❖ Focuses on **specific types of process only**

Lean six sigma:

- ❖ Lean Six Sigma is the **combination of Lean and Six Sigma** which help to achieve greater results that had not been achieved if Lean or Six Sigma would have been used individually.
- ❖ It increases **the speed and effectiveness** of any process within any organization.
- ❖ By using lean Six Sigma, organisations will be able to **Maximize Profits, Build Better Teams, Minimize Costs, and Satisfy Customers.**

Process Innovation (PI):

- ❖ Process Innovation means the implementation **of a new or significantly improved production or delivery method**
- ❖ Changes, improvements, increase on product or service capability done by addition in manufacturing or logical system, simple capital replacement or extension, customization, **regular seasonal and other cyclical changes are not considered innovations.**
- ❖ Process of innovation could fall into one of these areas:
 - **Production:** Related to processes, equipment and technology to enhance manufacturing or production processes
 - **Delivery:** Delivery process innovations involve tools, techniques and software solutions to help in supply chain and delivery systems
 - **Support services:** Innovations can also be done in support services such as purchasing, maintenance and accounting

Business Process Reengineering (BPR):

- ❖ **BPR is defined as fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed**
- ❖ Four components of BPR are:

Fundamental rethinking	✓ We need to <u>challenge the very basic assumptions</u> under which business operate ✓ We ask question such as why do we do what we do?
Radical redesign	✓ BPR relies on a <u>fresh-start, clean-slate approach to examining of an organization's basic processes</u> ✓ The goal is to reinvent what is done and how it is done rather than to tinker with the present system by making marginal, incremental improvements
Dramatic improvements	✓ Fundamental rethinking and radical redesign is aimed towards <u>making quantum leaps in performance</u> ✓ BPR is not about improvement in quality, speed of around 10% because improvement of this magnitude can be done by marginal, incremental changes to existing processes ✓ <u>On the other hand BPR would focus on major improvement</u>
End to end business processes	✓ <u>BPR focuses on end-to-end business processes and not the individual activities that comprise the processes</u> ✓ Many organization segment a process into individual activities and allot an activity to specialists. However while doing this, managers lose focus of the entire processes and focus on improving individual activities. BPR focuses on improving the entire process by re-engineering end to end business process

Principles of successful BPR:

- ❖ **Organize around outcomes and not tasks:** Single person should perform all steps in a process; design the job around an objective or outcome rather than a single task
- ❖ **Have those who need the results of a process perform the process:** Reengineering can provide customers with more timely service and reduce the overhead needed to coordinate the activities of these units by having customers provide their own service
- ❖ **Integrate the processing of information into the work process that produces the information:** The department which receives the information should process the same and integrate into the work-flow. However this will lead to relaxation of segregation of duties and management should evaluate the risks arising out of the same
- ❖ **Treat geographically dispersed resources as though they were centralized:** Decentralized resources typically provide better service to their customers at the expense of creating redundant operations and lost economies of scale. However companies should operate as a centralized unit while dealing with other parties to get the benefits of economies of scale
- ❖ **Link parallel activities instead of integrating their results:** If parallel activities have been created, use communication networks, shared databases and teleconferencing to coordinate activities that must eventually come together
- ❖ **Put the decision point where work is performed and build controls into the process:** Organizations often distinguish those who do the work from those who monitor and make decisions about the work. However organizations can reduce non-value added management and flatten the organization structure if the organizations use information technology to capture and store data, and expert system to supply knowledge, to enable people to make their own decisions

- ❖ **Capture information once and at the source:** Collected and store data in online data-bases for all who need them. This principle is facilitated by information technology

Main stages of BPR:

- ❖ **Process identification** – Each task performed being re-engineered is broken down into a series of processes
- ❖ **Process rationalization** – Processes which are non-value adding, to be discarded
- ❖ **Process redesign** – Remaining processes are redesigned
- ❖ **Process reassembly** – Re-engineered processes are implemented in the most efficient manner



Chapter 4 – Cost Management Techniques

Cost Control/waste control and cost reduction [Conquer your costs before they conquer you]**Cost Control:**

- ❖ Cost Control implies **regulation of cost** by **executive action**. For this purpose, the executives **are provided with some yard stick** such as **standards or budgets** with which the actual costs and performances are compared to ascertain the degree of achievement made.
- ❖ Cost Control involves **continuous comparisons of actual with the standards** or budgets to regulate the former.
- ❖ Cost Control is **possible only when an organization has an effective Cost Accounting System** to provide relevant information.
- ❖ Costs should be categorized into controllable and non-controllable. The organizations are divided into responsibility centres. Every executive is made responsible for the performance of the centre under his control

Cost Reduction:

- ❖ Cost Reduction is the achievement of **real and permanent reduction** in unit cost of products manufactured. It, therefore, **continuously attempts to achieve genuine savings in cost** of production distributing, selling and administration.
- ❖ It **does not accept a standard or budget**. It rather challenges the standards/budgets continuously to make improvement in them.
- ❖ It **attempts to excavate, the potential savings buried in the standards** by continuous and planned efforts.
- ❖ Cost Control relax that dynamic approach, it usually dealt with variances leaving the standards intact.

Cost reduction versus cost control:

Cost Reduction	Cost Control
Cost reduction is the achievement of real and permanent reduction in the unit cost of products manufactured	Cost control involves a comparison of actual with standards or budgets to regulate the actual costs
Realistic savings in cost	There could be temporary savings in cost
Product's utility, quality and characteristics are retained	Quality maintenance is not a guarantee
It is not concerned with maintenance of performance according to standards	The process involves setting up a target, investing variances and taking remedial measures to correct them
Continuous process of critical examination includes analysis and challenge of standards	Control is achieved through compliance with standards. Standards by themselves are not examined
Fully dynamic approach	Less dynamic than cost reduction
Universally applicable to all areas of business. Does not depend upon standards, though target amounts may be set.	Limited applicability to those items of cost for which standards can be set
Emphasis here is partly on present costs and largely on future costs	Emphasis on present and past behavior of costs
The function of cost reduction is to find out substitute ways and new means like waste reduction, expense reduction and increased production	Cost control does competitive analysis of actual results with established standards
Cost reduction is a corrective measure	Cost control is a preventive measure

Focus areas for cost reduction:

Area	Explanation
Product Design	❖ Product design being the <u>first step in manufacturing of a product</u> and the impact of the proper design can be seen in the entire manufacturing chain ❖ <u>Efficient designing for a new product or improving the design</u> for an existing product can help the company in reducing the cost in multiple ways such as: ○ <u>Cheaper substitute, higher yield and less quantity</u> and varieties of materials, cause cost reduction ○ Reduced time of operation and <u>increased productivity</u> ○ <u>Standardization and simplification</u> in variety increases productivity and reduces costs ❖ <u>Example: Tata Motors had made an ambitious plan of manufacturing a car at Rs.1,00,000.</u> The company made this plan due to its product design wherein they had focused on cutting unnecessary parts such as simplicity of the interiors, simple exterior such as one wiper, removal of left side mirror, using plastic exterior parts among others.
Organisation	❖ Proper assignment of task and delegation of responsibility to avoid <u>overlapping</u> ❖ Removal of <u>doubts and fiction</u> ❖ <u>Encouragement to employees</u> for cost reduction
Factory layout equipment	❖ Proper factory layout and utilization of the existing equipment to determine whether there is any scope for cost reduction by elimination of <u>wastage of men, materials and maximum utilization of available facilities</u>
Production plan programme and method	❖ Production control ensures <u>proper planning of work by installing and efficient procedure</u> and programme ordering correct machine and proper utilization of materials, manpower and resources ❖ Production control to be analyzed to ensure the following: ○ <u>Wastage of manpower</u> is kept to <u>minimum</u> ○ Scope for <u>reducing idle capacity</u> ○ <u>Efficient control of stores</u> and maintenance services ○ <u>Reduction of labour wastage and increased productivity</u> by eliminating faulty production method

Tools and techniques of cost control and cost reduction:

- ❖ Value analysis
- ❖ Inventory management (Just in Time, EOQ)
- ❖ Business Process Re-engineering
- ❖ Target costing
- ❖ Kaizen costing

Target Costing:

- ❖ Target costing can be defined as “a structured approach to determining the cost at which a proposed product with specified functionality and quality must be produced, to generate a desired level of profitability at its anticipated selling price”
- ❖ Target costing is almost the exact opposite of cost plus margin modeling where a company produces a product with no cost structure in mind. Once

the product is built they add a profit margin on top to arrive at the final price

Steps in Target costing:

- ❖ **Setting of target selling price:** The setting of target selling price of a product which customers are prepared to pay, depend on many factors like design specifications of the product, competitive conditions, customer's demand for increased functionality and higher quality projected production volume, sales forecasts etc. A concern can set its target selling price after taking into account all of the aforesaid factors.
- ❖ **Determination of target costs:** Target profit margin may be established after taking into account long-term profit objectives and projected volume of sales. On deducing target profit margin from target selling price, target cost is determined.
- ❖ **Estimate the actual cost of the product:** Actual cost of the product may be determined after taking into account the design specifications, material cost and other costs required to produce the product.
- ❖ **Comparison of estimated cost with actual cost:** In case the estimated cost of the product is higher than that of the target cost of the product then the concern should resort to cost reduction methods involving the use of Value Engineering / Value Analysis tools.

Advantages of Target Costing:

- ❖ Proactive approach to cost management.
- ❖ It reinforces top-to-bottom commitment to process and product innovation, and is aimed at identifying issues to be resolved, in order to achieve some competitive advantage.
- ❖ Target costing starts with customer's study or market study. It helps to create a company's competitive future with market-driven management for designing and manufacturing products that meet the price required for market success.
- ❖ It uses management control systems to support and reinforce manufacturing strategies; and to identify market opportunities that can be converted into real savings to achieve the best value rather than simply the lowest cost.
- ❖ Target costing ensures proper planning well ahead of actual production and marketing.
- ❖ Implementation of Target Costing enhances employee awareness and empowerment.
- ❖ Foster partnership with suppliers.
- ❖ Minimize non-value-added activities.
- ❖ Encourages selection of lowest cost value added activities.
- ❖ Reduced time to market.
- ❖ Target Costing takes a market - driven approach towards cost, in which value is defined not only by what customers demand but also by what they are willing to pay for

Main features of Target Costing System:

- ❖ Target costing is viewed as an integral part of the design and introduction of new products

- ❖ For any given product, a target selling price is determined using various sales forecasting techniques. Critical to setting the target selling price are the design specifications (reflecting certain levels of functionality and quality) of the new product
- ❖ Integral to setting the target selling price is the establishment of target production volumes, given the relationship between price and volume. The expected target volumes are also critical to computing unit costs, especially with respect to capacity-related costs (such as tooling costs), as product costs are dependent upon the production levels over the life cycle of the product
- ❖ Establishing Cost Reduction Targets
- ❖ It should be noted that a fair degree of judgement is needed where the allowable cost and the target cost differ. As the ideal is to produce at the allowable cost, it is important that the difference is not too great. Once the product-level target cost is set, however, it generally cannot be changed, and the challenge for those involved is to meet this target.

Components of Target Costing System:

- ❖ Value Analysis is a planned, scientific approach to cost reduction which reviews the material composition of a product and production design so that modifications and improvements can be made which do not reduce the value of the product to the customer or to the user.
- ❖ Value Engineering is the application of value analysis to new products. Value engineering relates closely to target costing as it is cost avoidance or cost reduction before production. Value analysis is cost avoidance or cost reduction of a product already in production; both adopt the same approach i.e. a complete audit of the product
- ❖ The company can perform value analysis/value engineering by answering the following questions:
 - Can we eliminate functions from the production process?
 - Can we eliminate some durability or reliability?
 - Can we minimize the design?
 - Can we design the product better for the manufacturing process?
 - Can we substitute steps?
 - Can we combine steps?
 - Can we take supplier's assistance?
 - Is there a better way?

Kaizen costing Versus value engineering:

- ❖ The initial value engineering may not uncover all possible cost savings. Thus, Kaizen Costing is designed to repeat many of the value engineering steps for as long as a product is produced, constantly refining the process and thereby stripping out extra costs
- ❖ The cost reductions resulting from kaizen costing are much smaller than those achieved with value engineering but are still worth the effort since competitive pressures are likely to force down the price of a product over time, and any possible cost savings allow a company to still attain its targeted profit margins while continuing to reduce cost.

Problems with Target Costing:

- ❖ The development process can be lengthened to a considerable extent since the design team may require a number of design iterations before it can devise a sufficiently low-cost product that meets the target cost and margin criteria
- ❖ A large amount of mandatory cost cutting can result in finger-pointing in various parts of the company; especially if employees in one area feel they are being called on to provide a disproportionately large part of the savings
- ❖ Representatives from number of departments on the design team can sometimes make it more difficult to reach a consensus on the proper design because there are too many opinions regarding design issues
- ❖ Effective implementation and use requires the development of detailed cost data
- ❖ Use of target costing may reduce the quality of products due to the use of cheap components which may be of inferior quality
- ❖ For every problem area outlined have the dominant solution is retaining strong control over the design teams, which calls for a good team leader

Management Accountant's Role in Target Costing Environment:

- ❖ The management accountant should be able to provide for the other members of the design team a running series of cost estimates based on initial designs sketch, activities based costing reviews of production processes, and "best guess" costing information from suppliers based on estimated production volumes.
- ❖ The management accountant should also be responsible for any capital budgeting requests generated by the design team since he or she has the knowledge of the capital budgeting process, how to fill out the required forms, and precisely what types of equipment are needed for the anticipated product design
- ❖ The management accountant should work with the design team to help it understand the nature of various costs (such as cost allocations based on an activity-based costing system), as well as the cost-benefit trade-offs of using different design or cost operations in the new product
- ❖ Management accountant is responsible for tracking the gap between the current cost of a product design and the target cost that is the design team's goal, providing an itemization of where cost savings have already been achieved and where there has not been a sufficient degree of progress
- ❖ Management accountant must continue to compare a product's actual cost to the target cost after the design is completed, and for as long as the company sells the product

Impact of Target Costing on Profitability:

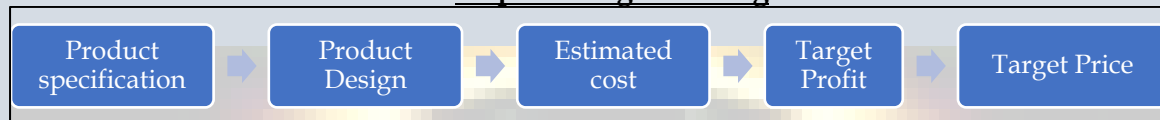
- ❖ Target costing can have a startlingly large positive impact on profitability, depending on the commitment of management to its use, the constant involvement of management accountants in all stages of a product's life cycle, and the type of strategy a company follows
- ❖ Target costing improves profitability in two ways:
 - It places a detailed continuing emphasis on product costs throughout the lifecycle of every product

- It improves profitability through precise targeting of the correct prices at which the company feels it can field a profitable product in the marketplace that will sell in a robust manner

Target Costing versus Traditional Costing



Steps in Target Costing



Steps in Traditional Costing

Target Costing data flow:

- ❖ Data can be obtained from central accounting data base carefully stocked form such a variety of sources as accounts payable, billing, bills of materials and inventory records
- ❖ In initial stages of product design, the cost accountant must make the best possible guesses regarding the cost of proposed designs
- ❖ The cost accountant may include the best estimate an additional estimate of the highest possible cost that will be encountered
- ❖ Data can also be obtained from competitor's information collected by the marketing staff or an outside research agency
- ❖ Sometimes information is compiled by a combined effort of the marketing and engineering staffs through a process called reverse engineering
- ❖ Engineering staff also compiles their own cost data relating to different designs/components.
- ❖ The final database available to the cost accounting member of a design team contains information regarding the previous quality, cost and on-time delivery performance of all key suppliers, as well as the production capacity of each one.

Most useful situations for target costing: Target costing is most useful in situations where the majority of product costs are locked in during the product design phase. This is the case with manufactured products but few services. Some companies, which seem to benefit most from target costing, are those, which maintain the following criteria

- ❖ Assembly-oriented industries, as opposed to repetitive-process industries that produce homogeneous products
- ❖ Involved heavily with the diversification of the product lines;
- ❖ Use technologies of factory automation, including computer-aided design, flexible manufacturing systems, office automation, and computer-aided manufacturing
- ❖ Have experienced shorter product life cycles where the pay-back for factory automation typically must be achieved in less than eight years
- ❖ Must develop systems for reducing costs during the planning, design and development phases of a product's life cycle
- ❖ Are implementing management methods such as just-in-time, value engineering

Target costing control points:

- ❖ **Identification of Principal Control Point:** Experience shows that there always comes a point, where the cost of maintaining the design team exceeds the savings garnered from additional iterations. It is also necessary that most products should be launched within a reasonably short time or they will miss the appropriate market, where they will beat the delivery of competing products to the market
- ❖ **Point of Go/No Go Decision:** If target costing is not reached, management retains power to abandon the design project. There comes a point, when actual performance is very close to expected performance in matter of cost incurrence
- ❖ **Milestone can be in terms of Timer or Points:** A milestone can be in terms of time, say one month. It can also be on the points in design process, at which specific activities are completed

Implementing a target costing system:

- ❖ **Create a project charter:** The target costing effort should begin with a document, approved by senior management that describes its goals and what it is authorized to do. This document, known as the project charter, is essentially a subset of the corporate mission statement and related goals as they pertain to the target costing initiative
- ❖ **Obtain a management sponsor:** The next step is to obtain the strongest possible support from a management sponsor. This should be an individual who is well positioned near the top of the corporate hierarchy
- ❖ **Obtain a budget:** The target costing program requires funds to ensure that one or more well-staffed design teams can complete target costing tasks
- ❖ **Assign a strong team member:** The best way to ensure that the team functions properly is to assign to the effort a strong team manager skilled in dealing with management, the use of project tools, and working with a diverse group of people
- ❖ **Enroll full-time participants:** A target costing team member puts the greatest effort into the program when he or she is focused only on target costing. Thus, it is essential that as many members of the team as possible be devoted to it full-time rather than also trying to fulfill other commitment elsewhere in the company at the same time
- ❖ **Use Project Management Tools:** Target costing can be a highly complex effort especially for high-cost products with many features and components. To ensure that the project stays on track, the team should use all available project management tools, such as Microsoft Project (for tracking the completion of specific tasks), a company database containing various types of costing information, and a variety of product design tools

Life Cycle Costing:

- ❖ Life Cycle Costing involves identifying the costs and revenue over a product's life i.e. from inception to decline
- ❖ Life cycle costing aims to maximize the profit generated from a product over its total life cycle

Product Life Cycle:

- ❖ **Stage I – Introduction Stage:** Stage one is where the new product is launched in the market. As the product is novel, there is minimal awareness and acceptance of it. Competition is almost negligible and profits are non-existent
- ❖ **Stage II: Growth Stage:** Sales begin to expand rapidly because of greater customer awareness. Competitors enter the market often in large numbers. As a result of competition, profit starts declining near the end of the growth stage
- ❖ **Stage III: Maturity Stage:** During the stage of maturity sales continue to increase, but at a decreasing rate. When sales level off, profits of both producers and middlemen decline. The main reason is intense price competition; some firms extend their product lines with new models. This stage poses difficult challenges
- ❖ **Stage IV: Decline Stage:** Decline in sales volume characterizes this last stage of the product life cycle. The need or demand for product disappears. Availability of better and less costly substitutes in the market accounts for the arrival of this stage.

Characteristics and strategies of 4 Stages:

	Introduction	Growth	Maturity	Decline
Characteristics				
Objectives	Create product awareness and trial	Maximize market share	Maximize profits while defending market share	Reduce expenditures & milk the brand
Sales	Low sales	Rapidly rising	Peak sales	Declining sales
Costs per customer	High cost per customer	Average cost per customer	Low cost per customer	Low cost per customer
Profits	Negative	Rising profits	High profits	Declining profits
Customers	Innovators	Early adopters	Middle majority	Laggards
Competitors	Few	Growing number	Steady number beginning to decline	Declining number
Strategies				
Product	Offer basic product	Offer product extensions, service and warranty	Diversify brands and models	Phase out weak items
Price	Cost plus profit	Price to penetrate market	Price to match or beat competitors	Price cutting
Advertising	Build product awareness amongst early adopters & dealers	Build awareness & interest in mass market	Stress on brand differences and benefits	Reduce level to keep hard core loyalty
Distribution	Build selective distribution	Build intensive distribution	Build more intensive distribution	Go selective; phase out unprofitable outlets

Sales promotion	Use heavy sales promotion to entice trial	Reduce to take advantage of heavy consumer demand	Increase to encourage brand switching	Reduce to minimal level
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Characteristics of Product Life Cycle:

- ❖ The products have finite lives and pass through the cycle of development, introduction, growth, maturity, decline and deletion at varying speeds.
- ❖ Product cost, revenue and profit patterns tend to follow predictable courses through the product life cycle
- ❖ Profit per unit varies as products move through their life cycles.
- ❖ Each stage of the product life-cycle poses different threats and opportunities that give rise to different strategic actions.
- ❖ Products require different functional emphasis in each stage-such as an R&D emphasis in the development stage and a cost control emphasis in the decline stage.
- ❖ Finding new uses or new users or getting the present users to increase their consumption may extend the life of the product.

Benefits of Product Life Cycle Costing:

- ❖ The product life cycle costing results in earlier actions to generate revenue or to lower costs than otherwise might be considered.
- ❖ Better decisions should follow from a more accurate and realistic assessment of revenues and costs, at least within a particular life cycle stage.
- ❖ Product life cycle thinking can promote long-term rewarding in contrast to short-term profitability rewarding.
- ❖ It provides an overall framework for considering total incremental costs over the entire life span of a product, which in turn facilitates analysis of parts of the whole where cost effectiveness might be improved.
- ❖ It is an approach used to provide a long-term picture of product line profitability, feedback on the effectiveness of life cycle planning and cost data to clarify the economic impact of alternatives chosen in the design, engineering phase etc.
- ❖ Product life cycle costing traces research and design and development costs etc., incurred to individual products over their entire life cycles, so that the total magnitude of these costs for each individual product can be reported and compared with product revenues generated in later periods

Uses of Product Life Cycle:

- ❖ As a Planning tool, it characterizes the marketing challenges in each stage and poses major alternative strategies, i.e. application of kaizen.
- ❖ As a Control tool, the PLC concept allows the company to measure product performance against similar products launched in the past.
- ❖ As a Forecasting tool, it is less useful because sales histories exhibit diverse patterns and the stages vary in duration.

Pareto Analysis:

- ❖ Pareto Analysis is a rule that recommends focus on the most important aspects of the decision making in order to simplify the process of decision making.

- ❖ It is based on the 80:20 rule or 70:30 rule. The management can use it in a number of different circumstances to direct management attention to the key control mechanism or planning aspects. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets

Usefulness of Pareto Analysis:

- ❖ Prioritize problems, goals and objectives to identify root causes
- ❖ Select and define key quality improvement programs.
- ❖ Select key customer relations and service programs.
- ❖ Select key employee relations improvement programs.
- ❖ Select and define key performance improvement programs.
- ❖ Allocate physical, financial and human resources

Application of Pareto Analysis:

- ❖ **Pricing of a product:** In the case of a firm having multiple products, 20% of the products may account for 80% of the revenues. Pareto Analysis can help in focusing management's attention to 20 percent of the products and the pricing decision for balance 80% of its products can be delegated to lower levels of management
- ❖ **Customer profitability analysis:** Instead of analyzing products, customers can be analyzed for their relative profitability to the organization. Again here it has been observed that 20% of the customers would contribute to 80 percent of the profits and hence Pareto analysis can help in finding the target customers and focusing on them
- ❖ **ABC analysis – Stock control:** Pareto Analysis can also be used in stock control wherein it has been observed that only a few goods in stock make up for most of the value
- ❖ **Application in Activity Based costing:** 20% of the organization cost drivers are responsible for 80% of the total cost. Companies can focus on major cost drivers for better cost management
- ❖ **Quality control:** Pareto analysis seeks to discover from an analysis of defect report or customer complaints which "vital few" causes are responsible for most of the reported problems. By concentrating once efforts on rectifying the vital 20%, one can have the greatest immediate impact on product quality. The purpose of the analysis is to direct management attention to the area where the best returns can be achieved by solving most of quality problems, perhaps just with a single action.

ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA)

What is EMA?

- ❖ EMA is the process of collection and analysis of the information relating to environmental cost for internal decision making
- ❖ EMA is an attempt to integrate best management accounting thinking with best environmental management practice
- ❖ EMA identifies and estimates the costs of environment-related activities and seeks to control these costs
- ❖ EMA aims to make a better use of or to modify sources of information and management accounting techniques and to evaluate sustainability and/or environmental efficiency of a company

Example No.1:

A small town wants to build an electricity-generating plant. The area gets a lot of wind and has plenty of coal under the ground; the town is locked in a debate over which energy source should be used. Half of the town feels that a wind-energy power plant is the way to go and the other half feels that a coal-burning power plant is the best option. Even though the town is split over the debate, they all want to come to the best decision and take into account all of the direct cost of the project as well as the indirect cost to the environment and people's health. As a management accountant you are required to help the town in deciding the type of plant?

- ❖ The town is required to use the concept of **environmental full cost accounting** to decide on the type of plant
- ❖ **Environmental full cost accounting** can be defined as a method of accounting that recognizes the **direct and indirect economic, environmental, health and social costs** of a project or action
- ❖ Environmental full cost accounting considers more than just the basic direct costs associated with a project, such as the costs of building supplies, production and distribution
- ❖ Environmental full cost accounting **also factors in indirect costs, including externalities**. Externalities are side-effects or costs of an activity that affect otherwise uninvolved parties. **For example, a coal-burning power plant will emit greenhouse gases that could impose health costs on society. And, the noise that comes from wind power generation could cause sleep disturbances, anxiety and stress in susceptible individuals.** These indirect costs are important considerations for a community to examine during the decision making process. The town can decide on the type of plant with the help of environmental full cost

Areas of application of EMA:

- ❖ Product Pricing
- ❖ Budgeting
- ❖ Investment appraisal
- ❖ Calculating costs and
- ❖ Savings of Environmental Projects or setting quantified performance targets

Classification of Environmental Costs:

<u>US Environmental Protection Agency Classification:</u>	
Conventional costs	<u>Raw materials and energy costs</u> having environmental relevance
Hidden costs	Costs which have been accounted for but then <u>lose their identity in general overheads</u>
Contingent costs	Costs to be incurred at a <u>future date</u> Example: Clean-up cost
Relationship cost	<u>Intangible costs</u> . For example the costs of preparing environmental reports
<u>United Nations Division for Sustainable Development classification:</u>	
Costs incurred to protect environment	Example: Measures taken to <u>control pollution</u>
Costs of wasted material, capital and labour	Example: <u>Inefficiencies</u> in the production process
<u>Practical classification:</u>	
Internal costs	Internal costs have <u>direct impact on the income statement</u> of a company
External costs	External costs are <u>imposed on society at large</u> , but not borne by the company that generates the cost in the first instance. However recently <u>Governments are using taxes, subsidies and regulations</u> to covert external costs into internal costs
<u>Hansen and Mendoza classification:</u>	

Environmental prevention costs	Cost associated with preventing adverse environmental impact Example: Evaluating and picking pollution control equipment, Creating environmental policies, Environmentally driven R&D, Site and feasibility studies, Investment in protective equipment, carrying out environmental studies
Environmental appraisal Costs	Costs incurred to determine whether products, process and activities are in compliance with environmental standards, policies and laws. Example: Monitoring, testing, inspection and reporting, Improved systems and checks in order to prevent fines/penalties, regulatory compliances, performing contamination tests, audit of environmental activities, verifying supplier environmental performance
Environmental Internal Failure Costs	Costs incurred from activities that have been produced but not discharged into the environment Example: Recycling scrap, Disposing toxic material, Back end costs such as decommissioning costs on project completion, maintaining pollution equipment
Environmental External Failure Costs	Costs incurred on activities performed after discharging waste into environment . These costs impact organization's reputation and natural resources Example: Cleaning up contaminated soil, restoring land to its natural state

Environmental perspective under balanced scorecard:

Objective	Measures
Minimize hazardous materials	Types and quantities (total and per-unit) Percentage of total materials cost Productivity measures (output/input)
Minimize energy requirements	Types and quantities (total and per-unit) Productivity measures (output/input)
Minimize release of residues	Pounds of toxic waste produced Cubic metres of effluents Tons of greenhouse gases produced Percentage reduction of packaging materials
Maximize opportunities to recycle	Pounds of materials recycled Number of different components Percentage of units manufactured Energy produced from recycled materials

Identification of Environmental Costs:

- ❖ Environmental management accounts require an intense review of general ledger as **environmental costs such as materials, utilities, waste disposal among others can be hidden in general overheads** of the company
- ❖ **Allocation of environmental costs to the processes or products** which give rise to them is important for organizations in **making well-informed business decisions**
- ❖ Some of the decisions done with help of EMA are:
 - Different pricing of products as a result of re-calculated costs
 - Re-evaluation of profit margins of products
 - Phasing out certain products when the change is dramatic
 - Re-designing processes or products in order to reduce environmental costs
 - Improving house-keeping and monitoring of environmental performance
 - Calculation of NPV/IRR for investment decision

Techniques for identification and allocation of environmental costs:

Technique	Explanation
Input-output analysis	❖ Technique records material inflows and balances with outflow on the principle that <u>what comes in must go out</u> ❖ <u>Example:</u> 100 kg of input has led to 80 kg of output. The company must now find what has happened to the balance 20 kg of input. <u>The difference could have been sold as scrap or got wasted. These will enable calculation of environmental costs</u>
Flow cost accounting	❖ Technique records material flows as well as material losses incurred at various stages of production ❖ Flow cost accounting makes material flows transparent by using various data such as quantities, costs and values ❖ <u>Material flows are divided into three categories, material, system and delivery and disposal</u> ❖ Material costs refer to the <u>material cost used in various processes</u> ❖ System costs refer to the <u>in-house handling costs incurred by the company</u> for the purpose of maintaining and supporting material throughput. Example: Personnel costs or depreciation ❖ Delivery and disposal costs refer to the <u>costs of flows leaving the company</u>. Example: Transport costs or cost of disposing waste
Life cycle costing	❖ Lifecycle costing <u>considers the costs and revenues of a product over its whole life</u> rather than one accounting period ❖ The company can use <u>TQM approach</u> in order to reduce life-cycle environmental cost ❖ TQM can help in <u>zero complaints, zero spills, zero pollution, zero waste and zero accidents</u>
Activity based costing	❖ ABC allocates <u>internal costs to cost centres</u> and cost drivers on the basis of activities that give rise to the costs ❖ Environmental accounting focuses on distinguishing between environment-related costs and <u>environmental driven costs</u> which tend to be hidden on general overheads ❖ Environment driven costs are <u>removed from general overheads</u> and traced to products or services using <u>some suitable allocation basis</u>. Some of the allocation keys used are: ○ Volume of emissions or waste ○ Toxicity of emission and waste treated ○ Environmental impact added (volume x input per unit of volume) volume of emission treated and ○ Relative costs of treating different kinds of emission

Controlling Environmental Costs:

Waste	❖ 'Mass balance' approach can be used to determine how much material is wasted in production, whereby the weight of materials bought is compared to the product yield. ❖ In addition to these monetary costs to the organization, waste has environmental costs in terms of lost land resources (because waste has been buried) and the generation of greenhouse gases in the form of methane. ❖ Costs of unused raw materials and disposal; taxes for landfill; fines for compliance failures such as pollution are considered as environmental cost associated with waste.
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Water	❖ Organization should identify where water is used and how consumption of the same can be decreased
Energy	❖ Environmental management accounts may help to identify inefficiencies and wasteful practices and therefore would help in energy cost reduction
Transport and travel	❖ EMA techniques can be used to identify savings in terms of travel and transport of goods and materials
Consumables and raw materials	❖ Directly attributable costs and discussions with management can help in reducing these costs

Reasons for controlling environmental cost:

- ❖ **Reducing carbon footprint:** Carbon footprint measures the total greenhouse gas emissions caused directly and indirectly by a person, organization, event or product. Controlling environmental cost can help in reducing carbon footprint
- ❖ **Scope for cost reduction:** Environmental costs are becoming huge for companies in highly industrialized sectors and reducing them can help in cost reduction
- ❖ **Regulatory requirement:** There are huge penalties for companies found guilty of breaching environmental regulations and are also liable for criminal prosecution as per the regulatory laws

Role of EMA in Product/Process Related Decision Making:

- ❖ Correct costing of products is a pre-condition for making sound business decisions. Accurate product pricing is needed for strategic decisions regarding volume and choice of products to be produced
- ❖ EMA can help in different pricing of products as a result of re-calculated costs, re-evaluation of profit margins of products, phasing out certain products, re-designing processes or products and improving housekeeping and monitoring of environmental performance

Advantages of EMA:

- ❖ **Improving revenue:** The company can increase the sales by producing products which meets the environmental concerns. These products can also be sold at a premium
- ❖ **Cost reductions:** Paying close attention to the usage of resources can lead to reduction in cost

Disadvantages of EMA:

- ❖ **Increase in costs:** Cost of complying with legal and regulatory requirements, and additional costs to improve the environmental image of the organization may result in increase in some costs
- ❖ **Costs of failure:** Significant costs may be incurred if there is poor environmental management. Thus, the cost of clean-up and fines on violation of any government environmental policy may be huge

Chapter 5 – Cost Management for Specific Sector**Power Sector:**

- ❖ Thermal Power Plants are one of the main sources of electricity in India.
- ❖ The **variation in the thermal power stations is due to the different fuel sources** (coal, natural gas, naphtha, etc.). Apart from thermal power plants, **there are other types of energy resources being used to generate electricity.**
- ❖ The various types of energy sources include **hydro- electricity, solar power, wind power, nuclear power, etc.**

Key Risks in the Sector

Highly Capital Intensive	✓ Power sector is a highly capital intensive business with long gestation periods before commencement of revenue streams (construction periods of 7-8 years) and an even longer operating period (over 25 years).
Coal Supply Position	✓ More than 50 percent of India's generation capacity is coal based. ✓ The shortage of coal is so acute that most of the power generation companies are looking at imported coal as a viable alternative to domestic coal.
Electricity Distribution - A Complex Network	✓ Electricity is generated at power plants and moves through a complex system, sometimes called the grid, of electricity substations, transformers, and power lines that connect electricity producers and consumers. ✓ Most local grids are interconnected for reliability and commercial purposes, forming larger, more dependable networks that enhance the coordination and planning of electricity supply.

Features of Power Sector

- ❖ Limited number of suppliers of electricity.
- ❖ Tariff determination is **based upon the rationality to determine the cost incurred at various points of operation.**
- ❖ Stakeholders **are existing and future consumers**, industries, government, regulators, and investors.
- ❖ **Continuous growing demand** of electricity.
- ❖ Flexible Cost allocation.
- ❖ **Distribution loss and inefficiency gaps** between generation and consumption of electricity.
- ❖ In-disciplined consumer.
- ❖ **Continuous network between generators**, transmitters, distributors, and consumers.
- ❖ Mostly **public sector undertakings** closely regulated by government.
- ❖ **Energy subsidies** having direct impact on national treasury affecting long term growth potential of the economy.

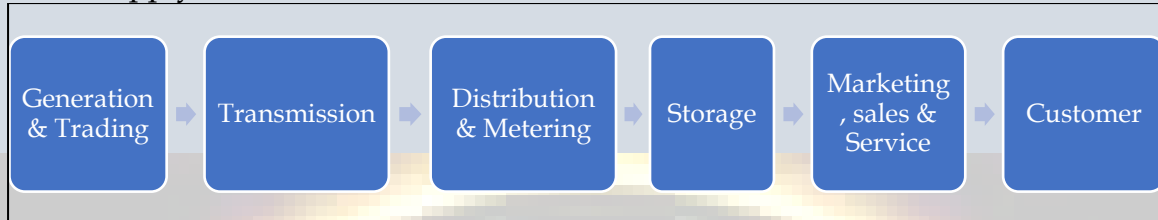
Application of Cost Management Techniques in Power Sector

- ❖ For determining prices and regulating tariffs.
- ❖ Developing a flexible cost allocation.
- ❖ Distribution loss and inefficiency gap analysis.

- ❖ Multi-dimensional costing calculations.
- ❖ Powerful analysis and reporting.

Value Chain Analysis

- ❖ This involves ensuring value creation in all the activities both inbound and outbound activities undertaken by the power company starting from electricity generation to the point of supply or distribution of the electricity supply.



Agriculture Sector:

Features

Fragmented Structure of the Industry	✓ The structure of the agriculture sector is seen to be unorganized and fragmented in nature and thus lack of effective regulation in the given sector is also seen as one of the reasons why farmers seem to be exploited and have been operating at very low margins.
Lack of understanding of costs and prices by the farmers	✓ Lack of prioritization of the cost management among farmers because of lack of knowledge with regards to the same.
Understanding the potential to work collaboratively	✓ The farmers need to be open to innovation in cost management and contracting techniques. Though there is scope for cost reduction in order to bring about improvement in the profit margins for the farmers, it is seen that generally the profits tend to get transferred to the customers and the only point of negotiation is in the contract pricing with the retailers which the farmers fail to reach.
Target cost Management	✓ The target costing technique involves determining the cost by subtracting the required margin from the anticipated price for the agricultural produce. However, the anticipated price for the agricultural products fluctuates making the process of cost management using the target cost management system ineffective in the case of the agricultural sector.
Imbalance of power distribution	✓ With the fragmentation and the unorganized nature of the farmers operating in the agricultural sector, the power of bargaining seems to lie in the hands of the wholesalers purchasing the produce from the farmers resulting in overall low margins for farmers in comparisons to the margins earned by the wholesalers and the retailers operating in the said sector.

Cost Management

- ❖ Cost Management focuses upon all the activities internal and external to the value chain process in order to help in cost reduction and cost control
- ❖ In relation to the agricultural sector, the Activity Based Costing technique is being increasingly accepted for the purpose of cost management. Activity Based Costing as the name suggests provides a better manner in which the indirect costs associated with the processes carried out in the agricultural sector can be carried out in an efficient manner.
- ❖ Benefits of using ABC for cost management in the agricultural sector are as follows:
 - Adjustable costing technique
 - Faster and more accurate
 - Enables carrying out a more detailed cost analysis

Minimum Support Price (MSP)

- ❖ In India, Minimum Support Price (MSP) was introduced by the Government of India to protect farmers against sharp dip of agricultural prices, which was usually observed during the harvest seasons.
- ❖ The harvest seasons are associated with huge supply, which overshadows the demand, and hence, in most cases the commodity prices hit the bottom. This forces the farmers, in necessity of money for repayment of debts, in selling their produce at losses or very little profits.
- ❖ Thus, the government fixes the MSP, as a part of government food grain procurement. Selling at MSP ensures profit margins for farmers and avoids distress selling situations.

IT Sector:

- ❖ Complexity of the operating structure and the difficulty seen in the implementation of the cost allocation models, it is seen that in order to manage the IT costs, most organizations tend to develop centralized IT departments acting as cost centers for the purpose of managing the IT budgets as well as allocation of costs associated with along with the charging back of expenses that are incurred by the business units.

IT Organization's Engagement Model:

- ❖ The question that needs to be addressed under the same is that whether the IT organization should be organized as a cost center to the organization or whether it should be seen as a strategic partner to the business.
- ❖ With more and more organizations whether large or small in nature, opting for third party allocation or opting for cloud computing services it can be seen that the internal IT departments are fighting hard for remaining relevant for the organization.
- ❖ In order to stay relevant, what the IT department needs is a better visibility towards the IT needs of the organization.
- ❖ In order to do the same, organizations operating in the given sector can adopt what is referred as to the 4D framework.

4D IT Cost Optimization Framework

Defining Organization Vision	✓ Any amount of spending carried out in relation to the Information Technology requirements of the organization
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	needs to be aligned to the organizational vision and long term objectives. ✓ Business owners should have a sense of ownership and thereby control the IT costs in an effective manner. ✓ The additional visibility through the model needs to determine the appropriate method of cost allocation in relation to the IT cost burden. Thus, the allocation model that is chosen needs to be both flexible and at the same time avoid being too complex in nature. ✓ The organization can either opt for a simple method of dividing the entire IT cost by the number of hours consumed by each department or a more complex but accurate method of ABC costing could be used for allocation of the costs based upon the associated cost drivers associated with each set of activities.
Documentation of the current state	✓ Documentation of the current state of the IT department implemented within the organization in order to identify gaps and potential weaknesses identified in relation to the current state for the purpose of identification of the appropriate pain points as well as identification of areas for potential automation.
Delineation of target business architecture	✓ The farmers need to be open to innovation in cost management and contracting techniques. Though there is scope for cost reduction in order to bring about improvement in the profit margins for the farmers, it is seen that generally the profits tend to get transferred to the customers and the only point of negotiation is in the contract pricing with the retailers which the farmers fail to reach. Once the current state of the IT architecture has been documented, the next step is developing a target business architecture for the purpose of addressing the gaps and limitations identified and laying down the foundation with regards to the formation of the crux of the IT cost management framework. ✓
Target cost Management	✓ The target costing technique involves determining the cost by subtracting the required margin from the anticipated price for the agricultural produce. However, the anticipated price for the agricultural products fluctuates making the process of cost management using the target cost management system ineffective in the case of the agricultural sector.
Imbalance of power distribution	✓ With the fragmentation and the unorganized nature of the farmers operating in the agricultural sector, the power of bargaining seems to lie in the hands of the wholesalers purchasing the produce from the farmers resulting in overall low margins for farmers in comparisons to the margins earned by the wholesalers and the retailers operating in the said sector.

Decision: Build v/s
Buy

- ✓ The last step understands whether the framework built is bought or custom built internally.
- ✓ The answer to the question involves a great amount of brainstorming and research taking into consideration the view point of all the strategic stakeholders involved.



Chapter 6 – Decision MakingCVP Analysis:

- ❖ CVP analysis involves analysing the interrelationships among revenues, costs, levels of activity, and profits
- ❖ CVP analysis is useful for numerous decisions related to production, pricing, marketing, cost structure, and many more
- ❖ CVP Analysis can be analysed under the following scenarios:
 - Activity based CVP Analysis
 - CVP Analysis under conditions of uncertainty
 - CVP Analysis in service and non-profit organizations
 - CVP Analysis in Just in Time environment

Marginal Costing:

- ❖ Marginal costing is a technique of decision-making which involves
 - Ascertainment of total costs
 - Classification of costs into fixed and variable and
 - Use of such information for analysis and decision making
- ❖ Marginal costing is also known as CVP (cost volume profit) analysis as it seeks to measure the impact of change in volume on company's cost and profits

Types of costs:

- ❖ Variable cost is that portion of cost which **varies proportionately with volume**. Variable cost per unit remains constant and any change in variable cost is to be interpreted as change in variable cost per unit
- ❖ Fixed costs are costs which are assumed to **remain constant for a given period of time** irrespective of the change in output. Fixed cost per unit is inversely proportional to volume. Any change in fixed cost has to be interpreted as change in total fixed cost.
- ❖ Semi-variable costs are those costs that exhibit characteristics of fixed and variable costs. Semi-variable costs can be split into variable cost and fixed cost using the following formula:
 - Variable cost per unit = Change in cost / Change in units
 - Total fixed cost = Total cost – total variable cost

Format of marginal cost statement:

Particulars	Per Unit	Total
Sales	XXX	XXX
Less: Variable Costs	(XXX)	(XXX)
Contribution	XXX	XXX
Less: Fixed Costs		(XXX)
Profit		XXX

Note:

1. The profit of the company does not vary proportionately with the change in sales on account of fixed costs. Hence therefore **change in contribution = change in profit**.
2. The cost does not vary proportionately with volume because of existence of fixed costs. Hence **change in total cost = change in variable cost**

Profit-Volume Ratio (PVR):

- ❖ PVR measures the extent of change in contribution/profit on account of change in sales. Net profit ratio keeps on changing for different sale amounts whereas PVR is constant.
- ❖ PVR is the true indicator of the profitability of the product

PVR = Contribution / sales	PVR = Change in contribution / Change in sales
PVR = Contribution per unit / SP	PVR = Change in profit / change in sales

Break-even point (BEP):

- ❖ BEP refers to the sales level at which the company earns no profit and no loss. This can be either expressed in units or rupees.
- ❖ If expressed in units it is called BEP and if expressed in rupees it is called Break even sales.
- ❖ Moreover at BEP, contribution = fixed cost and sales = total cost

BEP in units = Fixed cost / Contribution per unit	BEP in Rs. = Fixed cost / PVR
BEP in Rupees = BEP in units * Selling Price	

Margin of safety (MOS):

- ❖ MOS is the difference between the actual sales and break even sales. It is the extent of allowable drop in sales before the company starts incurring losses
- ❖ MOS can be expressed in rupees or in units or as a percentage of total sales

MOS in units = Profit / Contribution per unit	MOS in Rs. = Profit/ PVR
MOS in Rupees = MOS in units * Selling Price	
Sales in rupees = BEP in rupees + MOS in rupees	

Sales to achieve desired profit and profit at desired sales level:

1. Sales to earn desired profit = $\frac{\text{Target Profit} + \text{Total fixed cost}}{\text{PVR}}$
2. Profit at sales level = (Sales * PVR) - Total fixed cost

Note: For BEP, MOS, Sales, the answer would be in rupees if the denominator is PVR and the answer would be in units if the denominator is contribution per unit

Break-even point for multiple products:

- ❖ BEP is computed using fixed cost and PVR/Contribution per unit. However in case of multiple products there will be multiple PVR/Contribution per unit
- ❖ BEP for multiple products (in units) = TFC/Contribution per set. It would be assumed that one set would contain the product mix as given in the question
- ❖ BEP for multiple products (in rupees) = TFC/Composite PVR. Composite PVR would be calculated as overall contribution/overall sales

Steps for solving multiple break-even point problems:**Step 1: Identify class intervals**

A new class interval will emerge whenever there is a change in fixed cost or variable cost per unit or selling price for the additional units.

Class Interval	Selling Price	VC/unit	Cont./unit	Total fixed cost

Step 2: Calculate BEP using the following format:

Class Interval (CI)	Fixed cost of CI	FC recovery till previous CI	FC to be recovered	Contribution per unit	Units to be sold	Final BEP
Step 1	Step 1	Contribution earned till previous CI	Col 2 - Col 3	Step 1	Col 4 / Col 5	

BEP with semi-variable costs:

- ❖ Assume the Semi-variable cost as variable cost and calculate contribution per unit
- ❖ Use the contribution per unit and calculate tentative BEP

- ❖ Use the BEP format and calculate BEP for one range above tentative BEP and one range falling in tentative BEP.

Marginal costing and absorption costing:

- ❖ Marginal costing and absorption costing are the two properly used methods of computing profits
- ❖ Marginal costing consider only variable manufacturing costs for stock valuation whereas absorption costing consider both variable and fixed manufacturing costs for valuing inventory

Profit statement under absorption costing:

Particulars	Calculation	Amount
Variable manufacturing costs	Units produced * Cost per unit	XXX
Fixed manufacturing costs (absorbed)	Units produced * OAR	XXX
Cost of production		XXX
Add: Opening FG	Units * Cost per unit	XXX
Less: Closing FG	Units * Cost per unit	(XXX)
Cost of goods sold		XXX
Variable non-manufacturing costs	Units sold * Cost per unit	XXX
Fixed non-manufacturing costs		XXX
Cost of sales		XXX
Add/Less: Under/over absorbed overheads		XXX
Revised cost of sales		XXX
Profit (Balancing figure)		XXX
Sales		XXX

Profit statement under marginal costing:

Particulars	Calculation	Amount
Sales	Units sold * Selling Price	XXX
Less: Variable costs	Note 1	(XXX)
Contribution		XXX
Less: Fixed costs	Fixed manufacturing + fixed non-manufacturing costs	XXX
Profit		XXX

Note 1: Calculation of variable costs:

Particulars	Calculation	Amount
Variable manufacturing costs	Units produced * Cost per unit	XXX
Add: Opening FG	Units * Cost per unit	XXX
Less: Closing FG	Units * Cost per unit	(XXX)
Variable cost of goods sold		XXX
Add: Variable non-manufacturing costs	Units sold * Cost per unit	XXX
Total costs		XXX

Reconciliation of profits:

- ❖ Profits as per marginal costing and absorption costing statement will be different due to different base for valuation of inventory
- ❖ Profit reconciliation under both methods can be done with the help of following format:

Particulars	Amount
Profit as per marginal costing	XXX
Add: Excess valuation of closing stock in absorption costing	XXX
Less: Excess valuation of opening stock in absorption costing	(XXX)
Profit as per absorption costing	XXX

BEP under marginal and absorption costing:

1. BEP under Marginal costing = $TFC / \text{Contribution per unit}$
2. However BEP under absorption costing cannot be $TFC / \text{Contribution per unit}$ on account of existence of stocks as some portion of fixed costs would be recovered in the next year with stocks absorbing a certain part of fixed costs.
3. BEP under absorption costing
 - a. When stock info is given = $\frac{TFC - \text{Fixed cost inside net stock (Note 1)}}{\text{Contribution per unit}}$
 - b. When production is given = $\frac{TFC - \{ \text{FMOH} \times \text{Units produced} \}}{\text{Normal Production}}$
 $\text{SP} - \text{VC} - \{ \text{FMOH} / \text{Normal production} \}$

Note 1: If the net stock is opening then add the fixed cost in the net stock to the total fixed cost

Indifference point:

1. In case of two different alternatives indifference point refers to a level wherein the two alternative decisions would provide the same result
2. For level below the indifference point, the alternative with lower fixed cost is preferable and for level above the indifference point, the alternative with higher fixed cost is preferable
3. Indifference point = $\frac{\text{Difference in Fixed costs}}{\text{Difference in VC per unit or difference in VCR or difference in PVR}}$

Shut-down point:

1. In case of adverse economic conditions a company might have to make a decision on whether to continue their business or temporarily shut the business unless the demand revives
2. Shut-down point (in units) = $\frac{\text{Normal Fixed costs} - (\text{FC during shutdown} + \text{Add. FC for shutdown})}{\text{Contribution per unit}}$
3. Shut-down point (in Rs.) = Same Numerator / PVR
4. If the expected sales volume is less than the shutdown point then the company should close their business or else continue producing

Limiting factor:

1. Limiting factor is one which acts as a bottleneck and limits the company's ability to serve the demand of the external market
2. Limiting factor is a situation where in the demand for the limiting factor is always greater than the supply for the limiting factor

Steps for solving Limiting factor problems:

1. Identify the limiting factor – Limiting factor is one whose demand is more than supply
2. Calculate the contribution per unit of limiting factor and rank the products with maximum contribution being top ranked product

Particulars	Product A	Product B	Product C
Selling Price	XXX	XXX	XXX
Less: Variable cost	(XXX)	(XXX)	(XXX)
Contribution per unit (A)	XXX	XXX	XXX
No. of limiting factors required per unit (B)	XXX	XXX	XXX
Contribution per unit of limiting factor (A/B)	XXX	XXX	XXX
Rank	XXX	XXX	XXX

3. Use the following format for allocation of resources:

Product	No. of units	Units of limiting factor per unit	Limiting factor consumed	Total contribution

Concept: Make or Buy Decisions and Subcontracting decisions

1. A company on account of capacity constraints would not be able to meet the full demands of the external customers. Hence it becomes imminent for the companies to go for either subcontracting or buying the products from outside.
2. **Make or buy decision:** The Company should compare the purchase cost of a product with the variable costs of production and not the total costs of manufacture. If the variable cost of production is more than the purchase cost then the company should buy the product or else make it in house.
3. **Subcontracting decision:** We should compare the variable cost of production with the subcontracting cost and make the decision on the subcontracting. If the variable cost of production is more than the subcontracting cost then the company should subcontract the part or else make it in house
4. In order to solve these type of problems prepare statement of comparative cost showing manufacturing cost and purchase cost. (Only the relevant costs should be mentioned in these statements)

Limiting factor in subcontracting decision or make vs. buy decision:

Particulars	A	B	C	D
Variable Manufacturing cost				
Less: Purchase cost				
Saving in manufacturing (A)				
Units of limiting factor per unit (B)				
Saving per unit of limiting factor (A/B)				
Ranking				

Short run decision making:

- ❖ Short run decision making involves act of choosing one course of action among various feasible alternatives
- ❖ Short-term decisions sometimes are referred to as tactical, or relevant decisions because they involve choosing between alternatives with an immediate or limited time frame
- ❖ Short term decisions are small-scale actions that serve a larger purpose
- ❖ Companies need to identify relevant cost for tactical decision-making

Relevant cost:

- ❖ Relevant means pertinent to the decision at hand.
- ❖ Relevant costs are those expected future costs that are essential but differ for alternative courses of action
- ❖ Relevant cost is a future cost that would arise as a direct consequence of the decision under review

Rules of relevance:

- ❖ **Opportunity cost** refers to the value of sacrifice made or benefit of opportunity foregone by selecting one particular alternative in preference to the other alternative. **All opportunity costs are considered to be relevant costs.**
- ❖ **All variable costs are generally considered to be relevant** unless the costs do not vary between alternative courses of action.
- ❖ **All fixed costs are generally considered to be irrelevant** unless the costs vary between alternative courses of action.
- ❖ Sunk or historical costs are irrelevant

Committed fixed cost versus discretionary fixed cost:

- ❖ Committed fixed costs are those that arise from the possession of asset and are normally unaffected by any short-term changes in volume of production. Example: Rent of factory, Insurance. **Committed fixed costs are otherwise known as unavoidable fixed costs.**
- ❖ Discretionary fixed costs are incurred as result of management discretion/decision. Example: Advertising. **Discretionary fixed costs are otherwise known as avoidable fixed costs.**

Opportunity costs:

- ❖ The opportunity cost of the value of opportunity foregone is taken into consideration when alternatives are compared.
- ❖ Opportunity Cost is the value of the next best alternative. In other words, it is the opportunity cost lost by diversion of an input factor from one use to another. It is the measure of the benefit of opportunity foregone.

Notional Cost:

- ❖ As per CIMA terminology 'Cost used in product evaluation, decision making and performance measurement to reflect the use of resources that have no actual (observable) cost'

Avoidable costs:

- ❖ Avoidable costs are cost that can be skipped if the decision on activity in consideration will not been taken up.
- ❖ As per CIMA terminology avoidable costs are the 'Specific cost of an activity or sector of a business that would be avoided if the activity or sector did not exist'

Historical costs:

- ❖ Cost that has been already incurred in the past is called historical cost.

Sunk costs:

- ❖ Costs which do not change under given circumstance and do not play any role in decision making process are known as sunk costs.
- ❖ These are the costs which have been incurred by a decision made in past and cannot be changed by any decision made in the future

Out of pocket cost:

- ❖ This is that portion of costs which involves payments to outsiders i.e. it gives rise to cash expenditure as opposed to such costs as depreciation, which do not involve any cash expenditure

Shut-down cost:

- ❖ When an organization suspends its manufacturing, certain fixed expenses can be avoided and certain extra fixed expenses may be incurred depending upon the nature of the industry.
- ❖ By closing down the manufacturing, the organization will save variable cost of production as well as some discretionary fixed costs. This particular discretionary cost is known as shut-down cost

Engineered cost:

- ❖ Engineered costs result from a defined mathematical relationship with the cost object and resources consumed to produce an output. Example: Raw material, labour and machine hours

Inventoriable costs:

- ❖ Costs that are considered as part of merchandise and considered as asset when these are incurred and these costs become cost of goods sold when the final output is sold.
- ❖ In other words inventoriable costs are cost of purchase plus cost expended to make final product in saleable condition

Period costs:

- ❖ Period costs are all costs other than cost of goods sold and treated as expense in income statement.

Differential cost, Incremental cost and Incremental revenue:

- ❖ Differential cost (which may be incremental or decremental cost) is the difference in total cost that will arise from the selection of one alternative instead of another. It involves the estimation of the impact of decision alternatives on costs and revenues.
- ❖ The two basic concepts which go together with this type of cost analysis are incremental revenue and incremental costs.
- ❖ Incremental revenue is the change in the total income resulting from a decision.
- ❖ Incremental costs represent a change in the total costs resulting from a decision
- ❖ Concept of incremental/differential cost techniques can be used for the following decisions:
 - Whether to process a further product or not
 - Dropping or adding a product line
 - Making the best use of investment made
 - Acceptance of an additional order from a special customer at lower than existing price
 - Opening of new sales territory and branch
 - Make or buy decisions
 - Submitting tenders
 - Lease or buy decisions
 - Equipment replacement decisions

Non-financial considerations:

- ❖ With increase in competition, dynamic market changes and changing needs of customers, non-financial information have gained relevance in the decision-making process.

- ❖ Information of an organization like number of employees, employee morale, customer satisfaction that cannot be expressed in monetary terms is termed non-financial in nature.
- ❖ Non-financial information is long term focused and ensures profitability and sustainability in long term for an organization thereby evaluating the internal performance of the company.
- ❖ Non-Financial information which a company should focus that would turn out to be advantageous while making decisions for a company are:
 - Quality
 - Employee satisfaction
 - Customer satisfaction
 - Corporate social responsibility
 - Environmental factors
 - Intellectual Property
 - Intangible assets
 - Competitor's movements
 - Brand name

Ethics: Ethics are moral principles that guide the conduct of individuals. Following are the guidelines for Ethical conduct:

- ❖ Identify an ethical decision by using personal ethical standards of honesty and fairness.
- ❖ Identify the consequences of the decision and its effect on others.
- ❖ Consider obligations and responsibilities to those that will be affected by decision.
- ❖ Make a decision that is ethical and fair to those affected by it.

Decision-making model: Following are the steps for tactical decision-making

- ❖ Step 1: Define the problem
- ❖ Step 2: Identify alternatives, eliminating unfeasible alternatives
- ❖ Step 3: Identify costs & benefits of each alternative
- ❖ Step 4: Examine total relevant costs, benefits of each alternative
- ❖ Step 5: Assess non-financial factors and ethical issues
- ❖ Step 6: Select alternative with greatest overall benefit

Application of CVP Analysis:

Outsourcing Decisions	
Meaning	Outsourcing decision is also known as "make or buy" decision. It involves a decision of whether to continue 'making' a product versus 'buying' it from an external firm
Incremental analysis	Outsourcing decision requires incremental analysis. The incremental amounts are based on the difference in the cost of buying a product or service compared to the cost of producing the item or providing the service in house.
Opportunity costs	Opportunity costs are the costs forgone as a result of selecting a different alternative. They are always incremental. For example, if a company decides to outsource, it is able to lease its factory space that the product being outsourced no longer will occupy

Outsourcing Decisions- Accept or Reject?	If incremental cost savings + opportunity costs < incremental costs, reject the outsourcing, unless qualitative factors fiercely impact the decision
Qualitative factors	While considering the decision to Outsourcing the management should consider qualitative aspects like quality of goods, reliability of suppliers, impact on the customers and suppliers
Sell or further process decisions	
Meaning	Sell or process further refers to a decision-making situation where an executive has to decide either to sell a component/ product/ raw material as it is or alternatively process it further by incurring additional expenses
Decision	On further processing the component/product/raw material may not only be improved or reconditioned but will mostly fetch a higher sale value as well. Here if the differential sales value is more than the further processing cost, then it is beneficial to process the product further otherwise sell it without further processing
Qualitative factors	Resource availability such as the readiness of employees to work extra hours to further process the products and availability of materials required for the processing
Minimum Pricing Decisions	
Meaning	The minimum pricing approach is a useful method in situations where there is a lot of intense competition, surplus production capacity, clearance of old inventories, getting special orders and/or improving market share of the product
Rule	The minimum price should be set at the incremental costs of manufacturing, plus opportunity costs
Keep or drop decisions	
Meaning	Operating decision that management must make is whether to keep or drop unprofitable segments, such as product lines, services, divisions, departments, stores, or outlets
Incremental revenue	Incremental revenue is the difference in revenue between the original sales revenue and the new revenue that is expected to result due to dropping a segment.
Incremental cost savings	Variable costs associated with a segment to be dropped are incremental cost savings that cause profit to increase.
Opportunity costs	They often arise due to rental of production space that will become vacant if the decision is made to drop a product
Decision - keep or drop?	If incremental cost savings > incremental revenue lost, the segment should be dropped, unless qualitative characteristics fiercely impact the decision
Qualitative factors	Considerations of employees that will be terminated if the product is dropped, the effect a lay off might have on employees that are not terminated, effects of suppliers from which the materials needed for the product will no longer be purchased, and the effect of customers who previously purchased the product being dropped
Special order decisions	
Meaning	Special order decisions focus on whether a special priced order should be accepted or rejected. These orders often can be attractive, especially when the firm is operating below its maximum productive capacity

Incremental analysis	Special order decisions are based on incremental analysis. Incremental analysis enables managers to emphasis on the relevant areas of a decision
Decision -Accept or Reject?	If incremental revenue < incremental cost, reject the special order, unless qualitative characteristics fiercely impact the decision.
Product Mix Decisions	
Meaning	Many times the management has to take a decision whether to produce one product or another instead. Generally, decision is made on the basis of contribution of each product. Other things being the same the product which yields the highest contribution is best one to produce. But, if there is shortage or limited supply of certain other resources which may act as a key factor like for example, the machine hours, then the contribution is linked with such a key factor for taking a decision



Pricing Decision:

- ❖ A pricing decision is one of the **most crucial & difficult** decision that a firm has to make. Such a decision **affects the long-term survival** of any profit oriented enterprise
- ❖ Firms can fix the **price based on cost information by adding a suitable profit margin**. In other cases an established market prices is accepted
- ❖ Pricing policy are based on the objectives of an organization and the same could be either to **maximize profit/sales/output/utilization of resources**

Theory of Price:

- ❖ One of the basic assumption of pricing theory is that **firm's main objective is to maximize profits**. Optimum price is the one which yields the maximum profits.
- ❖ Firm should also take into account the position of **demand and cost functions while fixing on the price**
- ❖ If a firm sells unlimited number of units, total revenue will be a straight line arrived at by $TR = mx$; TR = Total revenue line; m = Quantity of units sold; x = Price per unit
- ❖ However in market situations, **additional units can be solved only by reducing the price**. This would mean that although total sales will increase as more and more units are sold, the increase in total revenue will gradually decrease
- ❖ Company can **identify the optimum price by finding a level at which Marginal revenue is equal to Marginal cost**. Any attempts of increasing the output beyond this level will lead to reduction in profits

Profit Maximization Model:

- ❖ Profit is said to be **maximum at a level of output where Marginal revenue (MR) is equal to Marginal cost (MC)**
- ❖ Basic price equation which is used to determine the price at which profit is maximum is given below:

$$P = a - bQ$$

Where P = Price; b = Slope of demand curve [Change in Price/Change in Quantity];
 Q = Quantity demanded; a = Price at which demand is zero

- ❖ Marginal revenue equation = $a - 2bQ$
- ❖ **Marginal cost is equated with Marginal revenue to identify the optimum quantity and based on that optimum price is derived**

Pricing under different market structures:Perfect competition:

- ❖ Under perfect competitive market, there are **large number of sellers selling a homogenous product using identical production process** and all of them have perfect competition about the market and price
- ❖ Perfect market allows **free entry and exit of firms** into and out the industry
- ❖ There is no pricing policy under this market and the firms have to be price takers
- ❖ **Under this market the Total revenue will be a straight line but the marginal cost will increase with every level of output**. Hence company should continue to produce and sell as long as marginal cost is lower than marginal revenue

Monopoly:

- ❖ Monopoly is a market condition where **there is only one supplier or producer of a homogenous product** for which there is no close substitute but has many buyers
- ❖ Under this market, **a firm is a price setter. It can fix any price but it has to take into account elasticity of demand** and fix a price at which it can make maximum profits

Monopolistic competition:

- ❖ Under monopolistic competition **there are large number of firms producing similar but no identical products**. Since there is a limit to the growth of competitors the excess profit earned by monopolistic situation attracts new competition
- ❖ **Under monopolistic competition consumers may buy more at a lower price than at higher price**. The profit may be maximized by equating marginal revenue with marginal cost

Oligopoly:

- ❖ A market structure **where there are few firms producing or selling homogenous or identical product**
- ❖ In this type of market structure the firms are aware of the mutual interdependence of investment, production process, advertising and sales plan of its rival firm
- ❖ **In this market, the price is determined not only based on demand but also the reactions of the other firms in the industry to any action or decision it may take**
- ❖ Following price strategies can be used in this market:
 - **Predatory Pricing** - Keep price artificially low which is below full cost of production
 - **Limit-pricing strategy** - This can be used to discourage entrants
 - **Cost-plus pricing**
 - **Players can collude and raise price together**, but this can attract new entrants

Pricing Policy:

- ❖ Pricing policy plays an important role in a business because the **long run survival of a business depends upon the firm's ability to increase its sales** and derive maximum profit from the existing and new capital investment
- ❖ Although **cost is an important aspect of pricing, consumer demand and competitive environment are far more significant** in pricing decisions
- ❖ Pricing policy should ensure the following:
 - **Provide an incentive for adopting improved technology** and maximizing production
 - **Work towards better balance** between demand and supply
 - Avoid adverse effects on the rest of the economy
 - Encourage optimum utilization of resources
 - Promote export

Principles of Product Pricing:

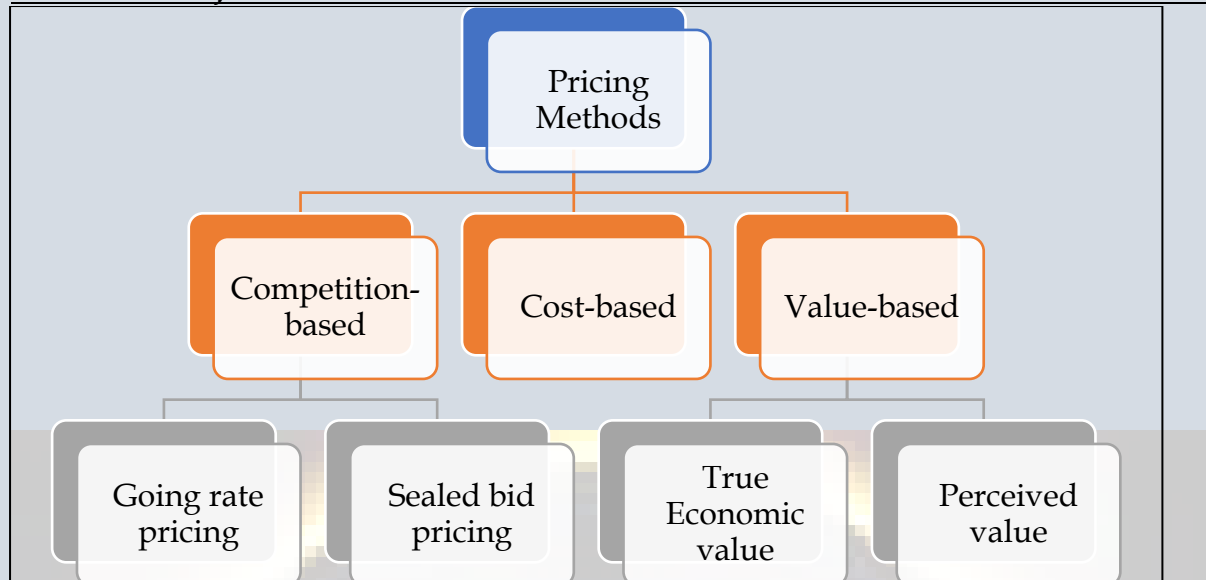
Price customization: Pricing of a product is some **time customized keeping taste, preference and perceived value of a consumer into consideration**. Price customization is done in various ways:

- ❖ **Based on Product Line:** Pricing can be different for a phone having 16GB memory as compared to a phone having 32GB memory
- ❖ **Based on customer's past behavior:** Customer with good payment track record can be given more discounts as compared to others
- ❖ **Based on demographics:** Different pricing can be based on age and social status. Example: Railway concession can be given for senior citizens and military personnel
- ❖ **Based on time differential:** Pricing for a product or service is also done on the basis of time differential i.e. different price for different time period

Price sensitivity: It measures the **customer's behavior to change in price of a product**. Sensitivity of the product can be measured through controlled experimentation wherein customers are offered different brands at different prices and customer's responses are obtained. Then the company change the price of its product and assess the consumption pattern. **The price at which the demand for the product starts declining is the level where price sensitivity begins and based on the response level, sensitivity can be measured.** **Following are the nine factors which can impact price sensitivity:**

- ❖ **Unique value effect** – More unique the product lower is price sensitivity
- ❖ **Substitute awareness effect** – High sensitivity if the buyers are aware of close substitutes
- ❖ **Difficult comparison effect** – Price sensitivity will be low if the buyers have difficulty in comparing two alternatives
- ❖ **Total expenditure effect** – If the expenditure is a very low proportion of total expenditure then price sensitivity will be less
- ❖ **End-benefit effect** – Buyers are less price sensitive where the expenditure on the product is low compared to total cost of the end product
- ❖ **Shared cost effect** – If the cost of the product is shared by another party, the buyer will have less prone to price sensitivity
- ❖ **Sunk investment effect** – Price sensitivity is low when products are used along with assets previously bought
- ❖ **Price quality effect** – Higher the perceived quality of the product, lower the price sensitivity
- ❖ **Inventory effect** – If the product cannot be stored, the buyer will be less price sensitive

Pricing Methods:



Cost-based pricing method:

- ❖ This is the **most commonly used method** wherein the company estimates the cost of the product & fix a margin of profit
- ❖ The term **cost would mean full cost** and include all fixed costs, allocated costs, labour costs among others
- ❖ Pricing based on total costs is subject to the following limitations:
 - **Allocation of inter-departmental overheads** is based on arbitrary basis and
 - **Allocation of overheads will require estimation of normal output** which often cannot be done precisely
- ❖ In order to avoid these two limitations firms can fix the price by adding **a suitable markup to variable costs**. The markup should cover the fixed cost and profit
- ❖ Sometimes instead of arbitrarily adding a percentage on cost, **the firm can determine the mark-up on the basis of required rate of return on investment**

Competition based pricing methods: When a company sets its price **mainly on the consideration of what its competitors are charging**, its pricing policy under such a situation is called competitive pricing or competition-oriented pricing. The price under this system is altered **based on competitor's action and not based on own costs/demand**. Following are the different types of competitive pricing in practice:

Going Rate Pricing:

- ❖ It is a competitive pricing method under **which a firm tries to keep its price at the average level charged by the industry**
- ❖ Going rate pricing is especially useful where it is difficult to measure costs
- ❖ Going rate pricing can lead to fair return and the same would be least disruptive for industry's harmony
- ❖ Going rate pricing is suitable for highly competitive conditions in a homogenous product market (food, raw materials and textiles)
- ❖ Going rate pricing is used in pure oligopoly wherein a few large concerns dominate the industry and hence the players have to fix price based on what the competitors charge

Sealed-bid pricing:

- ❖ **Competitive pricing also dominates in those situations where firms compete on the basis of bids, such as original equipment manufacturer and defense contract work**
- ❖ Bid is the firm's offer price and is a prime example of fixing the price based on how competitors will price rather than on a rigid relation based on concern's own costs or demand

Value-based Pricing Methods: There is an increasing trend to price the product on the basis of customer's perception of its value. This method helps the firm in reducing the threat of price wars. It is based on:

Objective value or true economic value:

- ❖ **This is a measure of benefits that a product is intended to deliver to the consumers relative to the other products without giving any regard whether consumer can recognize the benefits or not**
- ❖ **True Economic value = Cost of the next best alternative + Value of Performance differential**
- ❖ Cost of the next best alternative is the price of the competitors whereas value of performance differential is the value of additional features provided by a seller of a product

Perceived value:

- ❖ **This is the value that consumer understands the product deliver to it.** It is the price of a product that a consumer is willing to spend to have that product
- ❖ **Fixing the price below perceived value but above cost of production can be a win-win situation for both buyer and seller. Buyer's benefit = Perceived value - Price; Seller's benefit = Price - Cost of production**
- ❖ A firm focuses on creating value for its customers. The value can be created using the following strategies:
 - It should develop a product that satisfy the wants and needs of the customers
 - After identification and development, it should design a promotion program to convey the value of the products to the customers
 - Choosing the right distribution channel through which its product will reach to the customers
 - Design a pricing strategy that creates incentive to purchaser to buy the product and to seller to sell the product

Pricing in periods of recession: In periods of recession a firm may sell its articles at a price less than the total cost but above the marginal cost for a limited period. The advantage of this practice are:

- ❖ Firm can **continue to produce and use the services of skilled employees** who are well trained and will be difficult to re-employ later if discharged
- ❖ **Plant and machinery can be prevented from deterioration** through idleness
- ❖ Business would be ready to take **advantage of improved business conditions**
- ❖ **Avoids competition** of securing the business of the firm

Pricing below marginal cost: Firm may also be justifiable to sell the product at a price **below marginal cost for a limited period** provided the following conditions prevail:

- ❖ Where materials are of **perishable nature**
- ❖ Where stocks **have been accumulated in large quantities** and the market prices have fallen. This will save the cost of carrying stocks
- ❖ To **popularize a new product**
- ❖ Where such reduction **enables the firm to boost the sales of other products having larger profit margin**

Strategic pricing of new products: Pricing of a new product poses a bigger problem because of the **uncertainty involved in the estimation of the demand**. Pricing of a new product is very critical issue which should be decided after a thorough market study and consumer behavior analysis. A new product is analyzed into three categories for the purpose of pricing:

- ❖ **Revolutionary Product:** A product is said to be revolutionary when it **is new for the market and has the potential to create its own value**. This type of product has revolutionary impact on the market and consumer behavior. Revolutionary product may enjoy the premium price as a reward for its innovation and taking first initiative
- ❖ **Evolutionary Product:** A product introduced **with upgraded version with few additional characteristics of the product is known as evolutionary product**. Evolutionary product may be priced taking cost-benefit, competitor and demand for the product
- ❖ **Me-too product:** A product is said to be **me-too product when its emergence is a result of the success of a revolutionary product**. These type of products are very similar to revolutionary and/or evolutionary products of other firms. The me-too products are price takers as the price is determined by the market mainly by the competitive prices

Market entry strategies:

Skimming Pricing: It is a **policy of high prices during the early period** of product's existence. This can be synchronized with high promotional expenditure and in later years the prices can be gradually reduced. The reasons for following such policy are:

- ❖ Demand is likely to be **inelastic**
- ❖ Charge of high price in the initial period **serves the cream of the market that is relatively insensitive to price**
- ❖ Method is preferred in the beginning because in the initial periods when the demand for the product is not known **the price can cover the initial cost of production**
- ❖ **High initial capital outlays and high promotional advertising expenditure** is incurred in the beginning. Hence it is necessary to charge high prices

Penetration pricing: It is a **policy in favor of using a low price as the principal instrument for penetrating mass markets early**. It is opposite to skimming price. Penetration pricing is to be distinguished from predatory pricing. Predatory pricing is the practice of selling a product or service at a very low price, intending to drive competitors out of the market. Following are the circumstances under which penetration pricing can be used:

- ❖ Demand is said to be **elastic**
- ❖ Substantial savings due to **large scale production**
- ❖ When there is a **threat of competition**. Prices fixed at a low level becomes an entry barrier

Pricing and Product Cycle:

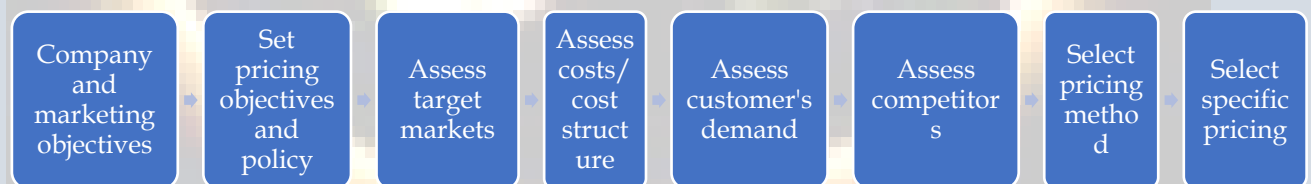
Introduction Stage	Growth Stage	Maturity Stage	Decline stage
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Skimming policy with high prices, but low profit margin due to high fixed costs	Reduce price to penetrate market further	Price to match or beat competitor	Cut price if not repositioning
Penetration pricing to enter the market and gain a high share quickly or to prevent competitors from entering		Retain higher prices in some market segments	Some increases in price may occur in the late decline stage

Price adjustment policies: These are tools to change the prices for various customer differences and changing situations.

- ❖ **Distributor's discounts:** It means price deductions that systematically make the net price vary according to buyer's position in the chain of distribution. Discounts vary on the basis of marketing functions (wholesaler, retailer, dealer) performed by them different prices for different customers and hence are also called as functional discounts
- ❖ **Quantity discounts:** Quantity discounts are price reductions related to the quantities purchased. This can be based on quantity per order or value of purchases
- ❖ **Cash discounts:** Cash discounts are price reductions based on promptness of payment. It is a convenient device to identify and overcome bad credit risks
- ❖ **Price discrimination:** Price discrimination means charging different prices and it takes various forms according to whether the basis is customer, product, place or time. Price discrimination is possible if following conditions are satisfied:
 - Maker must be capable of being segmented for price discrimination
 - Customer should not be able to resell the product of the segment paying higher price
 - Change of competitor's underselling in the segment of higher prices should not be possible
- ❖ **Geographic Pricing:** Seller should consider the cost of shipping goods to the buyer and hence the pricing can vary based on geography due to the freight costs

Structured approach to pricing decisions:



Sensitivity analysis in pricing decisions:

- ❖ Sensitivity analysis is very significant in making pricing decisions, and striking the right balance in which the price is good-looking enough to generate enough sales, yet also profitable for the firm
- ❖ Sensitivity analysis can also be used in determining how much can be spent on development or marketing
- ❖ Product pricing decisions must be balanced against cost and competitive market conditions. Sensitivity analysis is required to determine how sales and costs will respond to changes in the market conditions

- ❖ Sensitivity analysis is performed by **choosing the critical parameters upon which the proforma computations are done and systematically changing them to assess how the changes will impact the overall outcome**. This analysis is important towards understanding how the company will withstand external changes
- ❖ Sensitivity analysis can be based on market demand, changes in market price, exchange rate fluctuation, Initial outlay, R&D, Production cost, Marketing costs, Introduction dates, product prices among others

Pricing of services

- ❖ When services are uniquely tailored to each customer's needs, the pricing cannot be easy. **Each service transaction is likely to have distinct pricing pressure**
- ❖ In certain services the customer's participation is essential. **Hence the customer may have to incur certain intangible costs over and above monetary cost while making use of the service**. The company should consider these intangible costs that a customer has to bear while fixing the price
- ❖ Some services like **education, healthcare, transport fall within the ambit of Government** and hence the price tends to be regulated
- ❖ Services pricing can **also be determined in a collective manner**. Trade association, professional bodies or other institutions may impose certain guidelines for fixing price

[Chapter 8 – Performance measurement and evaluation](#)

Responsibility Accounting:

- ❖ Responsibility accounting is the collection, summarization, and reporting of financial information where individual manager is held accountable for certain costs, revenue, or assets of the firm
- ❖ Responsibility accounting is apt where top management has delegated authority to make decisions. The idea behind responsibility accounting is that each manager's performance should be judged by how well he or she manages those items under his or her control.

Functional organizational structure versus Divisional organizational structure:

<u>Functional organizational structure:</u>	<u>Divisional organizational structure:</u>
❖ A functional organizational structure forms when a business departmentalizes, according to the basic functions such as production, sales, marketing and finance ❖ Small and medium-sized enterprises frequently implement this structure. ❖ Under this structure pricing, product mix and output decisions will be made by central management. Consequently the functional managers in a centralized organization will have far less independence than divisional managers	❖ An organization with a division organizational structure has various divisions operating autonomously as business under a broad corporate framework according to geographical areas, markets, or products and services. ❖ Under this structure there is decentralization of the decision-making process and hence appropriate performance measurement systems is to be developed

Recognized levels of decentralization:

Cost or expense centres	Cost or Expense Centres are responsibility centres where the manager of such a centre or division is responsible for the costs associated with that centre and hence the main focus is cost minimisation. This level of decentralisation occurs normally in functional organisation types.
Revenue Centres	Revenue centres are responsibility centres where the manager is totally concerned with raising revenue with no responsibility for costs. The key measures used in appraising performance would be monitoring sales variances from budget
Profit centres	Manager of the division is responsible for both revenues and costs. Performance is measured through profits generated by the division
Investment centres	Investment centres are those divisions where manager is responsible not only for revenues and costs, but also the assets that generate these costs and revenues and the investment decisions relating to disposal and acquisition of assets

Divisional performance measures:

A good performance measure should:

- ❖ Provide incentive to the divisional manager to make decisions which are in the best-interests of the overall company (goal congruence)
- ❖ Only include factors for which divisional manager can be held accountable
- ❖ Recognize the long-term as well as short-term objectives of the organization

Divisional Performance Measures:

Financial Measures:	Other Measures:
❖ Return on Investment (ROI)	❖ Balanced scorecard
❖ Residual Income (RI)	❖ The Performance Pyramid
❖ Economic value added (EVA)	❖ Building Block Model
❖ Shareholder value added (SVA)	❖ The Performance Prism
	❖ Triple Bottom Line (TBL)

Common thread in all performance measures:

- ❖ Be allied to corporate strategy.
- ❖ Include internal as well as external measures.
- ❖ Include financial as well as non-financial measures.
- ❖ Make explicit the trade-offs between different dimensions of performance.
- ❖ Include all important but difficult to measure factors as well as easily measurable ones.
- ❖ Consider measures for managers/ employees' motivation.

Return on Investment (ROI):

Meaning	❖ ROI expresses divisional profit as a percentage of the assets employed in the division ❖ Assets employed can be defined as total divisional assets, assets controllable by the divisional manager or net assets
Goal Congruence	❖ Divisional ROI can be increased by actions that will make the company's ROI worse off and conversely, actions that decrease the divisional ROI may make the company as a whole better off

	❖ In other words evaluating divisional managers on the basis of ROI can lead to goal congruence issues
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Residual Income (RI):

Meaning	❖ Residual income is defined as controllable contribution less a cost of capital charge on the investment controllable by the divisional manager
Goal Congruence	❖ There is a greater probability that managers will be encouraged, when acting in their own best interests, also to act in the best interests of the company
Disadvantage	❖ Residual income suffers from the disadvantages of being an absolute measure, which means that it is difficult to compare the performance of a division with that of other divisions or companies of a different size

Economic value added (EVA):

- ❖ Economic Value Added is a measure of economic profit. Economic Value Added is calculated as the difference between the Net Operating Profit After Tax (NOPAT) and the Opportunity Cost of Invested Capital.

❖ $EVA = NOPAT - WACC \times \text{Capital}$
❖ NOPAT means net operating profit after tax. This profit figure shows profits before taking out the cost of interest

Shareholder value added (SVA):

- ❖ The process of analyzing how decisions affect the net present value of cash to shareholders. The analysis measures a company's ability to earn more than its total cost of capital.
- ❖ Within business units, SVA measures the value the unit has created by analyzing cash flows over time. At the corporate level, SVA provides framework for evaluating options for improving shareholder value by determining the tradeoffs between reinvesting in existing businesses, investing in new businesses and returning cash to stockholders
- ❖ SVA is affected by the following parameters:
 - Rate of sales growth
 - Operating profit margin
 - Income tax rate
 - Investment in working capital
 - Fixed capital investment
 - Cost of capital
 - Life of the project

Linking Financial and non-financial measures of performance:

- ❖ The main objective of profit-making organizations is to maximize shareholder value. Hence managers would analyze their performance through financial measures such as ROI/EVA. However these performance measures can inspire managers to become short-term oriented
- ❖ To overcome this issues the company should add non-financial measures for performance evaluation. This has created the need for linking financial and non-financial measures of performance

Linking critical success factors (CSFs) to Key Performance Indicators (KPIs) and corporate strategy:

- ❖ Critical Success Factors are elements tied to the strategy of business and they represent objectives that businesses are trying to achieve. They are derived from the strategic goals of the organization.
- ❖ The company should consider the following when identifying CSF's:
 - Industry structure
 - Competitive strategy
 - Environmental factors
 - Temporary influences
- ❖ Key Performance Indicators, on the other hand, are a consequence of critical success factors – they represent the 'how'. Having outlined 'what' businesses want to achieve, a company must subsequently define sets of measures and associated targets in such a way that achieving those targets will translate into successful completion of a CSF
- ❖ Ideally, each critical success factor should have a KPI associated with it. A single Critical Factor can also have more than one KPI, if need be. The KPI targets are more formally called thresholds, and the thresholds must be ascertained with a great deal of industry analysis, as well as internal analysis. KPI targets should be Specific, Measurable, Achievable, Relevant and Time Constrained.
- ❖ The objectives, CSFs, and KPIs together represent a chain of links that together deliver a company's strategic goal, by breaking down that strategic vision into a set of quantifiable targets
- ❖ Setting up KPIs is a step in the right direction, but the benefit of KPIs is only truly realized when they are implemented in the right way, and understanding their linked relationship with CSFs and objectives is paramount to this effect

Triple Bottom Line (TBL):

- ❖ TBL expands traditional accountancy reporting systems, looking at social and environmental performance, rather than simple financial performance
- ❖ TBL encourages managers to make decisions in a socially responsible manner
- ❖ TBL incorporates the following three dimensions:
 - Environmental – Measures the impact on resources, such as air, water, ground and waste emissions
 - Social – Relates to corporate governance, motivation, incentives, health and safety, human capital development, human rights and ethical behavior
 - Economic – refers to measures maintaining or improving the company's success

Balanced Scorecard:

- ❖ The balanced scorecard is a method which displays organisation's performance into four dimensions namely financial, customer, internal and innovation
- ❖ The four dimensions acknowledge the interest of shareholders, customers and employees taking into account of both long-term and short-term goals

Four perspectives of balanced scorecard:

Financial Perspective – How do we look to shareholders?

- ❖ Manager of a division or a unit, links its business objectives to the corporate strategy of the company as a whole. Financial performance measures indicate whether the company's strategy implementation and execution are contributing to its revenue and earnings
- ❖ Financial objectives chosen at the onset of the balanced scorecard implementation should serve two purposes:
 - To provide definite performance that was expected at the time of strategies selection.
 - To provide a focus for objectives and appropriate measures in each of the other three perspectives.

Customer Perspective – How do customers view us?

- ❖ Managers identify the lead indicators which make a particular business unit or product different from that of others.
- ❖ Lead indicator may vary from customer to customer or market segment. If for example, a customer values on-time delivery then on-time delivery becomes a lead indicator. Some of the lead-indicators are on-time delivery, on-site service, after sales support, defects per order, cost of the product, free shipments etc

Internal Business Perspective – At what must we excel?

- ❖ Companies identify objectives and processes which are necessary to achieve objectives set at financial and customer perspective stage
- ❖ These objectives may be achieved by reassessing the value chain and making necessary changes to the existing operating activities

Learning and growth perspective – How do we continue to improve and create value?

- ❖ Companies determine the activities and infrastructure that the company must build to create long term growth, which are necessary to achieve the objectives set in the previous three perspectives.
- ❖ Organizational learning and growth comes from the following three sources:
 - People (employee capabilities)
 - Systems (information system capabilities) and
 - Organizational procedures (motivation, empowerment and alignment)

Benefits of Balanced scorecard:

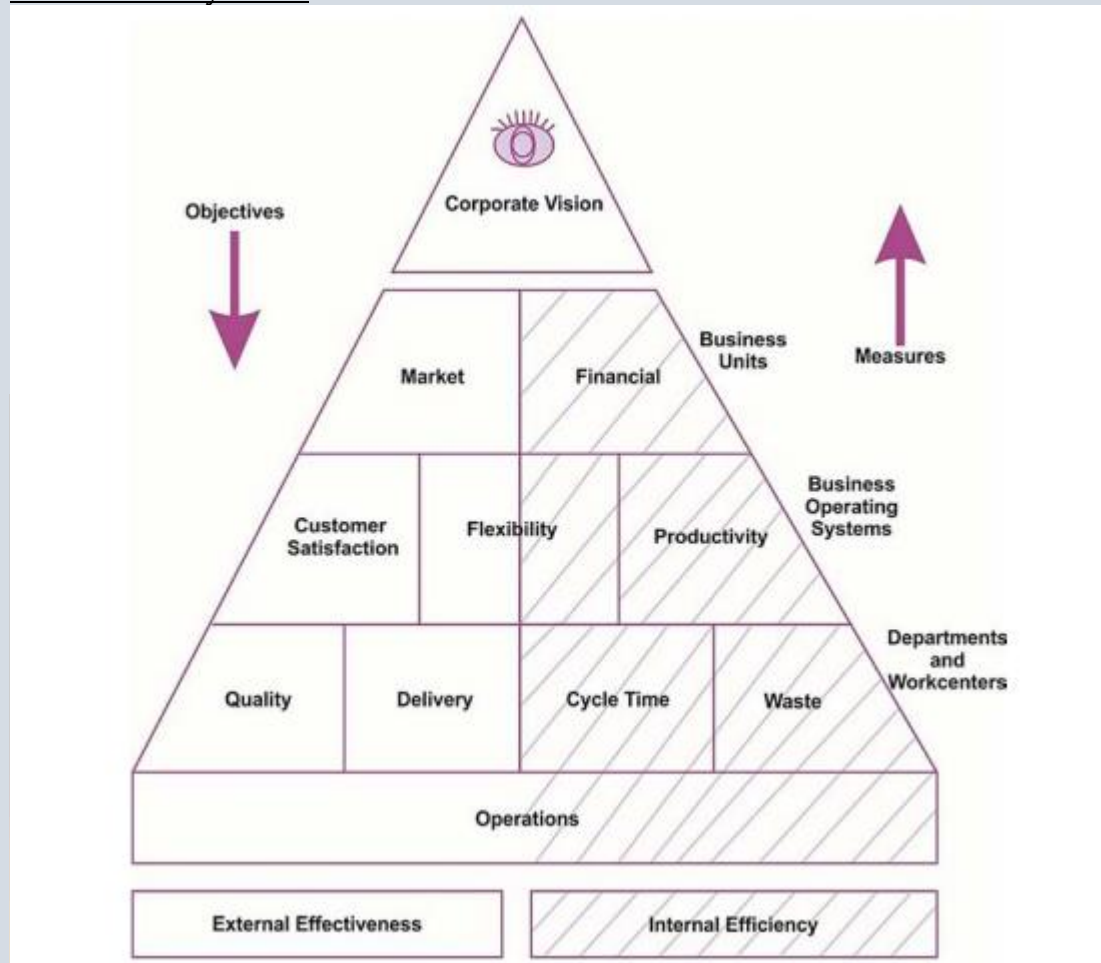
- ❖ The ultimate result of using the Balanced Scorecard approach should be an improved long term financial performance. Since the scorecard gives equal importance to the relevant non –financial measures, it should discourage the short termism that leads to cuts in spending on new product development, human resource development etc which are ultimately detrimental for the future prospects of the company.

Reasons for failure of balanced scorecard:

- ❖ Managers mistakenly think that since they already use non – financial measures, they already have a Balanced Scorecard.
- ❖ Senior executives misguidedly delegate the responsibility of the Scorecard implementation to middle level managers.

- ❖ Company's try to copy measures and strategies used by the best companies rather than developing their own measures suited for the environment under which they function.
- ❖ There are times when Balanced Scorecards are thought to be meant for reporting purposes only. This notion does not allow a Business to use the Scorecard to manage Business in a new and more effective way.



Performance Pyramid:

- ❖ Performance pyramid model viewed businesses as performance pyramids. Attractiveness of this framework is that it links the business strategy with day-to-day operations
- ❖ Objectives of the organizations are shown from top to bottom whereas the measures are from bottom to top
- ❖ At the top is the organization's corporate vision through which long term success and competitive advantages are described
- ❖ The 'business level' focuses on achievements of organization's CSF in terms of market and financial measures. The marketing and financial success of a proposal is the initial focus for the achievement of corporate vision.
- ❖ The above business are linked to achieving customers satisfaction, increase in flexibility and high productivity.
- ❖ The above driving forces can be monitored using the operating forces of the organization. The left-hand side of the pyramid contains external forces which are 'non-financial'. On the other hand, the right-hand side of the pyramid contains internal efficiency which are predominantly 'financial' in nature.

The Building Block Model:

- ❖ Building Block Model suggests the solution of performance measurement problems in service industries



Standards: These are the measures used to assess performance (KPI's). These should have the following characteristics:

- ❖ Equity - Performance measures should be equally challenging for all parts of business
- ❖ Achievable - Performance measures should be realistic
- ❖ Ownership - Performance measures should be acceptable to everyone. Employees should be involved in identification of measures rather than being imposed on them

Rewards: To ensure that employees are motivated to meet standards, standards need to be clear and provide for adequate rewards. Rewards should possess the following characteristics

- ❖ Motivation - Rewards scheme should be set in manner which motivates employees to achieve the business goals
- ❖ Clear - Rewards scheme should be clearly communicated to employees in advance. What kind of performance will be rewarded and how their performance will be measured?
- ❖ Controllability - Employees should only be reward or penalized of the result over which they some control or influence.

Dimensions: Dimensions are the goals for the business. These are further divided into two sub-categories

Determinants - Performance areas which influence results	Results - Reflects success or failure of determinants
Quality: Ability to deliver goods and services with consistency. Quality should be viewed from the eyes of the customer and it should be enough for price paid Flexibility: Responsiveness to change in the factor influencing the business performance Innovation: Ability of the business to devise new products and new ways of doing things Resource utilization: ability to use resources to achieve business objectives.	Financial performance: Financial performance gives an indication of overall business at a glance in monetary terms. These can be used to identify areas of strengths and weaknesses. It may also highlight other areas previous identified which may be critical to business success Competitive Performance: How do we stand in comparison to its competitors? How are we different from their competitors?

Business assets should be used for the proper purpose and in most efficient way.	
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Performance Prism:

- ❖ Performance Prism is an approach to performance management which aims to effectively meet the needs and requirements of all stakeholders. This is in contrast with the performance pyramid which tends to concentrate on customers and shareholders and is also in contrast with value based management, which prioritizes the needs of shareholders
- ❖ Performance Prism takes stakeholder requirement as the start point for the development of performance measures rather than the organization strategy. It also recognizes the need to work with stakeholders to ensure that their needs are met

Key questions in Performance Prism:

- ❖ **Stakeholders Satisfaction:** The organization needs to focus on who are the stakeholders? What are the needs and wants of the stakeholders.
- ❖ **Strategies:** What are the strategies required by the organization to fulfill the wants and needs of the stakeholders?
- ❖ **Processes:** What are the necessary processes required for satisfying the above strategies?
- ❖ **Capabilities:** What capabilities does the organization need for operating and enhancing the process?
- ❖ **Stakeholders Contributions:** It further takes into account what contribution does the management need from its stakeholders?

Benefits of Performance Prism:

- ❖ Develops agreed measures of activity.
- ❖ Clarifies the objectives of the organization.
- ❖ Greater understanding of process.
- ❖ Helps facilitate comparison between divisions.
- ❖ Promotes accountability to stakeholder.
- ❖ Helps in setting of targets for managers.
- ❖ Helps facilitate comparison between different organizations

Performance Prism - Problems:

- ❖ Tunnel Vision – Undue focus on measurements to the detriment of other areas
- ❖ Sub-optimization – Focus on one measurement to the detriment of others
- ❖ Myopia - Focusing too much on short-term measures and not looking long-term
- ❖ Misrepresentation - Not presenting the data correctly
- ❖ Misinterpreting – Misinterpreting the data
- ❖ Ossification – Keeping of out of date measures

Benchmarking:

- ❖ Benchmarking is a technique for continuous improvement in performance. It involves comparing a firm's products, services or activities against other best performing organisations, either internal or external to the firm

- ❖ The objective is to find out how the product, service or activity can be improved and ensure that the improvements are implemented. It attempts to identify an activity such as customer order processing needs to be improved and finding a non-rival organisation that is considered to represent world class best practice and studying how it performs the activity
- ❖ It is a performance measure that provides the driving force to establish high performance and means to accomplish these goals

Types of Benchmarking:

- ❖ **Competitive Benchmarking:** It involves the comparison of competitors products, processes and business results with own. Benchmarking partners are drawn from the same sector.
- ❖ **Process Benchmarking:** It involves the comparison of an organisation critical business processes and operations against best practice organisation that performs similar work or deliver similar services. For example, how do best practice organisations process customers' orders.
- ❖ **Strategic Benchmarking:** It is similar to the process benchmarking in nature but differs in its scope and depth. It involves a systematic process by which a company seek to improve their overall performance by examining the long term strategies. It involves comparing high level aspects such as developing new products and services, core competencies etc.
- ❖ **Global Benchmarking:** It is a benchmarking through which distinction in international culture, business processes and trade practices across companies are bridged and their ramification for business process improvement are understood and utilised.
- ❖ **Functional Benchmarking:** This type of benchmarking is used when organisations look to benchmark with partners drawn from different business sectors or areas of activity to find ways of improving similar functions or work processes.
- ❖ **Internal Benchmarking** involves seeking partners from within the same organisation, for example, from business units located in different areas. The main advantages of internal benchmarking are that access to sensitive data and information are easier; standardised data is often readily available; and, usually less time and resources are needed.
- ❖ **External Benchmarking** involves seeking help of outside organisations that are known to be best in class. External benchmarking provides opportunities of learning from those who are at the leading edge, although it must be remembered that not every best practice solution can be transferred to others.

Categorization of benchmarking:

- ❖ **Intra-Group Benchmarking:** In intra group benchmarking the groups of companies in the same industry agree that similar units within the cooperating companies will pool data on their process. The processes are benchmarked against each other at or operational level.
- ❖ **Inter-Industry Benchmarking:** In inter-industry benchmarking a non-competing business with similar process is identified and asked to participate in a benchmarking exercise. For example, a publisher of school book may approach a publisher of university level books to establish a benchmarking relationship

Goals of Benchmarking:

- ❖ Benchmarking can deliver significant performance improvements and returns based on efficiency, cost savings and new revenues
- ❖ Benchmarking projects typically target cycle times, productivity, customer service, quality and production costs. They also can be part of an effort to shift the culture of a company to be more customer oriented and results focused

Process of Benchmarking:**Planning:**

- ❖ **Determination of benchmarking goal statement:** The company should identify the areas to be benchmarked. It should look at the following criteria for identifying the areas to be benchmarked:
 - What would make the most significant improvements in our relationships with our customers.
 - What would make the most significant improvements to our bottomline.
- ❖ Identification of best performance
- ❖ Establishment of the benchmarking or process improvement team
- ❖ Defining the relevant benchmarking measurement

Collection of data and information: The data gathering for benchmarking could be done through national/international clearing houses, mail surveys, suppliers, company visits etc. The collection of information involve the following steps:

- ❖ Compile information and data on performance. They may include mapping processes.
- ❖ Select and contact partners.
- ❖ Develop with partners, a mutual understanding about the procedures to be followed and, if necessary, prepare a Benchmarking Protocol.
- ❖ Prepare questions and agree terminology and performance measures to be used.
- ❖ Distribute schedule of questions to each partner.
- ❖ Undertake information and data collection by chosen method for example, interviews, site-visits, telephone, fax and e-mail.
- ❖ Collect the findings to enable analysis.

Analysing the findings:

- ❖ Review the findings and produce tables, charts and graphs to support the analysis.
- ❖ Identify gaps in performance between our organisation and better performers.

- ❖ Seek explanations for the gaps in performance. The performance gaps can be positive, negative or zero.
- ❖ Ensure that comparisons are meaningful and credible.
- ❖ Communicate the findings to those who are affected.
- ❖ Identify realistic opportunities for improvements

Recommendations:

<u>Making Recommendations:</u>	<u>Implementing Recommendations:</u>
❖ Deciding the feasibility of making the improvements in the light of the conditions that apply within own organisation. ❖ Agreement on the improvements that are likely to be feasible. ❖ Producing a report on the Benchmarking in which the recommendations are included. ❖ Obtaining the support of key stakeholder groups for making the changes needed. ❖ Developing action plan(s) for implementation.	❖ Implement the action plans. ❖ Monitor performance. ❖ Reward and communicate successes. ❖ Keep key stakeholders informed of progress.

Monitoring and Reviewing:

- ❖ Evaluating the benchmarking process undertaken and the results of the improvements against objectives and success criteria plus overall efficiency and effectiveness.
- ❖ Documenting the lessons learnt and make them available to others.
- ❖ Periodically re-considering the benchmarks for continuous improvement.

Pre-requisites and difficulties in benchmarking:

<u>Pre-requisites</u>	<u>Difficulties:</u>
❖ Senior Management Support ❖ Clear definition of objectives ❖ Scope of work is appropriate in light of the objectives ❖ Availability of sufficient resources ❖ Benchmarking team should have clear view of organization performance ❖ Stakeholders and staff to be informed about the reasons for benchmarking	❖ Time-consuming and at times difficult ❖ Requires direct involvement of senior manager ❖ Resistance of employees ❖ Pre-occupied with measures. Hence companies don't look at improving process but look at matching the best practices ❖ Wastage of time in benchmarking non-critical functions ❖ Non-adaptation of best practice to tailor to a company's needs and culture

Benchmarking code of conduct:

Principle of Legality	Avoid discussions or actions that might lead to or imply an interest in restraint of trade. Do not discuss costs with competitors if costs are an element of pricing.
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Principles of exchange	Be willing to provide the same level of information that you request, in any benchmarking exchange.
Principle of confidentiality	Treat benchmarking interchange as something confidential to the individuals and organizations involved. Information obtained must not be communicated outside the partnering organizations without prior consent of participating benchmarking partners.
Principle of use	Use information obtained through benchmarking partnering only for the purpose of improvement of operations within the partnering companies themselves
Principle of First Party Contact:	Initiate contacts, whenever possible, through a benchmarking contact designated by the partner company
Principle of Third Party Contact	Obtain an individual's permission before providing their name in response to a contact request.
Principle of Preparation	Demonstrate commitment to the efficiency and effectiveness of the benchmarking process with adequate preparation at each process step; particularly, at initial partnering contact

Performance measurement in the not for profit sector:

Not-for-profit organisation does not exist for earning profits but for achieving certain social or charitable cause. The activities carried out by such organisations must be measure to give a confidence to the donors/ members that the resources contributed are being utilized efficiently and effectively. Following are the key challenges in measuring performance:

- ❖ **Benefits cannot be quantified:** A large part of benefits derived from the activities of these organisations are not quantifiable. For example - if a not-for-profit organisation is formed for providing free education to poor students, the benefits derived by the students cannot be quantified.
- ❖ **Benefits may accrue over a longer term:** The expenditure incurred in one year may yield benefits over several years. A hospital may invest in creating ICU (Intensive Care Units) facility, the benefit of which will be obtained over multiple years.
- ❖ **Measurement of utilisation of funds & expenditure:** Some not-for-profit organisation spend out of their fixed budget and do not earn any revenue. The assessment of whether the spending have been appropriate is a key challenge
- ❖ **Multiple objectives:** Many not-for-profit organisations are formed for multiple objectives. The prioritisation of objectives can be a challenging task

Performance measures in not-for-profit sector:

Value for Money (VFM) Framework: A framework which can be used for measurement of performance in not-for-profit sector is the Value for Money framework. Not-for-profit organisations are expected to provide value for money which is demonstrated by:

- ❖ **Effectiveness:** Whether the organisation has achieved its desired mission and objectives?
- ❖ **Efficiency:** Whether the resources and funds available to the organisation has been utilized efficiently i.e, maximum output has been obtained with minimum input.?
- ❖ **Economy:** Whether the desired output has been obtained using the lowest cost? It must be noted that use of lowest cost approach should not compromise quality.

Adapted Balanced Scorecard:

Customer Perspective	Satisfaction of beneficiary and other stakeholder's interest
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Financial Perspective	Fund raising, funds growth and funds distribution
Internal processes perspective	Internal efficiency, volunteer development and quality
Innovation and learning perspective	Capability of the organization to adjust to the changing environment

Other performance measures:

- ❖ The ability to raise funds to meet the objectives efficiently.
- ❖ Submitting periodic reports to the stakeholders in a transparent manner.
- ❖ The best use of financial as well as non-financial resources to achieve desired objectives and mission.
- ❖ The long- term impact (benefits) of the activities of the not-for-profit organisations.
- ❖ The quality of services provided by the organisations.

Performance reports:

- ❖ Responsibility Accounting is implemented by issuing performance reports at frequent intervals that inform responsibility centre managers of the deviations from budgets for which they are countable and required to take action.
- ❖ Performance reports are useful for not only comparing budgeted results to actual results, but for also showing managers the effects of activity changes and how well these changes are controlled by management.
- ❖ Note that the reports start from the bottom and move upward with each manager receiving information on the operations of the unit for which he is directly responsible and summary information on performance of other lower level managers under their direct or indirect control.
- ❖ No matter how much authority and autonomy is given to responsibility managers, performance reports are needed to evaluate the performance of the managers at all operating levels of the organization.
- ❖ At bottom levels, it helps in determining what all corrective measures are required in their segments. At top management level, these reports keep them top managers informed on the performance of all segments.

Transfer pricing:

- ❖ Transfer pricing refers to the price charged by one division to another division. Divisions either could be departments within a company or a group companies of a parent organization
- ❖ Transfer pricing serves the following utilities:
 - Performance evaluation
 - Employee engagement and compensation
 - Resource allocation
 - Taxation and profit remittance

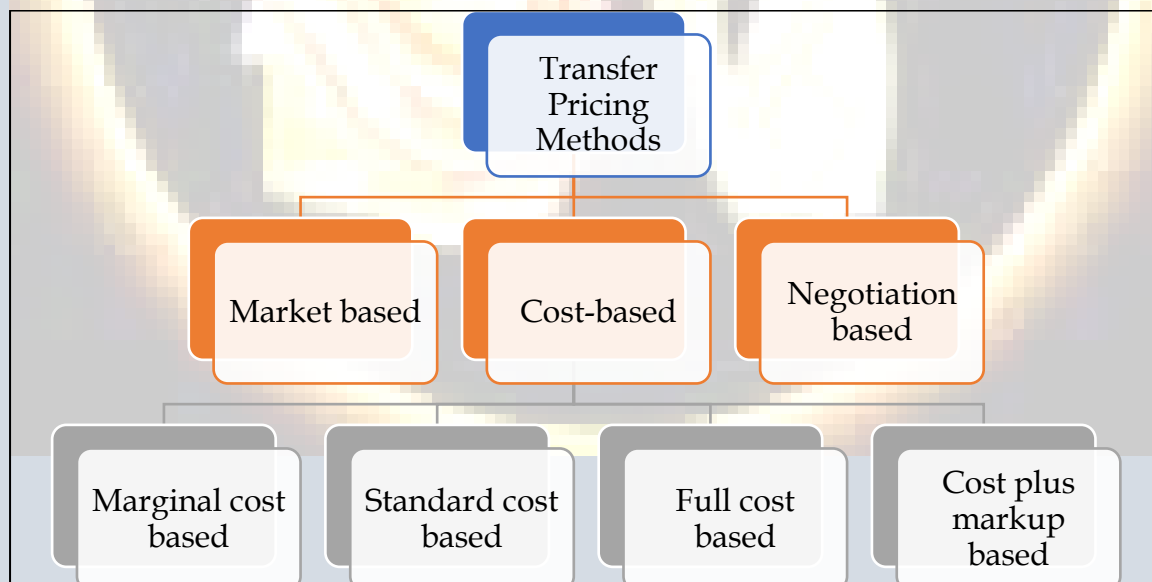
Transfer Pricing and Fair Value:

- ❖ Transfer Pricing is often associated with the term “arms-length” price. This implies that the price for inter-divisional transfer has to be fair and competent enough as if dealing with a third party
- ❖ Application of concept of arms-length price is more from taxation perspective
- ❖ Transfer pricing is revenue from one division and is a cost for other division. The companies should fix the transfer price in such a way that it is a good-deal for both divisions. Hence fair value depends on how each division finds the price compatible with its profit targets

Examples:

Division A produces goods at a cost of Rs.10 p.u. and transfers the goods to Division B which has additional costs of Rs.5 p.u. Division B sells externally at Rs.16 p.u. The company has a policy of setting transfer prices at cost + 20%.

- ❖ Profit of each division and the overall profit the company made.
- ❖ Write a brief analysis of the results.

**Market based transfer price:**

- ❖ Transfer price is based on market price of good or services adjusted for any costs that can be saved by internal transfer
- ❖ **Advantages:**
 - Unbiased,

- Less ambiguous and cannot be manipulated as compared to cost-plus method and
- Divisional performance can be measured objectively
- ❖ Disadvantages:
 - Market Price may not be completely unbiased due to distress sale scenario or manipulative pricing strategies,
 - Not suitable when market prices have wide fluctuation
 - Not suitable for intermediate goods

Shared profit relative to cost based transfer price:

- ❖ Shared profit relative to cost method is an alternative to market price method. In this method the profit of the organization is split on the basis of the amount of value addition by the processes
- ❖ Transfer Price = Cost of division + Profit based on value addition
- ❖ Profit of supplying division = (Cost of supplying division / Total costs) * Profit of company

Cost based transfer price:

- ❖ Cost based pricing models are based on internal cost records of the company. This method can be used when the information on market price is unavailable or if the management wants to benchmark division's performance based on cost targets
- ❖ Cost based transfer price may consider variable cost, standard cost, full cost and full cost plus mark-up
- ❖ **Advantages:**
 - Performance can be benchmarked against internal cost targets
 - Information is more readily available as compared to market price
- ❖ **Disadvantages:**
 - Cost basis on which transfer price is to be fixed can be subjective
 - Since cost is passed on to the next division, there will be little incentive for the supplying division to reduce costs

Method	Basis	Advantages	Disadvantages
Marginal cost based transfer price	TP is calculated based on margin cost (additional cost)	Useful when supplying division has spare capacity	No fixed cost or mark-up is allowed and hence supplying division will not any incentive to do transfer
Standard cost based transfer price	TP is recorded based on pre-determined cost	Performance evaluation can be done against budgeted cost targets	Profit performance measurement is centralized and hence cannot be measured for individual divisions
Full cost based transfer price	TP is based on full cost of goods which will also include fixed costs	Full cost of goods is transferred and hence supplying division will not show loss	No mark-up is charged and hence supplying division will not have any incentive to do transfer as the transfer will not add to profit
Cost plus a mark-up based	TP is based on full cost plus mark-up. Mark-up can be a	Supplying division makes profit and hence this addresses the disincentive	Under this method TP may be nearer to the market price. However there are cost savings on internal transfer

transfer price	percent of cost or capital employed	problem of supplying division	and the same should be factored in while fixing TP
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Negotiation based transfer price:

- ❖ Under this method managers of supplying and receiving division independently negotiate and arrive at a mutually agreeable transfer price
- ❖ **Advantage:** Managers are given full autonomy to decide whether to purchase from its sister unit or source from external market
- ❖ **Disadvantage:** Information on external market price, cost price, terms of trade etc. is required to negotiate a reasonable price

Transfer Pricing and Goal Congruence:

- ❖ Internal transfer pricing develops a competitive setting for managers of each division, it is possible that they may operate in the best interest of individual performance. This can lead to sub-optimal capacity utilization of resources
- ❖ Transfer pricing policy may be established to promote goal congruence and the same is presented below:

Minimum Transfer Price (determined by supplying division)	❖ Additional outlay cost per unit + Opportunity cost per unit ❖ Additional outlay cost = Marginal cost + Any additional costs incurred by the supplying division ❖ Opportunity cost = Benefit foregone
Maximum Transfer Price (determined by receiving division)	❖ Lower of Net Marginal Revenue and external purchase price (adjusted for saving/increase in costs) ❖ Net Marginal Revenue = Marginal revenue - Marginal cost of purchasing division

Transfer Pricing Decision under different circumstances:

Supplying division has excess capacity	❖ Minimum Transfer Price = Marginal cost per unit ❖ Maximum Transfer Price = Lower of Net Marginal Revenue and external purchase price
Supplying division operating at full capacity	❖ Minimum Transfer Price = Marginal cost per unit + Opportunity cost per unit ❖ Maximum Transfer Price = Lower of Net Marginal Revenue and external purchase price

Proposal for resolving transfer pricing conflict:

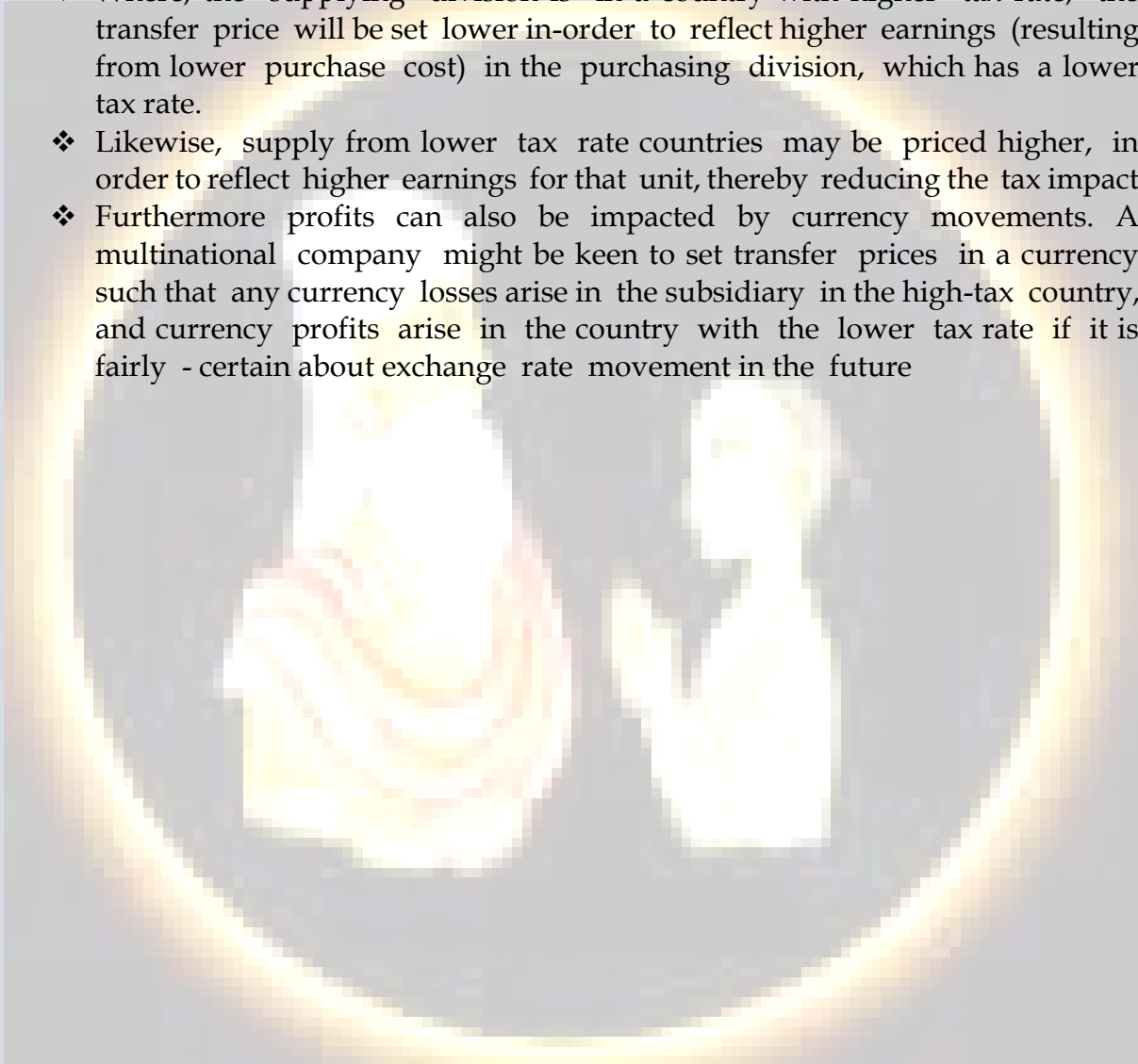
Conflict of interest between interests of individual divisions and the company can also be addressed by following the following systems for transfer pricing:

- ❖ **Dual Rate Transfer Pricing System:** Supplying division can record transfer price by including a normal profit margin whereas purchasing division will record the same at cost. This will allow for better evaluation of each division's performance and can promote goal congruence. However this can complicate the accounting records and it will lead to scenario of showing artificial profits which can be used only for internal evaluation
- ❖ **Two part transfer pricing system:** Under this method transfer price is equal to marginal cost of production + Lump-sum charge (two parts to pricing). Under this method, supplying division will be able to recover entire marginal cost and the lump-sum portion will contribute to recovery of fixed cost. Similarly the

purchasing division can purchase the goods at a lower rate compared to the market price

International Transfer Pricing:

- ❖ Transactions between divisions of multi-national companies can involve transfer of goods, provision of services or use of intangible assets involving royalty payments
- ❖ Taxation, profit repatriation and transfer prices are critical considerations to the senior management of multi-national companies
- ❖ Multi-national organizations try to maximize profits by using transfer pricing as a tool to reduce the tax impact on earnings.
- ❖ Where, the supplying division is in a country with higher tax rate, the transfer price will be set lower in-order to reflect higher earnings (resulting from lower purchase cost) in the purchasing division, which has a lower tax rate.
- ❖ Likewise, supply from lower tax rate countries may be priced higher, in order to reflect higher earnings for that unit, thereby reducing the tax impact
- ❖ Furthermore profits can also be impacted by currency movements. A multinational company might be keen to set transfer prices in a currency such that any currency losses arise in the subsidiary in the high-tax country, and currency profits arise in the country with the lower tax rate if it is fairly - certain about exchange rate movement in the future



Profitability Analysis

- ❖ Porter in its generic strategy theory has suggested that a firm can **survive profitably in the long term** if it chooses its **generic strategy according to the environment** in which it operates
- ❖ A firm would be profitable if it is either a **cost leader** or if it produces its products with some peculiar features which make it different from others.
- ❖ To achieve its objectives, it has to put some **performance measurement mechanism** into place so that any deviation can be measured and corrective action can be taken.
- ❖ Profitability Analysis can be useful to **measure the performance of a firm against the acceptable standards**.
- ❖ Profitability can be analysed as per the requirement of the management, to assist them to identify the critical success factors and to take appropriate decisions.

Strategic Profitability Analysis:

- ❖ Operating Profit of a firm is affected by various components which are responsible for changes in the revenue and costs.
- ❖ A change in the profit may be due to **revenue or costs or both the factors**.
- ❖ For analyzing operating income, we spread our analysis into three main areas or components which are
 - Growth Component
 - Price Recovery Component and
 - Productivity Component.
- ❖ **Growth Component** measures the change in **the quantity of output sold**. The growth component of the change in the operating income measures the increase/ decrease in revenue and in costs due to selling more/ less quantity units from the previous period.
- ❖ **Price Recovery Component** of change in operating income measures the changes in the revenue and costs solely **due to changes in prices**.
- ❖ **Productivity Component** measures the change in the operating income due to changes in the **product mix and/or yield of inputs** as compared with the last year. This component uses current year's prices of input to measure the changes in costs only.

Profitability Analysis through ABC:

- ❖ A well designed and implemented ABC system is a powerful aid to management evaluation and decision making, thereby improving organizational performance.
- ❖ In service sector, direct costs are generally low and overheads tend not to be volume related or capable of being easily attributed to product/ service/ customer being supplied.
- ❖ In this situation, ABC, with its emphasis on activities and their cost drivers, helps cost to identify more easily and managed more effectively.
- ❖ In addition, because the resource consumption by different products, customers or segments of the business is more accurately measured, activity-based profitability analysis is likely to provide more useful information to management.

Direct Product Profitability (DPP):

- ❖ A firm which has a portfolio of profitable products enjoys high profitability. However, it is very important to know the relative profitability of an individual product so that management can concentrate on the profitable products and weed out the loss-making products from the products' portfolio.
- ❖ Direct Product Profitability is one among the various analytical methods which analyse the profitability for each product or segment of products separately.
- ❖ DPP is generally used in the retail trade to determine profitability from an individual product.
- ❖ CIMA describe DPP "used primarily within the retail sector, DPP involves the attribution of both the purchase price and other indirect costs (for example distribution, warehousing and retailing) to each product line. Thus, a net profit, as opposed to a gross profit, can be identified for each product. The cost attribution process utilizes a variety of measures (for example warehousing space and transport time) to reflect the resource consumption of individual products."

Benefits of DPP

- ❖ Better cost analysis.
- ❖ Better pricing decisions.
- ❖ Better management of stores and warehouse space.
- ❖ The rationalisation of product ranges.

Direct Product Profitability Statement

- ❖ Retail organisations traditionally deducted the bought in cost of goods from the selling price to give a gross margin. A method was needed which relates the indirect costs to the goods according to the way the goods uses or creates these costs.
- ❖ Indirect costs, for DPP may be analysed into basic cost categories as follows:
 - Overhead Cost: This is incurred through an activity that is not directly linked to a particular product.
 - Volume Related Cost: The cost is incurred in relation to the space occupied by products. This includes storage and transport costs.
 - Product Batch Cost: This cost is often a time-based cost. If product items (that is a number of identical products which are handled together as a batch) are stocked on shelves a labour time cost is incurred.
 - Inventory Financing Costs: This is the cost of tying up money in stock and is the cost of the product multiplied by interest rate per day or per week.

Customer Profitability Analysis

- ❖ In many organisations it is just as important to cost customers as it is to cost products. Different customers or groups of customers differ in their profitability.
- ❖ This is a relatively new technique that ABC makes possible because it creates cost pools for activities.

- ❖ Customers use some activities but not all, and different groups of customers have different 'activity profiles'. Service organisations, such as a bank or a hotel, in particular need to cost customers.

Benefits of Customer Profitability Analysis

- ❖ It helps the supplier to identify which customers are eroding overall profitability and which customers are contributing to it.
- ❖ It can help to provide a basis for constructive dialogue between buyer and seller to improve margins.

ABC in Advanced Manufacturing Environment:

- ❖ Now a days organizations are adopting just in time manufacturing approach and implementing advanced manufacturing technology. Organization must improve value received by their customers while increasing their own profits simultaneously.
- ❖ ABC supports the continuous improvement process by allowing management to gain new insights into activity performance, by focusing attention on the sources of demand for activities and by permitting management to create a behavioral incentive to improve one or more aspects of manufacturing.
- ❖ Better assessment of cost behavior, increased accuracy in product costing and an attempt to achieve continuous cost improvement are all critical for advanced manufacturing environment.
- ❖ In advanced manufacturing environment, where support function overheads constitute a large share of total costs, ABC provides more realistic and accurate product costing, as traditional volume based costing system does not take into account the Non-unit Level Overhead Costs such as Setup Cost, Inspection Cost, and Material Handling Cost etc.
- ❖ Cost Analysis under ABC system shows that while these costs are largely fixed with respect to sales volume, but they are not fixed to other appropriate cost drivers.
- ❖ The concepts underlying a relevant costing analysis continue to be completely valid in an advanced manufacturing setting and in a situation where activity based costing is used.

Activity Based Cost Management (ABM):

- ❖ The term Activity based management (ABM) is used to describe the Cost Management application of ABC. The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Cost Management (ABM).
- ❖ ABM is a discipline that focuses on the efficient and effective management of activities as the route to continuously improving the value received by customers.
- ❖ ABM utilizes cost information gathered through ABC. Through various different types of analysis, ABM manages activities rather than resources. It determines what drives the activities of the organisation and how these activities can be improved to increase the profitability.
- ❖ Consortium for Advanced Management International (CAM) defines ABM as "adds a dynamic, continuous improvement dimension to the more static ABC model". CAM-1 defines ABM as: "A discipline that focuses on the

management of activities as the route to improving the value received by the customer and the profit achieved by providing this value. This discipline includes cost driver analysis, activity analysis, and performance measurement. Activity-Based Management draws on Activity-Based Costing as its major source of information.”

- ❖ ABM involves the following:
 - Cost Driver Analysis
 - Activity Analysis
 - Performance Analysis

Cost Driver Analysis

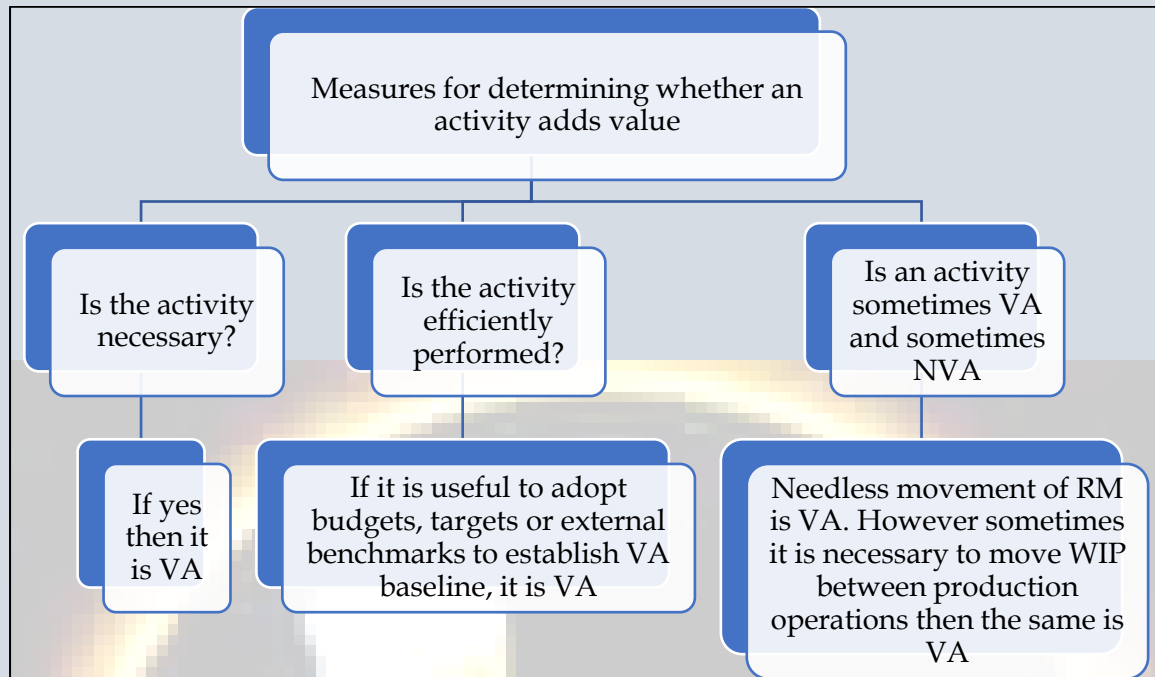
- ❖ The factors that cause activities to be performed need to be identified in order to manage activity costs. Cost driver analysis identifies these causal factors.
- ❖ For Example, a cost driver analysis study might determine that slow processing of customer invoices results largely from lack of training of the customer invoice associates. This lack of training is thus a cost driver of the customer invoice processing activity. The tangible cost savings and intangible benefits from the customer invoice processing improvements should be compared with both the tangible and intangible costs of the new training program in a cost-benefit analysis.
- ❖ The hypothetical customer invoice processing example shows that the identification and analysis of cost drivers (causal factors) is a necessary first step toward improving the cost-effectiveness of activities and cost management through ABM.

Activity Analysis

- ❖ Activity analysis, defined in above section, identifies the activities of an organisation and the activity centres (or activity cost pools) that should be used in an ABC system.
- ❖ Activity analysis also identifies Value Added (VA) and Non- Value Added (NVA) activities. The degree to which activities are grouped together into activity centres depends on the costs and benefits of the alternatives.

Performance Analysis

- ❖ Performance analysis involves the identification of appropriate measures to report the performance of activity centres or other organisational units, consistent with each unit's goals and objectives.
- ❖ Performance analysis aims to identify the best ways to measure the performance of factors that are important to organisations in order to stimulate continuous improvement.

Value Added (VA) Activities / Non-Value Added (NVA) Activities

- ❖ ABM classifies each activity within a process as value-added activities or non-value added activities.
- ❖ **Value-Added Activities:** The VA activities are those activities which are indispensable in order to complete the process. The customers are usually willing to pay (in some way) for these services.
- ❖ **Non-Value-Added Activities:** The NVA activity represents work that is not valued by the external or internal customer. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. Non-Value Added activities create waste, result in delay of some sort, add costs to the products or services and for which the customer is not willing to pay.

Ways in which time is spent in manufacturing process:

Process Time	The time during which a product is undergoing conversion activity
Inspection Time	The amount of time spent confirming that the product is of high quality
Move Time	The time spent moving raw materials, WIP or finished goods between operations
Waiting Time	The amount of time that raw material or WIP spend waiting for the next operation
Storage Time	The time during which materials, partially completed units, or finished goods are held in stock before further processing or shipment
Delivery cycle time	It is the average time between receipt of customer order and delivery of the goods
Manufacturing cycle time	It is the total amount of production time required per unit
Velocity	Velocity is defined as the number of units produced in a given time
Manufacturing cycle efficiency	$\text{Processing Time} / (\text{Processing Time} + \text{Inspection Time} + \text{Waiting Time} + \text{Move Time})$

Business Applications of ABM

- ❖ The goal of the ABCM is to make customer needs to be satisfied while making fewer demands for resources.
- ❖ Current research suggests that customers have perceived needs in four areas, all of which must be satisfied simultaneously. The customers require lower costs, higher quality, faster response time & greater innovation.
- ❖ To satisfy these needs ABM currently being used for a variety of business applications such as
 - Cost Reduction
 - Activity Based Budgeting
 - Business Process Re-engineering (BPR)
 - Benchmarking
 - Performance measurement

Cost Reduction:

- ❖ ABM helps the organisation to identify costs against activities and to find opportunities to streamline or reduce the costs or eliminate the entire activity, especially if there is no value added.
- ❖ It is particularly useful in identifying and quantifying process waste and providing vehicle for continuous process improvement through continuous cost reduction.

Activity Based Budgeting (ABB):

- ❖ ABB analyse the resource input or cost for each activity. It provides a framework for estimating the amount of resources required in accordance with the budgeted level of activity.
- ❖ Actual results can be compared with budgeted results to highlight both in financial and non-financial terms those activities with major discrepancies from budget for potential reduction in supply of resources.
- ❖ It is a planning and control system which seeks to support the objectives of continuous improvement.
- ❖ It means planning and controlling the expected activities of the organization to derive a cost-effective budget that meet forecast workload and agreed strategic goals.
- ❖ The three key elements of activity based budgeting are as follows:
 - Type of work to be done
 - Quantity of work to be done
 - Cost of work to be done

Business Process Re-engineering:

- ❖ Business Process Re-engineering involves examining business processes and making substantial changes to how organisation currently operates.
- ❖ ABM is a powerful tool for measuring business performance, determining the cost of business output and is used as a means of identifying opportunities to improve process efficiency and effectiveness. A business process consists of linked set of activities.

Benchmarking

- ❖ Benchmarking is a process of comparing of ABC derived activity costs of one segment of company with those of other segments. It requires uniformity in the definition of activities and measurement of their costs.

Performance Measurement:

- ❖ Many organisations are now focusing on activity performance as a means of facing competitors and managing costs by monitoring the efficiency and effectiveness of activities.
- ❖ Activity performance measures consist of measures relating to costs, time, quality and innovation.

Steps for Implementing ABM

1	Decide what are the organisation's most important issues and what types of information would be required to address those issues.
2	Top Management support is cited to identify critical information needs.
3	Incorporate ABC methods into organization's financial reporting process.
4	Implementation team should be represented by the people who will be actual users of the ABM information.
5	The existing information system should easily support input requirements.
6	If integrating ABC into the main cost reporting system is not feasible, consider developing a separate ABC system.
7	Implement ABM at a high level in order to get concepts across.

Benefits of Activity Based Cost Management

- ❖ Provision of excellent basis and focus for cost reduction.
- ❖ Provides operational management with a clear view of HOW to implement an Activity Based Budget?
- ❖ Provision of clear understanding of the underlying causes of business processing costs.
- ❖ Provision of excellent basis for effectiveness of management decision making.
- ❖ Identification of key process waste elements, permit management prioritisation and leverage of key resources.

Difference between ABC and ABM :

- ❖ The ABC refers to the technique for determining the cost of activities and the output that those activities produce. It is the logical distribution of overhead i.e. overhead should be distributed on the consumption of resources consumed by goods and services. The aim of ABC is to generate improved cost data for use in managing a company's activities.
- ❖ The ABM is a much broader concept. It refers to the management philosophy that focuses on the planning, execution and measurement of activities as the key to competitive advantage .

ACTIVITY BASED BUDGETING (ABB)

- ❖ Activity Based Budgeting is a process of planning and controlling the expected activities for the organisation to derive a cost-effective budget that meets forecast workload and agreed strategic goals.
- ❖ An activity based budget is a quantitative expression of the expected activities of the firm, reflecting management's forecast of workload and financial and non-financial requirements to meet agreed strategic goals and planned changes to improve performance.
- ❖ Thus, the key elements of ABB are:
 - Type of work/activity to be performed;

- Quantity of work/activity to be performed; and
- Cost of work/activity to be performed.
- ❖ ABB is a technique for enhancing the accuracy of financial forecasts and increasing management understanding. When automated, ABB can rapidly and accurately produce financial plans and models based on varying levels of volume assumptions.
- ❖ Traditional, functional-based budgeting is concerned with budgeting the costs of resources associated with organizational units, such as departments and plants. Firms that have implemented an activity-based costing system may also wish to install an activity-based budgeting system.
- ❖ An activity-based budgetary approach can be used to emphasize cost reduction through the elimination of wasteful activities and improving the efficiency of necessary activities
- ❖ As with traditional, functional-based budgeting, ABB begins with sales and production budgets. Direct materials and direct labor budgets also are compatible with an ABC framework because these production inputs are directly traceable to the individual products. The major differences between functional and activity-based budgeting are found within the overhead and selling and administration categories. In a functional-based approach, budgets within these categories typically are detailed by cost elements. These cost elements are classified as variable or fixed, using production or sales output measures as the basis for determining cost behavior. ABB, on the other hand, identifies the overhead, selling, and administrative activities and then builds a budget for each activity, based on the resources needed to provide the required activity output levels. Costs are classified as variable or fixed with respect to the activity output measure.

Activity Flexible Budgeting

- ❖ Activity flexible budgeting is the prediction of what activity costs will be as activity output changes.
- ❖ Variance analysis within an activity framework makes it possible to improve traditional budgetary performance reporting. It also enhances the ability to manage activities.
- ❖ Activity flexible budgets differ from traditional flexible budgets because the cost formulas are based on the activity drivers for the respective activities rather than being based only on a single unit-based driver, such as direct labor hours.

ABC – A Decision-Making Tool:

- ❖ **Complement to TQM:** ABC is a complement to total quality management (TQM). It provides quantitative data that can track the financial impact of improvements implemented as part of the TQM initiative.
- ❖ **Significant advantage for wholesale distributors:** Wholesale distributors can gain significant advantage in the decision-making process through implementation of ABC concepts. The expansion of line offerings has brought about difficult decisions for the distributor. ABC models the costs back to the activity. The burden created by the new product is correctly reflected. This allows the existing merits while leaving the new line to justify itself.

- ❖ **Facility and resource expansion:** Other decisions that can be assisted by ABC include facility and resource expansion. Often the basis for relocation or opening of a new distribution center is based on cost associations. Reduction in freight or other logistics costs can offset the expense of the new facility, staff or equipment. When the numbers used are enterprise-based, the return might not develop as expected. The ABC model can identify the specific cost elements being targeted, providing a much clearer picture from which management can act.
- ❖ **Decision support for Human Resources:** Where activity, and therefore cost, can be associated to an individual, new levels of financial performance can be determined. This might be appropriate in cases of branch management or sales. Adding or deleting resource slots can be determined based on costs of activities as well. The added data provided through ABC can present a number of options, including outsourcing, productivity improvements through automation, and a determination of employee/revenue ratios.
- ❖ **Cost plus markup method:** Companies who wish to determine price based on cost plus markup basis find ABC method of costing very relevant and are able to determine competitive prices for their products.

Basic understanding of ABC System:

In an ABC system the costs are initially allocated to the various activities and thereafter based on activity cost drivers the same are allocated to the cost objects.

For example: Rent of the factory would be allocated to the various activities such as stores department, purchasing department etc. Thereafter the stores department costs would get allocated to the various products (Cost objects) based on the number of stores requisition of each of the materials handled.

ABC System vs Traditional system:

Example: A company incurs total overheads of Rs.2,00,000 and manufacture two products A and B. The total machine hours used by A are 5000 and by B is 15000 hours.

Traditional system:

In the traditional system the costs are allocated based on machine hours and a total of Rs.50000 and Rs.150000 is allocated for product A and B respectively.

ABC System:

In the ABC system the total overheads are subdivided into various major activities and based on the cost driver the costs are allocated to the products.

The amount of Rs.2,00,000 can be divided into the following in an ABC System:

- Machine running activity : Rs.1,20,000 ~ Allocated based on machine hours
- Machine set up costs : Rs.40,000 ~ Allocated based on setup hours ;
Machine setup hours for A was 4000 and for B was 1000
- Inspection costs of Rs.40,000 ~ Allocated based on inspection time ;
Inspection time for A was 2000 hours and for B was 3000 hours.

Step 1: Calculation of cost driver rate:

Activity	Total cost	Cost driver name	Cost driver quantity	Cost driver rate
Machine Running	1,20,000	Machine hours	20000 hours	Rs.6
Machine setup	40000	Setup time	5000 hours	Rs.8
Inspection costs	40000	Inspection time	5000 hours	Rs.8

Step 2: Apportionment of OH

Activity	Product A		Product B	
	CDQ	Amount	CDQ	Amount
Machine Running	5000	30000	15000	90000
Set-up	4000	32000	1000	8000
Inspection time	2000	16000	3000	24000
Total OH allocated		78000		120000



Budgetary Control:

- ❖ Budgetary Control is “Systematic control of an organization's operations through establishment of standards and targets regarding income and expenditure, and a continuous monitoring and adjustment of performance against them.”
- ❖ Budget is an estimation of revenues and expenses over a specified future period of time which needs to be compiled and re-evaluated on a periodic basis based on the needs of the organisation.
- ❖ Budgetary Control is a process with the help of which, managers set financial and performance goals, compare the actual results with the budgets, and adjust performance, as it is needed.

Pre-requisites of effective budgetary control:

- ❖ Serious attitude to the system is required
- ❖ Clear demarcation between areas of managerial responsibility
- ❖ Reasonable budget targets
- ❖ Established data collection, analysis and reporting techniques
- ❖ Reports aimed at individual managers, rather than general
- ❖ Fairly short reporting periods, typically a month
- ❖ Timely variance reports
- ❖ Action being taken to get operations back under control if they are shown to be out of control

Feedback control:

- ❖ Feedback as the name suggests is a reaction after an action has taken place. So, there has to be an error if we want to take corrective actions.
- ❖ CIMA's official terminology defines feedback control as : ‘Measurement of differences between planned outputs and actual outputs achieved, and the modification of subsequent action and/or plans to achieve future required results. Feedback control is an integral part of budgetary control and standard costing systems.’
- ❖ Following are the various types of feedback:

Primary	❖ Could be reported to line management in the form of control reports, comparing actual and budgeted results. ❖ If the variances are small or can be corrected easily then the information may not be feedback to anyone higher in the organisation
Secondary	❖ Where feedback is sent to a higher level in an organisation and can lead to a plan being reviewed and possibly changed. ❖ For example, the revision of a budget after large variances were discovered due to price changes over time.
Negative	❖ Feedback taken to reverse a deviation from standard. This could be by amending the inputs or process so that the system reverts to a steady state
Positive	❖ Taken to reinforce a deviation from standard. ❖ The inputs or process would not be altered.

- ❖ **Limitations:** It depends heavily on success of error detection system. Furthermore there may be a time lag between error detection, error confirmation and error revision during which actual results may change again

Control reports:

Control reports are feedback devices, but they are only part of the feedback system. A control report does not by itself cause a change in performance. A change results only when managers take actions that lead to change. Following are the guidelines for feedback management control report:

- ❖ Feedback report should disclose both accomplishment and responsibility
- ❖ Feedback reports should be extracted promptly
- ❖ Feedback reports should disclose trends and relationships
- ❖ Feedback reports should disclose variations from standards
- ❖ Feedback reports should be in standardized format

Feed-forward control:

- ❖ According to the CIMA's Official Terminology, feed-forward control is defined as the 'forecasting of differences between actual and planned outcomes and the implementation of actions before the event, to avoid such differences.'
- ❖ A feed-forward control system operates by comparing budgeted results against a forecast. Control action is triggered by differences between budgeted and forecasted results

Implementation of feed-forward control: Following are the guidelines for implementing an effective feed-forward control

- ❖ Thorough planning and analysis are required
- ❖ Careful discrimination must be applied in selecting input variables
- ❖ The feed-forward system must be kept dynamic
- ❖ A model of control system should be developed
- ❖ Data on input variables must be regularly collected and assessed
- ❖ Feed-forward control requires action

Limitations:

- ❖ The feed-forward process is an evaluation process and is concerned with the estimates of uncertain future. This problem of uncertainty is likely to limit application of the concept.
- ❖ Study of future is not well developed; neither are the tools that have potential for overcoming the problem of uncertainty

Behavioral aspects of budgetary control:

- ❖ Behavioural aspects elucidate that many of the goals of budgeting are contradictory. On the one side, we want to be able to fairly evaluate the performance of managers. But we also want to motivate managers and therefore, even if managers are not involved in the process, managers may find the budget too challenging and therefore reduce their effort. That in turn would distort any evaluation.
- ❖ The participation of managers in setting targets for themselves tends to improve motivation and performance. If, we want budgets to act as a way of communicating organisational goals. But the budget themselves may distort the goals as they will be very short term, be focused on cost reduction rather than, say, quality aspects, and they will solely focus on financial aspects of the organisation's goals.
- ❖ There is therefore a conflict between aiming to achieve financial control and communicating the organisation's goals.
- ❖ Budget affects the approach and behaviour of managers and used to motivate the managers. Unrealistic demanding targets tend to affect manager's performance adversely. Allowing managers to set their own targets will introduce slack targets

Effect of the budget difficulty on performance:

Budgets are used to measure the performance of the individual by comparing the actuals with flexed budget performance. Organization should try to find an optimum performance budget for better evaluation. **"Budget level that motivates the best level of performance may not be achievable. In contrast, the budget that is expected to be achieved motivates a**

lower level of performance as managers no longer aspire to meet the budget target.

However following challenges can come in during performance evaluation:

- ❖ Budgets have no motivational effect unless they are accepted by the managers involved as their own personal targets.
- ❖ Up to the point where the budget is no longer accepted, the more demanding the target the better the results achieved.
- ❖ Demanding budgets are seen as more relevant than less difficult targets, but negative attitudes result if they are seen as too difficult.
- ❖ Acceptance of budgets is facilitated when good upward communication exists. The use of departmental meeting was found helpful in encouraging managers to accept budget targets.
- ❖ Managers' reactions to budget targets were found affected both by their own personality and by more general cultural and organizational norms

Participation in budget setting process:

- ❖ There are two main approaches for preparing budget namely Top Down approach and Bottom Up approach

Top-Down Approach	Bottom-Up Approach
Budgets can be prepared centrally and subordinates have little influence on the target setting. This called top down budget or imposed style approach. The benefit of top down approach is that it can be produced quickly and involve less management time than other options. However, there are significant risk of inaccurate budgets being set that are also not acceptable to the subordinate managers	Subordinate managers to participate in the preparation of their own budgets and then these budgets to be reviewed by senior management. This is called bottom up approach (sometimes referred participative approach)
Preferable in the following scenarios: ❖ Where personality characteristics of the participation may limit the benefits of participation ❖ Where participation by itself is not adequate in ensuring commitment to standards and managers can significantly influence the results ❖ Where a process is highly programmable and clear, stable input-output relationships ❖ Where a firm has large number of homogenous units and operating in a stable environment	Preferable in all scenarios except when top-down approach is preferred

Styles of performance evaluation:

Performance evaluation (comparing actuals versus budgets) can be done in the following three styles:

- ❖ **Budget Constrained Style:** The evaluation is based upon the Cost centre head's ability continually to meet the budget on short term basis.
- ❖ **Profit Conscious Style:** Performance of the Cost Centre's head is linked to ability in increase the general effectiveness of his unit's operations in relation to the long- term goals of the organization
- ❖ **Non- Accounting Style:** Accounting data plays a relatively unimportant part in the supervisor's evaluation of the cost centre head's performance
- ❖ Summary of the three styles is provided in the below table:

	Budget constrained	Profit conscious	Non-accounting
Involvement with costs	High	High	Low
Job-related tension	High	Medium	Medium

Manipulation of accounting information	Extensive	Little	Little
Relations with superiors	Poor	Good	Good
Relations with colleagues	Poor	Good	Good

Limitations of Traditional Budgeting:

- ❖ Time-consuming and costly to put together
- ❖ Constrain responsiveness and flexibility
- ❖ Often a barrier to change
- ❖ Rarely strategically focused and are often contradictory
- ❖ Add little value, especially given the time required to prepare
- ❖ Concentrate on cost reduction and not on value creation
- ❖ Developed and updated too infrequently, usually annually
- ❖ Are based on unsupported assumptions and guesswork
- ❖ Reinforce departmental barriers rather than encourage knowledge sharing
- ❖ Make people feel undervalued.

Beyond Budgeting:

- ❖ Beyond budgeting came into picture due to the limitations of traditional budgeting
- ❖ According to CIMA's Official Terminology- Beyond Budgeting is 'An idea that companies need to move beyond budgeting because of the inherent flaws in budgeting especially when used to set contracts. It is argued that a range of techniques, such as rolling forecasts and market related targets, can take the place of traditional budgeting.
- ❖ Beyond budgeting has the following two benefits:
 - It is a more adaptive process than traditional budgeting
 - It is a decentralized process, unlike traditional budgeting where leaders plan and control organizations centrally

Characteristics and suitability of beyond budgeting:

Characteristics	Suitability
❖ Rolling budgets may incorporate KPIs ❖ Benchmarking can be incorporated in budgets ❖ Focus of the managers shift to improving future results ❖ Allow operational managers to react to the environment ❖ Encourage a culture of innovation ❖ More timely allocation of resources	❖ Industries where there is a rapid change in environment (Flexible targets will be responsive to change) ❖ Industries using management models such as TQM (Continuous improvement will be the key) ❖ Industries undergoing radical change e.g.BPR (Budgets may be hard to achieve in such circumstances)

Benefits of Beyond Budgeting:

- ❖ Beyond budgeting helps managers to work in coordination to beat competition
- ❖ Helps in motivating individuals by defining clear responsibilities and challenges
- ❖ Eliminates behavioral issues
- ❖ Proper delegation of authority to operational managers
- ❖ Operational managers do not restrict themselves to budget limits and focus on achieving key ratios
- ❖ Establishes customer-oriented teams
- ❖ Creates information system which provides fast and open information

Beyond Budgeting - Principles for adaptive performance management:

Goals	Set aspirational goals aimed at continuous improvement, not fixed annual targets.
Rewards	Rewards are based on relative performance and not based on fixed annual targets
Planning	Make planning a continuous and inclusive process and not an annual event
Controls	Base controls are on relative KPIs and performance trends
Resources	Make resources available as needed and not annual budget allocations
Co-ordination	Co-ordinate cross-company interactions dynamically and not through annual planning cycles

Beyond Budgeting - Leadership Principles:

Customer	Focus everyone on improving customer outcomes, not on meeting internal targets.
Accountability	Create a network of teams accountable for results, not centralized hierarchies.
Performance	Champion success as winning in the marketplace, not on meeting internal targets.
Freedom to act	Give teams the freedom and capability to act, don't merely require adherence to plan.
Governance	Base governance on clear values and boundaries, not detailed rules and budgets.
Information	Promote open and shared information, don't restrict it to those who 'need to know'.

Implementation of Beyond Budgeting:

Step	Description
1	Define the case for change and provide an outline vision
2	Be prepared to convince the board
3	Get started
4	Design and implement new processes
5	Train and educate people
6	Rethink the role of finance
7	Change behavior - New processes and not management orders
8	Evaluate the benefits
9	Consolidate the gains

Traditional versus beyond budgeting:

	Traditional budgeting management model	Beyond budgeting management model
Targets	Incremental targets	Stretch goals
Rewards	Fixed incentives	Relative targets and rewards
Planning	Fixed annual plans	Continuous planning
Controls	Variance controls	KPI's & rolling forecasts
Resources	Pre-allocated resources	Resources on demand
Coordination	Central coordination	Dynamic coordination
Organizational culture	Central culture and focus on managing resources	Local control of plans/goals and focus on value creation

Planning and Operational Variances:

- ❖ When the current environmental conditions are different from the anticipated environmental conditions (prevailing at the time of setting standard or plans) the use of routine analysis of variance for measuring managerial performance is not desirable / suitable.
- ❖ The variance analysis can be useful for measuring managerial performance if the variances computed are determined on the basis of revised targets / standards based on current actual environmental conditions.
- ❖ A Planning Variance simply compares a revised standard to the original standard.
- ❖ An Operational Variance simply compares the actual results against the revised amount.
- ❖ Operating Variances would be calculated after the planning variances have been established and are thus a realistic way of assessing performance.

Market Size and Market Share Variance:

- ❖ The conventional Sales Volume Variance reports the difference between actual and budgeted sales valued at the standard price per unit. The variance just indicates whether sales volume is greater or less than expected. It does not indicate how well sales management has performed. In order to assess the performance of sales management, market conditions prevailing during the period should be taken into consideration.
- ❖ Accordingly, the sales volume variance can be sub-divided into a planning variance (market size variance) and operational variance (market share variance).

Variance Analysis in Activity Based Costing:

- ❖ Variance analysis can be applied to activity costs (such as setup costs, product testing, quality testing etc.) to gain understanding into why actual activity costs vary from activity costs in the static budget or in the flexible budget.
- ❖ Interpreting cost variances for different activities requires understanding whether the costs are output unit-level, batch level, product sustaining, or facility sustaining costs .
- ❖ The price variance is the difference between standard price and actual price for the actual quantity of input used for each cost driver.
- ❖ The efficiency variance measures the difference between the actual amount of cost driver units used, and the standard allowed to make the output. We multiply the difference in quantities by the standard price per cost driver to get the rupee value of the variance
- ❖ ABC approach is based on the assumption that the overheads are basically variable (but variable with the delivery numbers and not the units output).
- ❖ The efficiency variance reports the cost impact of undertaking more or less activities than standard, and the expenditure variance reports cost impact of paying more or less than standard for the actual activities undertaken.

Learning Curve – Impact on Variances:

- ❖ Learning curve is a geometrical progression, which reveals that there is steadily decreasing cost for the accomplishment of a given repetitive operation, as the identical operation is increasingly repeated.
- ❖ The amount of decrease will be less and less with each successive unit produced. As more units are produced, people involved in production become more efficient than before.
- ❖ Each additional unit takes less time to produce. The amount of improvement or experience gained is reflected in a decrease in man-hours or cost.
- ❖ Where learning takes place with a regular pattern it is important to take account of reduction in a labour hours and cost per unit`.
- ❖ In less-automated processes, however, where learning curves do occur, it is important to take the resulting decline in labour hours and costs into account in setting standards, determining prices, planning production, or setting up work schedules.
- ❖ With the help of the learning curve theory the standard time of any batch or unit can be computed then compare the actual data with the standard and compute the variances.

Relevant cost approach to variance analysis:

- ❖ Traditional approach to variance analysis is to compute variances based on total actual cost for production inputs and total standard cost applied to the production output. This is ambiguous, when inputs are limited. Failure to use limited inputs properly leads not only to increased acquisition cost but also to a lost contribution. Therefore, it is necessary to consider the lost contribution in variance analysis. When this approach is used, price or expenditure variances are not affected.

Variance analysis and throughput accounting:

- ❖ A system based on constraint management will likely show very odd results under a variance reporting system.
- ❖ For example, when a terminal upstream from the constrained resource runs out of work, a manager functioning under throughput accounting system will shut it down in order to avoid the formation of an unnecessary level of work-in-process inventory. However, this will result into a negative labor efficiency variance, since the terminal's staff is not actively producing anything.
- ❖ Throughput accounting does use variance analysis, but not the ones used by a traditional system. Instead, its main emphasis is on tracking variations in the size of the inventory buffer placed before the constrained resource, to confirm that the constraint is never halted due to an inventory shortage.

Variance Analysis in Advanced Manufacturing Environment/high technology firms:

- ❖ The variance analysis generally applies to all types of organizations; however, high-technology firms apply the model somewhat differently. Now much of electronic industry is highly automated.

- ❖ A large part of manufacturing process is computerized. In the high-technology environment that is emerging, many costs that once were largely variable have become fixed, most becoming committed fixed cost.
- ❖ Some high technology manufacturing organizations have found that the two largest variable costs involve materials and power to operate machines. In these companies, the emphasis of variance analysis is placed on direct materials and variable manufacturing overhead.
- ❖ Much of the manufacturing labour consists of highly skilled experts/operators/ programmers are largely committed cost. Firms don't want to take risk losing such highly trained personnel even during an economic downturn. The result is less direct labour and more overhead. For these firms labour variances may no longer be meaningful because direct labour is a committed cost, not a cost expected to vary with output.

Standard costing in service sector:

- ❖ Standard Costing can be equally applicable for various types of industries for example accountants, solicitors, dentists, hairdressers, transport companies and hotels.
- ❖ Service industries comprise a wide range of different businesses that differ in size and types of service provided.
- ❖ Standard costing and variance analysis is more tough to apply to service sector organizations as major portion of their cost is comprised of overhead expenses rather than production expenses.
- ❖ While traditional variance analysis of overheads does not deliver very useful information for overheads control purposes, application of activity based costing can provide an effective basis for variance analysis of overheads in service sector organizations although this may need significant time and effort in the implementation of a MIS.

Standard costing in Public sector:

- ❖ In order to cost control in public sector (e.g. street cleaning refuse disposal and so on), regular variance analysis is required.
- ❖ Actual unit costs should be calculated on a monthly basis and compared with estimated unit cost.
- ❖ To achieve this comparison, information needs to be maintained about the unit of service adopted. For example, statistics would be maintained on the number of visits made and the number of hours worked.
- ❖ In this example, time recording may be beneficial in providing the detailed information necessary for variance analysis. Actual monthly costs should be taken from the organisation's financial management system and each month financial reports should be produced which offer an accurate image of budgeted vs actual expenditure.
- ❖ These reports are must for budgetary control. Actual expenditure reported on financial systems may require some modification to take account of:
 - Trade Payables (services used but bills unpaid)
 - Accruals (services used but bills yet to be received)
 - Timing Differences (some costs are not incurred evenly over the year)

Factors to be considered when investigating variances:

- ❖ **Size:** A standard is seen as an average of the estimates and therefore small variations seen from the standard should be ignored and not investigated further. In addition organizations can establish limits and the variances seen beyond those limits should be undertaken for further investigation.
- ❖ **Type of Variance :** Adverse variance is given more importance by the organization over favorable variances seen with regards to the estimates.
- ❖ **Cost:** The costs associated with the undertaking of the investigation should be lower than the benefits associated with the investigation of variances for the organization to undertake the said investigation.
- ❖ **Pattern in variance :** The variances need to be monitored over a period of time and if the variance of a particular cost is seen to be worsening over time then in that case the investigation in relation to the variance needs to be undertaken.
- ❖ **Budgetary process:** In case the budgetary process is uncontrollable and unrealistic then in that case the investigation should be re-evaluating the budgetary process rather than undertaking investigation of the variances.

Methods used for investigating variance:

- ❖ **Simple Rule of Thumb Model:** It is based on arbitrary criteria such as investigating if the absolute size of a variance is greater than a certain amount or if the ratio of the variance to the total cost exceeds some predetermined percentage. They are based on managerial judgement and do not consider statistical significance.
- ❖ **Statistical Decision Model:** For the statistical models, two mutually exclusive states are possible. First assumes that the system is 'In Control' and a variance is simply due to random fluctuations around the expected outcome. The second possible state is that the system is in some way 'Out of Control' and corrective action can be taken to remedy the situation. An investigation is undertaken when the probability that an observation comes from an 'In- Control' distribution falls below some arbitrarily determined probability level.
- ❖ **Statistical Control Charts:** Statistical quality control is used mainly for monitoring and maintaining of the quality of products and services, but within a standard costing framework, statistical control charts can be used to monitor accounting variances. For example, labour usage could be plotted on a control chart on an hourly basis for each project. This process would consist of sampling the output from a project and plotting on the chart the mean usage of resources per unit for the sample output.

Possible interdependence between variances: It is a term used to express the way in which the cause of one variance may be wholly or partially explained by the cause of another variance. For control purposes, it might therefore be essential to look at several variances together and not in isolation. Some examples of interdependence of variances are listed below

- ❖ Use of cheaper material which is poorer quality, the material price variance will be favourable, but this can cause more wastage of materials leading to adverse usage variance.

- ❖ Using more skilled labour to do the work will result in an adverse labour rate variance, but productivity might be higher as a result due to experienced labour.
- ❖ Changing the composition of a team might result in a cheaper labour mix (favourable mix variance) but lower productivity (adverse yield variance).
- ❖ Workers trying to improve productivity (favourable efficiency variance) in order to get bonus (adverse rate variance) might use materials wastefully in order to save time (adverse materials usage).
- ❖ Cutting sales prices (adverse sales price variance) might result in higher sales demand from customers (favourable sales volume variance).
- ❖ Similarly, favourable sales price variance may result in adverse sales volume variance

Causes of variances:**Material Price Variance**

- ❖ Might be caused due to the use of a different supplier.
- ❖ Order size can result in variance.
- ❖ Any form of unexpected increase in buying costs such as higher delivery charges.
- ❖ Efficiency or inefficiency associated with the buying procedure adopted.
- ❖ Lack of appropriate inventory control can result in emergency purchase of material resulting in adverse variance.

Material Usage Variance

- ❖ Purchase of inferior quality material.
- ❖ Implementation of better quality control.
- ❖ Increased efficiency in production can help in bringing down wastage rate.
- ❖ Changes made in the material mix.
- ❖ Careless way of handling material by production department.
- ❖ Change in method of production/ design.
- ❖ Pilferage of material from the production department.
- ❖ Poor inspection.

Labour Rate Variance

- ❖ Unexpected increase in the pay rate of labour.
- ❖ Level of experience of the labour can impact the direct cost of labour.
- ❖ Payment of bonuses added to the direct labour costs.
- ❖ Change in the composition of the workforce can impact direct labour costs.

Labour Efficiency Variance

- ❖ Improvement in work or productivity efficiency.
- ❖ Workforce mix can have an impact upon labour efficiency levels.
- ❖ Industrial action in relation to workforce.
- ❖ Poor supervision of the workforce.
- ❖ Learning curve effect upon the labour efficiency levels.
- ❖ Resource shortages causing an unexpected delay and lowering of labour efficiency levels.
- ❖ Using inferior quality of material.
- ❖ Introduction of new machinery resulting in improvement of labour productivity levels.

Overhead Variances

- ❖ Fixed Overhead Expenditure Variance (adverse) are caused by spending in excess of the budget.

- ❖ Fixed Overhead Volume Variance is caused by changes in production volume.
- ❖ Variable Overhead Expenditure Variance are often caused by changes in machine running costs.
- ❖ Variable Overhead Efficiency Variances- Causes are similar to those for a direct labour efficiency variance.

Sales Price Variance

- ❖ Higher discounts given to customers in order to encourage bulk purchases.
- ❖ The effect of low price offers during a marketing campaign.
- ❖ Poor performance by sales personnel.
- ❖ Market conditions or economic conditions forcing changes in prices across the industry.

Sales Volume Variance

- ❖ Successful or unsuccessful direct selling efforts.
- ❖ Successful or unsuccessful marketing efforts (for example, the effects of an advertising campaign).
- ❖ Unexpected changes in customer preferences and buying patterns.
- ❖ Failure to satisfy demand due to production difficulties.
- ❖ Higher demand due to a cut in selling prices, or lower demand due to an increase in sales prices.

Reporting of variances through variance reports:

Variance reports should give due regard to the following points :-

- ❖ The concerned executives should be informed about what the cost performance should have been.
- ❖ How close the actual cost performance is with reference to standard cost performance.
- ❖ The analysis and causes of variances.
- ❖ Reporting should be based on the principle of management by exception.
- ❖ The magnitude of variances should also be stated.

Behavioural issues:

- ❖ Variance analysis may encourage short-termism due to their inherent tendency towards short-term, quantified objectives and results.
- ❖ A negative perception of an organization's variance analysis process can also encourage other sub-optimal behaviour among employees such as attempts to include budget slacks.
- ❖ The behavioural issues connected with variance analysis could be managed by participating employees during budget setting so that they do not assess the procedure as biased. It is also vital for an organization's performance measurement system to be based on a extensive range of quantitative and qualitative measures so as to encourage management to adopt a long-term view that is aligned with an organization's strategic direction.

Standard costing in contemporary business environment: Standard costing is inappropriate in modern business environment due to the following:

- ❖ Products in these environments are non-standardized
- ❖ Variance reports may arrive too late to solve problems
- ❖ Standard costs become outdated quickly
- ❖ Variance analysis may not give enough detail

- ❖ Production is highly automated
- ❖ The emphasis is on continuous improvement so pre-set standards become less useful
- ❖ Modern environments often use ideal standards rather than current standards

Introduction:

1. Standard costing system reconciles budgeted profit and actual profit
2. Standard costing is also known as variance analysis because it analyzes the cost and sales variances into various components and fixes up the responsibility for variances
3. The variance is analyzed as:
 - a. Sales Variances
 - b. Cost variances
 - i. Material cost variances
 - ii. Labour cost variances
 - iii. Overhead cost variances
 1. Variable overhead variances
 2. Fixed Overhead Variances
4. If a variance increases actual profit it is called "favorable" (F) and if it decreases actual profits it is called "adverse" (A)

Understanding different costs:

1. Budgeted cost refers to the cost to be incurred for the budgeted output
2. Standard cost refers to the allowable cost for the actual output. In short standard cost is nothing but budgeted cost flexed to actual output.
3. Actual cost refers to the cost incurred by the company in producing the output
4. Cost variance is the difference between standard cost and actual cost and not the budgeted and actual cost

Fill the following:

Budgeted output = 20000 units Standard cost p.u = 20 Actual output = 12000 units and Actual cost = 2,88,000

1. Budgeted cost =
2. Actual cost =
3. Standard cost =
4. Cost variance =

Material Variances:

1. In order to compute the material variances we require the following information
 - a. Standard Quantity - This is the budgeted quantity flexed for actual output
 - b. Revised standard quantity - This is the total of the actual quantity apportioned in the standard mix. This is applicable only when there is more than one material
 - c. Actual quantity - Actual quantity used and this is normally directly given in the problem
 - d. Standard price - This is the budgeted price to be paid for procuring the material
 - e. Actual price - This refers to the actual price paid for procuring the raw materials
2. The objective of variance analysis is to fix responsibility and take corrective action wherever required. They are attention seekers rather than the problem solvers
3. Material variances compute the difference between the standard material cost and the actual material cost and fix the responsibility for the variances. The variance can either occur on account of quantity or price variances

Computation table for Material Variances calculation:

SP * SQ	SP * RSQ	SP * AQ	AP * AQ
Standard material cost			Actual Material cost

Note: In case there is only one material SP* RSQ is not to be computed as there cannot be mix variance and the variance computed are only cost, price and usage variance

Types of problems under material variances:

- Single material
- Multiple material

Labour Variances:

- In order to compute the labour variances we require the following information
 - Standard Hours – This is the budgeted hours flexed for actual output
 - Revised standard hours – This is the total of the actual hours worked (**not actual hours paid**) apportioned in the standard mix. This is applicable only when there is more than one grade of labour
 - Actual hours worked – This refers to the number of hours actually worked. AHW = Actual hours paid – Idle time
 - Actual Hours paid – This refers to the number of hours for which the company is paying. Actual hours worked and actual hours paid are different only when there is idle time because idle time refer to hours paid but not worked
 - Standard rate – This is the budgeted rate to be paid to the labour
 - Actual rate – This refers to the actual rate paid for using the labour
- Labour variances compute the difference between the standard labour cost and the actual labour cost and fix the responsibility for the variances. The variance can either occur on account of efficiency or rate variances

Computation table for labour Variances:

SR * SH	SR * RSH	SR * AHW	SR * AHP	AR * AHP
Standard labour cost				Actual labour cost

Types of problems under labour variances:

- Single labour without idle time (Column 2 & Column 4 are not applicable)
- Single labour with idle time (Column 2 is not applicable)
- Multiple labour without idle time (Column 4 is not applicable)
- Multiple labour with idle time (All columns are applicable)

Variable overhead Variances:

- In order to compute the Variable OH variances we require the following information
 - Standard Hours – This is the budgeted hours flexed for actual output
 - Actual Hours– This refers to the number of hours actually worked. It does not include idle time as it is assumed that the company does not incur variable overheads during idle time
 - Standard rate per hour – This is the budgeted rate to be incurred every hour and is calculated by dividing the budgeted hours from budgeted variable overheads. {SR. per hour = Budgeted VOH / BH}
 - Actual rate per hour – This refers to the actual rate incurred on variable overheads
- VOH variances compute the difference between the standard VOH cost and the actual VOH cost and fix the responsibility for the variances. The variance can either occur on account of efficiency or rate variances

Computation table for VOH Variances:

SR * SH	SR * AH	AR * AH
Standard VOH cost		Actual VOH Cost

Conversion factor when information on output is given but hours not directly available:

- $SR/\text{per hour} * SH = SR/\text{per unit} * AO$
- $SR/\text{per hour} * AH = SR/\text{per unit} * SO$

Note:

- $SR/\text{per unit} = \text{Budgeted VOH} / \text{Budgeted units}$
- **Logic behind conversion:** The standard hours are always calculated with the help of the actual output and hence they standard hours are equated to actual output.

Fixed overhead Variances:

- In order to compute the Fixed OH variances we require the following information
 - Actual output or standard hours
 - Actual Hours or standard output
 - Standard rate per hour – This is the budgeted rate to be incurred every hour and is calculated by dividing the budgeted hours from budgeted variable overheads. $\{SR. \text{ per hour} = \text{Budgeted FOH} / BH\}$
 - Actual rate per hour – This refers to the actual rate incurred on fixed overheads
 - Possible FOH = $BFOH * AD/BD$

Computation table for FOH Variances:

AO * SR	AFOH	BFOH	AH * SR	PFOH
FOH absorbed	FOH incurred			

FOH ratios:

- Volume or activity ratio = $\text{Standard hours} / \text{Budgeted hours} * 100$
- Efficiency ratio = $\text{Standard hours} / \text{actual hours} * 100$
- Capacity ratio = $\text{Actual hours} / \text{Possible hours} * 100$
- Calendar ratio = $\text{Possible hours} / \text{Budgeted hours} * 100$

Sales Variances:

- In order to compute the sales variances we require the following information
 - Budgeted Quantity – This is the budgeted quantity expected to be sold at the beginning of the period
 - Revised budgeted quantity – This is the total of the actual quantity apportioned in the standard mix. This is applicable only when there is more than one material
 - Actual quantity – Actual quantity sold and this is normally directly given in the problem
 - Budgeted price – This is the price at which the product was expected to be sold at the beginning of the period
 - Actual price – This refers to the price at which the products are actually sold.

Computation table for Sales Variances calculation:

BP * BQ	BP * RBQ	BP * AQ	AP * AQ
Budgeted sales			Actual sales

Note: In case there is only one material BP* RBQ is not to be computed as there cannot be mix variance and the variance computed are only total sales, price and volume variance

Margin approach:

The above indicated method is called as total approach which finds out the impact on the topline and margin approach is used to find the impact on the bottom-line. Here BP is replaced with BM and AP is replaced with AM and the calculation for BM and AM is provided below:

- Absorption costing: $BM = SP - SC$ & $AM = AP - SC$ (not actual cost)
- Marginal costing: $BM = SP - SVC$ & $AM = AP - SVC$ (not actual VC)

Marginal Costing vs. absorption costing:

1. Stocks are valued at cost and those costs that are considered for stock valuation are called product costs and others are called period costs.
2. Period costs expires fully in the current accounting period whereas product cost expires only to the extent of COGS; and remains unexpired to the extent of closing stock (i.e.) credited in this year's account and carried forward to the next year
3. All non-manufacturing costs are period costs and in marginal costing system fixed manufacturing costs is also called period costs.
4. In Marginal costing system stock is valued at variable manufacturing cost whereas in absorption costing system, stock is valued at full manufacturing cost (including fixed manufacturing cost)
5. For calculating fixed cost per unit absorption costing system uses pre-determined rates or standard rates. $\text{Pre-determined rate / unit} = \text{BFO/BO}$. For denominator consider normal activity or capacity. In absence of details use 100% capacity as denominator
6. Due to use of pre-determined rates the fixed OH charged to cost or production will be $AO \times SR$. This is called absorbed OH.
7. When the actual OH is different from absorbed OH we would have under/over absorption which needs to be adjusted while calculating absorption costing profit.
8. In absence of info we can assume BFOH to be same as AFOH.

Income statement under marginal costing:

Particulars	Amount
Sales	XXX
Less: Variable manufacturing cost of goods sold:	
- Opening stock (VMC) XXX	
- Add: Variable cost of production XXX	
- Less: Closing stock (VMC) (XXX)	(XXX)
Gross contribution	XXX
Less: Variable administration and selling OH	(XXX)
Contribution	XXX
Less: Fixed manufacturing, admin & selling exp	(XXX)
Profit	XXX

Income statement under absorption costing:

Particulars	Amount
Sales	XXX
Less: COGS	
- Opening stock (FMC) XXX	
- Add: Cost of production XXX	
- Less: Closing stock (FMC) (XXX)	(XXX)
Gross Profit	XXX
Less: Admin & selling exp	(XXX)
Less: Under/over absorption of OH	(XXX)
Profit	XXX

Reconciliation:

1. Reconciliation statement is prepared in order to reconcile the budgeted profit as against the actual profit earned by the company
2. Following are the various approaches for profit reconciliation:
 - a. Budgeted profit to actual profit – Absorption costing system
 - b. Standard profit to actual profit – Absorption costing system
 - c. Budgeted profit to actual profit – Marginal costing system
 - d. Standard profit to actual profit – Marginal costing system

Reconciliation statement under various approaches:**Budgeted profit to actual profit – Absorption costing system**

<u>Particulars</u>	<u>Amount</u> <u>Favorable variance</u>	<u>Amount</u> <u>Adverse variance</u>	<u>Amount</u>
Budgeted profit			XXX
Material price variance	XXX	XXX	
Material mix variance	XXX	XXX	
Material yield variance	XXX	XXX	
Labour rate variance	XXX	XXX	
Labour mix variance	XXX	XXX	
Labour revised eff. Variance	XXX	XXX	
VO Expenditure variance	XXX	XXX	
VO Efficiency variance	XXX	XXX	
FO Expenditure variance	XXX	XXX	
FO Capacity variance	XXX	XXX	
FO calendar variance	XXX	XXX	
FO Efficiency variance	XXX	XXX	
Sales Margin price variance	XXX	XXX	
Sales Margin qty variance	XXX	XXX	
Sales Margin mix variance	XXX	XXX	
Actual profit			XXX

Standard profit to actual profit – Absorption costing system

<u>Particulars</u>	<u>Amount</u> <u>Favorable variance</u>	<u>Amount</u> <u>Adverse variance</u>	<u>Amount</u>
Budgeted profit			XXX
Less: Sales volume variance			XXX
Standard profit			XXX
Material price variance	XXX	XXX	
Material mix variance	XXX	XXX	
Material yield variance	XXX	XXX	
Labour rate variance	XXX	XXX	
Labour mix variance	XXX	XXX	
Labour revised eff. Variance	XXX	XXX	
VO Expenditure variance	XXX	XXX	
VO Efficiency variance	XXX	XXX	
FO Expenditure variance	XXX	XXX	
FO Capacity variance	XXX	XXX	
FO calendar variance	XXX	XXX	
FO Efficiency variance	XXX	XXX	
Sales Margin price variance	XXX	XXX	
Sales Margin qty variance	NA	NA	
Sales Margin mix variance	NA	NA	
Actual profit			XXX

Budgeted profit to actual profit - Marginal costing system

<u>Particulars</u>	<u>Amount</u> <u>Favorable variance</u>	<u>Amount</u> <u>Adverse variance</u>	<u>Amount</u>
Budgeted profit			XXX
Material price variance	XXX	XXX	
Material mix variance	XXX	XXX	
Material yield variance	XXX	XXX	
Labour rate variance	XXX	XXX	
Labour mix variance	XXX	XXX	
Labour revised eff. Variance	XXX	XXX	
VO Expenditure variance	XXX	XXX	
VO Efficiency variance	XXX	XXX	
FO Expenditure variance	XXX	XXX	
FO Capacity variance	NA	NA	
FO calendar variance	NA	NA	
FO Efficiency variance	NA	NA	
Sales Margin price variance	XXX	XXX	
Sales Margin qty variance	XXX	XXX	
Sales Margin mix variance	XXX	XXX	
Actual profit			XXX

Standard profit to actual profit - Marginal costing system

<u>Particulars</u>	<u>Amount</u> <u>Favorable variance</u>	<u>Amount</u> <u>Adverse variance</u>	<u>Amount</u>
Budgeted profit			XXX
Less: Sales volume variance			XXX
Standard profit			XXX
Material price variance	XXX	XXX	
Material mix variance	XXX	XXX	
Material yield variance	XXX	XXX	
Labour rate variance	XXX	XXX	
Labour mix variance	XXX	XXX	
Labour revised eff. Variance	XXX	XXX	
VO Expenditure variance	XXX	XXX	
VO Efficiency variance	XXX	XXX	
FO Expenditure variance	XXX	XXX	
FO Capacity variance	NA	NA	
FO calendar variance	NA	NA	
FO Efficiency variance	NA	NA	
Sales Margin price variance	XXX	XXX	
Sales Margin qty variance	NA	NA	
Sales Margin mix variance	NA	NA	
Actual profit			XXX

Few equations between various variances:

1. **Absorption costing approach:** Sales Margin volume variance = Total sales volume variance * NP Ratio
2. **Marginal costing approach:** Sales margin volume variance = Total sales volume variance * PVR
3. **Marginal costing approach:** Sales margin volume variance = Sales margin volume variance under absorption costing + FOH Volume variance
4. Budgeted profit under absorption costing = Budgeted units * Budgeted profit per unit
5. Standard profit under absorption costing = Actual units * Budgeted profit per unit

6. Budgeted profit under marginal costing = Budgeted units * Budgeted cont. per unit – Budgeted Fixed Overheads
7. Standard profit under marginal costing = Actual units * Budgeted cont. per unit – Budgeted Fixed overheads

Partial plan vs. single plan of recognizing variances:

Partial Plan	Single Plan
Raw material stock valued at actual cost and WIP and FG valued at standard cost	All the 3 stocks are valued at standard cost
WIP account debited with actual cost	WIP account debited with standard cost
All variances originate from WIP accounts	All variances originate from their respective accounts
Material price variance computed at the time of consumptions	Material purchase price variance computed at the time of purchase
AQ for price variance means AQ consumed	AQ for price variance means AQ purchased

Single Plan and partial plan accounting:

- In partial plan accounting the WIP is first debited with actual cost and thereafter the variance are debited or credited. When the variances are adjusted the WIP value is brought to the standard cost.
- In single plan accounting the WIP is debited with the standard cost and the variances are adjusted in the respective ledger accounts.

Journal Entries (all entries are made assuming adverse variances. In case the variance is favorable then it will be the reverse entry)

Transaction	Single	Partial
Purchase of RM	RM Control A/c MPV A/C To GL Adjustment A/c	RM Control A/c To GL Adjustment A/c
Issue of raw material to stores	WIP Control A/c MUV A/c To RM Control A/c	WIP Control A/c To RM Control A/c
Recognition of MPV and MUV	Already recognized	MPV A/c MUV A/c To WIP Control A/c
Disposal of MPV and MUV	Costing P & L A/c To MPV A/c To MUV A/c	Costing P & L A/c To MPV A/c To MUV A/c
Payment of wages	Wages control A/c LRV A/c To GL Adjustment A/c	Wages control A/c To GL Adjustment A/c
Transfer of wages to WIP	WIP Control A/c LEV A/c To Wages Control A/c	WIP Control A/c To Wages Control A/c
Recognition of LRV and LEV	Already recognized	LRV A/c LEV A/c To WIP Control A/c
Disposal of LRV and LEV	Costing P& L A/c To LRV A/c To LEV A/c	Costing P& L A/c To LRV A/c To LEV A/c

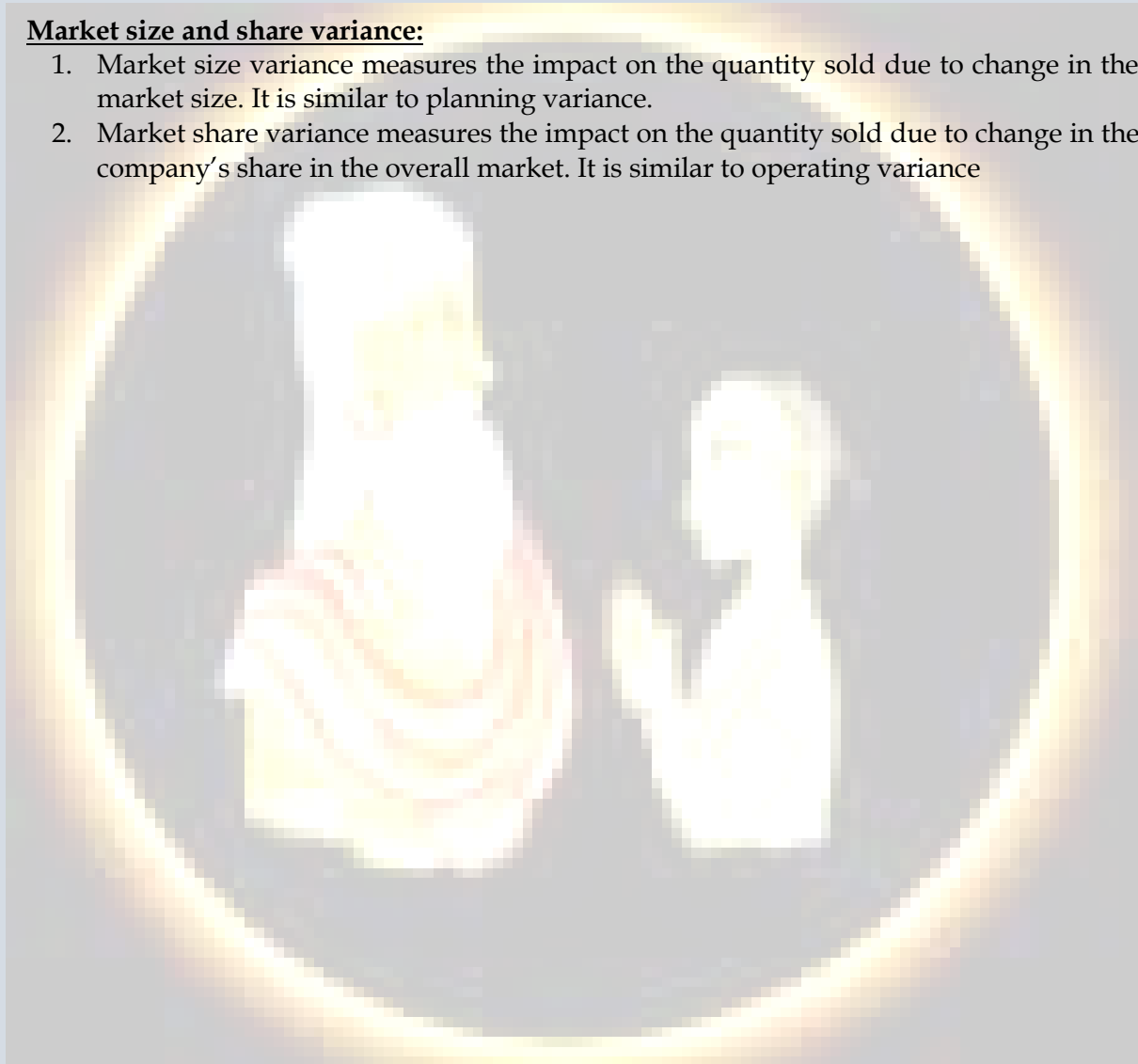
Note: Similar entries are to be recorded for overheads

Planning and operating variances:

1. When the scenario at the time of implementing the budget has drastically changed as compared to the prevailing during budget preparation to properly measure the performance, the company should revise the budget.
2. The difference between the original and revised budget is called as PLANNING variances and the difference between the revised and actual is called as OPERATING variances.
3. The responsibility should be fixed only for the operating variances.
4. While calculating planning variances, standard means original budget and actual means revised budget; For operating variances standard means revised budget and actual means actual performances

Market size and share variance:

1. Market size variance measures the impact on the quantity sold due to change in the market size. It is similar to planning variance.
2. Market share variance measures the impact on the quantity sold due to change in the company's share in the overall market. It is similar to operating variance



Meaning of LPP:

A Linear Programming Problem (LPP) is a mathematical model dealing with the use or allocation of certain scarce resources (i.e. key factor like raw materials, labour hours, machine time, capital availability etc.) in the best possible manner in order to maximize profit or minimize cost.

Methods of solving LPP:

Method	Condition for applicability
Graphical Method	Number of variables should be Two (since there are only two axes x and y on the graph sheet). Any number of constraints / inequalities are permitted, but the feasible region may not be easily identified if numerous constraints are introduced
Trial and Error Method	Number of variables = Number of constraints. For example, two equations in two variables can be solved. However, as more variables and constraints are introduced, solving algebraic equations may become comparatively difficult
Simplex Method	No restrictions as to number of variables and constraints

Steps involved in simplex method:

Step 1: Objective: Determine the objective function (denoted by Z). (either maximisation or minimisation)

Step 2: Constraints: List the constraints applicable for the objective. For maximisation objective, atleast one constraint should bear $\leq$ sign. For minimization objective, atleast one constraint should bear $\geq$ sign.

Step 3: Conversion of inequalities into equalities: Convert inequalities into equalities as below:

Particulars	Slack Variable	Surplus variable	Artificial variable
Meaning	Idle or unused resources	Excess amount of resources utilized	No physical or economic meaning. It is fictitious.
When used	' $\leq$ ' inequality	' $\geq$ ' inequality	' $\geq$ ' and ' $=$ ' constraints
Co-efficient in the constraint	+1	-1	+1
Co-efficient in the objective function	0	0	+M for minimisation and -M for maximisation
Used as initial program variable	Used as starting point (initial table)	Cannot be used since unit matrix condition is not satisfied	Initially used but later eliminated
Presence in the optimal table	Helps to interpret idle & key resources	-	Indicates "No feasible" solution

Step 4: Revised objective: Redraft the objective function by including the variable in this order –

- Regular variables as given in the objective
- Slack variables with zero co-efficient
- Surplus variable with zero co-efficient and

(d) Artificial variables with +M for minimization and -M for maximisation

Step 5: Initial table: The format of the table is as under:

Fixed Ratio	Program Variable	Profit / cost	Quantity	Variables column				Replacement ratio
				A	B	S ₁	S ₂	
	Row 1							
	Row 2 etc.							
			Z					
			C					
			NER = Z - C					

Notes:

- Select slack variables as initial program variable. In case of minimization objective, slack and artificial variables constitute the initial program, forming a unit matrix of co-efficients.
- Fill up profit/cost of the program variable as per objective function
- Fill up quantity = RHS of constraints
- Fill-up co-efficients of various variables as per the constraints, in the respective columns
- Fill up values of Z against each variable as per objective function
- Compute C = Profit/cost * co-efficient of each variable
- Compute net evaluation row (NER) = Z - C
- Select maximum positive NER (Z - C) for maximisation objective and circle key column. Corresponding variable is the incoming variable. In case of minimisation objective, select worst negative NER
- Compute replacement ratio = Quantity / key column element
- Select minimum non-negative replacement ratio and circle key row. In case RR = 0, it shall be selected as minimum non-negative. In case of tie, arbitrary selection shall be made
- Identify pivot element. Junction of key row and key column is called as pivot element
- Fixed ratio is not applicable for key row. For other rows (non-key rows), Fixed ratio is calculated as = Key column element / pivot element
- Determine replacement decision: (a) Incoming variable = key column and (b) Outgoing variable = key row.

Step 6: Second and subsequent table:

- Fill up program variables by replacement decision as per earlier table
- Fill up profit/cost of the program variables based on objective function
- Update key rows by the transformation rule, previous table key row element / pivot element
- Update non-key rows by the transformation rule = (Previous table corresponding row element) Less (Key row element * fixed ratio)
- Fill up values of Z against each variable, as per objective function
- Compute C = Profit * Co-efficient of each variable
- Compute NER = Z - C
- Repeat the selection and reallocation procedure till all $Z-C \leq 0$ for maximization, and all $Z-C \geq 0$ for minimization objective

Procedure for minimisation objective:

- Introducing surplus variables, the constraint functions are to be re-written

- However, since these variables when introduced as initial program, violate the non-negativity assumption, artificial variables “M” of heavy cost (close to infinity) are introduced and the constraints and objective function are re-written
- Initial program is commenced using artificial variables only (since it satisfies the unit matrix condition)
- An artificial variable once eliminated (i.e. selected as key row) will never re-enter the simplex table in the subsequent iterations
- If artificial variable exists in the optimal table the solution is not optimal. There is no feasible solution for that case.

Treatment in special cases:

Situation	Treatment
Degeneracy	• It occurs if there is a tie in the minimum non-negative replacement ratio • In case of degeneracy, the outgoing variable should be selected on an arbitrary basis • The variable not selected as outgoing, will bear “0” in the quantity column in the subsequent table
Equality Constraints	• Artificial variable is introduced to the constraint
Multiple optimal solutions	• For any optimal solution, $NER = 0$ for all program variables • LPP is said to have alternative solutions if in the optimal table, a non-program variable has $NER = 0$ • The alternative solutions can be obtained by identifying such non-program variable (bearing $NER = 0$) as the incoming variable
No feasible solution	• Artificial variable, once eliminated, should not re-enter subsequent iterations (tables) • If artificial variable persists in the “optimal” table, there is no feasible solution
Unbounded solution	• Outgoing variable is selected on the basis of minimum non-negative replacement ratio • If all replacement ratios are negative, the outgoing variable cannot be identified • The LPP is said to have unbounded solution in such cases, when all RR are negative.

Learning curve:

“Learning curve is a geometrical progression, which reveals that there is steadily decreasing cost for accomplishment of a given repetitive operation, as the identical operation is increasingly repeated. The amount of decrease will be less and less with successive unit produced. The slope of the decision curve is expressed as a percentage. The other names given to learning curve are experience curve, improvement curve and progress curve”.

Learning curve equation:

Mathematicians have been able to express relationships in equations. The basic equation is

$$y = ax^b$$

Where:

- y = Average time per unit for x units
- a = Time required for first unit
- x = Cumulative number of units produced
- b = Learning co-efficient

Learning curve ratio:

In the initial stage of a new product or a new process, the learning effect pattern is so regular that the rate of decline established at the outset can be used to predict labour cost well in advance. The effect of experience on cost is summarized in the learning ratio or improvement ratio.

$$\text{Learning ratio} = \frac{\text{Average labour cost of first } 2N \text{ units}}{\text{Average labour cost of first } N \text{ units}}$$