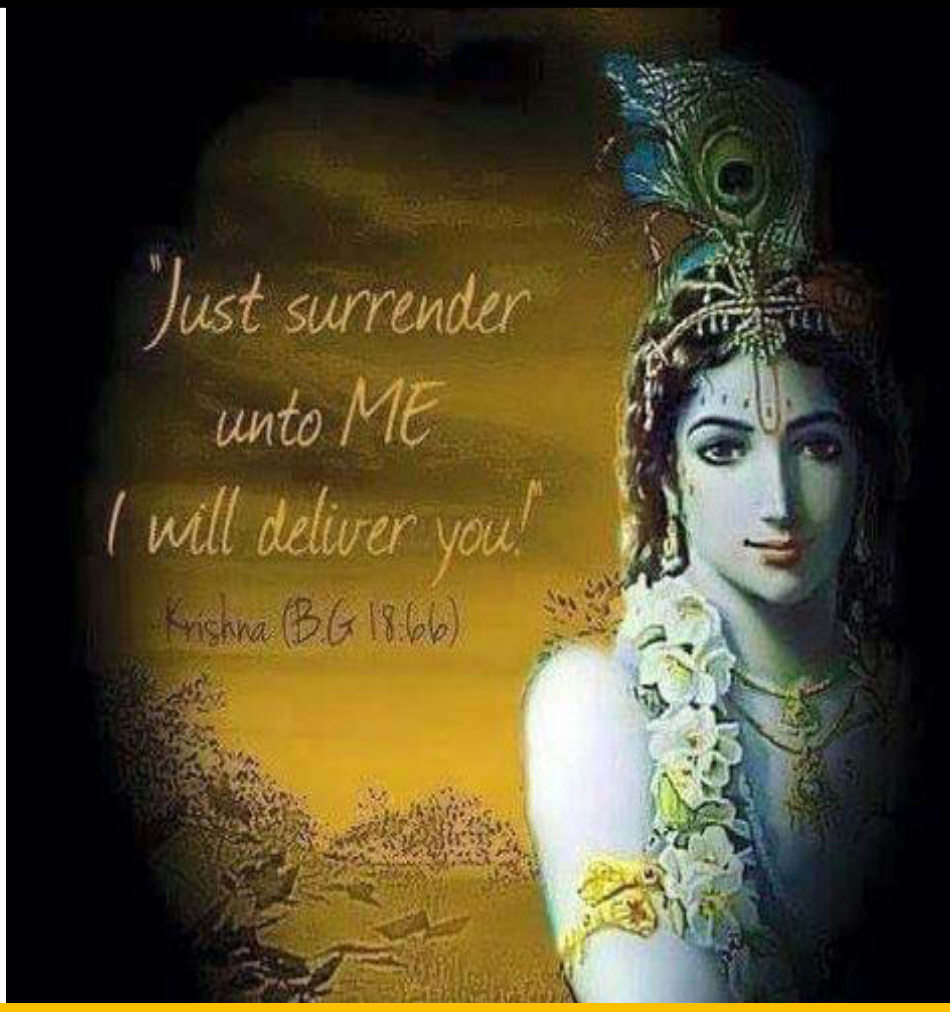
AIR1CA CAREER INSTITUTE

CA FINAL

PAPER 5 : SCMPE

CONCEPT NOTES

(Relevant for **NOV 2023** examination onwards)



These Concept Notes are prepared by **CA ATUL AGARWAL (AIR-1)**. All concepts of CA Final SCMPE are covered in **197 pages**. Refer these Notes alongwith the Question Bank and Lectures/Free Revision Videos.

Reach out to us at following for Classes, Mock Tests, Notes and Guidance:-

- **Telegram Channel** – AIR1CA Guidance & Notes
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- **Call/Whatsapp** – 7742554277
- **Youtube** – Atul Agarwal
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Best Wishes… Radhe Radhe!!

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Cost

Any Monetary Amount Spent to Produce/Achieve Something

Elements of Cost

- Material → Direct Material | Indirect Material
- Labour → Direct labour | Indirect labour
- Expenses → Direct Expenses | Indirect Expenses

Direct Expenses + Direct Material + Direct labour = Prime Cost (Always Variable)

Indirect Expenses + Indirect Material + Indirect labour = Overheads → Variable / Fixed

Overheads:
- Factory / Works / Production / Manufacturing OH
- Administration OH
- Selling & Distribution OH

Variable Cost and Fixed Cost

Variable Cost : That Change/Vary with Change in Level of Output
Fixed Cost : That does not Change with Change in level of Output → Total

Example

Per Production (Units)	Variable Cost P.u.	Variable Cost Total	Fixed Cost P.u.	Fixed Cost Total
Current = 10,000 units	5	50,000	2.4	24000
Increase = 12,000 units	5	60,000	2	24 000
Decrease = 8,000 units	5	40,000	3	24000

Production	Variable Cost P.u.	Variable Cost Total	Fixed Cost P.u.	Fixed Cost Total
Increase	Same	Change	Change	Same
Decrease	Same	Change	Change	Same

...crease

Same Change Change Same

⇓ ⇓

May Change May Change

→ Inflation → Inflation

→ Output Substantially Increase → Output Substantially Increase

Semi Variable Cost

Example

	Production	Electricity Expenses [Rs]	P.u.
Case I	1,00,000 Units	5,00,000	5
Case II	1,50,000 Units	6,00,000	4

⇓ Total Not same ⇓ P.u. Not Same

⇓ Divide it into Variable & Fixed Cost

Conversion of Semi Variable Cost into Variable & Fixed Cost

$$VC = \frac{\text{Change in Expenses}}{\text{Change in Units}}$$

$$FC = \text{Total Semi Variable Cost} - \text{Variable Cost}$$

In above Example

$$VC = \frac{6,00,000 - 5,00,000}{1,50,000 - 1,00,000} = \text{Rs } 2 \text{ p.u.}$$

FC

Case I = 5,00,000 − [1,00,000 units × 2] = 3,00,000

Case II = 6,00,000 − [1,50,000 units × 2] = 3,00,000

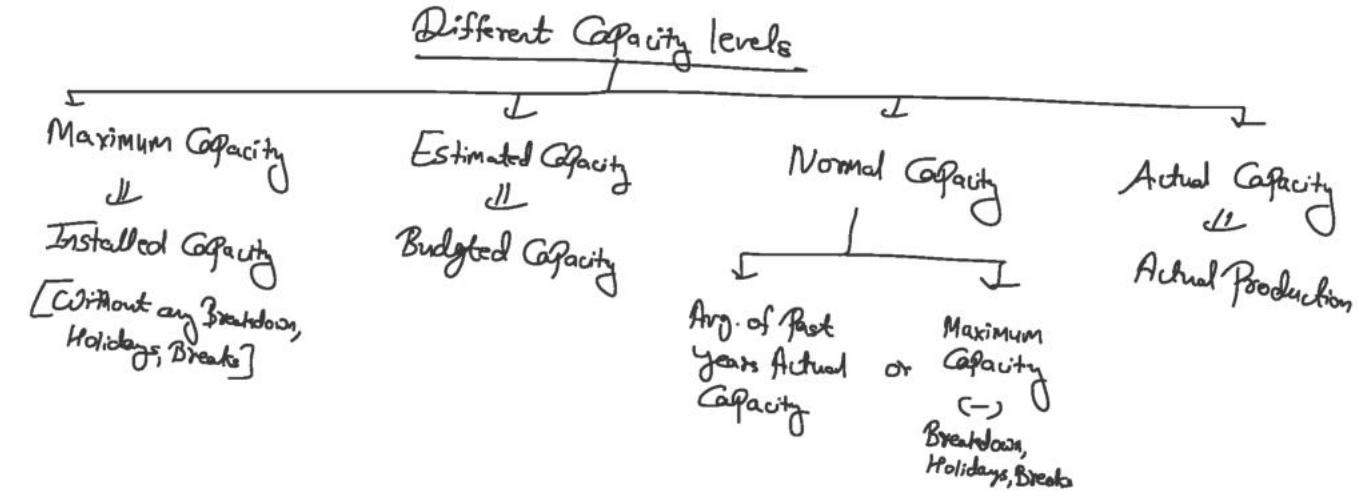
Variable Cost = Prime Cost + Variable Overhead

Fixed Cost = Fixed Overhead

Total Cost

VO ≠ VC
FO = FC

Fixed Cost Calculation → Per Unit and Total



Example 1

A Ltd. → Calculator Mfg. ⇒ Max. Capacity 10,000 units ✗ | Estimated Capacity 9,000 units ✗ | Normal Capacity 6,000 units | Actual Capacity 4,000 units ✗

⇓

Total Fixed Cost

⇓

6,00,000

S.P. of Calculator

VC	40
FC	100
TC	140
(+) Profit 20%	28
SP	168

[6,00,000 / 6000 ⇓ Normal Capacity]

Example 2

Tours & Travels → Bus From Jaipur to Kashmir ⇒ Max. | Estimated | Normal | Actual

⇓

Tours & Travels → Bus from Jaipur to Kashmir ⇒ Max. | Estimated | Normal | Actual

50 Seats | 2 Seats | 40 Seats | 30 Seats

Total Fixed Cost = 1,00,000

$\left(\frac{1,00,000}{40}\right)$ → Normal Capacity

FC = 2500 P.u.

Fixed Cost Conversion/Calculation → P.u. and Total

→ By Normal Capacity

→ If Normal Capacity is not given, then Use Estimated Capacity

→ If Normal and Estimated Capacity is not given, then Use Actual Capacity

→ If Normal, Estimated and Actual Capacity is not given, then Use Maximum Capacity

Marginal Cost Sheet [Costing P&L]

		P.u.	Total
Sales	⇒ By Actual or Estimated Capacity	XX	XX
(−) Variable Cost		(XX)	(XX)
Contribution		XX	XX
(−) Total Fixed Cost		−	(XX)
Profit		−	XX

Verification

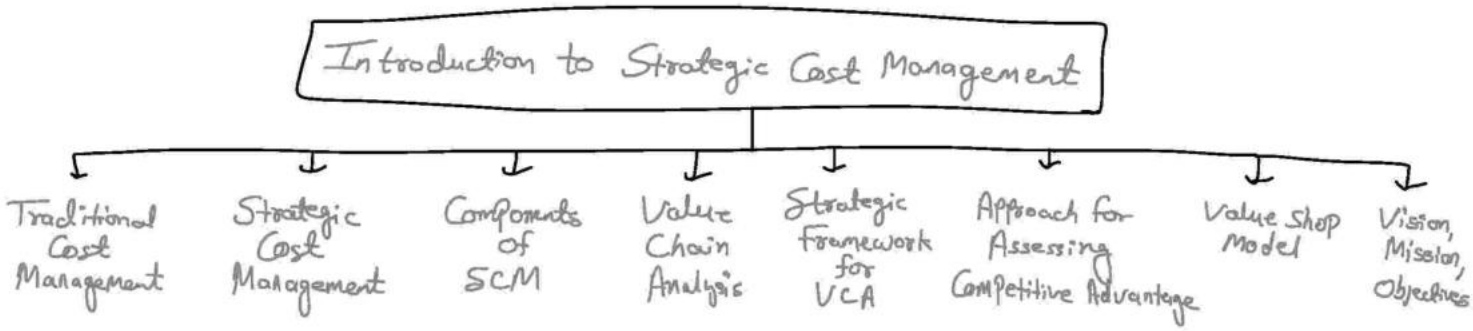
Sales − Total Cost = Profit

Sales − [VC + FC] = Profit

[Sales − VC] − FC = Profit

⇓

Contribution − FC = Profit



Traditional Cost Management

① Meaning & Basics

- It involves allocation of Cost & Overheads to the Production for Cost determination
- Involves Comparison of Actual with Budget, then analysing and Controlling the Variances
- Focus on Cost Control or Reduction
- Objective to reduce Cost and earn better Profit

② Limitations of Traditional Cost Management

LIER²S

- Short Term Outlook
- Reactive Approach
- Excessive Focus on Cost Reduction leads to inferior quality of Products & Services
- Ignores External Factors such as Competition, Market & Customer Requirements
- Rely on Accounting data which can be misleading
- Limited Focus on Review & Improvisation

Strategic Cost Management

① Meaning & Basics

- Application of Cost Management Techniques to Improve Strategic Position of

- Application of Cost Management Techniques to Improve Strategic Position of business as well as Control Cost
- Main aim is to achieve Competitive Advantage through → Product Differentiation or Cost Leadership

(2) Traditional v/s Strategic Cost Management

Basis of Difference	TCM	SCM
(i) Time	Short Term Concept	Long Term Concept
(ii) Focus	Internal	Both Internal & External
(iii) Cost Driver Concept	Based on Volume	Seprate Cost Driver based on Activity
(iv) Objective	Score keeping	Cost Leadership or Product Differentiation
(v) Cost Reduction	Primary Objective	Cost Reduction along with Value Improvement
(vi) Approach	Risk Averse	Risk Taking

FOCCAT

Components of Strategic Cost Management

- Strategic Positioning Analysis
- Cost Driver Analysis
- Value Chain Analysis

Strategic Positioning Analysis

- Analyse Present Position of Organisation
- What will be desired Future Position of Organisation and Making of Plans to achieve that Position

and
Making of Plans to achieve that Position

Cost Driver Analysis

- Traditional → Based on Volume
- SCM → Based on Activity
  - Structural Cost Driver
  - Executional Cost Driver

Example

Total Overheads = 10,00,000

Product A = 60,000 units
Product B = 40,000 units

Product A = 2 hrs. P.u. ⇒ 1,20,000 hrs
Product B = 1 hr. P.u. ⇒ 40,000 hrs
1,60,000 hrs.

TCM

OH Rate [units] = $\frac{10,00,000}{1,00,000 \text{ units}}$ = 10 P.u.
- A [60,000 × 10] = 6,00,000
- B [40,000 × 10] = 4,00,000

OH Rate [Hrs.] = $\frac{10,00,000}{1,60,000 \text{ hrs}}$ = 6.25 Per hr.
- A [1,20,000 × 6.25] = 7,50,000
- B [40,000 × 6.25] = 2,50,000

SCM

Total OH = 10,00,000
- Advertising = 2,00,000
- Machine Related = 4,00,000
- Batch Related = 4,00,000

	A	B
Advertising	80%	20%
Machine Hrs.	1,20,000 hrs.	40,000 hrs.
Batches	500 batch	500 batch

	A	B
Advertising	1,60,000	40,000
Machining	3,00,000	1,00,000
Batch	2,00,000	2,00,000
	6,60,000	3,40,000

Value Chain Analysis

Value Chain → All Activities Performed by Firm

Value Chain Analysis → Identify Activities → Value Added → Special Focus
→ Non Value Added → Eliminate

① Meaning & Basics

- Idea of Value Chain was suggested by Michael Porter
- Porter describe Value Chain as "Internal Processes or Activities that a Company Performs to Design, Produce, Market, Deliver or to Support its Product
- Value Chain Analysis is a Process by which Firm
  - → Identify & Analyse Various Activities that add Value to the Final Product
  - → Identify those Activities which do not add Value to the Final Product and eliminate those non Value adding activities

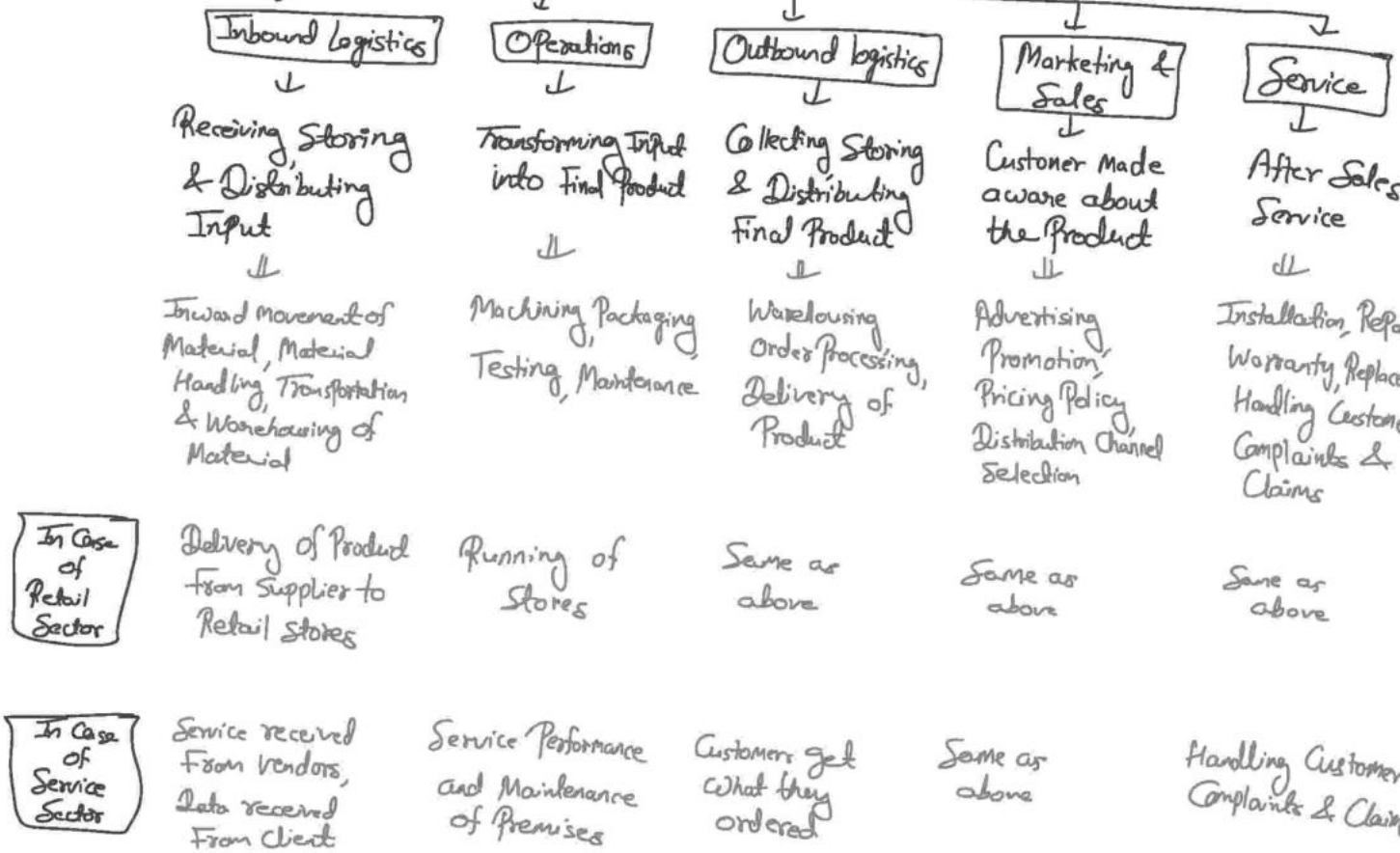
② Various Activities undertaken by Firm Can be divided into

Primary Activities
⇓
Activities directly involved in Transforming Input into Output & Service thereafter

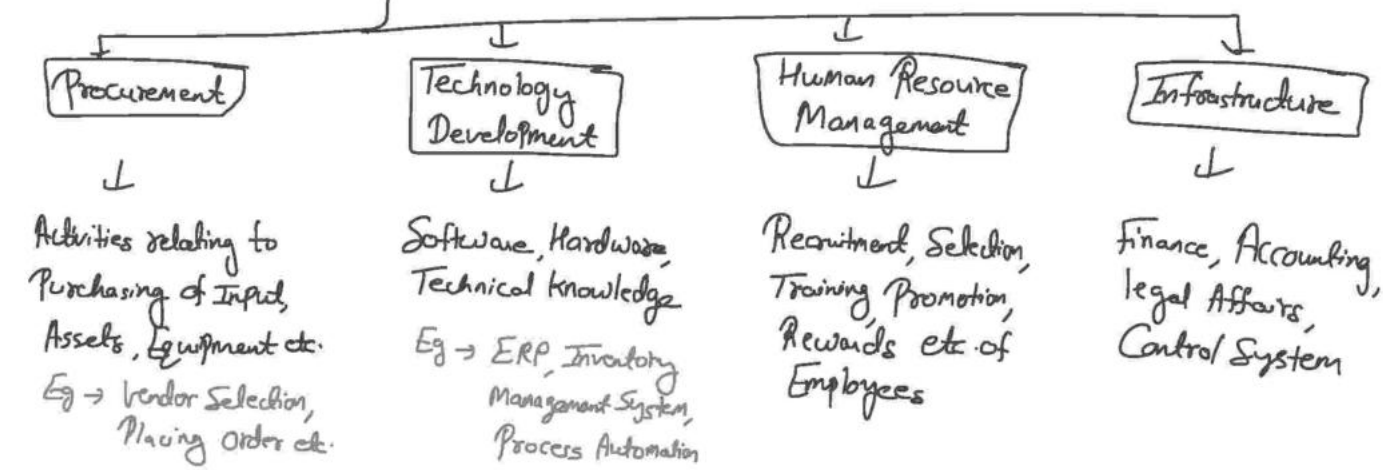
Secondary | Support Activities
⇓
Activities that support Primary Activities at all levels

& service thereafter

Primary Activities Includes



Secondary | Support Activities Includes



(3) Benefits of Value Chain Analysis

(3) Benefits of Value Chain Analysis

- It helps in eliminating Non Value Added Activities and helps in Creating Special Focus on Value Added Activities thereby achieving Cost Leadership or Product Differentiation
- It assist in determining best ways for developing higher level Competitive Performance
- It helps in focusing Core Areas of Business
- It also facilitate the development of Performance Matrix

PC 3

(4) Limitations/Criticisms of Value Chain Analysis

- It Cannot be easily applies to firms belonging to Service Industry
- Often, it can be Complicated and Create Frustration for Management of Firm
- It is Time Consuming and Expensive as a whole
- It has a Linear Approach and ignores the Concept of Value Networks

Linear CST

Strategic Framework for Value Chain Analysis

- Industry Structure Analysis
- Segmentation Analysis
- Core Competencies Analysis

Industry Structure Analysis

- Also known as Porter's Five forces Analysis
- Used to check whether Industry is Profitable or not
  - To take decision of entering into Industry
  - To Assess Competitive Environment of Existing Business/Industry

... Competitive Environment of Existing Business/Industry

- Factors which influence Profitability | Porter Five forces

Bargaining Power of Buyers

Ability of Buyers to Push down Price of Product/Service

High When
- → Volume Purchased is very high
- → Many options Available [Standardised Product]
- → Small Number of Buyers

High BPB = Low Profit

Bargaining Power of Suppliers

Ability of Suppliers to dictate any Price for Input

High When
- → Very few Suppliers of Input
- → Short Supply
- → High Importance of Product
- → No Substitution

High BPS = Low Profit

Threat of Substitute Products/Services

More Substitute → Low Price → Low Profit

Less Substitute → High Price → High Profit

Threat of New Entrants

Depends on barriers to Industry
eg → Capital Requirement, legal factors, Licenses, Technology Authorisation

High Barriers → High Profit

Low Barriers → Low Profit

Intensity of Competition/Rivalry among Firms

High When
- Industry has higher no. of firms
- High Exit Barriers

High Competition = Low Profit

Segmentation Analysis

- Identify Segmentation Variables & Categories → Product/Geographic/Customer
- Construct a Segmentation Matrix
- Analyse Segment attractiveness and key success factors
- Analyse attractiveness of broad v/s narrow segment scope

Core Competencies Analysis

- It Means unique skill that creates distinctive Customer Value as Compared to Competitors
- It Comes from resources and Capabilities
- It is a Primary Source of Organisation Competitive Advantage → Advantage Over Competitors

Differentiation Advantage → Product Differentiation / Differentiation Strategy

Low Cost Advantage → Cost Leadership / Low Cost Strategy

Product Differentiation / Differentiation Strategy

- Customer Percieve Product / Service offered by busines as Superior to Others
  eg → Apple, Dove, Havells, Sleepwell, Big 4
- It enables to Charge Premium Price for Product / Service
- Achieved by
  - → Superior Quality
  - → Superior Innovation
  - → Superior Customer Responsiveness i.e. Timely Delivery, Low Waiting Time etc.
- Risk in Differentiation Strategy
  - → Works only when Customers are not Price Sensitive
  - → Competitors can replicate design and features of your Product

Cost Leadership / Low Cost Strategy

- When Total Cost of Product / Service is lower than Competitors without affecting quality
  eg → Jio, Dmart, Indigo
- It enables to Charge Low Price than Competitors to gain Market Share
  and
  Charge Similar Prices in future & Increase Profit
- Achieved by
  - → Reduce Cost by Substitute Supplier, Resources
  - → Increase Productivity [Economies of Scale]
  - → High Volume Purchase to get bulk discounts

→ High Volume Purchase to get bulk discounts
→ Government Support
→ Learning Curve Benefits

- Risk in Low Cost Strategy
  → Competitors can also lower Cost and Price
  → Quality can also be affected

Focus Strategy

Focus on attaining low cost or Product differentiation for Particular buyer group, Segment of Product or geographic Market rather than for Industry as a whole [Narrow Target] → Cost Focus
→ Differentiated Focus

Identification of Strategy of firm in the same Industry on the basis of Income Statement

Calculate → Contribution/Sales
→ Fixed Cost/Sales
→ Profit/Sales

Higher → Differentiation Strategy

Lower → Low Cost Strategy

Approach for Assessing Competitive Advantage

- Internal Cost Analysis
- Internal Differentiation Analysis
- Vertical Linkage Analysis

Internal Cost Analysis

- Identify Firm Value Creating Process

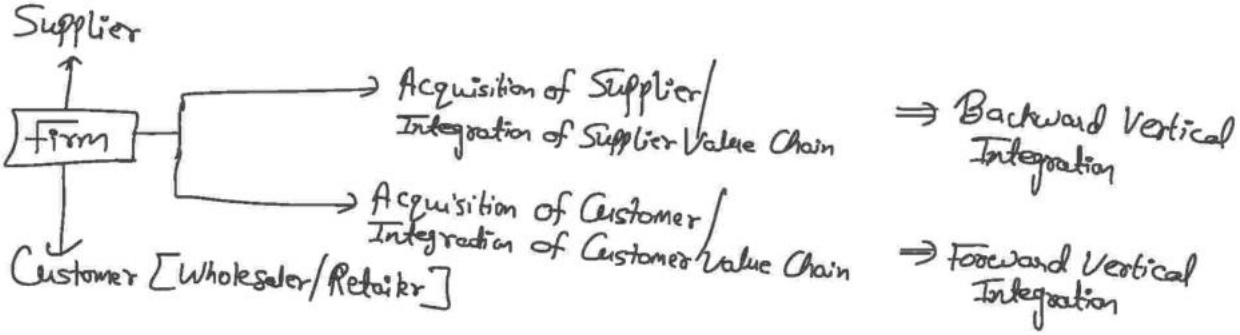
Internal Cost Analysis

- Identify Firm Value Creating Process
- Determine Portion of Total Cost attributable to each Value Creating Process
- Evaluate opportunities for achieving low cost advantage

Internal Differentiation Analysis

- Identify Customer Value Creating Process
- Evaluate differentiation Strategies for enhancing Customer Value
- Determine best differentiation Strategies

Vertical Linkage Analysis



Effects of forward/Backward Integration on Competitive Ability and Cost Competency

→ has to operate to different Production lines
→ Warehousing, Carrying Cost, idle Capacity may increase
→ May be difficult to Compete with Competitors due to diversion of Management Focus

Benefits

→ Give Strength for Differentiation/ Cost leadership
→ Helps to understand Consumer Specification

Limitations

→ Operating as well as Financial Risk
→ May not be able to attract requisite no. of clients

Value Shop Model or Service Value Chain

- Designed for Service Sector
- Designed to Solve Customer Problems rather than Creating Value
- It only deals with Problems and Finally comes with Solution
- It Mobilizes resources [People, Knowledge, Money] to Solve Specific Problems
- This Model has same Support Activities as Porter's Value Chain but Primary Activities are described differently

Primary Activities

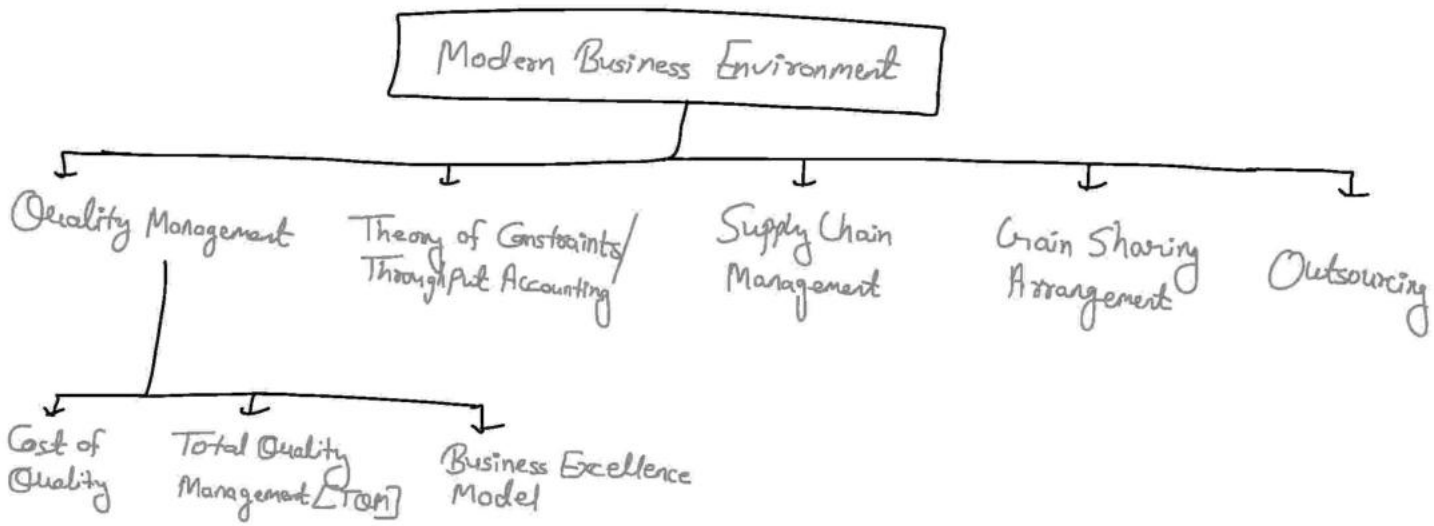
→ Problem Finding & Acquisition
→ Problem Solving
→ Choosing among Solutions
→ Execution
→ Control / Evaluation

Secondary / Support Activities

→ Procurement
→ Technology Development
→ Human Resource Management
→ Infrastructure

Vision, Mission and Objectives

- A Company Mission Statement is a Statement of Company's reason to be [Why Company Exist]
- A Company Vision is what the Company would like to achieve
- A Company Objective Statement specify what needs to be done to attain Company Mission or Vision



Cost of Quality [COQ]

① Meaning & Basics

Cost of Good Quality / Cost of Conformance / Cost of Control

⇓

Cost Incurred to bring quality in Product or Service

Prevention Cost

⇓

Incurred before Production Starts to bring Quality

⇓

Example

- Quality Planning
- Design/Quality Review
- Staff/Quality Training
- Quality Circles

Appraisal Cost

⇓

Incurred during production at all stages to bring and Maintain Quality

⇓

Example

- Testing and Inspection of Material, Equipment, Product etc
- Equipment Accuracy Checks

High Spending on Cost of Good Quality results in lower Cost of Bad Quality or Vice Versa

Cost of Bad Quality / Cost of Non-Conformance / Cost of Failure of Control

⇓

Cost Incurred due to Quality Failures

Internal Failure Cost

⇓

Incurred after Production but before delivery / Sales to Customer due to Quality failures

⇓

Example

- Any Scrap & Wastage
- Rework / Rectification / Repair / Retesting

External Failure Cost

⇓

Incurred after Product delivered to Customer due to Quality failures

⇓

Example

- Returns & Replacement
- Servicing
- Warranty Claims/Warranty Repairs

- Training
- Quality Circles
- Supplier Review/ Screening/Evaluation
- Planned Preventive Maintenance
- Design/Process Reengineering
- Equipment Accuracy Checks
- Process, Field Testing
- Product Acceptance Testing
- Procedure Verification
- Service of Quality Control Consultant
- Repair/Retesting
- Downgrading
- Downtime
- Rejection
- Warranty Claims/Warranty Repairs
- Customer Complaints Centre Cost
- Support Centre Cost
- Litigation Cost
- Product Liability Insurance
- Recalls
- Contribution Loss

(2) Optimal Cost of Quality [COQ]

- Where Combined Cost of Good & Bad Quality is Minimum

Note: For non financial Perspective, better option is where Cost of Poor Quality is lowest as it results in Increase Customer Satisfaction and Sales

Example

	Option 1	Option 2	Option 3
Prevention Cost	—	3,00,000	7,00,000
Appraisal Cost	—	2,00,000	1,00,000
Internal failure	2,00,000	50,000	10,000
External failure	8,00,000	50,000	10,000
	10,00,000	6,00,000	8,20,000
		⇓ Optimal COQ	⇓ For Non financial Perspective, This is better

(3) Measures to reduce Non-Conformance Cost

- Total Quality Management [TQM]
- Total Productive Maintenance [TPM]

Types of Questions → Classify Quality Cost

Types of Questions → Classify Quality Cost
→ Prepare Statement of Quality Cost
→ Analyse Quality Cost / Comparison between Current & Proposed Situation

Total Quality Management [TQM]

① Meaning & Basics

- Integrated System of Planning and Control by Management
  ↓
  To meet Customer Expectations and Organisational Objectives
  ↓
  By Continuous Improvement in Quality
  ↓
  With aim of achieving Zero Defect in Quality
- TQM is an Investment not a Cost
- It Increases Profit and Competitive Advantage without incurring additional expenditure to Improve Quality

② Ways in which Investment in TQM can be made

- Improving Product Mix & Process to Improve Quality
- Introducing Employee Development Programmes
- Empowering Employees
- Improving Top Management Commitment to Quality
- Monitoring Performance
- Ensuring Customer Satisfaction

E^2MI^3

③ Six C's of TQM for Successful Implementation of TQM

Commitment | Culture | Continuous Improvement | Co-operation | Customer | ...

Commitment | Culture | Continuous Improvement | Co-operation | Customer Focus | Control

(4) Deeming 14 Points for Process Improvement for achieving Quality Improvement

According to Deeming, Reasons of Defects are → 85% due to Process & Management
→ 15% due to Employees

(i) Adopt New Philosophy
(ii) Create Constancy of Purpose towards Improvement
(iii) Institute Training on the Job
(iv) Drive Out Fear
(v) Institute Leadership
(vi) Move towards single Supplier for any One Item
(vii) Eliminate Slogans
(viii) Transformation is Everyone's Job
(ix) Remove workmen barriers
(x) Institute Education and Self Improvement
(xi) Cease dependence on Inspection
(xii) Eliminate Management by Objectives
(xiii) Improve Constantly and Forever
(xiv) Breakdown barriers between Department

ACIDI - METRIC - EIB

(5) PDCA Cycle for Continuous Improvement

Plan : Establish Objective | Develop Action Plan
Do : Implement
Check : Measure
Act : Take Corrective Action

Business Excellence Model

① Meaning & Basics

- Philosophy for developing & Strengthening Management Systems & Processes of an organisation
  ↓
  By developing Quality Management Principles
  ↓
  for achieving excellence in everything that an organisation does and also to sustain it

- Business Excellence model is an holistic tool that create value for all stakeholders not just owners
  - Shareholders
  - Customers
  - Employees
  - Society

② Some Business Excellence Models / Tools to achieve & sustain excellence

- EFQM Excellence Model
- Baldrige Criteria for Performance Excellence
- Singapore BE Framework
- Japan Quality award Model
- Australian BE Framework

③ European Foundation for Quality Management [EFQM] Excellence Model

- European Model used to achieve Sustainable Excellence
- EFQM model has a set of Three Modules
  - Module 1 → Direction → Purpose, Vision & Strategy
  - Module 2 → Execution → → Engaging Stakeholders; → Creating Sustainable Value
  - Module 3 → Results → Stakeholder Perceptions

- RADAR : Analysing Results
  - → Results
  - → Approach
  - → Deploy
  - → Assess
  - → Refine

(4) Baldrige Criteria for Performance Excellence

It is built around Seven Categories
- → leadership
- → Strategy
- → Customers
- → Measurement, Analysis & knowledge Management
- → Workforce
- → Operations
- → Results

Theory of Constraints / Throughput Accounting

(1) Meaning & Basics

- Set of Principles to Manage & Remove **Bottleneck** and Maximise Profit
- Bottleneck is a resource whose availability is minimum in Comparison to requirement among all Other resources

Example

ABC Ltd. → Product A, B, C ⇒ Process through 3 Machines

Machine	Requirement	Availability	Resource Utilisation
→ P	600 hrs.	300 hrs.	2 : 1
→ Q	200 hrs.	40 hrs.	5 : 1 ⇒ Bottleneck
→ R	400 hrs.	100 hrs.	4 : 1

(2) Steps to Manage Bottleneck and Maximise P...

(2) Steps to Manage Bottleneck and Maximise Profit

→ Determine Requirement and Availability of different resources

→ Determine Resource Utilisation (%) for each resource as follows : $\frac{\text{Requirement of Resource}}{\text{Availability of Resource}} \times 100$

→ Identify Bottleneck Resource : Resource having highest utilisation (%) is Bottleneck

→ Determine Throughput Contribution P.U. of each Product as follows :

Throughput Contribution P.U. = Sales − Direct Material Cost

[Assumption of Throughput Accounting ⇒ Direct Material is only Variable Cost
All Other Costs are Fixed]

→ Determine Throughput Contribution Per Bottleneck Resource as follows :

$$\frac{\text{Throughput Contribution P.U.}}{\text{Bottleneck Resource P.U.}}$$

→ Allocate Rank to each Product as Per Throughput Contribution Per Bottleneck Resource

→ First Manufacture Rank 1 Product & so on and allocate resources on that basis

Note : If any order is already accept for Product, then first Produce for such order and then Produce as Per Rank

(3) Goldratt Five Steps to Remove Bottleneck

→ Identifying the Bottleneck

→ Exploit the Bottleneck : Fully utilised optimally

→ Non Bottleneck Activities are Sub-ordinate

→ Elevate the Bottleneck : By Enhancing Capacity & Efficiency

→ Repeat the Process

(4) Throughput Accounting Ratio [TAR]

• Calculation of Throughput Accounting Ratio of Products

$$\frac{\text{Throughput Contribution Per Bottleneck Resource}}{\text{Factory Cost Per Bottleneck Resource}}$$

Note

→ Factory Cost = All Other Operating Cost / Fixed Cost [Except Direct Material]

→ Factory Cost Per Bottleneck Resource = $\frac{\text{Total Factory Cost}}{\text{Total Bottleneck Resource time}}$

- If this ratio is greater than 1, it signifies Throughput Contribution of Product is greater than factory Cost and therefore Product is Profitable

Example

Xyz Ltd →	Product A	Product B
Selling Price P.u.	90	80
Direct Material Cost P.u.	66	60
Machine X hrs. P.u.	10 hr.	3 hr.
Machine Y hrs. P.u.	18 hr.	6 hr.
Machine Z hrs. P.u.	5 hr.	5 hr.
Demand	2000 units	2000 units

Machine X hrs. Available = 24,000 hrs.

Y hrs. Avaible = 32,000 hrs.

Z hrs. Available = 25,000 hrs.

Factory Cost = Rs 48,000

Calculate Production mix & Profit by applying Throughput Accounting.

Also Calculate Throughput Accounting Ratio

... production mix & Profit by applying Throughput Accounting. Also Calculate Throughput Accounting Ratio

Solution

Working

Requirement & Availability of Resources

		Requirement	Availability	Resource Utilisation (%)
Machine X	[2000×10 + 2000×3]	26000 hrs	24000 hrs	108.33 %
Machine Y	[2000×18 + 2000×6]	48000 hrs	32000 hrs	150 %
Machine Z	[2000×5 + 2000×5]	20,000 hrs	25000 hrs	80 %

Bottleneck

		Product A	Product B
Selling Price p.u.		90	80
(–) DM Cost		(66)	(60)
Throughput Cont p.u.	(A)	24	20
Bottleneck Resource p.u. [Machine Y]	(B)	18 hr.	6 hr.
Throughput Contribution Per Bottleneck Resource [A/B]		1.33	3.33
Rank		II	I

Machine Y has. Available 32000 hrs.

(–) For Product B [2000×6 Units] (12000 hrs)

(→ For Product B [2000 × 6 units] (12000 hrs)

20,000 hrs

(→ for Product A [20,000 / 18] (20,000 hrs)

= 1111 units

	A	B
Units Produced	1111 units	2,000 units
	×	×
Throughput Cont. p.u.	24	20
	26,664	40,000
	66,664	
(→ Factory Cost	(48,000)	
Profit	18,664	

Throughput Accounting Ratio

Factory Cost Per Bottleneck hr. = 48000 / 32000 = 1.5

TAR = Throughput Cont. Per hr. of y / Factory Cost Per hr. of y	Product A	Product B
	1.33 / 1.5	3.33 / 1.5
	=	=

TAR Ratio 0.89 II 2.22 I

Supply Chain Management [SCM]

① Meaning & Basics

- Supply Chain : All activities associated with Flow/Moving and Transformation of Goods From Raw Material Stage to end User
- Supply Chain Management : Management of all activities associated with Flow/Moving and Transformation of Goods from Raw Material Stage to end User
- Porter Primary Activities in Value Chain
  - → Inbound Logistics
  - → Operations
  - → Outbound logistics
  - → Marketing & Sales
  - → Service
- Supply Chain
  - → Production Planning
  - → Procurement / Purchase of Raw Material
  - → Operations & Production
  - → Distribution & Logistics
- As Per SCM, each of the above activities are Integrated & Interrelated to each Other
- SCM is a Continuous effort where Commitment is required from Top to Bottom
- Objective of SCM is to meet Customer demand in Cost effective Manner

② Supply Chain Management Process

- Plan / Production Planning
  - → Develop a Plan to address requirement of Customer
  - → Production Must be Planned based on Estimated or Actual Demand

→ Develop a Plan to address requirement of Customer
→ Production Must be Planned based on Estimated or Actual Demand

- **Procure**
  → Raw Material is Procured / Purchased From Suppliers in this Step
  → Good Relationship with suppliers to ensure Timely delivery & Better Quality
  → Select Quality Suppliers

- **Make**
  → Manufacture the Product required by Customer
  → As Per Demand & Taste of Customer

- **Deliver / Logistics**
  → Deliver the Product manufactured for Customer
  → This Stage is Concern with Logistics → Inbound Logistics, Outbound Logistics
  → An Excellent System must be in Place to ensure Movement of Materials and Goods is Uninterrupted
  Inhouse Logistics : Trained
  Third Party logistics : Tie up

(3) Types of Supply Chain

Push Model
⇓
Stocks Produced on the basis of Estimated Demand
⇓
Based on Research

Pull Model
⇓
Stocks Produced on the basis of Actual Demand

Upstream and Downstream Supply Chain

(4) Upstream Supply Chain

Management of Transactions with Suppliers
It rely upon Supplier Relationship Management and Use of Information Technology

(i) **Supplier Relationship Management**

(i) **Supplier Relationship Management**

- How Relationship with Suppliers are developed & Maintained
  - Sources
  - No. of Suppliers
  - Cost, Quality, Time
  - Partnership with Suppliers
- Benefits
  - Ensures quality & innovation
  - Enhance reliability in delivery

(ii) **Use of Information Technology**

- E-Procurement is an electronic method which improves speed & efficiency of Procurement
- Constituents of E-Procurement
  - E-Sourcing : Electronic Method for Finding New Suppliers
  - E-Purchasing : Product Selection & Ordering Online
  - E-Payment : Electronic Invoicing & Electronic Funds Transfer

(5) **Downstream Supply Chain Management**

Management of Transactions with Customers

It rely upon Customer Relationship Management and Use of Information Technology

(i) **Customer Relationship Management**

- Analysis of Customers & their behaviour
- Customer Account Profitability
- Customer Lifetime Value
- Customer Acquisition, Retention & Extension
  - Resell
  - Cross-sell
  - Upsell

  ⇓ Quality & Satisfaction

(ii) Use of Information Technology

- To Collect orders

- To Collect orders
- To record Sales [Use of E-POS]

(6) E-Commerce & SCM

- SCM shall be necessary for e-Commerce business
- As Customer Buying Online wants faster delivery from any Part of the world with Good Quality

Customer Order	Procurement	Production	Logistics
⇓	⇓		
Effective Mechanism to Capture Customer Order [Integrated ERP System]	Seamless Communication to Supplier [Integrated ERP]		

- In all Stages, SCM shall be neccsary for e-Commerce

(7) Key Processes in SCM Business Model

- Information flow : To understand expectations of customers & Collect Feedback of Customers
- Capacity & Skills Management : Required Capacity & Skilled Staff
- Demand Management : How to generate demand of Product
- Customer Relationship Management
- Supplier Relationship Management
- Service Delivery Management : Monitor Service Performance
- Cash flow : Inflow from Customer and Payment to Supplier

IC^3DS^2

(8) Benefits of Supply Chain Management

- Minimize Waste
- Reduce Supply Chain Cost

- Reduce Waste
- Reduce Supply Chain Cost
- Better Customer Service
- Better Delivery
- Optimum Inventory
- Generating Capabilities & becoming Future Ready
- Improves Supplier Relationship
- Ease & Transparency

MR - BOGIE

(9) Service Level Agreements [SLA]

- An agreement between Customer & Service Provider
- Legally binding formal or Informal Contract
- Include many Components From definition of services to termination of agreement

(10) Customer Lifetime Value

- Net Present Value of Projected Cash Flows From Life time of Customer Relationship
- Customer Lifetime Value = PV of Inflow − PV of Outflow
  - PV of Inflow = PV of Expected Income From Customer during Lifetime
  - PV of Outflow = Offers, Discounts etc. Cost at the beginning

Example

Jio → Offer, discounts etc. Cost at beginning Per Customer = Rs 2,000

Expected Income From Customer [5 years]

Year		
1	Rs 10000	PV factor = 10%
2	Rs 10000	Calculate CLV
3	Rs 10000	
4	Rs 5000	
5	Rs 5000	

4	Rs 500
5	Rs 500

Solution

PV of Inflow

Year	Inflow	PVF@10%	PV of Inflow
1	1000	0.909	909
2	1000	0.826	826
3	1000	0.751	751
4	500	0.683	342
5	500	0.621	311
			3,139

CLV = PV of Inflow − PV of Outflow

= 3,139 − 2,000 ⇒ **1,139**

Grain Sharing Arrangement

① Meaning & Basics

- It is a Contractual Arrangement where Supplier agrees to supply to Customer with no guarantee of receiving Payment
  ↓
  But Payment of Supply is based upon benefits that emerge to Customer
- Risky Stance to Supplier, as he can walk away with nothing
- If benefits to Customer are substantial, Supplier can get larger Return
- Grain / Benefit is not necessarily financial
- It is a win-win situation for both Supplier & Customer
- There should be Pre-defined Formula for sharing of benefits & Period thereof

② Reasons of Failure of Grain Sharing Arrangement

- Unstructured Terms of Agreement

- Unstouched Terms of Agreement
- Error in Implementation
- Bad relationship between Supplier & Customer

Outsourcing

(1) Meaning & Basics

- Also referred as Contracting Out
- It means shifting of Tasks/Processes/Jobs/Operations or Products to another Part for Span of Time
  ↓
  With objective to reduce Cost & Increase efficiency

(2) Advantages of Outsourcing

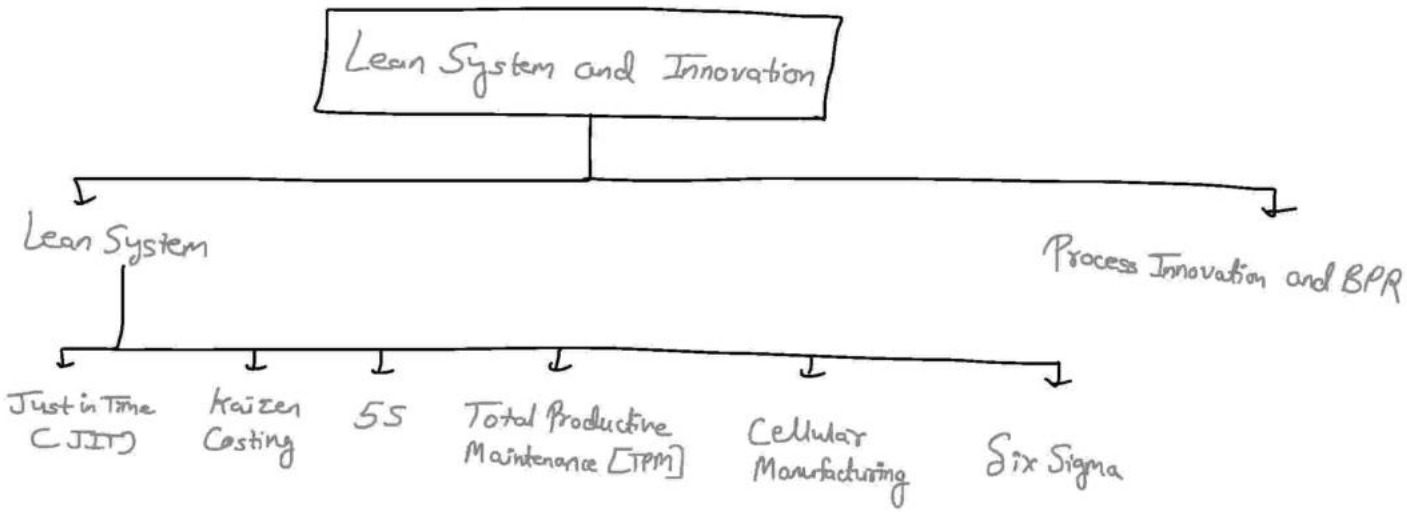
- Cost Savings
- Investment Savings
- Business Flexibility

(3) Disadvantages/Issues in Outsourcing

- Loss of Confidentiality/Risk of losing Sensitive data
- Quality Problems

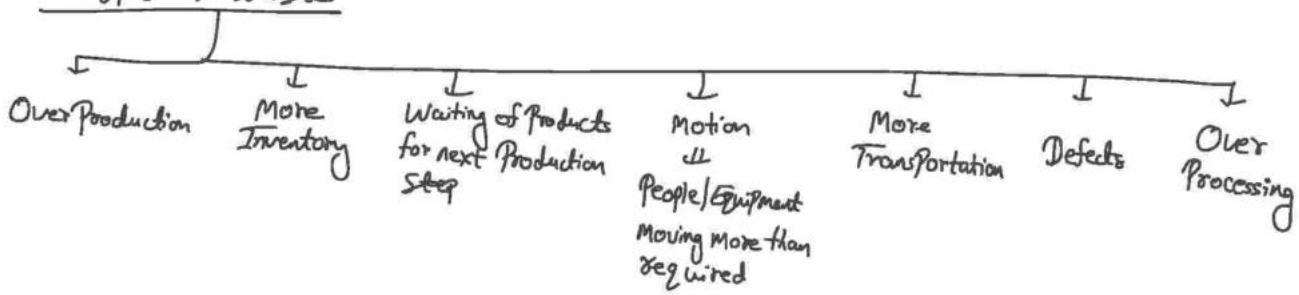
(4) How to address issues in Outsourcing

- Develop Code of Conduct
- Setup Audit Team that regularly audit outsourcing entities
- Give list of outsourcing entities on Website



Lean System

- Method for Waste Minimization during Production / Manufacturing
- Waste : Any Step/Process which is not required to Complete a Process
- 7 Types of Waste



- Techniques of Lean System
  - JIT
  - Kaizen Costing
  - 5S
  - TPM
  - Cellular Manufacturing
  - Six Sigma

Just in Time [JIT]

① Meaning & Basics

- JIT is a Collection of ideas that Streamline Company's Production Process so that wastage of all kind is driven out of the Process
- Under this System Material is Produced

Wastage of all kind is driven out of the Process

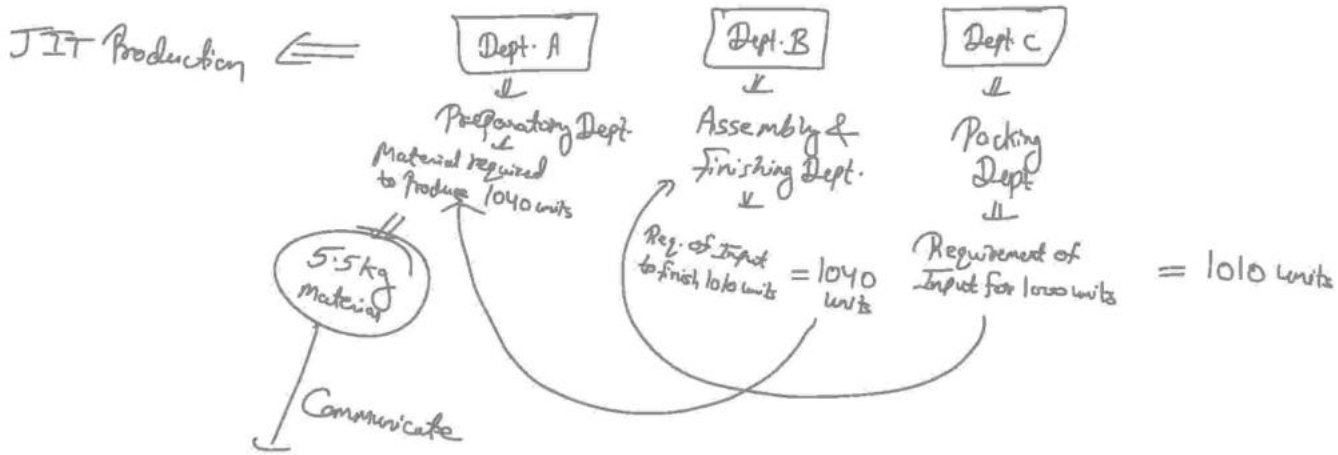
- Under this system, Material is Purchased exactly when required for Production **AND** Production will be done on the basis of Actual Sales Demand [Pull System]

JIT Purchase
⇓
Purchase of Material only when required for Production

JIT Production
⇓
Finished Goods Produced only on the basis of Actual Sales demand

Example

ABC Ltd → Implement JIT
⇓
1000 units Per Order → Communicate



JIT Purchase ⇐ Purchase Department → Purchase of 5.5 kg Material

(2) Some key Factors / Pre-requisites for Implementing JIT

- Manufacturer has to ensure that he receives Material from Supplier on Exact Date and Exact Time when required
- Supplier should be Located in Close Proximity to the Manufacturing Plant
- Supplier must be willing to make Frequent deliveries in small lots and in exact quantities specified by Manufacturer
- Delivery should be sent directly to the Production Floor for immediate Use
- For Ensuring Quality, Engineering Staff must visit supplier site & examine their Process

- For Ensuring Quality, Engineering Staff must visit supplier site & examine their Process
- Manufacturer shall also keep in mind, the efficiency of its workforce
- Entire Production Process has to be detailed & Integrated
- Continuous Monitoring of the System after Implementation to ensure smooth Operations

CDEF

(3) Savings and Cost due to JIT

Savings due to JIT

- Reduction in Holding Cost/Warehousing Cost/ Storage Cost
- Reduction in Insurance Cost
- Reduction in Carrying Cost
  - Material Handling Cost
  - Opportunity Cost of Funds blocked in Inventory

Cost due to JIT

- Extra Payment to Suppliers
- Overtime Cost
- Ordering Cost
- Stockout Cost
- Contribution loss due to Stockout

Note

→ Holding, Insurance and Carrying Cost is to be Calculated on Average Inventory

→ Calculation of Average Inventory
- In Case of JIT Purchase = $\frac{\text{Order Size / EOQ}}{2}$
- In Case of JIT Production = $\frac{\text{Opening Stock} + \text{Closing Stock}}{2}$

→ Economic Order Quantity [EOQ] = $\sqrt{\frac{2AO}{C}}$

A = Annual Consumption of Raw Material

O = Ordering Cost Per Order

C = Carrying Cost P.U. P.a.

→ Incremental / Extra Overtime Cost in Case of JIT Production

- If labour is to be Paid for Minimum Contracted Hours. ⇓ Consider Overtime Wages + Premium
- Other Case ⇓ Consider Only Overtime Premium

→ JIT Purchase Questions is to be Solved on the basis of Total Method → Total Cost under Current System, Total Cost under JIT Purchase → Compare

→ JIT Production Questions is to be Solved on the basis of Incremental Method → Extra Cost due to JIT Production, Savings due to JIT Production

(4) Main Features of JIT System / Why Implementation of JIT is a Major Source of Competitive Advantage & Success to the Company

- Opportunity to Customize the Product as Per Customers needs
- Material Handling & Holding Cost is Reduced
- Minimizing defects, Rework, Wastage & Scrap
- Multi-Skilled Labour / Multitasking by employee
- Reduces Lead time for receiving Materials
- Reduced Setup Time
- Reduced number of Suppliers & Move towards Single Sourcing

OM³R³

(5) Whether Company Should Shift to JIT on the basis of Manufacturing Cycle Efficiency

- Calculate Manufacturing / Processing / Production Cycle Efficiency under both Traditional and JIT System
- Calculation of MCE = $\frac{\text{Value Added Time}}{\text{Total Cycle Time}} \times 100$ → [Value Added Time + Non Value Added Time]

Total Cycle Time → [Value Added Time + Non Value Added Time]

Value Added Time = Processing Time

Non Value Added Time = Inspection Time, Storage Time, Waiting Time, Moving Time

- If Efficiency increases in JIT, then it is beneficial to shift to JIT System

- Takt Time = Average Net Time available to Produce 1 unit

$$= \frac{\text{Net Time Available for Production}}{\text{Total Qty. to be Produced}}$$

→ [Total Time Available for Production − Downtime (Shutdown, Cleaning, Breaks etc.)]

(6) Backflush Accounting

- It helps in Implementing JIT System
- Reduces number of Accounting Entries by delaying recording, hence save Cost & Time

(7) Kanban System

- **Meaning**
  - → Visual Signal based Workflow Management Technique
  - → Used in Pull System of Inventory
  - → Visual Cue to worker to understand that Further Material is required
  - → Reduces Cycle Time
  - → Hold Specific Amount of Material
  - → Can also applied to Non-Manufacturing Entities

- **Kanban Size and Number of Kanban**

$$\text{Kanban Size (in each Kanban)} = C \times LT \times L \times SF$$

- C ⇊ Consumption Per day
- LT ⇊ Lead Time
- L ⇊ Location of Kanban [2]
- SF ⇊ Smoothing Factor [1]

$$\text{No. of Kanban} = \frac{\text{Safety Stock + Consumption during Lead Period}}{\text{Kanban Size}}$$

- **Factors / Assumptions to be Considered and Specific Precautions / Pre-requisites of Kanban System**
  - → Supplier Should Participate in Pull System of Inventory and agree upon Kanban Program
  - → Supplier agrees to Supply Material directly at Point of Use
  - → Supplier ready to Supply Material in lot size equal to Kanban Size
  - → Consumption is Constant throughout Period
  - → Space requirement to Store Number of Kanban Met

Kaizen Costing

(1) Meaning & Basics

- Kaizen is a Japanese word which means 'Change for Better'
- In Business, Kaizen refers to "Small and Continuous Improvement" across all Functions, Processes and employees
- Toyota Production System is Pioneer in Kaizen Costing
- Since Kaizen Costing is a Continuous Improvement, a radical change is not expected in Kaizen Costing

(2) Key Features / Principles of Kaizen Costing

- It focus on eliminating waste in Systems & Processes and Improving Productivity for achieving Continuous Improvement
- Small Changes over long Period can lead to Significant Improvement
- It involves Workers From all levels and functions in Organisation

ESI

(3) Benefits of Kaizen Costing

- It improves the Overall Profitability of the Company
- Kaizen requires Participation of all employees. It improves Team work across organisation
- It leads to Less number of defective Products thereby increasing Customer Satisfaction
- Cost Reduction can be achieved through Small Improvements and Cost Savings
- Kaizen reduces waste in many areas which lead to improve efficiency in Overall Busines Processes

OIL-CR

business processes

OIL-CR

④ Changes required for adopting Kaizen Costing System

- Cost Control System to Cost Reduction System
- Reduction in Periodicity of Setting Standards & Variance Analysis → Weekly / Monthly
- Participation of Workers in Standard Setting

PCR

⑤ Impact of Kaizen Costing Implementation on Employee Management

- Role of Employees will Change drastically. Employees are seen as Solution Provider
- Increase Staff Motivation through Empowerment
- Change in Culture to Employee Self-empowered work culture

5S

- It explains how a workplace should be organised for Efficiency and Effectiveness
- 5 Japanese word

Sort [Seiri]	Set in Order [Seiton]	Shine [Seiso]	Standardise [Seiketsu]	Sustain [Shitsuke]
Sort & Remove Unnecessary items from work area → So that relevant items can be found easily	Systematic Arrangement of Items → So that they can easily identified for use	Keep Workplace Clean & Safe	Every Process is to be Standardise	Maintain discipline by Auditing work areas → So that 5S apply Continuously

- 5S reduces errors, improves Process Time and increases Employee Satisfaction

Total Productive Maintenance [TPM]

① Meaning & Basics

- Maintenance Philosophy aimed at eliminating Production Losses due to Faulty Machines/Equipments
- It includes attaining
  - → Zero Breakdowns
  - → Zero Downtimes/Stoppages
  - → Zero Defects
  - → No Efficiency Loss due to Machine/Equipment

(2) Features of TPM | 8 Pillars of TPM | Principles of TPM for TPM Implementation

Foundation Base : 5S [TPM Starts with 5S]

(i) Autonomous Maintenance : Training Operators so that they can do minor Maintenance
Example → Cleaning, Lubricating etc

(ii) Focused Improvement : Minor improvement made on Continuous basis

(iii) Planned Maintenance : Proactive instead of reactive with aim to Produce defects Free Product for Total Customer Satisfaction

(iv) Early Management : Shortening time required for Product development

(v) Quality Maintenance : Maintenance of Quality during Production for achieving Customer Satisfaction

(vi) Education & Training : Training of workers across all levels and departments

(vii) Office TPM : Application of TPM Techniques in Administration

(viii) Safety, Health & Environment : Zero Accidents and Health Damages

FEOA - POSE

(3) Types of Maintenance under TPM

- Breakdown Maintenance
- Preventive Maintenance
- Corrective Maintenance
- Maintenance Prevention
- Autonomous Maintenance

- Breakdown Maintenance : → No Maintenance unless equipment Fails
  → Used when equipment failure does not have much impact

- Preventive Maintenance : → Daily or Routine Maintenance
  → Used for Regular Use Machines
  → Reduced Breakdowns

- Corrective Maintenance : → Reconfiguration
  → Makes Maintenance Easier

- Maintenance Prevention : → Create / Buy Machines that are more reliable

- Autonomous Maintenance : → Minor / day to day repairs Carried out by Operators

ABC - PM

(4) TQM and TPM

- Both are different Approaches
- TQM focus on Quality of Product
- TPM focus on equipment used to Produce the Product. By improving quality of equipment, quality of Product increases
- Both result in Increase in Quality of the Product
- Therefore TPM is a way of achieving goals of TQM
- Connections between TQM & TPM
  - → Both improves Customer Satisfaction
  - → Involvement of workers is necessary in both
  - → Commitment from Top Management is necessary in both
  - → Fundamental Training & Education is necessary in both

(5) Performance Measurement in TPM

- By way of Overall Equipment Effectiveness [OEE]
- OEE is an aggregate measure of Productivity which comprises Component of Availability Performance and Quality. It Assumes each Component have equal importance
- Six Big Losses
  - Time Loss
    - Planned Time loss [Planned Downtime] ⇊ Lunch Break, Tea Break
    - Unplanned Time Loss [Unplanned Downtime] ⇊
  - Speed loss ⇊
    - Minor Stops
    - Reduced Speed
  - Quality loss ⇊
    - Reduced Output
    - Quality Defects

Lunch Break, Tea Break, Misc. Break, Shift Change, Preventive Maintenance, Cleanup Period

Equipment failure, Breakdown, Setup Changes, Power failure

Use to Calculate Availability

Use to Calculate Performance Efficiency

Use to Calculate Quality

- **Calculation of OEE**

$$OEE\ (\%) = Availability \times Performance \times Quality$$

$$Availability = \frac{Actual\ Time\ Worked / Taken}{Planned\ Time\ Available} \times 100$$

Note

→ Actual Time Worked / Taken = Total Time Available − Total Time loss

→ Planned Time Available = Total Time Available − Planned Time loss

$$Performance = \frac{Standard\ Time\ required\ for\ Output\ Produced}{Actual\ Time\ Taken/Worked\ for\ Output\ Produced} \times 100$$

Note

→ Cycle Time / Ideal Cycle Time means Standard Time required to Produce 1 Unit

$$Quality = \frac{Output\ Accepted \rightarrow Good\ Units}{Output\ Produced \rightarrow Total\ Units} \times 100$$

- **World Class Performance as Per Nakazima**

→ 100% OEE is unpracticable. OEE at world class Performance would be approximately **85% or More**

→ Ideal Values for each Component → Availability > 90%, Performance > 95%

Ideal values for each Component → Availability > 90%
→ Performance > 95%
→ Quality > 99%

→ If OEE is less than 85%, then Company should reduce Time loss, Speed loss & Quality Loss and thereby improves Availability, Performance, Quality so that OEE (%) can be improved

Single Shift Calculation and in Minutes → If Specifically not given

Example (1)

ABC Ltd. → Pen Mfg.

Total Time Available in a Shift = 500 minutes

Time loss → Lunch / Tea Break = 40 minutes
→ Breakdown = 50 minutes

Units Produced = 100, defective Units = 20

Standard Time required P.U. / Cycle Time = 3 minutes

Calculate OEE

Actual time worked
500 - 40 - 50
↓
410 min

Planned time Available
500 - 40 = 460 min

Std time for output Produced
100 × 3 = 300 min

Units Accepted = 100 - 20 = 80

Solution

Availability = $\frac{\text{Actual time worked}}{\text{Planned time Available}} \times 100 \Rightarrow \frac{410}{460} \times 100 = 89.13\%$

Performance = $\frac{\text{Std. time req.}}{\text{Actual time taken}} \Rightarrow \frac{300}{410} \times 100 = 73.17\%$

Quality = $\frac{\text{Goods Units}}{\text{Total Units}} \times 100 \Rightarrow \frac{80}{100} \times 100 = 80\%$

$OEE = A \times P \times Q \Rightarrow 89.13\% \times 73.17\% \times 80\%$

$\Downarrow$

$.8913 \times .7317 \times .80 = 0.5217$

$\Downarrow$

52.17%

Cellular Manufacturing

① Meaning & Basics

- Also known as One Piece Flow Production System / U-Shape Manufacturing
- It is a Scientific way of Production and lean way to enhance Productivity in which Manufacturing System has been Converted into Manufacturing Cells
- Types of Manufacturing / Production System

Traditional

$\Downarrow$

Department Wise Manufacturing

$\Downarrow$

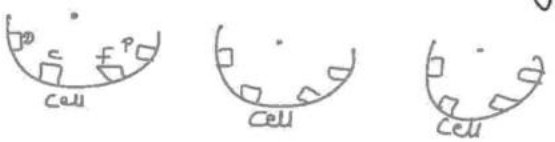
Limitations of Department Wise Manufacturing

→ Extra WIP
→ Extra Waste
→ Breakdown in One dept. affects all dept.
→ Issues in Maintenance of Big Machines & high Setup Time
→ No Customization
→ Delay in Production
→ Extra Transportation [Motion]

Modern

$\Downarrow$

Cellular Manufacturing



$\Downarrow$

→ Divide Production Process into Small Cells
→ Cell should be U-shaped so that worker/ Supervisor has to move less & can watch entire Process

② Goals/Benefits of Cellular Manufacturing

- Reduced Work-in-Process [WIP] Inventory
- Little Waste

- Breakdown in One Cell does not affect Other Cells
- Reduced Setup Time & Easy Maintenance
- Provide Scope for Customization
- Eliminate delay in Production
- Eliminate Transportation [Motion]
- Better Use of Human Resources
- Better Scheduling

RL-BEP

③ Whether Shifting From Existing System to Cellular Manufacturing [Rearrangement] beneficial or Not

Calculate Manufacturing/Processing Cycle Efficiency before and after Rearrangement

④ Types of Machine Cell Designs

Single Machine Cell	Group Machine Cell with Manual Handling	Group Machine Cell with Semi-Integrated Handling	Flexible Manufacturing System
⇓	⇓	⇓	⇓
Single Machine Plus Supporting tools	More than 1 Machine Plus Human Operators run the Cell & Perform Material Handling	More than 1 Machine Plus Mechanical Handling System such as Conveyor	Fully Automated & Integrated Material Handling System

⑤ Calculation of Appropriate Cells or Part Families & Machine Groups using Rank Order Clustering Algorithm

Steps

- Column Operation
  - → Assign Binary Weight [Bw] From end of each Column [$2^0, 2^1, 2^2, 2^3, 2^4$ & so on]
  - → Calculate Decimal Equivalent [DE] of Binary Values of each row = $\sum$ Bw x Row Value
  - → Rank the rows as Per Decimal Equivalent [DE] [Higher to lower]
  - → Re-arrange rows as Per Rank
- Row Operation

→ Assign Binary Weight [Bw] from end of each Row [$2^0, 2^1, 2^2, 2^3, 2^4$ & so on]
→ Calculate Decimal Equivalent [DE] of Binary Values of each column = $\sum$ Bw X Column Value
→ Rank the Columns as Per Decimal Equivalent [DE] [Higher to lower]
→ Re-arrange Columns as Per Rank

- Now again Continue Column Operation, then Row Operation until Ranks come in Sequence

Note

If Ranks come in Sequence but cells are not totally Independent, In that Case following are alternative ways to eliminate Inter cell moves

- → Redesigning the Part so that Machine of Other Cell is no longer required
- → Subcontracting the Part
- → Adding necessary Machine in the cell

Six Sigma

① Meaning & Basics

- Six Sigma is a quality improvement technique whose objective is to eliminate defects in every aspect that affects Customer Satisfaction and Practically achieve 'Zero Defects'
- Used to Turn Things Around [Eliminate quality issues & defects] also in Case of Service Industry
- Six Sigma improves the quality of Process/Product/Service by identifying and removing the Cause of defects
- Six Sigma is 3.4 defects Per Million or getting things right 99.99966% of Time
- Six Sigma means Total Bad Quality Cost is Zero/Negligible
- Various Sigma levels

Sigma level	Correct (%)	Defect (%)	Defects Per Million	Quality / Profitability
1	31	69	6,91,462	Loss

1σ	31	69	6,91,462	Loss
2σ	69	31	3,08,538	Non-Competitive
3σ	93.3	6.7	66,807	Industry Average
4σ	99.38	0.62	6,210	Above Average
5σ	99.977	0.023	233	Below Perfection
6σ	99.99966	0.0034	3.4	Near Perfection

(2) Two Methodologies for Implementation of Six Sigma

DMAIC
⇓
Define
Measure
Analyse
Improve
Control
⇓
Used to Improve Existing Business Process/Product/Service

DMADV
⇓
Define
Measure
Analyse
Design
Verify
⇓
Used to Develop/Design New Business Process/Product/Service

- **DMAIC**
  - → Define the Problems, Project Goals & Customer Requirements
  - → Measure the Process to determine Current Performance
  - → Analyse the Process to determine root Causes of Poor Performance/defects
  - → Improve the Process by eliminating root Causes of defects
  - → Control : Means Maintaining Improved Process and Future Process Performance

Example

One Plus Mobile Company → Existing Product

One Plus Mobile Company → Existing Product = One Plus 9

↓

Defects / Sales Return

↓ Hang
↓ Touch Problems
↓ Damaged & late Delivery
↓ Camera Problem

Improve One Plus 9 Quality by applying Six Sigma

Solution

DMAIC

(i) Define
- → Problems → Defects identified above
- → Customer Requirement → Defect Free / Quality One Plus 9
- → Project Goals → Remove all defects in One Plus 9 & achieve Zero defects to meet Customer Requirement

(ii) Measure → Current Process
- → Current PC, AC, IFC, EFC
- → Current Performance → 3-, 4-

(iii) Analyse → Whole Process
↓
Identify Root Causes of Problems / Defects
- → No Training
- → No Supplier Review
- → Weak distribution Process

(iv) Improve → By eliminating all root Causes of defects
- → Training
- → Supplier Review
- → Improve Distribution Process

(v) Control → Monitor Performance on regular basis

- **DMADV**

→ Define Project Goals & Customer Deliverables
→ Measure & Determine Customer Needs
→ Analyse Process Option to meet Customer Needs
→ Design Process to meet Customer Needs
→ Verify Design Performance to meet Customer Needs

Example

Apple Company → About to launch New iPhone 14 wants to implement Six Sigma so that iPhone 14 will meet Customer Needs & will achieve Zero defect

Solution

DMADV

(i) Define → Goals ⇒ Achieve Customer Satisfaction and ensure no defects of earlier version [iPhone 13] found in New

(ii) Measure & Determine ⇒ Customer Needs
- → Triple Camera —
- → Battery Improve —
- → Touch Improve —
- → Screen length —
- → Weight less ✗

(iii) Analyse options to meet needs ⇒ Design Review, Training, Research

(iv) Design → iPhone 14 as per needs

(v) Verify → iPhone 14 Performance → Whether it meet Customer Needs

- Difference between DMAIc and DMADV

DMAIc	DMADV
→ Review Existing Product/Process	→ Emphasis on design of New Product/Process
→ Reactive Process	→ Proactive Process
→ Rupee Benefits Quantified	→ Rupee Benefits more difficult to quantify

③ Limitations of Six Sigma

- Focuses on Quality Only
- Substantial Investment is required
- Complicated for Some Tasks

Process Innovation

It means implementation of New Production

It means implementation of New → Production / Delivery / Support Service → Methods

Business Process Re-Engineering [BPR]

(1) Meaning & Basics

- BPR is Fundamental re-thinking and radical redesign of business Processes / Functions to achieve dramatic improvement in Critical Contemporary measures of Performance such as Cost, Quality, Service and Speed
- Four key Components of BPR
  - → Fundamental Re-thinking : Change Thought
  - → Radical Redesign : Totally Change and Fresh Start
  - → Dramatic Improvement : 60-70% Improvement
  - → End to End Business Processes : Whole Process not individual activities

(2) How to Implement BPR / Stages of BPR

→ Each Business Process needs to be designed into series of Processes

→ Each Business Process needs to be documented & Analysed whether it is essential and adding Value or not

→ Processes which do not add Value must be removed

→ Remaining Process are restructured / redesigned as efficiently as Possible

(3) Characteristics of BPR

- Combining Several Job / Process / Functions into One
- Permitting workers to make more decisions themselves
- Defining different Processes for Simple Cases V/s Complex

- Defining different Processes for Simple Cases v/s Complex Ones
- Reorganising Jobs/functions to give individuals more understanding & responsibilities

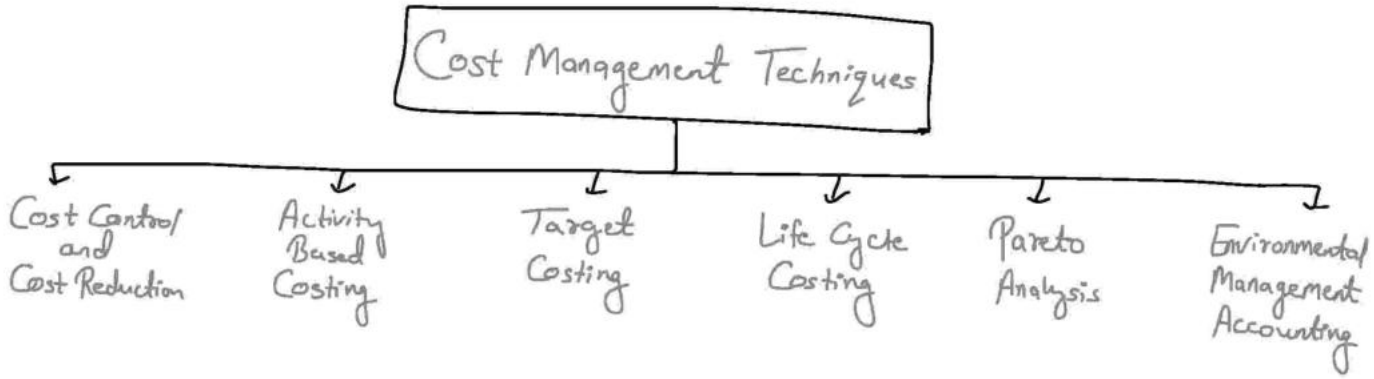
(4) Impact of BPR

- Workers : → Workers are not Susceptible to Change
  → Many become Unemployed
  → Those Continued may Uncertain about their Jobs in near future
  → It may lead them to Resist BPR
- Suppliers : Unethical Practices → Negative Image
- Environment : Pollution & other effects due to New Processes

(5) Benefits of BPR / How BPR Can Improve Performance / Improvements expected from Introducing BPR

- BPR may increase Cost in Short Run as Investment in Technology
- In long run, it Results in
  - → High level of Efficiency
  - → Meeting Performance Targets
  - → Lower Prices & Cost
  - → Better Customer Satisfaction
  - → Increase Profitability
  - → Motivating Staff
  - → Better facilities for Staff
  - → Fast & Parallel Processing
  - → Error Reduction

High MB FILE



Cost Control and Cost Reduction

Cost Control	Cost Reduction
• Comparison of Actual with Budget to regulate Actual Cost temporarily [i.e. Temporary Saving in Cost]	• Permanent Reduction in Cost
• Quality is not a guarantee	• Quality is Retained
• Emphasis is on Only Present Cost	• Emphasis is on Present and Future Cost
• Preventive Measure	• Corrective Measure
• Example : Substitute Material, Reduce Labour	• Example : Value Analysis, Increase Productivity JIT, Kaizen Costing

Activity Based Costing [ABC]

(1) Meaning & Basics

- Traditionally Overheads are recovered/allocated on the basis of 1 or 2 Recovery Rates [Based on Volume of Production], As a result accuracy of Cost of Product/Service Cannot be ensure
- Under ABC, Overheads are recovered on the basis of so many different Recovery Rates. Each Rate is based on an Activity
- It is used when Company Manufactures more than 1 Product/Variety of Product or Provide more

- It is used when Company Manufactures more than 1 Product / Variety of Product or Provide more than 1 Service

② Procedure of Allocation of Overheads and determination of Cost of Product/Service

- Identification of Various Activities of Organisation
- Determine Total Overhead / Cost Pool of each Activity
- Identify Cost Driver for Each Activity
- Determine number of units of Cost Driver of the Activity
- Determine Activity Based Recovery Rate [ABC Rate] for each Activity as follows:

$$\Rightarrow \frac{\text{Total Overhead of Each Activity}}{\text{Number of Units of Cost Driver of the Activity}}$$

- Now, Allocate Overheads to each Product on the basis of ABC Rates

③ Identification of Cost Drivers [If Specifically not given]

Activity	Cost Driver
Stores Receiving	No. of Purchase Requisitions
Machines / Operations	Machine Hours
Setup	Setup Hours / No. of Setups / No. of Production Runs
Inspection	Inspection Hours / No. of Production Runs
Dispatch	No. of Orders Executed

Target Costing

① Meaning & Basics

- Target Costing is a Cost Management Technique that aims at reducing Overall Cost of a Product with the help of Value Analysis

Overall Cost of a Product with the help of Value Analysis, Value Engineering and Other Concepts

- Target Costing is exact opposite of Cost based Pricing [Traditional Costing]

Traditional Costing
⇓
Sellers Market
⇓
Product Design
⊥
Total Estimated Cost
+
Desired Profit
⇓
Selling Price

Target Costing
⇓
Buyers Market
⇓
Market/Target Selling Price
⟵
Desired Profit
⇓
Target Cost
⇓
Product Design

② Steps of Target Costing

- Step 1 : Determination of Market/Target Selling Price with the help of Market Survey and Forecasting Techniques → 20
- Step 2 : Determine Target Cost P.u. as follows :

  Target Cost = Market/Target Selling Price − Desired Profit − Royalty [if any]

  20 − 4 − 1 [Royalty] = 15
- Step 3 : Determine Expected Cost or Current/Revised Cost P.u. of Product
  ⇓ New Product to be launched
  ⇓ Existing Product
  ⇒ 18

  [By Activity Based Costing, if data for ABC is given]
- Step 4 : Determine Cost Gap/Cost Reduction Target P.u. as follows :

  Expected Cost or Current/Revised Cost P.u. − Target Cost P.u.

  18 − 15 = 3 P.u.
- Step 5 : Now make efforts to achieve Cost Reduction Target with the help of Cost Reduction Techniques Such as Value Analysis, Value [illegible]
  Increase [illegible]

Cost Reduction Target with the help of Cost Reduction Techniques Such as Value Analysis, Value Engineering, Increase Productivity, Increase Efficiency, Value Chain Analysis, JIT, Kaizen Costing, 5S, TPM, Cellular Manufacturing etc

Note:

Proportionate Cost Reduction Plan: Under this Plan, Cost for each Category is Proportionately reduced in Proportion of Total Cost Reduction Target

(3) Components of Target Costing

Value Analysis

- → Analyse Existing Product
- → Eliminate any Cost which do not give any Contribution to Value
  [Eg. Machine Setup, Storage, Unnecessary Transport & Movement]
- → By Reviewing Product design and Material Composition

Value Engineering / Functional Analysis

- → Applies to design of New Product
- → Break Product into Functional Parts
- → Eliminate Unnecessary features and add new & attractive features

(4) Pros & Cons of Target Costing

Pros

- Real Savings
- Proactive Approach to Cost Management
- Focus on Value-added activities

Cons

- Require detailed Cost data
- May reduce Quality of Product
- High Forecasting & Estimation

(5) Issues & Challenges after adoption of Target Costing and their remedial measures

	Remedial Action
- Maintaining Target Price	

... Target Costing and their remedial measures

Remedial Action

- Maintaining Target Price : Apply Cost reduction techniques Such as kaizen Costing Continuously
- Environmental Issues : Pollution Control Norms
- Safety Issues : Safety Standards
- Competition : Apply Cost reduction techniques Such as kaizen Costing Continuously
- Unwanted Pressure on design & Implementation Stage : Strong Control over design team

(6) Most Suitable Situation for adopting Target Costing

- Target Costing is Most useful in those Situations where Substantial Amount of Product Costs are Committed during Product Design Phase [Manufacturing Sector]
- following Types of Organisations are expected to gain Maximum from Target Costing:
  - → Assembly Oriented Industries
  - → Involved diversification of Product Lines
  - → Use Technologies of Factory Automation
  - → Shorten Product life Cycles
  - → Implementing methods such as JIT, Value Engineering etc

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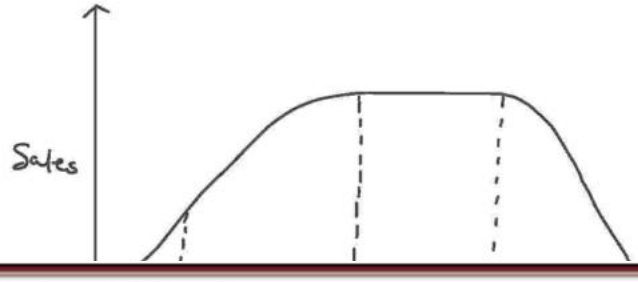
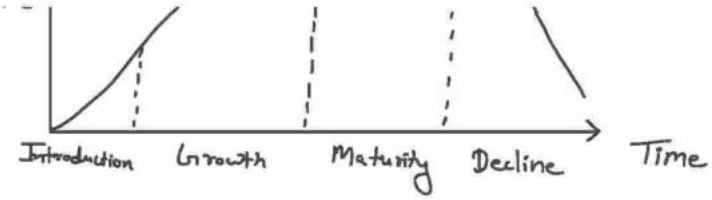
Life Cycle Costing

(1) Meaning & Basics

- Every Product has a Certain Life that vary from Few Months to Several years
- The Life Cycle of Product Consist of 4 Phases
  - → Introduction
  - → Growth
  - → Maturity
  - → Decline





- Customise Phases with regard to Type of Costs incurred
  - → Design : R&D, Design
    [Approx 80% of Product Cost is Committed in Design Phase, So Cost Management can be most effectively exercised during Design Phase]
  - → Manufacturing : Material, Labour, Overheads, Machining
    [Major Cost are incurred in Manufacturing Stage]
  - → Operation : Distribution, Advertising
  - → End of Life : Disposal, Cleanup

(2) Phases of Product Life Cycle

- **Introduction**

In this Phase, there is minimal awareness of Product. Competition is almost negligible and Profits are non existent

Characteristics

→ Huge Promotion Cost & Efforts
→ few Competitors Produce basic version of Product
→ Product refinement are not Possible

Strategies

→ Attracting Customers through Promotion
→ Expanding Channel & Supply Chain
→ Inducing Customer to Try Product

- **Growth**

In this Phase, Sales Increase rapidly because of greater Customer awareness. Competitors enter the Market in Large Numbers

Characteristics

→ High Volume of Business and Increase in Competition
→ Improving/Adding Features
→ Educating Market

Strategies

Strategies

→ Establish a clear brand identity
→ Control Product Quality to ensure Customer Satisfaction
→ Maximise availability of Product
→ Value Based Pricing Strategies may be used

- **Maturity**

In this Phase, Sales Continue to Increase but at decreasing rate. Intense Price Competition. Profit decline

Characteristics

→ Over Capacity in the Industry
→ High R&D Budgets
→ Customer Move towards Other Substitutes

Strategies

→ Strong Marketing Efforts
→ Product features may be Improved to differentiate from Competitors
→ Price have to be reduced to attract Price Sensitive Customers
→ Retention of Existing Customers & Trying to Win over Competitors Customers

- **Decline**

In this Phase, demand of Product disappears due to better and less Costly Substitutes

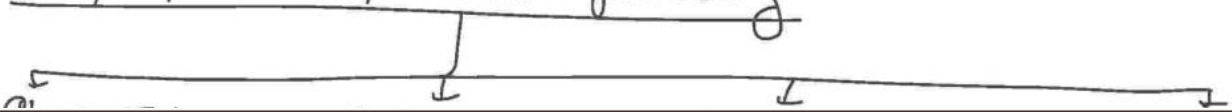
Characteristics

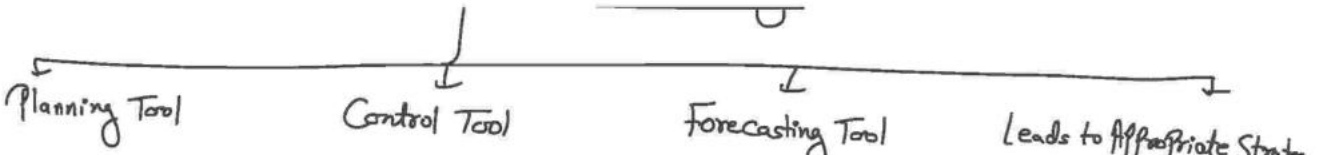
→ Sales drop to Zero or low level
→ Profit decline and becomes negative

Strategies

→ Firm can Continue to offer Product to its loyal Customers at reduced Price
→ Can discontinue Product
→ Use as Replacement Product for Launching another Product Successfully

③ **Uses / Importance of Product Life Cycle Costing**





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(4) Benefits of Product Life Cycle Costing

- It results in earlier actions to generate revenue or to lower Cost
- More Accurate and realistic assessment of Revenue and Cost
- Promote Long term Profitability rewarding
- Provides overall framework for Considering Total Cost over entire Life
- Traces Research, Design and Development Cost over entire Life Cycle

MR-LET

(5) Calculation of Product Life Cycle Cost and Product Life Cycle Profit

- Product Life Cycle Cost : Estimated Cost [to be incurred] over Entire Life

Particulars	(Rs.)
Research Cost/Design Cost/Development Cost	xx
Manufacturing Cost	xx
Marketing Cost	xx
Selling & Distribution Cost	xx
End of Product Cost	xx
Cost of Machine	xx
(-) Salvage Value	(xx)
	xx

- Product Life Cycle Profit

Product Life Cycle Sales [Estimated]	xx
(-) Product Life Cycle Cost	(xx)
	xx

Note

If PV factor is given [i.e. Time Value of Money is to be Considered]

If PV Factor is given [i.e. Time Value of Money is to be Considered]

Life Cycle Cost :

Machine Acquisition Cost / Initial Cost	XX
(+) PV of Annual Operating Cost	XX
(-) PV of Salvage Value	(XX)
	XX

Pareto Analysis

(1) Meaning & Basics

- It is based on 80:20 rule
- Observed by Pareto that 80% wealth of Milan City was owned by 20% Citizens and remaining 80% Citizens occupy only 20% wealth of the City
- This rule is used to Solve Business Problems Effectively

(2) Application of Pareto Analysis in Business

Pricing of Product
↓
20% Product = 80% Profit
80% Product = 20% Profit
↓
Focus on 20% [High Profit Products] and Delegate Pricing of 80% [Low Profit Products] to lower level of Management

Customer Profitability Analysis
↓
20% Customers = 80% Profit
80% Customers = 20% Profit
↓
Analyse which Customer is Profitable and Maintain Good relationship with them and Review Pricing of Other Customers

Stock Control
↓
20% Stock = 80% Value
80% Stock = 20% Value
↓
Special focus on 20% high Value Stock

Quality Control
↓
20% Defects = 80% Products
80% Defects = 20% Products
↓
First Remove 20% defects which are found in 80% Products

(3) Statement of Pareto Analysis

Particulars [Products/Defects/Customers]	Total Amount/Numbers [High to Low]	% of Total	Cumulative % Total
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
XX	XX	XX	XX
	XX	XX	XX

Environmental Management Accounting [EMA]

(1) Meaning & Basics

- Process of Collection & Analysis of Information relating to Environmental Costs for Internal Decision Making
- EMA identifies Cost of Environment related activities and seeks to Control these Costs
- Areas of Application of EMA
  - Product Pricing
  - Budgeting
  - Investment Appraisal
  - Setting Performance Targets

(2) Classification of Environmental Cost

(i) As Per Hansen and Mendoza

- Environment Prevention
- Environment Appraisal
- Environment Internal
- Environment Extern...

- **Environment Prevention Cost**
  - Preventing adverse Environmental Impact
  - Example: Investment in Pollution Control Equipments, Extra Investment in Protective Machines, Formulating Environmental Policies
- **Environment Appraisal [Detection] Cost**
  - Determine Process & Activities are in Compliance with Environmental Standards
  - Example: Monitoring & Testing, Contamination Test, Audit of Environmental Activities
- **Environment Internal Failure Cost**
  - Cost From Activities Produced but not discharged into Environment
  - Example: Recycling Scrap, Disposing Toxic Chemical
- **Environment External Failure Cost**
  - Cost on Activities Performed after discharge waste into Environment
  - Example: Penalties, Fines, legal Cost & Damages

(ii) As Per United States Environmental Protection Agency [USEPA]

- Conventional Costs : Usage of Resources [Material, Water, Energy etc.]
- Hidden Costs : Costs hidden in General Overheads
- Contingent Costs : Penalties, Fines etc
- Relationship & Corporate image Costs : Cost of Preparing Environmental Reports

(iii) General Classification

- Internal Environmental Costs : Incurred by Organisation
- External Environmental Costs : Born by Society

(3) Techniques for Identification and Allocation of Environmental Costs

- **Input-Output Analysis**
  - Input of Material Compared with final output. Difference is Waste/Scrap
- **Flow Cost Accounting**
  - Accounting of Waste at each step [Quantity, Cost, Value]
- **Life Cycle Costing**
  - Consider Total Environment Cost over entire Life
- **Activity Based Costing**
  - Allocation of Environment Cost to each Product

(4) Controlling / Managing Environmental Cost

- Waste
- Water
- Energy
- Transport
- Consumables &

Waste

- → Mass balance approach can be used to determine Material wasted in Production
- → By weight of Material bought Compared with Product yield
- → Minimise waste by using lean System

Water

- → Identify where Water used & how Consumption Can be decreased
- → RO, Ultrafiltration etc.

Energy

- → Identify Inefficiences & Wasteful Practices and remove them
- → Install LED Lights, 5 Star Energy Equipments, Solar Lights etc.

Transport & Travel

- → Invest in more fuel Efficient and Electric Vehicles

Consumables & Raw Materials

- → These are directly attributable Costs & discussions with Management Can reduce such Cost
- → Use recyclable Technology for Raw Material & Consumable
- → Example, Toner Cartridges refilled rather than replaced

(5) Reasons for Managing Environmental Cost / Why Management of Environment Cost is Important

- Carbon Footprint : Measures greenhouse gas released into atmosphere
- Environmental Costs are becoming huge, so they needs to be Manage
- For gaining advantage Over rivals and for Improving brand Image
- To Protect Organisation From Environmental Risks [Non Compliance of Regulations Can exposed to Environment risks such as fines, Penalties, legal Costs and damages]

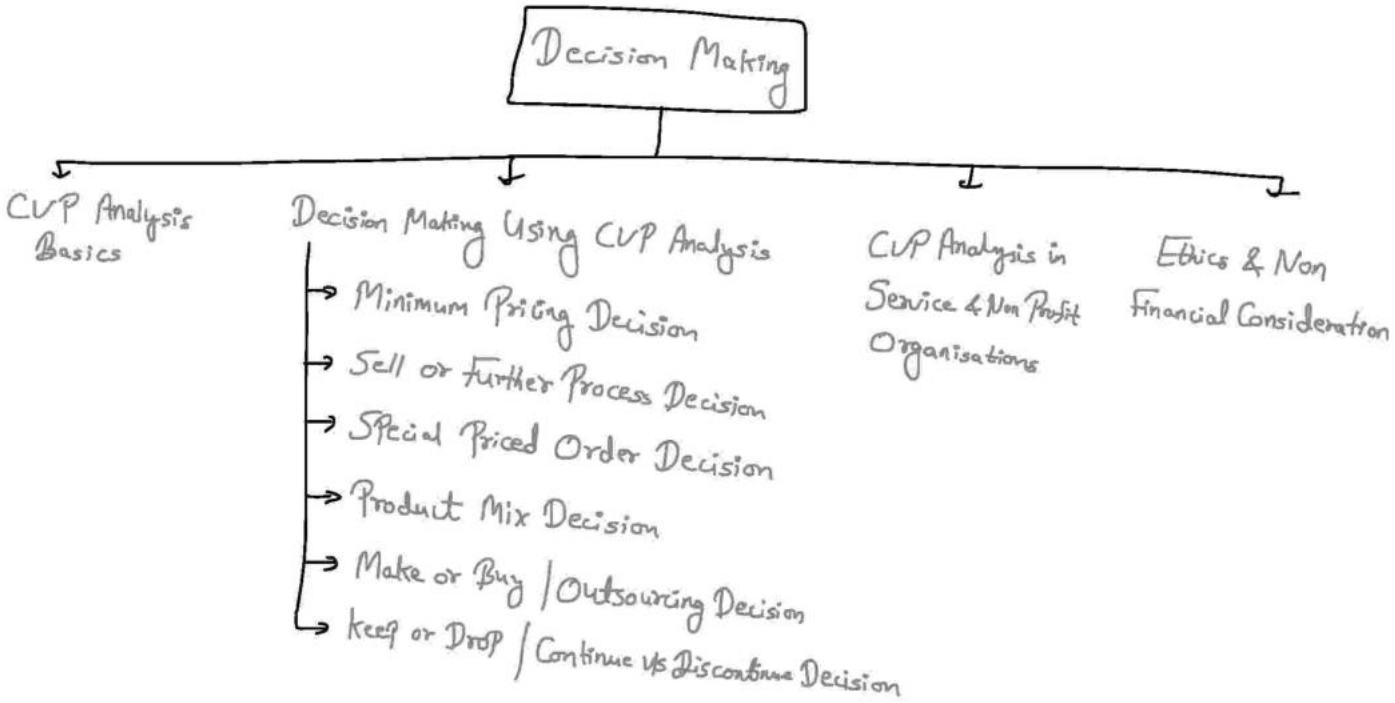
(6) Pros and Cons of EMA

Pros

- Improving Image
- Cost Reductions
  [Reduce or Eliminate Scrap Wastage, fines, Penalties etc]
- Improving Revenue
  [Also Provide Carbon Credits]

Cons

- Increase in Costs
- Additional burden on Top Management



CVP Analysis Basics

Different Types of Cost

① **Historical Cost** : Cost which is already incurred AND not effect Future Decisions

- **Sunk Cost** = Already Incurred & Paid in Past = Irrelevant for all Decision Making
- **Committed Cost** = Incurred in Past but not Paid upto yet = Irrelevant for all Decision Making

Example : Research and Development Cost [Already Incurred], Book Value of Assets etc

② **Opportunity Cost** : Maximum Benefit/Contribution forgone by rejecting alternative Course of Action. It is not Actual Cost but it is a Notional Cost

= Relevant for all Decision Mak...

... cost but it is a Notional Cost

∴ Relevant for all Decision Making

Example

(i) Funds Invested in Business = Rs 5,00,000

If funds not invested in Business, deposit in Bank @ 10% P.a.

Interest Income Forgone = 5,00,000 × 10% = 50,000

Opportunity Cost of doing Business = Rs 50,000

	Case 1	Case 2
Profit From Business	70,000	40,000
↳ OC of doing business	(50,000)	(50,000)
Net Benefit =	20,000	(10,000)

(ii) Big 4 = 9 lacs, MNC = 10 lacs, Govt. Company = 7 lacs

OC of doing Practice = 10 lacs

(iii) Market Manufacture ⇒ Contribution = 15,000

New offer ⇒ Pen Manufacture ⇒ Contribution = 11,000

∴ [Discontinue Market]

Net loss of Making Pen

Contribution from Pen = 11,000

↳ OC of making Pen = (15,000)

(4,000)

(iv)

Product	A	B	C
Contribution	20,000	18,000	25,000
OC	25,000	25,000	20,000

[Can Produce any 1]

(3) Out of Pocket Cost : To be incurred [Involves Payment]

(3) Out of Pocket Cost : To be incurred [Involves Payment]

⇓

Relevant for all Decision Making

(4) Fixed Cost / Fixed Overheads

↓

Allocated / Recovered / Absorbed / Added / Common / Existing

⇓

Irrelevant for all Decision Making

Except

- Cost Based Pricing
- Net Profit Calculation

→

Additional / Incremental / Avoidable / Specific / Traceable

⇓

Relevant for all Decision Making

Example

(i) CA in Progress

⇓

Fixed Cost [Coaching Fees]

	CA	CS Planning	Total FC
	1,00,000		1,00,000
	↓		
	50,000	50,000	1,00,000
		→ Irrelevant	
Due to CS, Additional Coaching Fees ⇓ 20,000	60,000	60,000	1,20,000
		→ 40,000 → Irrelevant	
		→ 20,000 → Relevant	

(ii) Product A Mfg.

⇓

Fixed Cost [Rent]

⇓

10,00,000

	Product A	Product B	Total FC
	5,00,000	5,00,000	10,00,000
		→ Irrelevant	

Product B offer

If Offer is Accepted, then FC Increase by Rs 1,00,000

5,00,000 | 6,00,000 | 11,00,000

6,00,000
- 5,00,000 → Irrelevant
- 1,00,000 → Relevant

Marginal Cost Sheet

	P.u.	Total
Sales	xx	xx
(-) Variable Cost	(xx)	(xx)
Contribution	xx	xx
(-) Total fixed Cost		(xx)
Profit		xx

Example

Product A Mfg. & Sale ⇒ 8,000 units

	P.u.	Total
Sales	10	80,000
(-) VC	(6)	(48,000)
Contribution	4	32,000
(-) Total Fixed Cost		(12,000)
Profit		20,000

Formulas

① **Contribution** : Excess of Sales over Variable Cost.
It Contributes towards recovery of Fixed Cost & Profit

- Sales over Variable Cost.

It Contributes towards recovery of Fixed Cost & Profit

Contribution = Sales − Variable Cost

or

Fixed Cost + Profit

In above Example

80,000 − 48,000 = 32,000

or

12,000 + 20,000 = 32,000

② Profit Volume Ratio [P/V Ratio] : Ratio of Contribution to Sales

$$P/V\ Ratio = \frac{Contribution\ P.u.\ |\ Total}{Sales\ P.u.\ |\ Total} \times 100$$

In above Example

$$\frac{4}{10} \times 100 = 40\%$$

or

$$\frac{32,000}{80,000} \times 100 = 40\%$$

③ Breakeven Point : No Profit No loss Point

Level of Sales where, Total Sales = Total Cost

or

Contribution = Total Fixed Cost

$$Breakeven\ Point\ [Units] = \frac{Fixed\ Cost}{Contribution\ P.u.}$$

$$Breakeven\ Point\ [Value] = \frac{Fixed\ Cost}{P/V\ Ratio}$$ or Breakeven Point [Units] × Selling Price P.u.

In above Example

$$BEP\ [units] = \frac{12,000}{4} = 3,000\ units$$

$$BEP\ [value] = \frac{12,000}{40\%} = 30,000 \text{ or } 3000\ units \times 10 = 30,000$$

	P.U.	Total
Sales	10	30,000 [3000 units]
↳ VC	(6)	(18,000)
Contribution	4	12,000
↳ FC		(12,000)
Profit		0

Activity Based Breakeven Point

$$\frac{\text{Fixed Cost (ABC) (Unanalyzed)} + [\text{Setup Cost} \times \text{No. of Setups}] + [\text{Engineering Cost} \times \text{No. of Engineering Hours}]}{\text{Contribution P.U.}}$$

(4) Margin of Safety : Excess of Actual Sales Over Breakeven Point

MOS (in value) = Actual Sales − Breakeven Sales

MOS (in Units) = Actual Sales Units − Breakeven Sales Units

In above Example

MOS (in value) = 80,000 − 30,000 = 50,000

MOS (in Units) = 8,000 units − 3,000 units = 5,000 units

(5) Indifference Point : Level of Production where Total Cost of Two Alt...
[Cost Breakeven Point]

(5) Indifference Point [Cost Breakeven Point] : Level of Production where Total Cost of Two different Alternatives [which are similar in all respect but differ in Cost Structure] becomes equal

Example

(i) Production of Product 'P'

	Machine A	Machine B
V.C. P.u.	10	20
Fixed Cost	60,000	80,000

(ii) Production of Product 'Q'

	Machine X	Machine Y
V.C. P.u.	10	15
Fixed Cost	2,00,000	1,50,000

$TC_X = TC_Y$

Assume Production Units = a

$10a + 2,00,000 = 15a + 1,50,000$

$15a - 10a = 2,00,000 - 1,50,000$

$a = \frac{2,00,000 - 1,50,000}{15 - 10} = 10,000$ units

// Indifference Points

$IDP = \frac{\text{Difference in Fixed Cost}}{\text{Difference in Variable Cost p.u.}}$

With the help of Indifference Point, A better alternative can be Selected

With the help of Indifference Point, A better alternative can be Selected

- If Expected Production = IDP → Then Select any Alternative
- If Expected Production > IDP → Then Select Alternative having High Fixed Cost
- If Expected Production < IDP → Then Select Alternative having Low Fixed Cost

In above Example → IDP = 10,000 units

	Case 1	Case 2	Case 3
Expected Production	10,000 units	12,000 units	7,000 units
	Any Alternative	Machine X	Machine Y

Decision Making Using CVP Analysis / Application of CVP Analysis

Minimum Pricing Decision

For Special Order/Job [One Time Order]

- Minimum Price to be Charged → Relevant Cost
- Evaluation of Special Order/Job → Relevant Revenue − Relevant Cost = Net Benefit/(Loss)

Relevant Revenue	XX
(−) Relevant Cost	(XX)
Net Benefit/(Loss)	XX

Relevant Revenue = Inflow due to Special Order

...it/(Loss) XX

Relevant Revenue = Inflow due to Special Order

Relevant Cost = Cost Incurred or Inflow avoided Due to Special Order

Determination of Relevant Cost of Each Element of Cost

Marker → One time Special Order Highlighter

Material

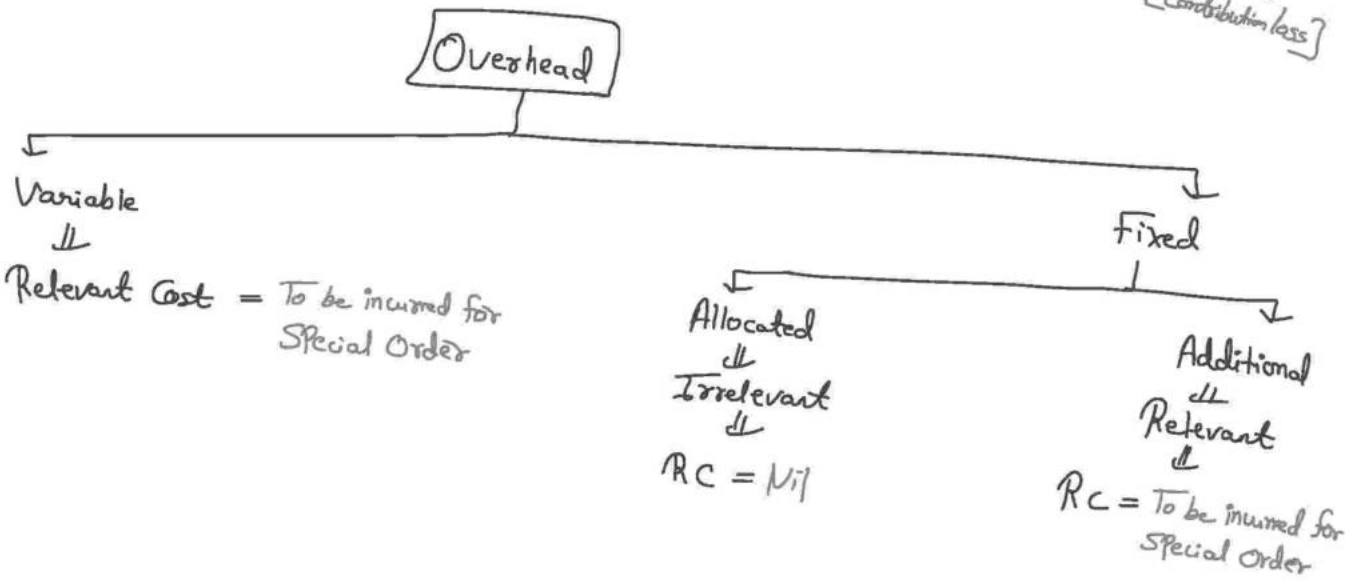
- Not in Stock (Glass)
  - ⇓ Relevant Cost = Purchase Price
- In Stock
  - Regular Use / Moving (Plastic)
    - ⇓ RC = Replacement Cost
    - [Replacement Cost = Purchase Price]
  - Obsolete / Irregular Use / Non Moving (Chemical)
    - If Saleable only ⇓ RC = NRV
    - If Can be Use as Substitute ⇓ RC = NRV or Benefit from Alternate Use ⇒ Higher
    - Cost to be Incurred on Disposal ⇓ RC = Negative [Savings]

Tax Audit → Special order [one time] & Bank Audit

Labour

- Temporary / Casual Labour
  - ⇓ RC = Wages Payable
- Permanent Labour
  - Surplus / Excess Spare Capacity ⇓ RC = Nil
  - Shortage / No Spare Capacity ⇓ RC = Wages + Opportunity Cost [Contribution lost]

Opportunity Cost [Contribution loss]

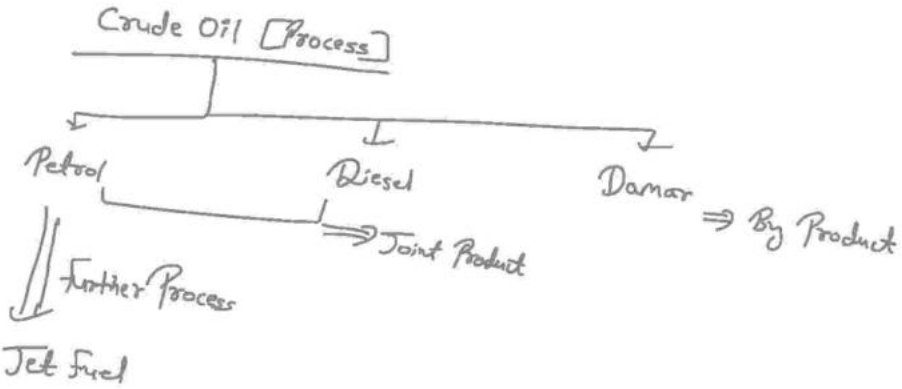


Two Main issues arise when Price is based on Relevant Cost

→ Profit Reporting : Different from Accounting

→ Pricing of future work : May not work for future similar Job/order

Sell or Further Process Decision



Decide whether Joint Product is to be Sold at → Split off Point or → Further Process & Sale thereafter

Incremental Revenue From Further Processing XX

[Revenue after Further Processing − Revenue at split off Point]

[Revenue after further Processing – Revenue at split off Point]

(–) Total Further Process Cost [VC + Add. FC] (XX)

Net Benefit From Further Processing XX / (XX)

↓ Further Process ↓ Sale at Split off

Note : Joint Process Cost or Cost upto Point of Separation / Split off are Sunk Cost as they are already Incurred . Hence Irrelevant

Example

Material → Process

⇓

Joint Products

	Product A	Product B	Total
Joint Process Cost Incurred	50,000	40,000	90,000
Sale Value at Split off	60,000	55,000	
Further Process Cost	10,000	8,000	
Sale Value after further Process	80,000	60,000	

Decide Whether Product A and B is to be Sold at Split off Point or after Further Processing

Solution

	Product A	Product B
Incremental Revenue ⇓		
Revenue after FP	80,000	60,000

	60,000	55,000
(–) Revenue at split off	(60,000)	(55,000)
	20,000	5,000
(–) Further Process Cost	(10,000)	(8,000)
Net Benefit/(Loss)	10,000	(3,000)
	⇓	⇓
	Further Process	Sale at split off

Note : Joint Process Cost of Rs 90,000 is Sunk Cost . Hence Irrelevant

Special Priced Order Decision

Decide Whether Special Priced Order should be → Accepted or Rejected

Revenue / Sale Amount From Special Priced Order	XX
(–) Variable Cost Incurred for Special Priced Order	(XX)
(–) Additional Fixed Cost Incurred for Special Priced Order	(XX)
(–) Opportunity Cost of Loss of Regular Sales [Only if there is Capacity Constraint]	(XX)
Net Benefit From Special Priced Order	XX / (XX)
	⇓ Accept / ⇓ Reject

Example

ABC Ltd. → Capacity = 10,000 units

⇓

HBC Ltd. → Capacity = 10,000 units

⇓

Product 'A' → Mfg. & Sale

⇓

5000 units → Selling Price = 140 P.u.
→ Variable Cost = 100 P.u.
→ Existing Fixed Cost = 1,50,000 → Irrelevant

Contribution
140 − 100 = 40 P.u.

Special Priced Order of Product 'A' = 1000 units @ Rs 120 P.u.
Additional Fixed Cost due to this Order = Rs 4,000

Decide whether Special Priced Order should be Accepted or Rejected

Solution

Sale Amt. From Special Priced Order [1000 × 120]	1,20,000
(−) VC for Special Priced Order [1000 × 100]	[1,00,000]
(−) Additional FC due to this Order	[4,000]
Net Benefit From Special Priced Order	16,000

⇓

Accept

Suppose in above Example, Capacity is 5500 units instead of 10,000 units

Capacity	5500 units
Special Order	(1000 units)
Remaining	4500 units

Current Normal Sale	5000 units
After Special Order	(4500 units)
Loss of Normal Sale =	500 units

OC of loss of Normal Sale [500 units × 40] = 20,000

Benefit as Computed above	16,000
(−) OC of loss of Normal Sale	(20,000)

Loss of Normal Sale (20,000)

Net Loss from Special Order (4,000)

∥

Reject

Other Factors to be Considered while Accepting Special Priced Order

- Statutory Compliances :
  - Documentation
  - Foreign laws [If Export order]
  - Penalty for non Compliances
- Buyer Creditworthiness :
  - Proper Assessment
  - 100% Advance
  - LC (If Export order)
- Industry Analysis :
  - Current & Future Demand of Product
  - Porter 5 Forces Analysis
- Additional Terms :
  - Delivery
  - Bank charges
  - Other Terms

BIAs

Product Mix Decision

Decide which Product and in what quantity should be Produced to Maximize Profit [In Case of Shortage of Resources and Multiple Products Production]

Such decision shall be taken with the help of Key Factor / Limiting Factor

Key Factor

Means any factor of Production [Material, Labour, Machine Hours] whose demand / Requirement is more than availability

When resources are Limited, decision is taken on the basis of following Parameter :

Key Factor → Decision Parameter

Material → Contribution P.U. of Material

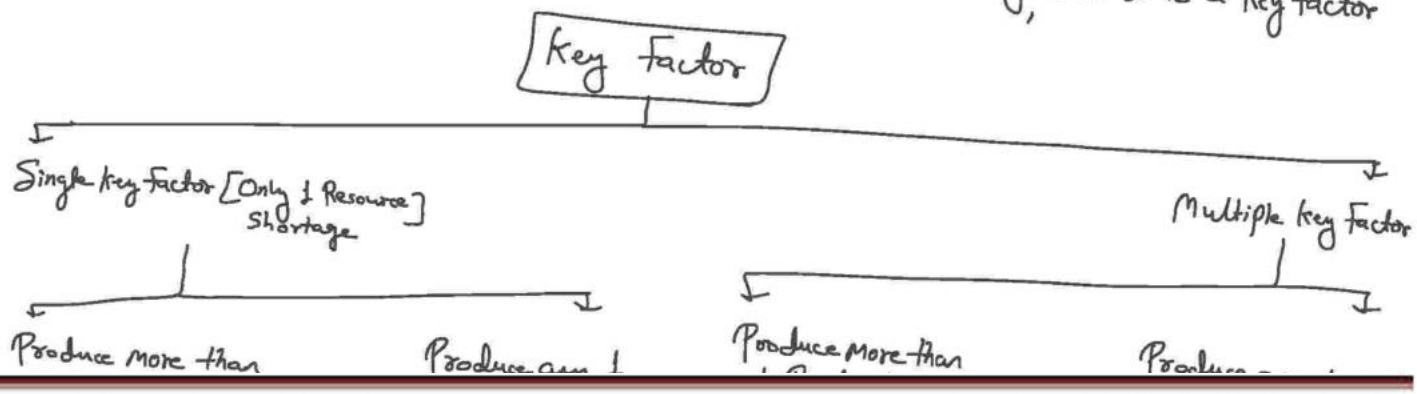
Labour → Contribution Per Labour Hour

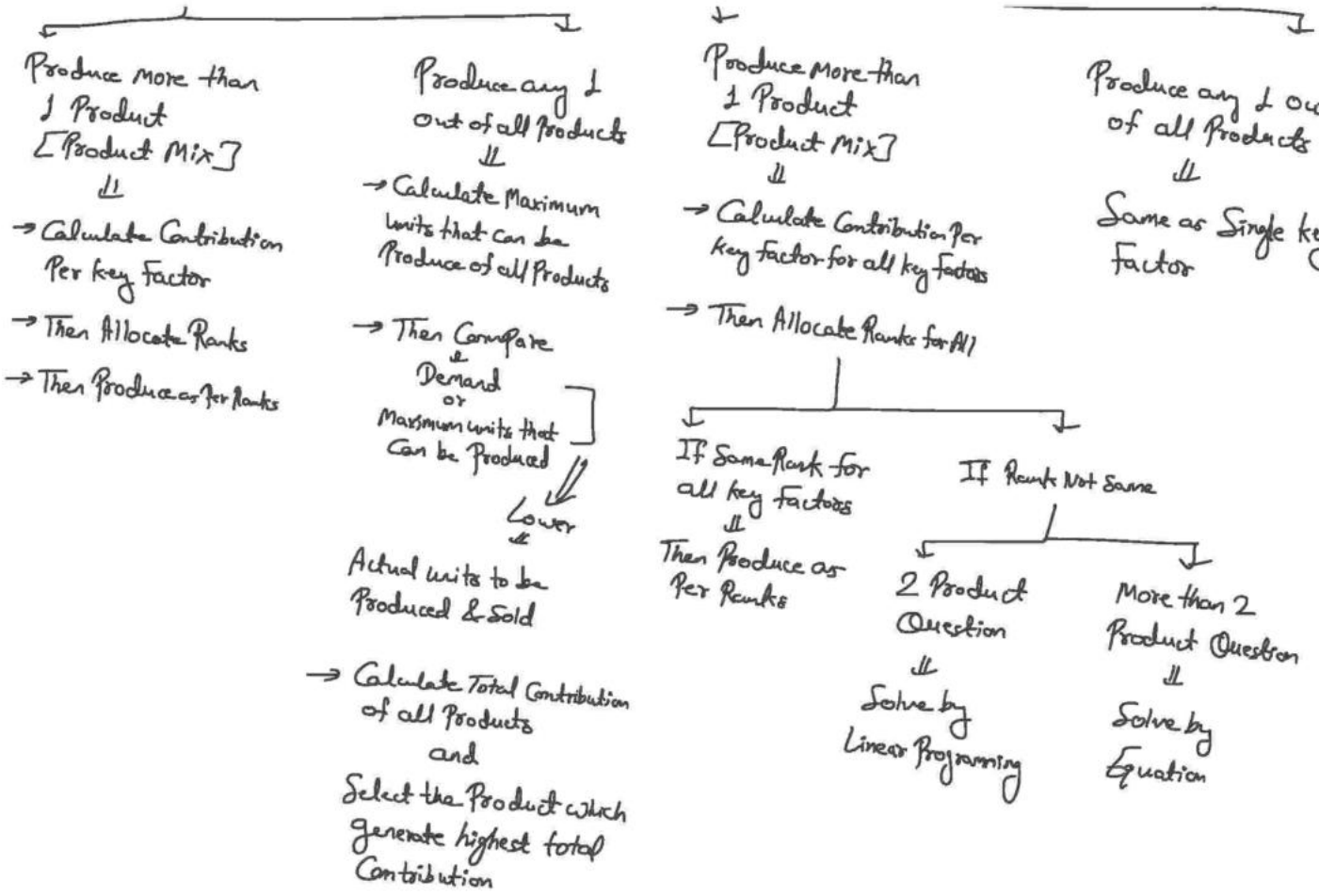
Machine Capacity → Contribution Per Machine Hour

Particulars	Products X	Y	Z
Selling Price P.U.	XX	XX	XX
↳ Variable Cost P.U.	(XX)	(XX)	(XX)
Contribution P.U. (A)	XX	XX	XX
Key Factor P.U. (B) [Material, Labour, Machine Hrs.]	XX	XX	XX
Contribution Per key Factor [A/B]	XX	XX	XX
Rank [on the basis of Contribution Per key Factor] ⇓ [Highest to Lowest]	–	–	–

→ Check Requirement and Availability of given Resources and Identify key Factor

→ If Requirement of any resource is more than Availability, then it is a key Factor





Note : [For Product Mix Question]

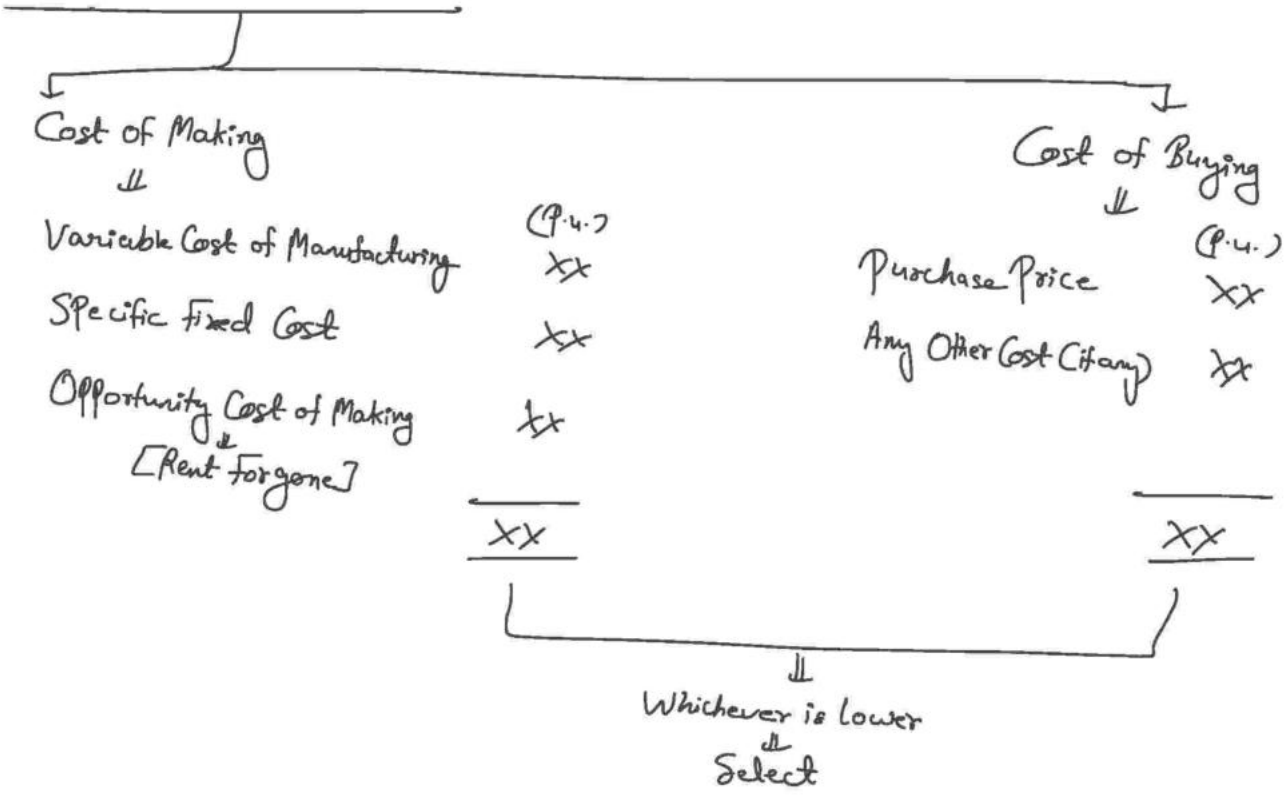
If Order is already accepted for any Product, then First Produce for such Order, then Produce as Per Ranks

Make or Buy | Outsourcing Decision

Decide whether Component / Product should be
- Manufactured or
- Purchased from Outside Supplier / Outsourced

- Single Component Question [No Capacity Constraint]
- More than 1 Product Question [Capacity Constraint]

Single Component Question



More than 1 Product Question

Step 1 : Calculate Savings due to Manufacturing Per unit

	Products			
	A	B	C	D
Outside Price / Buying Cost P.u.	XX	XX	XX	XX
↳ Variable Cost of Manufacturing P.u.	(XX)	(XX)	(XX)	(XX)
	XX	XX	XX	(XX)
				↓ Outsource

Note : If Outside Price of any Product is less than Variable Cost of Manufacturing/Production P.u. [Savings due to mfg P.u. Comes Negative], then Such Product Must be Purchased From Outside

Step 2 : Calculate Savings Per Key Factor

	A	B	C
Savings due to Manufacturing P.u (a)	xx	xx	xx
Key Factor P.u. (b)	xx	xx	xx
Savings Per key Factor $\left[\frac{a}{b}\right]$	xx	xx	xx

Step 3 : Give Ranks for Manufacturing Preference

Product having highest Savings per key Factor shall be given Rank 1 & so on

First Manufacture Rank 1 Product & so on upto Available Capacity. Remaining Outsource

Note : If any Product is not available Outside, then it has to be Manufactured First

Qualitative / Other Factors to be Considered in Make or Buy Decision

- Quality of Goods → Make or Buy
- Reliability of Supplier : Assurance for quality & timely delivery
- Financial Stability of Supplier
- Availability of Labour & Infrastructure for Manufacturing
- Demand Regularity of Product
- Confidentiality of Process
- Alternative uses of Capacity

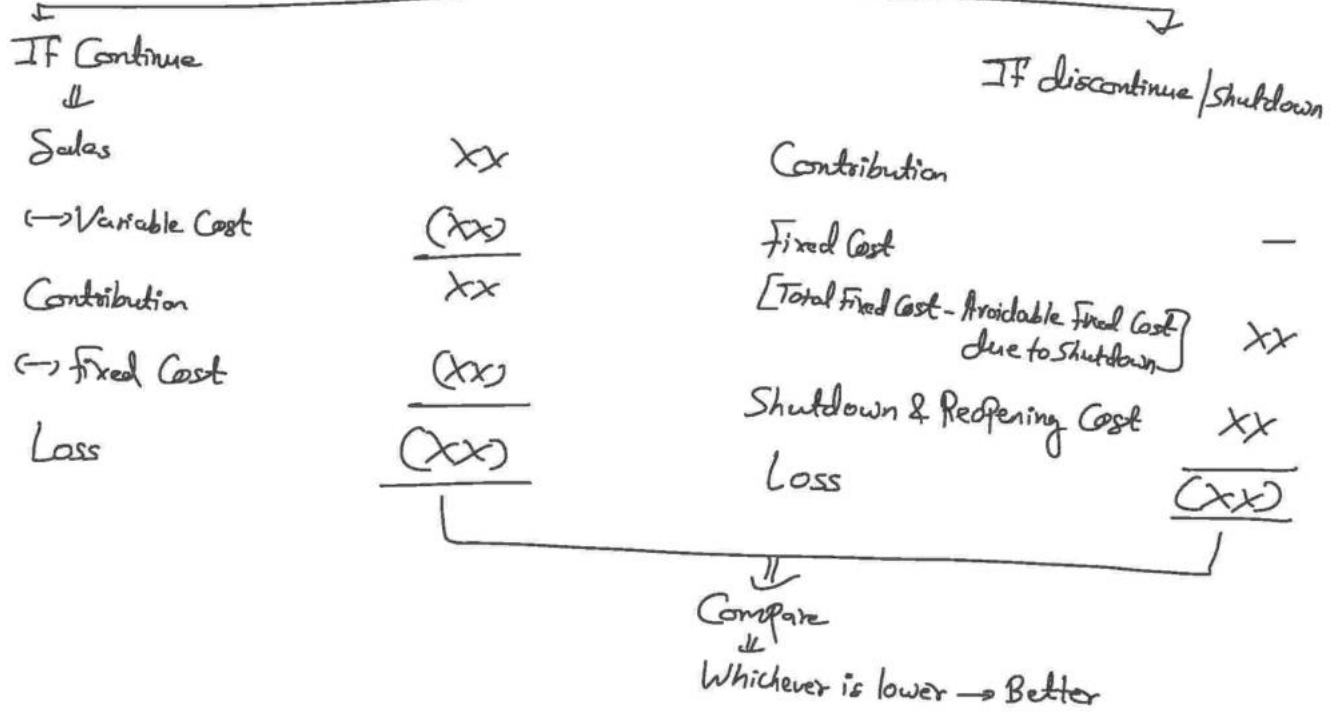
⇒ FQ - CARD

Keep or Drop / Continue or Discontinue Decision

Case I → Temporary discontinuance of Business/Production

Calculate Expected Loss

Calculate Expected Loss



$$\text{Shutdown Point} = \frac{\text{Total Fixed Cost (if Continue)} - \text{Total Fixed Cost (if Discontinue)}}{\text{Contribution Per Unit}}$$

[Includes Shutdown & Reopening Cost]

Case II → Discontinuance of Product/Division

Decide whether Particular Product or Division should be Continued or Not

Calculate Net Gain/Loss due to discontinuance

Gain/Savings due to discontinuance

Specific/Avoidable Fixed Cost	XX
Opportunity Gain due to discontinuance [if any]	XX
(A)	XX

Loss due to discontinuance

Contribution Loss	XX

Contribution Loss — XX

Any Other Loss [if any] — XX

(B) — XX

Net Gain / Net (Loss) due to discontinuance [A - B] — XX / (XX)

↓ Discontinue ↓ Continue

Qualitative / Other factors to be Considered in Continue or Discontinue Decision

- Adverse effects of discontinuance on Sale of Other Products
- Customer Relations
- Supplier Relations
- Employee Relations
- Timing of Shutdown

AC-SET

CVP Analysis in Service Organisations

- Cost Per Unit of Service
- Profitability of Service Organisation

Calculation of Cost Per Unit of Service

→ Determine Total Expenses for Specified Period

→ Determine Unit of Service for the Same Period

Output / Cost Unit of Service Industry differs from Manufacturing Industry

Service Organisation — Cost Unit of Service

(a) Hotel

Per Room Per day [Room Days]
⇊
No. of Rooms × No. of days × Occupancy Rate

(b) Hospital

Per Bed Per day [Bed Days]
⇊
No. of Beds × No. of days × Occupancy Rate

(c) Transport
⇊
Passenger

Per Passenger Per km [Passenger km]
⇊
No. of Seats of Passengers × Distance × Occupancy Rate

Goods

Per Tonne Per km [Tonne km]
⇊
Weight × Distance

→ Now, determine Cost Per Unit of Service as follows : $\frac{\text{Total Expenses}}{\text{No. of Unit of Service}}$

→ Taking | Hire | Fare p.u. = Cost p.u. of Service + Profit Margin

Profitability of Service Organisation

Revenue	XX
↳ Variable Cost	(XX)
Contribution	XX
↳ Fixed Cost	(XX)
Profit / Loss	XX

Ethics and Non Financial Considerations in Decision Making

- Organisation should analyse both Financial as well as Non Financial factors because modern organisations have moral duty to care wide range of Stakeholders not Just Owners

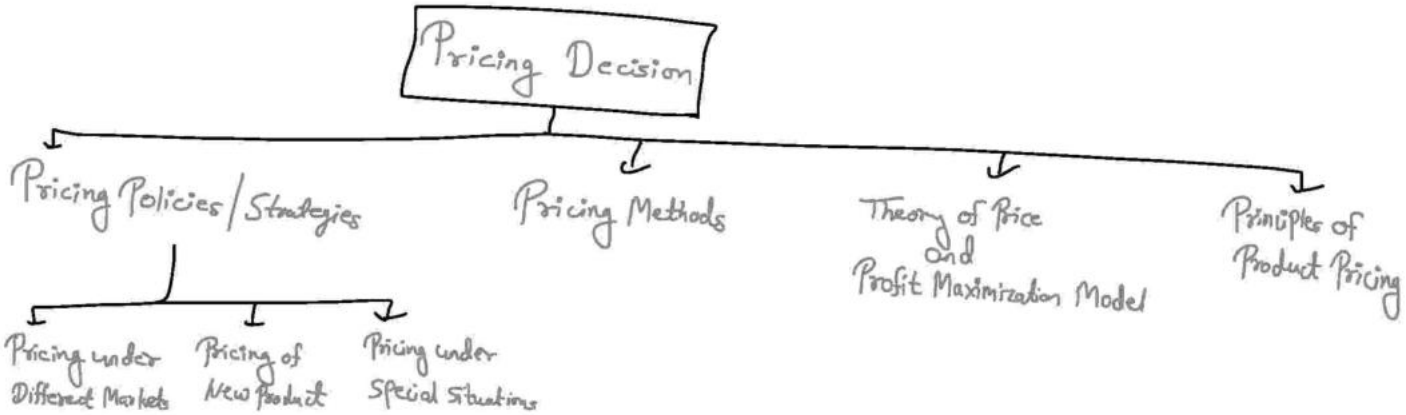
modern organisations have Moral duty to Care wide range of Stakeholders not Just Owners

- If Organisation does not Consider Ethics and Non Financial Considerations in Decision Making, It may earn Profit in Short run but will hurt Profitability in Long run

- Some Ethical and Non financial Considerations in Decision Making
  - → Government Regulations : Ensure all relevant Laws & Regulations are Complied Otherwise may face Penalties
  - → Employee Satisfaction/Motivation : Consider Employee Satisfaction Otherwise Strikes, Lockouts and Protest by Employees
  - → Quality
  - → Corporate Social Responsibility [CSR] : Responsibility towards Society & Environment
  - → Availability of Resources : Analyse Availability of Material, Manpower, Infrastructure etc
  - → Customer Satisfaction
  - → Environmental Factors : Consider Factors such as Pollution, deforestation etc If adverse affect on Environment, Protest by Environmentalist
  - → Humanity Values and Business Ethics : Should act in Fair and Transparent Manner and be honest in all dealings

⇒ GEO-CACHE

- Benefits of Considering above Factors
  - → Ensures Profitability and Sustainability in Long Run
  - → Avoid bad Publicity and Protect brand image
  - → Avoid Potential legal Action
  - → Ethical Operating Environment gives well being to Employees



Pricing : **Policies or Methods** for determining Selling Price of Product / Service

- External Pricing → Chapter 6 → Pricing Decision
- Internal Pricing → Chapter 8 → Divisional Transfer Pricing

Pricing Policies / Strategies ⇒ Which Selling Price is Best for Business
- → Market
- → Product
- → Situation

Pricing Methods ⇒ How to Calculate that Selling Price

Pricing Policies / Strategies

Pricing under different Markets

- **Perfect Competition**
  - large number of Sellers Selling identical [homogeneous] Product / Service
- **Monopoly**
  - Only One Seller of Product and No Substitute
- **Monopolistic Competition**
  - Large no. of Sellers Selling Similar but not identical Product
- **Oligopoly**
  - Few number of Sellers Selling identical Product

Selling identical [homogenous] Product/Service
- Free Entry & Exit

Eg. → Cement Industry, Medicine Industry

↓↓

No Pricing Policy [Market Price]

of Product and No Substitute
- Firm is Price setter

Eg. → Microsoft Windows

↓↓

Any Price [Premium Price]

Large no. of sellers selling Similar but not identical Product/Service

Eg. → Mobile Industry, Restaurants

↓↓

Market Price or Below Market Price

Few Number of Sellers Selling identical Product/Service

Eg. → Telecom Industry

↓↓

→ Predatory Price
→ Limit Price
→ Raise Price Together

Pricing of New Product

① Categories of New Product

Revolutionary Product
↓↓
→ Replaces Existing Technology
→ Totally New

Eg. Normal → Android TV
Channels → OTT Platform

↓↓
Premium/Skimming Pricing

Evolutionary Product
↓↓
Upgraded Version of Earlier Product

Eg. Intel Core i7 10th gen → 11th gen
Redmi Note 5o → Note 10 Pro
(Evolutionary)

↓↓
Demand Based Price [Price higher than earlier version]

Me-too Product
↓↓
Similar to/Copy of Revolutionary or Evolutionary Product of Other Firms

Eg. Sputnik Vaccine → Covishield Vaccine

Pfizer ≅ Corex → Rancof Rexcof (Me-too)

↓↓
Market Price/Penetration Price

② Pricing Strategies for New Product

→ Skimming Pricing
→ Penetration Pricing

- **Skimming Pricing** : Under this Strategy Product is introduced in the Market at high Price, later on Price is decreased gradually

Circumstances of Adoption

→ Product has Innovative features
→ Skim the Cream by Selling [illegible]

→ Product has Innovative Features
→ Skim the Cream, by Selling out few units & earn higher Profit
→ Demand Inelastic
→ High Initial Cost incurred such as R&D Cost, Patent Cost etc
→ Product launched in highly Priced Segment
→ Reduction in Price in later years may increase Sales

- **Penetration Pricing** : Under this Strategy, Product is introduced in the Market at low Price. When Product is established in the Market, Price is gradually Increased

Circumstances of Adoption

→ For Setting Market / Penetrate the Market
→ Demand Elastic
→ Substantial Savings due to large Scale Production [Economies of Scale]
→ Threat of Competition

(3) Change in Selling Price and Production Cost in Skimming and Penetration Strategy during Product life Cycle

Skimming → Product life Cycle

	Introduction	Growth	Maturity	Decline
Selling Price	High Price	Reduce Price → less unique as Competitors Use reverse engineering → To discourage Competitors from entering the Market → To Gain Market Share / Achieve growth in Sales Volume	Reduce Price or Constant [add ons]	Reduce Price [Cost or Below Cost]
Production Cost	High Cost → Innovative Product	Reduce → due to large Scale Production	Constant → Since Production is no longer	Increase → due to low Production

Cost

↓ Innovative Product

↓ Due to large Scale Production
→ Bulk discount / Negotiate better Price from Supplier
→ learning & Experience Curve Benefits
→ fixed Cost Spread over larger Number of Units [Economies of Scale]

↓ Since Production is no longer Increase
→ Material Cost remain Constant
→ labour Cost remain Constant
→ O/H Cost remain Constant

↓ due to low Production

Penetration → Product life Cycle

	Introduction	Growth	Maturity	Decline
Selling Price	Low Price [VC/MC]	Increase Price [Total Cost or TC Plus Some Margin]	Increase Price	Constant
Production Cost	Low Cost	Reduce	Constant	Increase

Pricing Under Special Situations

1. New Product For the Company but not for the Market → Market Price
2. Perishable Goods → Any Cash Realizable Value
3. Large Stock & Market has fallen [Outdated Product] → Pricing below Marginal Cost
4. Pricing in Period of Recession → less than Total Cost but above Marginal Cost

Pricing Methods

- Cost Based
- Competition Based
- Value Based

Cost Based | Competition Based | Value Based

Cost Based Method

- **Full Cost Method**

Selling Price = Total Cost + Desired Profit

Total Cost = [Variable Cost + Fixed Cost]

Example

Bottle Manufacturer
- Estimated Production = 10,000 units
- Normal Capacity = 8,000 units
- Installed Capacity = 15,000 units

Cost Structure P.U.

	(Rs.)
Direct Material	9
Direct labour → VC	6
Variable OH	5
Fixed OH → FC	10
Total Cost P.U.	30

Desired Profit Margin = 25% of Cost

Calculate Selling Price P.U. of Bottle by Full Cost Method

Solution

Total Cost Basis

VC

DM [9 × 10,000 units]	90,000
DL [6 × 10,000 units]	60,000
VO [5 × 10,000 units]	50,000
	2,00,000

FC

FC [10 × 8,000 units]	80,000
Total Cost	2,80,000
(+) Profit Margin [25% × 2,80,000]	70,000
Total Sales	3,50,000
Selling Price p.u. [3,50,000 / 10,000 units]	Rs 35 p.u.

- **Full Cost Method based on Return on Investment [ROI] / Return on Capital Employed [ROCE]**

Selling Price = Total Cost [Variable Cost + Fixed Cost] + Desired ROI/ROCE in Rs.

Desired ROI/ROCE in Rs. = Capital Employed × ROI/ROCE (%)

Capital Employed = [Fixed + Current/Variable/Working Capital]

Example

Per Manufacturer → Estimated Production = 1,00,000 units

Cost

Variable Cost = 3,00,000
Fixed Cost = 2,00,000

Capital Employed

Fixed Assets = 15,00,000
Current Assets = 5,00,000

ROI Required = 20%

Calculate Selling Price p.u.

Solution

Total Cost	
VC	3,00,000
FC	2,00,000
	5,00,000

Desired RoI in Rs
⇓
CE × RoI (%)
⇓
20,00,000 × 20%
[15,00,000 + 5,00,000]
⇓
4,00,000

Sales = TC + Desired RoI in Rs.
= 5,00,000 + 4,00,000 ⇒ 9,00,000

Selling Price p.u. ⇒ $\frac{9,00,000}{1,00,000}$ = Rs 9 p.u.

Special Points for Cost Based Method

→ Calculation is to be done on total basis [Calculate Total Sales, then Convert it into P.u.]

→ If More than 1 figure is missing in question, then Assume Sales Price p.u. = X

→ If Multiple Selling Price is given and question ask for Most Profitable Course of action, then Select the alternative which gives Maximum Profit

→ Profit as a % of Sales → Conversion into Profit as a % of Cost

10% of Sales = $\frac{1}{9}$ of Cost

20% of Sales = 25% of Cost

25% of Sales = $33\frac{1}{3}$% of Cost

$33\frac{1}{3}$% of Sales = 50% of Cost

50% of Sales = 100% of Cost

Competition Based Method

(i) Going Rate Pricing

Selling Price = Average Level Charged by the Industry

(ii) Scaled Bid Pricing

Use in Case of Tenders / Bids / Contract

Selling Price = lower than Contract Price Set by Competitors

Value Based Method

It is based on Market Research

Steps

→ Calculate True Economic Value [TEV]

True Economic Value [TEV] = Cost of Next Best Alternative + Value of Performance Differential

|| || ||

Value/Benefits that a Product intends to deliver to Customer | Value of Comparable Product of Other firms | Additional Features/Benefits from your Product

[If any additional Cost is incurred due to Product, then it has to be deducted]

→ Then, Calculate Perceived Value

Perceived Value = Amount which Customer is willing to spend for your Product

→ Then, Price decide

Selling Price = Lower than Perceived Value but higher than Cost

Example

LG → New AC launch

||

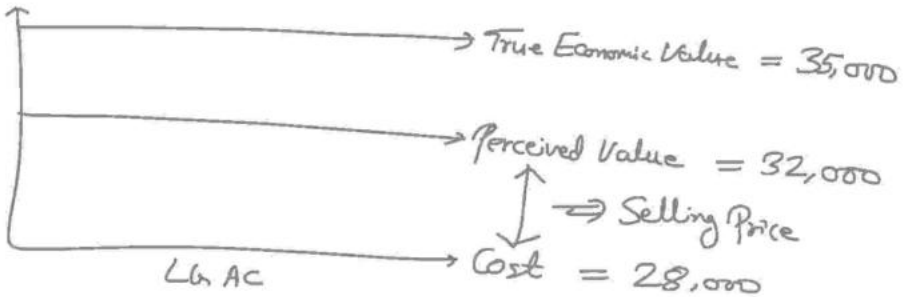
Comparable AC of Voltas [Single Inverter], Selling Price = 30,000

LG AC additional Features → Dual Inverter
→ Wifi Connectivity } → Cost = 5,000

TEV = 30,000 + 5000 = 35,000

Perceived Value of Lg Ac = 32,000

Total Cost of Lg Ac = 28,000



Theory of Price

Optimum Selling Price : Price which gives Maximum Total Profit

Example

Product A
- Current Selling Price = Rs 25 p.u.
- Variable Cost = Rs 17 p.u.
- Fixed Cost = Rs 20,000
- Current demand = 10,000 units

If Change in Selling Price by Rs 1 p.u., then Increase/decrease in demand by 1000 units

Optimum Selling Price

Selling Price [p.u.]	Variable Cost [p.u.]	Contribution [p.u.]	Demand [units]	Total Contribution	Fixed Cost	Profit
23	17	6	12,000	72,000	20,000	52,000
24	17	7	11,000	77,000	20,000	57,000
25	17	8	10,000	80,000	20,000	60,000
26	17	9	9,000	81,000	20,000	61,000
27	17	10	8,000	80,000	20,000	60,000

24	14	10	8,000	80,000	20,000	60,000
28	17	11	7,000	77,000	20,000	57,000

Optimum Selling Price = Rs 26 P.U.

Profit Maximization Model

Profit is Maximum at, When

Marginal Revenue = Marginal Cost

$a - 2bQ$ = Variable Cost

Selling Price Calculation

$$P = a - bQ$$

Where,

P = Selling Price Per Unit

a = Selling Price at which demand is 0

b = $\frac{\text{Change in Price}}{\text{Change in Quantity / demand}}$

Q = Optimum demand quantity

In above Example

VC = Rs 17 P.U.

a = 35

b = $\frac{1}{1000}$

Q = ?

P = ?

Solution

$$MR = MC$$

$$a - 2bQ = VC$$

$$35 - 2 \times \frac{1}{1000} \times Q = 17 \Rightarrow$$

$$35 - \frac{2}{1000}Q = 17$$

$$35 - 17 = \frac{2}{1000}Q$$

$$18 = \frac{2}{1000}Q$$

$$Q = \frac{18 \times 1000}{2} = 9000 \text{ units}$$

$$P = a - bQ$$

$$= 35 - \frac{1}{1000} \times 9000$$

$$\Rightarrow 35 - 9 = 26$$

Steps for Calculation of Optimum Selling Price

→ Calculate Optimum Demand Quantity [Q] by using $MR = MC$ [$a - 2bQ = VC$]

→ Then, Calculate Optimum Selling Price by using $P = a - bQ$

Note

If only Selling Price is required to be Calculated by using above Formula, then directly use $P = a - bQ$

Principles of Product Pricing

Price Customization

Ways in which Price Customization can be done

- Based on Product Line
- Based on Customer Past behaviour
- Based on Demographics
- Based on Time differential

PCDT

Price Adjustment Policies

- Cash Discount
- Quantity Discount
- Distributor Discount
- Geographic Pricing
- Price Discrimination [Differential Pricing / Peak-load Pricing]

Price Sensitivity

- It measures Customer behavior to change in Price of Product
- Price Sensitivity
  - High : Change in Price results in Change in Demand / Customer behavior
  - Low : Change in Price does not result in Change in Demand / Customer Behavior
- Factors that Contribute to Price Sensitivity
  - Unique Value Effect : Low
  - Difficult Comparison Effect : Low
  - Shared Cost Effect : Low
  - Price Quality Effect : Low
  - End benefit Effect : Low

PS-STUDIES

- Attribute to Price Sensitivity

→ Unique Value Effect : Low

→ Difficult Comparison Effect : Low

→ Shared Cost Effect : Low

→ Price Quality Effect : Low

→ End benefit Effect : Low

→ Total Expenditure Effect : Low

→ Sunk Investment Effect : Low

→ Inventory Effect : Low

→ Substitute Awareness Effect : High

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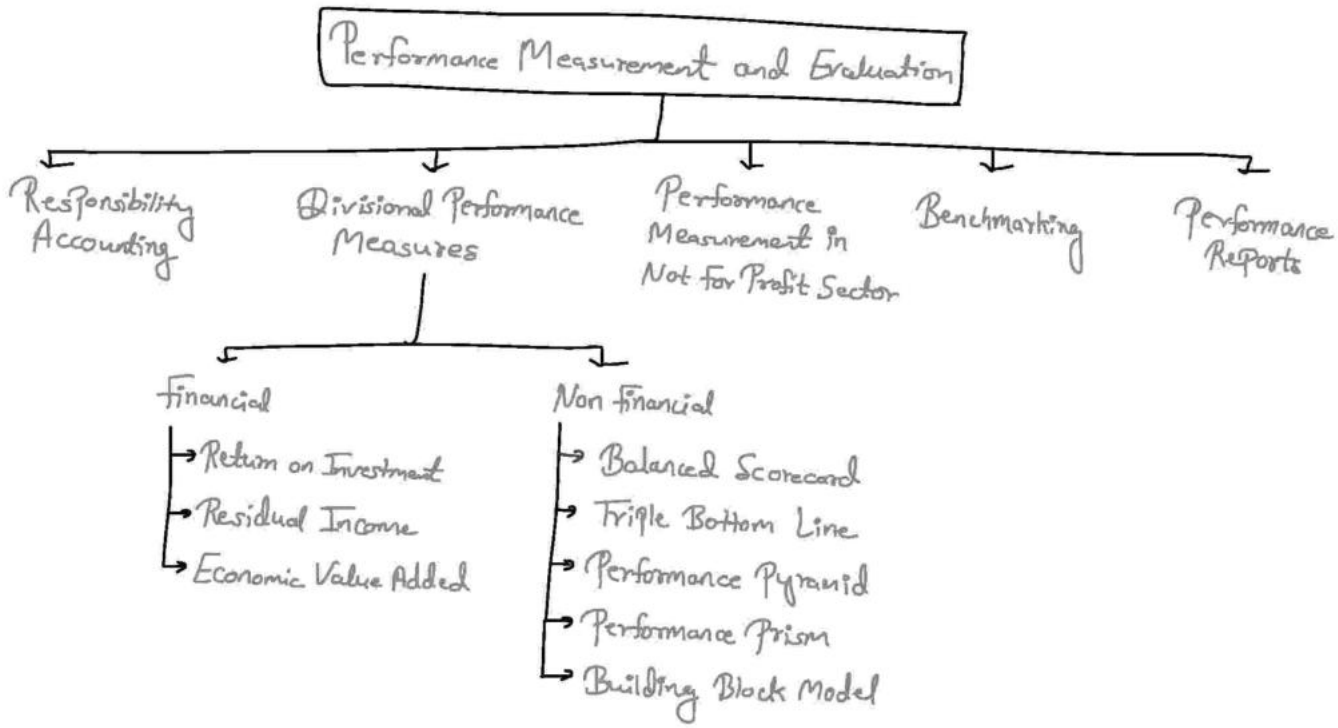


Responsibility Accounting

① Meaning & Basics

- Decentralisation : Delegation of decision making authority to lower levels of Organisation
- Responsibility Accounting means Collection, Summarisation & Reporting of financial Information where Individual Manager is held responsible for Certain Costs, Revenue or Assets of Firm
- Objective of Responsibility Accounting is to Judge each Manager Performance
- Responsibility Centre is a specific unit of Organisation assigned to a Manager

② Four recognised levels of Decentralisation

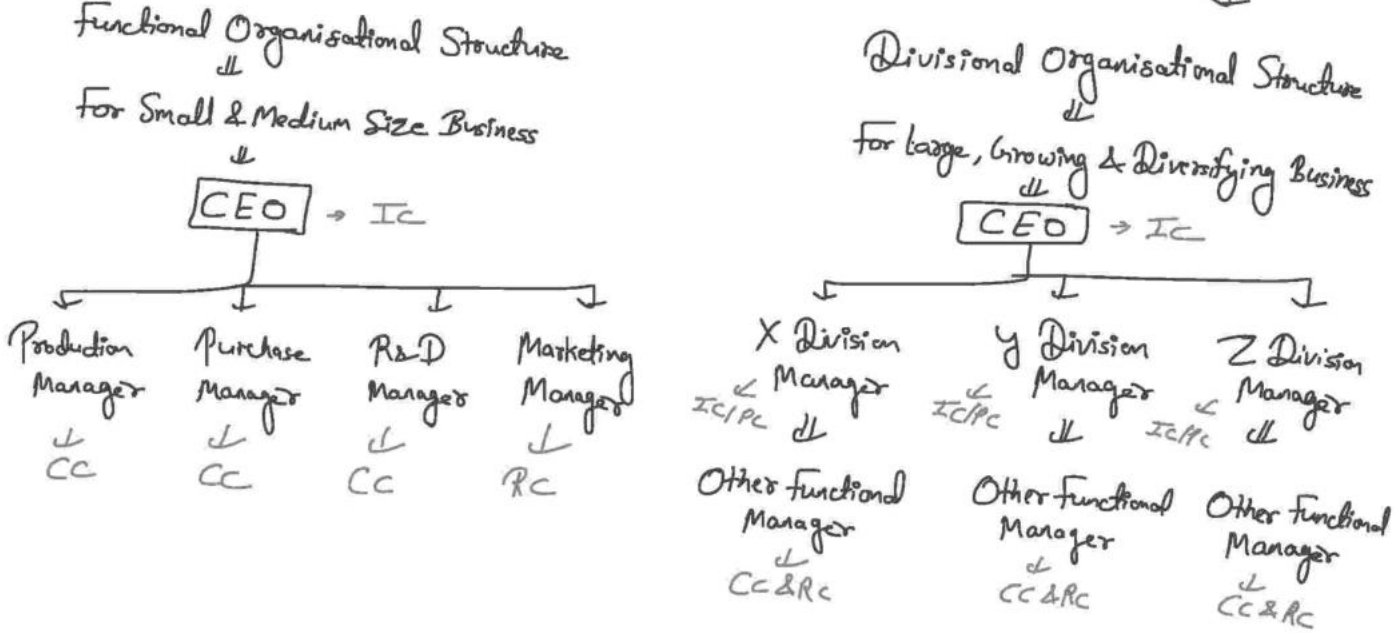
- Cost Centre : Responsible for Cost, Main Focus Cost Minimization. Performance Measured on the basis of Cost Variance

- Revenue Centre : Responsible for generation of Revenue.
  Performance Measured on the basis of Sales Variance

- Profit Centre : Responsibility for both Revenue & Cost.
  Performance Measured on the basis of Profit

- Investment Centre : Responsible for not Just Revenue & Cost but also Assets & Investment Decisions.
  Performance Measured on the basis of RoI, RI, EVA

③ Organisational Structure



Divisional Performance Measures

Financial Measures

Return on Investment [RoI]

- RoI express divisional Profit as a % of Assets Employed in Division

- ROI express Divisional Profit as a % of Assets Employed in Division
- ROI of Division = $\frac{\text{Controllable Profit of Division}}{\text{Net Assets / Operating Assets / Investment of Division}} \times 100$

→ Controllable Profit of Division = Operating Profit [PBIT] [Profit Controllable by Division Manager]
[Ignore Head Office Cost]

→ Net Assets of Division = Current Assets + Non Current Assets − Liabilities
[Ignore Head Office Assets & Liabilities]

- Evaluating Divisional Managers Performance on the basis of ROI may not encourage Goal Congruence

Example

	Division A	Division B
Proposed Investment	20 lacs	20 lacs
Controllable Profit from above	2 lacs	1.4 Lacs
ROI of Proposed Investment [$\frac{2}{20}\times100$]	10%	[$\frac{1.4}{20}\times100$] 7%
Present ROI	13%	5%
Overall Cost of Capital of Company / Company ROI		8%
As Per Division	Not Invest	Invest
As Per Company	Invest	Not Invest

Residual Income [RI]

- To Promote Goal Congruence, RI approach can be used to Measure Performance
- Residual Income = Controllable Profit of Division − [Overall Cost of Capital of Company × Investment of Division]
- If Residual Income → Positive : Accept
  → Negative : Reject

Example

	Division A	Division B
Proposed Investment	20 lacs	20 lacs
Controllable Profit from above	2 lacs	1.4 lacs
Overall Cost of Capital of Company		8%
Residual Income	40,000 [2 lacs − (8·1·X 20 lacs)]	(20,000) [1.4 lacs − (8% X 20 lacs)]
As Per Division & Company	Accept / Invest	Reject / Not Invest

- Residual Income has disadvantage of being an absolute Measure - It is difficult to Compare Performance of two divisions of different size based on RI

Example

	Division X	Division Y
Investment	1,00,000	1,00,00,000
Residual Income	20,000	4,00,000

Cannot be Compared on the basis of RI

Economic Value Added [EVA]

- EVA is a measure of Economic Profit which shows real Value Creation. If EVA is Positive, then Performance is Acceptable
- EVA = Profit Available for Debt & Equity − Charge on Capital
  = NOPAT − [WACC × CE]
- NOPAT : Net Operating Profit After Tax

Operating Profit before Interest & Tax [OPBIT]	xx
(−) Interest	(xx)
Profit before Tax	xx
(−) Tax	(xx)
Profit After Tax (PAT)	xx
(+) Interest (Net of Tax)	xx
NOPAT =	xx

Alternate

NOPAT = PAT + Interest (1 − Tax)
= PBT (1 − Tax) + Interest (1 − Tax)
= PBT + Interest [1 − Tax]
NOPAT = OPBIT [1 − T]

$$NOPAT = OPBIT\,[1 - Tax]$$

- **WACC : Weighted Average Cost of Capital**

$$WACC = W_e \times k_e + W_d \times k_d$$

W_e = Share Capital + R&S / (Share Capital + R&S + long term Debt)

k_e = Cost of Equity

W_d = Long term Debt / (Share Capital + R&S + long term Debt)

k_d = Post Tax Cost of Debt = Interest Rate [1 - Tax]

- **CE : Opening Capital Employed**

$$CE = \text{Opening}\,[\text{Share Capital} + R\&S + \text{Long Term Debt}]$$

- **If Adjustments Given**

→ Non Cash Expenses
  - Eg. → Provision for bad debts, Other Non Cash items

→ Deferred Revenue Expenses
  - Eg. → R&D, Training, Marketing

→ Depreciation
  - Accounting and Economic
    - As Per Asset Usage

→ Calculate Adjusted NOPAT and Adjusted Opening CE

→ **Adjusted NOPAT**

OPBIT	XX
(+) Non Cash Expenses	XX
(+) Deferred Revenue Expenses	XX
(+) Accounting Depreciation	XX

(+) Accounting Depreciation	XX
(−) Economic Depreciation	(XX)
(−) Tax Paid	(XX)
(−) Tax on Interest	(XX)
Adjusted NOPAT =	XX

⇒ Year for which EVA is Calculated

→ **Adjusted Opening Capital Employed**

Opening Capital Employed	XX
(+) Non Cash Expenses of Last year	XX
(+) Deferred Revenue Expenses of last year	XX
(+) Accounting Depreciation of last year	XX
(−) Economic Depreciation of last year	(XX)
Adjusted Opening Capital Employed	XX

Non Financial Measures

- Need of Non financial Measures : for being Sustainable [to Sustain financial Performance for long term], Organisation needs to Consider Non Financial Measures

- Scope / Role of Non Financial Measures / Indicators
  - → Human Resource Management : Job Satisfaction, Staff Turnover

- → Human Resource Management : Job Satisfaction, Staff Turnover
- → Product & Service Quality : Distinct from Others that can beat rival Product
- → Brand Awareness : Value of Brand, High Customer Loyalty

- **Advantages and Disadvantages of Financial and Non Financial Performance Measures**

Financial Performance Measures

Advantage

- → Focus on Financial Objectives
- → Quantification of Results is Possible
- → Such Measures are Comparable
- → Established Framework for Measurement

Disadvantage

- → Focus on Short term & ignores long term growth
- → Can be distorted by Inflation
- → Can be Manipulated

Non Financial Performance Measures

Advantage

- → Focus on qualitative aspects as well
- → Takes long term view

Disadvantage

- → Requires huge Information
- → Cannot be quantified
- → Difficult to Measure

Balanced Scorecard

- It is a method which displays Organisation Performance into 4 Dimensions
  - → Financial
  - → Customer
  - → Internal Business
  - → Learning & Growth

  → Non financial

The Four Dimensions acknowledge the Interest of Shareholders, Customers and Employees by Considering both long term and Short term goals

- **Four Areas/Perspective of Balanced Scorecard**

① **Financial Perspective** : Related to Shareholder

It views Organisational Performance from Shareholder Point of View . Focus on Financial Performance of Company and Divisions

It Includes Measures such as Revenue Growth, ROI, EVA, Profitability, Operating Expenses etc

② **Customer Perspective** : Related to Customer

It views Organisational Performance from Customer Point of view .

It Includes Measures such as Customer Satisfaction, Customer Loyalty, Repeat Buyers, First Time Buyers, Returns %, Complaints, Recall etc

③ **Internal Business Perspective** : Related to Internal Processes / Activities of Company

It views Organisational Performance through Quality and Efficiency of Processes to achieve Objective of Financial and Customer Perspective

It Includes Measures such as Productivity, Manufacturing Cycle Efficiency, Defects Produced, Replacement Time, Support Centres etc

④ **Learning & Growth / Training & Development Perspective** : Related to Innovation & Employees

It views Organisational Performance through Human Resources, Technology, Innovation, Culture etc

It Includes Measures such as New Products Produced, Investment in R&D, Training Hours, Employee Satisfaction, Employee Turnover etc

- **Objectives and Measures of Each Perspective of Balanced Scorecard**

Perspective	Objectives [Critical Success Factors]	Performance Measures [Key Performance Indicators]
Financial	→ Increase RoI / EVA → Increase Sales & Profitability → Most Profitable Company → Highest Market Share	→ Revenue, RoI & EVA Growth → Profitability & Operating Ratios
Customer	→ No. 1 Choice of Customer → Increase Customer Loyalty → Increase No. of Customers → Increase Customer Retention	→ Customer Satisfaction → Returns %, Recalls, Complaints → No. of first Time Buyers → Repeat Customers
Internal Business	→ Increase Efficiency of Operations → Reduce Non Value Added Activities → Implement TQM and TPM → Improve After Sales Service	→ Manufacturing Cycle Efficiency [MCE] → Productivity → No. of Defects Produced → Replacement Time → No. of Support Centres
Learning and Growth	→ Upto date Technology → Increase New Products → Improve Employee Satisfaction & Morale → Adequate Training	→ Amount Invested in R&D → No. of New Products Produced → Employees Satisfaction Rate → No. of Training Hours

Triple Bottom Line [TBL]

- It Measures not only Profit but also measures Impact on Society & Environment
- Difference between Traditional Accounting Framework and TBL Framework

• Difference between Traditional Accounting Framework and TBL Framework

Traditional Accounting Framework	TBL Framework
→ Traditional Accounting Framework has a Single Bottom line that focuses only on Profit. It Focus on meeting Information needs of only 1 Category of Stakeholder i.e. Shareholder	→ TBL Reporting focus on Social & Environmental Performance rather than Simply Financial Performance It has 3 Bottom line i.e. Environmental, Social, Economic
→ It does not Provide insight on Social & Environmental Implications of Company Operations	→ It encourage each division within Organisation to act in Socially Responsible Manner
→ It uses reporting currency as unit of Measurement and follows GAAP	→ No uniform Standard or Measurement

• TBL Framework incorporates 3 Dimensions
- → Environmental [Planet]
- → Social [People]
- → Economic [Profit]

① Environmental [Planet] : Measures impact on Resources such as air, water, ground etc

It Covers Following Aspects :
- → Waste disposal, Waste treatment
- → Solar System, Energy Consumption
- → Environmental Resources such as Paper, Cartridge, Fuel Consumption
- → Plastic Usage

② Social [People] : Measures CSR and Social Performance

It Covers Following Aspects :
- → Quality of Service
- → Child Labour
- → Charity
- → Financial Support
- → Employee Development & Training
- → Health, Safety & Care
- → Workplace Environment

- Health, Safety & Care
- Workplace Environment
- Product Safety
- Litigations
- Ethical Behaviour

③ Economic [Profit] : Measures Company Financial Success and Tax Compliances

It Covers following Aspects :

- Profit Generation
- Tax Payments Compliances

Performance Pyramid

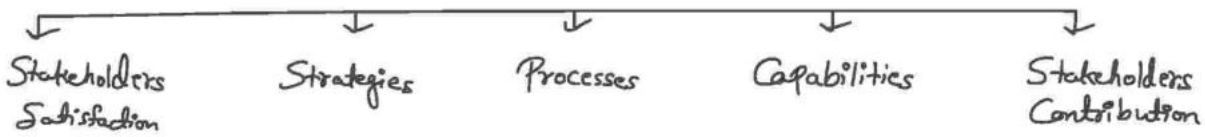
- **Internal Efficiency** : Financial Success can be achieved through improving Productivity by reducing Cycle Time and Waste

- **External Effectiveness** : Market Success can be achieved through increasing Customer Satisfaction by Improving Quality and Delivery.
  This Success requires Internal Business Efficiency

Performance Prism

- It aims to meet needs of All Stakeholders, while Balanced Scorecard mainly focuses on Shareholders and Customers

- **Five Facet to Performance Prism**



(1) Stakeholders Satisfaction

Identify Stakeholders and Needs & Wants of Stakeholders

- → Investors : Better RoI
- → Customers : Good Product at low Price
- → Suppliers : Better Price for Input & High Volume Purchase
- → Employees : Better Work Life Balance
- → Government : Taxes
- → Society : Employment Opportunities

(2) Strategies

Required to fulfill Needs & Wants of Stakeholders

(3) Processes

Required for Implementing Strategy

④ Capabilities

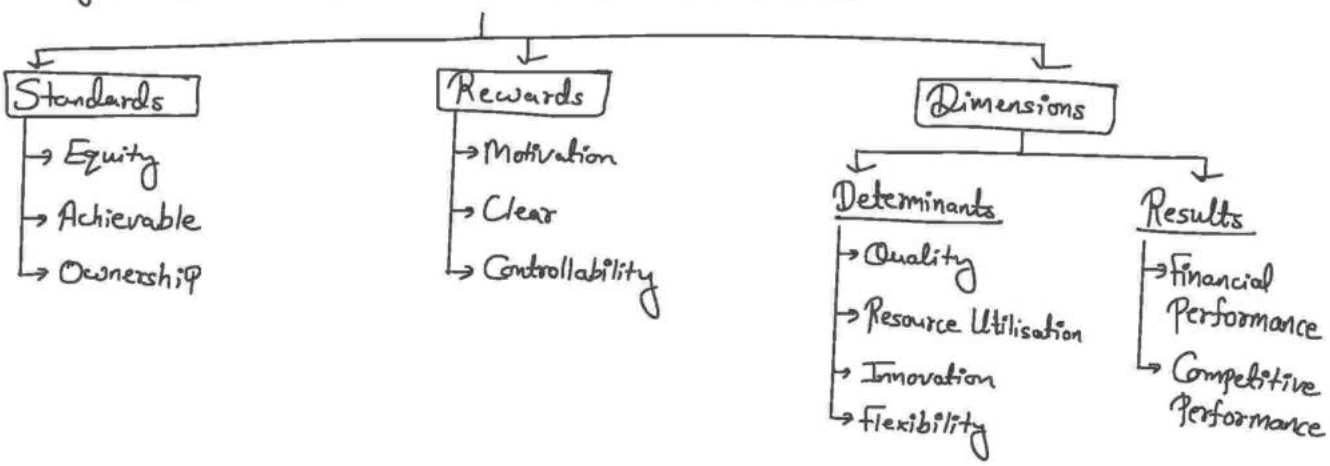
Required for Operating Processes

⑤ Stakeholders Contribution

- Investors : Investment
- Customers : Buy Product
- Suppliers : Better Quality
- Employees : Better Work
- Government : Simple Compliances
- Society : Co-ordination

Building Block Model

- By Fitzgerald & Moon
- Mainly for Performance Measurment of Service Industries



① Standards

- Standards are targets related to Performance Measures
- Characteristics
  - Equity : Equally Challenging for all
  - Achievable : Should be Realistic
  - Ownership : Responsibility for results is Accepted

(2) Rewards

- To ensure employees are motivated to meet Standards, Proper reward System is required for achievement of Standards

- Characteristics
  - Motivation : Reward Scheme Should be Set in Manner which Motivates Employees to achieve desired Results
  - Clearity : Should be Cleary Communicated to Employees in Advance
  - Controllability : Reward or Penalised only for Results Over which they have Control

(3) Dimensions

- Dimensions are business goals that Company wants to achieve
- Determinants : Performance areas which Influence the Results
  - Quality : Ability to deliver Service with Consistency
  - Resource Utilisation : Ability to use resources in efficient way
  - Innovation : Ability to devise new Products & new ways of doing things
  - Flexibility : Ability to cope with Changes

Example

School		Measures
	Quality	: Student Pass %
	Resource Utilisation	: Teacher to Student Ratio
	Innovation	: New Courses
	Flexibility	: Online Courses in Special Situations

- Results : It reflects the Success or failure of determinants
  - Financial Performance : Monetary Terms [Measures : Net Profit, Profitability Ratios]
  - Competitive Performance : Competitive Edge / Advantage
    - Cost leadership [Cost]
    - Product Differentiation [Selling Price]

Benchmarking

- Technique for Continuous Improvement in Performance

- By Comparing Firm Products, Services, Activities against Other best Performing Organisations either Internal or External to the Firm

Performance Measurement in Not for Profit Sector

- Not for Profit Organisation (NPO) does not exist for earning Profits but for achieving Certain Social or Charitable Objectives
- Activities of NPO must be measured to give Confidence to donors / Contributors that resources Contributed are being utilised Efficiently and Effectively
- Key Challenges for Measuring Performance in NPO / Importance of Non Financial Measures in Performance Measurement of NPO
  - → Benefit cannot be Quantified
  - → Benefit may accrue over long term
  - → Measurement of Utilisation of Funds and Expenditure
  - → Multiple Objectives
- Performance Measurement
  - → Value for Money Framework
  - → Adapted Balanced Scorecard

Value for Money

(i) Economy
- → Whether desired output has been Obtained using lowest cost and without Compromising Quality
- → It involves minimising resource Consumption while meeting quality requirements

(ii) Efficiency
- → Whether resources and Funds available to the Organisation has been Utilised Efficiently i.e. Maximum Output Obtained with Minimum Input

→ It Involves Maximising ratio between Input and Output. Maximising Output using Minimum Resources

(iii) Effectiveness

→ Whether Organisation has achieved its desired Mission and Objectives

→ It Involves ensuring outcome achieves desired aims and Objectives

Adapted Balanced Scorecard

(i) Financial Perspective : Fund Raising, Fund Growth, Fund Distribution

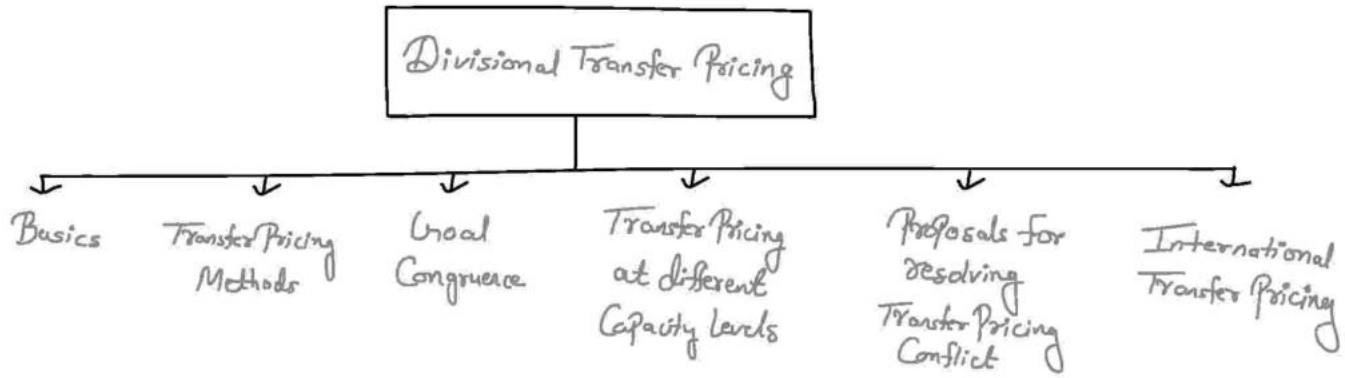
(ii) Customer Perspective : Satisfaction of Beneficiary & Other Stakeholders

(iii) Internal Business Perspective : Internal Efficiency

(iv) Innovation & Learning Perspective : Capability of Organisation to adjust the Changing Environment

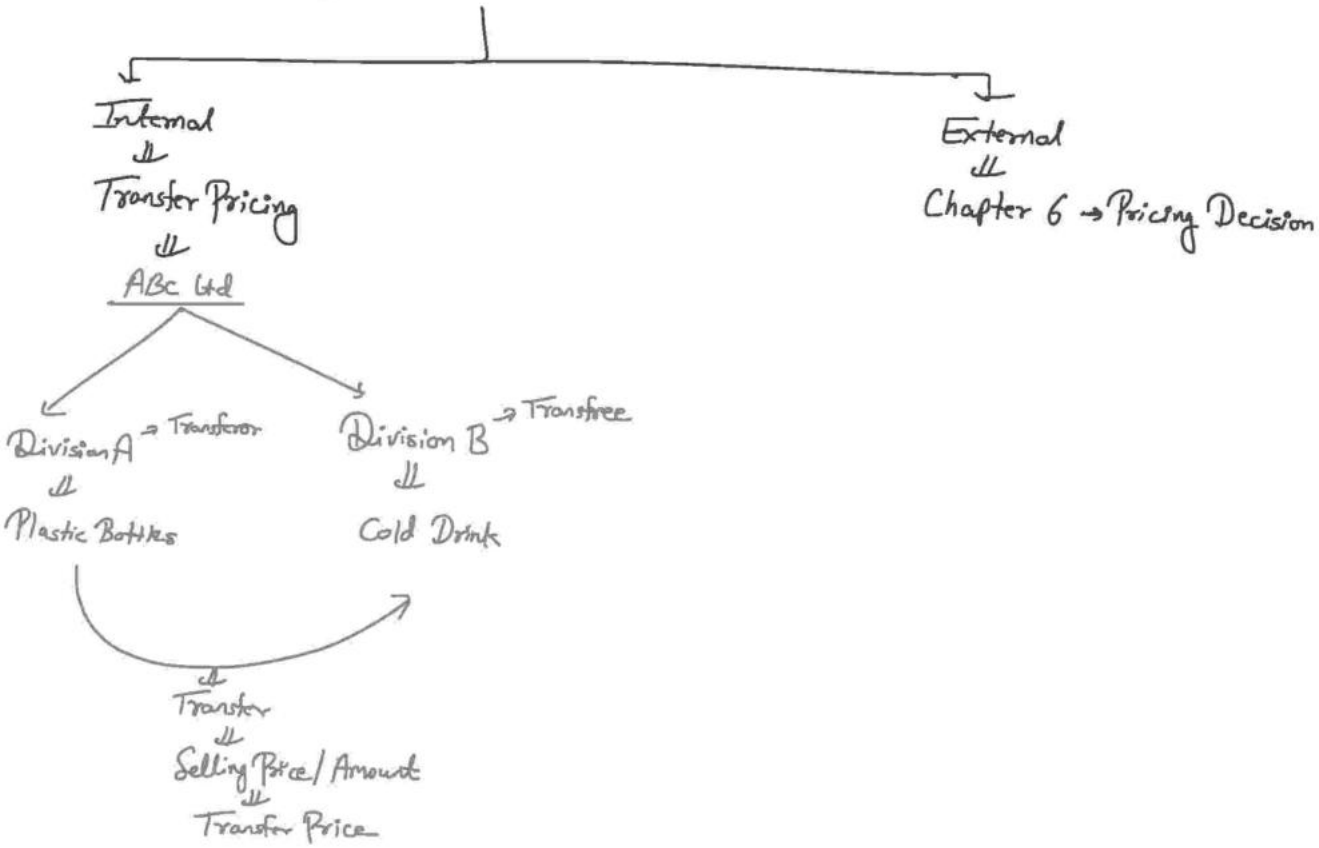
Performance Reports

Responsibility Accounting is Implemented by issuing Performance Reports at Frequent Intervals that inform deviations from budgets



Basics of Transfer Pricing

- **Pricing** : Selling Price determination



→ When One Division/department Transfer Goods & Services to Other Division/Department of Same Enterprise, then Price at which transfer took Place is Transfer Price

→ Division which sells goods is Transferor/Supplying Division

→ Division which receives goods is Transfree/Receiving Division

• Performance Evaluation of Divisions / Departments

Traditional

⇓

Divisions are treated as Cost Centre

⇓

Div A → (Cost) Div B → (Cost) Div C

Div A	Div B	Div C
Fixed Salary 5 lacs	8 lacs	9 lacs

New

⇓

Divisions are treated as Profit Centre

Div A → (Cost + Profit / Transfer Price) Div B → (Cost + Profit / Transfer Price) Div C

Div A	Div B	Div C
Salary 5 lacs + Incentive Based on Profit xx	8 lacs xx	9 lacs xx

• Objectives of Transfer Pricing

→ To develop healthy Competition among various divisions of organisation

→ To develop Commercial Attitude among divisional employees

→ For Performance Evaluation of various divisions of Organisation

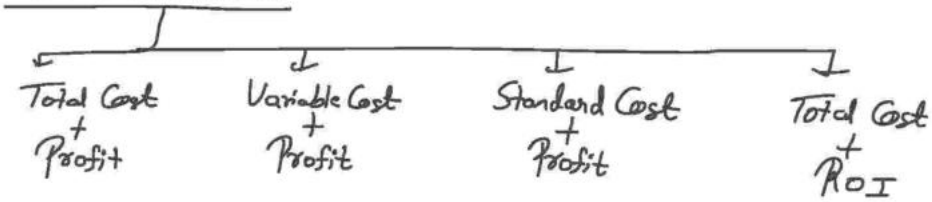
→ To give bonus to divisional employees properly on the basis of Performance

• Division wise and Overall Profitability Statement

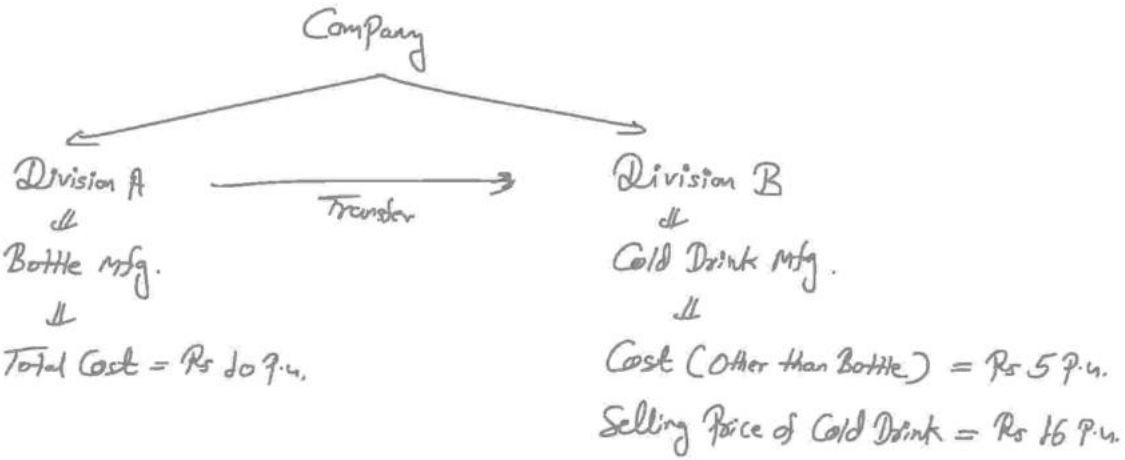
	Division A (Transferor)	Division B (Transferee)	Company Total
Outside Sales	xx	xx	xx
Transfer Price [Internal Transfer]	xx	—	—
	xx	xx	xx
↳ Variable Cost			
↳ Ocon	(xx)	(xx)	(xx)
↳ Transfer Price	—	(xx)	—
↳ Fixed Cost	(xx)	(xx)	(xx)

↳ Fixed Cost	(XX)	(XX)	(XX)
Profit	XX	XX	XX

- **Cost Based Method**



Example



Company Policy ⇒ Transfer Price = Total Cost + 20% Profit

Solution

Transfer Price = Rs 10 + Rs 2 = Rs 12

	A	B	Total
Sales	-	16	16

Transfer Price	12	–	–
	12	16	16
(–) Cost			
↳ Own	(10)	(5)	(15)
↳ TP	–	(12)	–
Profit	2	(1)	1
		↓ Demotivate	

- **Market Based Method**

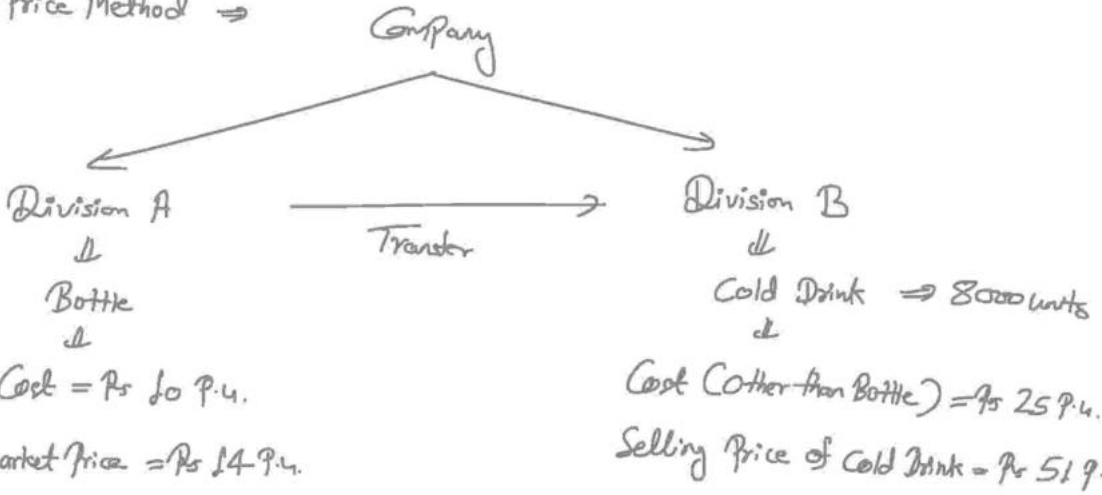
  - Market Price
    ↓
    Transfer will be done at Market Price
    ↓
    TP = MP

  - Shared Profit relative to Total Cost
    ↓
    → Total Profit of Company will be divided among divisions in Total Cost Ratio
    ↓
    $\frac{\text{Total Cost of Division}}{\text{Total Cost of Company}} \times \text{Total Profit of Company}$

    → TP = Total Cost of Supplying Division + Shared Profit

Example 1

Market Price Method ⇒



Division A
↓
Bottle
↓
Cost = Rs 10 P.u.
Market Price = Rs 14 P.u.

Division B
↓
Cold Drink ⇒ 8000 units
↓
Cost (other than Bottle) = Rs 25 P.u.
Selling Price of Cold Drink = Rs 51 P.u.

Solution

As Per Market Price Method, TP = Rs 14

	A	B	Total
Sales / Transfer Price	14	51	51
↳ Cost			
↳ Own	(10)	(25)	(35)
↳ TP	—	(14)	—
Profit	4	12	16

Example 2

Suppose in Example 1, Division A transfer 8000 units to Division B.
Calculate Transfer Price by following Shared Profit relative to Total Cost Method

Solution

Total Profit of Company

Sales [8000×51]		4,08,000
↳ Cost		
↳ Div A [8000×10]	80,000	
↳ Div B [8000×25]	2,00,000	[2,80,000]
Profit =		1,28,000

Division A

$\frac{80,000}{2,80,000} \times 1,28,000$

36,571

Division B

$\frac{2,00,000}{2,80,000} \times 1,28,000$

91,429

36,571 91,429

Transfer Price = Total Cost of Division A + Shared Profit of Division A

= 80,000 + 36,571 = 1,16,571

T.P. p.u. = $\frac{1,16,571}{8000 \text{ units}}$ = **14.57**

- Negotiation Based Method

Transferor and Transfree shall negotiate Price

Transfer Pricing and Goal Congruence

- Decision shall be in the best interest of Divisions and Company as a whole
- Calculation of → Minimum Transfer Price for Transferor
  → Maximum Transfer Price for Transfree

- **Minimum Transfer Price** for Transferor

⇓

Variable Cost of Transfer + Specific Fixed Cost (if any) + Opportunity Cost of Transfer [If Capacity Shortage]

↓

[Total VC of Transferor − Expenses not incurred in Internal Transfer eg → S&D Expenses]

- **Maximum Transfer Price** for Transfree

⇓

→ External Buying Cost ± Alteration etc. Cost

OR

→ Selling Price of Transfree − Other VC of Transfree

OR

⇓

→ Selling Price of Transferor [Net of Expenses not incurred in Internal Transfer eg. SLD Exp.]

⇓

2 Questions

Lower

⇓

Maximum Transfer Price

Example 1

ABC Co.

Division A [Transferor]

⇓

Component 'X' mfg.

⇓

VC p.u. = Rs 45

S.P. to outside = Rs 60

Capacity = 10,000 units

Division B [Transferee]

⇓

Calculator mfg. = 2000 units

⇓

Each Calculator requires 1 unit of Component 'X'. So Component X required = 2000 units

S.P. p.u of Calculator = Rs 88

V.C. p.u. of Calculator [Other than Component X] = Rs 30

Division B can purchase Component 'X' from External Market @ Rs 57 p.u.

Outside demand of Component X

Case 1	Case 2	Case 3
⇓	⇓	⇓
8000 units	9000 units	10,000 units

Calculate Minimum and Maximum Transfer Price in all 3 Cases

Solution

Minimum Transfer Price for Division A

Component X

	Case 1	Case 2	Case 3
Outside Demand	8000 units	9000 units	10,000 units
Capacity	10,000 units	10,000 units	10,000 units

	Case 1	Case 2	Case 3
Capacity	10,000 units	10,000 units	10,000 units
Idle Capacity	2000 units	1000 units	–
Requirement of Division B	2000 units	2000 units	2000 units
	⇓	⇓	⇓
	2000 units from Idle Capacity	1000 units from Idle / 1000 units Shortage	2000 units Shortage
			loss of outside Sale
Minimum TP	⇓	⇓	⇓
	VC + OC	VC	VC + OC
	⇓ ⇓	⇓	⇓
	45 0	45	45 + 15 → [60 + 45]
	⇓		⇓
	45	60	60
		$\frac{45 \times 1000 + 60 \times 1000}{2000 \text{ units}}$	
		⇓	
		52.5	

Maximum Transfer Price for Division B

→ External Buy Cost ± Alteration Cost

57 ± 0 ⇒ 57

→ S.P. of Transfree − Other VC of Transfree [Except Component X]

88 − 30 ⇒ 58

→ ~~Selling Price of Transferor~~ ⇒ 60

⇓

Lower

⇓

Maximum TP = 57

Minimum TP	45	52.5	60
Maximum TP	57	57	57
Range	45-57	52.5-57	X

Example 2

→ Suppose in Example 1, VC of Division A includes S&D Cost of Rs 4 P.u. not incurred in Internal Transfer

→ If Division B Purchase from Division A, Division B has to do Alteration/Modification in Component X which Cost Rs 6 P.u.

Calculate Minimum and Maximum Transfer Price

Solution

Minimum Transfer Price for Division A

	Case 1	Case 2	Case 3
Outside demand	8000 units	9000 units	10,000 units
	2000 units Idle	1000 units Idle	1000 units Shortage
	↓	↓	↓
Minimum TP	VC + OC	VC	VC + OC
	↓ ↓	↓	↓
	[45-4] + 0	[45-4]	41 + 15 → [60-45]
	↓	↓	↓
	41	41	56
		41 × 8000 + 56 × 1000 / 2000 units	
		↓	
		48.5	

	Case 3
	2000 units Shortage
	↓
	VC + OC
	↓
	41 + 15 → [60-45]
	↓
	56

Maximum Transfer Price for Division B

→ External Buy Price ± Alteration Cost

57 - 6 = 51

→ Selling Price of Transfree - Other VC of Transfree

88 - [30 + 6] = 52

→ Selling Price of Transferor [Net of SSD Exp.] ⇒ 56

Lower

Maximum TP = 51

	Case 1	Case 2	Case 3
Minimum TP	41	48.5	56
Maximum TP	51	51	51
Range	41-51	48.5-51	X

If Range Formed

- Transfer within Range → Beneficial for All [Goal Congruence]
- Transfer Outside Range → Beneficial for Company [Loss to 1 Division]
- No Transfer Took Place → Loss to the Company

If Range Not Formed

- No Transfer → Beneficial for All [Goal Congruence]
- If Transfer Took Place → Loss to the Company

अगर Range बन जाती है [Case 1 & Case 2]
तो Internal Transfer होना जरूरी है

→ इस Range में Internal Transfer होता है तो सबका भला [Goal Congruence]

→ इस Range के बाहर Internal Transfer होता है तो किसी / Division के नुकसान [Company के लिए Beneficial ही रहेगा]

→ अगर Range बनने के बाद भी Internal Transfer नहीं होता तो Company को नुकसान

अगर Range नहीं बनती [Case 3]

→ No Transfer = सबका भला [Goal Congruence]

→ अगर Range नहीं बनने पर भी Internal Transfer होता है तो Company को नुकसान

Note : Transfer Price के कम या ज्यादा रखने से Company के Profit पर कोई फर्क नहीं पड़ता

Benefit / Loss to the Company as a whole [If Transfer took place / Not took place]

[Maximum TP − Minimum TP] × No. of units required by Transfree / No. of units Transfer

Transfer Pricing at Different Capacity Levels

- If Transferor makes multiple Products and there is key factor i.e. Transferor has Something in Short Supply [Labour hrs., Machine hrs. etc.]

  → Calculate Contribution Per key Factor of all Products and Rank Accordingly

  → Calculate Product Mix of outside Sales

  - Product Mix of Total Available Hours without Internal Transfer
  - Product Mix of Hours Remaining After Internal Transfer

Difference between above two will be Opportunity Cost of Internal Transfer

→ Minimum Transfer Price = VC + Opportunity Cost of Internal Transfer

Example

Division A manufactures 3 Products

	Product X	Product Y	Product Z
Selling Price P.u.	48	46	40
VC P.u.	33	24	28
Labour hrs P.u.	3 hr.	4 hr.	2 hr.
Outside demand	800 units	500 units	300 units

Labour hrs. Available
5600 hrs

Quantity of Product Y required by Division B = 300 units

Calculate Transfer Price

Solution

Calculate Contribution Per key Factor

	X	Y	Z
S.P. P.u.	48	46	40
← VC P.u.	(33)	(24)	(28)
Contribution P.u.	15	22	12
(÷) labour hrs. P.u.	3	4	2

Contribution per labour hr.	5	5.5	6
Rank	III	II	I

Product Mix Without Internal Transfer

Hrs. Available	5600 hrs
↳ for Z [300 units × 2]	(600 hrs)
	5000 hrs
↳ for y [500 units × 4]	(2000 hrs)
	3000 hrs
↳ for X [800 units × 3]	(2400 hrs)
	600 hrs

Product Mix of Outside Sales without Internal Transfer → X 800 units, y 500 units, Z 300 units

Product Mix of Hours Remaining after Internal Transfer

Hrs. Available	5600 hrs
↳ Hrs Required for Internal Transfer of 300 units of Product y [300 units × 4]	(1200 hrs)
Hrs. remaining after Internal Transfer	4400 hrs.
↳ for Z [300 units × 2]	(600 hrs)
	3800 hrs

↳ for y [500 units × 4] (2000 hrs)

1800 hrs

↳ for X [1800 hrs / 3 hrs] (1800 hrs)

⇓

600 units —

Product Mix of outside Sales after Internal Transfer → X 600 units, → y 500 units, → Z 300 units

Calculation of Opportunity Cost

	Outside Sale before Internal Transfer	Outside Sale after Internal Transfer	Loss of outside Sale
X	800 units	600 units	200 units
y	500 units	500 units	—
Z	300 units	300 units	—

OC of Internal Transfer = 200 units × 15 = **3000**

Minimum TP = VC + OC

⇓

300 units × 24 + 3000 ⇒ 10,200

T.P. P.u. = 10,200 / 300 units ⇒ Rs 34 P.u.

Proposals for resolving Transfer Pricing Conflict

Alternate Transfer Pricing Models / Steps to Change the attitude of divisional heads if they are against inter-divisional transfers

Or

Transfer Pricing Policy to overcome Conflicts / to kept Motivated divisional managers

Dual Rate Transfer Pricing System

- Supplying Division Credited with Full Cost Plus Profit Margin
- Receiving Division Charged with Marginal Cost

→ Improves Co-operation, Promote Goal Congruence

→ Complicate Records, Results in errors

→ Profit is artificial & used only for Internal Evaluation

Two Part Transfer Pricing System

Transfer Price = Marginal Cost + Lump Sum Fixed Charge

→ Better Profit to Supplying Division

→ Purchasing Division can Purchase at lower Price than Market

International Transfer Pricing

When divisions of Company located in Different Countries

Case 1 : Overall Benefit to Company

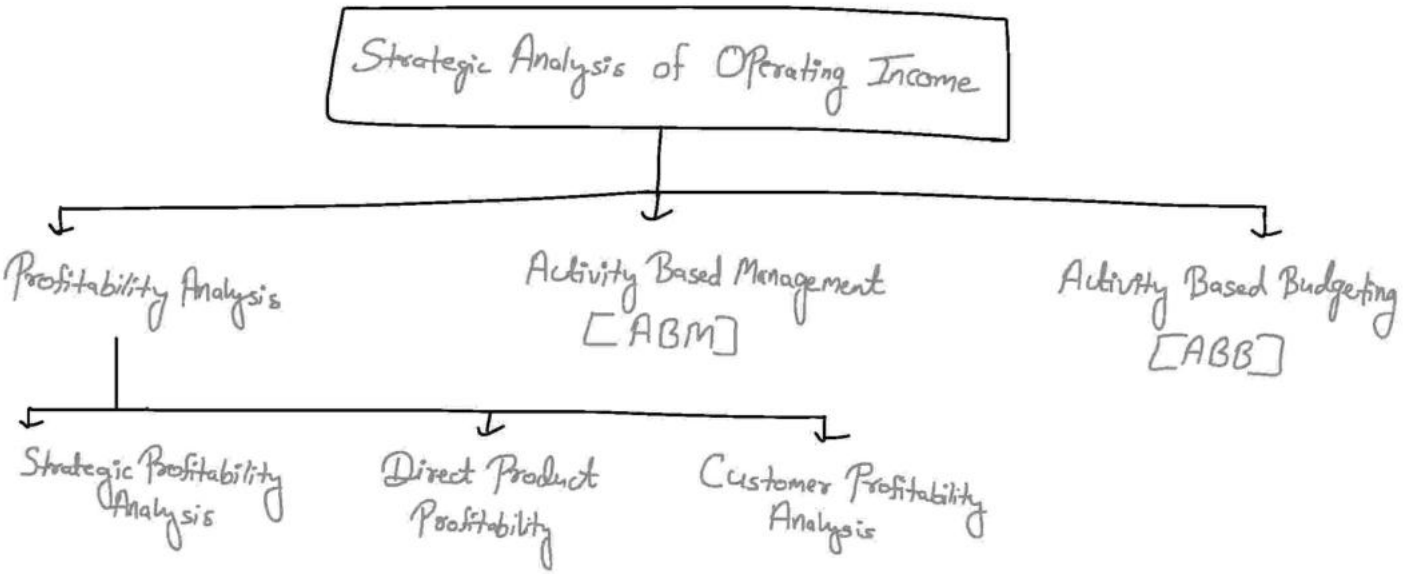
Savings / Benefits to One Division [Net of Tax] XX

↳ Cost / Loss to Other Division [Net of Tax] (XX)

Overall Benefit to Company = XX

Case 2 : Income Statement under International Transfer Pricing

	Division A [Transferor]	Division B [Transferee]
Outside Sale	–	XX
Transfer Price [Internal Transfer]	XX	–
	XX	XX
↳ Cost		
Ocon → VC	(XX)	(XX)
↳ FC	(XX)	(XX)
Transfer Price	–	(XX)
Profit Before Tax	XX	XX
↳ Tax	(XX)	(XX)
Profit After Tax	XX	XX



Profitability Analysis

Strategic Profitability Analysis

① Reason for Change in Profit

- Growth Component → Change in Revenue & Cost due to Change in Sales Units
  - Market Size Change
  - Market Share Change
- Price Recovery Component → Change in Revenue & Cost due to Change in Prices
- Productivity Component → Change in Cost due to Change in Efficiency

② Reconciliation Statement

Operating Income of Last year	XX
+/(-)	

Change due to Market Size	XX
Change due to Productivity	XX
Change due to Product Differentiation [Price Recovery and Market Share]	XX
Operating Income of Current year	XX

Note

Change due to Market Size = Growth Component × $\frac{\text{Change in Sales Units due to Market Size}}{\text{Total Change in Sales Units}}$

Example

A Ltd → Pen Manufacturer
- Last year demand = 1,00,000 units
- Current year demand = 1,20,000 units

Market of Pen Increase by 5% over Last year

Growth Component of A Ltd = Rs 2,00,000

Solution

Total Change in Sales Units = 1,20,000 − 1,00,000 = 20,000 units

- Due to Market Size: 1,00,000 units × 5% = 5000 units
- Due to Market Share = 15000 units

Change in Profit due to Market Size = 2,00,000 × $\frac{5000 \text{ units}}{20,000 \text{ units}}$ ⇒ Rs 50,000

Change due to Productivity = Productivity Gr...

Change due to Productivity = Productivity Component

Change due to Product Differentiation

Price Recovery Component	xx
Change due to Market Share	xx
[Growth Component × (Change in Sales Units due to Market Share / Total Change in Sales Units)]	
	xx

Direct Product Profitability [DPP]

(1) Basics

- Used Primarily within Retail Sector
- Attribution of
  - Purchase Price
  - Other Cost such as
    - Warehousing
    - Retailing
    - Transportation [Distribution]

(2) DPP Statement

	Product X	Product Y
Selling Price P.u.	xx	xx
(-) COGS/Purchase Price P.u.	(xx)	(xx)
Gross Margin P.u.	xx	xx

Gross Margin P.u.	XX	XX
↳ Direct Product Cost P.u. [Warehousing, Retailing, Transportation]	(XX)	(XX)
Direct Product Profit P.u.	XX	XX

③ Direct Product Cost Apportionment

Warehousing, Retailing, Transportation ⇒ Based on Volume

[Volume Related Cost
Incurred in relation to Space occupied by Product]

Note : Head Office Cost is Irrelevant in DPP . Hence ignore

Customer Profitability Analysis

① Customer Profitability Statement

	Customer A	Customer B	Customer C
Gross / List Selling Price P.u.	XX	XX	XX
↳ Sales Return (if any)	(XX)	(XX)	(XX)
↳ Discount	(XX)	(XX)	(XX)
Net Sales P.u.	XX	XX	XX

(−) Variable Cost / Variable Cost of Production / Buying Cost / COGS P.u.	(XX)	(XX)	(XX)
Contribution Margin P.u.	XX	XX	XX
X			
No. of Units Sold	XX	XX	XX
Total Contribution	XX	XX	XX
(−) Overhead Cost relating to Customer Activity [Based on ABC]	(XX)	(XX)	(XX)
Total Profit Per Customer	XX	XX	XX
(÷)			
No. of Units Sold	XX	XX	XX
Profit Per Unit Per Customer	XX	XX	XX

② Analyse / Comment / Recommend on Customer wise Profit

- General Comment
  - → Total Profit Per Customer and Profit Per Unit Per Customer
  - → Discount
  - → Overhead Cost relating to Customer Activity
    - → Order Processing
    - → Delivery
    - → Customer Visit
    - → Others
- Special Comment
  - → Maintain Good Relationship with Profitable Customer [illegible]

- Special Comment
  - → Maintain Good Relationship with Profitable Customers with the help of Customer Relationship Management
  - → Review Discount & Overhead Costs of Low Profit/Non Profitable Customers

(3) Benefits of Customer Profitability Analysis

- Helps to identify which Customer erode Overall Profitability or which Contribute to it
- Provide basis for Constructive dialogue between buyer and seller to improve margins

(4) List of Service Organisation using Customer Profitability Analysis

- Financial Institution like Bank and Insurance Companies
- Hospitality Service
- Professional Service
- Hospitals
- Logistics

(5) Fundamental Aspects of Customer Relationship Management [CRM] to facilitate building relationship with Profitable Customers

- Operative : Take Care of Individual Transaction
- Analytical : Behaviour Analysis
- Collaborative : Seamless Information Flow

Activity Based Cost Management [ABM]

(1) Meaning & Basics

- Use of ABC to Manage Cost at Activity level is known as ABM

- Use of ABC to manage Cost at Activity level is known as ABM
- Focus on Efficient and Effective Management of Activities
- ABC v/s ABM
  - ABC : Determine Cost of Activity
  - ABM : Manage Cost of Activity
- ABM is divided into

Operational ABM
⇓
Doing Things Right
⇓
Increase Efficiency
[Reduce Cost Driver Rate of Activities]

Strategic ABM
⇓
Doing the Right Things
⇓
Determine which Product to be Manufactured and which activities are to be used
⇓
Removing Non Value Added Activities

(2) Applications and Benefits of ABM

- Activity Based Budgeting
- Business Process Re-engineering
- Cost Reduction
- Performance Measurement
- Process Improvement

ABC - PP

(3) Value Added Activities / Non Value Added Activities

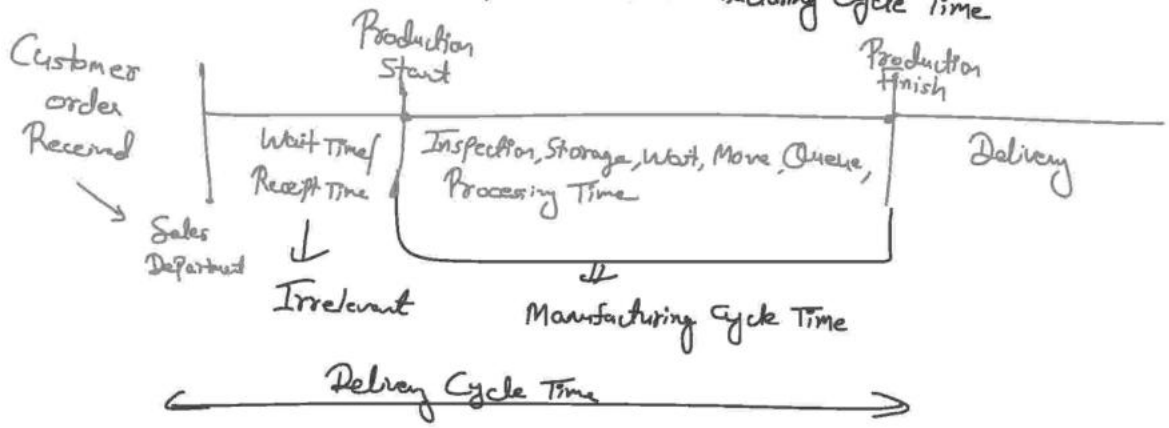
- Value Added Time = Processing Time
- Non Value Added Time = Inspection Time, Storage Time, Waiting Time, Move Time, Queue Time
- Manufacturing Cycle Efficiency [MCE] = $\frac{\text{Value Added Time}}{\text{Total Production Time / Manufacturing Cycle Time}} \times 100$

Total Production Time / Manufacturing Cycle Time = Value Added + Non Value Added Time

Note

→ Wait Time before order Processing / before order received by Manufacturing Department [Receipt Time] is irrelevant in above Calculation, hence ignore

→ Delivery Cycle Time = Receipt Time + Manufacturing Cycle Time



Activity Based Budgeting [ABB]

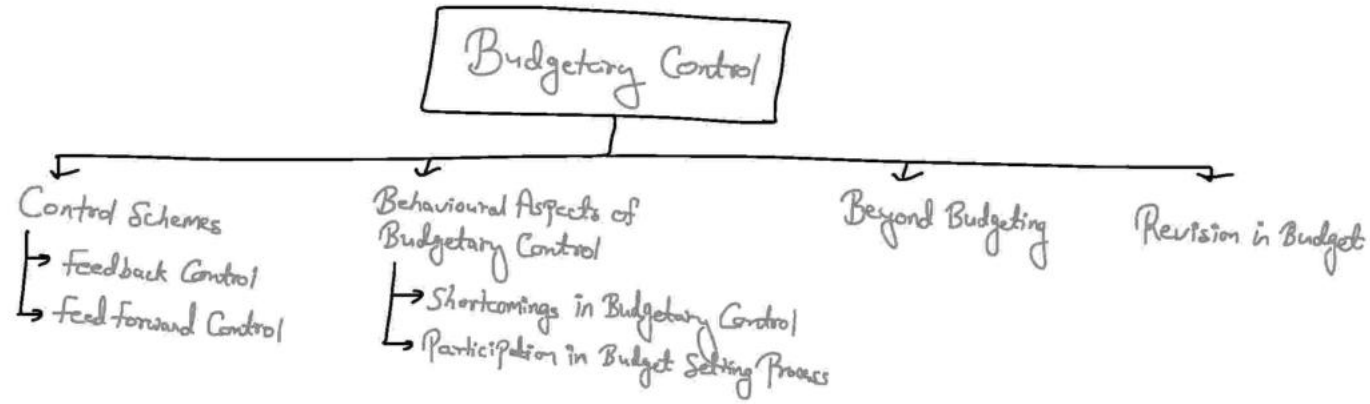
① Meaning & Basics

- Planning and Controlling the Expected Activities of Organisation by Making and analysing Overhead Cost Budget based on Activity
- Elements of ABB
  - → Type of Activities to be Performed
  - → Quantity of Activities to be Performed
  - → Cost of Activities to be Performed
- Activity Based Budget = Budgeted ABC Rate for each Activity × Budgeted Units of Cost Driver of Activity for each Product

(2) Benefits of Activity Based Budgeting

- Better identification of resource needs
- Clear Linking of Cost with Staff Responsibilities
- Identification of Budget Slack

CBI



Budgetary Control

- Systematic Arrangement of Organisation Operations through Establishment of Standards & Targets regarding Income & Expenses and Continuous Monitoring and adjustment of Performance against them
  - Budget [Set Standards/Target]
  - Continuous Monitoring & Forecasting
  - Compare with Actual
  - Variations/Deviations
  - Control

- Prerequisites of Effective Budgetary Control
  - Serious attitude to the System
  - Clear demarcation between Responsibility Areas
  - Reasonable budget Targets
  - Short Reporting Periods
  - Timely Variance Reports

Control Schemes

Types of Control → Feedback Control

Types of Control → Feedback Control
→ Feedforward Control

Feedback Control

(1) Meaning & Basics

- Also known as Post Action Control
- Reaction after an Action has taken Place i.e. Control Activity that takes Place after Process is Complete
- Simple and Easy to Implement
- Compare the Actual Results with Budgeted Results and Modification of Subsequent Actions to Achieve Future required Results

(2) Feedback Management Control Report

- Should disclose both Accomplishment and Responsibility
- Should be Extracted Properly
- Should disclose Trends & Relationships
- Should disclose Variations from Standards
- Should be in Standardised Format

Feedforward Control

(1) Meaning & Basics

- Also referred as Preventive Control
- Foresee Potential Problems and take Corrective Actions to ensure that Final Output is as Expected
- Forecasting of Expected Results of future and if difference arise between Expected & Budgeted Results, Control Actions are taken to minimize gap
- Costly to Implement as it requires additional Investment and Resources
- Feedforward Control attempts to take Corrective Action before event whereas Feedback

- Feedforward Control attempts to take Corrective Action before event whereas Feedback Control takes Corrective Action after event

② Guidelines for Implementation of Feedforward Control

- Thorough Planning and Analysis is required
- Model of Control System Should be developed
- Data must be regularly assessed and Collected
- Feedforward System must be kept dynamic
- Feedforward Control requires Action

Behavioural Aspects of Budgetary Control System

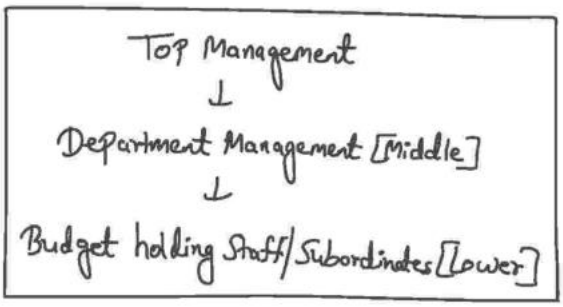
General Shortcomings in Budgetary Control System

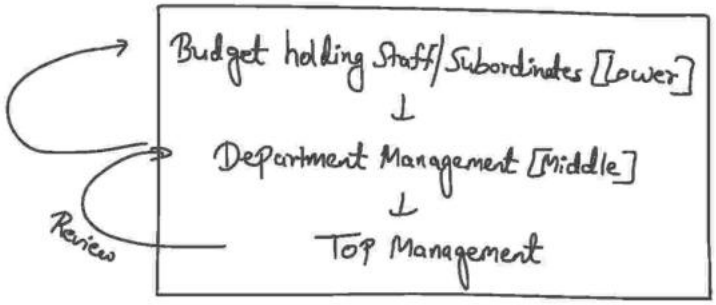
- Lack of Coordinated goals
- Influences of Uncontrollable Factors
- Short run Perspectives

How to Improve →
- Clearly define Company Objective
- Develop an Accounting Reporting System
- Establish budget values for appropriate time Period

Participation in Budget Setting Process

- Top Down Approach
  - Also known as Top Down Budget / Imposed Style Budget
- Bottom up Approach
  - Also referred as Participative Approach





① Top Down Approach

- In Top Down Approach, Budget figures will be Imposed on Subordinates by Top Management and Subordinates will have very little Participation in Budget Process
- Produced More quickly and involves less Management Time
- Significant risk of inaccurate budget being set

② Bottom up Approach

- In Bottom up Approach, Subordinates create their own budget and these budgets are reviewed by Top Management
- This results in greater goal Congruence as budget goals becomes manager Personal goals
- Knowledge of local Conditions may enhance entire Planning Process
- This approach is Time Intensive and Very Costly
- In Order to achieve Personal goals, Participants may also engage in Creating Budgetary Slack [Incorporation of Slack in budget to make it easier to achieve]

③ Advantages and Disadvantages of Involving Staff in Budget Setting

Advantages

- Ownership of work
- Cannot blame for Unrealistic Goals
- Feeling of Appreciation & Value
- Can discuss Organisational Issues

Disadvantages

- Lack of knowledge to formulate Budget
- Personality Traits

- Can discuss Organisational Issues

Beyond Budgeting

(1) Meaning & Basics

Budgeting

Traditional Budgeting

⇓

Limitations

- → Add Little Value
- → Often a barrier to Change
- → Developed & updated too infrequently Usually Annually
- → Make People Feel Undervalued
- → Concentrates on Cost Control and not on Value Creation
- → Time Consuming and Costly

Beyond Budgeting

⇓

To Overcome these Limitations, a tool Came into force known as Beyond Budgeting

- → Budget Revised/Amend as Per Market Changes and Uncontrollable Factors
  +
- → Bottom up Approach
  +
- → Growth based targets instead of Budget based targets
  +
- → Target Shift to Competitors

(2) Advantages of Beyond Budgeting

- More Adaptive Process than Traditional Budgeting
- Decentralised Process [In Traditional Budgeting, Leaders Plan & Control/ Organisation Centrally]

(3) Nature of Beyond Budgeting

- Shift From Top Down to Bottom Up
- Budget is Evolving rather than Obsolete. It depends on Trust & Transparency
- Involves Forecasting
- Highlights level of Improvement that can be achieved

(4) Benefits of Beyond Budgeting

- It helps in Motivating Individuals by defining Clear responsibility & Challenges
- It Eliminates Behavioural Issues by making rewards Team based
- It establishes Customer Oriented Teams
- It Creates Information System which Provides Fast & Open Information
- It helps Managers to work in Coordination to beat Competition · Internal Rivalry is reduced as target shift to Competitors

(5) Suitability of Beyond Budgeting

- Industries where there is rapid Change · Business Environment
- Industries using methods such as TQM
- Industries undergoing radical Change

Revision in Budget due to Uncontrollable Factors

- Calculate Revised Budgeted Sales and Variable Cost for Controllable Period/Months by Excluding Uncontrollable Period from Original Budget
- Budgeted Fixed Cost will remain Same [However if any Specific Uncontrollable Fixed Cost is given, then it will be Considered in Revised Budget]

- Basic Variances
- Reconciliation of Profit
- Advanced Variances
  - Planning & Operational Variance
  - Variance Analysis in ABC
  - Relevant Cost Approach in Variance Analysis
- Reporting & Interpretation of Variances

Standard Costing

→ It is a technique of Cost Control. Under this Technique, Standards are let down for each element of Cost.

→ Standards are let down for Specified Period. Actual Performance of Specified Period shall be Compared with the Standards & Variance are determined.

→ After Investigation & Analysis of Variance, Reasons of Variance are determined.

Basic Variances

Cost Variances

- Material Variance
- Labour Variance
- Overhead Variance
  - Variable OH
  - Fixed OH

Sales Variances

- Based on Sales
- Based on Profit/Margin
- Based on Contribution
- Mar...

... → Fixed OH

... based on Contribution

- Market Size & Market Share Variance

Material Variance

Example 1

Budget

Bottle mfg

5000 units Production

- Production Manager → Material Plastic = 100 kg [For 1 unit = 0.2 kg]
- Purchase Manager → Standard Price p.u of Material = Rs 20 Per kg

Actual

Bottle mfg.

400 units Production

- Actual Material Consumed → 90 kg
- Actual Price p.u of Material → Rs 22 Per kg

Solution

SQ = Standard Qty. of Material required for Actual Production [400 units]

$400 \times 0.2 = 80\text{kg}$

Material Cost Variance = $80\text{kg} \times 20 - 90\text{kg} \times 22$

$= 380\ (A)$

- Purchase mgr. → $(20 - 22) \times 90\text{kg}$ = 180 (A)
- Production mgr. → $(80\text{kg} - 90\text{kg})$ ...

180 (A)
↓
Material Price Variance

(320kg - 300kg) × ₹10
200 (A)
↓
Material Usage Variance

Example 2

Product 'P' mfg.

Budget

Production = 100 units

	Budgeted Qty.	Std. Price p.u.
Material A	140 kg	Rs 2 per kg
Material B	200 kg	Rs 5 per kg

Actual

Production = 150 units

	Actual Qty Consumed	AP p.u.	Total Actual Cost
Material A	300 kg	3	900
Material B	320 kg	4	1280
	620 kg		2180

Solution

SQ (150 units)

		SP p.u.	Total Std. Cost
Material A	140kg/100 × 150 = 210 kg	2	420
Material B	200kg/100 × 150 = 300 kg	5	1500
	510 kg		1920

Material Cost Variance = TSC − TAC
↓ ↓
1920 − 2180 = 260 (A)

↓ Purchase mgr.
↓ Material Price Variance

↓ Production mgr.

Mat A (2 - 3) × 300 kg = 300(A)
Mat B (5 - 4) × 320 kg = 320(F)
20(F)

⇓

(SP - AP) × AQ

Material Qty. / Usage Variance

⇓

Mat A (210 kg - 300 kg) × SQ → less A
Mat B (300 kg - 320 kg) × SP → less A
280(A)

⇓

(SQ - AQ) × SP

⇓

Since more than 1 material

⇓

[SQ - SMQ + SMQ - AQ] × SP

[SQ - SMQ] × SP

⇓

Material Yield Variance

A (210 - 255) × 2
B (300 - 365) × 5
415(A)

[SMQ - AQ] × SP

⇓

Material Mix Variance

⇓

A (255 - 300) × 2
B (365 - 370) × 5
135(F)

SMQ

⇓

Standard Mix Quantity = Total Actual Qty of materials in Standard Ratio

SMQ

Mat A 620 kg × 210/510 = 255 kg
Mat B 620 kg × 300/510 = 365 kg
620 kg

Calculation of Material Variance

Material Cost Variance = Total Standard Cost of Material − Total Actual Cost of Material

TSC − TAC

SQ × SP − AQ × AP

- Material Price Variance [Purchase Mgr.]
  - (SP − AP) × AQ
- Material Qty./Usage Variance [Production Mgr.]
  - (SQ − AQ) × SP
  - [If More than 1 RM]
    - Material Yield Variance
      - (If Total of AQ & SQ are different)
      - (SQ − SMQ) × SP
    - Material Mix Variance
      - (If Ratio of AQ & SQ are different)
      - (SMQ − AQ) × SP

Where

AP = Actual Price P.U. of Material

SP = Standard Price P.U. of Material

AQ = Actual Qty. of Material Consu

AQ = Actual Qty. of Material Consumed

SQ = Standard Qty. of Material for Actual Production
[Raw Material required for Actual Production as Per Budget / Standard]

SMQ = Total Actual Qty. of Material in Standard Ratio

Labour Variance

Example 1

Bottle mfg.

Budget
⇓
500 units Production
- Production mgr. ⇓ Hrs = 1000 hrs. [For 1 unit = 2 hrs]
- HR Mgr. ⇓ SR = Rs 3 Per hour

Actual
⇓
400 units Production
- Actual hrs. Paid & worked ⇓ 900 hrs.
- Actual Rate ⇓ Rs 4 Per hr.

Solution

SH = Standard Hrs. For Actual Production [400 units]
⇓
400 × 2 = 800 hrs.

Labour Cost Variance = 800 hrs × 3 − 900 hrs × 4

⇓

2400 − 3600

⇓

1200 (A)

HR Manager

⇓

(3 − 4) × 900 hrs.

⇓

900 (A)

⇓

Labour Rate Variance

Production Manager

⇓

(800 hrs − 900 hrs) × 3

⇓

300 (A)

⇓

Labour Efficiency Variance

Example 2

Product P mfg.

⇓

Budget

100 units Production

	Budgeted hrs.	SR
Skilled	400 hrs	Rs. 10 P.H.
Unskilled	200 hrs	Rs. 5 P.H.

Actual

150 units Production

	Actual hrs. Paid	Actual hrs. Worked	AR
Skilled	700 hrs.	680 hrs.	Rs 9 P.H
Unskilled	250 hrs.	240 hrs.	Rs 7 P.H.

Solution

TAC

⇓

S	9 × 700	6300
US	7 × 250 (Actual hrs Paid)	1750
		8050

SH = Std. hrs. required for Actual Production (150 units)

⇓

SH

Skilled	400 hrs / 100 × 150 =	600 hrs.
Unskilled	200 hrs	

SR

	10

TSC

	6000

Unskilled $\frac{700}{100} \times 150 = 600$ hrs.

$\frac{200 \text{ hrs}}{100} \times 150 = 300$ hrs.

	JIT	TSC
	10	6000
	5	1500
		7500

Labour Cost Variance = TSC − TAC

SH × SR − AH Paid × AR

7500 − 8050 = 550 (A)

HR Mgr. → Labour Rate Variance

Skilled (10 − 9) × 700 ⇒ 700 (F)

Unskilled (5 − 7) × 250 ⇒ 500 (A)

AH Paid

200 (F)

Production Mgr. → Labour Efficiency Variance

Skilled (600 − 680) × 10 = 800 (A)

Unskilled (300 − 240) × 5 = 300 (F)

AH worked

500 (A)

Idle Time Variance → Idle hrs. × SR

AH Paid − AH worked

Skilled (700 − 680) ⇒ 20 × 10 ⇒ 200

Unskilled (250 − 240) ⇒ 10 × 5 = 50

250 (A)

Calculation of Labour Variance

Labour Cost Variance = Total Std. Cost of labour − Total Actual Cost of labour

Labour ⇓ TSC ⇓ SH X SR — Actual Cost of labour ⇓ TAC ⇓ AH Paid X AR

- Labour Rate Variance ⇓ (SR - AR) X AH Paid
- Labour Efficiency Variance ⇓ (SH - AH Worked) X SR
- Idle Time Variance ⇓ Idle hrs. X SR

Where

AR = Actual Rate Per Labour hr.

SR = Standard Rate Per Labour hr.

AH Paid = Actual Hours Paid

AH worked = Actual Hours Worked

SH = Standard Hrs. required for Actual Production ⇓ [Hrs. required for Actual Production as Per Budget/Standard]

Idle hrs. = AH Paid - AH worked

Overhead Variance

Variable OH Variance

Example

Example

Bottle mfg.

Budget

500 units Bottle

- Production mgr. → Hours = 1000 hrs. [1 unit = 2 hrs.]
- VO mgr. → SR of Electricity = Rs 5 Per hr.

Actual

400 units Bottle

- Actual Hrs. worked = 900 hrs.
- Actual Rate of Electricity = Rs 6 Per hour

Solution

SH = Std. hrs for Actual Production

$400 \times 2 = 800$ hrs.

Variable OH Cost Variance = TSC − TAC

$800 \times 5 - 900 \times 6$ (AH worked)

$\Rightarrow 1400$ (A)

- VO Manager → VO Expenditure Variance: $(5-6) \times 900$ hrs (AH worked)
- Production Manager → VO Efficiency Variance: $(800 - 900) \times$

AH worked
⇓
900 (A)

(800 - 900) × 5
⇓
AH worked
⇓
500 (A)

Calculation of Variable OH Variance

VO Cost Variance = TSC of Variable OH − TAC of Variable OH

SH × SR − AH worked × AR

- VO Expenditure Variance = (SR − AR) × AH worked
- VO Efficiency Variance = (SH − AH worked) × SR

Where,

AR = Actual Variable OH Rate P.H.
SR = Standard Variable OH Rate P.H.
SH, AH worked = Same as labour

Fixed Overhead Variance

Example

Bottle Mfg.

Budget

500 units Production

FO Manager ⇓ Budgeted Fixed OH = 1,00,000

Production Manager ⇓ Hrs. = 1000 hrs.

Actual

400 units Production ⇓ Actual Fixed OH = 1,20,000

Solution

Standard Rate Per hr. of FO (SR) = Budgeted FO / Budgeted hrs = 1,00,000 / 1000 ⇒ Rs 100 Per hr.

Standard Cost Per Unit of FO / Recovery Rate P.U. (SC) = Budgeted FO / Budgeted units = 1,00,000 / 500 = Rs 200 P.U.

SH = Std. hrs. for Actual Production (400 units) ⇓ 400 x 2 = 800 hrs.

Fixed OH Cost Variance = Recovered FO − Actual FO

400 units ⇓ x 200 ⇓ − 1,20,000 =

Actual Production x SC/RR Per unit of

Actual Production × SC/RR
Pre. of FO

80,000 - 1,20,000 = 40,000(A)

Or

800 hrs × 100 - 1,20,000 =
SH × SR

80,000 - 1,20,000 = 40,000(A)

FO Manager

1,00,000 - 1,20,000

20,000 (A)

FO Expenditure Variance

Budgeted FO - Actual FO

Production Manager

80,000 - 1,00,000

20,000 (A)

FO Volume Variance

Recovered FO - Budgeted FO

Calculation of Fixed OH Variance

FO Cost Variance = Recovered FO - Actual FO

SH × SR
or
Actual Production ×

or
Actual Production X SC

FO Expenditure Variance [FO Manager]
=
Budgeted FO - Actual FO

FO Volume Variance
= [Production Mgr.]
Recovered FO - Budgeted FO

Where

SR = Standard Rate Per hour of FO = $\frac{\text{Budgeted FO}}{\text{Budgeted Hrs.}}$

SC = Standard Cost Per Unit of FO = $\frac{\text{Budgeted FO}}{\text{Budgeted Units of Production}}$

RR → Recovery Rate

SH = Same as labour & VO

Other Points relating to Overheads

→ AH, SH, BH are same in labour, VO & FO.

→ AH worked used in OH [not AH paid]

→ In Standard Marginal Costing, there is only Fixed OH

Expenditure Variance [in case of FO]
=
Budgeted FO - Actual FO

Special Point for Material, Labour, OH ⇒ C

In Case of FG / WIP Stock

Equivalent Actual Production (Units)

	[For Material]	[For labour & OH]
Completed Units	XX	XX
(+) Closing Stock [% of Completion]	XX	XX
(−) Opening Stock [% of Completion]	(XX)	(XX)
Equivalent Actual Production =	XX	XX

Example

Budget = 500 units Production

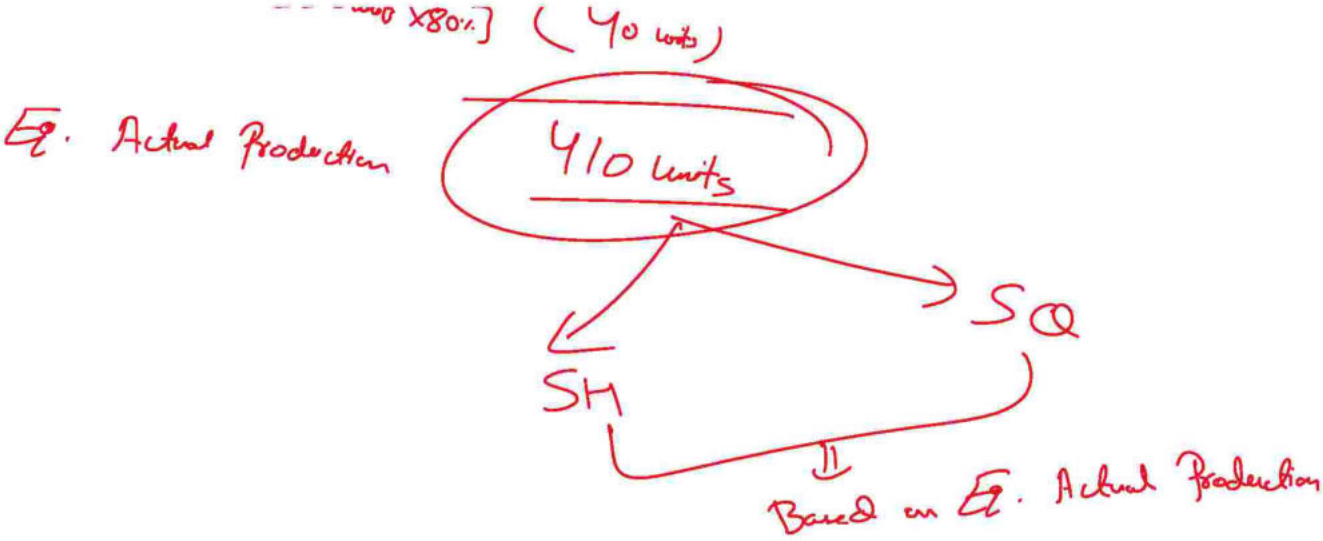
Actual = 400 units Production

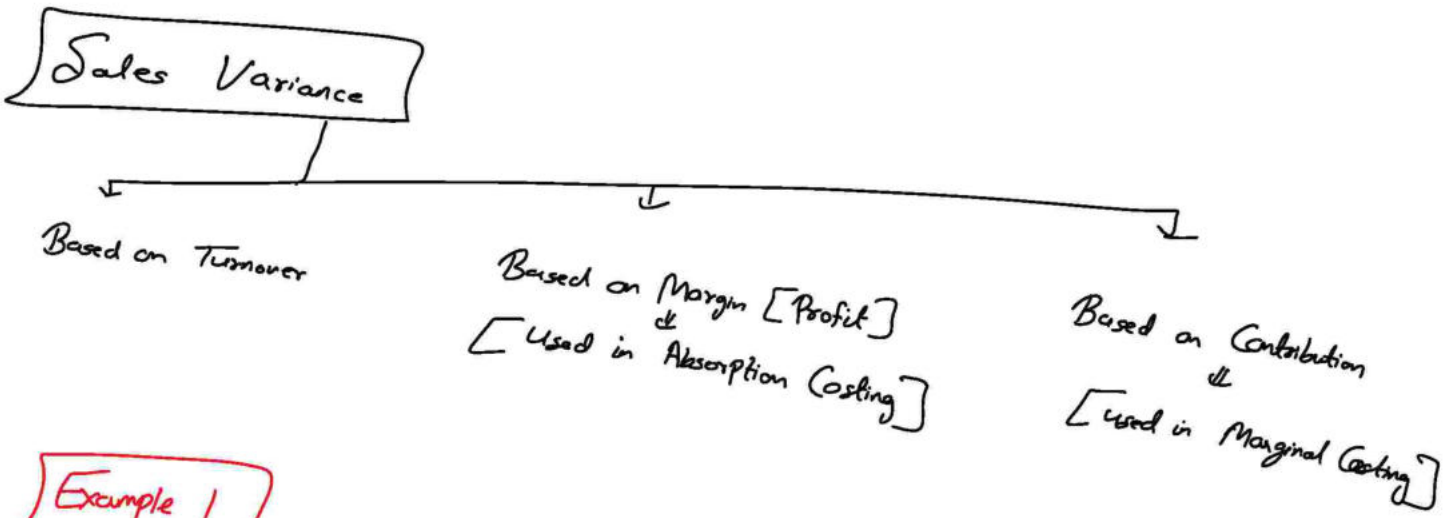
WIP ⇒ Opening = 50 units [80% Complete] → for M, L&O

Closing = 100 units [50% Complete] → for M, L&O

Equivalent Actual Production

Completed Units	400 units
(+) Closing Stock [100 units × 50%]	50 units
(−) Opening Stock [50 units × 80%]	(40 units)





Example 1

Product A

Budget		Actual	
Budgeted Sales Qty = 1000 units		Actual Sales Qty = 800 units	
	(P.u.)		(P.u.)
SP	60	SP	59
VC	(40)	VC	(41)
Contribution	20	Contribution	18 X
FC	(13)	FC	(16)
Profit	7	Actual Profit	2 X

Workings

(BP) Budgeted / Std. Profit P.u. = Rs 7

Actual Profit P.u. (AP) = Actual SP − Budgeted Total Cost

59 − [40+13]

6

(BC) Budgeted / Std. Contribution P.u. = Rs 20

Actual Contribution P.u. (AC) = Actual SP − Budgeted VC

59 − 40 = [illegible]

Profit ⟵ ↗ | 59 − 40 = Rs 19

Solution

Sales Variance

Based on Turnover ⇓ **Sales Value Variance** ⇓

800 × 59 − 1000 × 60 ⇓ R800 (A) ⇓ SQ × ASP − BSQ × BSP

- Sales Price Variance ⇓ (59 − 60) × 800 ⇓ 800 (A) ⇓ (ASP − BSP) × ASQ
- Sales Volume Variance ⇓ (800 − 1000) × 60 ⇓ 12000 (A) ⇓ (ASQ − BSQ) × BSP

Based on Margin [Profit] ⇓ **Sales Margin Variance** ⇓

800 × 6 − 1000 × 7 ⇓ 2200 (A) ⇓ ASQ × AP − BSQ × BP

- Sales Margin Price Variance ⇓ (6 − 7) × 800 ⇓ 800 (A) ⇓ (AP − BP) × ASQ
- Sales Margin Volume Variance ⇓ (800 − 1000) × 7 ⇓ 1400 (A) ⇓ (ASQ − BSQ) × BP

Based on Contribution ⇓ **Sales Contribution Variance** ⇓

800 × 19 − 1000 × 20 ⇓ 4800 (A) ⇓ ASQ × AC − BSQ × BC

- Sales Cont. Price Variance ⇓ (19 − 20) × 800 ⇓ 800 (A) ⇓ [AC − BC] × ASQ
- Sales Cont. Volume Variance ⇓ (800 − 1000) × 20 ⇓ 4000 (A) ⇓ [ASQ − BSQ] × BC

Example 2

	Budget: Product P	Budget: Product Q		Actual: Product P	Actual: Product Q
Sales Qty.	1000 units	500 units	Sales Qty.	1100 units	700 units (Total 1800 units)
P.	(p.u.) 20	(p.u.) 30	SP	25	
VC	(12)	(			

	(20)	(30)	SP	25	Total 28 units
VC	(12)	(16)	VC	(15)	(20)
Contribution	8	14	Contribution	10	8
FC	(3)	(3)	FC	(2)	(1)
Profit	5	11	Actual Profit	8	7

Total 1800 units

If more than 1 Product

Volume Variance = [AS@ − BS@] × BSP/BP/BC

= [AS@ − BSM@ + BSM@ − BS@] × BSP/BP/BC

BSM@ ⇒ Total Actual Sales Qty. in Budgeted Ratio

[AS@ − BSM@] × BSP/BP/BC = Mix Variance

(BSM@ − BS@) × BSP/BP/BC = Quantity Variance

Solution

BSM@ = Total Actual Sales Qty. in Budgeted Ratio

Product P ⇒ 1800 × 1000/[illegible] = [illegible]

Product P ⇒ 1800 × 1000/1500 = 1200 units
Product Q ⇒ 1800 × 500/1500 = 600 units
Total = 1800 units

Mix & Qty. Variance

Based on Sales

Sales Mix Variance = P [1100 − 1200] × 20 = 2000 (A)
Q [700 − 600] × 30 = 3000 (F)
1000 (F)

Sales Qty Variance = P [1200 − 1000] × 20 = 4000 (F)
Q [600 − 500] × 30 = 3000 (F)
7000 (F)

Based on Margin

Mix = P [1100 − 1200] × 5 = 500 A
Q [700 − 600] × 11 = 1100 F
600 (F)

Qty = P [1200 − 1000] × 5 = 1000 (F)
Q [600 − 500] × 11 = 1100 (F)
2100 (F)

Based on Contribution

Calculation of Sales Variance

Based on Sales / Turnover

Sales Value Variance = Actual Sales − Budgeted Sales

= ASQ × ASP − BSQ × BSP

- **Sales Price Variance** = (ASP − BSP) × ASQ
- **Sales Volume Variance** = (ASQ − BSQ) × BSP

If more than 1 Product

- **Sales mix Variance** = (ASQ − BSMQ) × BSP
- **Sales Quantity Variance** = [BSMQ − BSQ] × BSP

Where

BSP = Budgeted Selling Price P.u.

ASP = Actual Selling Price P.u.

Budgeted Selling Price P.u.

ASP = Actual Selling Price P.u.

BSQ = Budgeted Sales Qty.

ASQ = Actual Sales Qty.

BSMQ = Total Actual Sales Qty. in Budgeted Qty. Ratio

Based on Margin [Profit]

Sales Margin Variance = Actual Profit − Budgeted Profit

ASQ × AP − BSQ × BP

- Sales Margin Price Variance = (AP − BP) × ASQ
- Sales Margin Volume Variance = (ASQ − BSQ) × BP
  - If more than 1 Product
    - Sales Margin Mix Variance = (ASQ − BSMQ) × BP
    - Sales Margin Qty. Variance = (BSMQ − BSQ) × BP

Where

SQ) × BP

Where

↓

BP = Budgeted / Standard Profit p.u.

↓

Budgeted Selling Price p.u. – Budgeted Total Cost p.u.

AP = Actual Profit p.u.

↓

Actual Selling Price p.u. – Budgeted Total Cost p.u.

Based on Contribution

↓

Sales Contribution Variance = Actual Contribution – Budgeted Contribution

↓

ASQ × AC – BSQ × BC

Sales Cont. Price Variance

↓

(AC – BC) × ASQ

Sales Cont. Volume Variance

↓

(ASQ – BSQ) × BC

↓

If more than 1 Product

Sales Cont. mix Variance

↓

(ASQ – BSMQ) × BC

Sales Cont. Qty. Variance

↓

(BSMQ – B…

$(AQ - BSMQ) \times Bc$ ∴ $(BSMQ - BSQ) \times Bc$

Where

Bc = Budgeted/Standard Contribution P.U.

Budgeted SP P.U. − Budgeted Variable Cost P.U.

Ac = Actual Contribution P.U.

Actual SP P.U. − Budgeted Variable Cost P.U.

Other Points relating to Sales Variance

→ Sales Price Variance = Sales Margin Price Variance = Sales Contribution Price Variance

→ In Reconciliation of Profit Question

- Based on Absorption/Conventional Method → Sales Margin Variance → Profit Variance is Used
- Based on Marginal/Relevant Costing method → Sales Contribution Variance is Used

→ Volume Variance Alternate Formula

→ **Volume Variance Alternate Formula**

Sales Margin Volume Variance = Sales Volume Variance × Budgeted Net Profit Ratio

⇓

Budgeted Profit / Budgeted Sales × 100

Sales Contribution Volume Variance = Sales Volume Variance × Budgeted P/V Ratio

⇓

Budgeted Contribution / Budgeted Sales × 100

Or

Market Size Variance + Market Share Variance

Market Size & Market Share Variance

Sales Contribution Volume Variance = Market Size Variance + Market Share Variance

Sales Contribution Volume Variance = [ASQ - RSQ]

Sales Volume Variance = [ASQ − BSQ] × BC

[Actual Sales Qty. − Budgeted Sales Qty.] × Budgeted Contribution P.U.

[Actual Market Share − Budgeted Market Share] × Budgeted Contribution P.U.

[Actual Market Share − Budgeted Market Share of Actual Market Size + Budgeted Market Share of Actual Market Size − Budgeted Market Share] × Budgeted Contribution P.U.

[Actual Market Share − Budgeted Market Share of Actual Market Size] × BC

Market Share Variance

[Operational / Controllable]

Sales Manger is Responsible

[Budgeted Market Share of Actual Market size − Budgeted Market Share] × BC

Market Size Variance

[Planning / Uncontrollable]

No one is Responsible

Example

Product 'P'

Product 'P'

Budgeted Market Size ⇓ 4,00,000 units

Actual Market Size ⇓ 3,75,000 units

ABC Ltd. → Mfg. & Sale Product 'P'

Budgeted Sales Qty. [Budgeted Market Share] ⇓ 2,00,000 units

Actual Sales Qty. [Actual Market Share] ⇓ 1,65,000 units

Budgeted Contribution = Rs 4.17 p.u.

Solution

Budgeted Market Share of ABC Ltd in % = $\frac{\text{Budgeted Market Share}}{\text{Budgeted Market Size}} \times 100$

$\frac{2,00,000}{4,00,000} \times 100 \Rightarrow 50\%$

Budgeted Market Share of Actual Market Size = Budgeted Share (%) × Actual Market Size

⇓

50% × 3,75,000 = 1,87,500 units

Market Share Variance

[1,65,000 − 1,87,500] × 4.17

93,825 (A)

Controllable / Operational

Sales Mgr. is Responsible

Market Size Variance

[1,87,500 − 2,00,000] × 4.17

52,125 (A)

Uncontrollable / Planning

No one is Responsible

Reconciliation of Profit

Absorption / Conventional Costing Method

	[Amount]
Budgeted Profit (BSQ × BP)	
(±) Sales Margin Variance → Price	xx
→ Volume	xx
(±) Cost Variance	xx
Material → Price	xx
→ Usage	xx
Labour → Rate	xx
→ Efficiency	xx

Variable OH → Expenditure
→ Efficiency

Fixed OH → Expenditure
→ Volume

Actual Profit as Per Books

Marginal / Relevant Costing Method

Budgeted Profit [Amount]

(±) Sales Contribution Variance → Price
→ Volume
→ Market Size
→ Market Share

(±) Cost Variance

Material → Price
→ Usage

Labour → Rate
→ Efficiency

VO → Expenditure
→ Efficiency

FO ⇒ Expenditure

Actual Profit as per Books — XX

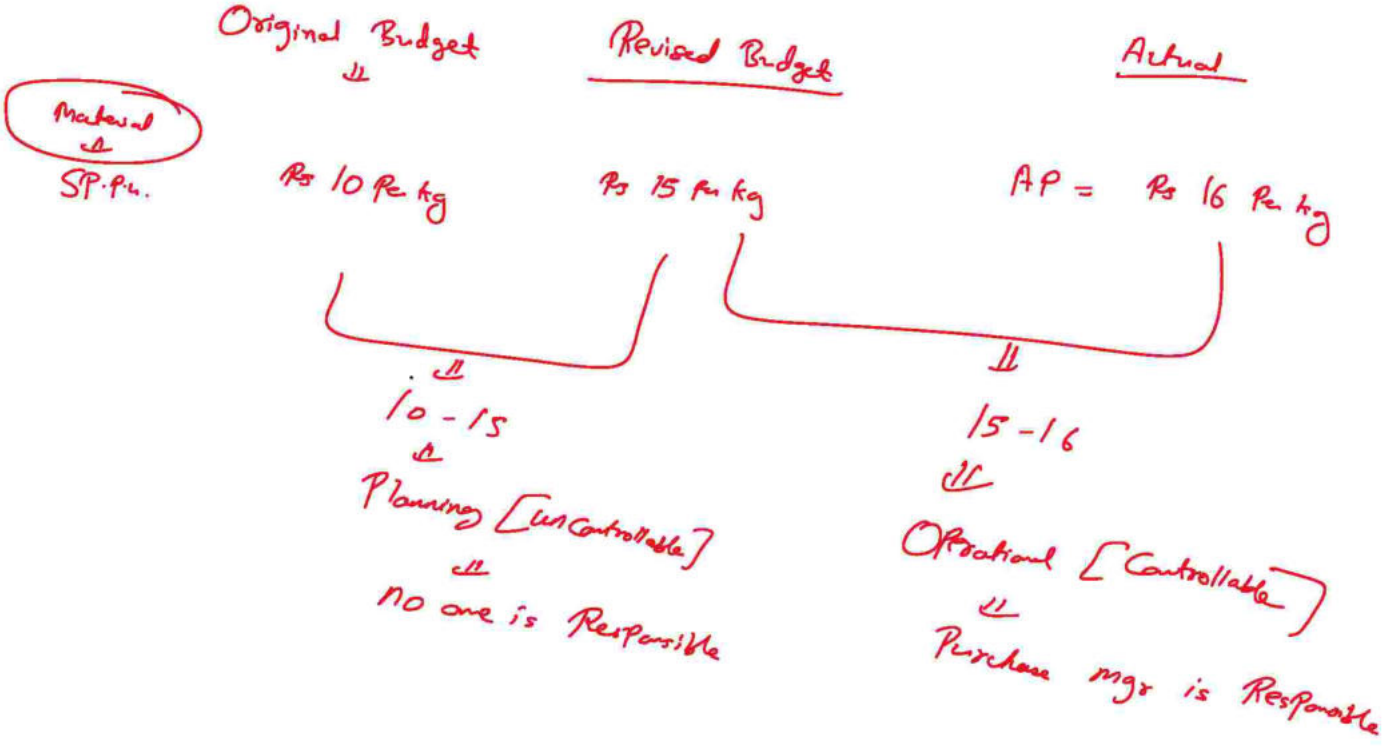
Favourable Variance = (+)

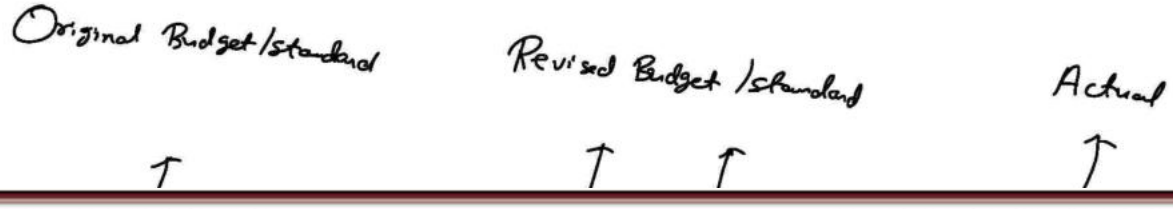
Adverse Variance = (−)

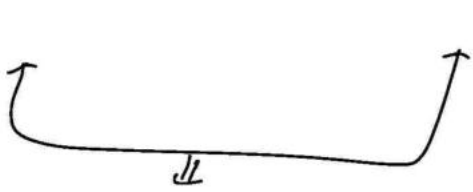
Advanced Variances

⇓

Planning & Operational Variance





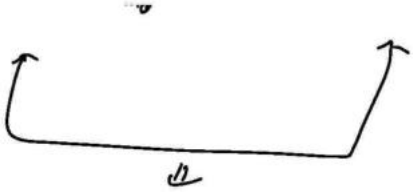


Planning Variance

Uncontrollable

Due to External Factors [Such as Change in Market / Environmental Conditions]

No one is Responsible



Operational Variance

Controllable

Due to Internal Reasons [Such as Performance of Managers]

Managers are Responsible

Example

Bottle Mfg.

	Original Budget/Standard			Revised Budget/Standard			Actual		
Production units	= 100 units			100 units			100 units		
Material	Std. Qty.	Std. Price	Cost	Revised Std. Qty.	Revised Std. Price	Cost	Actual Qty	Actual Price	Cost
Plastic Material	200 kg	5	1000	240 kg	8	1920	260 kg	7	1820

Solution

Traditional Variance Analysis

Original Budget V/s Actual

MCV = 1000 - 1820

820 (A)

MPV

(5 - 7) x 260kg

520 (A)

MUV

(200 - 260) x 5

300 (A)

Planning & Operational Variance

Original Std. → Revised Std. → Planning

Revised Std. → Actual → Operational

Planning Variance

MCV = 1000 - 1920 = 920 (A)

MPV

(5 - 8) x 240

720 (A)

MUV

(200 - 240) x 5

200 (A)

Operational Variance

MCV = 1920 - 1820 = 100 (F)

MPV
(8 - 7) × 260 kg
260 (F)

MUV
(240 kg - 260 kg) × 8
160 (A)

Variance Analysis in Activity Based Costing [ABC]

Variance Calculated for each Activity

Flexible Budget Variance for each Activity = TSC - TAC

TSC = Flexible Budget Cost of each Activity

TAC = Actual Cost of each Activity

Standard units of Cost Driver × Standard Cost Driver Rate — Actual units of Cost Driver × Actual Cost Driver Rate

Expenditure Variance

(Std. Cost Driver Rate − Actual Cost Driver Rate) × Actual units of Cost Driver

Efficiency Variance

(Std. units of Cost Driver − Actual units of Cost Driver) × Std Cost Driver Rate

$$\text{Standard Cost Driver Rate} = \frac{\text{Budgeted OH of Activity}}{\text{Budgeted units of Cost Driver}}$$

$$\text{Actual Cost Driver Rate} = \frac{\text{Actual OH of Activity}}{\text{Actual units of Cost Driver}}$$

Standard units of Cost Driver = Cost Driver units required for Actual Production/output as Per Budget/Standard

Example

ABC Ltd. ⇒ follows ABC

Product 'P' Production

	Budget	Actual
	2000 units	2100 units

Delivery [Activity]

Overhead	Rs. 4000	Rs. 3900

Rs. 4000 Rs. 3900

No. of deliveries [Units of Cost Driver] 20 19

Calculate Variances using ABC

Solution

Standard units of CD = $\frac{20}{2000 \text{ units}} \times 2100 \text{ units} = 21$ deliveries

Std. Cost Driver Rate = $\frac{4000}{20} = 200$

Actual Cost Driver Rate = $\frac{3900}{19} = 205.263$

Flexible Budget Variance = $21 \times 200 - 19 \times 205.263$

= 300 (F)

- Expenditure = $(200 - 205.263) \times 19$ = 100 (A)
- Efficiency = $(21 - 19) \times 200$ = 400 (F)

Relevant Cost Approach in Variance Analysis

Note: Reconciliation of Profit Statement is based upon **Sales Contribution Variance.**

If there is any Scare Resources [Shortage of Resources]
[Material, labour hrs.]

Then for **Excess Usage** of Scare Resource

Production Manager is Responsible for Contribution loss on Excess Usage of Scarce Resources

Contribution loss on Excess Usage

Excess Usage of Scare Resource × Budgeted Contribution P.U. of Scarce Resource (Material Qty. / labour hrs.)

(AQ/AH - SQ/SH)

Then,

Total Material Usage / labour Efficiency Variance = Normal + Contribution loss on excess Usage

Sales Manager is not responsible for loss of Sales due to excess Usage of Scarce Resource

⇓

Sales Contribution Volume Variance = Normal − Contribution loss on Excess Usage

Reporting & Interpretation of Variances

Material Variances

⇓

- **Price**
  - Purchase of low quality material
  - Use of different Supplier
  - Order size
  - Unexpected decrease / Increase in Price
- **Usage**
  - Purchase of Inferior quality material
  - Increase / Decrease in Efficiency
  - Change in Material mix

Labour Variances

⇓

- **Rate**
  - Bonus
  - Market Conditions not Predicted Properly
- **Efficiency**
  - Increase / Decrease in Productivity of labour
  - Workers efficiency not estimated Correctly

... not Estimated Correctly

Sales Variances

Price → Discounts
→ low Price to Increase Sales Volume

Volume → Depends on Marketing Efforts
→ High demand due to Reduction in Selling Price

Learning Curve Theory

Used in
- Pricing Decisions
- Standard Costing
- Life Cycle Costing

Audit → CA Final

8 hrs Per day

30 days [First Reading]

14 days [Ist Revision]

7 days [IInd Revision]

3 days [IIIrd Revision]

1.5 days [Before Exam Revise]

Learning Curve Theory

→ When Same Job is done by Same labour force again & again, then time taken will be reduced Significantly.

→ As a result, labour & labour related Cost Significantly

result, labour & labour related cost also decrease significantly. significantly without affecting Quality of the Product.

Learning Ratio / learning %

⇓

It explains the rate by which overage time taken will be reduced / decrease when Production is doubk as Compared to Previous level.

⇓

- learning Curve (%) applies on Average / labour Hrs.
- learning Curve (%) applies directly when Production / output is double
- learning Curve applies only on Manual labour & not on Automatic Machines

Example

learning Ratio = 90%

Product Units	Average labour Hrs.	Total labour Hrs.
1	100 hrs	100 hrs.
2	90 hrs [100 × 90%]	180 hrs.

Hrs. required for 2nd unit
⇓
180 − 100 = 80 L.

... hrs. ... for 2nd unit
⇓
180 − 100 = 80 hrs.

4 — 81 hrs. [90 hrs. × 90%] — 324 hrs

Hrs. required for 3rd & 4th unit
⇓
324 − 180 = 144 hrs.

8 — 72.9 hrs. [81 hrs. × 90%] — 583.2 hrs

16 — 65.61 hrs. [72.9 hrs × 90%] — 1049.76 hrs.

Equation of learning Curve [When Production/output is not double]

⇓

$$y = a x^b$$

Where,

y = Average labour hrs. for 'x' no. of units

a = labour hrs. required for 1st unit

x = No. of units

b = learning Coefficient / learning Index $= \frac{\log \text{ of learning Ratio}}{\log \text{ of } 2}$

In above Example
Calculate Ava ...

In above Example
Calculate Avg. labour hrs for 15 units

$$y = a x^b$$

y = Average labour hrs. for 15 units

a = 100 hrs.

x = 15

$$b = \frac{\log \text{ of } 90\text{r.}}{\log \text{ of } 2} = -0.152 \text{ [given]}$$

$$y = 100 \times (15)^{-0.152}$$

$$100 \times \left(\frac{1}{15}\right)^{0.152}$$

⇒ Power Positive

$\frac{1}{15}$

$\sqrt{}$ 14 times

-1

X Power ⇒ 0.152

$+1$

X = 14 times

0.6626

$y = 100 \times 0.6626 = 66.26$ hrs.

Calculate time required for 16th unit

Total time for 16 units − Total time for 15 units

$1049.76 - [66.26 \times 15]$

$= 55.86$ hrs.

Log Properties

$\log ab = \log a + \log b$

$\log\left(\frac{a}{b}\right) = \log a - \log b$

$\log a^b = b \log a$

$\log 1 = 0$, $\log 10 = 1$, $\log 100 = 2$ & so on.

Question 19 ⇒ Chapter 4

(i) Total labour hrs for 1000 units

Labour hrs. required for 1st unit = 30 hrs

Learning Ratio (L.R.) = 80%

Learning Index = $\frac{\log \text{ of } 80\%}{\log \text{ of } 2} = -0.3219$

1000 units

First 250 units

Next 750 units
=
Same time r.u. as 250th unit

Avg. time for 250 units

$y = a x^b$

$\Rightarrow 30 \times 250^{-0.3219}$

$$30 \times 0.1691 = 5.073 \text{ hrs.}$$

Total time for 250 units $= 250 \times 5.073 = 1268.25$ hrs.

Avg. time for 249 units

$$y = a x b$$

$$= 30 \times 249 - 0.321g$$

$$30 \times 0.1693$$

$$5.079 \text{ hrs.}$$

Total time for 249 units $= 5.079 \times 249 = 1264.67$ hrs

Time required for

250th unit = Total time for 250 units − Total time for 249 units

$$1268.25 - 1264.67$$

$$3.58 \text{ hrs}$$

Time required for Next 750 units = 750 × 3.58

⇓

2685 hrs.

Time req. for 1000 units = 1268.75 (first 250 units) + 2685 (next 750 units)

⇓

3953.75 hrs

(ii) Profitability

⇓

Sales [5000 × 1000 units] 50,00,000

(→ Life Cycle Cost

Material (1850 × 1000 units) (18,50,000)

Labour [80 × 3953.75 hrs] (3,16,260)

VO [1000 × 1000 units] (10,00,000)

Packing Machine (5,00,000)

Life Cycle Profit 13,33,740

(iii) ⇒

Target Sales [5000 × 1000 units] 50,00,000

(–) Desired Profit [800 × 1000 units] (8,00,000)

Target Cost 42,00,000

Assume Target labour Cost P.u = x

Expected Cost

Material	18,50,000
labour	1000x
VO	10,00,000
Machine	5,00,000
	33,50,000 + 1000x

33,50,000 + 1000x = 42,00,000

x = Rs. 850 P.u.

Question 13 ⇒ Std. Costing

[...] ⇒ Std. Costing

$$SR = \frac{1,19,788}{180.74} = 660$$

$$AR = \frac{79,704}{118.08} = 675$$

SH = Hrs. required for Actual Production as per Budget (25 units)

AH = 118.08 hrs.

Learning Rate = 80%

Learning Cease after 15 units

Time taken for 1st unit = 10 hrs.

Learning Index at 80% = − 0.322

$$y = ax^b$$

for 15 units

y ⇐ Avg. hrs for 15 units

$$= 10 \times 15^{-0.322}$$

$$10 \times \left(\frac{1}{15}\right)^{0.322}$$

$$10 \times 0.4181 \Rightarrow 4.181$$

Total hrs. for 15 units = 15 × 4.1...

total hrs. for 15 units = $15 \times 4.181 = 62.72$ hrs.

For 14 units

$y = 10 \times 14^{-0.322}$

$10 \times 0.4275 = 4.275$

Total time for 14 units = $4.275 \times 14 = 59.85$ hrs.

Time required for 15th unit = 62.72 hrs - 59.85 hrs

2.87

Time for 25 units

15 units ← 62.72 hrs. + 2.87 × 10 units

$62.72 + 28.70 =$ 91.42 hrs

SH

LRV = (660 - 675) ×

$$LKV = (660 - 675) \times 118.08$$

$$\Downarrow$$

$$1771.2 \text{ (A)}$$

$$LEV = (91.42 - 118.08) \times 660$$

$$\Downarrow$$

$$17,595.6 \text{ (A)}$$

Material to be followed

⇓

Concept & Theory Notes

+

Question Bank

Rounding Off

⇓

Amt. in (Rs) = Always Round off → 0.5 or above = Upper
below 0.5 = lower

Amt. in Cr. & lacs = 2 decimals

% = 2 decimals

PV factor = 3 decimals

Units

- Production mix → Lower Round off
- Theory of Constraint → In decimals
- Others → 0.5 or above → upper R/O; below 0.5 → lower R/O

Solution in Per Unit or Total

- Per Unit
  - Target Cost
  - Contribution Per key factor
  - Savings Per key factor
- Both in P.u. & Total
  - Special Priced Order
  - Make or Buy [Single Component Question]
- Total
  - All Others
  - [Pricing / TP Solved in Total but SP / TP Converted in P.u.]

Case Study

- Dir...

Direct

- Intro
- Give Answers of Questions Asked ⇒ 19 → Concepts

⇒ 1

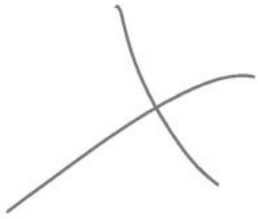
90

Application Based

- Issue → 1
- Concepts → 12
- Analysis / Application → 6
- Conclusion → 1

Handwriting

Tables / Formats



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