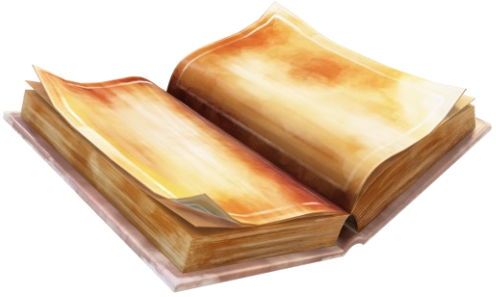
CHAPTER-WISE INDEX

(Strategic Cost & Performance Management)



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- By CA Vinay Kumar

- By CA Avishi Gupta

- Core Competences are some of the most important sources of uniqueness: these are the things that a company can do uniquely well, and that no-one else can copy quickly enough to affect competition.
- Information Technology (IT), Information System (IS) and Information Management (IM), all three are inter-connected; but not same. Information technology techniques are used as part of information system to manage information. Organisations develop strategies to ensure alignment among these three and overall organisational strategy in place.
- IT collectively with IS and IM has potential to transform the business around the corners. It has strong influence on Michael E Porter's Five Force, Moreover IT/IS has capabilities to revamp the value chain and empower the organisation to tap the opportunities for creating greater values.
- Management Accountant is a position that holistically addresses the various aspects, which affect the sustainability of a business's performance. The management accountant is at the crossroads of technology, financial analysis and strategy, and leadership, helping to identify what is driving the company's profits and losses, rather than simply reporting them.
- Management Accountant assume the role of leader, who need to make or assist in decision making in wake of organisational strategy, make communications (of strategy, plans, vision and values) while getting such decisions executed either himself or through others; and remain ethical throughout.

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Mr. Anirban, Chief Management Accountant and advisor to CEO of Avantha Holdings considering the value proposition canvas as tool to respond to aspects highlighted by customer profile analysis. You (cost trainee) recently join Avantha Holding, Mr. Anirban asked to appraise the following statement to pick the correct statement regarding value proposition map

Options

a. Pain relievers and gain creators counter each other's effects

b. Pain relievers and gain creators are the one and same thing

c. Pain relievers are different from Gain creators

d. Either one of Pain relievers or Gain creator can be part of value proposition map

Key - c

Reason – Pain relievers and gain creators both create value for the customer in different ways. The difference is that the former specifically addresses pains in the customer profile, while the latter specifically addresses gains. It is okay if either of them addresses pains and gains at the same time, The main goal of these two areas is to make the customer value creation of your products and services explicit.

MCQ 2

In continuation to previous MCQ

Mr. Nilanjan is hired by Avantha holding as independent consultant for drafting of value proposition map. He suggests that ranking of customer's jobs, pains, and gains is essential to respond them. Mr. Anirban is not convinced with need of rank said three elements of customers' profile; hence he seeks your help in evaluating following two statements regarding the customer's jobs, pains, and gains.

I. Pains and Gains are controlled by Business.

II. All the pains and gains need not be responded or addressed.

Options

a. Both the statements are correct

b. Both the statements are incorrect

c. Only statement 1 is correct

d. Only statement 2 is correct

Key - d

Reason – Pain relievers and gain creators are distinctly different from pains and gains. Business have control over the former, whereas it doesn't have control over the latter. Business decides (i.e., design) how it intend to create value by addressing specific jobs, pains, and gains. Business don't decide over which jobs, pains, and gains the customer has and no value proposition addresses all of a customer's jobs, pains, and gains. The best ones address those that matter most to customers and do so extremely well.

MCQ 3

The technique of "Management by wandering around" is concerned with which of following leadership aspects of management accountant.

I. Communication

II. Decisions Making

Options

a. Both of I and II

b. Only with I

c. Only with II

d. None of I and II

Key - b

Reason – Management by wandering/walking around (MBWA)[29] is helpful in making communications and supporting TQM. MBWA refers to a style of business management which involves managers wandering around, in an unstructured manner, through the workplace(s), at random (rather than a plan where employees expect a visit from managers at more systematic, pre-approved or scheduled times), to check with employees, equipment, or on the status of ongoing work. The expected benefit is that a manager, by random sampling of events or employee discussions, is more likely to facilitate improvements to the morale, sense of organizational purpose, productivity and total quality management of the organization, as compared to remaining in a specific office area and waiting for employees.

MCQ 4

Technology is dynamic in nature and has significant bearing on activities that create value for customers. Your organisation is considering introducing RFID, as technological breakthrough. RFID is capable to revamp which of following primary activities (to generate scope of value);

I. Inbound logistic

II. Outbound logistic

III. Sales and Marketing

IV. After-Sale Services

Options

a. III and IV only

b. II and III only

c. I and III only

d. I and II only

Key - d

Reason – RFID (Radio-frequency identification uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID system consists of a tiny radio transponder, a radio receiver and transmitter) can be used to track items in trading concerns throughout the supply chain. It is calibre to positively influence inbound and outbound logistic.

MCQ 5

A Business model should contain which three components out of those stated below;

I. Customer value proposition

II. Profit formula

III. Impact factor

IV. Key resources and processes

[29] Management consultants Tom Peters and Robert H. Waterman had used the term in their 1982 book In Search of Excellence: Lessons from America's Best-Run Companies

Options

a. I, II and III only

b. I, II and IV only

c. I, III and IV only

d. II, III and IV only

Key - b

Reason – In 2008, Johnson along with Christensen & Kaggerman[30] extended the scope of business model to what was earlier proposed by Margretta and proposed that a business model also needs a **value proposition**, therefore business model should contain three components–

1. Customer value proposition.

2. Profit formula.

3. Key resources and processes.

MCQ 6

Shakti Bearing Ball Trading Limited is considering the proposal to enter into trading of casting iron as well. Mr. Madhu Sudan, chief strategic enumerate the entry exist barriers of proposed business line and called a review meeting at request of CEO to consider final advice of C-suite. You (Chief Cost Advisor) also attended the meeting and suggested that barriers have influence on profitability (rate as well as nature). Mr. Sudan told SBBTL expected that there will be high entry and exit barriers you are advised to tell nature and margin rate in context of five force model.

Options

a. Low margin with stable return

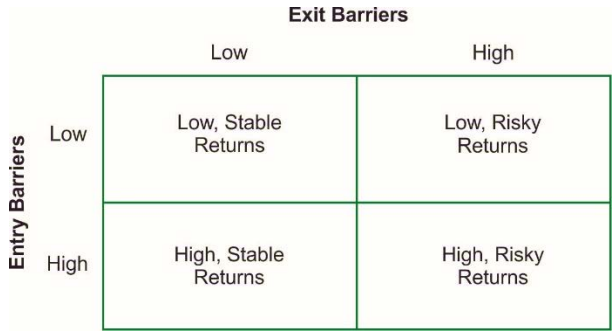
b. Low margin with Risky return

c. High margin with stable return

d. High margin with Risky return

Key - d

Reason – Impact of exit and entry barriers on profitability (margin) are depicted below-



[30] Johnson M, Christensen C & Kaggerman H, 2008, 'Reinventing your business model', *Harvard Business Review*, December, www.innosight.com/insight/reinventing-your-business-model-form.

MCQ 7

The board of Modern Furniture Limited considering the need of strategies for Information related aspects. Chief Information and Technology officer made a statement "Information Technology (IT), Information System (IS) and Information Management (IM), all three are inter-connected; but not same. Information technology techniques are used as part of information system to manage information". He further highlights the nature of IT/IS/IM strategies and suggests–

I. IT strategy is supply-oriented

II. IS strategy is demand-oriented

III. IM Strategy is dimension-oriented

Which of the above specified statements are incorrect

Options

a. I only

b. III only

c. I and II only

d. I and III only

Key - b

Reason – **IM strategy** trying to 'put management into IT' by defining the **role and structure** of the IT activities in the organisation. It is concerned with the management controls for IT, management responsibilities, performance measurement and management processes. Here it is decided who can assess the data and who can't. It formulated at organisation wide level. It deals with control over the layout of IT uses in organisation. Hence IM strategy is **relationship oriented**.

MCQ 8

Ali Fabrics Limited (AFL) has recently decided to invest in an Electronic Data Interchange system that will enable the AFL to automatically place orders with its major suppliers. Currently, AFL purchasing department staff have to place orders using postal mails and telephone to the company's suppliers, which is slow and inefficient.

Which activity within AFL's value chain will the new EDI system improve?

Options

a. Infrastructure

b. Inbound Logistic

c. Procurement

d. Outbound Logistic

Key - c

Reason – The EDI system will improve the system for sourcing and purchasing materials. This is procurement. Note that inbound logistics refers to inventory management - not the purchasing of inventory itself.

MCQ 9

Management Accountant assume the role of leader, who need to make or assist in **decision making** in wake of organisational strategy, make **communications** (of strategy, plans, vision and values) while getting such decsions executed either himself or through others; and remain **ethical** throughout. Which of the following statements are incorrect?

I. An increasing number of organizations are segregating management accountants in separate managerial-accounting departments.

II. Management accountants often are part of cross-functional teams.

III. Management accountants make significant business decisions and resolve operating problems while support in strategic decision making.

IV. The role of management accountants has changed considerably over the past decade.

Options

a. Only I

b. Only III

c. Both I and III

d. Both I and II

Key - a

Reason – Management Accountant is a position that holistically addresses the various aspects, which affect the sustainability of a business's performance. The management accountant is at the crossroads of technology, financial analysis and strategy, and leadership, helping to identify what is driving the company's profits and losses, rather than simply reporting them.

MCQ 10

Tara Fabrics considering the decisions regarding segmentation. Management Accountant raised and said it was acknowledged that managerial discretion and judgment determine which markets are selected and targeted and which others are ignored. In order for market segmentation to be effective, all segments must be –

Options

a. Distinct, Artistic, Measurable and Profitable.

b. Distinct, Accessible, Measurable and Popular.

c. Desperate, Accessible, Many, and Profitable.

d. Distinct, Accessible, Measurable and Profitable.

Key - d

Reason – In order to be recognised as segment, the following criteria shall be satisfied the segment should be homogeneous internally, heterogeneous externally (distinct), identifiable (measurable), shall be reasonable if not substantial (profitable), and must be responsive (accessible).

TEST YOUR KNOWLEDGE- CASELET BASED MCQS

Case-let on Strategic Fit - Value Propositions of a multinational automotive company that is engaged in designs and manufactures electric vehicles

In electronic-vehicle segment (four-wheelers), there are many players, who are trying to meet different requirements of their customers including personal mobility, regular long-distance trips, and be different from others with their offerings but an emerging multinational automotive company that is engaged in designs and manufactures electric vehicles is leading the chart.

In 2008, such multinational automotive company released its first electric car, the Speed. The Speed was the first car to use lithium-ion battery cells, and the first electric car to travel more than 320 km (200 miles) per charge. Such multinational automotive company aims to create more affordable electric car options to attract a broader customer base. Such multinational automotive company expanded its geographic footprint, with production facilities in Country C (country with cheap resources) and the Country U (a developed country), as well as 438 stores and 100 service centres in various countries.

The M10EV (e-vehicle) was launched in July 2009, and The Leaf, another e-vehicle form another rival company was introduced in December 2010. But such multinational automotive company counter them strongly with the Model S on 22 June 2012 and the first delivery to a retail customer in Europe took place on 7 August 2013, while deliveries in Country C began on 22 April 2014. The next model was the Model X launched in 2015. Then such multinational automotive company launched Model 3 in mid-2017. The sale of such Model 3 surpassed the sale of The Leaf in early 2020 to become the world's best-selling electric car ever, with more than 5,00,000 total units sold by March 2020. However, the Model Y of such multinational automotive company is the bestselling electric vehicle in terms of yearly units. Such multinational automotive company also became the first auto manufacturer to produce 1 million electric cars in March 2020. Global sales of the Model 3 passed the 1 million milestone in June 2021, the first electric car model to do so.

While the Leaf achieved the milestone of 5,00,000 units sold globally in early December 2020, 10 years after its inception.

Country C is larger consumer of e-vehicles with total of 78,42,668 light-duty plug-in electric vehicle on road at end of 2021 and nearly 15% of new vehicle sold during 2021 were electric vehicle there.

There is a clear division between the opinions of industry experts. Larger chunk of experts feels a strategic fit between value map and customer profile is the reason of superior performance by such multinational automotive company, while some other feels first mover advantage is the reason.

You after qualifying chartered accountancy, recently join a consulting firm that has undertaken the task to study the value proposition of such multinational automotive company. Team of consultants, list the pains, gains, pain relievers and gain creators. List was then given to computer operator for digitisation and circulation among all consultants, who are working on this. But operator jumbled the list as–

1. *Growing network of charging points*
2. *Brand recognition*
3. *Slow charging*
4. *8 years battery warranty*
5. *Durable battery lifetime*
6. *Insufficient number of charging points*
7. *Reputable brand*
8. *Developed interior ergonomics*
9. *Self-driving option*
10. *Lack of luggage space*
11. *Interior ergonomics*
12. *75 minutes to charge 100% with supercharging stations*

Requirements

MCQ 1

Which of following is correct combination of Pains?

Options

a. Item No. 3, 6 and 10

b. Item No. 3, 5 and 10

c. Item No. 3, 5 and 11

d. Item No. 2, 5 and 11

Key – a i.e., Item No. 3, 6 and 10

Reason – Refer answer to first descriptive question of this case-let

MCQ 2

Which of following is correct combination of Gains?

a. Item No. 3, 6 and 10

b. Item No. 2, 5 and 11

c. Item No. 3, 5 and 11

d. Item No. 3, 5 and 10

Key – b i.e., Item No. 2, 5 and 11

Reason – Refer answer to first descriptive question of this case-let

MCQ 3

Which of following is correct combination of Pain Relievers?

a. Item No. 1, 7 and 9

b. Item No. 4, 7 and 9

c. Item No. 1, 8 and 12

d. Item No. 4, 8 and 12

Key – c i.e., Item No. 1, 8 and 12

Reason – Refer answer to first descriptive question of this case-let

MCQ 4

Which of following is correct combination of Gain Creators?

a. Item No. 1, 7 and 9

b. Item No. 4, 7 and 9

c. Item No. 1, 8 and 12

d. Item No. 4, 8 and 12

Key – b i.e., Item No. 4, 7 and 9

Reason – Refer answer to first descriptive question of this case-let

Descriptive Question 1

Do you agree to the opinion of larger chunk of industry experts or not? Justify you answer.

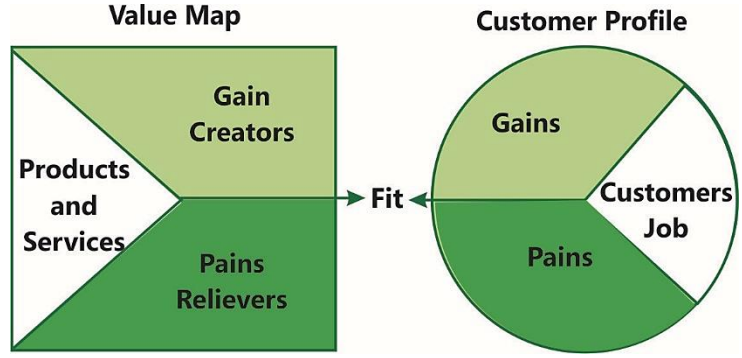
Answer - The opinion of larger chunk of industry expert is correct considering value proposition canvas.

Value Proposition describes the benefits that customers can expect from product and the bundle of products and services that business offer to specific customer segment to create value. Therefore, value proposition canvas[31] is the tool that will help the organisation **to design, test, build and manage the great customer value propositions**.

The **Value Proposition Canvas** has two sides. With the Customer Profile business can have clear understanding of customer character. With the Value Map business describe how it intend to create value for that customer. Business achieve Fit between the two when one meets the other.

[31] By Alexander Osterwalder, Yves Pigneur, Gregory Bernarda, Alan Smith in Value Proposition Design - How to Create Products and Services Customers Want (2014)

Value Proposition Canvas



Value Proposition Canvas of multinational automotive company that is engaged in designs and manufactures electric vehicles

Value Map		Customer Profile
Products & services Model S Model X Model 3		**Customer Jobs** Personal mobility Regular long-distance trips Be different from others
Pain relievers Growing network of charging points Developed interior ergonomics 75 minutes to charge 100% with supercharging stations	**FIT**	**Pains** Insufficient number of charging points Lack of luggage space Slow charging
Gain creators 8 years battery warranty Reputable brand Self-driving option		**Gains** Durable battery lifetime Brand recognition Interior ergonomics

Business is said to achieve a **problem-solution fit**, when the features of business's value proposition map perfectly match the characteristics of your customer segment profile. When the market validates this match and business value proposition gets traction with real customers, business achieved the **product-market fit**.

The value proposition canvas drawn above shows fit (problem-solution as well as product-market) exist, hence options of larger chunk of expert is factually correct.

Descriptive Question 2

How establishing manufacturing in Country C help such multinational automotive to do better in primary activities of their value chain?

Answer – Primary activities of value chain consist of the inbound logistics, operations, outbound logistics, marketing & sale, and after sale services. Automobile industry use assemblies, which are usually procured from countries with low-cost model (because such countries are capable to produce these assemblies cheaply, substantially due to cheap labour rates). Such multinational automotive company is not an exception to this. Country C is one such country. Therefore, by establishing their operations in Country C such multinational automotive company is able to reduce inbound cost, also reduce the cost of operation due to cheap labour rate.

Moreover, Country C is largest market for E-Vehicle. This not only reduce outbound logistic cost as well as easy and large market hence marketing and sale also become easy; further the fact Country C is growing market create a great source of value.

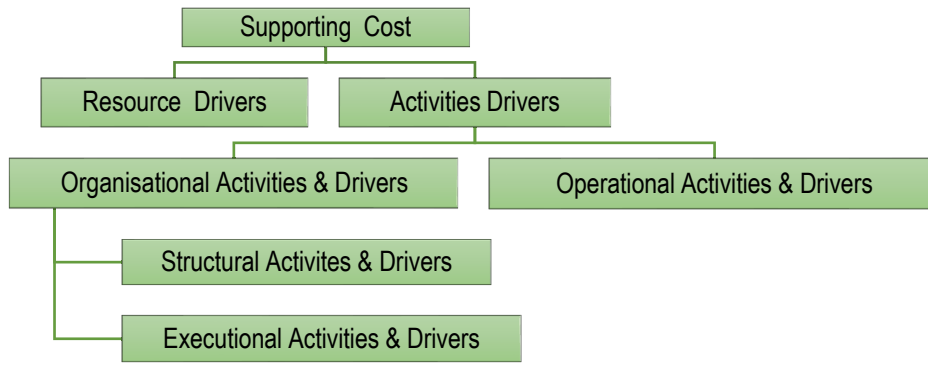
Hence, establishing operation in Country C is beneficial to such multinational automotive company in generating same or higher value (perceived value by customer) for its customer at lower cost level (than earlier); therefore, increasing margin.

Note – Alternate answers are possible to this particular descriptive question.

ANNEXURE 1

Based upon two **distinct nature of supporting cost (overhead cost),** drivers can also be categories into two classes

1. **Resource drivers** – Concerned with contribution of specific quantum of resources, which caused cost → electricity costs to produce products and the number of machine hours spent (machine hour is resource).
2. **Activity driver** – Concerned with cost incurred on the activities required to complete a specific task → inspection costs and the number of inspections or the hours of inspection (Inspection is required activity to ensure quality).



2.1 Organizational activities and cost drivers

2.1.1 Structural cost drivers relate to business strategic choices about an organization's underlying economic structure, such as scale and scope of operations, use of technology and complexity of products.

- Scale – What are the investment amounts for research and development, product design, production and other operations?
- Scope – What is the area of operation, front-line or back-end?
- Experience – How many years has the company already operated this?
- Technology – What technical processes are involved in each process of the company's value chain?
- Complexity – How sophisticated are the products or services to provide to customers?

Note – Not necessary that more is better.

2.1.2 Executional cost drivers relate to the execution of the business activities, such as utilization of employees, provision of quality service, and product design and manufacturing.

- Workforce involvement – Do the employees take part in decision-making and performance improvements?
- Total quality management – Are the managers and employees devoted to total quality in processes and products?
- Capacity utilization - What are the operational scales for matching utilization of plant capacity?
- Plant layout efficiency – How efficient is the production plant's layout?
- Product configuration – Is the product design or service formulation effective?
- Linkage with suppliers and customers – Is the linkage with vendors and customers based on the company's value chain?

Examples

Structural activities	**Structural cost drivers**
Plant construction	Number of plants, scale, degree of work centralization
Employee grouping	Number and type of work units
Complexity	Number of product lines, number of unique processes, number of unique parts, degree of complexity
Process selection and use	Types of process, experience of usage
Executional activities	**Executional cost drivers**
Employee utilization	Degree of involvement
Quality service provision	Quality management approach
Operation of plant layout	Plant layout efficiency
Product design & manufacturing	Product configuration

2.2 Operational activities and cost drivers

Operational activities are daily work activities done as a result of the structure and process adopted by the company. Operational cost drivers refer to factors that drive the costs of operational activities. Can be categories at Unit, Batch and Product level.

Examples

Unit-level activities	**Unit-level cost drivers**
Grinding materials	Grinding machine hours
Component assembly	Labour assembly hours
Drilling holes	Drilling machine hours
Materials use	Material weight
Electricity use (Power)	Number of kilowatt-hours
Batch-level activities	**Batch-level cost drivers**
Equipment set up	Number of setups
Finished products moved in batch	Number of moves
Manufacturing products inspected in batches	Inspection hours
Reworking products	Number of detective units
Product-level activities	**Product-level cost drivers**
Product design and/or redesign	Number of change orders
Product line scheduling	Number of different products
Product testing	Number of procedures

ANNEXURE 2

List of Porter's Five Forces factors

Threat of new entrants

- Economies of scale
- Product differentiation
- Brand identity/loyalty
- Access to distribution channels
- Capital requirements
- Access to latest technology
- Access to necessary inputs

- Absolute cost advantages
- Experience and learning effects
- Government policies
- Switching costs
- Expected retaliation from existing players

Bargaining power of suppliers

- Number of suppliers
- Size of suppliers
- Supplier concentration
- Availability of substitutes for the supplier's products
- Uniqueness of supplier's products or services (differentiation)
- Switching cost for supplier's products
- Supplier's threat of forward integration
- Industry threat of backward integration
- Supplier's contribution to quality or service of the industry products
- Total industry cost contributed by suppliers
- Importance of the industry to supplier's profit

Bargaining power of buyers

- Buyer volume (number of customers)
- Size of each buyer's order
- Buyer concentration
- Buyer's ability to substitute
- Buyer's switching costs
- Buyer's information availability
- Buyer's threat of backward integration
- Industry threat of forward integration
- Price sensitivity

Threat of substitute products or services

- Number of substitute products available
- Buyer's propensity to substitute
- Relative price performance of substitutes
- Perceived level of product differentiation

- Switching costs
- Substitute producer's profitability & aggressiveness

Rivalry among existing competitors

- Number of competitors
- Diversity of competitors
- Industry concentration and balance
- Industry growth
- Industry life cycle
- Quality differences
- Product differentiation
- Brand identity/loyalty
- Switching costs
- Intermittent overcapacity
- Informational complexity
- Barriers to exit

NOTES

TEST YOUR KNOWLEDGE- CASELET BASED MCQS

Case-let on Push-Pull Inventory System

ABC Ltd. is a very profitable company with a high sales volume for its products. The company has been in this business for the last 20 years. The business cycles can be predicted with high accuracy. The products it manufactures can be bought off the shelf from retail stores. Demand is continuous throughout the year. Hence, its inventory turnover is high. Profit margin earned on its sales are high and generate sufficient cash flow.

Production cost is optimal when products are produced on a large scale. It is a mid-sized company that wields sufficient bargaining power over its suppliers. Factory land is owned, and it has sufficient storage area within its premises. Working capital needs of the company are sufficiently met by internal reserves.

Requirements

MCQ 1

Given the above conditions, which type of supply chain may be more suitable for ABC Ltd. to adopt:

Options

a. Pull model supply chain

b. Push model supply chain

Key – b

Reason – Push model supply chain.

- The ability to keep production cost low on account of economies of scale of production,
- ability to forecast demand for its products with high accuracy,
- having sufficient working capital requirements that can help it stock up finished goods inventory.

All these factors can enable ABC Ltd. to produce its products on a large scale in anticipation of demand. Inventory of finished goods can be stocked up and sold when the demand for it arises. Therefore, production in anticipation of demand, which is the Push model of supply chain can be adopted here. In Push model of supply chain, the production is done in anticipation of demand. The manufacturers or distributors then "push" these finished goods to the customer.

MCQ 2

Where in the flow of the supply chain are the customers?

Options

a. At the end of the supply chain (downstream)

b. At the beginning of the supply chain (upstream)

Key – a

Reason – Customers are at the end of the flow of the supply chain. They are at the end of the downstream flow in the supply chain.

MCQ 3

Implication of high inventory turnover ratio on working capital locked in finished stock is –

Options

a. Working capital gets locked in finished stock for a shorter period of time

b. Working capital gets locked in finished stock for a longer period of time

Key – a

Reason – High inventory turnover ratio implies that finished goods inventory is converted into sales at a faster rate. Hence working capital locked in finished stock can be recouped faster through cash flows generated from sale of products.

MCQ 4

What advantages can ABC derive from economies of scale of production on production cost and the ability to wield sufficient bargaining power over its suppliers?

Options

a. The factors provide ABC Ltd. a competitive advantage on the ability to compete with the market based on price of the product. It can follow the low cost advantage strategy.

b. The factors provide ABC Ltd. a competitive advantage on the ability to compete with the market based on variety of the finished product. It can follow the product differentiation advantage strategy.

Key – a

Reason – Economies of scale of production on production cost and the ability to wield sufficient bargaining power over its suppliers can help reduce the overall cost of production. This savings in cost provides a cushion to the company that can enable it to offer its products at a discounted price to the customers. This is the low cost advantage strategy.

Ability to offer product differentiation works better in industries where production is based on customer requirements (more variety). Where more variety is offered, it may not always be possible to produce on a large scale. Economies of scale may not be optimally achievable in these cases.

MCQ 5

What are the risks involved in the selected model –

Options

a. Risk of overstocking due to variations in actual demand as compared to forecast.

b. Inventory has working capital locked in finished stock and there is higher need for storage space for finished stock.

c. Both (a) and (b) above

d. Neither (a) nor (b) above

Key – c

Reason –The risks involved in using the push model is that

- Overstocking of inventory may occur when the actual demand does not follow the pattern of forecasted demand. Since production is done based on forecasted demand it might happen that inventory can pile up when there is sluggish demand that was not accounted for.
- Since production is in advance, working capital gets tied up in finished stock as part of inventory. Also, since production is in anticipation of demand, finished goods need to be stored. Hence the need for more space for storage of finished goods.

MCQ 6

Had ABC Ltd. been producing products that are highly customized in nature, based on individual customer requirements, what would be the more appropriate type of supply chain to adopt?

Options

a. Pull model supply chain

b. Push model supply chain

Key – a

Reason – Had ABC Ltd. been producing goods that are highly customized in nature, production will depend on meeting the customer's requirements. Hence, a pull system of supply chain would work better where product customization is important.

TEST YOUR KNOWLEDGE

Cost of Quality/ Total Quality Management

1. CIMZ is a new banking company which is about to open its first branch in INDIA. CIMZ believes that in order to win customers from the market, it needs to offer potential customers a new banking experience. Other banking companies are focusing on interest rates and bank charges, whereas CIMZ believes that quality and timely availability of service is an important factor to attract customers.

Required

EXPLAIN how Total Quality Management would enable CIMZ to gain competitive advantage in the banking sector.

2. The CEO of P Limited is concerned with the amounts of resources currently spent on customers' warranty claims. Each box of its product is printed with the logo: "satisfaction guaranteed or your money back". P Limited is having difficulty competing with X Limited because it does not have the reputation for high quality that X Limited enjoys. Since the warranty claims are so high, the CEO of P Limited would like to evaluate what costs are being incurred to ensure the quality of the product. Following information is collected from various departments within the company relating to 2022-23:

Particulars of Costs	(₹)
Warranty claims	4,25,000
Employee training costs	1,20,000
Rework	3,00,000
Lost profits from lost customers due to impaired reputation	8,10,000
Cost of rejected units	50,000
Sales return processing	1,75,000
Testing	1,70,000

For the year 2023-24, the CEO is considering spending the following amounts on a new quality programme:

	(₹)
Inspect raw material	1,20,000
Reengineer the production process to improve product quality	7,50,000
Supplier screening and certification	30,000
Preventive maintenance on plant equipment	70,000

P Limited expects the new quality programme to save costs by the following amounts:

	(₹)
Reduction in lost profits from lost sales due to impaired reputation	8,00,000
Reduction in rework costs	2,50,000
Reduction in warranty costs	3,25,000
Reduction in sales return processing	1,50,000

Required

(i) PREPARE a 'Cost of Quality Statement' for the year 2022-23 showing the percentage of the total costs of quality incurred in each cost category.

(ii) PREPARE a 'Cost Benefit Analysis' of the new quality programme showing how the quality initiative will affect each cost category.

(iii) STATE how the manager trade-offs among the four categories of quality costs.

3. A company produces and sells a single product. The cost data per unit for the year 2024 is predicted as below:

	₹ per unit
Direct Material	35
Direct Labour	25
Variable Overheads	15
Selling Price	90

The company has forecast that demand for the product during the year 2024 will be 28,000 units. However, to satisfy this level of demand, production quantity will be increased.

There are no opening stock and closing stock of the product.

The stock level of material remains unchanged throughout the period.

The following additional information regarding costs and revenue are given:

— 12.5% of the items delivered to customers will be rejected due to specification failure and will require free replacement. The cost of delivering the replacement item is ₹5 per unit.

— 20% of the items produced will be discovered faulty at the inspection stage before they are delivered to customers.

— 10% of the direct material will be scrapped due to damage while in storage.

Due to above, total quality costs for the year is expected to be ₹10,75,556.

The company is now considering the following proposal:

1. To introduce training programmes for the workers which, the management of the company believes, will reduce the level of faulty production to 10%. This training programme will cost ₹4,50,000 per annum.
2. To avail the services of quality control consultant at annual charges of ₹50,000 which would reduce the percentage of faulty items delivered to customers to 9.5%.

Required

(i) PREPARE a statement of expected quality costs the company would incur if it accepts the proposal. Costs are to be calculated using the four recognised quality costs heads.

(ii) Would you RECOMMEND the proposal? Give financial and non-financial reasons (in brief).

4. EKS Ltd. manufactures a single product, which requires three components. The company purchases one of the components from three suppliers. DE Ltd., PE Ltd. and ZE Ltd. The following information are available:

	DE Ltd.	PE Ltd.	ZE Ltd.
Price quoted by supplier (per hundred units)	₹240	₹234	₹260
% of Defective of total receipts	3%	5%	2%

If the defectives are not detected, they are utilized in production causing a damage of ₹200 per 100 units of the component. Total requirements are 12,000 units of the components.

The company intends to introduce a system of inspection for the components on receipt. The inspection cost is estimated at ₹26 per 100 units of the components. Such as inspection will be able to detect only 90% of the defective components received. No payment will be made for components found to be defective in inspection.

Required

(i) ADVICE whether inspection at the point of receipt is justified?

(ii) Which of the three suppliers should be asked to supply?

5. H Automobile Group is among top 20 business houses in India. It has been founded in the year 1930, at the height of India's movement for independence from the British, the group has an illustrious history. H's footprint stretches over a wide range of industries, spanning automobiles (two wheelers manufacturer and three wheelers manufacturer). H's headquarter is located at Hyderabad. Bike Production is one of segment of H Group. Management of H wants to analyse the following actual information for the April:

Cost Data

Customer Complaints Centre Cost	35 per hr.
Equipment Testing Cost	18 per hr.
Warranty Repair Cost	1,560 per bike
Manufacturing Rework Cost	228 per bike

Volume and Activity Data

Bikes Requiring Manufacturing Rework	3,200 bikes
Bikes Requiring Warranty Repair	2,600 bikes
Production Line Equipment Testing Time	1,600 hrs.
Customer Complaints Centre Time	2,000 hrs.

Additional Information

Due to the quality issues in the month, the bike production line experienced unproductive 'down time' which cost ₹7,70,000. H carried out a quality review of its existing suppliers to enhance quality levels during the month at a cost of ₹1,25,000.

Required

(i) PREPARE a statement showing 'Total Quality Costs'.

(ii) ADVISE any TWO measures to reduce the non- conformance cost.

6. Cool Air Private Ltd. manufactures electronic components for cars. Car manufacturers are the primary customers of these products. Raw material components are bought, assembled and the electronic car components are sold to the customers.

The market demand for these components is 5,00,000 units per annum. Cool Air has a market share of 100,000 units per annum (20% market share) for its products. Below are some of the details relating to the product:

Selling price	₹2,500 per unit
Raw material cost	₹900 per unit
Assembly & machine cost	₹500 per unit
Delivery cost	₹100 per unit
Contribution	₹1,000 per unit

The customers due to defects in the product return 5,000 units each year. They are replaced free of charge by Cool Air. The replaced components cannot be repaired and do not have any scrap value. If these defective components had not been supplied, that is had the sale returns due to defective units been nil, customers' perception about the quality of the product would improve. This could yield 10% increase in market share for Cool Air, that is demand for its products could increase to 1,50,000 units per annum.

Required

(i) ANALYZE, the cost of poor quality per annum due to supply of defective items to the customers.

(ii) The company management is considering a proposal to implement an inspection process immediately before delivery of products to the customers. This would ensure nil sales returns. The cost of having such a facility would be ₹2 crores per annum, this would include materials and equipment for quality check, overheads and utilities, salaries to quality control inspectors etc. ANALYZE the net benefit, if any, to the company if it implements this proposal.

(iii) Quality control investigations reveal that defective production is entirely on account of inferior quality raw material components procured from a large base of 30 suppliers. Currently there is no inspection at the procurement stage to check the quality of these materials. The management has a proposal to have inspectors check the quality control at the procurement stage itself. Any defective raw material component will be replaced free of cost by the supplier. This will ensure that no product produced by Cool Air is defective. The cost of inspection for quality control (materials, equipment, salaries of inspectors etc.) would be ₹4 crores per annum. ANALYZE the net benefit to the company if it implements this proposal? Please note that scenarios in questions (ii) and (iii) are independent and not related to each other.

(iv) Between inspection at the end of the process and inspection at the raw material procurement stage, ADVISE a better proposal to implement (a) in terms of profitability and (b) in terms of long term business strategy?

ANSWERS/ SOLUTIONS

1. Total Quality Management is a management philosophy. It concerns itself with managing the processes and people to make sure that the customer is satisfied at each and every stage. This means *making the needs of the customer the priority, expanding the relationship beyond traditional services and incorporating the customer's needs in the company's business plan and corporate strategy.* In TQM, the concept of "quality" is perceived exclusively from the frame of reference of the customer. These customers can be internal, such as, those working in another department and there can be external customers who are the end recipients of the product or services. The organisation should attempt for continuous improvement in the quality that it delivers with the ultimate aim of achieving zero defects in this quality.

TQM should be view as an investment rather than as a cost that should be minimised. There are many ways in which investment can be made in TQM.:

- fine-tuning the product mix,
- fine-tuning of the processes of ensuring quality,
- introducing employee development programmes with the nature of an academic course,
- empowering the employees professionally and personally,

- improving the top management commitment to quality,
- monitoring of the performances and proper rewarding based on achievements,
- ensuring the customer satisfaction etc.

CIMZ could provide its employees with *training* in the technical aspects of banking practice as well as in customer care. Customers would thus get a better service not only technically but also from a customer care perspective. This should lead to smaller customer complaints and greater customer satisfaction. It could also motivate customers to recommend others to use this bank.

TQM also requires CIMZ to respond to its customer's requirements immediately for example by providing more staff to reduce the lengths of queues in festive/ seasonal/ busy time. If Bank could also be opened for longer hours to allow customers to complete their bank related requirements and have meetings with bank employees at a time that is more convenient for the customer, this would lead to more satisfaction to customers.

In long run, if bank continue to follow TQM, the bank would have higher profits and competitive advantage in banking sector despite incurring additional expenditure to improve quality.

2. (i) Cost of Quality Statement

For the year 2022-23

Particulars of Costs	Cost Incurred (₹)	Total Cost Incurred (₹)	% of Total Costs of Quality
Preventive Costs:			
Employee training	1,20,000	1,20,000	5.85%
Appraisal Costs:			
Testing	1,70,000	1,70,000	8.29%
Internal Failure Costs:			
Rework	3,00,000	3,50,000	17.08%
Cost of rejected units	50,000		
External Failure Costs:			
Lost profits from lost sales due to impaired reputation	8,10,000	14,10,000	68.78%
Sales return processing	1,75,000		
Warranty costs	4,25,000		
Total Cost of Quality	**20,50,000**		**100%**

(ii) **Cost Benefit Analysis of New Quality Programme**

Particulars of Costs	Additional (Costs) / Cost Savings (₹)	Total New (Costs) / Cost Saving (₹)
Preventive Costs:		
Reengineer the production process	(7,50,000)	(8,50,000)
Supplier screening and certification	(30,000)	
Preventive maintenance on equipment	(70,000)	
Appraisal Costs:		
Inspect Raw Materials	(1,20,000)	(1,20,000)
Internal Failure Costs:		
Reduction in rework costs	2,50,000	2,50,000
External Failure Costs:		
Reduction of lost profits from lost sales	8,00,000	12,75,000
Reduction from sales return	1,50,000	
Reduction from warranty costs	3,25,000	
Total Savings/ (Costs) from Quality Programme		**5,55,000**

(iii) Investment in prevention costs and appraisal costs (also known as costs of good quality), reduces internal and external failure costs (also known as cost of poor quality).

Costs incurred before actual production begins, to prevent defects and other product quality issues, are known as preventive costs. In the given example, reengineering production process, screening / certification of suppliers and preventive maintenance of equipment are preventive costs. Likewise, appraisal costs are incurred to ensure that activities conform to desired quality requirements. They are incurred in all stages of production. In the given example inspection of raw material is an appraisal cost.

While preventive and appraisal costs would not directly improve the quality of the product, they would definitely reduce internal failure costs like rework costs or external failure costs like sales returns or warranty claims. These would also enhance the reputation of the product for its standard of quality. Conversely, it follows that internal failure costs may be preferable to external failure costs since it affects the company's brand image.

Costs incurred to ensure conformance to quality will ensure higher chances of detection of defects in the product. At the same time ensuring zero defective rate may require huge resources and therefore may be costly. Instead, companies may have the ability to absorb costs incurred due to rework, warranty claims or lost sales. Therefore, they must determine a reasonable threshold defective rate that is acceptable, a normal cost in

business operations. Tools for quality production management like Total Quality Management (TQM) will help in determining the optimum cost of quality that the company is willing to bear. TQM focus on continuous improvement of an organization's business activities. This creates an awareness of quality that the company comes to expect from various processes. Things need to be done right the first time, consequently eliminating defects and waste from operations. At the same time, an in-depth knowledge of business processes provides information that can help the management set acceptable threshold limits for reasonable level of defects it is willing to bear.

3. (i) Statement of 'Expected Quality Costs'

Particulars	Current Situation (₹)	Proposed Situation (₹)
Prevention Costs	---	4,50,000
Appraisal Costs	---	50,000
External Failure Costs	3,20,000	2,35,120
Internal Failure Costs	7,55,556	3,91,538
Total Quality Costs	10,75,556	11,26,658

Workings

External Failure Cost

Particulars	Current Situation	Proposed Situation
Customer's Demand …(A)	28,000 units	28,000 units
Number of units Dispatched to Customers …(B) $\left(\frac{28,000\text{ units}}{87.5\%}\right)$; $\left(\frac{28,000\text{ units}}{90.5\%}\right)$	32,000 units	30,939 units
Number of units Replaced …(B) – (A)	4,000 units	2,939 units
External Failure Cost {4,000 units × ₹(35+25+15+5)}; {2,939 units × ₹(35+25+15+5)}	₹3,20,000	₹2,35,120

Internal Failure Cost

Particulars	Current Situation	Proposed Situation
Number of units Dispatched to Customers …(A)	32,000 units	30,939 units
Number of units Produced & Rejected …(B) $\left(\frac{32,000\text{ units}}{80\%}\right)$; $\left(\frac{30,939\text{ units}}{90\%}\right)$	40,000 units	34,377 units
Number of units Discovered Faulty … (B) – (A)	8,000 units	3,438 units

Cost of Faulty Production …(D) {8,000 units × ₹(35+25+15)}; {3,438 units × ₹(35+25+15)}	₹6,00,000	₹2,57,850
Material Scrapped $\left(\frac{40,000\text{ units}}{90\%}\times 10\%\right)$; $\left(\frac{34,377\text{ units}}{90\%}\times 10\%\right)$	4,444.44 units	3,819.67 units
Cost of Material Scrapped …(E) {4,444.44 units × ₹35}; {3,819.67 units × ₹35}	₹1,55,556	₹1,33,688
Internal Failure Cost …(D)+(E)	₹7,55,556	₹3,91,538

(ii) Recommendation

On purely *financial grounds* the company should not accept the proposal because there is an increase of ₹51,102 in quality costs. However, there may be *other factors* to consider as the company may enhance its reputation as a company that cares about quality products and this may increase the company's market share.

On balance the company should accept the proposal to improve its *long-term* performance.

This question can also be solved by considering rejections of 3,500 units (12.5% of 28,000) Hence, total 31,500 units are required to be produced.

4. (i) A: Statement Showing Computation of Effective Cost before Inspection

Particulars	DE Ltd.	PE Ltd.	ZE Ltd.
Units Supplies (No.s)	12,000	12,000	12,000
Defectives Expected (No.s)	360	600	240
Costs:			
Purchase of Components	28,800	28,080	31,200
Add: Production Damage on Defective Components (@ ₹200 per 100 components)	720	1,200	480
Total	29,520	29,280	31,680
Good Components (Nos.)	11,640	11,400	11,760
Cost per 100 Good Components	253.61	256.84	269.39

B: Statement Showing Computation of Effective Cost after Inspection

Particulars	DE Ltd.	PE Ltd.	ZE Ltd.
Units Supplies (No.s)	12,000	12,000	12,000
Defects Not Expected (No.s)	36	60	24
Defectives Expected (No.s)	324	540	216
Components Paid For	11,676	11,460	11,784
Costs:			
Purchase of Components	28,022.40	26,816.40	30,638.40
Add: Inspection Cost	3,120.00	3,120.00	3,120.00
Add: Production Damage on Defective Components (@ ₹200 per 100 components)	72.00	120.00	48.00
Total	31,214.40	30,056.40	33,806.40
Good Components (Nos.)	11,640	11,400	11,760
Cost per 100 Good Components	268.16	263.65	287.47

Advice Whether Inspection at the Point of Receipt is Justified

On comparing the cost under situation, A and B shown above, we find that it will not be economical to install a system of inspection.

Further we also need to consider that presently many organizations are undergoing Just in Time (JIT) implementation. JIT aims to find a way of working and managing to eliminate wastes in a process. Achievement of this is ensured through eliminating the need to perform incoming inspection. Inspection does not reduce the number of defects, it does not help in improving quality. In general inspection, does not add value to the product. It simply serves as a means of identifying defects the supplier has failed to recognize subsequent to the manufacturing of the product.

As a matter of fact, organizations implementing JIT are seeking eventually to eliminate the need for performing incoming inspection activities through a combination of reducing the supplier base, selection through qualification and vendor development. Vendor development and its proper management seeks to assist the supplier who maintains an interest in striving to provide 100% defect-free materials and parts.

So, to decision whether inspection at the point of receipt is justified or not will also depend on Qualitative factors as well.

(ii) On comparing the buying cost of components under different situations, as analysed and advised above, if company decides not to install a system of inspection, supplier DE would be cheaper otherwise supplier PE would be cheaper and company may choose supplier accordingly.

This question can also be solved by assuming receipt of **good components** as requirement i.e. 12,000 units.

5. (i) Statement Showing 'Total Quality Costs'

Particulars of Costs	₹
Prevention Costs	
Supplier Review	1,25,000
Appraisal Costs	
Equipment Testing (₹18 × 1,600 hrs.)	28,800
Internal Failure Costs	
Down Time	7,70,000
Manufacturing Rework (₹228 × 3,200 bikes)	7,29,600
External Failure Costs	
Customer Complaints (₹35 × 2,000 hrs.)	70,000
Warranty Repair (₹1,560 × 2,600 bikes)	40,56,000
Total Quality Costs	**57,79,400**

(ii) The reporting of quality costs highlights the *cost of quality activities* at H. The total quality costs statement clearly displays the relationship between conformance costs (prevention and appraisal costs) and non-conformance costs (internal failure and external failure costs) and the drivers of a reduction in the overall spending on quality. Statement indicates that only 2.16% of the total quality cost is the cost of preventing quality problems while 0.50% is the cost of appraisal activities. Thus, prevention and appraisal costs make up only 2.66% of total quality costs. In contrast, 97.34% of quality control costs are incurred for internal and external failure costs. Following two measures can be used to reduce non- conformance cost:

Total Productive Maintenance (TPM) is a system of maintaining and improving the integrity of production and quality system through *keeping all equipment in top working condition* so as to avoid breakdowns and delays in manufacturing processes. It involves identifying machines in every division (including planning, manufacturing, maintenance) and then planning & executing a maintenance programme covering their entire useful life.

In this scenario, TPM will help in reducing internal failure cost (i.e. downtime and manufacturing rework cost), which constitutes 25.95% of total quality cost, by keeping all equipment in good working conditions so that there is no downtime or machine breakdown and ensuring that all equipment run smoothly. If machines work properly, the chances of rework will reduce, ultimately will also reduce chances of warranty repair and customer complaints (comprising 71.39% of total quality cost which is the major part of total quality cost).

Total Quality Management (TQM) aims at improving the quality of organisational output, including goods and services, through *continual improvement* of internal practices. Its objective is to eradicate waste and increase efficiency without compromising with the quality. It requires that company maintain this quality standards in all aspects of business by ensuring that things are done right the first time so that defects and waste are eliminated from operation.

It appears that H is not a TQM company at present due to *huge disparity between conformance costs and non-conformance costs*. In order to make H to be successful, all staff at H must be engaged in the improvement process and share in the continuous improvement ethos. In order to establish a reputation as a high- quality bike manufacturer H must ensure staff are focused on quality *and* attitudes changed toward the importance of conformance activities, for instance, H can conduct third party inspection of raw material at supplier's workplace leading to maintenances of quality standards.

Overall, while applying above two measures, in the H, consideration must therefore be given to the *optimum balance* between the costs of conformance and the costs of non-conformance.

6. (i) Customer demand for Cool Air's products is 1,00,000 units per annum. However, 5,000 defective units supplied are to be replaced free of charge by the company. Therefore, the total number of items supplied to customers per annum = 1,00,000 + 5,000 units = 1,05,000 units. The cost of replacement would include raw material cost, assembly & machining cost and delivery cost of 5,000 units = 5,000 units × (900+500+100) per unit = 5,000 units × ₹1,500 per unit = ₹75,00,000 per annum. Further, had the sale returns not happened, market share would have increased by 50,000 units. Contribution is ₹1,000 per unit, for 50,000 units contribution would be ₹5,00,00,000. Therefore, the cost of poor quality per annum = cost of replacement + contribution from lost sales = ₹75,00,000 + ₹5,00,00,000 = ₹5,75,00,000 per annum.

(ii) Inspection at the end of the process would detect defects before delivery to the customers. This would ensure that the sale returns would be nil. Given in the problem, 5,000 units supplied are defective and would need to be replaced, in other words, they need to be manufactured again. In other words, inspection after production, before delivery to customers would not prevent production of defective units. However, compared to the current scenario, since these defective units have not yet been delivered to the customer, the cost for additional delivery of replaced products would be saved. This savings in the extra delivery cost = 5,000 units × ₹100 per unit = ₹5,00,000 per annum. Further, had the sale returns not happened, market share would have increased by 50,000 units. Contribution is ₹1,000 per unit, for 50,000 units it would be ₹5,00,00,000 per annum. However, additional failure cost for 2,500 units due to increase in sales from 1,00,000 to 1,50,000 units would be incurred. Since these defective units have not yet been delivered to the customer, this cost would be net of delivery cost. This additional failure cost = 2,500 units × ₹1,400 per unit = ₹35,00,000 per annum. Therefore, the total benefit from the inspection process before delivery to customers = savings on delivery costs + contribution from incremental sales - additional failure cost = ₹5,00,000 + ₹5,00,00,000 - ₹35,00,000 = ₹4,70,00,000 per annum. The cost to the company to maintain good quality of its products through inspection = ₹2,00,00,000 per annum. Therefore, the net benefit to the company would be ₹2,70,00,000 per annum.

This part can also be analysed by taking 7,895 defectives on 1,50,000 good units. For 95,000 good units, gross production is 1,00,000 units. For, 1,50,000 good units, gross production would be 1,57,895 units (1,00,000/ 95,000×150,000). Therefore, total defective units will be 7,895.

(iii) Inspection of raw material at the procurement stage could entirely eliminate defective production. The benefit would be two-fold, the current replacement cost for 5,000 units will no longer be incurred. Secondly, due to better customer perception, market share would increase, resulting in an increased contribution / revenue to the company. In other words, the cost of poor quality will be nil.

As explained in solution (i), the cost of poor quality per annum = cost of replacement + contribution from lost sales = ₹75,00,000 + ₹5,00,00,000 = ₹5,75,00,000 per annum. This would be the benefit by implementing the proposal.

Cool Air has to incur an inspection cost to ensure this highest standard of quality (0% defects) which would cost ₹4,00,00,000 per annum. Therefore, the net benefit to the company would be ₹1,75,00,000 per annum.

(iv) **(a)** The proposal to implement inspection immediately before delivering goods to the customers results in a net benefit of ₹2,70,00,000 per annum. Alternately, the proposal to implement inspection at the raw material procurement stage results in a net benefit of ₹1,75,00,000 per annum. Therefore, from a profitability point of view, inspection immediately before delivery of goods to the customer would the preferred option.

(b) The drawback of inspection at the end of the production process is that (1) it cannot prevent production of defective goods and (2) information regarding the root cause of defective production, in this case, supply of defective raw materials will not get tracked. Therefore, inspection at the end of production does not contribute to resolving the root cause of defective production. On the other hand, inspection at the procurement stage can eliminate production of defective goods. This will ensure a much higher quality of production, better utilization of resources and production capacity. Therefore, from a long-term strategy point of view, inspection at the raw material procurement stage will be very beneficial. Currently the cost of ensuring this highest quality of production (0% defects) is ₹4 crores per annum. The cost of ensuring 100% quality is quite high, such that the net benefit to the company is lesser than the other proposal. However, due to its long-term benefit, Cool Air may consider some minimum essential quality control checks at the procurement stage. Although selective quality check might not ensure complete elimination of defective production, it can contribute towards reducing it. At the same time cost of selective quality check would not be so high as to override its benefits. To determine the extent of quality control inspection, Cool Air should determine its tolerance limit for defective production and do an analysis of the quality / cost trade-off.

NOTES

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

5S fits in which stage of the PDCA cycle in the context of the organization striving for continuous improvement?

Options

a. Plan

b. Do

c. Check

d. Action

Key – b

Reason – Plan and Do are enablers for continual improvement, while Check and Action are results. 5S, being the foundation of TPM (even all the lean practices that eventually led to TQM), acts as the enabler for continual improvement and fits in at the Do stage.

MCQ 2

Which one is not a benefit of Shine?

Options

a. Less production downtime

b. Happier employees

c. Improved quality

d. Inventory reduction

Key – d

Reason – It is necessary to keep the work area clean and safe. Shining is also an inspection process for the area, i.e., is everything in good condition? This leads to less production time, happier employees by reducing their stress levels, and improved quality. Inventory reduction is not among the benefits of shine.

MCQ 3

Which of the following does Kaizen improvement process not focus on?

Options

a. 5S

b. Poka-Yoke

c. Just-in-time principles

d. Improvement by innovation

Key – d

Reason – Kaizen is lean thinking and structured around the core premise of continuous improvement rather innovation hence Kaizen focuses on first three options only.

MCQ 4

Which of the following is not a tool used in the 'Define' process in the DMAIC Model of Six Sigma?

Options

a. Project charter and plan

b. Check sheet

c. Effort/ impact analysis

d. Process mapping

Key – b

Reason – Project charter and plan, Effort/impact analysis, and process mapping are the tools used in the 'Define' process in the DMAIC Model of Six Sigma. In addition to this, tree diagram is also used.

The Check Sheet (Defect Concentration Diagram), is a structured form for collecting and analyzing data. It is one among the 7 Basic Quality Tools. The check sheet is a form used to collect data in real time at the location where the data is generated. The data it captures can be quantitative or qualitative. When the information is quantitative, the check sheet is sometimes called a tally sheet. It is used in the 'Measure' process.

MCQ 5

What will be overall equipment effectiveness, if second is ideal cycle time; planned production time is 7 hour and out of total count of 19,240 units, the good count are 18,848 units.

Options

a. 97.96%

b. 76.35%

c. 74.79%

d. None of these

Key – c

Reason – Formula for calculating Overall Equipment Effectiveness (OEE) can be either of Availability × Performance × Quality or (Good Count × Ideal Cycle Time) / Planned Production Time

(18,848 units × 1.0 seconds) / (420 minutes × 60 seconds) = 0.7479 (74.79%)

MCQ 5

Which principle or technique is considered as the base platform for TPM?

Options

a. Six sigma

b. 5S

c. SMED

d. Kaizen

Key – b

Reason – The traditional approach to TPM was developed in the 1960s and consists of 5S (Sort, Set in Order, Shine, Standardize, and Sustain) as a foundation and eight supporting activities (sometimes referred to as pillars).

TEST YOUR KNOWLEDGE

Just in Time

1. Pearson Metal and Motor Works (PM^2W) deals in manufacturing of the copper wired electronic motor, which is specifically designed. PM^2W is thinking to shift from traditional system to JIT system as part of process innovation.

CEO among the other top bosses at PM^2W are hopeful that implementation of JIT will not only improve value in value chain for end consumer, but also improve overall manufacturing cycle efficiency. JIT pre-implementation team was formed to evaluate the probabilities, which collects following actual and estimated data about process –

Activity Category	Traditional System (Actual)	JIT System (Estimated)
Inspection	40	30
Storage	80	20
Moving	20	10
Processing	60	40

 # All data in minutes

Further, PM^2W decided to practice single piece flow under JIT. PM^2W received an order which is due to manufacture and delivered for 10 such motors. Total available production time to produce what customer demands is 480 minutes out of which it normal practice that 30 minutes will be spent in shutdown and cleaning. CEO is also considering JIT purchase apart from JIT production.

Required

(i) EXPLAIN just in time.

(ii) CALCULATE the 'takt time' and INTERPRET the results.

(iii) ADVISE whether company should shift to JIT.

2. A manufacturer is considering implementing Just in time inventory system for some of its raw material purchases. As per the current inventory policy, raw materials required for 1 month's production and finished goods equivalent to the level of 1 week's production are kept in stock. This is done to ensure that the company can cater to sudden spurt in consumers' demand. However, the carrying cost of inventory has been increasing recently. Hence, the consideration to move to a more robust just in time purchasing system that can reduce the inventory carrying cost. Details relevant to raw material inventory are given below:

- The average inventory of raw material held by the company throughout the year is ₹1 crore. Procurement of raw material for the year is ₹12 crore. By moving to just in time procurement system, the company aims at eliminating holding this stock completely in its warehouse. Instead, suppliers of these materials are ready to provide the goods as per its production requirements on an immediate basis. Suppliers will now be responsible for quality check of raw material such that the raw material can be used in the assembly line as soon as it is delivered at the company's factory shop floor.

- Increased quality check service done by the suppliers as well as to compensate them for the risk of holding the inventory to provide just in time service, the company is willing to pay a higher price to procure raw material. Therefore, procurement cost will increase by 30%, total procurement cost will be ₹15.6 crore per year. Consequently, quality check and material handling cost for the company would reduce by ₹1 crore per year. Similarly, insurance cost on raw material inventory of ₹20 lakh per year need not be incurred any longer.
- Raw material is stored in a warehouse that costs the company rent of ₹3 crore per annum. On changing to Just in time procurement, this warehouse space would no longer be required.
- Production is 1,50,000 per year. The company plans to maintain its finished goods inventory equivalent to 1 week's production. Despite this, in order to have a complete cost benefit analysis, the management is also factoring the possibility of production stoppages due to the unavailability of raw material from the suppliers. This could happen due to of delay in delivery or non-conformance of goods to the standard required. Labor works in one 8-hour shift per day and will remain idle if there is no material to work on. Due to the stoppage of production for the above reason, it is possible to have stockout of 3,000 units in a year. Stockout represents a lost sales opportunity due to unavailability of finished goods, the customer walks away without purchasing any product from the company. Therefore, in order to reduce this opportunity cost and to make up for the lost production hours, labor can work overtime that would cost the company ₹10 lakh per annum. This is the maximum capacity in terms of hours that the labor can work. With this overtime, stockout can reduce to 2,000 units.
- Currently, the sale price of product is ₹5,000 per unit, variable production cost is ₹2,000 per unit while variable selling, general and administration (SG&A) cost is ₹750 per unit. Raw material procurement cost is currently ₹800 per unit, that will increase by 30% to ₹1,040 per unit under Just in time inventory system.
- On an average, the long-term return on investment for the company is 15% per annum.

Required

(i) CALCULATE the benefit or loss if the company decides to move from the current system to Just in Time procurement system.

(ii) RECOMMEND factors that the management needs to consider before implementing the just in time procurement system.

Total Productive Maintenance (TPM)

3. Pacific Coast Company Ltd. manufactures spare parts. It works in two shifts of 9 hours for 6 days in a week. Lunch break is 30 mins and other miscellaneous breaks add up to 15 minutes. The following details are collected for the last 4 weeks by the TPM team for one of their important equipment

Hours for Planned Preventive Maintenance = 15 minutes per shift

For Breakdown Maintenance = 6 hours total

Set up Changes = 14 hours total

Power Failure = 4 hours total

Standard Cycle Time per piece = 3 minutes

No of Parts Produced per shift = 140

Parts Accepted per shift = 131

Required

CALCULATE 'OEE'.

4. GVK Pharmaceuticals Ltd. is producing medication products (pills, balms etc.) and can be called high volume based production environment. There are several different automated production machines located in the plant, through which production of medicines is accomplished and fulfilled the demands. Plant operates in double shift a day each consisting of 8 hours with 25 minutes' lunch break and tea break of 10 minutes. Following data pertains to automated machine 'X-78'.

X-78

19 April 2023, Wednesday

Breakdown, repair and start up time (unplanned)	90 minutes
Standard cycle time	2.5 minutes *per tablet*
Quality loss due to scrap, rework, and rejection	40 tablets
Total quantity produced	280 tablets

Required

CALCULATE 'OEE'.

5. Hindustan Ltd. supplies the following information relating to a vital equipment used in its production activity for April 2023:

Total time worked during the month	210 hrs.
Total production during the month	2,800 units
No. of units accepted out of total production	2,520 units
Standard time for actual production of the month	180 hrs.
Time lost during the month	28 hrs.

Required

(i) STATE an appropriate approach to measure the total productive maintenance performance of an equipment.

(ii) Quantify the total productive maintenance performance of the above-mentioned equipment by using the approach stated in (i) above.

(iii) COMMENT on the effectiveness of maintenance of the equipment.

ANSWERS/ SOLUTIONS

1. (i) **Just-in-time** (JIT) is a collection of ideas that streamline a company's production process activities to such an extent that wastage of all kind viz., of time, material and labour systematically driven out of the process with single piece flow after considering takt time.

In JIT, production facility is required to be integrated with vendor system for signal (Kanban) based automatic supply which depends upon demand based consumption. Under JIT system of inventory storage cost is at lowest level due to direct issue of material to production department as and when required and resultantly less/no material lying over in store or production floor.

Prerequisite of JIT system is integration with vendor, if vendor is not integrated properly or less reliable, then situation of stock out can arise and which can result into loss of contribution.

Multitasking by employee is another key feature of JIT, group of employees should be made based upon product instead based upon function. Hence, functional allocations of cost become less appropriate.

Overall, JIT enhance the quality into the product by eliminating the waste and continuous improvement of productivity.

(ii) **Takt Time** is the maximum available time to meet the demands of the customer; this will help to decide the speed of/ at manufacturing facility.

Takt time is the average time between the start of production of one unit and the start of production of the next unit, when these production starts are set to match the rate of customer demand.

$$\text{Takt Time} = \frac{\text{Available Production Time}}{\text{Total Quantity Required}}$$

Here, Available Production Time is 'total available time for production' – 'planned downtime i.e., spent in shutdown and cleaning' i.e., 450 minutes = 480 minutes – 30 minutes.

Total Quantity Required is 10 units.

$$\text{Takt Time} = \frac{450 \text{ minutes}}{10 \text{ units}} = 45 \text{ Minutes}$$

Note - Heijunka can be applied in order to reduce variation between 'Takt times' over the production.

Interpretation

Customer's demand is 10 units, to calculate the takt time, divide the available production time (in minutes) by the total quantity required. The takt time would be 45 minutes. This means that process must be set up to produce one unit for every 45 minutes throughout the time available. As order volume increases or decreases, takt time may be adjusted so that production and demand are synchronized.

(iii) Advise on Shifting to JIT

To evaluate how much of the old cycle time was spent in inventory, we need to know how organizations assess the efficiency of their **manufacturing processes**. One commonly used measure is process cycle efficiency and to calculate the same every process is breakdown into combination of activities such as value added activities, non-value added activities and non-value added activities but strategic activities. In order to generate highest value to customer, only *value added activities* are included in process. But those non-value added activities, which are strategic in nature, also need to be part of process. Therefore, it may be possible that entire process is not efficient.

To measure efficiency of process, managers keep track of the relation between 'times taken by value added activities' in comparison 'total cycle time'. Such relation/ratio is processing cycle efficiency.

$$\text{Process Cycle Efficiency} = \frac{\text{Value Added Time}}{\text{Cycle Time}}$$

Processing time is considered as value added time; whereas time spend on inspection, storage and moving is non-value added time and included in cycle time. The higher the percentage, less the time (and costs) needs to be spent on non- value added activities such as moving and storing etc.

Computation of Processing Cycle Efficiency

Sr. No.	Activity Category	Traditional System (Actual)	JIT System (Estimated)
A.	Inspection	40	30
B.	Storage	80	20
C.	Moving	20	10
D.	Processing	60	40
E.	Value Added Time	60	40
F.	Cycle Time …(A)+(B)+(C)+(D)	200	100
	Process Cycle Efficiency …(E)/ (F)×100	30%	40%

Of the 200 minutes required for manufacturing cycle under PM²W's traditional system, only 60 minutes were spent on actual processing. The other 140 minutes were spent on non- value added activities, such as inspection, storage, and moving. The process cycle efficiency formula shows that processing time equalled to 30% of total cycle time. The cycle time is reduced substantially in the JIT system from 200 minutes to 100 minutes. In addition to this, the amount of time that used up in inventory i.e., non-value-added activities is also reduced. Therefore, process cycle efficiency has been increased from 30% to 40%. This significant improvement in efficiency over the previous system comes from the implementation of JIT system. Therefore, it is advantageous to shift to JIT system.

2. (i) Implementing Just in time procurement system will benefit the company as explained below:

Particulars	Current Purchasing Policy (₹)	JIT Procurement System (₹)
Raw material procurement cost per year	12,00,00,000	15,60,00,000
Quality check and material handling cost *(No longer required in JIT)*	1,00,00,000	---
Insurance Cost on raw material inventory *(No longer required in JIT)*	20,00,000	---
Warehouse rental for storing raw material *(No longer required in JIT)*	3,00,00,000	---
Overtime Charges under JIT to reduce Stockouts (note1)	---	10,00,000
Stockout Cost (note 2)	---	40,20,000
Total Relevant Cost	16,20,00,000	16,10,20,000

Therefore, moving to just in time procurement system results in savings of ₹9,80,000 per year for the company. **If reinvested**, long-term return on investment for the company at 15% would yield a return of ₹1,47,000 per year.

In addition, by switching over to JIT system, the company will also save working capital requirement of ₹1 crore on account of average inventory of raw material held at present. The company can earn a further 15% on this amount i.e. ₹15,00,000 per year.

Therefore, total benefit for the company would be ₹26,27,000 per year.

Note 1: Should overtime cost be incurred to reduce Stockouts?

Contribution per unit = Sale price - Variable production cost - Variable selling, distribution cost per unit; Variable production cost under the just in time system = ₹2,000+ ₹(1,040-800) = ₹2,240 per unit; Contribution per unit = ₹5,000 - ₹2,240-₹750 per unit = ₹2,010 per unit.

Overtime cost can reduce stockouts from 3,000 units to 2,000 units, that is customers' demand of 1,000 units more can be met.

Contribution earned from selling these 1,000 units = 1,000 × ₹2,010 per unit = ₹20,10,000.

Therefore, the contribution earned of ₹20,10,000 is more than the related overtime cost of ₹10,00,000. Therefore, it is profitable to incur the overtime cost.

Note 2: Stockout Costs

Out of the total shortfall of 3,000 units, by spending on overtime 1,000 units of demand can be met. Therefore, actual stockout units is only 2,000 units. As explained above, contribution per unit is ₹2,010 per unit. Therefore, stockout cost = 2,000 units × ₹2,010 per unit = ₹40,20,000.

(ii) The company plans to eliminate its raw material inventory altogether. Raw material will be delivered as per the production schedule directly at the factory shop floor, from whence production will begin. The management should therefore carefully consider the following points:

(a) The entire production process has to be detailed and integrated sequentially. This is essential to know because it should be known in advance when in the sub-assembly process is each raw material is required and in what quantity.

(b) Since production is dependent on delivery and quality of raw material, heavy reliance is being placed on suppliers. They should be able to guarantee timely delivery of raw material of the appropriate quality. The company is paying a premium of 30% of the original cost, that is ₹240 per unit (₹1,040 - ₹800 per unit) in order to ensure the same. Each unit gives a contribution of ₹ 2,010 per unit, which is 40.2% of the sale price per unit. Lost sales opportunities due to unavailability of raw material or non-conformance of the material can result in substantial losses to the company. While a portion of this has been factored while doing the cost benefit analysis of implementing Just-in-time systems, it needs careful consideration and monitoring even after implementation. Therefore, to hedge its loss, the management and suppliers should agree on penalties or costs the supplier should incur should there be any delay or non-conformance in quality of materials beyond certain thresholds.

(c) Accurate prediction of sales trends is important to determine the production schedule and finished goods planning.

(d) Continuous monitoring of the system even after implementation is essential to ensure smooth operations. Management commitment and leadership support are essential for its successful implementation and working.

3. *Calculation of Shifts*

Days *per week* ...(A)	6
Shifts *per week* ...(B)	2
Total Working Shifts *per week* ...(C = A × B)	12
Total Weeks ...(D)	4
Total Shifts ...(E = C × D)	48

Calculation of Un-Planned Downtime

Breakdown Maintenance (in mins)	360
Set up Changes (in mins)	840
Power Failure (in mins)	240
Total ...(A)	1,440
Loss of Minutes *per shift* ...(A/ 48)	30

Calculation of Planned Production Time

	Mins.
Total time (9 hrs. × 60 mins.)	540
Less: Planned downtime	
Lunch break	30
Miscellaneous breaks	15
Preventive maintenance	15
Planned Production Time	480

Availability Ratio = $\left\{\frac{480 \text{ mins.} - 30 \text{ mins.}}{480 \text{ mins.}}\right\} \times 100$

= 93.75 %

Actual Production = 140 units *per shift*

Standard time = 3 minutes

Standard Time Required = 140 units × 3 minutes

= 420 minutes

Actual Time Taken = 480 mins. – 30 mins.

= 450 minutes

Performance Ratio = $\left\{\frac{420 \text{ mins.}}{450 \text{ mins.}}\right\} \times 100$

= 93.33%

Quality Ratio = $\left\{\frac{131 \text{ parts}}{140 \text{ parts}}\right\} \times 100$

= 93.57%

Thus, **OEE** = 0.9375 × 0.9333 × 0.9357 = 81.87%

4. Calculation of Planned Production Time

	Mins.
Total time	480
Less: Planned downtime	
tea break	10
lunch break	25
Planned Production Time	445

Availability Ratio = $\left\{\frac{445 \text{ mins.} - 45 \text{ mins.}}{445 \text{ mins.}}\right\} \times 100$

= 89.89 %

Actual Production = 140 tablets *per shift*

Standard time = 2.5 minutes

Standard Time Required = 140 units × 2.5 minutes

= 350 minutes

Actual Time Taken = 445 mins. – 45 mins.

= 400 minutes

Performance Ratio = $\left\{\frac{350 \text{ mins.}}{400 \text{ mins.}}\right\} \times 100$

= 87.50%

Quality Ratio = $\left\{\frac{140 \text{ tab.} - 20 \text{ tab.}}{140 \text{ tab.}}\right\} \times 100$

= 85.71%

Thus, **OEE** = 0.8989 × 0.8750 × 0.8571

= 67.41%

5. (i) The most important approach to the measurement of TPM performance is known as Overall Equipment Effectiveness (OEE) measure. The calculation of OEE measure requires the identification of "six big losses".

- Equipment Failure/ Breakdown
- Set-up/ Adjustments
- Idling and Minor Stoppages
- Reduced Speed
- Reduced Yield and
- Quality Defects and Rework

The first two losses refer to time losses and are used to calculate the availability of equipment. The third and fourth losses are speed losses that determine performance efficiency of equipment. The last two losses are regarded as quality losses.

Performance × Availability × Quality = OEE %

OEE may be applied to any individual assets or to a process. It is unlikely that any manufacturing process can run at 100% OEE.

(ii) **Availability Ratio** *per shift* = $\left\{\frac{210 \text{ hrs.}}{210 \text{ hrs.}+28 \text{ hrs.}}\right\} \times 100$

= 88.24 %

Performance Ratio = $\left\{\frac{180 \text{ hrs.}}{210 \text{ hrs.}}\right\} \times 100$

= 85.71%

Quality Ratio = $\left\{\frac{2{,}520 \text{ units}}{2{,}800 \text{ units}}\right\} \times 100$

= 90.00%

Thus, **OEE** = 0.8824 × 0.8571 × 0.90

= 68.06%

This question has been solved by considering "**Time Available** *equals to* **Total Time Worked** *plus* **Time Lost**".

(iii) **Comment**

World Class OEE is 85% or greater, Hindustan Ltd.'s OEE is somewhere around 68%. It just means that company got some opportunities for improvement. Hindustan Ltd. may improve OEE by collecting information related to all downtime and losses on equipment, analyzing such information through graphs and charts, making improvement decisions thereon like autonomous maintenance, preventive maintenance, reduction in set up time etc. and implementing the same.

NOTES

Life Cycle Costing- Lifecycle costing considers the costs and revenues of a product over its whole life rather than one accounting period. Therefore, the full environmental cost of producing a product will be taken into account.

Activity Based Costing (ABC)- ABC distinguishes between environment-related costs, which can be attributed to joint cost centres, and environment- driven costs, which tend to be hidden on general overheads.

- Advantages of EMA– Improved Revenues Cost Reductions, Improve Brand Image.
- Disadvantages of EMA– Increases in Costs for legal and regulatory requirements, Costs of Failure if there is poor environmental management, Additional burden on top management.

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Which of the following techniques is not relevant to target costing?

Options

a. Value Analysis

b. Variance Analysis

c. Functional Analysis

d. Activity Analysis

Key - b

Reason – Option (b) Variance Analysis is not relevant to target costing. Variance analysis is the comparison of actual performance with standards / budgeted performance. Variance analysis helps in monitoring costs against a benchmark. Analysis is done after the cost is incurred. Target costing helps to determining the cost at which a proposed product (with specified functionality and quality) must be produced, to generate a desired level of profitability at its anticipated selling price. It uses techniques like value analysis, functional analysis, and activity analysis. Analysis is done before the cost is incurred; target is the goal to be achieved in future.

TEST YOUR KNOWLEDGE- CASELET BASED MCQS

Art Décor is a marble sculpture making company based out of Jaipur, Rajasthan. It has been making miniature figurines (small statues) for the past many years. It now plans to foray into making larger sizes statues that can be displayed in gardens, resorts or large corporate offices. As a trial it has asked its main designer Raj to come up with an appropriate design model that would appeal to such customers. There is already a competitive market for such larger size statues. However, the management of Art Décor has a skilled artist like Raj who can come up with attractive designs for customers. Within the month, Raj has come up with the appropriate design. Jay is the product manager who likes the design but wants to price it competitively in the market. The costing for 200 statues is as below:

Cost	*Amount (₹)*
Design cost	*5,00,000*
Direct materials	*20,00,000*
Direct manufacturing labour	*25,00,000*
Variable manufacturing overhead	*20,00,000*
Fixed manufacturing overhead	*5,00,000*
Marketing	*10,00,000*

Required

MCQ 1

The target profit required is 25% of revenue. If the sale price per statue is ₹45,000 what is the target cost per statue?

Options

a. ₹33,750 per statue

b. ₹36,000 per statue

c. ₹42,000 per statue

d. ₹56,250 per statue

Key – a i.e., ₹33,750

Reason – Target profit per statue is 25% of ₹45,000. Therefore, target profit is ₹11,250 per statue. Hence, target cost = selling price – target profit = ₹45,000 - ₹11,250 = ₹33,750 per statue. Option (b) ₹36,000 calculates that cost by taking profit to be 25% of cost i.e. 20% of selling price. Therefore, target cost is ₹45,000 - ₹9,000 = ₹36,000 per statue. Options (c) and (d) are incorrect options.

MCQ 2

What is the cost estimate per unit as per the cost information given above?

Options

a. ₹45,000 per statue

b. ₹42,500 per statue

c. ₹30,250 per statue

d. ₹43,000 per statue

Key – b i.e., ₹42,500

Reason – Option (b) ₹42,500 per statue is the correct option. The calculation is given:

Cost	Amount (₹)
Design cost	5,00,000
Direct materials	20,00,000
Direct manufacturing labour	25,00,000
Variable manufacturing overhead	20,00,000
Fixed manufacturing overhead	5,00,000
Marketing	10,00,000
Total Estimated Cost	8,500,000

Estimated Cost per statue = ₹85,00,000 / 200 statues = ₹42,500 per statue.

MCQ 3

Given your calculations in (a) and (b) has the target cost per statue been met?

Options

a. Yes, the estimated cost is lower than the target cost per statue.

b. No, the estimated cost is higher than the target cost per statute.

Key – b i.e., No

Reason – The estimated cost is higher than the target cost per statue. The estimated cost is ₹42,500 per statue (2) while the target cost price is ₹33,750 per statue (1). Hence, the company has to find ways to reduce the estimate cost through value engineering.

MCQ 4

During the course of discussions, Jay the product manager found that the designer Raj plans to use high quality marble for these statues. Jay suggests that he use a much lower quality marble material for the statues. This would reduce the material cost by 60%. Skilled labour hours required will also be reduced resulting in direct manufacturing labour to reduce by 50%. Accordingly, what would the revised estimate cost per unit be if value engineering is applied?

Options

a. ₹45,000 per statue

b. ₹42,500 per statue

c. ₹30,250 per statue

d. ₹43,000 per statue

Key – c. i.e., ₹30,250 per statue

Reason – With 60% saving in direct material cost and 50% saving in direct manufacturing labour, the revised estimate cost per statue if value engineering is adopted would be:

Cost	Amount (₹)
Design cost	5,00,000
Direct materials	8,00,000
Direct manufacturing labour	12,50,000
Variable manufacturing overhead	20,00,000
Fixed manufacturing overhead	5,00,000
Marketing	10,00,000
Total Estimated Cost	60,50,000

Estimated Cost per statue = ₹60,50,000 / 200 statues = ₹30,250 per statue.

MCQ 5

Given your calculations in (1) and (4) has the target cost per statue been met?

Options

a. Yes, the revised estimate cost by adopting value engineering is lower than the target cost per statue.

b. No, the revised estimate cost by adopting value engineering is higher than the target cost per statue.

Key – a. i.e., Yes

Reason – Yes, the target cost per statue is (1) is ₹33,750 per statue while the revised estimate cost per statue if value engineering is adopted as per (4) is ₹30,250 per statue. Hence, value engineering technique does lower the cost per statue.

MCQ 6

Raj the designer does not agree with Jay's proposition given in (4) above. He feels that inferior quality material would affect the durability of the statue and hence would affect the demand for it in the long run. Instead of value engineering, he feels that 10% increased spending in marketing can increase the selling price per statue to ₹50,000 per statue. The target profit required is 25% of revenue. Given this scenario, what is the target cost per statue?

Options

a. ₹33,750 per statue

b. ₹37,500 per statue

c. ₹35,000 per statue

d. ₹36,250 per statue

Key – b i.e., ₹37,500 per statue

Reason – The target profit per statue is 25% of ₹50,000. Therefore, target profit is ₹12,500 per statue. Hence, target cost = selling price – target profit = ₹50,000 - ₹12,500 = ₹37,500 per statue.

MCQ 7

Given the situation in (6) what would be revised estimated cost per statue after increasing the spend on marketing?

Options

a. ₹45,000 per statue

b. ₹42,500 per statue

c. ₹30,250 per statue

d. ₹43,000 per statue

Key – Option (d), ₹43,000 per statue

Reason – The revised estimate cost per statue would be:

Cost	Amount (₹)
Design cost	5,00,000
Direct materials	20,00,000

Direct manufacturing labour	25,00,000
Variable manufacturing overhead	20,00,000
Fixed manufacturing overhead	5,00,000
Marketing	11,00,000
Total Estimated Cost	86,00,000

Estimated Cost per statue = ₹86,00,000 / 200 statues = ₹43,000 per statue.

MCQ 8

Given your calculations in (6) and (7) has the target cost per statue been met?

Options

a. Yes, the estimate cost after increased spend on marketing is lower than the target cost per statue.

b. No, the estimate cost after increased spend on marketing is higher than the target cost per statue.

Key – b i.e., No

Reason – No, the estimated cost after increased spending on marketing is higher than the target cost per statue. The estimated cost is ₹43,000 per statue (7) while the target cost price is ₹37,500 per statue (6). The 10% increase in marketing spend increases the cost per statue to ₹43,000 beyond the target cost of ₹37,500 per statue.

MCQ 9

What is the estimate profit earned per statue as per (4) (adopting value engineering) and (6) (increasing marketing spend)?

Options	Profit per statue with value engineering as per (4)	Profit per statue after increased marketing spend as per (6)
a.	₹14,750	₹7,000
b.	₹2,500	₹7,000
c.	₹11,250	₹12,500

Key – a i.e., ₹14,750, ₹7,000

Reason – Refer below given calculations. Jay the product manager's proposal of adopting value engineering as per (4) is more profitable as compared to Raj the designer's proposal. Adopting value engineering may be encouraged. At the same time, designer Raj's opinion is also critical since it affects the durability of the product, which also impacts the long run demand for these products. Hence, the management of Art Décor has to take strategic decisions on the quality of statues it wants to launch. Pricing will also be affected by the external competitive market conditions.

Particulars	Estimates as per value engineering (4)	Estimates as per marketing spend (6)
Selling price per statue	₹45,000	₹50,000
Estimated cost per statue	₹30,250	₹43,000
Profit per statue	₹14,750	₹7,000

TEST YOUR KNOWLEDGE

Target Costing

1. Storewell Industries Ltd. manufactures standard heavy duty steel storage racks for industrial use. Each storage rack is sold for ₹750 each. The company produces 10,000 racks per annum. Relevant cost data per annum are as follows:

Cost Component	Budget	Actual	Actual Cost p.a. (₹)
Direct Material	5,00,000 sq. ft.	5,20,000 sq. ft.	20,00,000
Direct Labour	90,000 hrs.	1,00,000 hrs.	10,00,000
Machine Setup	15,000 hrs.	15,000 hrs.	1,50,000
Mechanical Assembly	200,000 hrs.	200,000 hrs.	30,00,000

The actual and budgeted operating levels are the same. Actual and standard rates of material procurement and hourly labour rate are also the same. Any variance in cost is solely on account of difference in the material usage and hours required to complete production. Aggressive pricing from competitors has driven down sales. A comparable rack is available in the market for ₹675 each. Vishal, the marketing manager has determined that in order to maintain the company's existing market share of 10,000 racks, Storewell Industries must reduce the price of each rack to ₹675.

Required

(i) CALCULATE the current cost and profit per unit. IDENTIFY the non-value added activities in the production process.

(ii) CALCULATE the new target cost per unit for a sales price of ₹675 if the profit per unit is maintained.

(iii) RECOMMEND what strategy Storewell Industries should adopt to attain target cost calculated in (ii) above.

Life Cycle Costing

2. Tt Co. Ltd. makes digital watches. The company is preparing a product life cycle budget for a new watch. Development on the new watch is to start shortly. Estimates for new watch are as under:

Life Cycle Units Manufactured and Sold	2,40,000	***Marketing Costs:***	
Selling Price Per Watch	₹500	Variable Cost Per Batch	₹24
Life Cycle Costs:		Watches Per Batch	96
R&D and Design Cost	₹80 Lakh	Fixed Costs	₹8 Lakh
Manufacturing Costs:		***Distribution Costs:***	
Variable Cost Per Watch	₹120	Variable Cost Per Watch	₹240
Variable Cost Per Batch	₹4,000	Fixed Costs	₹45 Lakh
Watches Per Batch	300	***Customer Service Cost:***	
Fixed Costs	₹112 lakh	Variable Cost Per Watch	₹10

Required

(i) CALCULATE the budgeted life cycle operating income for the new watch.

(ii) COMPUTE % of budgeted total product life-cycle costs incurred till the R & D and design stages.

(iii) ADVISE the strategies to be adopted by the Tt Co. Ltd. to develop a new watch.

3. Mould & Dies (M&D) was established in 1980 and has enormous wealth of experience in the mould manufacturing industry and serves a wide range of plastic moulds all over the nation. Over the past decade, M&D has developed a reputation for quality products & services for a customer-focused approach. It deals in injection moulds, blow moulds, die sets, moulds base etc.

With a state-of-the-art infrastructure facility, M&D is able to meet the qualitative and quantitative demands of its clients. Its vision & mission is to provide high class manufactured products by using the best quality raw materials.

M&D has developed a new product "M" which is about to be launched into the market and anticipates to sell 80,000 of these units at a sales price of ₹ 300 over the product's life cycle of four years. Data pertaining to product "M" are as follows:

Costs of Design and Development of Molds, Dies, and Other Tools	₹ 8,25,000
Manufacturing Costs	₹ 125 per unit
Selling Costs	₹ 12,500 per year + ₹ 100 per unit
Administration Costs	₹ 50,000 per year
Warranty Expenses	5 Replacement Parts per 25 units at ₹ 10 per part; 1 Visit per 500 units (Cost ₹ 500 per visit)

Required

(i) COMPUTE the product "M"'s 'Life Cycle Cost'.

(ii) SUGGEST two ways to maximize "M''s lifecycle return.

Note: *Ignore time value of money*

4. P & G International Ltd. (PGIL) has developed a new product ' α^3 'which is about to be launched into the market. Company has spent ₹30,00,000 on R&D of product ' α^3 '. It has also bought a machine to produce the product ' α^3 ' costing ₹11,25,000 with a capacity of producing 1,100 units per week. Machine has no residual value. The company has decided to charge price that will change with the cumulative numbers of units sold:

Cumulative Sales (units)	Selling Price ₹ per unit
0 to 2,200	750
2,201 to 7,700	600
7,701 to 15,950	525
15,951 to 59,950	450
59,951 and above	300

Based on these selling prices, it is expected that sales demand will be as shown below:

Weeks	Sales Demand per week (units)
1-10	220
11-20	550
21-30	825
31-70	1,100
71-80	880
81-90	660
91-100	440
101-110	220
Thereafter	NIL

Unit variable costs are expected to be as follows:

	₹ per unit
First 2,200 units	375
Next 13,750 units	300
Next 22,000 units	225
Next 22,000 units	188
Thereafter	225

PGIL uses just-in-time production system. Following is the total contribution statement of the product ' α^3 ' for its Introduction and Growth stage:

	Introduction	Growth	
Weeks	1 - 10	11 – 30	
Number of units Produced and Sold	2,200	5,500	8,250
Selling Price per unit (₹)	750	600	525
Variable Cost per unit (₹)	375	300	300
Contribution per unit (₹)	375	300	225
Total Contribution (₹)	8,25,000	16,50,000	18,56,250

Required

(i) PREPARE the total contribution statement for each of the remaining two stages of the product's life cycle.

(ii) DISCUSS Pricing Strategy of the product 'α^3'.

(iii) FIND possible reasons for the changes in cost during the life cycle of the product 'α^3'.

Note: Ignore the time value of money.

Theory of Constraints

5. Z Plus Security (ZPS) manufactures surveillance camera equipment that is sold to various office establishments. The firm also installs the equipment at the client's place to ensure that it works properly. Each camera is sold for ₹2,500. The direct material cost of ₹1,000 for each camera is the only variable cost. All other costs are fixed. Below is the information for manufacturing and installation of this equipment:

Particulars	Manufacture	Installation
Annual Capacity (camera units)	750	500
Actual Yearly Production and Installation (camera units)	500	500

Required

The questions below are separate scenarios and are not related to each other.

(i) IDENTIFY the bottleneck in the operation cycle that ZPS should focus on improving. Give reasoning for your answer.

(ii) An improvement in the installation technique could increase the number of installations to 550 camera units. This would involve a total additional expenditure of ₹40,000. ADVISE ZPS whether they should implement this technique?

(iii) Engineers have identified ways to improve manufacturing technique that would increase production by 150 camera units. This would involve a cost of ₹100 per camera unit due to necessary changes to made in direct materials. ADVISE ZPS whether they should implement this new technique.

6. ZED produces two types of products, Z and D at its manufacturing plant. Both the products are produced using the same materials, machinery and skilled labour. Machine hours available for the year are 4,000 hours.

Information relating to products are as follows:

Particulars	Z	D
Selling Price *per unit*	₹16,000	₹4,000
Material Costs *per unit*	₹7,000	₹1,200
Machine Hours *per unit*	1.6 hrs.	0.8 hrs.
Maximum Annual Demand	2,000 units	1,600 units
Online Booking (already accepted for)	400 units	1,200 units

Due to poor productivity levels, late order and declining profits over recent years, the CEO has suggested the introduction of throughput accounting in the company.

The total of all factory costs is ₹1,42,60,000, excluding material.

Required

(i) Using throughput accounting, PREPARE statement to determine the optimum production mix and maximum profit for the next year.

(ii) CALCULATE the amount of profit lost due to acceptance of online booking of the products.

(iii) RECOMMEND the options to be followed in order to avoid any loss of profit.

(iv) LIST various ways through which price customization could be done.

(v) Given that products Z and D are respectively in 'maturity stage' and 'introduction stage' of their life cycle. STATE the most appropriate pricing policy that could be followed by the ZED for Z and D as per their life cycle.

Environmental Management Accounting

7. Following three independent situations pertaining to environmental management and sustainability are provided to you:

Situation I

Wasco Limited is a chemical company which uses chloro-fluorocarbons (CFC) in the production of chemical. As awareness of the environmental damage caused by CFC spread, Wasco Limited stopped using CFC in its production processes and analysed and redesigned its product range much before the legislation controlling use of CFC introduced by the Government.

Situation II

Energy drink manufacturer Cool Limited was ordered to submit a yearly report to the Ministry of Environment and Forests on activities, which contains information concerning collection, recovery and recycling of packaging waste, fulfilment of the targets, volume of recovered and recycled packaging waste by type of material and declaration that all compulsory contributions and taxes have been paid.

Situation III

KOA Limited has achieved a 25% reduction of energy consumption through its "Go Renewable" initiative. For, the company a 25% reduction represents a cost saving of about Rs. 30,00,000/-.

Required

Read the above three situations and EXPLAIN:

(i) Why Wasco Limited stopped using CFC and redesigned its product range much before legislation introduced by Government?

(ii) The risk exposure of Cool Limited.

(iii) How does focusing on environmental sustainability provides opportunity to KOA Limited for reducing costs?

8. "QR" Ltd. is the leading manufacturer and exporter of high-quality leather products - Product Q and Product R.

The selling price per unit of Product Q and Product R is ₹620 and ₹420 respectively.

Both the products pass through three processes - Tanning, Dyeing and Finishing during manufacturing process. Allocation of costs per unit of leather products manufactured among the processes are given below:

Particulars	Tanning	Dyeing	Finishing	Total
Direct Materials Cost ₹ *per unit*	140	180	140	460
Direct Labour Cost ₹ *per unit*	90	120	90	300
Cost allocation to Product Q	70%	50%	70%	
Cost allocation to Product R	30%	50%	30%	

General overheads per unit of leather products Q or R manufactured are ₹115. This blanket absorption rate is derived after division of total general overhead with number of leather product be it Q or R. Above cost allocation is the basis for the decisions regarding pricing of the products.

In this Industry, all the major production processes have environmental impact at all stages of the process, including generation of waste, emission of harmful gases, noise pollution, water contamination etc.

The management of the company is worried about the above environmental impact and has taken initiative to preserve the environment like - research and development activities aimed at reducing pollution level, planting trees, treatment of harmful gases and airborne emissions, wastewater treatment etc.

The management of the company desires to adopt Environmental Management Accounting as a part of the strategic decision-making process. The pricing of products should also factor in the environmental cost generated by each product.

General overheads blanket rate per unit of leather products (be it Q or R) manufactured are ₹115 which includes –

Treatment cost of harmful gases.....₹40

Wastewater treatment cost.....₹50

Cost of planting of trees.....₹10

Miscellaneous.....₹15

Process wise information related to generation of wastewater and harmful gases is given as below–

	Tanning	Dyeing	Finishing	Total
Wastewater generated (litres per week)	900	600	0	1,500
Emission of harmful gases (cc per week)	400	300	100	800
Cost allocation to Product Q	70%	50%	70%	
Cost allocation to Product R	30%	50%	30%	

The remaining overheads cost (miscellaneous) and cost of planting trees can be allocated equally between Product Q and Product R.

Required

(i) CALCULATE the product wise profitability based on the original cost allocation.

(ii) RECALCULATE the product wise profitability based on activity-based costing (Environment driven costs).

(iii) ANALYZE the difference in product profitability as per both the methods.

ANSWERS/ SOLUTIONS

1. (i) The current cost and profit per unit are calculated as below:

Cost Component	Units	Actual Cost p.a. for 10,000 racks (₹)	Actual Cost per rack (₹)
Revenue	10,000 racks	75,00,000	750
Direct Material	5,20,000 sq. ft.	20,00,000	200
Direct Labour	1,00,000 hrs.	10,00,000	100
Machine Setup	15,000 hrs.	1,50,000	15
Mechanical Assembly	200,000 hrs.	30,00,000	300
Total Cost		61,50,000	615
Profit		13,50,000	135

Therefore, the current cost is ₹615 p.u. while the profit is ₹135 p.u. Machine setup is the time required to get the machines and the assembly line ready for production. In this case, 15,000 hours spent on setting up does not add value to the storage racks directly. Hence, it is a non-value add activity.

(ii) New sale price per rack is ₹675 per unit. The profit per unit needs to be maintained at ₹135 per unit. Hence, the new target cost per unit = new selling price per unit – required profit per unit = ₹675 - ₹135 = ₹540 per unit.

(iii) As explained above, current cost per unit is ₹615 while the target cost per unit is ₹540. Hence, the cost has to be reduced at least by ₹75 per unit. Analysis of the cost data shows the variances between the budget and actual material usage and labour hours. It is given that the material procurement rate and labour hour rate is the same for budgets and actuals. Hence, the increment in cost of direct materials and labour is due to inefficient use of material and labour hours to complete the same level of production of 10,000 storage racks.

Corrective actions to address these inefficiencies could result in the following savings:

(a) Inefficiencies resulted in use of extra 20,000 sq. ft. of material.

Material cost per sq. ft. = Actual cost / Actual material usage = ₹20,00,000 / 5,20,000 sq. ft. = ₹3.85 per sq. ft.

Therefore, inefficiencies resulted in extra cost = 20,000 sq. ft. × ₹3.85 per sq. ft. = ₹77,000.

If corrective action is taken, for 10,000 racks this translates to a saving of ₹7.70 per unit.

(b) Inefficiencies resulted in extra 10,000 hrs. to be spent in production.

Labour cost per hr. = Actual cost / Actual labour hrs. = ₹10,00,000 / 10,000 hrs. = ₹10 per hr.

Therefore, inefficiencies resulted in extra cost = 10,000 hrs. × ₹10 per hour = ₹100,000.

If corrective action is taken, for 10,000 racks this translates to a saving of ₹10 per unit.

(c) Machine setup cost is a non-value added cost. Value analysis can be done to determine if the setup time of 15,000 hrs. can be reduced. However, since these activities have been carried out for a reason, care should be taken to ensure that this change should not adversely impact the production activity later down the stream.

(d) Mechanical assembly cost is almost half of the total cost. These are costs incurred during the production process on the assembly line. Value analysis can be done to determine if the production process can be made more efficient. For example, the process can be streamlined, such that steps can be combined that can be handled by fewer people (process centering). Similarly, value analysis / value engineering can focus on the product design.

Some questions to raise may be:

- Can the product be designed better to make the production more efficient?
- Can the design be minimized to include fewer parts and thus make it easier and efficient to manufacture?
- Can be substitute parts to make it more efficient? *Or*
- Is there simply a better way of producing the same product?

While target costing is a dynamic and corrective approach, care must the taken the product quality, characteristics and utility are maintained.

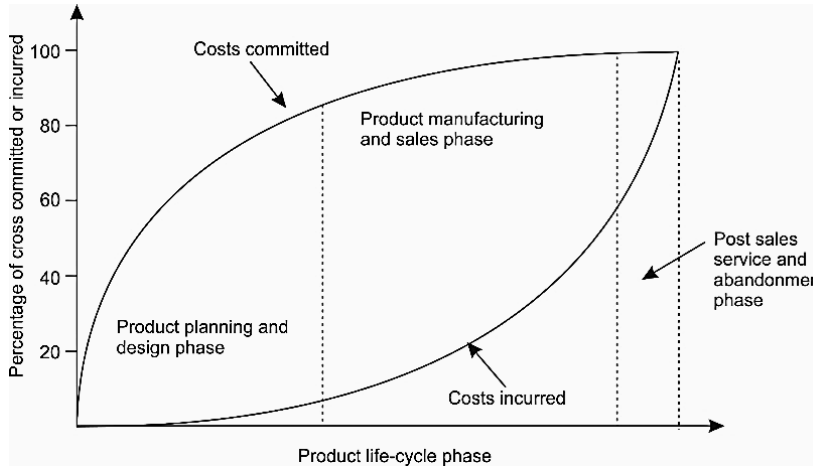
2. (i) Statement Showing Budgeted Life-Cycle Operating Income

Particulars	(₹)
Revenues (₹500 × 2,40,000 units)	12,00,00,000
Less: R&D and Design Costs	80,00,000
Manufacturing Costs:	
Variable (₹120 × 2,40,000 units)	2,88,00,000
Batch $\left(2,40,000 \times \frac{₹4,000}{3,000}\right)$	32,00,000
Fixed	1,12,00,000
Marketing Costs:	
Batch $\left(2,40,000 \times \frac{₹24}{96}\right)$	60,000
Fixed	8,00,000
Distribution Costs:	
Variable (₹240 × 2,40,000)	5,76,00,000
Fixed	45,00,000
Customer Service Costs:	
Variable (₹10 × 2,40,000)	24,00,000
Total Costs	11,65,60,000
Operating Income	34,40,000

(ii) % of Budgeted Total Product Life-Cycle Costs incurred till the R & D and Design Stages:

$$\left(\frac{₹80,00,000}{₹11,65,60,000} \times 100\right) = 6.86\%$$

(iii) We can see from the below figure that approximately 80% of a product's cost are committed during the planning and design stage. At this stage product designers determine the product's design and the production process. In contrast, the majority of costs are incurred at the manufacturing stage, but they have already become locked in at the planning and design stage and are difficult to alter.



The pattern of cost commitment and incurrence will differ based on the industry and specific product introduced. For developing a watch, Tt Co. Ltd. needs to incur only ₹80 lacs for its R&D and design Cost. So, Cost Management of Tt Co. Ltd can be most effectively exercised during the planning and design stage of its new watch and not at the manufacturing stage when the product design and processes have already been determined and costs have been committed. At the manufacturing stage only cost containment is possible rather than on cost management. An understanding of life-cycle costs and how they are committed and incurred at different stages throughout a product's life cycle of the watch will also led to the emergence of target costing, a technique that focuses on managing costs during a product's planning and design phase.

3. (i) Statement Showing "M's Life Cycle Cost (80,000 units)"

Particulars	Amount (₹)
Costs of Design and Development of Molds, Dies, and Other Tools	8,25,000
Manufacturing Costs (₹125 × 80,000 units)	1,00,00,000
Selling Costs (₹100 × 80,000 units + ₹12,500 × 4)	80,50,000
Administration Costs (₹50,000 × 4)	2,00,000
Warranty	
(80,000 units / 25 units × 5 parts × ₹10)	1,60,000
(80,000 units / 500 units × 1 visit × ₹500)	80,000
Total Cost	1,93,15,000

(ii) Following ways are suggested to maximize "M" lifecycle return:

R&D Costs

Often **significant part of cost (even above 80%) is committed at the R&D phase of new product**, hence M&D should carefully plan and design its new product "M" as it will determine the number of parts, production process to be used etc. M&D can apply ***value engineering*** here. It involves improving product quality, reducing product costs, fostering innovation, eliminating unnecessary and costly design elements, ensuring efficient investment in product, and developing implementation procedures. Value engineering is most successful when it is performed early in the product development stage. A value engineering study should be performed within the first 25-30% of the design effort prior to selecting the final design alternative. Here, it is also important that R&D team should work as a part of cross functional team i.e. (participate in a group of people from different functional areas), to minimise lifecycle cost and the production cycle time in new development.

Speed up the Product Launch

In cutthroat competitions, it is important for M&D to get new product 'M' launch into the market as soon as possible since this will give "M" a ***long stay*** in the marketplace *without competition* in the market. Competitors always try to launch a rival product as quickly as possible in order to gain a 'competitive edge'. M&D may lose overall profitability if it delays in launching of Product 'M'. It is usually worthwhile incurring extra costs to keep the launch on schedule or to speed up the launch.

4. (i) Total Contribution Statement

"Total Contribution- for remaining two stages"

Particulars	Maturity		Decline
Weeks	31 - 50	51 - 70	71 - 110
Number of units Produced and Sold	22,000	22,000	22,000
Selling Price per unit (₹)	450	450	300
Less: Unit Variable Cost (₹)	225	188	225
Unit Contribution (₹)	225	262	75
Total Contribution (₹)	49,50,000	57,64,000	16,50,000

(ii) Pricing Strategy for Product α^3

PGIL is following the skimming price strategy that's why it has planned to launch the product α^3 initially with high price tag.

A skimming strategy may be recommended when a firm has incurred large sums of money on research and development for a new product.

In the problem, PGIL has incurred a huge amount on research and development. Also, it is very difficult to start with a low price and then raise the price. Raising a low price may annoy potential customers.

Price of the product α^3 is decreasing gradually stage by stage. This is happening because PGIL wants to tap into the mass market by lowering the price.

(iii) Possible Reasons for the changes in cost during the life cycle of the product 'α^3'

Product life cycle costing involves tracing of costs and revenues of each product over several calendar periods throughout their entire life cycle. Possible reasons for the changes in cost during the life cycle of the product are as follows:

PGIL is expecting reduction in unit cost of the product α^3 over the life of product as a consequence of economies of scale and learning / experience curves.

The learning effect may be a possible reason for the reduction in per unit cost if the process is labour intensive. When a new product or process is started, the performance of the worker is not at its best and the learning phenomenon takes place. As the experience is gained, the performance of a worker improves, time taken per unit reduces and thus his productivity goes up. The amount of improvement or experience gained is reflected in a decrease in cost.

Till the stage of maturity, PGIL is in the expansion mode. The PGIL may be able to take advantage of quantity discount offered by suppliers or may negotiate the price with suppliers.

Product α^3 has the least variable cost ₹188 in last phase of maturity stage; this is because a product which is in the mature stage may require less marketing support than a product which is in the growth stage so, there is a saving of marketing cost per unit.

Again, the cost per unit of the product α^3 jumps to ₹225 in decline stage. As soon as the product reaches its decline stage, the need or demand for the product disappears and quantity discount may not be available. Even PGIL may have to incur heavy marketing expenses for stock clearance.

Workings

Cumulative Sales along with Sales Price and Variable Cost

Weeks	Demand *per week*	Total Sales	Cumulative Sales	Selling Price per unit (₹)	Variable Cost per unit (₹)
1 - 10	220	2,200	2,200	750	375
11 - 20	550	5,500	7,700	600	300
21 - 30	825	8,250	15,950	525	300
31 - 50	1,100	22,000	37,950	450	225

51 - 70	1,100	22,000	59,950	450	188
71 - 80	880	8,800	68,750	300	225
81 - 90	660	6,600	75,350	300	225
91 - 100	440	4,400	79,750	300	225
101 - 110	220	2,200	81,950	300	225

5. **(i)** Ever increasing and demanding environmental regulation is forcing companies to change their practices. In many countries, numerous pieces of legislation cover areas such as air quality, climate change, hazardous substances, packaging, waste, and water quality.

The trend is very much in the direction of increased and more stringent legislation. Environmental sustainability is not an issue that can be avoided by any organisation.

Organisations need to consider how environmental regulation will impact their operations and the cost of doing business.

By stopping the use of CFC much before the legislation, Wasco Limited gained advantages over its rivals. Wasco's actions were integral to its own strategic success, and instrumental in driving through the subsequent legislation from which the company later benefited. This will also help Wasco Limited to improve their brand image among the stakeholders as corporate citizens.

(ii) Organizations increasingly have to demonstrate that they are managing all of their risks systematically and responsibly. This includes environmental risks- risks that are a result of the impacts of the organization on the environment. By assessing the environmental risks associated with their activities, processes, product, and services, organizations can identify their potential legal and business exposure. Non-compliances can cause enormous financial impacts, such as fines, penalties, legal costs, and damages.

Thus, Cool Ltd is exposed to environmental risks.

(iii) Focusing on environmental sustainability will often provide opportunities for reducing costs. For example, reducing carbon impacts often also saves energy costs. Similarly, programmes for reducing waste improve environmental performance and reduce operating costs.

Reducing environmental impacts can also reduce or eliminate associated fines, levies, and other compliance costs.

Focusing on environmental sustainability thereby making investments in developing clean technologies and more energy-efficient products and processes will not only save the organization money but could also be patented and/ or sold to other organizations, providing an additional source of income. KOA Limited may have carbon credit for efficiency in reducing energy and selling on the open market, thereby actually generating revenue.

6. (i) Identification of Bottleneck: Installation of cameras is the bottleneck in the operation cycle. The annual capacity for manufacturing and installation are given to be 750 camera units and 500 camera units respectively. Actual capacity utilization is 500 camera units, which is the maximum capacity for the installation process. Although ZPS can additionally manufacture 250 camera units, it is constrained by the maximum units that can be installed. Therefore, the number of units manufactured is limited to 500 camera units, subordinating to the bottleneck installation operation. Therefore, ZPS should focus on improving the installation process.

(ii) Improving Capacity of Installation Technique: Every camera sold increases the throughput contribution by ₹1,500 per camera unit (sale price ₹2,500 per camera unit less direct material cost ₹1,000 per camera unit). By improving the current installation technique an additional 50 camera units can be sold and installed. This would involve a total additional expenditure of ₹40,000. Hence, the incremental benefit would be:

Particulars	Amount (₹)
Increase in throughput contribution (Additional 50 camera units ₹1,500 per camera unit)	75,000
Less: Increase in total expenditure	40,000
Incremental benefit	35,000

Since the annual incremental benefit is ₹35,000 per annum, ZPS should implement this improvement to installation technique, the current bottleneck operation.

(iii) Improving Manufacturing Capacity: Every camera sold increases the throughput contribution by ₹1,500 per camera unit (sale price ₹2,500 per camera unit less direct material cost ₹1,000 per camera unit). By improving the current manufacturing technique an additional 150 camera units can be produced. This would involve a cost of ₹100 per camera unit due to the necessary changes to be made in direct materials. Therefore, the number of units manufactured can increase to 650 camera units. However, production of 150 camera units will not translate into additional sales, because each sale also requires installation by ZPS. In a year only 500 camera installations can be made, leading to an inventory pile up of 150 camera units. This is detrimental to ZPS, since it does not earn any contribution by holding inventory. Therefore, ZPS should not go ahead with the proposal to improve the manufacturing technique.

7. (i) Statement Showing Machine Hours

Product	Maximum Demand	Machine Hours/ Unit	Total Machine Hours
Z	2,000 units	1.6	3,200
D	1,600 units	0.8	1,280
Total machine hours required to meet maximum demand			4,480
Machine hours available			4,000
Shortage of machine hours			480

'Machine hours' is the bottleneck activity.

Statement of Ranking

Particulars	Z	D
Selling Price *per unit*	₹16,000	₹4,000
Less: Material Costs *per unit*	₹7,000	₹1,200
Throughput *per unit*	₹9,000	₹2,800
Machine Hour Required *per unit*	1.6	0.8
Throughput Return *per hour*	₹9,000/1.6 = ₹5,625	₹2,800/0.8 = ₹3,500
Throughput Accounting (TA) Ratio (throughput return per hour/ cost per factory hour)	5,625/3,565 =1.58	3,500/3,565 =0.98
Ranking	I	II

Cost per factory hour = ₹1,42,60,000/ 4,000 hrs. = ₹3,565

Optimum Production Plan

Product	No of units	Machine hr. per unit	Total Machine hrs.	T/P per hr. ₹	Total T/P ₹
Z (online orders)	400	1.6	640	5,625	36,00,000
D (online orders)	1,200	0.8	960	3,500	33,60,000
Z	2,400/1.6 =1,500	1.6	2,400 (b/f)	5,625	1,35,00,000
Total					2,04,60,000
Less: Total Factory Costs					1,42,60,000
Profit					62,00,000

(ii) Had there been no online booking first product Z should be produced = 2,000 units using 3,200 machine hours (2,000 × 1.6). Because of online booking already accepted for 1,200 units of product D, unfulfilled demand of product Z = 2,000 -1,900 = 100 units.

Machine Hrs. Required for 100 units of Z (100 × 1.6)	160 hrs.
Throughput Lost for Product Z (160 hrs. × 5,625)	₹9,00,000
Throughput Return Earned for Product D (160 hrs. × 3,500)	₹5,60,000
Throughput lost	₹3,40,000

(iii) Recommendation

Option-1

Throughput accounting ratio is the throughput return earned in an hour divided by the factory cost (labour and overheads) incurred by the factory in one hour. Factory cost is generally fixed in nature. *A ratio above 1 signifies that the throughput return is greater than the factory cost and therefore the product is profitable.* Product Z has a throughput accounting ratio of 1.58 while Product D has a throughput accounting ratio of 0.98, this indicates that hourly return from Product A can cover the hourly factory cost, it is profitable. Product D does not yield enough hourly return to cover the hourly factory cost, it is not profitable. Therefore, ZED should consider ways of ***improving the throughput accounting ratio of Product D (i.e. above 1.0)***. TA ratio could be improved by:

- Increasing the selling price of Product D but the demand may fall.
- Reducing the material cost per unit as well as operating costs. However, there may be quality issues.
- Improving efficiency e.g. increase number of units that are made in each bottleneck hour.
- Raising up bottleneck so that more hours are available of bottleneck resource.

Option-2

ZED has to ***prioritize production of Product Z*** since it is more profitable than Product D. As per the throughput accounting ratio, Product D does not yield sufficient return per hour to cover the hourly overhead cost, therefore, gets second priority over Product Z.

Since machine hours are the bottle neck, if production for entire 4,000 hours is focused on Product Z, return yielded would be sufficient to cover the factory overheads. However, Product Z has a maximum demand of 2,000 units, that requires 3,200 machine hours (2,000 units × 1.6 hours per unit of production). The remaining 800 machine hours can be devoted to Product D, during which 1,000 units can be produced (800 machine hours / 0.8 hours per unit). Maximum demand for Product D is 1,600 units. Therefore, the balance demand of 600 units of Product D will remain unsatisfied.

However, to meet unsatisfied demand of Product D, ZED may consider the ***option of sub-contracting either a part of whole of the production of Product D***. This way it can meet the entire demand for Product D for 1,600 units. If it subcontracts the entire production of Product D, it can also scale down its in-house capacity. Sub-contracting decision requires suitable cost benefit analysis. Moreover, the risk associated with outsourcing like unsatisfactory quality and service, or failure of supplier cannot be ignored.

Overall, to enhance profitability or avoid any type of loss of profit, ZED may consider the options recommended above with a *long-term perspective*.

(iv) Pricing of a product is sometimes customized keeping taste, preference, and perceived value of a customer into consideration. Price customization is done in the following ways:

- *Based on product line:* When products are customized as per the customer's requirements, pricing can be adapted based on the customer's specifications. Standard products can have a base price, to which the company can top-up charges to any additional customization.
- *Based on customer's past behavior:* Customers with good payment record have established their creditworthiness. To sustain business, they may be extended additional discounts as compared to other customers.
- *Based on demographics:* Different pricing strategies may be adopted based on age or social status. For example, railway fare discounts for senior citizens or concessional price tickets for military personnel.
- *Based on time differential:* Different price for different time periods. If a customer extends a long-term contract, an additional discount may be extended since business is contracted for a longer period of time. Example, discounted price for data usage provided by a broadband service provider if subscription paid for six months or more.

Apart from the above accounting principles, other macroeconomic and legal factors should also be given importance while chalking out a pricing strategy.

(v) The life cycle of a product has 4 stages namely Introductory stage, Growth stage, Maturity stage and Decline stage.

Product Z is given to be in the maturity stage. This third stage of the product life cycle is characterized by an established market for the product. After rapid growth in sale volume in the previous stages, growth of sales for the product will saturate. Competition would be high due to the large number of rivals in the market, this may lead to decreasing market share. Unit selling price may remain constant since the market is well established. Occasional offers may be used to tempt customers, otherwise this stage will mark consolidation of the market.

Product D is in the introduction stage, the first stage of the product life cycle. Penetration pricing is adopted to charge a low price in the initial stage for penetrating the market as quickly as possible. For a new product this low-price strategy will popularize the product. Once the market is established, the price may be increased. Penetration pricing will be suitable when:

(i) Demand for the product is elastic, more demand when prices are low.

(ii) Large scale production of the product yields economies of scale.

(iii) The threat of competition requires prices to be set low. It serves as an entry barrier to prospective competitors as well.

However, if Product D is a highly innovative product, it may adopt Skimming price policy. The product with unique features will differentiate it from other products leading to a revolutionary impact on market and customer behavior. Customers may not mind paying a premium for the unique product offering. Focus may be on promoting the product to gain market share. Skimming price policy may work when:

(i) There seem to be no competitors providing similar products.

(ii) Demand is inelastic.

Over time, competitors can reverse engineer and offer similar products. Therefore, the price may be lowered in the long run to retain market share.

8. (i) Product Wise Profitability as per Original Allocation Methodology

(Figures in ₹ per unit of leather produced)

Particulars	Product Q	Product R	Total
Selling Price	620	420	1,040
Direct Material (Refer Table 1)	286	174	460
Direct Labour (Refer Table 1)	186	114	300
Overheads	115	115	230
Total Expenses	587	403	990
Profit	33	17	50
Profitability (%)	**5.32%**	**4.05%**	×

Workings

Table 1 Cost Allocation to the Products

(Figures in ₹ per unit of leather produced)

Particulars	Tanning			Dyeing			Finishing			Total		
	Q	R	Total	Q	R	Total	Q	R	Total	Q	R	Grand Total
Direct Material	98	42	140	90	90	180	98	42	140	286	174	460
Direct Labour	63	27	90	60	60	120	63	27	90	186	114	300

(ii) Product wise profitability based on activity-based costing using *environment driven costs* requires the following steps:

- For convenience let presume only 2 units (1Q and 1R) are manufactured, currently the total overhead of ₹230 (115×2) is equally divided between Q and R i.e. ₹115 per unit of Q and R. But this is blanket or convention approach of allocation and misleading too. Hence the total overhead of ₹230 need to be divided such as ABC as required in question.

- Breakdown of total overhead cost of ₹230 per unit into treatment cost of harmful gases, wastewater treatment cost, cost of planting trees and other overhead costs. Refer Table 2 for the breakup.
- Treatment cost of harmful gases and wastewater treatment cost need to be individually allocated to various processes based on relevant cost drivers. Refer Table 3 for cost allocation to process.
- The overheads mentioned in the point above thus allocated to the various processes will be reallocated to products based on the specific ratios given in the problem. Refer Table 4 for cost allocation to products.

Product Wise Profitability Statement based on ABC using *environment driven costs*

(Figures in ₹ per unit of leather produced)

Particulars	Product Q	Product R	Total
Selling Price	620	420	1,040
Direct Material (Refer Table 1)	286	174	460
Direct Labour (Refer Table 1)	186	114	300
Allocation of Overheads			
Treatment Cost of Harmful Gases (Refer Table 4)	50	30	80
Wastewater Treatment Cost (Refer Table 4)	62	38	100
Cost of Planting Trees (shared equally)	10	10	20
Other Overhead Cost (shared equally)	15	15	30
Total Expenses	609	381	990
Profit	11	39	50
Profitability %	**1.77%**	**9.29%**	×

Workings

Table 2: Breakdown of General Overheads (at total level of ₹ 230)

Overhead	Amount (₹)	Allocation basis between products
Treatment Cost of Harmful Gases	80	Emission of Harmful Gases (cc per week)
Wastewater Treatment Cost	100	Wastewater Generated (litres per week)
Cost of Planting Trees	20	Equally *between* Products Q and R
Miscellaneous	30	Equally *between* Products Q and R
Total General Overheads	230	

Table 3: Allocation of Treatment Cost *to various process*

Process Wise Information (Basis of apportionment, Cost Driver and their volume)

Overhead	Amount (₹)	Allocation Basis Between Products	Tanning	Dyeing	Finishing	Total
Treatment Cost of Harmful Gases	80	Emission of Harmful Gases (cc per week)	400cc	300cc	100cc	800cc
Wastewater Treatment Cost	100	Wastewater Generated (ltr. per week)	900lt.	600lt.	---	1,500lt.

Cost Allocation to Process

Overhead	Amount (₹)	Allocation Basis Between Products	Tanning (₹)	Dyeing (₹)	Finishing (₹)	Total (₹)
Treatment Cost of Harmful Gases	80	Emission of Harmful Gases (cc per week)	40	30	10	80
Wastewater Treatment Cost	100	Wastewater Generated (litres per week)	60	40	0	100

Table 4: Reapportionment of Treatment Cost to Product Q and R **(₹)**

Overhead	Tanning	Dyeing	Finishing	Total
Treatment Cost of Harmful Gases	₹40	₹30	₹10	₹80
Cost Allocation % to Product Q	70%	50%	70%	×
Cost Allocation % to Product R	30%	50%	30%	×
Cost Allocation to Product Q	₹28	₹15	₹7	₹50
Cost Allocation to Product R	₹12	₹15	₹3	₹30
Wastewater Treatment Cost	₹60	₹40	---	₹100
Cost Allocation % to Product Q	70%	50%	70%	×
Cost Allocation % to Product R	30%	50%	30%	×
Cost Allocation to Product Q	₹42	₹20	---	₹62
Cost Allocation to Product R	₹18	₹20	---	₹38

(iii) Analysis of the difference in product profitability as per both the methods

In the first method, general overhead costs are allocated to the products Q and R, irrespective of the environmental costs that each product incurs. General overhead costs are to each product equally. The resultant product profitability shows that Product Q yields 5.32% and Product R yields 4.05% profitability. Therefore, "QR" Ltd. would conclude that Product Q is more profitable.

In the next method, general overhead costs are bifurcated to identify "hidden" environment costs that are incurred on account of manufacturing these products. Environment costs are first traced to the process that generates harmful gases and

wastewater, for which treatment is done. It can be seen that Tanning process, followed by Dyeing and Finishing process generates the maximum amount of waste. Therefore, by proportioning the cost based on the waste generated, more cost is allocated to Tanning the process. Similarly, Dyeing and Finishing are allocated lesser cost since they do not generate as much waste. It is further given that 70% of the cost of Tanning relates to Product Q. This is much higher than the 50% that was allocated to the Product as per the first method.

Accordingly, the revised workings show that Product Q yields 1.77% and Product R yields 9.29% profitability. The reason being, Product Q generates more environment driven costs as compared to Product R.

"QR" Ltd. will therefore increase the selling price of Product Q if it wants to maintain profitability as per the original method. However, the more sustainable approach would be find out ways of reducing wastewater and harmful gases the manufacturing process produces. This would in turn result in a reduction of environment driven costs such as wastewater treatment and treatment of harmful gases. This would sustain profits in the long run.

NOTES

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Disruptive innovations can be classified in following categories:

Options

a. Low end disruption and new product disruption

b. Low end disruption and new market disruption

c. High end disruption and new product disruption

d. High end disruption and new market disruption

Key – b

Reason – Christensen explains that there are two types of disruptive innovation: low-end and new-market. Low-end disruption is when a company uses a low-cost business model to enter at the bottom of an existing market and claim a segment. New-market disruption is when a company creates a new segment in an existing market with a low-cost version of a product.

MCQ 2

Which of the following category of technological advancement best describe installing passbook update kiosk at bank.

Options

a. Automation

b. Extension

c. Transformation

d. Revolution

Key – a

Reason – Change in business model on account of technological advancements can be classified into automation, extension or transformation. Automation is the use of technologies for performing any function or process digitally which was earlier performed by humans. Installing passbook updation kiosk is mere automation, where installing ATM can be seen as transformation.

MCQ 3

Which of the following category of technological advancement best describe installing Automated Teller Machine (ATM) that allow the banks' customer to withdraw cash, print of mini statement of transactions and balance enquiry, etc. out of banking hours as well.

Options

a. Automation

b. Extension

c. Transformation

d. Revolution

Key – c

Reason – Change in business model on account of technological advancements can be classified into automation, extension or transformation. Transformation is the use of technology that not only revamps the product or services that an organisation offers but also its process and culture. Installing ATM can be seen as transformation.

MCQ 4

Identify the option with correct sequence out of given below-

Options

a. Design Thinking → Lean Start-up → Six Sigma → Agile

b. Design Thinking → Agile → Lean Start-up → Six Sigma

c. Design Thinking → Lean Start-up → Agile → Six Sigma

d. Agile → Lean Start-up → Six Sigma → Design Thinking

Key – c

Reason – Post-Ideation phase design-thinking is critical to check/ensure product viability. The journey from design thinking to lean start-up involves the development of minimum viable product (or service), while when MVP is tested to map agile story journey advances to agile and further shift to six-sigma wherein focus shifts from product to process as product become mature.

MCQ 5

Grammarly is an American cloud-based typing assistant. It reviews spelling, grammar, punctuation, clarity, engagement, and delivery mistakes in English texts, detects plagiarism, and suggests replacements for the identified errors. It also allows users to customize their style, tone, and context-specific language. It offers two plans for individuals.

Free for individuals, that offers basic writing suggestions and tone detection (Grammar, Spelling, Punctuation, Conciseness, and Tone detection)

Premium plan for individual that offers Clarity, vocabulary, and tone improvements (Everything in Free, Full-sentence rewrites, Word choice, Tone suggestions and Citations).

Grammarly business relying on which of following business models-

Options

a. Free

b. Premium

c. Subscription

d. None of these

Key – d

Reason – Model adopted by Grammarly is Freemium, wherein essential services or product is offered free and for premium services or more quantum you have to pay (yes, payment can be further based upon either subscription model or pay as per use model).

NOTES

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Match the item of list I with that of list II and suggest correct code-

List I - Pricing Strategy	List II – Explanations
A. Customary Pricing	1. Ending price with 99
B. Skimming	2. Pricing a product based on perceived expectation of customers
C. Penetration Pricing	3. Setting a high price which gradually reduces as competitors enter the market
D. Psychological Pricing	4. Setting a low price for a new product during its initial offering

Options

a. A - 4, B - 1, C - 2, D - 3

b. A - 3, B - 4, C - 1, D - 2

c. A - 2, B - 3, C - 4, D - 1

d. A - 1, B - 2, C - 3, D - 4

Key – c

Reason - Customary Pricing is value based perception oriented pricing, skimming is pricing strategy wherein prices are reduced gradually to capture each point of price curve (those who need the product early on have to pay more), penetration pricing is charging low price with intent to capture more market share; whereas psychological pricing rest on triggering psychological effect (known as Bata pricing in India, because Bata bring this trend to India and price their products say pair of shoes for 999 or 1,499 rather 1,000 or 1,500)

MCQ 2

In a product mix decision, which is the most important factor to consider in order to try to maximise profit?

Options

a. Contribution per unit of a scarce resource used to make the product

b. Contribution per unit of the product

c. Profit per unit of a scarce resource used to make the product

d. Profit per unit of the product

Key – a

Reason – Product mix decision is short term decisions where bottleneck or limiting factor is involved. Short term decisions have two characteristics that make them relatively easier than longer term decisions. Firstly the time value of money can be ignored, secondly the most of the fixed costs will be incurred anyway so can be ignored as not relevant

In such cases the main approach is usually to consider relevant cash flows, which may simplify to looking at the impact of the decision on **the contribution**. Hence contribution per unit of limiting factor shall be used to make the decisions.

MCQ 3

Modern Gas Limited deals in liquid nitrogen (a standardised product). NGL pay less attention to its own costs or demands and bases its price largely on competitor's prices. The Pricing method adopted by MGL is–

Options

a. Value pricing

b. Going rate pricing

c. Image pricing

d. Psychological Pricing

Key – b

Reason – Going rate pricing is completion-based pricing method. Going Rate Pricing is a competitive pricing method under which a firm tries to keep its price at the average level charged by the industry. The use of such a practice of pricing is especially useful where it is difficult to measure costs.

MCQ 4

DM Mart is a retail chain. Competition is stiff and revolve around the price among the market player in retain chain segment. DM Mart adopted the practice of pricing some its products below cost, with an intention to destroying the competitor. Such pricing practice/strategy is referred to as

Options

a. Loss leader pricing

b. Predatory pricing

c. Price discrimination

d. Penetration Pricing

Key – b

Reason – Predatory pricing (loss leading) is the practice of selling a product or service at a very low price, intending to drive competitors out of the market or create barriers to entry for potential new competitors.

Note - One should not confuse penetration pricing with predatory pricing.

MCQ 5

Café coffee hub offer a feature of writing name of customer on the takeaway glass down under the logo of CCH, the size of logo of CCH on glass of coffee is which type of attribute (referring to Kano Model)

Options

a. Reversal

b. Delighter

c. Performance

d. Indifferent

Key – d

Reason – The size of logo on the takeaway cup of coffee is not really making any difference to value and utility of product or even value perceived by customer hence it is indifferent attribute. Indifferent qualities are neither good nor bad and have no effect, positive or negative, on customer satisfaction. **To illustrate** – look of emoticons in messaging apps in phone, placing of logo on phone, size thereof.

MCQ 6

COO of Modern Furniture Limited heard about Kano Model. MFL decided to use Kano Model to enhance customer satisfaction; but not sure which attribute of Kano Model need to be focused **mainly** (in priority over others) in order to enhance the customer's willingness to pay.

Options

a. Reversal

b. Delighter

c. Performance

d. Indifferent

Key – c

Reason - Most organisations focus on Kano's performance attributes on the basis that the higher the performance attributes, the higher the customer's willingness to pay.

TEST YOUR KNOWLEDGE- DESCRIPTIVE QUESTIONS

1. 'S' manages the school canteen (approximately 1,600 students) at Noida. The current cash payment system requires three clerks (each paid ₹90 per hour), employed for about 4 hours a day. The canteen operates approximately 240 days a year.

'S' is considering a Wireless Cash Management System (WCMS), where a student could just swipe an ID Card for payment. This system would cost ₹1,25,000 to setup and ₹36,000 per year to operate. 'S' believes that he could manage with one clerk if he were to implement the system.

Required

ADVISE 'S' on the choice of a plan, assuming working life of WCMS as 5 years. (Ignore the time vale of money)

2. Aayla runs the Planetarium Station in New Delhi, India. The strength of the station lies in its live interactions and programs for visitors, students and amateur astronomers. The station is always active with programs for school and college students and for amateur astronomers. One of the station's key attractions is a big screen IMAX theatre. IMAX is a 70 mm motion picture film format which shows images of far greater size and resolution than traditional film systems. The IMAX cinema projection standards were developed in Canada in the late 1960s. Unlike traditional projectors, the film is run horizontally so that the image width is greater than the width of the film.

The average IMAX show at the station attracts 120 visitors (50 children and 70 adults) at a ticket price of ₹160 for children and ₹200 for adults. Aayla estimates that the running costs per IMAX show are ₹10,000. In addition, fixed costs of ₹7,500 are allocated to each show based on annual estimate of the number of IMAX shows.

The Hobart School has approached Aayla about scheduling an extra show for its class VIII students. One hundred students and five teachers are expected to join the special show on the 'Planets & Solar System', a feature that is currently showing. The school has asked Aayla for a price quote. The special show will take place at 08:30 AM when the IMAX is not usually open.

Required

RECOMMEND the minimum amount that Aayla should charge.

3. The President of Automation Limited, a 150 persons engineering company, decided it was time to fire the company's biggest client. Although the client provided close to 60% of the company's annual revenue, Automation Limited decided that dropping this client was necessary. The client was profitable.

The President of Automation Limited stated "We cannot be a great place to work without employees, and this client was bullying my employees. Its demands for turnaround were impossible to meet even with people working seven days a week. No client is worth losing my valued employees".

The initial impact on revenues was significant. However, Automation Limited was able to cut costs and obtain new customers to fill the void. Moreover, the dropped client later gave Automation Limited two projects on more equitable terms.

Required

DISCUSS the reasons behind dropping of a profitable client by Automation Limited.

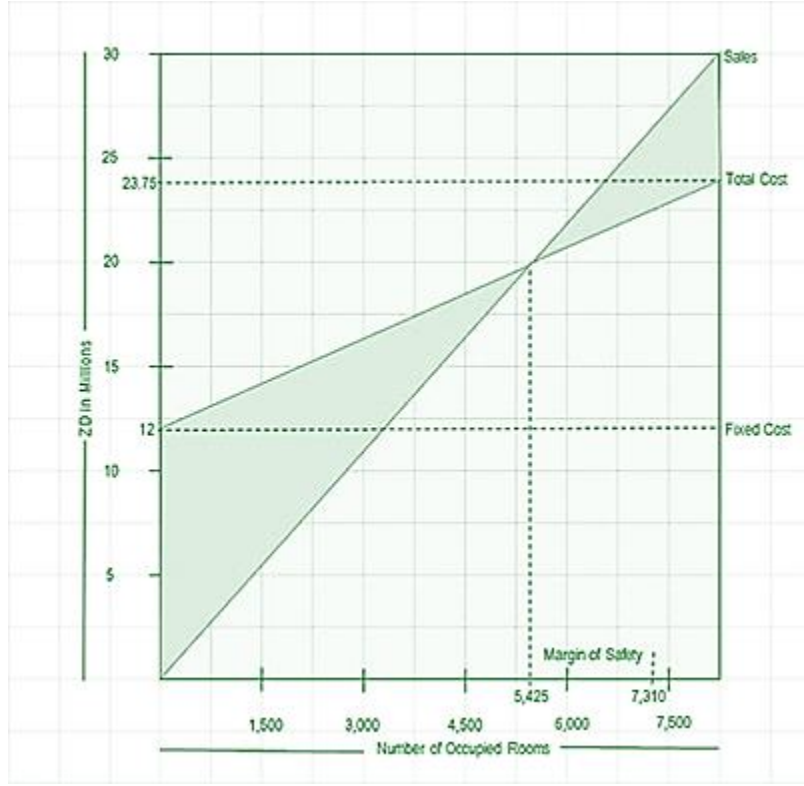
4. Hotel Nikko, Zeeland, an affordable leisure hotel resort is an ideal retreat to escape, unwind and enjoy peace of mind. Set amid expansive tropical greenery in the enclave of Zeeland, Hotel Nikko is designed for pleasure, where services reign supreme and Italian-style architecture of its 25 classic rooms harmonize with nature. Hotel Nikko, Zeeland is a beachfront resort that features a good choice of swim-up pool bar, gym, and variety of restaurants. A wide array of

water sport activities like surfing, sailing, jet skiing etc. are available from beach operators at walking distance. The hotel is synonymous with enjoyment and value for money, with a large choice of very attractive "All Inclusive" packages.

Nikko charges guests ZD 2,700 per room per night, irrespective of single or double occupancy. The variable cost is ZD 900 per occupied room per night. The Nikko is available throughout 365 days a year and has a 75% budgeted occupancy rate. Fixed costs are budgeted at ZD 9 million and are incurred evenly during the year.

During the second quarter (Q2) of the year, usually the room occupancy rates remain substantially below the levels expected at other quarters of the year. Nikko is expecting to sell 900 occupied room nights during Q2. Management is considering strategy to improve profitability, including closing the Nikko for the duration of Q2 or adopting one possible option as follows –

There is scope to extend the Nikko by creating enough space to run a Rustic Chic, Italian Style restaurant to serve its guests. The annual revenues, costs and sales volumes for the combined operations are given in the following graph–



Note

Zeeland's home currency is the ZD.

Required

ANALYZE the profit improvement plan.

5. Y-Connections, China based firm, has just developed ultra-thintablet S-5 with few features like the ability to open two apps at the same time. This tablet cost ₹ 5,00,000 to develop; it has undergone extensive research and is ready for production. Currently, the firm is deciding on plant capacity, which could cost either ₹ 35,00,000 or ₹ 52,00,000. The additional outlay would allow the plant to increase capacity from 500 units to 750 units. The relevant data for the life cycle of the tablet at different capacity level are as under:

Expected Sales	500 units	750 units
Sale Price	₹ 79,600 per unit	₹ 69,600 per unit
Variable Selling Costs	10% of Selling Price	10% of Selling Price
Salvage Value - Plant	₹ 6,25,000	₹ 9,00,000
Profit Volume Ratio	40%	

Required

ADVISE Y-Connections, regarding the 'Optimal Plant Capacity' to install. The tablet's life cycle is two years.

Note: Ignore the time value of money.

6. Color paints is a manufacturer of industrial dyes. It has received an order for 200 kgs of powder dye that needs to be customized to certain specifications. The job would require the following materials:

Material	Total units required	Units already in inventory	Book value of the units in inventory (₹per unit)	Realizable value (₹per unit)	Replacement cost (₹per unit)
A	2,000	0	NA	NA	8
B	3,000	1,200	7	8	10
C	2,000	1,400	12	9	14
D	500	500	9	12	15

I) Material B is used regularly in production of all types of dyes that Color plaints produces. Therefore, any stock used towards this job order would need to be replaced to meet other production demands.

II) Inventory of material C and D are from stock that was purchased in excess previously. Material C has no other use other than for this special order. Material D can be used as a substitute for 700 units of material Z which currently costs ₹11 per unit. The company does not have any inventory of material Z currently.

Required

ANALYSE the relevant costs of material while deciding whether to accept the order or not?

7. Diezel, is engaged in manufacturing many chemical products. It is using many chemicals some of which are fast moving, some are slow moving and few are in non-moving category. The firm has a stock of 10 units of one non-moving toxic chemical. Its book value is ₹2,400, realizable value is ₹3,500 and replacement cost is ₹4,200.

One of the customers of the firm asks to supply 10 units of a product which needs all the 10 units of the non-moving chemical as an input. The other costs associated with the production of the product are:

Allocated overhead expenses ₹16 per unit.

Out of pocket expenses ₹50 per unit.

Labour cost ₹40 per hour. For each unit two hours are required.

Other material cost ₹80 per unit.

The labour force required for the production of the product will be deployed from among the permanent employees of the firm. This temporary deployment will not lead to any loss of contribution.

Required

(i) RECOMMEND the minimum unit price to be charged to the customer without any loss to the firm.

(ii) ANALYSE with reasons for the inclusion or exclusion of each of the cost associated with the production of the product.

(iii) ADVICE a pricing policy to be followed by Diezel in perfect competition.

8. Golden Pacific Airlines Ltd. operates its services under the brand 'Golden Pacific'. The 'Golden Pacific' route network spans prominent business metropolis as well as key leisure destinations across the Indian subcontinent. 'Golden Pacific', a low-fare carrier launched with the objective of commoditizing air travel, offers airline seats at marginal premium to train fares across India.

Profits of the 'Golden Pacific' have been decreasing for several years. In an effort to improve the company's performance, consideration is being given to dropping several flights that appear to be unprofitable.

Income statement for one such flight from 'New Delhi' to 'Leh' (GP - 022) is given below (per flight):

	₹	₹
Ticket Revenue (175 seats x 60% Occupancy x ₹ 7,000 ticket price)		7,35,000
Less: Variable Expenses (₹1,400 per person)		1,47,000
Contribution Margin		5,88,000
Less: Flight Expenses:		
Salaries, Flight Crew	1,70,000	
Salaries, Flight Assistants	31,500	
Baggage Loading and Flight Preparation	63,000	

Overnight Costs for Flight Crew and Assistants at destination	12,600	
Fuel for Aircraft	2,38,000	
Depreciation on Aircraft	49,000*	
Liability Insurance	1,47,000	
Flight Promotion	28,000	
Hanger Parking Fee for Aircraft at destination	7,000	7,46,100
Net Gain / (Loss)		(1,58,100)

** Based on obsolescence*

The following additional information is available about flight GP-022.

1. Members of the flight crew are paid fixed annual salaries, whereas the flight assistants are paid by the flight.
2. The baggage loading, and flight preparation expense is an allocation of ground crew's salaries and depreciation of ground equipment.
3. One third of the liability insurance is a special charge assessed against flight GP-022 because in the opinion of insurance company, the destination of the flight is in a "high-risk" area.
4. The hanger parking fee is a standard fee charged for aircraft at all airports.
5. If flight GP-022 is dropped, 'Golden Pacific' Airlines has no authorization at present to replace it with another flight.

Required

Using the data available, prepare an ANALYSIS showing what impact dropping flight GP-022 would have on the airline's profit.

9. About Aditya Group

Aditya Group was established in 1975, manufactures and sells electronic personal grooming and beauty products. The group has two 100% subsidiaries AUS Ltd. and ANZ Ltd. AUS Ltd. manufactures luxury products that cater to niche customers who prefer specialized personal grooming and beauty care. ANZ Ltd. caters to regular daily beauty and grooming requirements that has a wide reach within the market. Factories of both companies are located within India. The products are sold to wholesalers, who supply these products to the retail market.

Aditya Group purchases its raw material requirements from both domestic and overseas markets. Additionally, certain products manufactured by AUS Ltd. can be enhanced based on the products manufactured by ANZ Ltd. Therefore, as per production requirements, AUS Ltd. sources some product components from ANZ Ltd.

Aditya Group has a centralized decision-making set-up. Basic policy decisions for functions such as production planning, sales and client relationship, finance and human resources are handled at the group level. Individual units AUS Ltd. and ANZ Ltd. concentrate on the manufacturing alone.

About You

You are an Assistant Manager in Finance and Accounts department of Aditya Group, headed by Director- Finance Ms. Elsea. You assist and report to Ms. Fiona, Manager of your department. Sometimes you also assist Director Finance in analysing financial and non-financial information, drafting reports for board meetings, preparation of presentation and staff trainings.

Business Situation- 1

Yesterday, 5.15 P.M.

You got an email from Ms. Elsea, with Cc to Ms. Fiona. Ms. Elsea, asked you to prepare a cost statement for making a quotation to a new customer. She has also informed you that the customer can also maintain a long- term business relation with us. You have been requested to gather information related to the specification from Sales Manager.

Yesterday, 5.25 P.M.

You have been called by Ms. Fiona, and provided the product specification received from Sales- Manager for which quotation has to be quoted. Ms. Fiona has also requested you to gather relevant information to prepare cost statement. Due to the expected long term business relationship that AUS Ltd. wants to have with the customer, the sales manager wants to quote the lowest possible price. AUS Ltd. currently has some spare capacity that can be utilized to cater to this entire order. Therefore, only the relevant cost to AUS Ltd. has to be considered to arrive at the quote.

After meeting with your reporting officer, you mailed to various concerned department and requested for data.

The following information has been obtained in relation to the contract:

Today, 10.05 A.M.

You got an e-mail from Production Manager, it has been informed that 40 tonnes of material Dx would be required. This material is in regular use by AUS and has a current purchase price of ₹380 per tonne. Currently, there are 5 tonnes in inventory which cost ₹350 per tonne. The resale value of the material in inventory is ₹240 per tonne.

Further, with regards to components, it has been informed that 4,000 components would be required. These could be bought externally for ₹15 each or alternatively they could be supplied by ANZ Ltd. The variable cost of the component if it were manufactured by ANZ Ltd. would be ₹8 per unit. ANZ Ltd. has sufficient capacity to produce 2,500 components without affecting its ability to satisfy its own external customers. However, in order to make the extra 1,500 components required by AUS Ltd., ANZ Ltd. would have to forgo other external sales of ₹50,000 which have a contribution to sales ratio of 40%. To have uniformity in the quality of the component, it is assumed that AUS Ltd. would procure its entire requirement of 4,000 components either externally or from ANZ Ltd. The transfer pricing policy of Aditya Group for sales between units aims at goal congruence. The unit selling the goods would be allowed to charge any opportunity cost on account of catering to internal demand, while the purchasing unit should ensure that the company is not at a loss.

Today, 10.45 A.M.: You got an e-mail from Personnel Manager, it has been informed that 2,000 high skilled labour hours would be required. The grade of labour required is currently paid ₹5 per hour. Highly skilled labour is in short supply and cannot be increased significantly in the short-term. This labour is presently engaged in meeting the, demand for product 'G', which requires 4 hours of highly skilled labour. The contribution from the sale of one unit of product L is ₹24.

It has also been informed that the contract would require a specialist machine. The machine could be hired for ₹15,000 or it could be bought for ₹50,000. At the end of the contract if the machine were bought, it could be sold for ₹30,000. Alternatively, it could be modified at a cost of ₹5,000 and then used on other contracts instead of buying another essential machine that would cost ₹45,000. The operating costs of the machine are payable by AUS whether it hires or buys the machine. These costs would total ₹12,000 in respect of the new contract.

Supervisor

The contract would be supervised by an existing manager who is paid an annual salary of ₹50,000 and has sufficient capacity to carry out this supervision. The manager would receive a bonus of ₹5,000 for the additional work.

Development Time

15 hours of development time at a cost of ₹30,000 have already been worked in determining the resource requirements of the contract.

Fixed Overhead Absorption Rate

AUS uses an absorption rate of ₹20 per direct labour hour to recover its general fixed overhead costs. This includes ₹5 per hour for depreciation.

Today, 11.15 A.M: Ms. Fiona called you in her place as asked you the following:

Required

(i) CALCULATE the relevant cost of the contract to AUS. You must present your answer in a schedule that clearly shows the relevant cost value for each of the items identified above. You should also EXPLAIN each relevant cost value you have included in your schedule and why any values you have excluded are not relevant. Ignore taxation and the time value of money.

(ii) DISCUSS two problems that can arise as a result of setting prices using relevant costing.

Business Situation- 2

Today, 5.26 P.M: A memo from Managing Director of the group has been circulated to all officers of the group which stated *"My objective for the forthcoming year is to reduce our quality costs in each of the primary activities in our value chain".* The company is keen to build a reputation for quality and gives a five-year guarantee with all of its products.

Today, 5.37 P.M: Ms. Fiona, called you in her place and asked the following:

Required

(iii) EXPLAIN, by giving examples, how each of the four types of quality cost could be reduced. You should also IDENTIFY in which primary activity each one of your examples would occur in Aditya Group's value chain.

10. **N2 Co.** is the manufacturer and supplier of firefighting and safety equipment for industrial use and follows the international quality standards and uses the high-grade raw material. It is a fast-growing brand that protects millions of people across the India, every single day. N2 has been offered a bid on a prospective export contract for 20,000 commercial fire extinguishers with following specification from USA buyer and the delivery terms is FOB.

"two-gallon cylinder holding 10 pounds of multi-purpose dry chemical at 380 PSI"

N2 is exporting first time. The price computation per fire extinguisher is as follows:

	₹	₹
Direct Material		
Circle Part Cost	620	
Necking Part	30	
Bottom Part	50	
Fire Extinguisher Powder	590	
Heat Process	50	
Nozzle	60	
Meter	20	
Pipe	50	
Nitrogen	30	1,500
Direct Labor (2 hrs. × ₹40)		80
Leakage Testing		50
Variable Overheads (including packing)		214
Export Clearance Charges on FOB term		36
Fixed Overhead		100
Total		1,980
Add: Markup @ 10%		198
Price		2,178
USD to INR		67
Price in USD		**32.51**

After quotation of USD 32.51, the buyer is negotiating the price and ready to pay only USD 28.50.

Required

ADVISE whether it is worth accepting at USD 28.50 considering other factors.

11. The budgeted cost data of a product manufactured by Ayudhya Ltd. is furnished as below:

Budgeted units to be produced	2,00,000
Variable cost (₹)	32 per unit
Fixed cost (₹)	16 lacs

It is proposed to adopt cost plus pricing approach with a mark-up of 25% on full budgeted cost basis.

However, research by the marketing department indicates that demand of the product in the market is price sensitive. The likely market responses are as follows:

Selling Price (₹ per unit)	44	48	50	56	60
Annual Demand (units)	1,68,000	1,52,000	1,40,000	1,28,000	1,08,000

Required

ANALYSE the above situation and DETERMINE the best course of action.

ANSWER/ SOLUTION- DESCRIPTIVE QUESTIONS

1. For each day, 'S' spends ₹360 per clerk (₹90 per hr. × 4 hrs.). Therefore, 'S' spends ₹1,080 per day to employ three clerks. Annually, this outlay amounts to ₹2,59,200 (₹1,080 per day × 240 days).

Over five years, the outlay would be ₹12,96,000. If the WCMS is implemented, the initial cost is ₹1,25,000. If we add the annual cost of ₹36,000, the total cost over five years amounts to ₹3,05,000. Since one clerk will be needed as well, 'S' has to incur ₹4,32,000 over five years to pay clerk (₹4,32,000 = ₹90 × 4 hrs. × 1 clerk × 240 days × 5 years). Therefore, the total cost of this option is ₹7,37,000.

Accordingly, there is cost saving of ₹5,59,000 from WCMS implementation.

Relevant Non-Financial Considerations

The WCMS may be a lot more efficient, but more rigid. For instance, what if, a student forgets to bring his/ her card or transaction failure due to connectivity issue, and may not have enough cash to pay. Automated systems may be less able to handle these situations. Having clerks may add an aspect of flexibility and a human aspect that is hard to quantify.

Conclusion

Obviously, WCMS option is more cost effective for 'S' because there is a cost saving of ₹5,59,000. But, non- financial factors should also be taken into consideration.

2. The incremental cost associated with the IMAX show appears to be ₹10,000 i.e. cost of running the show. The allocated fixed cost per show is not relevant because the total amount of fixed costs for the year will not change as a result of the special show. Further, the stated ticket prices are not relevant because the show will take place at 08:30 AM when the IMAX is not usually open – thus, the students will not be displacing any regular visitors. Based on the financial data provided, the minimum price quote appears to be ₹10,000.

Aayla should consider the following factors:

- Does the station have a souvenir shop and/or cafeteria?

  If so, many students are likely to buy food and/or souvenir items, thereby increasing the station's contribution. In turn, this would reduce the minimum price quote.

- What is the impact on future revenue?

  After seeing the show, many students may return with their parents, thereby increasing future revenue.

- Are there costs linked with the special showing that are not included in the ₹10,000 variable cost number?

For example, will the station have to pay an overtime premium.

Aayla should also consider the educational mission of the Planetarium Station. Such shows directly contribute to this mission, the station, and, hopefully, the betterment of the students. The special shows may be an excellent way to expose some students to earth science – these students may have never gone through the Planetarium Station if it were not for the school excursion.

Overall, the "best" price to charge is unclear and requires some judgment as Aayla needs to balance an array of financial and non-financial factors.

3. With increasing completion, dynamic market changes, changing needs of customers, *non-financial* and *ethical considerations* have gained relevance in the decision- making process. A company may face the dilemma of meeting customers' needs while protecting employees' rights. While there are no clear-cut parameters to measure the impact of such decisions, they have a *long-term impact* on the company's operations that ensures profitability and sustainability of an organization.

In the given scenario, a customer who contributes close to 60% of Automation Ltd.'s profits has been making turnaround demands that are unreasonable for the company employees to meet. Automation Ltd. has to decide whether to continue doing business with the customer based on the current terms or protecting the work environment of its employees. In the current scenario, *it is in Automation's long term interests to protect its employees' rights (a non-financial consideration). Keeping this approach in mind, Automation Ltd. decided to terminate business with the profitable client. While this had a significant impact on revenues in the short term, in the long run Automation Ltd. was able to get business from new clients.* Also, realizing the *value of service* provided, the dropped client came back with projects on equitable terms. Therefore, even though it did not make financial sense in the short run, decisions based on non-financial metrics played an important role in ensuring Automation Ltd.'s long term sustainability.

4. The Present Profit of Hotel Nikko

Total Room Days	=	25 Rooms × 365 days × 75% = 6,844
Profit	=	Total Contribution – Fixed Cost
	=	6, 844 room days × (ZD 2,700 – ZD 900) - ZD 90,00,000
	=	ZD 33,19,200

If Nikko is Shut Down during Q2

Loss of Contribution {900 Room Days × (ZD 2,700 - ZD900)} = ZD 16,20,000

Nikko should not close its hotel during Q2. The fixed costs will still be incurred and hotel closure would result in lost contribution of ZD16,20,000. This in turn would decrease annual profits by ZD16,20,000. In addition, Nikko could lose guests at other quarters of the year, particularly their regular business customers, who may perceive the Nikko as being *non-reliable*.

Proposal of Opening an Italian Restaurant

Opening a restaurant will increase the fixed costs of the Nikko from ZD 9 million p.a. to ZD 12 million p.a. Thus, annual increment of ZD 3 million.

Average Revenue per occupied room will rise from ZD 2,700 to ZD 3,636.36... (ZD 30 Million / 8,250 rooms) because increasing guest expenditure in Italian restaurant.

The total cost predicted at a level of 8,250 occupied rooms is ZD 23.75 million which means the variable costs must be ZD 11.75 million (ZD 23.75 million – ZD 12 million fixed costs). This is a variable cost per occupied room of ZD 1,424.24… which is an increase of ZD 524.24…

Consequently, the breakeven point has gone up from 5,000 to 5,425 (as shown in the diagram) occupied rooms so the Nikko is required to sell more room nights to cover costs. However, budgeted occupancy is now 7,310 occupied room nights which is 80.11% occupancy (7,310/ 9,125). This provides a margin of safety of 1,885 occupied room nights or 25.79%. At 7,310 occupied room nights, Nikko's budgeted profit would be ZD 41,70,597 {7,310 × (ZD 3,636.36 – ZD 1,424.24) – 12 million} which is more than present budgeted profit by ZD 8,51,397. So, it is better for Nikko to go for opening an Italian Restaurant.

5. Advice

Based on the above 'Expected Profit' statement, which is purely based on *financial considerations* firm may go for high price – low volume i.e. 500 units level. However, *non-financial considerations* are also given due importance as they account for actions that may not contribute directly to profits in the short run but may contribute significantly to profits in long run. Here, it is important to note that life cycle of product is two years and there is no significant difference between the profits at both levels. In this scenario firm may opt the plant having high capacity *not only to increase its market share but also to establish a long term brand image*.

Workings

Statement Showing "Variable Manufacturing Cost *per unit*"

Particulars	₹ / unit
Sales	79,600
Less: Contribution (40%)	31,840
Variable Cost	47,760
Less: Variable Selling Costs (₹79,600 × 0.1)	7,960
Variable Manufacturing Cost	39,800

Statement Showing "Expected Profit"

Particulars	('000) ₹ / unit	
	500 units	750 units
Sales	39,800 (₹79,600 × 500)	52,200 (₹69,600 × 750)
Less: Variable Mfg. Cost	19,900 (₹39,800 × 500)	29,850 (₹39,800 × 750)
Less: Variable Selling Cost	3,980 (₹39,800 × 0.1)	5,220 (₹52,200 × 0.1)
Add: Salvage Value	625	900
Less: Cost of Plant	3,500	5,200
Net Profit	13,045	12,830

Development cost is sunk and is not relevant.

6. Material A

The requirement of 2,000 units of Material A has to be purchased in entirety since there are no units in stock. Therefore, the relevant cost will be the replacement cost at ₹8 per unit, which for 2,000 units is ₹16,000 (2,000 units × ₹8 per unit).

Material B

There is a requirement of 3,000 units of Material B, of which 1,200 units are in stock. Material B used regularly in the production of all types of dyes. If the 1,200 units in stock are used, they need to be replenished (replaced) in order to meet production demands of other dyes. In addition, for the special order, additional 1,800 units of Material B is required to be procured from the market. Therefore, 3,000 units of Material B has to be procured if the special order is undertaken. The relevant cost will be the replacement cost at ₹10 per unit, which for 3,000 units is ₹30,000 (3,000 units × ₹10 per unit).

Material C

There is a requirement of 2,000 units of Material C, of which 1,400 units are in stock. The balance 600 units have to be procured at the replacement (market) price of ₹14 per unit, which would be ₹8,400. Material C has no other use, so if the special order is not undertaken the stock of 1,400 units can be sold at ₹9 per unit. So, the opportunity cost of undertaking this order is ₹12,600. Therefore, the relevant cost for Material C is procurement cost of 600 units plus the opportunity cost of not disposing the current stock of 1,400 units, which would be ₹8,400 + ₹12,600 = ₹21,000.

Material D

The entire requirement of 500 units of Material D is in stock. If the special order is not accepted, Color paints has two options (i) sell the excess material at ₹12 per unit or (ii) use it as a substitute for Material Z, which would otherwise need to be procured.

(i) The realizable value of Material D is ₹6,000 (500 units × ₹12 per unit).

(ii) Material D can be used as a substitute for 700 units of Material Z. Since there is no stock of Material Z currently, if the special order is accepted, the entire quantity would have to be procured at ₹11 per unit. This would cost the company ₹7,700 (700 units × ₹11 per unit).

Both options (i) and (ii) represent opportunity cost if the special order is accepted. The relevant cost for Material D, if the special order is accepted would be higher of either of these two opportunity costs. The higher opportunity cost of that of procuring Material Z from the market at ₹7,700. Therefore, the relevant cost for Material D is ₹7,700.

Therefore, the relevant cost to accepting the special order would be the cumulative of the relevant cost for Materials A, B, C, and D. This works out to ₹74,700.

Note- *This question has been solved by considering use of material D as a* ***rare or infrequent*** *substitute for material Z. However, this question can also be solved alternatively by considering* ***perfect substitute****.*

7. **(i)** Diezel has the opportunity to utilize 10 units of non-moving chemical as input to produce 10 units of a product demanded by one of its customers. The minimum unit price to be charged to the customer would be–

Cost Component	Cost per unit of product (₹)
Cost of Material (Realizable value = ₹3,500 / 10 units of chemical)	350
Out of Pocket Expenses	50
Other Material Cost	80
Minimum Unit Price that can be charged	480

Therefore, the minimum unit price that can be charged to the customer, without incurring any loss is ₹480 per unit of product. As explained below in point (ii), allocated overhead expenses and labor cost are sunk costs that have been ignored while calculating the minimum unit price to be charged.

(ii) Analysis

(a) Cost of Material: Relevant and hence included at realizable value. Diezel has 10 units of non-moving chemical input that has a book value of ₹2,400, realizable value of ₹3,500 and replacement cost of ₹4,200. Realizable value of ₹3,500 would be the salvage value of the chemical had it been sold by Diezel instead of using it to meet the current order. This represents an opportunity cost for the firm and hence included while pricing the product. Book value would represent the cost at which the inventory has been recorded in the books, a sunk cost that has been ignored. Replacement cost of ₹4,200 would be the current market price to procure 10 units of the input chemical. This would be relevant only when the inventory has to be replenished after use. This chemical is from the non-moving category, that means that it is not used regularly in production process and hence need not be replenished after use. Therefore, replacement cost is also ignored for pricing.

(b) Labour Cost: Not relevant and hence excluded from pricing. It is given in the problem that this order would be met by permanent employees of the firm. Permanent employee cost is a fixed cost that Diezel would incur irrespective of whether this order is produced or not. No additional labour is being employed to meet this order. Therefore, this cost is a sunk cost, excluded from pricing.

(c) Allocated Overhead Expenses: These expenses have been incurred at another Cost Centre, typical example would be office and administration costs. Such costs are fixed in nature that would be incurred irrespective of whether this order is produced or not. Therefore, this cost is a sunk cost, excluded from pricing.

(d) Out of Pocket Expenses: These are expenses that are incurred to meet the production requirement of this order. These are additional variable expenses, that need to be included in pricing.

(e) Other Material Costs: These are expenses that are incurred to meet the production requirement of this order. These are additional variable expenses, that need to be included in pricing.

(iii) Advice on Pricing Policy

Under perfect competition conditions, Diezel can have no pricing policy of its own, here sellers are price takers. It cannot increase its price beyond the current market price. The firm can only decide on the quantity to sell and continue to produce as long as the marginal cost is recovered. When marginal cost exceeds the selling price, the firm starts incurring a loss.

Since Diezel cannot control the selling price individually in the market, it can adopt the *going rate pricing* method. Here it can keep its selling price at the average level charged by the industry. This would yield a fair return to the firm. An average selling price would help the firm attract a *fair market share* in competitive conditions.

8. As per the statement given in the problem, FlightGP-022 incurs a net (loss) of ₹158,100. This is the net result of revenue less costs. Revenue is entirely variable depending upon passenger occupancy. Costs are both variable and fixed nature. To analyze the impact of dropping flight GP-022, we need to *re-compute* net gain/ (loss) that Golden Pacific earns when it operates the flight **based on relevant costing principles**.

Net Gain/ (Loss) = Revenue earned from flight operations *less* Variable costs of operation

Revenue earned is the ticket revenue earned from flight operations of GP-022, this is entirely variable. Variable costs of flight operations are those expenses that would be incurred only when the flight is operated. These include variable expenses per passenger, salaries flight assistants, overnight costs for flight crew and assistants, fuel for aircraft, a third portion of flight insurance that is specifically related to this flight sector and flight promotion expense. These are expenses that will not be incurred if the flight is not operated. Hence, relevant for decision making.

Other expenses like salaries of flight crew and hanger parking fees for aircraft are fixed expenses that will be incurred even if the flight does not operate. Loading and flight preparation expense is an allocated cost that will continue to be incurred even if flight GP-022 does not operate. Depreciation of aircraft and liability insurance expense (2/3rd portion not related to a specific flight sector) are sunk costs. These expenses have already been incurred and hence are irrelevant to decision making. Therefore, these fixed, allocated and sunk expenses are ignored while analyzing the decision whether to continue operating flight GP-022.

Flight GP-022

Statement Showing Net Gain/ (Loss)

	₹	₹
Contribution Margin *if the flight is continued*		5,88,000
Less: Flight Costs		
Flight Promotion	28,000	
Fuel for Aircraft	2,38,000	
Liability Insurance (1/3 × ₹1,47,000)	49,000	
Salaries, Flight Assistants	31,500	
Overnight Costs for Flight Crew and Assistants	12,600	3,59,100
Net Gain/ (Loss)		2,28,900

If Golden Pacific Airlines Ltd. discontinues flight GP-022, profits will be reduced by ₹2,28,900. The statement showing loss in operations of ₹158,100 is misleading for decision making purpose because it accounts for costs that are fixed and irrelevant. However, since flight GP-022 yields a net gain of ₹2,28,900, flight operations should continue.

9. (i) Statement Showing Relevant Cost

Type of Cost	Explanation	Amount (₹)
Material Dx (40 tonnes × ₹380)	1	15,200
Components	2	52,000
Direct labour (2,000 hrs. × ₹11)	3	22,000
Specialist machine	4	10,000
Machine operating cost	5	12,000
Supervision	6	5,000
Development time	7	Nil
General fixed overhead	8	Nil
Total relevant cost		1,16,200

Explanation

1. Material Dx is in regular use by AUS Ltd. and must be replaced. Consequently, its relevant value is its replacement cost. The historical cost is not relevant because it is a past cost and the resale value is not relevant because AUS Ltd. is not going to sell it because the material is in regular use.

2. AUS Ltd. would like to procure 4,000 components either from ANZ Ltd. or externally from the market. At the current production level, ANZ Ltd. (seller) has available capacity to accommodate part of AUS Ltd's request to the extent of 2,500 components. At this point, ANZ Ltd. would be operating at its maximum capacity. To cater to the remaining demand of 1,500 units from AUS Ltd., ANZ Ltd. has to forego external sales of ₹50,000 to its own customers. Given that the contribution to sales ratio is 40%. Therefore, ANZ Ltd. has to forego contribution of ₹20,000 (40% of external sales foregone ₹50,000) in order to cater to AUS Ltd.'s request. Fixed cost at ANZ Ltd. is irrelevant, since it would be incurred irrespective of whether AUS Ltd.'s order to catered to or not.

   Therefore, in spirit of goal congruence, the transfer price that ANZ Ltd. would charge AUS Ltd. would be the variable cost of ₹8 per unit and ₹20,000 towards lost contribution as explained above. Therefore, the transfer price

   = (₹8 per unit × 4,000 components) + ₹20,000

   = ₹32,000 + ₹20,000

   = ₹52,000 for 4,000 components

   Therefore, per component, the price charged would be ₹52,000 / 4,000 = ₹13 per component. This is lower than the external market price of ₹15 per unit. Therefore, in the interest of goal congruence the cheaper option is preferred. AUS Ltd. should source its components from ANZ Ltd, for a total procurement cost of ₹52,000.

3. Skilled labour is in short supply and can only be obtained by reducing the production of product 'G', resulting in a loss of contribution of ₹24 (given) or ₹6 per hour of skilled labour. Hence the relevant labour cost will be ₹6 (contribution lost per hour) + ₹5 (hourly rate of skilled labour) i.e. ₹11 per hour.

4. AUS Ltd. has a number of options: (a) If the machine were to be hired it would have a cost of ₹15,000; (b) if the machine were bought and then sold at the end of the work it would have a net cost of ₹20,000; or (c) if the machine were bought and then modified to avoid the need to buy the other machine it would have a net cost of ₹10,000 (₹50,000 plus ₹5,000 modifications less ₹45,000 cost of another machine). Thus, the most economic approach is buy the machine and then modify it so the relevant cost is ₹10,000.

5. The machine operating costs are future costs of doing the work and therefore are relevant.

6. The supervisor's salary is irrelevant, but the bonus needs to be included because it is dependent on this work and therefore is relevant.

7. The development time has already been incurred. Therefore, it is a past cost and not relevant.

8. General fixed overhead costs and their absorption are not relevant because they will be incurred whether the work goes ahead or not. Depreciation is also not relevant because it is an accounting entry based on the historical purchase of assets. It is not affected by the work being considered.

(ii) Two main issues arise when pricing work based on relevant costs:

- Profit reporting; and
- Pricing of future work.

With regard to profit reporting, the decision as to whether to proceed with the work will have been based on the use of relevant costs, but the routine reporting of the profit from the work will be based on the company's normal accounting system. Since this system will be based on total cost, it is probable that the costs of the work reported will be greater than its relevant cost. Consequently, the amount of profit reported to have been made on this order will be lower than expected and may even be a loss. This may cause difficulties for the manager who accepted the work as an explanation will be required of the reasons why there is such a difference in profit.

With regard to the pricing of future work the difficulty lies in increasing the price for similar items for the same customer in future. Once a price is set, customers tend to expect that any future items will be priced similarly. However, where a special price has been offered based on relevant cost because of the existence of spare capacity the supplier would not be able to continue to price on that basis as it does not recover its long-term total costs. There may also be difficulties created by this method of pricing as other customers are being charged on a full cost basis and if they were to discover that a lower price was offered to a new customer they would feel that their loyalty was being penalised.

(iii) Prevention

Operations: Preventative maintenance and checking of the calibration of machinery. This would reduce the number of potentially faulty products being produced and therefore reduce guarantee claims.

Appraisal

Inbound Logistics: Reduce costs of incoming inspections by building close links with suppliers and getting them to adopt TQM. If suppliers can guarantee their quality, then inbound inspections could be eliminated.

Internal Failure

Operations: Reduce costs of re-works by training employees on a continual basis e.g., quality circles. This would reduce failure costs and also improve quality.

External Failure

Service: Design quality into the product to try to prevent guarantee claims and therefore the cost of servicing/repairing the product.

10. Workings

Statement Showing Benefit from Prospective Export Contract

	₹
Direct Material	1,500
Direct Labor (2 hrs. × ₹40)	80
Leakage Testing	50
Variable Overheads (including packing)	214
Export Clearance Charges on FOB term	36
Total Relevant Cost	1,880
USD to INR	₹67
Relevant Cost	$28.06
Price Offered by Customer	$28.50
Benefit *per extinguisher*	$0.44
No. of Extinguishers	20,000
Total Benefit	$8,800

Advise

From financial perspective, it will be profitable for N2 to accept the contract because of gain of $8,800 (₹5,89,600) along with export incentives of drawback. Besides this, following consideration should also be taken into consideration while exporting fire extinguishers:

Statutory Compliances

Before exporting to a foreign country or even agreeing to sell to a new customer in a foreign country, N2 should be aware of foreign laws that might affect the sale. Export documentation is important as it plays a significant role in regulating the flow and movement of goods in international markets. Each country has its own prescribed statutory documents to be complied by exporters and importers. Thus, N2 should consider about the documentation and inspection compliances part of new buyer. It may include third party audit, commercial invoice and packaging list requirements, certificate requirements like- no child labour certificate, inspection certificate, reach compliance certificate etc. If any compliance requirement is not met, what will be the consequences? There may be stiff penalty has to be paid owing to non-compliance or failure to accurately comply with the export obligation.

Buyer Creditworthiness

It is necessary that before shipment the exporter to carry out its own credit check on the importer to determine creditworthiness. Thus, N2 should make a proper assessment of the creditworthiness of the foreign buyer and spend sufficient time in cross checking the credit worthiness of his counterpart to avoid any kind of unforeseen situation in future. Such information can be easily availed through contracts or through ECGC. Private agencies also provide information on paid service basis. However, this risk can be covered by asking for LC payment terms or 100% advance or opting for post shipment insurance for goods being exported.

Industry Analysis

Industry analysis involves such things as assessing the competition in the industry; the interplay of supply and demand in the industry; how the industry holds up against other industries that are emerging and providing competitions; the likely future of the industry, especially in light of technological developments; how credit works in the industry; and the exact extent of the impact that external factors have on the industry.

For N2, it is worthwhile to know the current and future demand of fire extinguisher and factors influencing the growth of global fire extinguisher market. N2 can perform industry analysis through three main ways i.e. the Competitive Forces Model (also known as Porter's 5 Forces); the broad factors analysis, also known as PEST analysis; and SWOT Analysis. It may also arrange industry report from trusted sources.

Additional Terms

Ensure that the all terms are clear and suit the business purpose. For instance, delivery terms should provide date of shipment or means of determining the date. In some circumstances, a late delivery penalty may be incurred where goods are not supplied by a specific delivery date. Therefore, N2 should evaluate whether shipment date is attainable or not. If the target shipment date could not be met, what will be the charges? Further, N2 must also check whether the foreign bank charges are subject to beneficiary account. If yes, then the same must be considered in the quotation.

Overall, N2 should accept the proposed contract only after due and careful consideration of above factors.

11. Analysis of Cost *plus* Pricing Approach

The company has a plan to produce 2,00,000 units and it proposed to adopt **Cost *plus* Pricing** approach with a markup of 25% on full budgeted cost. To achieve this pricing policy, the company has to sell its product at the price calculated below:

Qty.	2,00,000 units
Variable Cost (2,00,000 units × ₹ 32)	64,00,000
Add: Fixed Cost	16,00,000
Total Budgeted Cost	80,00,000
Add: Profit (25% of ₹ 80,00,000)	20,00,000
Revenue (need to earn)	1,00,00,000
Selling Price *per unit* $\left(\frac{₹\,1,00,00,000}{2,00,000\ \text{units}}\right)$	50 p.u.

However, at selling price ₹50 per unit, the company can sell 1,40,000 units only, which is 60,000 units less than the budgeted production units.

After analyzing the price-demand pattern in the market (which is price sensitive), it is perceived that to sell all the budgeted units of 2,00,000 market price needs to be further lowered, which might be lower than the total cost of production. This action does not seem to be in favor of firm's interest.

Statement Showing "Profit at Different Demand & Price Levels"

	I	II	III	IV	Budgeted
Qty. (units)	1,68,000	1,52,000	1,40,000	1,28,000	1,08,000
	₹	₹	₹	₹	₹
Sales	73,92,000	72,96,000	70,00,000	71,68,000	64,80,000
Less: Variable Cost	53,76,000	48,64,000	44,80,000	40,96,000	34,56,000
Total Contribution	20,16,000	24,32,000	25,20,000	30,72,000	30,24,000
Less: Fixed Cost	16,00,000	16,00,000	16,00,000	16,00,000	16,00,000
Profit (₹)	4,16,000	8,32,000	9,20,000	**14,72,000**	14,24,000
Profit (% on total cost)	5.96	12.87	15.13	**25.84%**	28.16%

Determination of the Best Course of Action

(i) Taking the above calculation and analysis into account, the company should produce and sell 1,28,000 units at ₹56. At this price company will not only be able to achieve its desired mark up of 25% on the total cost but can earn maximum contribution as compared to other even higher selling price.

(ii) If the company wants to uphold its proposed pricing approach with the budgeted quantity, it should try to reduce its variable cost per unit for example by asking its supplier to provide a quantity discount on the materials purchased. With a reduction in variable cost per unit, the selling price per unit (determined as a percentage of full costs) will also reduce and suitably create demand for 2,00,000 units as budgeted.

NOTES

- Activity Based Costing in Advanced Manufacturing Environment – In advanced manufacturing environment, where support function overheads constitute a large share of total costs, ABC provides more realistic and accurate product costing.
- Activity Based Cost Management (ABM) – A discipline that focuses on the management of activities as the route to improving the value received by the customer and the profit achieved by providing this value. This discipline includes cost driver analysis, activity analysis, and performance measurement.
- Value-Added Activities (VA) – The VA activities are those activities which are indispensable in order to complete the process. The customers are usually willing to pay (in some way) for these services. Eg. polishing furniture by a manufacturer dealing in furniture is a value- added activity.
- Non-Value-Added Activities (NVA) – The NVA activity represents work that is not valued by the external or internal customer. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. Non-Value Added activities create waste, result in delay of some sort, add costs to the products or services and for which the customer is not willing to pay. Moving materials and machine set up for a production run are examples of NVA activities.
- Activity Based Budgeting (ABB) – Activity Based Budgeting is a process of planning and controlling the expected activities for the organisation to derive a cost-effective budget that meets forecast workload and agreed strategic goals.
- Pareto Analysis– Pareto Analysis is a rule that recommends focus on the most important aspects of the decision making in order to simplify the process of decision making. It is based on the 80: 20 rule where it is believed that 80% of the profits of an organisation relates to 20% of the customers. It helps to clearly establish top priorities and to identify both profitable and unprofitable targets.

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Pareto principle based upon the law of –

Options

a. Diminishing returns

b. Variable returns

c. Increasing returns

d. Stable returns

Key – a

Reason - Pareto Analysis ranks the causes (reasons) in descending order of effect. Hence help to identify pay-off. It's obvious that focus is on items at the top (vital few) of the list because these have a higher probability of payoff. Hence the law of diminishing returns (pick the low hanging fruits first) applies here.

MCQ 2

Pareto principle can't be applied to –

Options

a. Inventory control

b. Quality control

c. Customer profitability analysis

d. None of the above

Key – d

Reason – Pareto analysis can be applied in Inventory Control, Pricing the products, Customer profitability analysis, ABC analysis, and Quality control etc.

MCQ 3

Pareto analysis shall be performed –

Options

a. Periodically

b. Continuously

c. Occasionally

d. Quarterly

Key – a

Reason – To keep check, that trivial should not become vital (and if turning to vital can be responded early one) and to check that effort done by management eliminate or reduce the impact of vital root-causes.

MCQ 4 – Which one need to be responded first –

Options

a. Trivial many

b. Vital few

c. Both

Key – b

Reason – Pareto is one of 7QC tools which help the management as control mechanism to prioritize, in term of root causes that need to be responded first. Vital few causing significant impact hence to offer higher payoff.

TEST YOUR KNOWLEDGE

Manufacturing Cycle Efficiency

1. "W" specialises in engineering design and manufacture in the automotive and motorsport industry. "W"'s design team has many years' experience in the design and development of engine components for the market and high performance engines. Though "W" is performing well, but many a times, the customers complained that they had to wait for long after placing the orders. "W" is interested in cutting the amount of time between when a customer places an order and when the order is completed. For the last year, the following data were reported in respect of Division "D":

Inspection time = 0.5 days per batch
Process time = 2.8 days per batch
Wait time = 16.0 days per batch
Queue time = 4.0 days per batch
Move time = 0.7 days per batch

Required

(i) CALCULATE Manufacturing Cycle Efficiency (MCE) and INTERPRET the result.

(ii) STATE what percentage of the production time is spent in non-value-added activities.

(iii) CALCULATE the delivery cycle time.

(iv) CALCULATE the new MCE if by using Lean Production all queue time can be eliminated.

Profitability Analysis

2. ABC Airlines has two divisions organised as profit centres, the Passenger Division and the Cargo Division. The following divisional informations were given for the year ended 31st March 2024:

Particulars	Cargo Division	Passenger Division	Total
Number of personnel trained	200	800	1,000
Number of flights	350	250	600
Number of reservations requested	Nil	7,000	7,000
Revenue	₹42,00,000	₹42,00,000	₹84,00,000
Operating Expenses (excluding service department charges)	₹36,00,000	₹28,50,000	₹64,50,000
Service Department Charges			
Training	₹3,20,000	₹3,20,000	₹6,40,000
Flight Scheduling	₹1,50,000	₹1,50,000	₹3,00,000
Reservations	₹1,05,000	₹1,05,000	₹2,10,000

The service department charge rate for the service department costs was based on revenue. Since the revenue of both the divisions were the same, the service department charges to each division were also the same.

Required

(i) COMMENT on whether the income from operations for the two divisions accurately measures performance.

(ii) PREPARE the divisional income statement using the activity bases provided above in revising the service department charges.

Direct Product Profitability (DPP)

3. XYZ Ornamental Company has been a name to count on for quality and service. It has been designing wide range of ornamental products for more than two decades using the highest-quality standard. Such quality is achieved through years of experience and the integrity that is maintained by its employees. They are known for their perfection. VGG approached XYZ to make an inquiry of two products. The two products are indoor fountain known as 'The Star' and a large gnome known as 'Dwarfs' for garden. Mr. Bob, the management accountant of XYZ, has estimated the variable costs per unit of 'The Star' and 'Dwarfs' as being ₹622.50 and ₹103.75 respectively. He estimated his calculations based on the following information:

(1) Products Data

	The Star	Dwarfs	Other Products
Production/ Sales (units)	10,000	20,000	80,000
Total Direct Material Costs	₹22,50,000	₹7,50,000	₹60,00,000
Total Direct Labour Cost	₹15,00,000	₹5,00,000	₹60,00,000

(2) Total variable overheads for XYZ are ₹1,20,00,000 out of which 30% belong to the procurement, warehousing and use of direct materials. While all other variable overheads are related to direct labour

(3) XYZ presently allocates variable overheads into products units using percentage of total direct material cost and total direct labour cost.

(4) VGG is willing to purchase 'The Star' at ₹740 per unit and 'Dwarfs' at ₹151 per unit.

(5) XYZ will not accept any work yielding an estimated contribution to sales ratio less than 28%.

The directors of XYZ are considering switching to an activity-based costing system and recently appointed a management consultants' firm to undertake an in-depth review of existing operations. As result of that review, the consultants concluded that estimated relevant cost drivers for material and labour related overhead costs attributable to 'The Star' and 'Dwarfs' are as follows:

	The Star	Dwarfs	Other Products
Direct Material Related Overheads: (The volume of raw materials held to facilitate production of each product is the cost driver.)			
Material Ratio *per product unit*	5	8	5
Direct Labour related overheads: (The number of labour operations performed is the cost driver.)			
Labour Operations *per product unit*	7	6	5

Required

(i) Give a financial ANALYSIS of the decision strategy which XYZ may implement about the manufacture of each product using the unit cost information available.

(ii) DISCUSS whether activity-based management should be adopted in companies like XYZ.

Customer Profitability Analysis (CPA)

4. **Jawahar Stationary Mart** (JSM) is located in centre of city "X" and popular for wide range of stationary products at competitive rate. Box files and cobra files are among the major products of JSM. JSM clients majorly, include medium and large corporate offices apart from reasonable base of retail clients. Mr. Ronit who done his masters in operations and marketing, recently join the family business (JSM). Mr. Ronit during first week itself, identify there are regular complaints from corporate clients regarding 'delivery of items, which are different from what is ordered' and 'for not meeting the requirements'. Mr. Ronit understands consumer behavior is very critical in nature, if understood well and used through-out the business operation; then can be key success factors. Hence with intent to establishing the integrated relations with customers at JSM, Mr. Ronit advise marketing team to start recording the date regarding customer in systemic manner and reporting of same.

Following is information regarding five major customers, who are regularly orders printed cobra files (Product code – J-Cobra 10) from JSM.

Particulars	A	B	C	D	E
No. of units sold	6,000	8,000	10,000	7,000	8,000
Margin per unit (₹)	6	7.5	7	8	10
No. of purchase order	10	30	25	20	10
No. of deliveries (normal)	3	4	6	4	5
Kilometers per delivery	100	185	50	250	50

Cost of processing the order is ₹2,000 per order and cost of handling material is ₹0.15 per item, whereas transport cost is ₹3 per kilometer for delivery of goods. 3 rushed deliveries made to 'B', cost for rush delivery is ₹800 per delivery.

Required

(i) ANALYZE customer profitability for JSM.

(ii) EXPLAIN three fundamental aspects of CRM to facilitate building relationship with profitable customer/(s).

5. ANCA Limited has decided to analyse the profitability of its four retail customers. It buys product 'Bio-aqua' at ₹218 per case and sells to them at list price less discount. The data pertaining to four customers are:

Particulars	Customer			
	A	B	C	D
No. of cases sold	7,580	38,350	78,520	15,560
List selling price	₹250	₹250	₹250	₹250
Actual selling price	₹245	₹236	₹228	₹232
No. of sale visits	6	12	16	10
No. of purchase orders	12	18	35	24
No. of delivery kilometres	280	350	450	400

It's four activities and cost drivers are:

Activity	Cost Driver Rate
Sale visits	₹750 per sale visit
Order taking	₹800 per purchase order
Deliveries	₹10.50 per delivery km travelled
Product handling cost	₹2.50 per case sold

Required

(i) COMPUTE the customer level operating income.

(ii) ANALYZE the profitability for each customer.

6. Bookmark LLP is a publishing firm that started operations very recently. The firm has published "Advanced Learner's Dictionary" this first year, that have been sold to 3 distributors PER, MGH and WLY. The firm's financials reflect profits in its first year of operations. The management is pleased with the results. However, they are interested in finding out how profitable each customer is. This would help them formulate their sales strategy.

Particulars	PER	MGH	WLY
Sales units p.a.	1,000	950	1,250
Sale price (gross)	250	250	250
Payment terms	3/10 net 30	net 30	3/10 net 30
Sales returns	0.5%	0%	10%
Delivery terms	FOB destination	FOB destination	FOB shipping point

In order to get market share, PER and WLY have been extended credit terms to avail discount if payment is made within 10 days. Customer MGH does not have much bargaining power and hence has been allowed only 30 days' credit period without any benefit of availing discount for early payment. Both PER and WLY have made payments within 10 days to avail of the discount extended.

On the cost front, variable cost of goods sold attributable to the net sales to customers PER, MGH and WLY are ₹1,50,000, ₹1,42,500, and ₹1,87,500 respectively. Key metrics of customer assignable marketing, administrative and distribution costs are as below:

Activity	Activity Driver	No. of Units of Activity Driver			Cost Driver Rate (₹)
		PER	MGH	WLY	
Order taking and processing	# of orders	4	2	15	300
Expedited / rush orders	# of orders	1	-	5	250
Delivery costs	# distance in km.	100	50	-	80
Sale return processing	# of returns	1	-	8	150
Billing cost	# of invoices	4	2	15	50
Customer visit	# of visits	1	-	5	800
Inventory carrying cost *	# 1 per unit	1,000	950	1,250	10

** Assume no opening and closing stock*

Fixed cost that are not assignable to any customer is ₹1,00,000 p.a.

Required

(i) PREPARE the customer wise profitability statement as also the overall profitability statement of Bookmark LLP.

(ii) RECOMMEND a strategy for Bookmark LLP regarding its customers.

Pareto Analysis

7. Generation 2050 Technologies Ltd. develops cutting-edge innovations that are powering the next revolution in mobility and has nine tablet smart phone models currently in the market whose previous year financial data is given below:

Model	Sales (₹'000)	Profit-Volume (PV) Ratio
Tab - A001	5,100	3.53%
Tab - B002	3,000	23.00%
Tab - C003	2,100	14.29%
Tab - D004	1,800	14.17%
Tab - E005	1,050	41.43%
Tab - F006	750	26.00%
Tab - G007	450	26.67%
Tab - H008	225	6.67%
Tab - I009	75	60.00%

Required

(i) Using the financial data, carry out a Pareto ANALYSIS (80/20 rule) of Sales and Contribution.

(ii) DISCUSS your findings with appropriate RECOMMENDATIONS.

8. The information given below pertains to ABC Enterprises, a specialized car garage door installation company. ABC Enterprises use to get multiple service calls from the customers with variety of requirements. They may have to Install, Replace, Adjust or Lubricate some part or other to make the door functional. They work with 5 major parts as given in the table, namely Door, Motor, Track, Trimmer and T -Lock.

Sr.No.	Parts	Type of Service				Total
		Install	Replace	Adjust	Lubricate	
1	Door	2	5	1	0	**8**
2	Motor	3	2	16	9	**30**
3	Track	5	0	6	6	**17**
4	Trimmer	14	6	0	0	**20**
5	T-Lock	5	0	1	0	**6**
6	Miscellaneous	0	2	1	1	**4**
	Total	**29**	**15**	**25**	**16**	**85**

Required

(i) Using the above data, carry out a Pareto Analysis (80/20 rule) of Total Parts.

(ii) Using the same data carry out the second level Pareto Analysis on the type of services with respect to Motors only.

(iii) Give your RECOMMENDATIONS on the basis of your calculations in (i) and (ii) above.

(Do calculations to two decimals only)

ANSWERS/ SOLUTIONS

1. (i) Manufacturing Cycle Efficiency (MCE)

$$= \frac{\text{Processing Time}}{\text{Inspection Time + Process Time + Queue Time + Move Time + Wait Time}}$$

$$= \frac{2.8 \text{ days}}{0.5 \text{ days} + 2.8 \text{ days} + 4.0 \text{ days} + 0.7 \text{ days} + 16.0 \text{ days}} = 11.67\%$$

Interpretation

In AKG, the MCE is 11.67%, which means that 88.33% of the time a unit is in process is spent on the activities that do not add value to the product. Monitoring the MCE helps companies to reduce non -value added activities and thus get products into the hands of customers more quickly and at a lower cost.

(ii) Percentage of Time Spent on Non- Value Added Activities

= 100% -11.67%

= 88.33%

(iii) Delivery Cycle Time

= 0.5 days + 2.8 days + 4.0 days + 0.7 days + 16 days

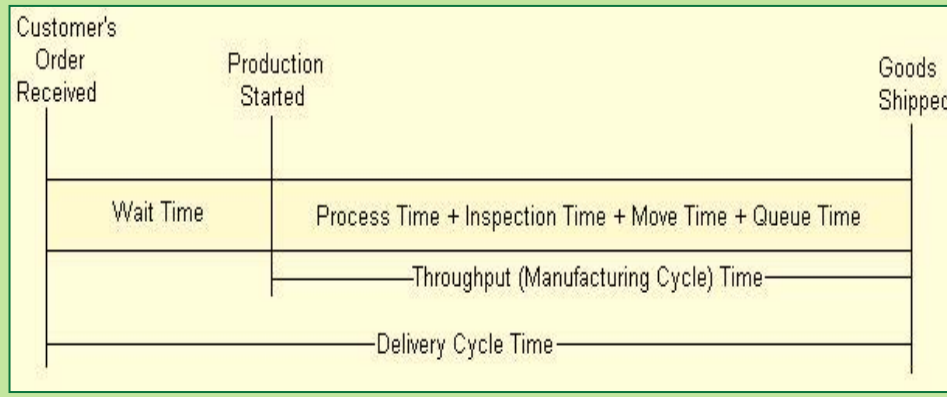
= 24 days

(iv) Revised MCE

$$= \frac{2.8\text{ days}}{0.5\text{ days} + 2.8\text{ days} + 0\text{ days} + 0.7\text{ days} + 16\text{ days}}$$

= 14%

Alternative



(i) Manufacturing Cycle Efficiency (MCE)

$$= \frac{\text{Value Added Time (Processing Time)}}{\text{Throughput (Manufacturing Cycle) Time}}$$

$$= \frac{2.8\text{ days}}{0.5\text{ days} + 2.8\text{ days} + 4.0\text{ days} + 0.7\text{ days}}$$

= 35%

Interpretation

In AKG, the MCE is 35%, which means that 65% of the time a unit is in process is spent on the activities that do not add value to the product. Monitoring the MCE helps companies to reduce non -value added activities and thus get products into the hands of customers more quickly and at a lower cost.

(ii) Percentage of Time Spent on Non- Value Added Activities

= 100% -35%

= 65%

(iii) Delivery Cycle Time

= 0.5 days + 2.8 days + 4.0 days + 0.7 days + 16 days

= 24 days

(iv) Revised MCE

$$= \frac{2.8 \text{ days}}{0.5 \text{ days} + 2.8 \text{ days} + 0 \text{ days} + 0.7 \text{ days}}$$

= 70%

Note that MCT does not include the *waiting time* before the "order is received by manufacturing" (**i.e. receipt time**).

Examples of non value added cycle time include the time the product spends waiting for parts or for the next stage in the production process, being inspected or repaired or being moved.

This question has been solved in two different ways

Wait time: from start of production to completion.

In the first way, "Waiting Time" has been considered as the time product spends waiting for parts etc. from the start of production to completion i.e. in the *production process*. In this case "Waiting Time" is a non- value- added activity and part of MCT and will reduce MCE.

Wait time: from order being placed to start of production.

In second way, "Waiting Time" has been considered as the time between 'customer places order' and 'order received by manufacturing department', in other words it is the time product spends *before the production process starts*. MCT does not include the *waiting time* before the 'order is received by manufacturing department'. Therefore, the same has not been considered for the MCE calculations.

2. (i) The reported income from operations does not accurately measure performance because the service department charges are based on revenue. Revenue is not associated with the profit centre manager's use of the service department services. For example, the Reservations Department serves only the Passenger Division and number of reservations requested by Cargo Division is NIL. Thus, by charging this cost based on revenue, these costs are incorrectly charged to the Cargo Division. Further, the Passenger Division requires additional personnel. Since these personnel must be trained, the training costs assigned to the Passenger Division should be greater than the Cargo Division.

(ii)

ABC Airlines
Divisional Income Statement
For the Year Ended March 31, 2024

Particulars	Cargo Division (₹)	Passenger Division (₹)	Total (₹)
Revenue	42,00,000	42,00,000	84,00,000
Less: Operating Expenses (excluding service department charges)	36,00,000	28,50,000	64,50,000
Gross Margin	6,00,000	13,50,000	19,50,000
Less: Service Department Charges			
Training	1,28,000 $\left(\frac{200}{1,000}\times₹6,40,000\right)$	5,12,000 $\left(\frac{800}{1,000}\times₹6,40,000\right)$	6,40,000
Flight Scheduling	1,75,000 $\left(\frac{350}{600}\times₹3,00,000\right)$	1,25,000 $\left(\frac{250}{600}\times₹3,00,000\right)$	3,00,000
Reservation	NIL	2,10,000 $\left(\frac{7,000}{7,000}\times₹2,10,000\right)$	2,10,000
Operating Income	**2,97,000**	**5,03,000**	**8,00,000**

3. (i) Analysis

The product costs per unit along with the respective contribution per unit may be calculated either by employing an ABC approach or alternatively by using the existing basis for the allocation of variable overhead cost.

The current scenario of product costing suggests that 'Dwarfs' should be produced as per the request of VGG because the contribution to sales ratio is 31.29%. However, the current scenario of product costing also suggests that XYZ should not undertake production of 'The Star' at a selling price of ₹740 per unit since the estimated contribution to sales ratio is 15.88% is lower than the desired contribution to sales ratio of 28%.

Activity based costing approach ensures greater accuracy by using multiple cost drivers and determines areas generating the greatest profit or loss. Table [(d)] shows how much the contribution to sales (%) for each product changes when the overhead allocation method changes to ABC. As shown in Table, contribution to sales ratio on 'The Star' increased to 31.87% from 15.88% while contribution to sales ratio on 'Dwarfs' reduced from 31.87% to - 29.23%.

Thus, XYZ should opt to produce 'The Star' for VGG as contribution to sales ratio is 31.87 which is higher than the desired one.

(ii) The term Activity based management (ABM) is used to describe the cost management application of ABC. The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Cost Management (ABM). ABM is a discipline that focuses on the efficient and effective management of activities as the route to continuously improving the value received by customers and to improve strategic and operational decisions in an organisation. Kaplan and Cooper divide ABM into Operational and Strategic.

Operational ABM covers the actions that increase efficiency, lower cost (i.e. reduce the cost driver rate of activities) and lead to higher revenue through better resources utilisation- in short, the action required to do things right. In other words, it is all about *'doing things right'*, using ABC information to improve efficiency. It also helps in identifying and improving value added activities and removing non-value-added activities as to reduce cost without distorting product value.

Strategic ABM is about *'doing the right things'*. It uses ABC information to determine which products is to be manufactured and which activities is to be used. XYZ can also use this for customer profitability analysis, identifying that which customers are the most profitable and focusing on them more.

A risk with ABM is that some activities have an implicit value are not reflected in a financial value added to any product. For example, a good and pleasant working environment can attract and retain the best human resources, but might not be identified as value added activities in operational ABM.

ABM provides managers an understanding of costs and helps teams to make certain decisions that benefit the whole organizations and not just their own activities.

Therefore, some companies like XYZ may adopt ABM to improve their operations and obtain useful activity information.

Workings

(a) Direct Material Cost per unit

	The Star	Dwarfs
Total Costs (₹)	22,50,000	750,000
Production units	10,000	20,000
Cost per unit (₹)	225.00	37.50

(b) Direct Labour Cost per unit

	The Star	Dwarfs
Total Costs (₹)	15,00,000	5,00,000
Production units	10,000	20,000
Cost per unit (₹)	150.00	25.00

(c) Variable Overheads

Material Related

Overhead Cost = 30% × ₹120,00,000 = ₹36,00,000

Total Volume Factor

Particulars	Units	Required per unit	Total Volume
The Star	10,000	5	50,000
Dwarfs	20,000	8	1,60,000
Other	80,000	5	4.00,000
Total Volume Factor			6,10,000

Overhead *per unit of volume* = ₹36,00,000/ 6,10,000 = ₹5.90.

Therefore, Overhead Cost *per product unit* will be as follows:

The Star	5	₹5.90	29.50
Dwarfs	8	₹5.90	47.20

Labour Related

Overhead Cost = 70% × ₹120,00,000 = ₹84,00,000

Total Operations Factor

Particulars	Units	Required per unit	Total Volume
The Star	10,000	7	70,000
Dwarfs	20,000	6	1,20,000
Other	80,000	5	4,00,000
Total Operations Factor			5,90,000

Overhead *per operation* = ₹84,00,000/ 5,90,000 = ₹14.24.

Therefore, Overhead Cost *per product unit* will be as follows:

The Star	7	₹14.24	99.68
Dwarfs	6	₹14.24	85.44

(d) Product Information (by unit) is as follows:

Particulars	The Star		Dwarfs	
	Current Scenario	ABC Basis	Current Scenario	ABC Basis
Selling Price ...(A)	740.00	740.00	151.00	151.00

Direct Material Cost	225.00	225.00	37.50	37.50
Direct Labour Cost	150.00	150.00	25.00	25.00
Variable Overhead Cost:				
Material Related	90.00	29.50	15.00	47.20
Labour Related	157.50	99.68	26.25	85.44
Total Variable Cost …(B)	622.50	504.18	103.75	195.14
Contribution …(A) - (B)	117.50	235.82	47.25	(44.14)
Contribution to Sales (%)	15.88	31.87	31.29	(29.23)

Total Variable Overheads are 120L. Out of which 30% i.e. 36L relates to material and 70% i.e. 84L relates to Labour. Now allocate variable overheads into product units using % of total direct material cost and total direct labour cost.

VO Material Related 40% of Material Cost
₹{36L/ (22.5L + 7.5L + 60L)}

VO Labour Related 105% of Labour Cost
₹{84L/ (15L + 5L + 60L)}

The Star & Dwarf

VO Material Related ₹90 = 40% of ₹225;
₹15 = 40% of ₹37.5

VO Labour Related ₹157.5 = 105% of ₹150;
₹26.25 = 105% of ₹25

4. (i) Statement of the Customer Profitability at JSM

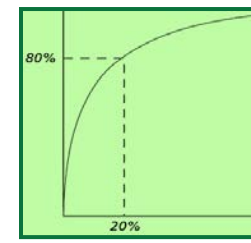
Particulars	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Margin …(A) (no. of units sold × margin per unit)	36,000	60,000	70,000	56,000	80,000
Customer Attributable Costs:					
Cost of Processing Purchase Orders (no. of purchase order × cost of processing the order)	20,000	60,000	50,000	40,000	20,000
Product Handling Cost (no. of units sold × cost of handling per item)	900	1,200	1,500	1,050	1,200

Delivery Cost (no. of deliveries × km per delivery × cost per km)	900	2,220	900	3,000	750
Cost of Rush Deliveries (no. of rush deliveries × cost per rush delivery)	---	2,400	---	---	---
Total …(B)	21,800	65,820	52,400	44,050	21,950
Profit (or Loss) …(A) – (B)	14,200	–5,820	17,600	11,950	58,050
Profit/ Net Revenue (in % age)	39.44%	–9.7%	25.14%	21.34%	72.56%

Analysis

From the above, it can be concluded that customer A, C, and D are less profitable than customer E; whereas customer B is causing losses. Customer B provides a positive operating margin but is unprofitable when customer attributable costs are considered. This is because customer B requires more sales orders than the other customers. In addition, the customer has rush delivery costs.

This analysis can make sense, if interpreted, considering the 'Pareto Analysis'. Pareto Analysis named after economist Vilfredo Pareto, who specifies that 80% of consequences come from 20% of the causes i.e. 20% of customer provide 80% of the profit. Means input and output may not be balanced. (Curve of revenue, as shown in figure; represent that initially large amount of revenue comes from small portion of sales/customers only - such small proportion of customers is critical to success of entity).



Although here proportion of 80:20 don't hold truth, but for JSM; major portion of profit (around 60%) coming from customer E only, therefore, customer E is critical to JSM. Special attention can then be given to enhancing the relationships with the customer E to ensure that customer E cannot migrate to other competitors. In addition, greater emphasis can be given to attract new customers that have the same attributes as the most profitable customer E.

Further, there is no point in serving customer B, but instead of refusing to trade with customer B, if possible; it may be better to turn it into profitable customer. Customer B can be made profitable if action is taken to convince the customer B to place a smaller number of larger quantity orders and avoid rush deliveries. If customer B cannot be convinced to change its buying behavior, selling prices should be increased to cover the extra resources consumed.

(ii) Supply chain management is the technique to integrate the supplier, manufacturing, store, and distribution function efficiently; in order to procure, produce and distribute at/in right time, quantity and place respectively. For effective distribution, CRM can be enabling tool. CRM is an integrated approach to manage and coordinate customer interactions to

identifying, acquiring, and retaining customers. CRM enables businesses to understand and retain customers (through better customer experience) apart from attracting new customer, in order to increase profitably and decrease customer management costs. CRM system, comprises following three fundamental aspects to facilitate building relationship with profitable customers –

- **Operative CRM** takes care of individual transactions and is used by operational team. Interactions by customers are kept in the data base and are used later by the service, sales, and marketing team for operational decisions. In JSM, the staff who is responsible to deal with customer must be given access to customer's details including all the information of activities performed earlier. This will enhance the JSMs' staff's efficiency to deal with customer-facing processes in a better way.
- **Analytical CRM** analyses the data created on the operational side of the CRM effort for evaluation and prediction of customer behavior. In JSM, analytical CRM can highlight the patterns in customers' behavior which will help sale team while pitching the product at JSM.
- **Collaborative CRM** ensures that information about customer must flow seamlessly throughout the supply chain, majorly distribution channel; in form of collaborative effort by all associated department of JSM to increase the quality of services provided to customers. Increase in utility at customer end will result in increased loyalty. Collaborative CRM comprises interactive technology like email, digital media to simplify the communications between customers and staff which would help in building relationships.

5. (i) Customer's Profitability Statement

Particulars	Customer- A	Customer- B	Customer- C	Customer- D
Sales (cases)	**7,580**	**38,350**	**78,520**	**15,560**
	(₹)	(₹)	(₹)	(₹)
List Price *per case*	250	250	250	250
Less: Discount	5 (₹250 × 2%)	14 (₹250 × 5.6%)	22 (₹250 × 8.8%)	18 (₹250 × 7.2%)
Actual Selling Price (Net of Discounts) *per case*	245	236	228	232
Less: Variable Cost *per unit*	218	218	218	218
Contribution *per unit*	27	18	10	14
Total Contribution	2,04,660 (₹27 × 7,580 units)	6,90,300 (₹18 × 38,350 units)	7,85,200 (₹10 × 78,520 units)	2,17,840 (₹14 × 15,560 units)

Less: Additional Overheads				
Visit Cost	4,500 (6 × ₹750)	9,000 (12 × ₹750)	12,000 (16 × ₹750)	7,500 (10 × ₹750)
Order Processing Cost	9,600 (12 × ₹800)	14,400 (18 × ₹800)	28,000 (35 × ₹800)	19,200 (24 × ₹800)
Delivery Cost	2,940 (280 × ₹10.50)	3,675 (350 × ₹10.50)	4,725 (450 × ₹10.50)	4,200 (400 × ₹10.50)
Product Handling Cost	18,950 (7,580 × ₹2.50)	95,875 (38,350 × ₹2.50)	1,96,300 (78,520 × ₹2.50)	38,900 (15,560 × ₹2.50)
Profit *per customer*	1,68,670 (11.81% of total)	5,67,350 (39.72% of total)	5,44,175 (38.10% of total)	1,48,040 (10.37% of total)
Profit *per customer per case*	**22.25**	14.79	6.93	9.51

(ii) Going by volume of cases sold, customer C is the biggest customer accounting for 56% of total sales volume, followed by customer B (27%), customer D (11%) and customer A (6%). However, in terms of profit per customer, Customer B is the most profitable accounting for 39.72% of the cumulative customer profits of ₹14,28,235. Customer C contributes to 38.10% of the same. Comparing customers B and C, customer B is more profitable despite accounting for sales volume that is less than half of customer C (customer C's 56% of sale volume versus customer B's 27%). The primary reason for this is because the discount given to customer C (8.8%) is higher than that given to customer B (5.6%). The difference is terms of sale could be due to the fact that customer C is the biggest customer and hence is able to negotiate for a higher discount. Consequently, for each case sold, customer C gets an additional discount of ₹8 as compared to customer B. This is reflected in the contribution generated per case. Sale of one case to customer C generates ₹10 contribution versus sale of one case to customer B generates ₹18 contribution. This has a huge impact on profitability. In terms of profit generated per case sold, customer C has the lowest contribution at ₹6.93 per case. The company may review whether this difference in terms of sale to each of its customers is justified. If the discount to customer C at 8.8% was initially extended to promote sales, negotiations can be made to reduce this to mutually acceptable rates. However, care must be taken not to lose customer C to competitors.

Customer D is the least profitable accounting for just 10.37% of the total customer profits. In terms of sale volume, the customer ranks third providing 11% volume. However, the customer is not profitable because of the following reasons:

(a) A *discount rate* of 7.2% is provided to the customer. Each case sold after a discount of ₹18 per case, generates a contribution per case of only ₹14 per case. This is much lower compared to the contribution per case of customer A (₹27 per case) and customer B (₹18 per case). This discount policy may need to be reviewed. One scenario where such a high discount may be justified would be where customer D supplies the products that it manufactures at a discounted rate to a sister concern of the company. Therefore, at a parent company / overall level, the higher discount rate for a low volume customer D may be justified.

(b) For a customer that provides 11% of volume, the *number of site visits* during the year were 10. Customer C giving 56% of volume had only 16 visits and customer B giving 27% of volume had only 12 visits. This indicates that customer D, although a smaller customer, requires more visits than regular customers. Therefore, site visit costs are higher for this customer. The reason for a higher handholding by the company for this customer has to be analyzed. For example, one possible reason could be that customer D requires the cases customized to its production requirement. This may require more site visits by the company's personnel. To resolve this, due to the extra work involved, the company may wish to charge a higher sale price for the cases customized for customer D. In another other scenario, it may choose to charge the customer a fixed rate for each site visit.

(c) For a customer that provides 11% of volume, the *number of orders* placed in a year are 24. Customer C giving 56% of volume placed 35 orders in a year and customer B giving 27% of volume placed 18 orders in a year. This indicates that customer D, although a small customer, places orders more frequently than other larger customers. Therefore, order processing costs are higher for customer D. The company may revise *ordering schedule* for this customer or find out the reason for higher proportion of purchase orders, in order to pass on some of the cost to the customer. For example, let us say, customer D has an agreement with the company to provide cases "just in time" resulting in more frequent orders as compared to other customers. Therefore, the company is providing flexibility in procurement to customer D. For this convenience, it may pass on some of the ordering cost to customer D by way of a higher selling price or a lower discount.

(d) Again, given the volume, the *number of deliveries* to customer D (400) is at a higher proportion compared to the larger customers C (450) and B (350). The company may revise *delivery schedule* for this customer or find out the reason for higher proportion of deliveries, in order to pass on some of the cost to the customer. For example, let us say, customer D has an agreement with the company to provide cases "just in time" resulting in more frequent deliveries as compared to other customers. Therefore, the company is providing flexibility in procurement to customer D. For this convenience, it may pass on some of the delivery cost to customer D by way of a higher selling price or a lower discount.

Customer A is the smallest customer providing only 6% of total sale volume. However, with a contribution per case at ₹27 per case and a profit per case at ₹22.25 per case, it is the most profitable of all customers. The primary reason for this is the discount of 2% offered is much lower than other customers. Each case sold to customer A yields a contribution of ₹27 as compared to a contribution of ₹10 from customer C, the biggest customer. Possible reason for a lower discount maybe customer A, being a smaller player, may have lesser bargaining power compared to other customers. If the company wishes to have a longer business relationship with customer A, it may wish to provide more favorable discount terms to this party. However, since customers B and C are much larger customers, any benefit passed onto customer A should not impact the company adversely in the long run. For example, to get more orders from customer A, the company gives a 10% discount to the party. Consequently, the profitability of customer A will decrease. Let us say customer A places huge orders due to which there are capacity constraints within the company. Sales to customers B and C, the current larger customers, may be impacted. This could affect the company adversely in terms of lost sales to customers B and C and loss of business relationships with these parties. Therefore, careful consideration should be given before extending discounts to improve sales from customer A.

As regards *product handling cost*, each customer is currently charged ₹2.5 per case sold. The company, if feasible, apply Activity Based Costing technique to find out if this can be allocated based on the cost driver for each customer. Let us say, packing cost before shipment is part of product handling cost. If customer B requires special packing to ship the goods, then customer B needs to be allocated a higher packaging cost as compared to the others. This cost can be recouped from customer B through a higher selling price.

6. (i) Customer Wise Profitability Statement and Overall Profitability Statement

SN.	Particulars	PER	MGH	WLY	Total ₹
A	Sales (net proceeds) –Table 1	2,41,288	2,37,500	2,72,812	7,51,600
B	Variable Cost of Goods Sold	1,50,000	1,42,500	1,87,500	4,80,000
C	*Assignable- Marketing and Administration Cost* - Table 2				
	• Order Taking and Processing	1,200	600	4,500	6,300
	• Sale Return Processing	150	-	1,200	1,350
	• Billing Cost	200	100	750	1,050
	• Customer Visit	800	-	4,000	4,800
	Total Assignable Marketing and Administration Cost	2,350	700	10,450	13,500

D	*Assignable- Distribution Cost* - Table 2				
	• Expedited / Rush Orders	250	-	1,250	1,500
	• Delivery Costs	8,000	4,000	-	12,000
	• Inventory Carrying Cost	10,000	9,500	12,500	32,000
	Total Assignable Distribution Cost	18,250	13,500	13,750	45,500
E	*Non- Assignable Fixed Cost*	-	-	-	1,00,000
F	Total Costs (B+C+D+E)	1,70,600	1,56,700	2,11,700	6,39,000
G	Net Profit (Step A - F)	70,688	80,800	61,112	1,12,600
H	Profit % of Sales (G / A)	29%	34%	22%	15%

Workings

Table 1: Customer Sales Analysis - Revenue Analysis

All figures in ₹

Particulars	PER	MGH	WLY	Total ₹
Sales {Sale Units × Sale Price (gross)}	2,50,000	2,37,500	3,12,500	8,00,000
Less: Sale Return (Step 1 × Return%)	1,250	-	31,250	32,500
Net Sales	2,48,750	2,37,500	2,81,250	7,67,500
Less: Cash Discount	7,462	-	8,438	15,900
Net Proceeds	2,41,288	2,37,500	2,72,812	7,51,600
Final Collections vs Original Sale	97%	100%	87%	94%

Table 2: Assignable Marketing, Administrative and Distribution Costs

All figures in ₹

Particulars	PER	MGH	WLY	Total
Order Taking and Processing (# of orders × cost per order)	1,200	600	4,500	6,300
Expedited / Rush Orders (# of orders × cost per order)	250	-	1,250	1,500
Delivery Costs (Distance in km. × cost per km)	8,000	4,000	-	12,000
Sale Return Processing (# of returns × cost per return)	150	-	1,200	1,350
Billing Cost (# of invoices × cost per invoice)	200	100	750	1,050
Customer Visit (#of customer visits × cost per visit)	800	-	4,000	4,800
Inventory Carrying Cost (# of units × inventory carrying cost p.u.)	10,000	9,500	12,500	32,000

(ii) Customer strategy: It can be seen that Bookmark LLP has an overall profit of ₹1,12,600 or 15% of sales. While the performance is good, the firm's management has to analyze customer wise profitability.

(a) WLY is the largest customer in terms of units sold. However, Table 1 above shows that sale returns at 10%, which is unusually large compared to other customers. Bookmark LLP has to investigate why the returns are of such large quantity. Possibly, there could be communication gap between the firm and WLY. Possible non-conformity in goods delivered has resulted in returns. Only 87% of the original sale value is being collected. The root cause of the problem has to be identified and rectified. This will also reduce the sale return processing costs.

(b) WLY has placed many rush orders, which requires Bookmark LLP to ship these orders immediately, using costlier means of transportation. Currently, there is no charge for shipping rush orders. In order to deter WLY from repeatedly placing rush orders, Bookmark LLP can charge the customer for shipping such orders beyond a threshold number of orders. Say rush orders beyond 2 orders will be charged to the customer.

(c) WLY has placed 15 orders for 1,250 units. Comparatively, PER and MGH placed 4 and 2 orders for approximately 1,000 units each. WLY can be requested to place fewer orders with larger quantity per order, in order to optimize ordering cost.

(d) Being the largest customer, WLY has 5 sale visits from Bookmark LLP, which is more than the other 2 customers. Priced at ₹800 per visit, this very costly. At the same time, WLY is yielding the least profit. Therefore, Bookmark LLP should reassess if resources can be reallocated to the other two more profitable customers. That may encourage more sales from higher yielding customers.

(e) Since WLY seems to need more hand-holding in terms of more sales visits as well as higher rush orders, Bookmark LLP may assess if it wants to discontinue or reduce business. Alternatively, it may reassign these resources towards existing or newer customers to get better profitability. However, if WLY can be migrated to a higher profitability, Bookmark LLP need not lose out its market share.

(f) Customer MGH is the most profitable yielding 34% return over sales, although in terms of 'Advanced Learner's Dictionary' ordered, it is the smallest of the three. Bookmark LLP can assess if it can extend some discount, in order to encourage more sales. Currently, Customer MGH does not get any discount.

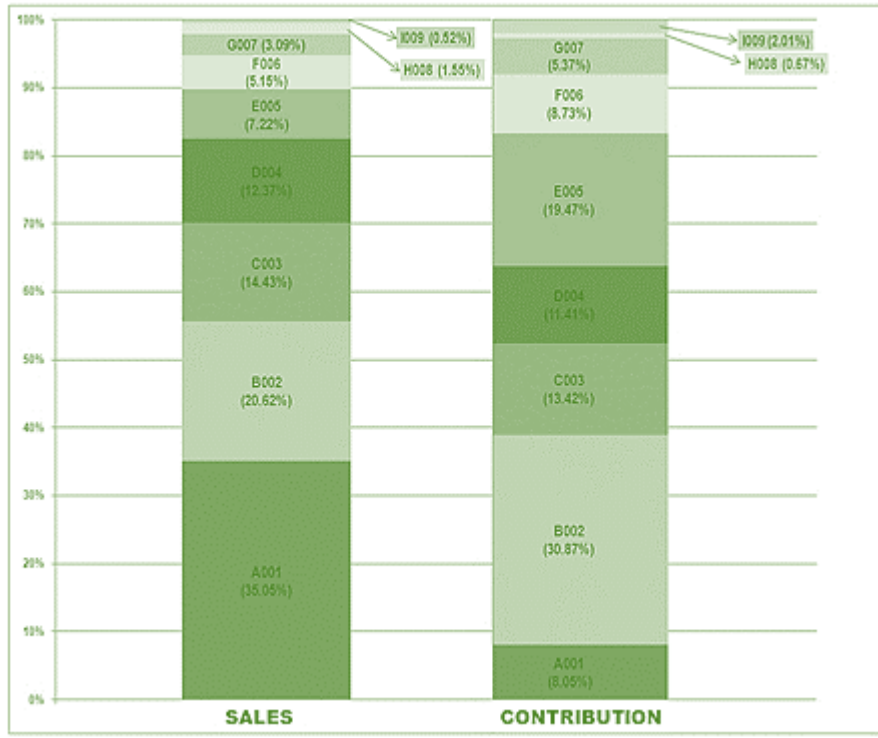
(g) Bookmark LLP can assign more sales visits to Customer PER and MGH to encourage them purchase more as well as provide high quality customer service.

7. "Pareto Analysis"

Model	Sales (₹'000)	% of Total Sales	Cumulative Total	Model	Cont. (₹'000)	% of Total Cont.	Cumulative Total %
Pareto Analysis Sales				Pareto Analysis Contribution			
A001	5,100	35.05%	35.05%	B002	690	30.87%	30.87%
B002	3,000	20.62%	55.67%	E005	435	19.47%*	50.34%
C003	2,100	14.43%	70.10%	C003	300	13.42%	63.76%
D004	1,800	12.37%	82.47%	D004	255	11.41%	75.17%
E005	1,050	7.22%	89.69%	F006	195	8.73%*	83.90%
F006	750	5.15%	94.84%	A001	180	8.05%	91.95%
G007	450	3.09%	97.93%	G007	120	5.37%	97.32%
H008	225	1.55%	99.48%	I009	45	2.01%	99.33%
I009	75	0.52%	100.00%	H008	15	0.67%	100.00%
	14,550	100.00%			2,235	100.00%	

(*) *Rounding - off difference adjusted.*

Diagram Showing "Sales and Contribution"



Recommendations

Pareto Analysis is a rule that recommends focus on the most important aspects of the decision making in order to simplify the process of decision making. The very purpose of this analysis is to direct attention and efforts of management to the product or area where best returns can be achieved by taking appropriate actions.

Pareto Analysis is based on the 80/20 rule which implies that 20% of the products account for 80% of the revenue. But this is not the fixed percentage rule; in general business sense, it means that a few of the products, goods or customers may make up most of the value for the firm.

In present case, four models namely A001, B002, C003, D004 account for around 80% (82.47%) of total sales whereas around 80% (83.90%) of the company's contribution is derived from five models namely B002, E005, C003, D004 and F006.

Models B002 and E005 together account for 50.34% of total contribution but having only 27.84% share in total sales. So, these two models are the key models and should be the top priority of management. Both C003 and D004 are among the models giving 80% of total contribution as well as 80% of total sales so; they can also be clubbed with B002 and E005 as key models. The management of the company should allocate maximum resources to these four models.

Model F006 features among the models giving 80%of total contribution with a relatively lower share in total sales. Management should focus on its promotional activities.

Model A001 accounts for 35.05% of total sales with only 8.05% share in total contribution. Company should review its pricing structure to enhance its contribution.

Models G007, H008 and I009 have a lower share in both total sales as well as contribution. Company can delegate the pricing decision of these models to the lower levels of management, thus freeing themselves to focus on the pricing decisions for key models.

8. (i) Statement Showing "Pareto Analysis of Total Parts"

Parts	No. of Items	% of Total Items	Cumulative Total
Motor	30	35.29	35.29%
Trimmer	20	23.53	58.82%
Track	17	20.00	78.82%
Door	8	9.41	88.23%
T-Lock	6	7.06	95.29%
Miscellaneous	4	4.71	100.00%

(ii) Statement Showing "Pareto Analysis of Type of Services (Motor)"

Type of Services	No. of Items	% of Total Items	Cumulative Total
Adjust	16	53.33	53.33%
Lubricate	9	30.00	83.33%
Install	3	10.00	93.33%
Replace	2	6.67	100.00%
	30		

(iii) Pareto Analysis is a rule that recommends focus on most important aspects of the decision making in order to simplify the process of decision making. The very purpose of this analysis is to direct attention and efforts of management to the area where best pay-off can be achieved by taking appropriate actions.

Pareto Analysis is based on the 80/20 rule which implies that 20% of the products account for 80% of the revenue. But this is not the fixed percentage rule. In a general business sense, it means that a few of the products, goods or customers may make up most of the value for the firm.

The present case stands in a difference to 80/20 rule. Because the company installs doors, they sometimes have multiple service calls to install each door piece by piece. They may have to install, replace, adjust, or lubricate some part to get the door working properly. They work with five main parts: door, motor, track, trimmer and t-lock. The service calls with reference to motors are heavy and accounted for as much as 35.29% of the number of calls attended. Motor together with trimmer accounted for 58.82%. So, these two parts are to be considered as key parts and ABC enterprises must be ever ready to cater to all provisional requirements for attending these classes without any inordinate delay. Any delay in service these calls is likely to damage its service rendering reputation within a very short span of time. Further, the second level Pareto Analysis on motors has revealed a particular reference to the service problems related to motors. Adjustments and Lubrication issues cover up 83.33% of the total service problems exclusively connected to Motors. So, ABC Enterprise must direct its best efforts and develop specific expertise to solve these problems in the best interest of the customer.

NOTES

- Effectiveness of accounting system (especially management accounting) is essential for efficient performance management system. From an accounting angle there are two categories of accountability: hard and soft accountability.
- Management control systems have an important role to play in developing accountability and in turn accountability leads to better performance. There are three broad categories of control mechanism which any business can use are Behavioural control, Personnel and cultural control, and Reporting control.
- Clearly communicated performance measures (CSFs and KPIs thereof) acts as stimuli that mend the way people behave, therefore in turn influence performance.
- It is essential to ensure that the management style employed must be appropriate to an organisation context. Management must ensure that overall culture prevailing in the organisation is aligned to its strategy.
- There are two sorts of models available to predict corporate failure, the Quantitative and the Qualitative models. The quantitative models either compute score or assign ranks are based upon ratios and values, to classify the companies into category of surviving or failing companies, whereas the Qualitative models usually assign the score to particular risk factors.
- Once the signs of impending failure are seen, it is important to investigate and identify the causes; and provide suitable response to them.

TEST YOUR KNOWLEDGE - MCQS

MCQ 1

McKinsey's 7S framework divided 7S into two sets of areas i.e., soft and hard area. The hard S are easy to quantify (measure) hence changes can be made to these by management with greater ease. Which of following is not a hard S?

Options

a. Strategy

b. Structure

c. System

d. Style

Key – d

Reason – There are three hard S, Namely Strategy, Structure and System.

MCQ 2

Business integration brings all aspects of business in alignment, so that business objectives can be achieved; by effective implementation of strategies while making efficient use of available set of resources. There are four aspects that are essential to be integrated, namely people, operations, strategy and

Options

a. Finances

b. Logistics

c. Technology

d. Knowledge

Key – c

Reason – Four aspects in particular need to be linked as part of business integration effort i.e. **people, operations, strategy, and technology.** Performance management improves as result of integration of these four aspects.

MCQ 3

'A' Motors directed 'A' Steels to deliver a specific metal material for its upcoming e-vehicle considering the design. Engineers from Production and Operation division of 'A' Motors visited to 'A' Steel to explain the needs after deliberation decided some of process need to be performed in such metal while in process at 'A' Steel's plant only (even prior to bring to 'A' Motors' Plant). One of engineer from 'A' Motors placed at 'A' Steel till such metal prepared and deliver to keep check at specifications. Above facts highlights the concept of –

Options

a. Value Chain

b. Value System

c. Value Specification

d. Value Set

Key – b

Reason – Extended value chain encompasses the customer's customers and the suppliers' suppliers. Because by creating extended organisation, dynamic and hostile environment can respond in better manner. A firm's value chain is connected to what, Porter calls a value system.

MCQ 4

The new appointed top brass at Jim-Jam Limited give local manager greater autonomy for decision making, with intent to improve performance, in light of fact that company introduced a number of changes in recent past.

Because in past decisions are made at corporate level, local managers only execute them, hence despite power vested with local manager they didn't exercise the authority resultantly changes that were introduced recently failed to create any yield or impact.

Which one of the following elements of McKinsey's 7S's model best explains why the change initiatives have been unsuccessful at DJK Co?

Options

a. Shared values

b. Strategy

c. Structure

d. Systems

Key – c

Reason - The Jim-jam in past used to have centralised structure but sudden change in structure from centralised to decentralised make it difficult for staff to mend their ways. Nothing regarding Shared Values, Strategy and System is specified in facts of case.

MCQ 5

Which of following is not a limitation of complex business structure in measuring and evaluating performance?

Options

a. Lack of information

b. Disagreement on objectives

c. Legal aspects

d. Cultural conflicts

Key – c

Reason – The generic issues in complex business structure are -

- Establishing objective in is never easy, because the parties involved in complex business structures may have different values, vision, risk appetites and timescales.
- Approaches and attitude of parties towards factors that are critical for performance such as quality, control and risk, etc. may be different.
- Since different sets of resources, skills and knowledge contributed by parties, assigning accountability for performance is a key issue.
- Lack of trust is a critical aspect, because for performance measurement and evaluation detailed information is required, whereas parties of complex business structures may be hesitant to share information freely if they lack trust in each other.
- Cultural conflicts may result in poor performance.

MCQ 6

Which among the following is not a category of control mechanism that can be used as part of management control system.

Options

a. Behavioural Control

b. Reporting Control

c. Physical Control

d. Cultural Control

Key – c

Reason – Management control systems have an important role to play in developing accountability and in turn accountability leads to better performance. There are three broad categories of control mechanism which any business can use are Behavioural control, Personnel and cultural control, and Reporting control.

MCQ 7

Based upon the Z score the companies are classified into different zone of discriminations, which of following is not a Zone of discrimination?

Options

a. Distress

b. Grey

c. Safe

d. Warning

Key – d

Reason – There are three zones of discrimination -

Distress – Companies are in danger and possibly heading towards bankruptcy in upcoming two years.

Grey – Further investigation is required, especially in CSFs and KPIs.

Safe – Companies are financially sound.

MCQ 8

Skyway Airline Limited (SAL), an international carrier took series of loans to finance the M&A deals, but now observing the working capital crisis. CEO of SAL in response to a question at recent press-conference, reported the Z-score of 1.6 and assure the investors as well as stakeholders that thing are under control. In which of following zones, you place the SAL.

Options

a. Distress

b. Grey

c. Safe

d. Warning

Key – b

Reason – The classification criteria (into zones of discrimination) applicable to non-manufacturing entities, as per Z-score are-

Z-Score	Zone of discrimination	Prediction regarding corporate failure (due to bankruptcy)
Less than 1.1	Distress	Companies with a Z score of below 1.1 are in danger and possibly heading towards bankruptcy.
1.1 - 2.6	Grey	Companies with scores 1.1 to 2.6 need further investigation.
2.6 above	Safe	Companies with a score of 2.6 above are financially sound.

Mind-it, Skyway Airline Limited (SAL) is an international carrier, a non-manufacturing entity.

MCQ 9

Which of following statements are incorrect in regard to Argenti's A score model.

1. Mistakes and defects not inter-related.
2. Threshold is Kept at score of 45.
3. There are three underlying groups (dimensions) i.e., Mistakes, Defects and Symptoms of failure.

Options

a. Only 1

b. Only 1

c. Both 1 and 2 only

d. Both 1 and 3 only

Key – c

Reason – Mistake and defects are interrelated. To illustrate, if the management and accounting system is weak (defect) then mistakes are bound to happen. The threshold score to identify the corporate at risk of failure is 25.

MCQ 10

Following are the scores of six firms as per Argenti's A score model. You are required to identify healthy firms-

Firm	Defects	Mistake	Symptoms of trouble
1	10	0	4
2	2	15	0
3	10	15	0
4	15	0	0
5	0	30	0

Options

a. Only firm 1, 2, 3, and 4

b. Only firm 1 and 4

c. Only firm 2 and 3

d. Only firm 2, 3, 4, and 5

Key – c

Reason – The maximum score allotted is 100 (being 43 from **Defects**, 45 from **Mistake** and 12 from **Symptoms of trouble**). For a firm to be cleared as healthy, its overall score must be less than the **maximum acceptable score of 25** (with 10 and 15 being the maximum acceptable scores in defects and mistakes respectively). If a firm scores anything in **Symptoms of trouble** this is immediately seen as an indicator that the firm is at risk.

A firm that scores more than 25 overall, even if it scores below the individual thresholds in either of **Defects** (10) or **Mistake** (15), would still be considered at risk.

In case of 1st firm Symptoms of trouble score is 4, while in case 4th firm Defects score is more than 10 whereas in case of 5th firm Mistake scores are 30, which more than acceptable limit of 15, hence Firm 1, 4 and 5 are at risk. On contrary firm 2 and 3 are healthy.

MCQ 11

Consider the following categories of performance measures.

I.	Profitability measures.
II.	Customer-satisfaction measures.
III.	Efficiency, quality, and time measures.
IV.	Innovation measures.

A cruise line operates on a national scale in a very competitive marketplace. In view of this information, which measures should the company use in the evaluation of its managers?

Options

a. I

b. I and II

c. II and III

d. I, II, III and IV

Key – d

Reason – These categories of performance measures are all the things that a company needs in order to have a competitive advantage. Competitive advantage is an advantage that a company has over its competitors which it gains by offering consumers greater value than they can get from its competitors.

In a very competitive marketplace such as this cruise line is in, competitive advantage is essential. In order to have a competitive advantage, the company needs to excel in all of these performance measures. If managers are not evaluated on their performance in these areas, they will not work toward excelling in them, and the company will not have a competitive advantage. Therefore, the company should use all of these measures in its evaluation of its managers.

TEST YOUR KNOWLEDGE – CASE-LETS

Nova Automobile Limited (NAL) is a bike manufacturer that specializes in environmentally friendly 'hybrid' bikes. Its bikes are powered by both electric batteries and CNG. Despite being in its initial years, NAL has already earned a good reputation for the quality and dependability of its bikes.

NAL has made significant investments in the development of hybrid engines and is now looking to expand its market reach to nearby countries. The majority of shares in NAL are held by two venture capital firms that are supporting the company's growth plans ***……continue…….***

MCQ 1 – Which of the following option allow the Nova to expand its market reach without sparing any of its resources, rather it will be generating cash inflows –

Options

a. Joint venture

b. Strategic Alliance

c. Setting-up plant in those countries

d. Licensing

Key – d

Reason – Licensing involves obtaining permission from an entity (licensor) to manufacture and sell one or more of its products (or even rendering services on behalf of said licensor) within a defined market area for a set period in return for a royalty.

Hence if Nova decides to be licensor of their hybrid-bikes by allowing other automobile manufacturers to manufacture and sell its bikes, may expand its market reach without sparing any of its resources. Instead, they will get royalty payment (undoubtedly there will no control on quality directly and technology is also transferred to licensees).

MCQ 2 – Since brand is big resource to attain and sustain competitive advantage, hence Nova don't want to compromise with quality that may harm the repute which it earns; therefore, intended to keep control over quality through active participation while preserving it independence in addition to least possible resource application, then which form is best for Nova.

Options

a. Joint venture

b. Strategic Alliance

c. Setting-up plant in other countries

d. Licensing

Key – b

Reason - A strategic alliance is an arrangement between two or more enterprises to undertake a mutually beneficial project while each retains its independence.

A Strategic Alliance agreement is less complex and less binding than a joint venture. In joint venture two businesses pool resources to create a separate business entity, whereas in case strategic alliance they retain their independence. So, NAL through strategic alliance can control the quality while.

On the other hand, setting up plants in other countries would require huge capital outlay, whereas licensing lead not control of NAL over quality.

Note *- Since independence is retained under the Strategic Alliance, hence it become difficult to put common performance measures in place and to collect and analyse management information for same because security of confidential information is a concern.*

....continue..... *NAL's board of directors is considering a joint venture with Country B's Anumaj Automobiles Limited (AAL), because Country B, which is a neighbouring country has a rapidly growing market for environmentally friendly bikes. Though AAL does not currently produce hybrid vehicles, but it does have excess capacity in its factory.*

AAL is also interested in proposal because their sale during proceeding three years has been declining due to the safety issued in their bikes. Even couple of blast issues report in their bike in recent past, engine caught fire in both the cases; resultantly petrol tank bust results in blast.

MCQ 3 – Managing performance of Joint-venture is difficult due to which of the following limitations.

I. Difference in Culture and management styles in both the companies (JV partners)

II. Difference in financial reporting framework in both the countries

III. Difference in attitude towards risk and quality in both the companies (JV partners)

Options

a. I and II only

b. I and III only

c. II and III only

d. All I, II and III

Key – b

Reason – Limitations that become root cause of problems in measuring and managing the performance of JV.

- Establishing objective in is never easy, because the parties involved in complex business structures may have different values, vision, risk appetites and timescales. This shortcoming highlights the inevitable need of goal congruence.
- The approaches and attitude of parties towards factors that are critical for performance such as quality, control and risk, etc. may be different, hence a common minimum programme needs to be devised.
- Since different sets of resources, skills and knowledge contributed by parties, hence assigning accountability for performance is key issue. Accountability shall be clearly established and communicated at the outset.
- Lack of trust is a critical aspect, because for performance measurement and evaluation detailed information is required, whereas parties of complex business structures may be hesitant to share information freely if they lack trust in each other. Control and reporting framework shall be mutually decided and climate of trust shall be foster by opting compatible management style.
- Cultural conflicts may result in poor performance, hence shared values shall be redefined so that they may be more liberal and serve the purpose.

MCQ 4 – Which of the following primary activity shall be substantial source of enlarged value for proposed JV of Nova and AAL.

Options

a. Inbound logistics

b. Outbound logistics

c. Marketing and sales

d. After sale services

Key – c

Reason – Country B has a rapidly growing market for environmentally friendly bikes, hence managing marketing mix to drive higher margin (through high perceived value) will be easy for JV of PAL and AAL; therefore, marketing and sales activities shall be substantial source of enlarged value.

DESCRIPTIVE QUESTION

How can information technology breakthrough help Nova and AAL to overcome the limitation of complex business structure in managing performance of JV they are going to form?

Answer – Joint Venture is considered to be complex business structure; it faces a variety of issues in measuring and managing performance. Information Technology breakthroughs can be game-changer for such complex business structure though ensuring accurate, reliable and timely information.

All the JV parties must agree to use one uniform system for information exchange pertaining to shared interest. If such information system is separate from their core individual information system, then plug-in between common system and respective information systems of JV partner shall be used for real-time information sharing to ensure seamless flow of information.

Having one common system used by all partners' means that everyone is using the same data. This will also result in less difficulty collecting information about the performance of partners since the information will all be stored on one system.

NOTES

- Performance Pyramid – The Performance Pyramid is also known as Strategic Measurement and Reporting Technique. They view businesses as performance pyramids. The attractiveness of this framework is that it links the business strategy with day-to-day operations.
- Building Block Model – Fitzgerald and Moon have developed an approach to performance measurement in business services that is based on the three building blocks of dimensions, standards and rewards.
- Triple Bottom Line (TBL) – TBL expands traditional accountancy reporting systems, looking at social and environmental performance, rather than simply financial performance.

❑ Disadvantages to Non-financial Performance Measures – Multiple measures create conflict in the short term can also be time consuming, unlike accounting measures, non-financial data are measured in many ways, there is no common denominator.

❑ In today's competitive global business environment, quality is one of the keyways in which a business can differentiate its product or service, improve performance and gain competitive advantage. Quality can form a key part of a strategy.

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

ROI is _____ measures and leads to _____

Options

a. Relative, optimisation

b. Relative, sub-optimisation

c. Absolute, optimisation

d. Absolute, sub-optimisation

Key - b

Reason – ROI is a relative measure; it discourages investment because this can decrease ROI in the short term, hence leads to sub-optimisation.

MCQ 2

RI is _____ measures, hence best applicable to compare performance of division of _____size.

Options

a. Relative, Same

b. Relative, Different

c. Absolute, Same

d. Absolute, Different

Key - c

Reason – RI is excess of operating income over the required income to meet cost of capital hence absolute measure, therefore comparison can be made between divisions of same size only.

MCQ 3

The number of inpatient hospital deaths decreased 8%, from 776 in 2021 to 715 in 2022.

Options

a. Economic (Profit)

b. Social (People)

c. Environmental (Planet)

d. Need not to be reported

Key – b

Reason – Social bottom line, since hospital mortality rate measures the clinical quality.

MCQ 4

Key Performance Indicator is the _____ of Critical Success Factor

a. Target Measure

b. Source

c. Extension

d. Substitute

Key - a

Reason - Key performance indicators (KPIs) are the way to measure whether the CSFs are working. Using CSFs and KPIs helps a business stay focused on the key actions that will keep it on track to achieving its goals.

MCQ 5

Critical Success Factors are true _____ of Competitive Advantage

a. Target Measure

b. Source

c. Extension

d. Substitute

Key - b

Reason - If any organisation is able to use its core competencies to exploit the CSFs, it will surely have an edge over rivals, which will position the organisation in a better strategic position; leads to competitive advantages. Hence Critical Success Factors are a true source of Competitive Advantage.

TEST YOUR KNOWLEDGE

Return on Investment (ROI)

1. "Y" Limited has three autonomous divisions. The divisions are evaluated on the basis of ROI, with yearend bonuses given to divisional managers who have the highest ROI. Operating results of Division II for the last year are given below:

	₹
Sales	2,10,00,000
Less: Variable Expenses	1,26,00,000
Contribution margin	84,00,000
Less: Fixed Expenses	67,20,000
Net Operating Income	16,80,000
Divisional Operating Assets	52,50,000

The company's overall ROI for the last year was 18% (considering all divisions). Division II has an opportunity to add a new product line that would require an investment of ₹30,00,000. Other details of the new product line are as follows:

	₹
Sales	₹ 90,00,000 per annum
Variable Expenses	65% of sales
Fixed Expenses	₹ 25,20,000 per annum
Life cycle of the product line	5 years

Required

(i) CALCULATE last year's ROI of Division II.

(ii) DISCUSS whether the manager of Division II would accept or reject the new product line, if he takes his decision based solely on divisional ROI.

(iii) ADVISE how residual income approach can be used as an alternative financial measure for evaluation of managerial performance in the best interest of the company.

2. BYD Alloy Ltd. first opened its door in 1991 for business and now it is a major supplier of metals supporting over a dozen different industries and employs experts to support each industry. These include Wood & Panel Products Manufacturing, Hearth Products, Site Furnishings, Commercial and Residential Construction etc. It has grown through devotion to its customers, dedication to customer service and commitment to quality products. The company has two divisions: Division 'Y' and Division 'D'. Each division works as an investment centre separately. The salary of each divisional manager is ₹7,20,000 per annum with the addition of an annual performance-related bonus based on divisional return on investment (ROI). A minimum ROI of 12% p.a. is expected to be achieved by each divisional manager. If a manager only achieves

the 12% target, he will not be rewarded with a bonus. However, for every whole 1% point above 12% which the division achieves for the year, a bonus equal to 3% of annual salary will be paid subject to a maximum bonus of 20% of annual salary. The figures belonging to the year ended 31 March 2024 are given below:

	Division 'Y' ('000)	Division 'D' ('000)
Revenue	29,000	17,400
Profit	5,290	3,940
Less: Head Office Cost	(2,530)	(1,368)
Net Profit	2,760	2,572
Non- Current Assets	19,520	29,960
Cash, Inventory, and Trade Receivable	4,960	6,520
Trade Payable	5,920	2,800
Manager Responsible	HAI	FAI

During the financial year 2023-24, FAI manager of Division 'D' invested ₹13.6 million in new equipment including an advanced cutting machine, which will increase productivity by 10% per annum. HAI, manager of Division 'Y', has made no investment during the year, even though its computer system needs updation. Division 'Y''s manager has already delayed payments of its suppliers due to limited cash & bank balance although the cash balance at Division 'Y' is still better than that of Division 'D'.

Required

(i) For each division, COMPUTE, ROI for the year ending 31 March 2024. JUSTIFY the figures used in your calculation.

(ii) COMPUTE bonus of each manager for the year ended 31 March 2024.

(iii) DISCUSS whether ROI provides a justifiable basis for computing the bonuses of managers and the problems arising from its use at BYD for the year ended 31 March 2024.

Economic Value Added (EVA)

3. X Greetings is a Korean company based in Seoul committed to supplying the highest quality stationery, greeting cards, gifts, and children's products, which are sourced from all over the world. The company also distributes Sunday Paper – Korean made eco-friendly stationery designed and manufactured in Seoul. X's home currency is the KRW. It is also listed on the KRX for last 20 years and its current share price is KRW 23.25.

You are the Management Accountant of X Greetings and the directors have asked you to study X on value-based management, which is a different approach to the performance management. The directors have heard about this method, considering it a way of focusing on shareholder's interests and in the present economic scenario, they think it to be useful for the growth of X.

Conventionally earnings per share (EPS) and share price were used to assess performance. The proposed changes are important, and the directors require you to have the implications of the new analysis and also want to convince the major investors about the future benefits.

Financial data for X Greetings

Particular	2023-24	2022-23
	KRW in million	KRW in million
Profit after interest and tax	55.55	65.38
Interest	15.60	8.00
Opening capital employed	273.58	198.40
Closing capital employed	329.13	273.58
	Debt to Equity	Debt to Equity
Capital structure	40:60	40:60
	%	%
Costs of capital		
Equity	14.20	11.50
Debt (pre-tax rate)	8.00	6.00
Tax rate	30	30
Stock market information:		
Average number of shares in issue	3.2 million	3.2 million
Stock market all-share index	1,985	2,561
Retailing sector index	1,155	1,408
X Greetings (share price)	KRW 22.50	KRW 24.40

Required

ASSESS the performance of X Greetings using Economic Value Added and ANALYSE the result relative to those of earnings per share (EPS) and share price. Assumptions, if any, should be clearly stated.

4. Water Utilities Services (WUS) is established with an aim for supply and distribution of water in Mumbai as well as supply of water to the various local authorities for distribution to villages and other small cities adjacent to Mumbai. This involved planning, operating, treating, maintaining, and distributing water resources in the country's urban centres and other areas mandated by Maharashtra Government. Its mission is "To provide sustainable water in a cost effective and environmentally friendly manner to the economy".

The government ensures that WUS does not take advantage of its monopoly position in the regional area by increasing prices. The government controls majority of services through its

water regulatory body which determines an acceptable margin level (ROCE) and ensures that the pricing of WUS within these areas does not break this level. The remaining work, i.e. a water bottle operation (WBO) is not regulated by the government and WUS charges a market rate for water supply in bottles. The regulator computes the return on capital employed (ROCE) of WUS based on its own valuation of the capital assets which are used in operation and the profit from those services.

The acceptable level of ROCE set by the regulator is 7.00%. If WUS breaches this level, then the company would be penalized. The WUS board is trying to improve the performance for the benefit of the shareholders. In order to communicate the objective of maximizing shareholders' wealth, the directors have decided to consider economic value added (EVA) as the key performance indicator.

Compute EVA of WUS based on the following information for the year ending 31 March 2024:

Particulars	**Water Distribution Operation (WDO)**	**Water Bottle Operation (WBO)**	**Total**
	₹ in Crore	**₹ in Crore**	**₹ in Crore**
Revenue	555.00	186.00	741.00
Less: Operating Cost	460.00	119.00	579.00
Operating Profit	95.00	67.00	162.00
Less: Finance Charges			46.00
Profit Before Tax			116.00
Less: Tax at 30%			34.80
Profit After Tax			81.20
Capital Employed		**2023-24**	**2022-23**
		₹ in Crore	**₹ in Crore**
Audited Accounts		1,616.20	1,495.00
Determined by the Regulator (for WDO Only)		1,558.00	1,422.00

Notes

1. Operating Costs includes:

Particular	**2023-24**	**2022-23**
	₹ in Crore	**₹ in Crore**
Depreciation	118	114
Provision for doubtful debts	4	1
Research and Development	24	–
Other non-cash items	14	12

2. Economic depreciation is ₹166 Crore in 2023-24. In FY 2022-23, economic and accounting depreciation were assumed to be the same.

3. Current year tax paid is ₹18 Crore and deferred tax provisions of ₹16.80 Crore has been adjusted. There was no deferred tax balance before 2023-24. The provision for doubtful debts was ₹9 Crore in the 2023-24 balance sheet.

4. Research and development has been non-capitalized. It belongs to a new project that will be developed over five years and is expected to be of long-term benefit to the company. 2023-24 is the first year of this project.

5. Cost of Capital

Equity	14%
Debt (Pre-Tax)	6%

6. Gearing of WUS

Equity	45%
Debt	55%

Required

(i) EVALUATE the financial performance of WUS using EVA.

(ii) ASSESS whether WUS complies with its acceptable ROCE level.

(iii) Advise on how to improve profitability.

5. Beta Control (BC) is a global leader in the manufacturing of commercial building control systems with over 250 distributors and many thousands of installations in more than 50 countries. Control systems involve air conditioning systems, facility management, energy and water management, access control and security controls etc. At BC, manufacturing is done at a number of factory sites where some products are easy and largely produced and have a long life while other products are intricated and have a short life due to changing technologies. BC's mission statement is 'to keep you ahead through control systems that improve productivity and save energy'.

A Newly appointed chief executive officer (CEO) is anxious about declining share price of BC in the last two years. She identified that the business has grown through acquisition and senior management have focused on making corporate deals but not on making control systems. She announced that the BC's focus must be on optimization and upgradation of its value generation rather than just getting bigger through acquisitions.

Assuming yourself as a performance management expert of BC, the CEO has asked you to aid her in her improvement programme. Firstly, she wants your views on the use of EVA as the key performance metric at BC. You are given the current EVA computation (Annexure1) but there is some suspicion about whether the assistant who has done this work is sufficiently well trained in this method. So, she requires you to examine his accuracy and the assumptions forming part of the calculation.

Required

Write a report to the chief executive officer to EVALUATE the usefulness of EVA as performance measure and accuracy of the calculation done by assistant apart the assumptions taken if any.

Annexure 1

NOPAT

Particulars	Year ended 31st March 2024	
	₹ in Lacs (L)	Notes
Operating Profit	1,102.80	
Add:		
Non-Cash Expenses	30.20	
Marketing Expenditure Capitalised	46.20	7
Less:		
Tax	269.60	9
Lost Tax Relief on Interest	48.96	
Net Operating Profit After Tax (NOPAT)	860.64	

Capital Employed

Particulars	Year ended 31st March 2024	
	₹ in Lacs (L)	Notes
From the Statement of Financial Position	4,802.00	10
Add:		
Marketing Expenditure Capitalized	46.20	7
Adjusted Capital Employed	4,848.20	

WACC = (1/2 × 15%) + (1/2 × 7.8%)

= 11.40%

EVA = NOPAT – (WACC × Capital Employed)

= ₹860.64 L – ₹4,848.20 L × 11.40%

= ₹860.64 L – ₹552.69 L

= ₹307.95 L

Assumptions and Notes

1. Debt/Equity 1:1
2. Cost of Equity is 15.00%

3. Cost of Debt (pre-tax) is 7.80%
4. Tax Rate is 30.00%
5. Interest charged in the period was ₹163.20 L.
6. In the current fiscal year, BC spent ₹80.00 L in Training and Development by leveraging the latest digital technologies including virtual classrooms to deliver highly relevant training to staff at the point of need.
7. Marketing Expenditure has been ₹46.20 L each year for the last two years to build the long- term brand.
8. The total R & D spending was ₹20 L during this year for in- depth study of the TCP/IP protocols. The TCP/IP based products have not been launched yet.
9. BC has paid Tax of ₹260 L while the tax charged per the accounts was ₹269.60 L.
10. Capital employed during the Period (from the statement of financial position):

Opening	₹4,564.00 L
Closing	₹4,802.00 L

Balanced Scorecard

6. Your Bank Ltd. was established on the 30th September, 1940 under the provisions of Co-operative Societies Act by the eminent professionals to encourage self-help, thrift, cooperation among members. Bank was issued Banking License under Banking Regulation Act, 1949 on October 25, 1986 to carry out the Banking Business within the national capital and since then the Bank has been growing continuously. At present, the Bank has a large number of membership of individuals from different sections. The Bank has 12 branches in the NCT of Delhi. Bank offers 'traditional counter service'. Opening hours are designed to coincide with local market days.

The Board of Directors were worried about the growing popularity of new style banks. These banks offer a diverse range of services such as direct access to executive management, a single point of contact to coordinate all banking needs, appointment banking to save time, free online banking services 24/7, free unlimited ATM access etc.

It has now been decided that the bank will focus on "What Customers Want" and will use a balanced scorecard to achieve this goal.

Required

PRODUCE, for each of the three non-financial perspectives of a 'Balanced Scorecard', an objective and a performance measure that the bank could use with appropriate reason.

7. B. Steels is a leading manufacturer of flat and long products and have state-of the-art plants. These plants manufacture value added products covering the entire steel value chain right from coal mining to manufacturing Pig Iron, Billets, HR Coils, Black Pipe/GI Pipe, Cable Tapes etc. conforming to international standards. The rock-solid foundation combined with nonstop upgradation and innovation has enabled B. Steels to surpass its goals constantly. Its vision

and values for sustainable growth are balancing economic prosperity and social equality while caring for the planet. It is preparing its balanced scorecard for the year 2023-24. It has identified the following specific objectives for the four perspectives.

▪ Improve post-sales service	▪ Improve employee morale	▪ Improve employee job satisfaction
▪ Increase gross margin	▪ Increase number of customers	▪ Increase profitability of core product line
▪ Increase plant safety	▪ Increase customer retention	

B. Steels has collected Key Performance Indicators (KPIs) to measure progress towards achieving its specific objectives. The KPIs and corresponding data collected for the year 2023-24 are as follows:

Key Performance Indicator	Goal	Actual
Average replacement time (number of days)	2	1.5
Gross margin growth percentage	15%	16%
Number of customers	15,000	15,600
Number of plant accidents	0	2
Percentage of repeat customers	83%	81%
Core product line profit as a percentage of core-product line sales	5%	4.4%
Employee turnover rate (number of employees leaving/ Average number of total employees)	2%	3%
Employees satisfaction rating (1-5, with 1 being the most satisfied)	1	1.2

For preparation of Balanced Scorecard report, the following format has been developed:

B. Steels Balanced Scorecard Report For the year ended March 31, 2024					
Perspective	**Objective**	**KPI**	**Goal**	**Actual**	**Goal Achieved (Yes or No)**
Financial	×	×	×	×	×
Customer	×	×	×	×	×
Internal Business Process	×	×	×	×	×
Learning and Growth	×	×	×	×	×

Required

(i) PREPARE a balanced scorecard report using the above-mentioned format. Place objective under the appropriate perspective heading in the report. Select a KPI from the list of KPIs that would be appropriate to measure progress towards each objective.

(ii) B. Steels desires to integrate sustainability and corporate social responsibility related KPIs in their balance scorecard to adhere vision and values. ADVISE B. Steels, using TBL framework.

8. History

In 2012, Luxo had a monopoly in the eyewear market of America, but the problem with the company was that it was selling a variety of eyewear, by putting a big price on it. At present, there is almost nothing that you can't buy online, but at that time there were limited things that you could order online. In 2012, **Arby Signer** Inc. launched a website to sell eyeglasses online. Selling eyewear online and competing with Luxo was a challenge for Arby. Within just 4 years Arby broke the monopoly of Luxo and captured the major market of America. People find it really convenient to buy sunglasses and glasses online and get delivery at doorstep. Following the footstep of Luxo, Arby eliminated the middleman from the manufacturing process, launched its own optical lab to have its own manufacturing process. The range of products/services offered by Arby which make different from Luxo include easy buying process, delivery at doorstep, stylish glasses, customize eyewear glasses, products was sold on the site at very affordable, with a starting range of just $95 etc.

Mission, Vision & Objectives

Mission	*"Improving people's lives with our health care products in a socially cognizant way"*
Vision	*"To be a trusted health care partner"*
Objective	*"To offer people designer eyewear at a revolutionary price"*

As a mission- based brand, Arby needed a way to instill in their team of employees a passion for the mission. Arby let their employee know 'what they value' and 'what the employee should value' in 'who they are'. This is important to setting up 'what they do' and 'why they do it' as a core foundation of their brand story. Arby also contributes to philanthropic *work*; it inspires the people with its mission. For every pair of glasses customer pays, Arby donates a pair of glasses to needy person. In December 2023, Arby reported the donation of 9,60,000 pairs of eyeglasses. The company also claims to be 90% carbon neutral.

Extracts from the Balanced Scorecard

Performance Measure	2023 Actual	2023 Target
Financial perspective		
Return on capital employed (ROCE)	13%	14%
Net income	$95 Millions	$89 Millions
Customer perspective		
Number of first-time buyers	1,20,000	1,00,000
Customer retention ratio	78%	75%
Number of complaints (per 1,000 customers)	1.5	2
Number of glasses donated to needy people	9,60,000	9,00,000
Internal processes		
Number of business processes re-engineered	110	100
Number of new services made available through online application	2	4
Incidences of fraud on customers' accounts (per 1,000 customers)	3	10
Total CO_2 emissions (tons)	850	1,100
Learning and growth		
Number of employees trained to instruct retailers	1,000	1,050
Number of hours (paid for) used to support social plans	10,200	10,000
Number of trainee positions from rural areas	189	200

Other Information

Arby Signer has recently invested heavily in IT security to prevent fraud.

Required

EXAMINE the performance of The Arby Signer in 2023.

Triple Bottom Line (TBL)

9. Caregiver Ltd. is a multi-specialty hospital in a mid-sized town. A 300+ bedded facility offers treatment across all medical disciplines of Cardiac, Oncology (Medical, Surgical and Radiotherapy), Neurosciences, Urology, Nephrology, Kidney Transplant, Aesthetics and Reconstructive Surgery, and other ancillary services. Most of the community members have their livelihood linked with the hospital. Many of them are directly employed at the hospital as doctors, nursing staff, lab technicians or as other support staff. While others are indirectly related as suppliers of medical devices or drugs to the hospital, catering or housekeeping contractors etc. for the hospital. Hence, the existence of the hospital is vital to the community.

Growing awareness about sustainable business prompted the management to identify areas that can help the hospital operate in a sustainable manner that would be mutually beneficial to the organization as well as the town that depends on it. Therefore, it has identified the initiatives that have been put in place to create a sustainable business. Information captured from various departments are being considered to prepare the Triple Bottom Line (TBL) report that is for the consumption both to internal and external stakeholders.

Required

IDENTIFY, which of the following aspects need to be reported in the TBL report and under which of the three categories. Provide reasons for classifying the aspect under a specific category, if applicable.

(i) Medical staff conduct charity camps every month. Open to all members of the community, who are provided with consultation free of charge.

(ii) Prompt and accurate tax payments based on records maintained without errors or fraud.

(iii) Caregiver, with the help of traffic police, has implemented a "green corridor" for ambulances that carry donor organs for transplantation. Organs harvested from the donor at one hospital can reach another hospital with the recipient patient at the earliest.

(iv) Medical waste is discarded at a landfill in a nearby dumpsite. Some of the waste are not bio-degradable.

(v) During review of the supplier for housekeeping service, it was observed that the service provider resorted to child labor to keep cost of operations lower.

(vi) Training and professional development programs doctors and nurses.

(vii) Lab reports are being made available online within the hospital computer system. This would reduce printing costs and storage space needed to maintain older records.

(viii) Caregiver has a good track record of having no medical negligence litigation cases filed against it.

(ix) The hospital is planning to market medical check-up packages so that facilities in its out-patient department can be utilized better.

(x) The number of inpatient hospital deaths decreased 8%, from 776 in 2022 to 715 in 2023.

Assume all aspects are material enough to be reported in the TBL report.

ANSWERS/ SOLUTIONS

1. (i) Calculation of last year ROI of Division II

= Controllable Profit/ Controllable Net Asset

= ₹16,80,000/ ₹52,50,000

= 32%

(ii) Calculation of ROI of New Product Line

Particulars	Amount (₹)
Sales	90,00,000
Less: Variable Cost	58,50,000
Controllable Contribution	31,50,000
Less: Fixed Cost	25,20,000
Controllable Profit	6,30,000
Investment Available	30,00,000
Return on the Proposed Line (ROI)	**21%**

The manager of Division II will reject the investment proposal (Invest additional ₹30 lacs in new product line) because this would decrease Division II's ROI of 32% to 28%*.

(*) 28% = (₹16,80,000 + ₹6,30,000) / (₹52,50,000 + ₹30,00,000)

Note *– Divisional performance measures have certain issues, one among them is lack of goal congruence between divisions and organisation as a whole. The divisional managers are forced to choose between the best interests of their division (because their individual performance is linked to division performance) and the best interests of the company as a whole. It is obvious, a manager who is evaluated based on ROI will reject any project whose rate of return is below the division's current ROI even if the rate of return of the project is above the company's minimum required rate of return. In present case too investment proposal with ROI of 21% which above organisation wide ROI i.e. 18%. This will give birth to situation of* ***sub-optimisation****.*

(iii) RI is capable of overcoming the inherent shortcoming of ROI. If divisional managers are evaluated using residual income, then every such investment proposal will be acceptable whose rate of return is above the minimum required rate of return, because it will increase their residual income. Hence if decision is based upon RI rather ROI, division II will accept the proposal to invest additional capital of 30 lacs, because it will fetch them 21% which more than 18% the required rate of return; in the best interest of the company as a whole because capable to add ₹ 90,000 each year for next 5 year to profit of company.

Working Note – Calculation of RI for division II (from proposed investment).

Particulars	Amount in ₹
Controllable Profit	6,30,000
Cost of Capital (18%)	5,40,000
Residual Income (RI)	**90,000**

Note *– Where RI is capable of overcoming the sub optimisation but has its own shortcomings. Being an absolute measures RI is not capable of comparing the performance of divisions which are different in size.*

Alternative

To overcome the dysfunctional consequences of ROI, the residual income approach can be used. For the investment decision for Divisions II, the residual income calculations are as follows:

Proposed Investment	₹ 30,00,000
Controllable Profit	₹ 6,30,000
Cost of Capital (18%)	₹ 5,40,000
Residual Income (RI)	**₹ 90,000**

Advise

This calculation indicates that the residual income of Division II will increase if the manager accepts the project. However, it is important to note that Residual Income does not always point to the right decision, because notional interest on accounting capital employed is not the same as IRR on cash investment.

This Project has 1.65% IRR.

Overall, Residual Income is more likely than ROI to improve when managers make correct investment decisions, and so is probably a 'safer' basis than ROI on which to measure performance.

2. (i) ROI

Division 'Y'

Controllable Profit = ₹5,290K

Net Assets = ₹19,520k + ₹4,960K – ₹5,920K = ₹18,560K

ROI = 28.50%

Division 'D'

Controllable profit = ₹3,940K

Net Assets = ₹29,960K + ₹6,520K – ₹2,800K = ₹33,680K

ROI = 11.70%

Responsibility accounting advocates that manager's performance shall be judged based upon how well he or she manages the items under his or her control, hence in computation of ROI of both division, *controllable profit* has been taken into consideration, because head office costs are not controllable by divisional managers. Figures of Non-current and current assets apart from the current liabilities have been taken into consideration as they are such items over which divisional managers have complete control.

(ii) Bonus

Bonus to be paid for *each whole percentage point* is ₹21,600 (₹7,20,000×3%), But there is ceiling limit as well, i.e. 20% of salary hence the maximum Bonus will be ₹1,44,000 (₹7,20,000 × 20%).

Division 'Y'

Divisional ROI is 28.5%, which results in 16 whole percentage points above the minimum required ROI of 12%. Hence the bonus according to each whole percent of excess ROI will be ₹3,45,600 (16 × ₹21,600). But there is upper cap of ₹1,44,000 Therefore HAI will be paid the bonus of ₹1,44,000.

Division 'D'

Divisional ROI is 11.7%, since same is less than the minimum required ROI of 12%, hence FAI will not be rewarded with a bonus.

(iii) Discussion

FAI will not receive any bonus since he has not earned any point above minimum percentage. This is due to the larger investment base on which the ROI figure has been computed. Total investment of Division 'D' is almost 1.81 times to that of Division 'Y'. The major reason behind this is that Division 'D' invested ₹13.6 million (₹13,600K) in new equipment during the year. Ignoring this investment of division D is just 1.1. times to that of division Y and net Investments would have been only ₹20,080K and the ROI for Division 'D' would have been 19.62% resulting in payment of a bonus ₹1,44,000 (7 × ₹21, 600 i.e. ₹1,51,200 but subject to upper cap of ₹1,44,000) rather than the nothing. So, FAI is being penalized for making investment decisions which are in the best interests of his division and company, because new investment enhance productivity which will support customer loyalty, dedication to customer services and quality, the CSFs for BYD. It is very surprising that he decided to invest where he knew that he would receive a lesser bonus subsequently. On the other hand, HAI has benefited from the fact that he has not invested in anything even though it was needed for computer system updation. This is an example of sub-optimal decision making.

Further, Division 'Y''s trade payables are more than double those of Division 'D'. In part, one would expect this due to higher sales (almost 66% more than Division 'D') and low cash levels at Division 'Y'. Higher trade payable leads to a reduction in net assets figures. The fact that BYD is rewarding HAI with a bonus, even though relationships with suppliers may be badly affected, is again a case of sub-optimal decision making.

If the profit margin (excluding head office cost) as percentage of sales is calculated, it comes to 18.24% (₹5,290 / ₹29,000) for division 'Y' and 22.64% (₹3,940 / ₹17,400) for division 'D'. Therefore, it can be seen that division 'D' is performing better if capital employed is ignored. ROI is simply distorting the division 'D''s performance.

FAI might feel extremely disappointed by getting nothing and in the future, he may opt to postpone the investment to increase the bonus. Non- investing in new technology and equipment will mean that the BYD will not be kept updated with industry changes and its overall future competitiveness will be affected.

Briefly, the use of ROI results in sub-optimal decision making and a lack of goal congruence i.e. what is good for the managers is not necessarily good for the company too and vice versa. Hence ROI is not a justifiable basis to for computing the bonuses of divisional managers and also cause problem for BYD.

3. Conventionally X Greetings considered EPS and Share Price as performance measure, but management has shown interest in using EVA as performance measure now.

EPS - The performance of X Greetings has gone down since earnings per share is down by 15.03% (WN2) from last year. This indicates the company is not performing well and it is not in the favor of investors to continue with their investment in X Greetings or invest further.

Share Price and Index - However, the share price seems relatively better than that of the sector and stock market as whole. The share price of X Greeting declined by 7.79% in comparison to 17.97% decline in retailing sector index and 22.49% decline in Stock Market all-share index (WN3). The sector comparison is relevant for determining the performance of X Greetings rather stock market all-share index. According to this measure, the performance of X Greetings is acceptable, because it registered comparatively less destruction of market cap.

This implies that the within retailing sector X Greetings is seen as company with better prospects and this will encourage the shareholders to continue to hold their shares in the company.

EVA - X Greetings has generated positive EVA KRW 37.03 million during 2023-24 and same is less than what it earns during year ago (KRW 53.96 million) (WN1). No doubt EVA falls by around 31% over a year, but it is still positive; means value is generated. Hence performance is acceptable.

To Conclude, even in the bearish market X Greetings is capable to generate value for fund providers including shareholders hence performance of X Greetings is acceptable can be consider as good investment option.

Working Note-1 (EVA)

EVA calculations for the periods given are:

Particulars	2023-24 KRW in million	2022-23 KRW in million
Profit after interest and tax	55.55	65.38
Add Back: Interest (net of tax at 30%)	10.92	5.60
Net operating profit after tax (NOPAT)	66.47	70.98
Opening Capital employed	273.58	198.40

Assumptions

- There are no non-cash expenses to adjust the profit.
- Economic depreciation and accounting depreciation are equal.
- No lease exists for capitalisation.

Cost of Capital

WACC $_{2023\text{-}24}$ = 0.60 × 14.20% + 0.40 × 5.60%

= 10.76%

WACC $_{2022\text{-}23}$ = 0.60 × 11.50% + 0.40 × 4.20%

= 8.58%

EVA = NOPAT – Capital Employed × WACC

EVA $_{2023\text{-}24}$ = 66.47 m – 273.58 m × 10.76%

= KRW 37.03 m

EVA $_{2022\text{-}23}$ = 70.98 m – 198.40 m × 8.58%

= KRW 53.96 m

Working Note-2 (EPS)

Particulars	2023-24	2022-23	Change
EPS	KRW 17.36	KRW 20.43	-15.03%

Working Note-3 (Index and Share Price Movement)

Particulars	2023-24	2022-23	Change
KOSPI (capitalization-weighted index of *all common shares*)	1,985	2,561	-22.49%
Retailing sector index	1,155	1,408	-17.97%
X share price	KRW 22.50	KRW 24.40	-7.79%

4. (i) Computation of NOPAT

Particulars	₹ in Crore
Operating Profit	162.00
Add:	
Non-Cash Items	14.00
Accounting Depreciation	118.00
Doubtful Debts	4.00
Research and Development	24.00
Less:	
Economic Depreciation	166.00
Tax Paid	18.00
Tax Saving on Interest (₹46 × 30%)	13.80
NOPAT	124.20

Computation of Capital Employed

Particulars	₹ in Crore
Capital Employed as on 31.03.2023	1,495.00
Add:	
Provision for Doubtful Debt as on 31.03.2023 (i.e. ₹9 - ₹4 crore)	5.00
Other Non-Cash Items (incurred in 2022-23)	12.00
Adjusted Opening Capital Employed	1,512.00

WACC = 0.45 × 14% + 0.55 × 6% × (1 – 30%)

= 8.61%

EVA = NOPAT – (WACC × Capital Employed)

= ₹124.20 – (8.61% × ₹1,512)

= ₹124.20 – ₹130.18

= – ₹5.98 Crores

Evaluation

Presently, WUS is distorting value as it is not able to meet the economic cost of its own capital. This put the company into the question of perpetual succession and lead the company against shareholder's interest. The reason could be the higher cost of equity for WUS. The investment risk should be low since 75% of the services that the company renders are important for the economy and demand is guaranteed in future. Optionally, WUS needs to either increase its NOPAT enough to break even on economic value added or slash its capital employed by selling unutilized or under-utilized assets.

(ii) Regulatory ROCE: Target 7.00%

$$\text{ROCE} = \left(\frac{\text{Operating Profit}}{\text{Capital Employed}}\right) \times 100.00\%$$

$$= \left(\frac{95}{1,422}\right) \times 100\%$$

$$= 6.68\%$$

The ROCE is within the acceptable ROCE of 7.00%.

(iii) *Operating Margins*

Water Distribution Operation = 17.12%

Water Bottle Operation = 36.02%

Advise

Operating margin from WBO is 36.02% compared to 17.12% (WDO). WUS may use the WDO activities as a trusted source of cash profit to reinvest in expansion of the WBO. Expansion through acquisition of appropriate non-regulated businesses using the cash generated by the regulated activities might be a good decision.

Further, WUS may improve profitability by controlling costs within WDO activities through performance measurement. The regulatory body cannot argue that the company is overcharging its customers to increase the profit margin. This is possible through strict observance of expenses and using cost savings techniques through efficiency improvements. In order to control costs within WDO, targets should be based on minimal variances and adopting cost cutting methods.

Overall, In WDO, there is only a limited scope for increase in the operating profit since the maximum operating profit allowed is ₹ 99.54 crore i.e. 7.00% of ₹ 1,422 crore of capital employed. Thus, WUS should go to expand its WBO as this is producing higher operating profit margins.

5. Report

To: CEO, Beta Control

From: Performance Management Expert

Date: 31st May 2024

Subject: Evaluation of EVA at Beta Control

EVA provides a link between decisions, performance measures and rewards, which focuses managers on performing better. Incentive schemes based on EVA provide better quality information and motivation in making decisions which in turn maximise shareholders' wealth. In other words, EVA links the operating returns to the assets that were used to generate those returns. The learning which flows from EVA analyses can be perceptive and can allow the manager not only to identify areas of weakness in performance but also to easily find solutions. BC is a multiproduct company having a number of factory sites. EVA can help to appraise divisional contributors to, or detractors from, overall profitability. Thus, managers may be educated through EVA and pursue such objectives that improve operating profits investing more capital.

In addition, this report deals with evaluation of the accuracy and assumptions used in the calculation of BC's EVA. There are many errors in the present calculation of EVA. These have been discussed below and revised calculations are enclosed.

- Non-Cash Expenses have been correctly added back to the profit as these are expenses which do not affect the cash flow of a given period.
- Addition back of Marketing Expenditure is also correct as spending contributes to *future value-creation*. For the same reason, the *prior year's spending* is also added into the capital employed.

- Training and Development Expenses should be capitalised. Training and Development Expenses have been treated as an expense in the income statement, they should be added back to profit, and added to capital employed (at the end of the year).
- Research and Development (R & D) Expenses should be treated as marketing expenditure for a long period.
- The tax expenses in the EVA calculation should be the tax *paid* with adjustment for lost tax relief on interest and not the adjusted amount of tax *charged* in the accounts.
- The WACC is incorrect because it should be based on post-tax cost of debt.
- Generally, a company takes at least a year's time to earn a return on its investment. Thus, the capital employed figure should be based on the beginning numbers.

NOPAT

Particulars	Year ended 31st March 2024
	₹ in Lacs
Operating Profit	1,102.80
Add:	
Non-Cash Expenses	30.20
Marketing Expenditure Capitalised	46.20
Training & Development Expenses	80.00
R & D Expenses	20.00
Less:	
Tax	260.00
Lost Tax Relief on Interest	48.96
Net Operating Profit After Tax (NOPAT)	970.24

Capital Employed

Particulars	₹ in Lacs
From the Statement of Financial Position (Starting)	4,564.00
Marketing Expenditure Capitalized	46.20
Adjusted Capital Employed	4,610.20

WACC = (1/2 × 15%) + (1/2 × 7.8% × 70%)

= 10.23%

EVA = NOPAT – (WACC × Capital Employed)

= ₹970.24 L – ₹4,610.20 L × 10.23%

= ₹498.62 L

The recomputed EVA has increased from ₹307.95 Lacs to ₹498.62 Lacs, which shows a positive position for BC as it adds up the shareholder's wealth.

For calculating NOPAT, following most common adjustments to accounting profit as remarked by the Stern Stewart has been considered.

- For Advertising, Research and Development Items expensed, Staff Training
  - Impact on Profit: Increase CY's profit, deduct economic depreciation on PY's EVA adjustment.
  - Impact on Capital Employed: Increase capital employed at the end of the year, increase capital employed in respect of similar add backs of PY's investments not treated as such in financial statements (net of economic depreciation).
- For Depreciation
  - Impact on Profit: Add accounting depreciation and subtract economic depreciation.
  - Impact on Capital Employed: Alter value of non-current assets (and capital employed) to reflect economic depreciation not accounting depreciation.
- For Non- Cash Expenses
  - Impact on Profit: Add back to profit.
  - Impact on Capital Employed: Add to retained profits at the end of the year.
- For tax charge, this will be based on 'cash taxes' rather than the accruals-based methods used in financial reporting.

Further, the revised calculation of EVA is largely based on the following assumptions:

- There is an implicit assumption that accounting depreciation (included in operating profit) is equivalent to economic depreciation (which should be used for EVA calculations). This assumption is doubtful, although there is no information for more accurate calculation.
- For Additional Marketing Expenditure, no estimation of economic life (expected period during which an asset remains useful) in building the brand and corresponding economic depreciation has been considered in the above calculation.
- No amortisation of the R & D Costs is required to be recognised as the product has not been introduced yet. This is in line with the accounting treatment of such items. There was no Research & Development expenditure in the previous year.

6. Internal Business Process Perspective

Objective: Cross-sell Products

Measure: Products Purchased *per customer*

Reason: Cross-selling, or encouraging customers to purchase additional products e.g. insurance, forex etc. is a *measure of customer satisfaction*. Only if a service is perceived as highly satisfactory the service would be repeated/ additional products or services would be accepted.

Learning and Growth Perspective

Objective: Increase the Number of New Products or Services Sold

Measure: Number of Customers Buying the New Products/ New Services

Reason: Long-term financial success requires banks to create new products / services (e.g. internet banking, ATM access) that will meet emerging needs of current / future customers such as 24/7 banking.

Customer Perspective

Objective: Increase Customer Loyalty

Measure: Number of Accounts Closed or Closure Request Received

Reason: Customer loyalty describes the extent to which a bank maintains durable relations to its customers. The share of existing customers should have a high importance as it indicates about image and reputation. Closure request is not a good sign for the bank. Bank should investigate reasons for the same and take appropriate actions to improve services offered to retain customers.

Other **Objectives** and **Measures** are also possible, but they must relate to the bank's **Goal**.

7. (i)

B. Steels
Balanced Scorecard Report
For the year ended March 31, 2024

Perspective	Objective	KPI	Goal	Actual	Goal Achieved (Yes or No)
Financial	Increase Gross Margin	Gross margin growth percentage	15%	16%	Yes
	Increase Profitability of Core Product Line	Core product line profit as a percentage of core product line sales	5%	4.4%	No
Customer	Increase number of customers	Number of Customers	15,000	15,600	Yes
	Increase customer retention	Percentage of repeat customers	83%	81%	No
Internal Business Process	Improve post sales service	Average replacement time (number of days)	2.0	1.5	Yes
	Increase plant safety	Number of plant accidents	0	2	No
Learning and Growth	Improve employee job satisfaction	Employees satisfaction rating *(1-5, with 1 being the most satisfied)*	1	1.2	No
	Improve employee morale	Employee turnover rate *(Number of employees leaving/ Average number of total employees)*	2%	3%	No

(ii) "**Triple Bottom Line"** concept encourages companies to measure not only their *financial profits*, but also the impact that its operations have on the *society* and *environment*. Therefore, this framework measures the full cost of doing business by measuring the following bottom lines (i) Profit (ii) People and (iii) Planet.

Diminishing non-renewable resources have forced businesses to focus on *sustainable manufacturing*. This term refers to managing manufacturing processes such that they *minimize any negative impact on the environment* by conserving energy and natural resources. In many instances, improved operational efficiency not only reduces waste (thereby costs) but also improves product safety, it strengthens the *brand's reputation* and builds *public's trust* about the company. As a long- term strategy, this improves *business viability* and provides a *competitive edge* to the company. This concept is the "**Planet Bottom Line**" within the Triple Bottom Line framework. Metrics on the following aspects may be investigated to find out the *environment impact* of business operations:

- Material consumption.
- Energy consumption.
- Water utilization.
- Emissions, treatment of effluents and waste (emissions affecting air, water, and land).
- Fuel consumption by tracking freight and transportation costs.
- Land utilization.
- Recyclability and disposal of product.

"Corporate Social Responsibility" enables the company to become conscious of the impact its operations have *on society*. CSR programs, through philanthropy and volunteer efforts can forge a stronger bond between *itself*, *its employees*, and the *wider community*. Again, this improves both the *brand image* as well as builds *the public's trust* about the company. This concept is the **"People Bottom Line"** of the Triple Bottom Line framework. Metrics on the following aspects maybe investigated to find out the *social impact* of business operations:

- Workplace environment and labour relations.
- Occupational health and safety, accident rates.
- Human rights practices – child labour, employee work-place security policies.
- Training and education.
- Equal opportunity employer – diversity of workforce and opportunities available for employees' growth.
- Suppliers – local sourcing versus sourcing from external markets.
- Philanthropy and volunteer programs organized.
- Product safety in terms of customer health and safety.
- Pricing of essential products to enable wider reach within society.
- Transparent and ethical business practices.

B. Steels can study these aspects, determine the relevant metrics, and prepare periodic KPI reports that can help in measuring responsibilities towards sustainability and social impact.

8. The balanced scorecard approach looks at both financial performance and non-financial performance. In order to gain competitive advantage, organizations have to be conscious of the needs and convenience of their customers. The Arby signer has a vision and strategy which goes far beyond just making money. They want to help the community and give something back to customers also. Hence, performance measures which address whether the Arby is being successful in pursuing their vision has been incorporated in Balanced Scorecard. The performance of the Arby will be considered under each of the titles used in the balanced scorecard:

Financial Perspective: The Arby has had a year of diverse achievements when looking at the extent to which it has met its financial targets. Its ROCE shows how efficiently it has used its assets to generate profit for the business. The target for ROCE for the year was 14% but it has only achieved 13% return. Arby's Net Income, however, was in fact $6 million higher than its target, which is good. The most likely reason for the under-target ROCE is possibly the investment which Arby has made in IT security. Whilst this may have reduced ROCE, this investment is essentially a good idea as it helps Arby to pursue its mission and will keep customers happy.

Customer Perspective: Regarding its customers, Arby's performance is better in the current year. It has not just exceeded its target sales to first-time buyers by 20,000 but also improved its customer retention ratio, which is good for the company to pursue its vision of being a trusted healthcare partner.

Customers' complaints have reduced from 2 complaints to 1.5 complaints for every 1,000 customers, the exact reason is not clear, but it might be because of improved processes and the team efforts of employees.

Also, the number of glasses donated exceeded the target. It shows that the company has exceeded its target of helping people, which is good for the company's reputation.

Internal Processes: The number of business processes within Arby re-engineered has exceeded the target, which is very good and the impact of which may be reflected in the lowering of the level of customer complaints. Likewise, the investment to improve IT security has been a great success, with only three incidences of fraud per 1,000 customers reported compared to the target of 10. However, only two new services have been made available via online application, instead of the target of four, which is unsatisfactory. But fortunately, its CO_2 emission is below the target level.

Learning and Growth: Arby has succeeded in training its employees to instruct retailers. However, the number of employees trained to instruct retailers are comparatively lesser than targeted, shortfall in training of employees to give instruction to retailers may have an impact on the Arby's failure to meet its target of market expansion.

The number of hours (paid for) used to support social plans are comparatively higher, it results in additional costs which could have contributed to the fact that the Arby did not quite meet its target for ROCE. Further, company has not met aim for helping the rural area as targeted. This may be because the number of candidates applying from these areas was not as high as planned and this situation is beyond the company's control.

In general, the Arby Signer had a successful year, meeting many of its targets.

9. Aspects that need to be reported in the TBL report:

S.N.	Aspect	Category on the TBL Report
(i)	Medical staff conduct charity camps every month. Open to all members of the community, who are provided with consultation free of charge.	**Social bottom line**, as it benefits the local community.
(ii)	Prompt and accurate tax payments based on records maintained without errors or fraud.	**Economic bottom line**, since tax payments impact an organization's bottom line and money flow.
(iii)	Caregiver, with the help of traffic police, has implemented a "green corridor" for ambulances that carry donor organs for transplantation. Organs harvested from the donor at one hospital can reach another hospital with the recipient patient at the earliest.	**Social bottom line,** since green corridor would unable the ambulance to transport harvested organs between the hospitals at the earliest this would be beneficial for patients in need of critical care.
(iv)	Medical waste is discarded at a landfill in a nearby dumpsite. Some of the waste are not bio-degradable.	**Environmental bottom line**, as it affects the ecological surroundings of the town.
(v)	During review of the supplier for housekeeping service, it was observed that the service provider resorted to child labor to keep cost of operations lower.	**Social bottom line**, since employing child labor leads to exploitation of children within the community.
(vi)	Training and professional development programs doctors and nurses.	**Social bottom line**, since it contributes towards employee development.
(vii)	Lab reports are being made available online within the hospital computer system. This would reduce printing costs and storage space needed to maintain older records.	**Environmental bottom line**, since paper, cartridge and storage requirement would be lower. This preserves environmental resources.
(viii)	Caregiver has a good track record of having no medical negligence litigation cases filed against it.	**Social bottom line**, since this is an indicator of the quality of services provided to patients.
(ix)	The hospital is planning to market 'medical check-up packages' so that facilities in its outpatient department can be utilized better.	Not relevant to TBL report. This is a marketing strategy to improve profitability (alternatively, Economic bottom line).
(x)	The number of inpatient hospital deaths decreased 8%, from 776 in 2022 to 715 in 2023.	**Social bottom line**, since hospital mortality rate measures the clinical quality.

NOTES

TEST YOUR KNOWLEDGE- CASELET BASED MCQS

ABC Healthcare is a non-profit organization that provides medical services to the underprivileged population of a developing country. The organization was established 10 years ago and has been successful in providing quality healthcare services to thousands of people who cannot afford private healthcare. ABC Healthcare places great importance on value for money, which is reflected in the efficient use of resources and effective delivery of healthcare services. The organization implemented several measures to ensure that it is providing value for money, including:

- *ABC Healthcare implemented a cost-effective model for healthcare delivery, which allowed it to keep the costs of medical services low. In addition, ABC negotiated discounted rates with the suppliers for medical equipment and supplies, enabling it to reduce its operating costs.*
- *ABC Healthcare created a streamlined healthcare delivery process to reduce wait time and ensure that patients receive prompt and efficient medical attention. Further, ABC introduced a digital medical records system to reduce paperwork and administrative cost.*
- *ABC Healthcare appointed a team of highly qualified and experienced medical professionals, ensuring that patients receive quality medical care. Further, ABC was also engaged in various preventive healthcare programs to reduce the incidence of diseases.*

  Recently, ABC has entered into various agreements with several international organizations, enabling it to provide specialized medical services to patients with complex medical conditions.
- *ABC Healthcare provided scholarships to 100 medical students in the past year, ensuring that there is a pipeline of highly qualified medical professionals to serve the population in the future. In the same year, ABC Healthcare served more than 50,000 patients.*
- *ABC Healthcare operates with the highest ethical standards, ensuring that patient privacy is protected and that medical procedures are conducted in a safe and responsible manner. For this, ABC Healthcare established a code of conduct for all employees, ensuring that they uphold ethical principles in all aspects of their work.*
- *ABC Healthcare provides medical services to all patients, regardless of their ability to pay, ensuring that everyone has access to quality healthcare services. In last year, ABC conducted several community outreach programs, to provide medical services to underserved populations in rural areas.*

Required

MCQ 1

What is an example of an "efficiency" measure in ABC Healthcare?

Options

a. Streamlining healthcare delivery processes

b. Hiring highly qualified medical professionals

c. Establishing partnerships with international organizations

d. Providing medical services to all patients, regardless of ability to pay

Key – a

Reason – Streamlining healthcare delivery processes relates to 'efficiency' measure. It relates to high productivity.

MCQ 2

What is an example of an 'economy and efficiency' measure in ABC Healthcare?

Options

a. Specializing in complex medical conditions

b. Hiring highly qualified medical professionals

c. Implementing a digital medical records system

d. Providing medical services to all patients, regardless of ability to pay

Key – c

Reason – Implementing the digital medical records system will not only reduce paperwork (i.e., increase in efficiency), but also administrative costs (i.e., bring economy).

MCQ 3

Which of the following is NOT related to 'effectiveness' measure in ABC Healthcare?

Options

a. Programs to reduce the incidence of diseases

b. Specializing in complex medical conditions

c. Hiring highly qualified medical professionals

d. Streamlining healthcare delivery processes

Key – d

Reason – Streamlining healthcare delivery processes relates to 'efficiency' measure. It relates to high productivity. All others relate to the valued outcomes.

MCQ 4

Which of the following measures has ABC Healthcare implemented to ensure 'economy'?

Options

a. Established a team of highly qualified medical professionals

b. Negotiated discounted rates with suppliers for medical equipment and supplies

c. Conducted community outreach programs

d. Implemented a code of conduct for employees

Key – b

Reason – Negotiated discounted rates with suppliers for medical equipment and supplies related to 'economy'. Economy refers to obtaining the appropriate quantity and quality of resources at the lowest cost possible.

MCQ 5

How has ABC Healthcare established 'ethics' in its operations?

a. By providing medical services to underserved populations in rural areas

b. By implementing community outreach programs

c. By establishing a code of conduct for all employees

d. By implementing preventive healthcare programs

Key – c

Reason – ABC Healthcare established a code of conduct for all employees, ensuring that they uphold ethical principles in all aspects of their work.

TEST YOUR KNOWLEDGE

Performance Measurement in the Not-for-Profit Sector

1. West Coast community operates Homelessness Services (HS) on a not-for-profit basis as a local solution to local housing needs. The primary objective is to meet the accommodation needs of persons within its locality targeting those living in the low/middle income groups and senior citizens. Accommodation is basically furnished; it consists of a small house, with kitchen, bathroom, bedroom/(s), and a sitting room. HS manages 450 such houses across various localities. Exclusive Services (ES) is a profit-seeking organisation which provides rented accommodation to the public. ES manages 200 such houses across localities similar to HS' operations.

Income and Expenditure accounts for the year ended 31st March 2021 were as follows:

	HS (₹)	ES (₹)
Rent Received	1,02,98,600	1,09,98,000
Less:		
Employee Costs	24,00,000	38,00,000
Planned Maintenance and Substantial Repairs	34,19,500	10,41,000
Running Repairs	23,91,600	6,38,000
Miscellaneous Operating Costs	15,27,500	11,75,000
Insurance, Property Taxes, and Interest etc.	13,15,500	18,75,000
Operating (Deficit)/ Surplus	(7,55,500)	24,69,000

Operating Information in respect of the year ended 31st March 2021 was as follows:

House and rental information:

Size of House	Number of Houses		Rent per Week (₹)	
	HS	ES	HS	ES
1 Bedroom +	40	20	400	750
2 Bedrooms +	80	40	450	800
3 Bedrooms +	250	140	500	1,175
4 Bedrooms +	80	Nil	700	N.A.

HS had certain houses that were unoccupied during part of the year. The rents lost as a consequence of unoccupied properties amounted to ₹18,17,400. ES did not have any unoccupied houses at any time during the year.

Employees were paid as follows:

Number of Staff		Salary per Staff Member (₹) per annum	
HS	ES	HS	ES
1	2	3,00,000	5,00,000
2	2	2,50,000	3,00,000
4	11	2,00,000	2,00,000
8	-	1,00,000	-

Planned maintenance and substantial repairs undertaken:

Nature of Work	Number of Houses		Cost per House (₹)	
	HS	ES	HS	ES
Miscellaneous Building Work	10	-	12,500	-
Sanitary Fittings (Kitchen + Bathroom) [all are the same size]	45	5	26,100	52,200
AC Upgrades/ Replacements	8	-	15,000	-
Replacement of Wooden Structure for 3-Bedroomed Houses	50	13	40,000	60,000

Running Repairs Information:

Classification of Repair	Number of Repair Undertaken		Total Cost (₹)
	HS	ES	HS
Emergency	480	160	6,72,000
Urgent	990	376	11,28,000
Non-urgent	560	102	5,91,600

Each repair undertaken by ES costs the same irrespective of the classification of repair.

Required

(i) Critically EVALUATE how the management of Homelessness Services could measure the 'Value for Money' of its service provision during the year ended 31 March 2021.

(ii) IDENTIFY, 2 performance measures in relation to Flexibility and Service Quality (dimensions of performance measurement).

(iii) ANALYSE, 3 performance measures relating to 'Cost and Efficiency' that could be utilised by the management of Homelessness Services when comparing its operating performance against that achieved by Exclusive Services.

ANSWERS/ SOLUTIONS

1. (i) For commercial enterprises, generating profits is a very important objective. Likewise, not-for-profit enterprises have certain cultural, social or educational objectives for which they are created. Regardless of the type of organization, it is important to know whether the internal operations meet certain performance benchmarks, that will ensure that the organization achieves its objectives in a better manner. Moreover, even if the organization does not operate for profits, it is important for it to be "cost effective". Resources (including money) should be used optimally to achieve intended outcomes. For example, HS can use this benchmarking tool to look into the following questions:

(a) Does the organization function in an efficient and cost-effective manner?

(b) Does the estate management make best use of the buildings to achieve the objectives of the organization?

(c) Does the estate management function manage upkeep of buildings in terms of repairs and improvements in an effective manner?

(d) Are the tenants satisfied with the service provided by the estate management and the suitability of the accommodation for their needs?

"Value for Money (VFM)" is an assessment made based on the criteria of economy, efficiency and effectiveness.

Economy *involves minimising resource consumption while meeting specified requirements of quality and quantity.* Minimize the cost of resources / required inputs (implies to spend less) while ensuring that the desired quality of service is achieved. For HS, inputs could be purchases made for maintenance and repair work like sanitary fittings, AC, wooden structure for the houses etc., while resources could be the labour employed to carry out these services. HS should aim at purchasing required quality of inputs at the least possible price. Skilled labour needed for this job should be procured at the lowest pay scale possible. Procuring these at lower cost leads to savings for HS. At the same time, HS should ensure that cost cutting / saving does not come at the cost of quality. Lower quality implies inferior service levels, which ultimately will compromise HS' social commitment to provide quality housing to needy members of its community.

Efficiency involves *maximising the ratio between resources (input) and the output of goods, services or other results.*

The focus of efficiency is on the process of rendering service. The objective of efficient operations is to maximize output using minimum resources. Improved productivity means that resources procured are used in an optimal way (implies spending well).

In the case of HS, one of the resources is the labour employed for repair and maintenance work. Efficiency (productivity) measured would be the relationship between the employees available and the repair work performed by them. If the pool of employees does more repair work than the benchmark set, productivity is higher. This also closely ties up with economy (cost) of operations. If the given pool of employees (resources), who are paid optimum salary (cost), cater to more repair and maintenance work, economy of operations is achieved due to higher productivity of operations. In case these activities are outsourced, efficiency and economy can be achieved by calling for tenders. Select the tender that provides maximum work for least cost.

In addition, HS may explore options for efficiencies from business process improvements, shared services as well as further efficiencies within assets management.

Effectiveness involves *ensuring that the outcome achieves the desired policy aims and objectives*. Have the objectives been achieved, how does the impact of the actual output / service compare with its intended impact? (Implies to spend money wisely to achieve desired objectives). In the case of HS, effectiveness could be assessed based on the following questions.

(a) Are the housing needs of the targeted community members met?

(b) Are the tenants satisfied with the accommodation?

(c) Given its social cause, are the staff friendly, courteous and hospitable to the customers?

(d) Do the housing accommodations comply with safety standards and other legal requirements?

Each measure is inter linked with the other. For example, HS has replaced sanitary fittings in the kitchen and bathroom in 45 houses for ₹26,100 each, costing a total of ₹11,74,500. Compared to ES that has spent ₹52,200 on each house for sanitary fitting replacement. For the cost of ₹11,74,500 ES could have replaced fittings in only 22 houses (₹11,74,500 / 52,000) as compared to HS' ability to replace fittings in 45 houses. Therefore, HS' decision has been economical, getting more work done for same cost. At the same time, this does not indicate whether the fittings replaced by HS are of similar or better quality as compared to ES. ES could have used better quality fittings that last longer, enhance customer experience, safety etc. The spending by ES could have been more effective than HS because it helps achieve the desired objective of customer satisfaction, safety and less running cost for maintenance. Therefore, to achieve economy, HS may have compromised on effectiveness.

Benchmarking is a good method of measuring performance it enables a comparison of the process, costs etc. with those of a close competitor. Services will be expected to use benchmarking information to learn from best practice, change procedures and processes to achieve enhanced methods of working, and reduce unnecessary expenditure.

However, benchmarking of performance against ES is not ideal. The performance of HS can be better measured by adopting *benchmarking against similar charities* whose primary objective is the provision of accommodation to the communities in which they operate.

Thus, HS must have permanent membership of the House Benchmarking Organisations, which helps social housing property-owners to compare the costs of service delivery, resources, and key performance indicators across all areas of the business. For example, the management of HS can enquire about a norm in respect of the repair charges, sanitary charges or wood structure replacement charges etc. of similar non-profit seeking organisations.

Further, benchmarking should be conducted annually to analyse all areas of the business and is used to identify high performing, low cost services. Using the annual benchmarking exercise results, the HS can plan to target those areas that are low performing and high cost.

Overall, HS should have strong commitment to value for money, which needs to be reflected in the business plan and in service-delivery plans. By applying these principles HS would be able to achieve the optimum utilisation of resources, which will in turn lead to extra capacity and allow HS to provide better services.

(ii) The Building Block Model proposed by Fitzgerald and Moon, gives six dimensions of performance measurement including service quality and flexibility.

Service Quality- Service quality is the measurement of how well a delivered service conforms to the customer's expectations. As a not for profit organization, HS provides housing services to cater to the needs of lower and middle income groups as well as senior citizens in the local community. Although service is provided at a concessional rate compared to its commercial peer ES, quality of HS' service needs to be judged based on certain parameters that were promised by the organization to its tenants. These could be used as parameters to assess service quality. Some of them could be:

- Behaviour, attitude, proactivity of staff employed by HS.
- Quality of basic amenities provided.
- Availability of on-site service for the residents
- Safety within and around the residential unit

Data for assessment of quality can be collected from feedback of tenants, analysing the number and nature of complaints made by tenants, tenant retention rate/loyalty etc. Feedback form tenants can be taken on specific issues or could be general in nature.

Flexibility- Flexibility is the ability of the organization to adapt to customers' requirements. This can be measured through service delivery time, promptness in responding to customer requests, ability of employees to perform different kinds of work etc. In the case of HS, the following performance measures can be used to assess the flexibility:

- The average waiting time for a tenant for a house to become available. Lower the wait time better the flexibility as it indicates that there are sufficient housing units available for rental accommodation.
- Following change in requirements, ability to meet the tenant's request for another house of a different size. This indicates whether the range of housing units offered is sufficient (flexible) to cater to the tenants' changing demand.
- Waiting time for undertaking repairs of an emergency nature, once notified by a tenant. Lower the waiting time during emergencies indicates the availability of appropriate personnel to carry of the repairs on short notice.

Students are only required to provide two *performance measures*. These others have been given for completeness.

(iii) The management of HS could use the following performance measures –

An organization should aim at achieving results with maximum efficiency at the least possible cost. Efficiency measures the relationship between the input resources utilized and the output service achieved. Few of the measures that HS could use to compare performance with ES are:

The Average Employee Cost *per week per house*

Here, the resource (input) are the employees, which is 15 in case of both HS and ES.

The employees at HS cater to 450 houses as compared to 200 houses catered by ES. Therefore, HS is more efficient as compared to ES.

Likewise, cost of resources to HS is the employee cost, for which the pay structure and remuneration policies are different in both the organizations. HS has the ability to hire most of its resources at an annual salary of ₹1,00,000, which is the least level in the pay structure. Comparatively, ES also hires cheaper labour but at a slightly higher pay level of ₹2,00,000 annual salary. Therefore, the total cost of labour is higher by ₹14,00,000 (58%) for ES as compared to HS.

To compare the figures on a common factor, the employee cost can be calculated per week per house.

	HS	ES
The Average Employee Cost *per week per house* [₹24,00,000^/ (450@ × 52)] and [₹38,00,000^/ (200@ × 52)] ^ Employee cost from the income and expenditure table @ Number of houses (given): HS = 450; ES = 200	₹102.56	₹365.38

The average employee cost per week per house of ES is ₹365.38 (2.46 times) more than of HS. It can be concluded that HS is both efficient, in terms of being able to cater more houses with same number of employees, as well as cost effective due to the use of cheaper labour.

The Average Day to Day Repair Cost *per week per house*

Here, the resource (input) is measured in terms of the cost spent on repairs to maintain the rental houses. Running repairs are generally do not add much value to the rental houses. Therefore, lesser the repairs, higher the efficiency. From the income and expenditure table, it can be seen that HS has spent ₹23,91,600 as running repair cost for 450 houses versus ES that has spent ₹6,38,000 for 200 houses. To compare them on a common factor, the average repair cost per week per house has been calculated.

	HS	ES
The Average Day-to-Day Repair Cost *per week per house* [₹23,91,600^/ (450@ × 52)] and [₹6,38,000^/ (200@ × 52)] ^ Running repair cost from the income and expenditure table @ Number of houses (given): HS = 450; ES = 200	₹102.21	₹61.35

The average day to day repair cost per week per house for ES is ₹40.86 less than that of HS (-40%). This may be due to the fewer repairs required and the fact that there is no extra cost required for emergency and urgent repairs. The cost of repairs whether emergency, urgent or non-urgent to ES is the same, ₹1,000 [₹6,38,000/ (160 + 376 + 102)] whereas the cost of emergency repairs to HS is ₹1,400 (₹6,72,000/480), urgent ₹1,139 (₹11,28,000/990) and for non-urgent repairs it is ₹1,056 (₹5,91,600/560).

ES's low cost of repairs (which is identical for all types of repairs – emergency, urgent and non-urgent) may have been achieved through entering into a *contractual agreement for repairs*. HS should also think of entering into such contracts in order to save money.

Percentage of Rent Lost

Occupancy of rental houses indicate whether the capacity (in terms of houses rented) is being optimally utilized. Lesser the vacancy better the efficiency in terms of capacity utilization. This represents opportunity cost of not letting out the property.

	HS	ES
Percentage of Rent Lost (= Rent Lost / Gross Rent) [(₹18,17,400/ ₹1,21,16,000] Gross Rent = Rent Earned + Rent Lost = ₹1,02,98,600 + ₹18,17,400 = ₹1,21,16,000	15%	---

ES did not have any unoccupied properties at any time during the year; it has 100% occupancy. This shows that ES's properties are in high demand. On the other hand, HS has lost rent worth ₹18,17,400 through unoccupied properties; this is about 15% of the gross rent receivable.

The management of HS should identify the reasons why the houses remained unoccupied when the occupancy rate is 100% for an organisation like ES, a peer organisation should be used to benchmark the performance.

NOTES

TEST YOUR KNOWLEDGE - MCQS

MCQ 1

Which one of the following statements about internal performance reporting is true?

Options

a. Always contain a mixture of financial and non-financial measurements.

b. Can take any form that management chooses.

c. Are required by an accounting standard to be based on the 'Balanced Scorecard' system.

d. Contain the same information as financial accounting statements, but they are produced monthly rather than annually.

Key – b

Reason - Internal performance reports can take any form that management chooses considering the need of organisation, as these are voluntary reports not statutory required.

MCQ 2 – Since performance report also includes reporting on non-financial measures, you are required to identify which of the following statements correct about the non-financial performance measures?

i. Non-financial measures do not involve the calculation or recording of any numbers.

ii. The most appropriate non-financial measures vary, depending upon the nature of the organisation.

iii. Non-financial measures should correspond as far as possible with the aims of the organisation as a whole.

iv. The use of non-financial performance measures helps to address the deficiencies of measurements such as Return on Investment (ROI).

Options

a. i, ii, and iii

b. ii, iii and iv

c. iii, iv and i

d. iv, i, and ii

Key – b

Reason – Only statement i is incorrect rest all are correct. Non-financial qualitative information is likely to be as important as quantitative data, but it is more difficult to quantify and present in reports. Technically, qualitative information is referred to as a 'construct,' which is an attribute that cannot be directly measured. **To illustrate**, Constructs include things like enthusiasm and empathy. Typically, an effort must be made to convert qualitative information into quantifiable information for communication, assessment, and comparison purposes. The conversion of construct into variable involves the calculation or recording of any numbers.

NOTES

TEST YOUR KNOWLEDGE- CASELET BASED MCQS

Case-let on International Transfer Pricing

Quicklink manufactures mobile phones at its plant in Karnataka, India. The company also has marketing divisions worldwide, one of which is in Paris, France. The division in France imports 50,000 mobile phones annually from the manufacturing plant in India. Given below is some information about the divisions in India and France:

Number of mobile phones sold by Indian division to French division	*50,000 units*
Indian income tax rate on the Indian division's operating income	*35%*
French income tax rate on the French division's operating income	*40%*
Import duty rate paid by French division	*15%*
Full manufacturing cost per unit	*₹12,000 per unit*
Selling price (net of marketing and distribution costs) in France (in equivalent Indian Rupees)	*₹18,000 per unit*
Comparable market price based on similar imports in France (in equivalent Indian Rupees)	*₹15,000 per unit*

The Indian and French tax authorities allow for transfer prices only that between full manufacturing cost ₹12,000 per unit and comparable market price ₹15,000 per unit based on similar imports of mobile phones in France. Import duty paid by the French division is based on the price at which the phones are transferred i.e., the transfer price. Import duty paid is a deductible expense for calculating income tax in France.

Requirements

MCQ 1

Calculate the after tax operating income of the Indian division when the transfer price is set at full manufacturing cost.

Options

a. ₹60 crores

b. ₹9.75 crores

c. Nil (no taxable income)

d. ₹12.60 crores

Key – c

Reason – Refer working– Step A5 of Method A. Option (a) ₹60 crore is the revenue of the Indian division under full manufacturing cost method. Option (b) ₹9.75 crore is the profit as per Method B Option (d) ₹12.60 crores is the overall profit of Quicklink as per Method A.

MCQ 2

Calculate the after tax operating income of the French division when the transfer price is set at full manufacturing cost.

Options

a. ₹9 crores

b. ₹21 crores

c. Nil (no taxable income)

d. ₹12.60 crores

Key – d

Reason – Refer working – Step B7 of Method A. Option (a) ₹9 crore is the import duty paid by the French division under Method A. Option (b) ₹21 crores is the operating profit before taxes of the French Division under Method A. Option (c) is the after tax Operating profit of the Indian division under Method A.

MCQ 3

Calculate the after tax operating income of the Indian division when the transfer price is set at market price of comparable imports in France.

Options

a. ₹15 crores

b. ₹9.75 crores

c. ₹ Nil (no taxable income)

d. ₹2.25 crores

Key – b

Reason – Refer working– Step A5 of Method B. Option (a) ₹15 crores is the operating profit of the Indian division before taxes under Method B. Option (c) Nil is the operating profit of the Indian division under Method A. Option (d) ₹2.25 crore is the operating profit after tax of the French division under Method B.

MCQ 4

Calculate the after tax operating income of the French division when the transfer price is set at market price of comparable imports in France.

Options

a. ₹9.75 crores

b. ₹3.75 crores

c. ₹ 11.25 crores

d. ₹2.25 crores

Key – d

Reason – Refer working– Step B7 of Method B. Option (a) ₹9.75 crores is the operating income after tax of the Indian division under Method B. Option (b) ₹3.75 crores is the operating income before tax of the French division under Method B. Option (c) ₹11.25 crores paid by the French division under Method B.

MCQ 5

Which method of transfer pricing is more beneficial for the company as a whole?

Options

a. Transfer price at full manufacturing cost.

b. Transfer price at market price of comparable imports in France.

Key – a

Reason – Refer to Step C of working. When transfer price is charged as per Method A at the full manufacturing cost, the operating income (after taxes) is ₹12.60 crores. When the transfer price is charged as per Method B at the market price of comparative imports in France, the operating income (after taxes) is 12 crores. Hence, it is more beneficial for Quciklink to set the transfer price at full manufacturing cost of ₹12,000 per unit (Method A).

MCQ 6

Assume that the Indian division is charging the French division full manufacturing cost of ₹12,000 per unit. If the manager of the Indian division wants to increase the transfer price to ₹12,001 per unit, that is transfer price is proposed to be increased by ₹1, what will be the impact on the income tax to be paid by the Indian division in India?

Options

a. Increase in income tax payable in India by ₹0.35 per ₹1 increase in transfer price.

b. Decrease in income tax payable in India by ₹0.35 per ₹1 increase in transfer price.

c. No impact in income tax payable in India.

Key – a

Reason – Increase in income tax payable in India by ₹0.35 per ₹1 increase in transfer price. Refer to Step 1 in the explanation table.

MCQ 7

Assume that the Indian division is charging the French division full manufacturing cost of ₹12,000 per unit. If the manager of the Indian division wants to increase the transfer price to ₹12,001 per unit, that is transfer price is increased by ₹1, what will be the impact on the income tax and import duty to be paid by the French division in France?

Options

a. Increase in income tax payable in France by ₹0.46 and increase in import duty payable in France by ₹0.15 per ₹1 increase in transfer price.

b. Decrease in income tax payable in France by ₹0.46 and increase in import duty payable in France by ₹0.15 per ₹1 increase in transfer price.

c. Increase in income tax payable in France by ₹0.46 and decrease in import duty payable in France by ₹0.15 per ₹1 increase in transfer price.

d. Decrease in income tax payable in France by ₹0.46 and decrease in import duty payable in France by ₹0.15 per ₹1 increase in transfer price.

Key – b

Reason – Decrease in income tax payable in France by ₹0.46 and increase in import duty payable in France by ₹0.15 per ₹1 increase in transfer price. Refer to Step 2 and 3 in the explanation table.

MCQ 8

Assume that the Indian division is charging the French division full manufacturing cost of ₹12,000 per unit. If the manager of the Indian division wants to increase the transfer price to ₹12,001 per unit, that is transfer price is proposed to be increased by ₹1. What will be the impact on the overall profits of Quicklink per ₹1 increase in transfer price?

Options

a. Decrease in overall profits by ₹0.04 per ₹1 increase in transfer price.

b. Increase in overall profits by ₹0.04 per ₹1 increase in transfer price.

c. Increase in overall profits by ₹1 per ₹1 increase in transfer price.

d. No impact on the overall profits of Quicklink.

Key – a

Reason – Decrease in overall profits by ₹0.04 per ₹1 increase in transfer price. Refer to Step 4 in the explanation table.

MCQ 9

Assume that the Indian division is charging the French division full manufacturing cost of ₹12,000 per unit. The manager of the Indian division wants to increase the transfer price to ₹13,000 per unit, that is transfer price is proposed to be increased by ₹1,000 per unit. What will be the impact on the overall profits of Quicklink for the 50,000 mobile phones transferred from India to France? Please use your answers to Questions 6, 7 and 8 for your analysis.

Options

a. Decrease in overall profits by ₹20,00,000

b. Increase in overall profits by ₹20,00,000

c. Increase in overall profits by ₹50,00,000

d. No impact on the overall profits of the Quicklink

Key – a

Reason – Decrease in overall profits by ₹20,00,000. Refer to Step 5 in the explanation table.

MCQ 10

Based on your analysis of questions 6 to 9, should the Indian division increase the transfer price to ₹13,000 per unit that is ₹1,000 per unit above the full manufacturing cost of ₹12,000 per unit?

Options

a. Yes

b. No

Key – b

Reason – If the Indian division increases the the transfer price from ₹12,000 per unit to ₹13,000 per unit and transfers 50,000 units to the French division, the overall profits will decrease by ₹20,00,000. Refer to Step 5 in the explanation table. Therefore, the Indian division should not increase the transfer pricing rate.

Descriptive Question 1

Advise on behavioural consequences based on your findings in Questions 6 to 9.

Answer- ***Observation:*** The income tax rate in India is 35% as compared to the income tax rate in France at 40%. Hence, on first glance it might seem attractive to increase the transfer price from ₹12,000 per unit to ₹13,000 per unit. In India this increase in transfer price of ₹1,000 per unit is taxed at 35%. In France the procurement cost increases by ₹1,000. While it might seem beneficial at first glance, the impact of import duty of 15% on this additional procurement cost of ₹1,000 negates the benefit.

The most optimal transfer price in the above case of Quicklink is the full manufacturing cost of ₹12,000 per unit where the overall company profit is maximum at ₹12.60 crores.

Behavioural Consequence: When the transfer price is at full manufacturing cost of ₹12,000 per unit, the Indian division does not show any profit in its financials. The net operating income after taxes is nil. The manager of the Indian division may want to charge above the full manufacturing cost of ₹12,000 per unit in order to start reflecting profits in the financials of the Indian division. However, the management should discourage this as the overall impact is negative. Performance evaluation of the Indian division may have to be done of a different basis other than financials.

Conclusion- Multinationals have to carefully understand the tax structure while they determine the transfer pricing models and the transfer price rate to be charged between two divisions in different countries.

Workings

		All figures in ₹	All figures in ₹
Sr. No.	**Particulars**	**Method A Internal Transfer at Full manufacturing costs**	**Method B Internal Transfer at comparable market price of similar imports**
A	**Indian Division**		
A1	Revenue Method A: 50,000 units × ₹12,000 per unit Method B: 50,000 units × ₹15,000 per unit	60,00,00,000	75,00,00,000
A2	Full manufacturing costs Method A and B: 50,000 units × 12,000 per unit	60,00,00,000	60,00,00,000
A3	Division operating income (Step A3 = Step A1 - Step A2)	-	15,00,00,000
A4	Division income tax (Step A3 × 35% income tax rate)	-	5,25,00,000
A5	**Division after tax operating income** (Step A5 = Step A3 - Step A4)	**-**	**9,75,00,000**
B	**French Division**		

B1	Revenues Method A and B: 50,000 units × ₹18,000 per unit	90,00,00,000	90,00,00,000
B2	Transferred in costs (refer Step A2 above)	60,00,00,000	75,00,00,000
B3	Import duty @15% of transferred in price (Step B2 × 15%)	9,00,00,000	11,25,00,000
B4	Total division costs (Step B4 = Step B2 + Step B3)	69,00,00,000	86,25,00,000
B5	Division operating income (Step B5 = Step B1 - Step B4)	21,00,00,000	3,75,00,000
B6	Division income tax (Step B6= Step B5 × 40% income tax rate)	8,40,00,000	1,50,00,000
B7	**Division after tax operating income (Step B5 - Step B6)**	**12,60,00,000**	**2,25,00,000**
C	**Total (Overall) after tax income of the company** (Step A5 + Step B7)	**12,60,00,000**	**12,00,00,000**

Explanations for MCQs 6 to 10

When the transfer price is increased by ₹1 per unit (from full manufacturing cost of ₹12,000 per unit to the proposed rate of ₹12,001 per unit)

Sr. No.	Particulars	Impact per ₹1 increase in transfer price
1.	Increase in transfer price by ₹1 will increase revenue in India by ₹ 1. Indian income tax will increase as revenue increases by ₹1. Increase in Indian income tax per ₹1 increase in transfer price = ₹1×Indian income tax rate of 35%	₹0.35
2.	Increase in transfer price by ₹1 will increase the French import duty as procurement cost for the French division will increase. Increase in French import duty = ₹1 × 15% duty rate	₹0.15
3	Increase in transfer price by ₹1 will decrease French income tax (i) there will be an increase in procurement cost of ₹1 and (ii) consequently import duty will increase by ₹0.15 as explained in Step 2 above. Totally additional expense of ₹1.15 can be claimed against taxable profits. Decrease in French income tax = ₹1.15 × 40% income tax rate.	₹0.46
4	Impact on overall profit of Quicklink on account of increase in transfer price by ₹1: Step 1 – Increase in Indian income tax decreases profit by ₹0.35. Step 2 – Increase in French import duty decreases profit by ₹0.15. Step 3 – Decrease in French income tax increases profit by ₹0.46. Step 4 – Impact on overall profit for every ₹1 increase in transfer price = Step 1 + Step 2 – Step 3 = ₹0.35 + ₹0.15 – ₹0.46 = ₹0.04 decrease in overall profit.	₹0.04 decrease in overall profit
5	As per question 9, transfer price increased by ₹1,000 per unit for 50,000 units. Transfer price between the divisions will increase by ₹1,000 per unit × 50,000 units = ₹50,00,000 Net impact on overall profits of Quicklink = Step 4 × ₹50,00,000 = ₹0.04 × ₹50,00,000 = ₹20,00,000 decrease in overall profit	₹20,00,000 decrease in overall profit

TEST YOUR KNOWLEDGE

Basic Concepts

1. G is the transferring division and R, the receiving division in a company. R has a demand for 20% of G's production capacity which has to be first met as per the company's policy. STATE with reason, which division, G or R enjoys more advantage in each of the following independent situations, assuming no inventory build-up.

Sl. No.	G Transfers to R at Transfer Price equal to	G's Production level	External Demand	Division having more advantage	Reason
(i)	Full cost: No mark up	60%	40%		
(ii)	Market Price	80%	60%		
(iii)	Marginal Cost	100%	80%		
(iv)	Market Price	100%	90%		

Methods of Transfer Pricing

2. B Ltd. makes three products X, Y and Z in Divisions X, Y and Z respectively. The following information is given:

	X	Y	Z
Direct Material (₹ / unit) (excluding material X for Divisions Y and Z)	8	22	40
Direct Labour (₹ / unit)	4	6	8
Variable Overhead (₹ / unit)	2	2	2
Selling price to outside customers (₹ / unit)	25	65	90
Existing capacity (no. of units)	6,000	3,000	3,000
Maximum external Market demand (no of units)	5,000	5,500	5,000
Additional fixed cost that would be incurred to install additional capacity (₹)	45,000	9,000	23,100
Maximum additional units that can be produced by additional capacity	6,000	2,000	2,250

Y and Z need material X as their input. Material X is available in the market at ₹23 per unit. Defectives can be returned to suppliers at their cost. Division X supplies the material free from defects and hence is able to sell at ₹25 per unit. Each unit of Y and Z require one unit of X as input with slight modification.

If Y purchases from outside at ₹23 per unit, it has to incur ₹3 per unit as modification and inspection cost. If Y purchases from Division X, it has to incur, in addition to the transfer price, ₹2 per unit to modify it.

If Z gets the material from Division X, it can use it after incurring a modification cost, of ₹1 per unit. If Z buys material X from outside, it has to either inspect and modify it at its own shop floor at ₹5 per unit or use idle labour from Division X at ₹3 per unit. Division X will lend its idle labour as per Z's requirement even if Z purchases the material from outside.

The transfer prices are at the discretion of the Divisional Managers and will remain confidential. Assume no restriction on quantities of inter-division transfers or purchases.

Required

DISCUSS with relevant figures the best strategy for each division and for the company as a whole.

3. Centurion Co. operates a Pulp Division that manufactures Wood Pulp for use in production of various paper goods. The following information are available:

	₹
Selling Price	210
Less: Variable Expenses	126
Contribution	84
Less: Fixed Expenses (based on a capacity of 1,00,000 kgs per year)	54
Net Income	30

Centurion Co. has just acquired a small company that manufacturers paper cartons. This company will be treated as a division of Centurion with full profit responsibility. The newly formed Carton Division is currently purchasing 10,000 kgs of pulp per year from supplier at a cost of ₹210 per kg less a 10% quantity discount. Centurion's President is anxious that the Carton Division begins purchasing its pulp from the Pulp Division if an acceptable transfer price can be worked out.

Situation I

If the Pulp Division is in a position to sell all of its pulp to outside customers at the normal price of ₹210 per kg, will the Managers of the Carton and Pulp Division agree to transfer 10,000 kgs of pulp next year at a determined price? EXPLAIN with reasons.

Situation II

Assuming that the Pulp Division is currently, selling only 60,000 kgs of pulp each year to outside customers at the stated price of ₹210 per kg will the Managers agree to a mutually acceptable transfer price for 10,000 kgs of pulp in next year? EXPLAIN with reasons.

Situation III

If the outside supplier of the Carton Division reduces its price to ₹177 per kg, will the Pulp Division meet this price? EXPLAIN. If the Pulp Division does not meet the price of ₹177 per kg, what will be the effects on profits of the company as a whole?

Behavioural Consequences

4. APC Ltd. has two divisions- Division X and Division Y with full profit responsibility. Division X produces components 'Gex' which is supplied to both division Y and external customers.

Division Y produces a product called 'Gextin' which incorporates component 'Gex'. For one unit of 'Gextin' two units of component 'Gex' and other materials are used.

Till date, Division Y has always bought component 'Gex' from division X at ₹50 per unit since the lowest price at which the component 'Gex' could have been bought by Division Y was ₹52 per unit.

Division X charges the same price for component 'Gex' to both division Y and external customers. However, it does not incur selling and distribution costs when transferring internally.

Division Y has received a proposal from a new supplier who has offered to supply component 'Gex' for ₹47 per unit at least for the next three years.

Manager of Division Y requests the manager of Division X to supply component 'Gex' at or below, ₹47 per unit. Manager of Division X is not ready to reduce the transfer price since the divisional performance evaluation is done based on profit margin ratio of the division.

The following additional information is made available to you :

	Component 'Gex'₹	Product 'Gextin'₹
Selling Price per unit	50	180
Less: Variable Costs		
Direct Materials		
Component 'Gex'	-	100
Other materials	12	22
Direct labour	16	13
Manufacturing Overhead	2	5
Selling and Distribution Costs	4	2
Contribution per unit	16	38
Annual fixed costs	₹40,00,000	₹20,00,000
Annual external demand (units)	3,00,000	1,20,000
Capacity of plant (units)	5,00,000	1,50,000

Required

(i) CALCULATE the present profit of each division and the company as a whole.

(ii) ANALYSE the impact on the total annual profits of each division and the company as a whole if Division Y accepts the offer of the new supplier.

(iii) In the changed scenario, DISCUSS why the top management should intervene and advise a suitable transfer price for component 'Gex' for resolving transfer pricing conflict which promotes goal congruence through efficient performance of the concerned division.

5. A manufacturer has two divisions, Division A and Division B. Division B produces components that are used by both Division A as well as external customers. Division A gets its entire requirement for the component from Division B.

The annual production capacity of Division B is 1,00,000 units. The division operates at full capacity, with no inventory at the beginning and end of the year. It sells its components to external customers at ₹4,000 per unit. Variable cost of production for the component is ₹2,750. Internally, it transfers it components to Division A factoring any opportunity cost in the form of lost sales. Total sales of Division B were ₹36 crores, of which sales to external customers was ₹20 crores.

As per company policy, demand from Division A has priority over external customers. This year, there was an additional demand from external customers for 18,000 components. However, since Division B operated at full capacity, this demand was not catered to.

Required

(i) ANALYZE the Sales in terms of ₹and units made by Division B to both external and internal customers.

(ii) RECOMMEND the transfer pricing range that would promote goal congruence between Divisions A and B.

(iii) DISCUSS the effect of changes in external demand on the transfer price for the company, assuming the current policy continues.

6. GL Ltd. is a multiproduct manufacturing concern functioning with four divisions. The Electrical Division of the company is producing many electrical products including electrical switches. This division functioning at its maximum capacity sells its switches in the open market at ₹25 each. The variable cost per switch to the division is ₹16.

The Household Division, another division of GL Ltd., functioning at 70% capacity asked the Electrical Division to supply 5,000 switches per month at the rate of ₹18 each to fit in night lamps produced by it. The total cost per night lamp is being estimated as detailed below;

	₹
Components purchased from outside suppliers	50.00
Switch if purchased internally	18.00
Other variable costs	40.00
Fixed overheads	21.00
Total cost per night lamp	129.00

The Household Division is marketing night lamps at a price of ₹130 each, with a very small margin, as it is doing business in a very competitive environment. Any increase in price made by the division will push out the division from the market. Therefore, the division cannot pay anything more to switches if they the Electrical Division. Further, the manager of the division informed that it is very much essential to keep on the market share for night lamps by the Household Division to retain the experienced workers of the division. The company is using return on investments (ROI) as a scale to measure the divisional performances and also marginal costing approach for decision making.

Required

(i) Would you RECOMMEND the supply of switches to Household Division by Electrical Division at a price of ₹18 each? Substantiate your recommendation with suitable reasons.

(ii) ANALYZE whether it would be beneficial to the company as a whole the supply of switches to Household Division at a unit price of ₹18 by Electrical Division.

(iii) Do you feel that- the Divisional Managers should accept the inter-divisional transfers in principle? If yes, what should be the range of transfer price?

(iv) SUGGEST the steps to be taken by the chief executive of the company to change the attitude of divisional heads if they are against the inter-divisional transfers.

7. Business Model

Rest Easy Company is a rapidly growing start-up in the technology sector. It develops customized ERP packages for clients across various business sectors. The business comprises primarily of two departments (1) consultant and (2) customer support. Consultant department has highly qualified professionals from management, accounting, and technology background, who approach clients as a team and work out solutions that meet their needs. Customer support personnel are in charge of IT implementation and provide support through telephone, e-mail or on-site. Currently, the strength of the consultant's department is 200 while that of customer support is 150.

Yash, the founder and CEO of the company, is very passionate about this business model. To deliver high-quality product solutions, he believes that his staff should be well-trained and up-to-date with developments in their professional fields. Therefore, Rest Easy provides periodic training to its staff in-house. All employees are expected to undergo 2 weeks of training annually. A training department has been set up with qualified trainers in various fields, who provide periodic training sessions to both Consultant and Customer Service departments. The training department has 5 trainers. Training sessions are aimed at providing skills that the executives need to provide better service to their clients. This in-house focus of high-quality delivery, is the key factor that Yash believes would set apart Rest Easy from its competitors.

In addition to delivering training sessions, trainers are responsible for developing training material for routine, on-going as well as specialized training sessions. They attend conferences, train the trainer sessions and subscribe to journals to keep themselves up-to-date with various developments that consultants and customer support executives need to be aware of.

At the beginning of each year, heads of consultant and customer service departments advise the training department on the expected number of training sessions that their staff would undertake. In special situations, where developments need to be communicated rapidly, extra sessions can also be conducted. Training department budgets are prepared based on these needs.

Transfer Pricing - Training Cost Allocation

Cost incurred by the training department is allocated to the consultant and customer service department based on the training sessions availed by both departments. A standard quote (transfer price) based on budgets is provided at the beginning of the year. At the end of the year, actual cost is allocated based on actual training sessions of each department.

Each of the user departments use the transfer price to prepare their individual budgets, that further gets built into their pricing models used for billing clients. One of the metric for manager appraisal is also the financial performance of their individual departments. Hence, managers of both consultant and customer service departments are very cost conscious.

Figures for budget and actual costs for 2023 of the training department are as follows:

Figures in ₹

Cost Particulars	Budget	Actual
Salaries	25,00,000	30,00,000
Depreciation on Office Equipment	2,00,000	5,00,000
Software Licenses for Training Packages	80,000	1,05,000
Conference Travel for Train the Trainer Sessions	10,000	15,000
Telephone	20,000	25,000
Training Supplies	50,000	60,000
Trainee Lunch	100,000	120,000
Total Expenses	29,60,000	38,25,000

Consultant and Customer service departments are charged based on the number of training sessions actually availed. Details of training sessions for each department are:

Department	Budget	Actual
Consultant	100	100
Customer Service	100	80
Total	200	180

Problem of Goal Congruence

In accordance with the above explanation, the training department quoted a rate of ₹14,800 per session based on the budgeted cost and budgeted training sessions. (Budgeted cost ₹29,60,000 for 200 training sessions). Actual cost per session is ₹21,250 (Actual cost ₹38,25,000 for 180 training sessions). Cost overrun of ₹6,450 per session, a jump of 44% from the original quote.

Consequently, a meeting was called that was attended by the managers of consultant, customer service and training departments, along with the CEO Yash.

The user departments were unhappy with the higher charge. Manager of the consultant department raised the following concerns:

(a) The market rate for similar trainings provided by external vendors was only ₹12,000 per session. He has accepted a higher transfer price of ₹14,800 per session only because the in-house training program was more customized towards Rest Easy's end-user-clients. However, if the department is actually going to be charged ₹ 21,250 per session, he would rather source the training to the outside vendor.

(b) Further, he pointed out that while his department had adhered to its commitment of 100 training sessions, the customer service department has availed of 20 lesser sessions than its commitment. Reviewing the cost structure of the training department, most of the expenses are fixed in nature. Therefore, when the transfer price is based on the actual cost and actual training sessions, the per session cost has increased because the customer service department did not undergo the entire 100 sessions. He questions, why he should bear a higher allocation of cost due to variance in actual and budgeted usage of training resources of the customer service department?

Manager of the customer service department explained that the variance of 20 training session is on account of the executives handling high-priority work pressure that did not allow them enough time to complete some of the training sessions. At the same time, she contended that she should not be charged for those 20 sessions for which no training was availed.

Manager of the training department explained that the ₹5,00,000 cost overrun on salary due to new hire of a trainer. The trainer's experience is very valuable to the company and hence to get her on board, the company had to offer a higher pay scale. Depreciation on office equipment was higher by ₹3,00,000 due to higher replacement cost of ageing equipment. A specialized software license resulted in an excess spend of ₹25,000. The manager argued that the rest of the expenses were normal increases which were not controllable.

Yash, the CEO, was understandably not happy with the cost over-run. Higher internal transfer price to the end user departments would affect employee morale. However, even though a cheaper option was available from an outside vendor, he could still foresee the value of investing in in-house training programs. Intangible benefits from these customized sessions, would definitely help the company's growth.

To conclude, he was not willing to shut down the training department. At the same time, he had to resolve the dispute resulting from internal transfer pricing in an amicable way. Like profits, teamwork is critical to success.

Required

(i) IDENTIFY the threats to goal congruence due to internal transfer pricing.

(ii) During the meeting, an alternate transfer pricing methodology based on two-part pricing system was formulated. Costs would be segregated into fixed and variable categories. A transfer price for each category would be arrived based on budgeted costs and budgeted usage. The standard rate for fixed cost will be applied to the budgeted training sessions and charged to the user departments. The standard rate for variable cost will be applied to the actual training sessions and charged to the user departments. Fixed cost would be defined as those that are not directly impacted by the number of training sessions. CALCULATE the transfer price to be charged to each department under this method.

(iii) EVALUATE how the two-part pricing price method of transfer pricing address the threats to goal congruence as identified in question 1?

International Transfer Pricing

8. Standard Corporation Inc. (SCI) is a US based multinational company engaged in manufacturing and marketing of Printers and Scanners. It has subsidiaries spreading across the world which either manufactures or sales Printers and Scanners using the brand name of SCI.

The Indian subsidiary of the SCI buys an important component for the Printers and Scanners from the Chinese subsidiary of the same MNC group. The Indian subsidiary buys 1,50,000 units of components per annum from the Chinese subsidiary at CNY (¥) 30 per unit and pays a total custom duty of 29.5% of value of the components purchased.

A Japanese MNC which manufactures the same component which is used in the Printer and Scanners of SCI, has a manufacturing unit in India and is ready to supply the same component to the Indian subsidiary of SCI at ₹320 per unit.

The SCI is examining the proposal of the Japanese manufacturer and asked its Chines subsidiary to presents its views on this issue. The Chinese subsidiary of the SCI has informed that it will be able to sell 1,20,000 units of the components to the local Chinese manufactures at the same price i.e. ¥ 30 per unit but it will incur inland taxes @ 10% on sales value. Variable cost per unit of manufacturing the component is ¥ 20 per unit. The Fixed Costs of the subsidiaries will remain unchanged.

The Corporation tax rates and currency exchange rates are as follows:

Corporation Tax Rates		Currency Exchange Rates	
China	25%	1 US Dollar ($)	= ₹ 61.50
India	34%	1 US Dollar ($)	= ¥ 6.25
USA	40%	1 CNY (¥)	= ₹ 9.80

Required

(i) PREPARE a financial appraisal for the impact of the proposal by the Japanese manufacturer to supply components for Printers and Scanners to Indian subsidiary of SCI. [Present your solution in Indian Currency and its equivalent.]

(ii) IDENTIFY other issues that would be considered by the SCI in relation to this proposal.

(Note: While doing this problem use the only information provided in the problem itself and ignore the actual taxation rules or treaties prevails in the above mentioned countries)

ANSWERS/ SOLUTIONS

1.

Sl. No.	Division Having More Advantage	Reason
(i)	G	G is utilizing only 40% of production capacity by selling to 'External Market' which implies that G might have not been able to recover its full fixed costs. By transferring 20% of its production capacity to division R at full cost, G will be able to recover fixed costs components.
(ii)	G	G will not be losing any external market demand as it is within its production capacity. By transferring 20% of production capacity to division R at market price, G will earn extra contribution towards the fixed costs and profit.
(iii)	R	Here G is operating at 100% capacity level and external market demand is 80% only i.e. G is not losing any external market demand. But by transferring 20% of production capacity to R at marginal cost i.e. at variable cost, G may not be able to recover fixed cost part of total cost. On the other hand R will be able to get these units at marginal cost only.
(iv)	G	Though G is losing its 10% of external market demand but it would be able to earn the same revenue by transferring the goods to division R at market price. Moreover, G will be able to utilize 100% of its production capacity.

2. Statement Showing "Contribution *per unit*"

(₹)

Particulars	Division X			Division Y		Division Z
	Sale to	Internal Transfer to		Purchase from	Transfer from	Transfer from
	Outside	Y	Z	Outside	X	X
Selling Price	25.00	---	---	65.00	65.00	90.00
Transfer Price	---	24.00*	25.00#	---	---	---
Direct Material	8.00	8.00	8.00	22.00	22.00	40.00

(Excluding Material 'X')						
Direct Labour	4.00	4.00	4.00	6.00	6.00	8.00
Variable Overhead	2.00	2.00	2.00	2.00	2.00	2.00
Purchase Price 'X'	---	---	---	23.00	---	---
Transfer Price 'X'	---	---	---	---	24.00	25.00
Modification Cost	---	---	---	3.00	2.00	1.00
Contribution	11.00	10.00	11.00	9.00	9.00	14.00

(*) Division 'Y' will not pay Division 'X' anything more than ₹24, because at ₹24, it will incur additional cost of ₹2 per unit to modify it, ₹23 + ₹3 = ₹26, the outside cost.

(#) To purchase material X from outside is costly for Division 'Z' as after modification at own shop floor, cost of the same comes to Division 'Z' is ₹ 28 (₹23 + ₹5).

If Division 'X' goes to utilize its full capacity in that case labour would not be available for modification to Department 'Z'.

Accordingly Division 'Z' may purchase material X at ₹25 from Division 'X' i.e. market price to outsiders.

Statement Showing "Internal Transfer Decision (units)"

Particulars	X	Y	Z
Existing Capacity ...(A)	6,000 units	3,000 units	3,000 units
Maximum Capacity *that can be added* ...(B)	6,000 units	2,000 units	2,250 units
Total Maximum *that can be produced* ...(C)=(A)+(B)	12,000 units	5,000 units	5,250 units
Maximum External Demand ...(D)	5,000 units	5,500 units	5,000 units
Balance ...(C) – (D)	7,000 units	---	250 units
Internal Transfer to Other Divisions	5,000 units to Z* 2,000 units to Y	N.A.	N.A.
Internal Transfer from Other Divisions	N.A.	2,000 units transfer from X (material X)	5,000 units transfer from X (material X)

(*) Division 'X' will supply its production to Division 'Z' first (after meeting its external requirement) as contribution from product Z is high.

Statement Showing "Decision Whether to Expand or Not"

(₹)

Particulars	X	Y	Z
Additional Fixed Cost on Expansion	45,000	9,000	23,100
Contribution that can be earned by expansion	64,000 (4,000 units × ₹11 + 2,000 units × ₹10)	18,000 (2,000 units × ₹9)	28,000 (2,000* units × ₹14)
Net Benefit from Expansion	19,000	9,000	4,900
Decision	Expansion	Expansion	Expansion

(*) As maximum demand of product Z is 5,000 units which Division 'Z' first complete with existing capacity of 3,000 units. Balance 2,000 units from expansion.

Statement Showing "Net Revenue Addition"

(₹)

Particulars	X	Y	Z	Total
Contribution – External Sales	55,000 (5,000 units × ₹11)	45,000 (5,000 units × ₹9)	70,000 (5,000 units ×₹14)	1,70,000
Contribution – Internal Transfer	75,000 (2,000 units × ₹10 + 5,000 units × ₹11)	---	---	75,000
Additional Fixed Cost	45,000	9,000	23,100	77,100
Net Revenue Addition				1,67,900

Strategy for Company & Divisions

(i) Division 'X' will transfer maximum possible material to Division 'Z' as Division 'Z' is offering maximum transfer price to Division 'X'. At the same time Division 'Z' is fetching maximum contribution for the organisation so it is beneficial for both the Divisions as well as organisation as a whole.

(ii) As shown above all the three Divisions are getting net benefit when they are taking decision to expand and hence, all the three Divisions should expand their activity by incurring additional fixed cost on expansion.

3. Situation I

The lowest acceptable transfer price from the perspective of the selling division is given by the following formula:

$$\text{Transfer price} \geq \underset{\text{per unit}}{\text{Variable cost}} + \frac{\text{Total contribution margin on lost sales}}{\text{Number of units transferred}}$$

The Pulp Division has no idle capacity, so transfers from the Pulp Division to the Carton Division would cut directly into normal sales of pulp to outsiders. Since the costs are the same whether the pulp is transferred internally or sold to outsiders, the only relevant cost is the lost revenue of ₹210 per kg from the pulp that could be sold to outsiders. This is confirmed below:

$$\text{Transfer Price} \geq ₹126 + \frac{(₹210 - ₹126) \times 10,000}{10,000} = ₹210$$

Therefore, the Pulp Division will refuse to transfer at a price less than ₹210 per kg.

The Carton Division can buy pulp from an outside supplier for ₹210 per kg, less a 10% quantity discount of ₹21, or ₹189 per kg. Therefore, the Division would be unwilling to pay more than ₹189 per kg.

$$\text{Transfer Price} \leq \text{Cost of Buying from Outside Supplier} = ₹189$$

The requirements of the two divisions are incompatible. The Carton Division won't pay more than ₹189 and the Pulp Division will not accept less than ₹210. Thus, there can be **no mutually agreeable transfer price and no transfer will take place**.

Situation II

The Pulp Division has idle capacity, so transfers from the Pulp Division to the Carton Division do not cut into normal sales of pulp to outsiders. In this case, the minimum price as far as the Carton Division is concerned is the variable cost per kg of ₹126. This is confirmed in the following calculation:

$$\text{Transfer price} \geq ₹126 + \frac{₹0}{10,000} = ₹126$$

The Carton Division can buy pulp from an outside supplier for ₹189 per kg and would be unwilling to pay more than that for pulp in an internal transfer. If the managers understand their own businesses and are cooperative, they should agree to a transfer and should settle on a transfer price within the range:

$$₹126 \leq \text{Transfer price} \leq ₹189$$

Situation III

Yes, ₹177 is a bona fide outside price. Even though ₹177 is less than the Pulp Division's ₹180 "full cost" per unit, it is within the range and therefore will provide some contribution to the Pulp Division.

If the Pulp Division does not meet the ₹177 price, it will lose ₹5,10,000 in potential profits.

Price *per kg*	₹177
Less: Variable Costs	₹126
Contribution margin *per kg*	₹51

10,000 kgs × ₹51 per kg = ₹5,10,000 potential increased profits.

This ₹5,10,000 in potential profits applies to the Pulp Division and to the company as a whole.

For situation III also considered that "the Pulp Division is currently selling only 60,000 kgs of pulp each year to outside customers".

4. (i) Profitability of each division and the company as a whole when Division X supplies 240,000 units of Gex annually to Division Y.

Division Y produces 1,20,000 units of Gextin. Each component of Gextin requires 2 components of Gex that it currently procures from Division X. Therefore, it procures 2,40,000 units of Gex from Division X annually.

Division X has an overall capacity of 5,00,000 units annually to produce Gex. Of this it produces 2,40,000 units for Division Y, which it must first cater to. The remaining 2,60,000 units of Gex is sold to external customers.

Divisional and Overall Profitability of APC Ltd.

Sr. No.	Particulars	Division X				Division Y		Total APC Ltd
		Per unit of Gex	External Sales	Internal Sales	Total Division X	Per unit of Gextin	External Sales	
			2,60,000 units	2,40,000 Units	5,00,000 Units		1,20,000 units	
1	Selling Price	50	1,30,00,000	1,20,00,000	2,50,00,000	180	2,16,00,000	4,66,00,000
2	*Less:* Variable Cost							
a	Direct Material							
b	Component Gex	---	---	---	---	100	1,20,00,000	1,20,00,000
c	Other materials	12	31,20,000	28,80,000	60,00,000	22	26,40,000	86,40,000
d	Direct Labour	16	41,60,000	38,40,000	80,00,000	13	15,60,000	95,60,000
e	Manufacturing Over-head	2	5,20,000	4,80,000	10,00,000	5	6,00,000	16,00,000
f	Selling and Distribution Costs	4	10,40,000	----	10,40,000	2	2,40,000	12,80,000
	Total	34	88,40,000	72,00,000	1,60,40,000	142	1,70,40,000	3,30,80,000
3	Contribution (Step 1 - 2)	16	41,60,000	48,00,000	89,60,000	38	45,60,000	1,35,20,000
4	Annual Fixed Cost				40,00,000		20,00,000	60,00,000
5	Annual Profit (Step 3 - 4)				**49,60,000**		**25,60,000**	**75,20,000**

Note

Division X does not incur marketing costs on internal sales. Therefore, cost not incurred on transfer of 240,000 units to Division Y.

(ii) Impact if Division Y accepts to buy 240,000 units of Gex annually from the external supplier at ₹47 per unit of Gex.

Sr. No.	Particulars	Division X				Division Y		Total
		Per unit of Gex	External Sales	Internal Sales	Total Division X	Per unit of Gextin	External Sales	
			3,00,000 units	0 Units	3,00,000 units		1,20,000 units	
1	Selling Price	50	1,50,00,000	-	1,50,00,000	180	2,16,00,000	3,66,00,000
2	*Less:* Variable Cost							
a	Direct Material							
b	Component Gex	-	-	-	-	94	1,12,80,000	1,12,80,000
c	Other Materials	12	36,00,000	-	36,00,000	22	26,40,000	62,40,000
d	Direct Labour	16	48,00,000	-	48,00,000	13	15,60,000	63,60,000
e	Manufacturing Overhead	2	6,00,000	-	6,00,000	5	6,00,000	12,00,000
f	Selling and Distribution Costs	4	12,00,000	-	12,00,000	2	2,40,000	14,40,000
	Total	34	1,02,00,000	-	1,02,00,000	136	1,63,20,000	2,65,20,000
3	Contribution (Step 1 - 2)	16	48,00,000	-	48,00,000	44	52,80,000	1,00,80,000
4	Annual Fixed Cost				40,00,000		20,00,000	60,00,000
5	Annual Profit (Step 3 - 4)				8,00,000		32,80,000	40,80,000

Analysis

APC Ltd

Overall profitability of APC Ltd. reduces from ₹75,20,000 per annum to ₹40,80,000 per annum. The reduction in profit is therefore ₹34,40,000 per annum. Reasons are:

(a) The cost of manufacturing Gex is only ₹30 per unit while Division Y is procuring this at ₹47 per unit from an external supplier. Annually this results in a loss of ₹40,80,000 (240,000 units of Gex×₹17 per unit).

(b) Since Division X no longer makes Gex for internal sales, it can ramp up its external sales to meet the full annual demand of 300,000 units. This results in extra external sales of 40,000 units annually. Each unit gives a contribution of ₹16 per unit. Therefore, additional contribution from sale of 40,000 units of Gex to external customers is ₹640,000 per annum.

(c) Therefore, netting both (a) and (b) above, the net loss to the company is ₹34,40,000 per annum.

Division Y

Impact on profit of Division Y, increase from ₹25,60,000 per annum to ₹32,80,000 per annum that is **₹7,20,000** per annum increase. This is due to the savings in procurement cost of Gex for Division Y. Instead of procuring Gex at ₹50 per unit Division Y proposes to buy it at ₹47 per unit externally. For its annual demand of 2,40,000 units of Gex**, it translates to savings of ₹7,20,000 annually in procurement cost for Division Y.**

Division X

Impact on profit of Division X, reduction from ₹49,60,000 per annum to ₹8,00,000 per annum. A substantial reduction of **₹41,60,000** in its divisional profit per year. Division X earns a contribution of ₹20 per unit of Gex from its internal transfer to Division Y. (Selling price ₹50 per unit less variable cost of manufacturing ₹30 per unit). If Division Y procures Gex externally, this would result in an annual loss of ₹48,00,000 in contribution for Division X (240,000 units ×₹20 per unit). However, due to additional external sales of 40,000 units of Gex, Division X can earn an additional contribution of ₹6,40,000 per year (40,000 units of Gex × ₹16 contribution per unit of external sale). Offsetting, this results in a lower contribution **of ₹41,60,000 per annum for Division X.**

This also results in excess capacity of 2,00,000 units per annum in Division X.

(iii) APC Ltd. can suffer a loss of ₹34,40,000 per annum if Division Y decides to procure Gex from the external supplier. It costs on ₹30 per unit to manufacture Gex internally as compared to ₹47 per unit that Division Y is willing to pay to the external supplier. However, Division X is unwilling to reduce the price from ₹50 per unit since divisional performance is done based on the profit margin ratio of the division. Therefore, the management of the company has to step in to promote goal congruence. If Division Y buys GEX from the external supplier, not only is it costly for the company, it also results in a lot of unused capacity lying idle in Division X.

In the current scenario, one possible way of arriving at an acceptable transfer price range could be:

Division X is currently working at full capacity of 5,00,000 units per annum. Of this production, 2,40,000 units is supplied internally to Division Y while the balance is supplied to external market. The marginal cost of production of Gex is ₹30 per unit. If this were sold externally, it would earn a contribution of ₹16 per unit. **Therefore, the minimum transfer price the Division X would demand = marginal cost of production per unit + opportunity cost per unit = ₹30 + ₹16 = ₹46 per unit of Gex.**

(The other way of looking at this could also be that Division X does not incur any selling and distribution costs on internal transfers. To outside clients it needs to spend ₹4 per unit towards the same. Therefore, to make its price more competitive with the external market, Division X can reduce the price by ₹4 per unit, which it has been recovering from Division Y for a cost it does not incur in internal transfers. Thus, based on its cost structure and the competitive profit margin it earns from external sales, it can price its internal transfers at ₹46 per unit.)

Division Y will be willing to pay the lower of net marginal revenue or the external buy-in price.

The Net Marginal Revenue per unit of Gextin = Selling price per Gextin – (marginal cost for Division Y other than the cost of Gex) = ₹180 - ₹42 = ₹138 per unit of Gextin. This translates that Division Y will be willing to pay upto ₹69 per unit of Gex, that it can incur without incurring a divisional loss. Meanwhile, the external buy-in price is ₹47 per unit.

Therefore, the maximum price Division Y will be willing to pay = lower of Net Marginal Revenue or external buy-in price = lower of ₹69 or ₹47 per unit of Gex. Therefore, Division Y will be willing to pay maximum ₹47 per unit of Gex to Division X.

Therefore, the transfer price range can be set between **₹46 - ₹47** per unit of Gex. Division X would then have to compete with the external supplier to retain its internal sales. This would promote more efficient working between Division X and Y. **By selling it at ₹46 per unit, the contribution of Division X would be maintained at ₹16 per unit. For Division Y. the procurement of Gex at ₹46 per unit would be beneficial since it is lower than the external market price. If transfer price set at external market rate ₹47 per unit, Division Y would still be able to improve its profit margin as compared to the original transfer price of ₹50 per unit.**

Given that the marginal cost of manufacturing Gex is only ₹30 per unit, the management has to ensure that production of Gex is made in-house. Performance measure at a divisional level should then not be restricted to financial performance alone (full profit responsibility) and should be accordingly modified to include non-financial / operational measures as well.

5. (i) Sales Analysis of Division B

Total annual capacity and actual production of Division B is 100,000 units of components. Zero inventory implies that sales for the year was also 100,000 units of components. Sales to external customers was ₹20 crores, at ₹4,000 per unit. Therefore, units sold to external customers would be 50,000 units this year (₹20 crores sales / ₹4,000 per unit sale price).

Therefore, internal sales can be derived to be 50,000 units for the year (annual sales 100,000 units less external sales 50,000 units). For the year, value of sales made to Division A is ₹16 crore (Division B's total sales of ₹36 crore less external sales of ₹20 crores).

Had there been no extra demand, opportunity cost for Division B would have been nil. Therefore, transfer price would only be the variable cost of ₹2,750 per unit of component, However, given in the problem, that there was excess demand for 18,000 units of components from external customers, that could not be met since Division B had to give priority to internal demand. Had these sales been made Division B would have earned ₹1,250 per unit contribution (Sale price ₹4,000 per unit less variable cost ₹2,750 per unit). This lost contribution of ₹1,250 per unit is the opportunity cost per unit for Division B. Due to company's policy of giving priority to internal demand, Division B lost a profit of ₹2.25 crore during the year. (18,000 units × contribution of ₹1,250 per unit).

Therefore, internal sales comprise of two parts:

32,000 units of components transferred at variable cost of ₹2,750. This amounts to ₹8.8 crores.

18,000 units of components transferred factoring any opportunity cost = variable cost + contribution per unit = external sale price = ₹4,000 per unit. This amounts to ₹7.2 crores.

Therefore, internal sales = ₹8.8 crores + ₹7.2 crores = ₹16 crores.

Summarizing

External sales are 50,000 units amounting to ₹20 crores annual sales value. Internal sales are 50,000 units amounting to ₹16 crores annual sales value. Transfer price for 32,000 units is at variable cost of ₹2,750 per unit while for 18,000 units is at external sales price of ₹4,000 per unit.

(ii) Transfer Price Range for Divisions A and B

Division A procures its entire demand of 50,000 units from Division B. Out of this, 18,000 units at market price of ₹4,000 per unit while 32,000 units are procured at a lower rate of ₹2,750 per unit. Had Division A procured 32,000 units from the market, the additional cost of procurement would be ₹4 crores {(External price of ₹4,000 per unit *less* internal transfer price at variable cost of ₹2,750 per unit) ×32,000 units}. Only Division A currently enjoys this benefit of lower procurement cost. Financials of Division B show no profit from such internal transfers. This may skew the performance assessment of the divisions, if it is based primarily on financial metrics of each division. In order, promote goal congruence, some portion of this benefit can be shared with Division B.

Division B will at the minimum want to recover its variable cost of ₹2,750 per unit, while Division A will be ready to pay only up to external market price of ₹4,000 per unit. Therefore, transfer price range can be set between ₹2,750 - ₹4,000 per unit. Division A enjoys lower procurement rate while Division B financial reflect some benefit of transferring components internally to Division A.

(iii) Impact of External Demand on Transfer Price

As per the company's transfer pricing policy, Division B gives priority to demand from Division A. The division has a production capacity of 100,000 units annually. If there is *no external market* for Division B's components, then transfer price for the entire internal transfer would be the variable cost of ₹2,750 per unit plus portion of the fixed cost (if any). This is the minimum cost that Division B would like to recover from Division A.

When there is an *external market*, transfer price would depend on whether Division B had to incur any opportunity in the form of lost sales. When total demand (internal and external) is within production capacity of 100,000 units, the entire demand can be met. There would be *no lost sales* for Division B, no opportunity cost. Therefore, transfer price for the entire internal transfer would be the variable cost of ₹2,750 per unit. This is the minimum cost that Division B would like to recover from Division A.

When there is an *external market*, such that total demand (internal and external) is more than production capacity of 100,000 units, due to priority given to internal transfer, some portion of the external demand might not be met. This would be *lost sales* for Division B, opportunity cost would be the contribution lost from such sales at ₹1,250 per unit. This opportunity cost would be passed onto Division A. As explained in part (ii) above, transfer price range will be from ₹2,750 - ₹4,000 per unit. More lost sales for Division B would keep the average transfer price higher towards ₹4,000 per unit. Lesser lost sales for Division B would keep the average transfer price towards the lower bound of ₹2,750 per unit. Therefore, the proportion of external demand that could not be catered to, would determine the average transfer price. Higher the demand from external customers would drive up the average transfer price within the company.

6. (i) Electrical Division is operating at full capacity and selling its switches in the open market at ₹25 each. Therefore, it can transfer its production internally by giving up equal number of units saleable in the open market. In this situation, transfer price should be based on variable cost plus opportunity cost {₹16 + (₹25 - ₹16)} = ₹25/-.

As the price quoted by Household Division ₹18 is less than the transfer price based on opportunity cost, the Electrical Division should not accept internal transfer. Further, the company is measuring divisional performances based on ROI. Therefore, transferring for a price which is less than the minimum price would affect the return on investments and divisional performance severely.

(ii) In the total cost per night lamp, the Fixed Overheads being a fixed cost is not relevant for decision making. Similarly, the variable cost of switch (₹16 p.u.) included in the cost of night lamp is also irrelevant as it is common for both internal and external transfers. The only relevant cost is the loss of revenue when units are transferred internally.

Accordingly, the benefit from internal transfer would be {₹130 - (₹50 + ₹40) - ₹25) =₹15/- on each unit sale on night lamp. Therefore, it is beneficial to the company as a whole to the extent of ₹15 per unit of night lamp sold.

Hence, internal transfer is profitable to the company as a whole. Further, Household Division is operating at 70% capacity and has experienced workers which may be utilized for other divisions requirements if any and based on contribution earned fixed cost could be minimized due to large scale of production.

(iii) Internal transfer pricing develops a competitive setting for managers of each division, it is possible that they may operate in the best interest of their individual performance. This can lead to *sub-optimal utilization of resources*. In such cases, transfer pricing policy may be established to promote goal congruence. The market price of ₹25 per switch leaves Electrical Division in an identical position to sale outside. Thus, ₹25 is top of the price range. Division Household will not pay to Electrical Division anything above (₹130 - ₹50 - ₹40) = ₹40/-. The net benefit from each unit of night lamp sold internally is ₹15. Thus, any transfer price within the range of ₹25 to ₹40 per unit will benefit both divisions. Divisional Managers should accept the inter divisional transfers in principle when the transfer price is within the above range.

(iv) Transfer at marginal cost are unsuitable for performance evaluation since they do not provide an incentive for the supplying division to transfer goods and services internally. This is because they do not contain a profit margin for the supplying division. Chief Executive's intervention may be necessary to instruct the supplying division to meet the receiving division's demand at the marginal cost of the transfers. Thus, divisional autonomy will be undermined. Transferring at cost plus a mark-up creates the opposite conflict. Here the transfer price meets the performance evaluation requirement but will not induce managers to make optimal decisions.

To resolve the above conflicts the following transfer pricing methods have been suggested:

Dual Rate Transfer Pricing System

The supplying division records transfer price by including a *normal profit margin* thereby showing reasonable revenue. The purchasing division records *transfer price at marginal cost* thereby recording purchases at minimum cost. This allows for better evaluation of each division's performance. It also improves co-operation between divisions, promoting goal congruence and reduction of sub-optimization of resources.

Two Part Transfer Pricing System

This pricing system is again aimed at resolving problems related to distortions caused by the full cost based transfer price. Here,

transfer price = marginal cost of production + a lump-sum charge (two part to pricing).

While marginal cost ensures recovery of additional cost of production related to the goods transferred, lump-sum charge enables the recovery of some portion of the fixed cost of the supplying division. Therefore, while the supplying division can show better profitability, the purchasing division can purchase the goods at lower rate compared to the market price.

7. (i) Threats to goals congruence due to internal transfer pricing are:

(a) User groups, consulting and customer service department are concerned that training department is not controlling its costs. Since the entire actual costs gets allocated to the users, training department may not be managing its costs efficiently. Since the financials of user departments are affected, it may lead to conflict between the departments.

(b) Yash, the CEO is a firm believer of in-house training and its benefits. However, there are outside vendors that provide similar service at substantially reduced costs. Performance assessment of managers of consulting and customer service are based on their department's financial metrics. Higher internal transfer price for training would affect employee morale since they have no control over these allocated costs. However, their performance is being evaluated based on uncontrollable factors. This could lead to discontent among the managers. Alternatively, Yash may want to re-consider his strategy of in-house training. When suitable, training can be sourced to cheaper options available in the market, without compromising on quality.

(c) Most costs of the training department are fixed in nature, as they need to be incurred irrespective of the number of training sessions. These costs are being allocated to the users based on actual training sessions. The budgeted target price is used by the user departments, to determine their billing model to Rest Easy's end user clients. Hence it is important that the budget transfer price is not very different from the actual transfer price charged at the end of the year.

In the given problem, internal transfer price has been based on a budget of 200 sessions. Here the customer service department does not adhere to its commitment of 100 training sessions, training sessions actually availed are only 80. Since costs are mostly fixed in nature, the actual cost per training session increases. This is then charged out to the consultant and customer service departments. Consequently, despite meeting its commitment, the consultant department bears a higher cost allocation due to variance in the usage of training resources. This can lead to friction between the user departments.

(ii) By segregating the costs into fixed and variable components, Rest Easy is working out two-part pricing system for transfer price.

Two-Part Pricing System = Lump-Sum Charge + Marginal Cost

To segregate the costs into fixed and variable categories, the criteria is whether the costs change per additional training session. Accordingly, the classification of costs will be as below:

Cost Particulars	Budget (₹)	Classification
Salaries	25,00,000	Fixed
Depreciation on Office Equipment	2,00,000	Fixed
Software Licenses for Training Packages	80,000	Fixed
Conference Travel for Train the Trainer Sessions	10,000	Fixed
Telephone	20,000	Fixed
Training Supplies	50,000	Variable
Trainee Lunch	100,000	Variable
Total Expenses	29,60,000	

The lump-sum charge would be based on the fixed cost budget. Marginal cost would be based on the variable cost budget.

Total budget fixed expenses = ₹28,10,000 and total budget variable expenses = ₹150,000. Number of training sessions is 200, that is 100 each for consultant and customer service departments. Hence the fixed cost allocation rate would be ₹14,050 per session and variable cost allocation rate is ₹750 per session.

Transfer price to the consulting department = lump-sum charge + marginal cost

= (Standard Fixed Cost *per session* × Budgeted Training Sessions) + (Standard Variable Cost per Session × Actual Training Sessions)

= (₹14,050×100) + (₹750×100)

= ₹14,05,000 + 75,000

= ₹14,80,000.

Transfer price to the customer service department = lump-sum charge + marginal cost

= (Standard Fixed Cost *per session* × Budgeted Training Sessions) + (Standard Variable Cost *per session* × Actual Training Sessions)

= (₹14,050 × 100) + (₹750 × 80)

= ₹14,05,000 + ₹60,000

= ₹14,65,000.

Total transfer price allocation is ₹29,45,000 versus actual expenses of ₹38,25,000. Unallocated expenses are ₹880,000.

(iii) Evaluate how the two-part transfer pricing model would address the goal congruence issues listed in question 1?

(a) Since transfer prices are based on budgets, the training department would become more cost-conscious. As explained above, as per this transfer pricing method, unallocated expenses of ₹8,80,000 would have to be borne by the training department. As given in the problem, this variance is mainly on account of extra cost for the newly hired trainer and the higher depreciation expense. The department will be more cautious while taking future decisions. However, Yash the CEO must ensure that the quality of training is not compromised and remains in line with the company's strategic policy.

(b) Internal transfer price of ₹14,800 per session is still higher than the outside rate of ₹12,000 per session. Further decisions would be based on the company's strategic objective. At the same time, if the number of training sessions are expected to increase beyond the budget, this transfer pricing method charges the user department only a marginal cost of ₹750 per session. This is definitely lower that the external rate.

(c) Under this method, fixed expenses that form majority of the cost are allocated based on budgeted cost and budgeted usage. Variable expense are allocated based on actual training sessions. Hence, any variance in the utilization of training resources, does not impact the other user department.

Therefore, most of the goal congruence issues can be addressed through this methodology.

8. (i) Impact of the Proposal by the Japanese Manufacturer to Supply Components for Printers and Scanners to the Indian Subsidiary of the SCI.

On Indian Subsidiary of SCI

Particulars	Amount (₹)
Cost of Purchase from the Chinese Manufacturer :	
Invoiced Amount {(1,50,000 units × ¥ 30) × ₹9.80}	4,41,00,000
Add: Total Custom Duty (₹ 4,41,00,000 × 29.5%)	1,30,09,500
Total Cost of Purchase from the Chinese Manufacturer ...(A)	5,71,09,500
Cost of Purchase from Japanese Manufacturer in India:	
Invoice Amount (1,50,000 units × ₹320)	4,80,00,000
Total Cost of Purchase from Japanese Manufacturer in India ...(B)	4,80,00,000
Savings on Purchase Cost Before Corporate Taxes ...(A) – (B)	91,09,500
Less: Corporate Tax @34%	30,97,230
Savings after Corporate Taxes	60,12,270

On Chinese Subsidiary of SCI

Particulars	Amount (₹)
Loss of Contribution [{(1,50,000 – 1,20,000 units) × ¥ (30 – 20)} × ₹9.80]	29,40,000
Add: Inland taxes on Local Sale - Chinese Manufacturer [{(1,20,000 units × *¥ 30)* × *10%}* × *₹9.80]*	35,28,000
Total Loss Before Corporate Taxes	64,68,000
Less: Tax Savings on the Losses (₹64,68,000 × 25%)	16,17,000
Net Loss after Corporate taxes	48,51,000

On SCI Group

Particulars	Amount (₹)
Saving from Indian Subsidiary	60,12,270
Loss from Chinese Subsidiary	48,51,000
Net Benefit to SCI Group	11,61,270

From the above analysis, it can be seen that the proposal from the Japanese manufacturer in India is beneficial for the SCI as it give a net benefit of ₹11,61,270.

(ii) The SCI need to consider various other issues before reaching at a final decision of accepting the proposal of the Japanese manufacturer in India. The few suggestive issues that should be considered are as follows:

- *The longevity of the proposal of the Japanese manufacturer:* Whether Japanese manufacturer will supply the components in the future also. For this purpose, a long term agreement between the Indian Subsidiary of SCI and Japanese manufacturer in India needs to be entered.
- *Certainty of the fiscal policy in India:* The Japanese manufacturer will not be able to supply the component at the present price if the fiscal policy of India will change in the future.
- *Repatriation of Profit earned in India:* Though the Indian subsidiary is making profit but it depends on the Government policy on the repatriation of profit from India to USA.
- *Operating Conditions in China:* The SCI has to make sure that the Chinese subsidiary is operating profitably and able to use the spare capacity in the future as well.
- *The fiscal policy in China:* If the Government of China liberalize its fiscal policies in China in future then the manufacturing cost will be cheaper than the today's cost.

Apart from above suggestive points the foreign relations and other tax treaties and accords should also be kept in consideration.

NOTES

TEST YOUR KNOWLEDGE- MCQS

MCQ 1

Variance which arises because of inaccurate or faulty standards, it is not in control of management, and they should not be held responsible. This variance is –

Options

a. Planning variance

b. Operational variance

c. Labour variance

d. Efficiency variance

Key - a

Reason – Planning variance arises because of inaccurate or faulty standards; it is not in control of management, and they should not be held responsible.

MCQ 2

Variances which arise due to inefficiency of a cost centre /department is –

Options

a. Controllable variance

b. Uncontrollable variance

c. Under controllable variance

d. Planning variance

Key - a

Reason – Variances which arise due to inefficiency of a cost centre /department is Controllable variance. It is in the control of the management of the organization.

MCQ 3

If in MyGlam company the new manager wants to understand that if the variance arises solely because the actual quantity sold differs from the budgeted quantity sold is –

Options

a. Static budget variance.

b. Master budget increment.

c. Sales mix variance.

d. Sales volume variance.

Key - d

Reason – Sales Volume Variance arises due to difference of actual quantity sold and budgeted quantity sold.

MCQ 4

The total fixed overhead variance is the –

Options

a. Measure of the lack of production volume

b. Amount of the under-applied or over-applied fixed overhead costs.

c. Cost Reduction achieved from difference in productions.

d. Measure of production inefficiency.

Key - b

Reason – The total fixed overhead variance is the difference between the actual total fixed overhead cost incurred and the applied fixed overhead.

MCQ 5

The Managing Director of ACE Toy company reviewed the standard cost variance analysis, and he wants to understand the reason of unfavourable labour efficiency variance of ₹6,700. The most likely cause of the variance is –

Options

a. The new contract with labour increased wages.

b. For last few weeks the machinery maintenance has been inadequate.

c. The production department has employed highly skilled workers.

d. None of the above.

Key - b

Reason – If machine will not work properly for production in such case labour efficiency variance will be unfavourable.

MCQ 6

If the production levels increase in a manufacturing organization ABS Ltd within a relevant range, which of the following costs would decrease if production levels were increased within the relevant range?

Options

a. Total fixed costs

b. Variable costs per unit

c. Total variable costs

d. Fixed costs per unit

Key - d

Reason –The fixed cost per unit decreases, if production increases within a relevant range.

MCQ 7

When we perform a task, as experience is gain with the task, which one of the following techniques would most likely be used –

Options

a. Regression analysis

b. Learning curve analysis

c. Sensitivity analysis

d. Normal probability analysis

Key - b

Reason – A learning curve is a concept that shows how a process is improved over time due to learning and increased proficiency.

MCQ 8

The manager of production department is arguing that the following point is not responsible for Material Usage Variance –

Options

a. Change in method of production/ design

b. Increased efficiency in production can help in bringing down wastage rate

c. Changes made in the material mix

d. Purchase price of inferior quality material

Key - d

Reason – Quantity of Inferior quality material is responsible for material usage variance.

MCQ 9

A newly appointed manager of HR Department interested to know which of the following is not responsible for Labour Rate Variance.

Options

a. Unexpected increase in the pay rate of labour

b. Level of experience of the labour can impact the direct cost of labour

c. Poor supervision of workforce

d. Change in the composition of the workforce can impact direct labour costs

Key - c

Reason – Poor supervision of workforce will be responsible for labour efficiency variance.

MCQ 10

The manager who has just implemented JIT in the company is stating that the following point is not responsible for Labour Efficiency Variance.

Options

a. Poor supervision of the workforce

b. Learning curve effect upon the labour efficiency levels

c. Using inferior quality of material

d. Salary paid to female employees

Key - d

Reason –The salary paid to female employee will not impact the labour efficiency variance.

MCQ 11

Deciding the selling price of the new product in market is the most difficult decision. While doing the variance analysis, the manager of the sales and marketing department of the company is interested to know which of the following is not responsible for Sales Price Variance –

Options

a. Higher discounts given to customers in order to encourage bulk purchases

b. Failure to satisfy demand due to production difficulties

c. Better sales price realization

d. Market conditions or economic conditions forcing changes in prices across the industry

Key - b

Reason – Failure to satisfy demand due to production difficulties will result in Sales volume variance and not sales price variance.

TEST YOUR KNOWLEDGE

Planning and Operational Variances

1. Managing Director of Petro-KL Ltd (PTKLL) thinks that Standard Costing has little to offer in the reporting of material variances due to frequent changes in price of materials.

PTKLL can utilize one of two equally suitable raw materials and always plan to utilize the raw material which will lead to cheapest total production costs. However, PTKLL is frequently trapped by price changes and the material actually used often provides, after the event, to have been more expensive than the alternative which was originally rejected.

During the last accounting period, to produce a unit of 'P' PTKLL could use either 2.50 Kg of 'PG' or 2.50 kg of 'PD'. PTKLL planned to use 'PG' as it appeared it would be cheaper of the two and plans were based on a cost of 'PG' of ₹1.50 per Kg. Due to market movements, the actual prices changed and if PTKLL had purchased efficiently the cost would have been:

'PG' ₹2.25 per Kg;

'PD' ₹2.00 per Kg

Production of 'P' was 1,000 units and usage of 'PG' amounted to 2,700 Kg at a total cost of ₹ 6,480/-

Required

CALCULATE the material variance for 'P' by:

(i) Traditional Variance Analysis; and

(ii) An approach which distinguishes between Planning and Operational Variances.

2. Ski Slope had planned, when it originally designed its budget, to buy its artificial ice for ₹10/ per kg. However, due to subsequent innovations in technology, producers slashed their prices to ₹9.70 per kg. and this figure is now considered to be a general market price for the purpose of performance assessment for the budget period. The actual price paid was ₹9.50, as the Ski Slope procurement department negotiated strongly for a better price. The other information relating to that period were as follows:

Original Standards (ex-ante)		Revised Standards (ex-post)		Actual (5,500 units)	
5,500 units × 5 Kgs. × ₹10	₹2,75,000	5,500 units × 4.75 Kgs. × ₹9.70	₹2,53,412.50	27,225 Kgs. × ₹9.50	₹2,58,637.50

Required

(i) CALCULATE the variances for 'Ice' by

(a) Traditional Variance Analysis; and

(b) An approach which distinguishes between Planning and Operational Variances.

(ii) INTERPRET the result.

3. KONY Ltd., based in Kuala Lumpur, is the Malaysian subsidiary of Japan's NY corporation, headquartered in Tokyo. KONY's principal Malaysian businesses include marketing, sales, and after-sales service of electronic products & software exports products. KONY set up a new factory in Penang to manufacture and sell integrated circuit 'Q50X-N'. The first quarter's budgeted production and sales were 2,000 units. The budgeted sales price and standard costs for 'Q50X-N' were as follows:

	RM	RM
Standard Sales Price *per unit*		50
Standard Costs *per unit*		
Circuit X (10 units @ RM 2.5)	25	
Circuit Designers (6 hrs. @ RM 2)	12	(37)
Standard Contribution *per unit*		13

Actual results for the first quarter were as follows:

	RM '000	RM '000
Sales (2,000 units)		158
Production Costs (2,000 units)		
Circuit X (21,600 units)	97.20	
Circuit Designers (11,600 hours)	34.80	(132)
Actual Contribution (2,000 units)		26

The management accountant made the following observations on the actual results–

"*In total, the performance agreed with budget; however, in every aspect other than volume, there were huge differences. Sales were made at what was supposed to be the highest feasible price, but we now feel that we could have sold for RM 82.50 with no adverse effect on volume. The Circuit X cost that was anticipated at the time the budget was prepared was RM 2.5 per unit. However, the general market price relating to efficient purchases of the Circuit X during the quarter was RM 4.25 per unit. Circuit designers have the responsibility of designing electronic circuits that make up electrical systems. Circuit Designer's costs rose dramatically with increased demand for the specialist skills required to produce the 'Q50X-N', and the general market rate was RM 3.125 per hour - although KONY always paid below the normal market rate whenever possible. In my opinion, it is not necessary to measure the first quarter's performance through variance analysis. Further, our operations are fully efficient as the final contribution is equal to the original budget.*"

Required

COMMENT on management accountant's view.

4. AGF is a chemical processing company that produces sprays used by farmers to protect their crops. One of these sprays 'Agrofresh' is made by using either chemical A or chemical B. To produce one litre of Agrofresh spray they have the option to use either 12 litres of chemical A or 12 litres of chemical B. During the financial year, the purchase department of AGF has planned to use chemical B as it appeared that it would be the cheaper of the two and their plans were based on a cost of chemical B of ₹15 per litre.

Due to subsequent market movement during the year the actual prices changed and if the concerned department had purchased efficiently, the cost would have been:

Chemical A	₹15.40 per litre
Chemical B	₹16.00 per litre

Production of Agrofresh spray was 1,000 litres and the usage of chemical B was 12,800 litres at a cost of ₹2,09,920.

You are the CEO of AGF and the management accountant has sent to you the following suggestions through e-mail:

"I feel that in our particular circumstances the traditional approach to variance analysis is of little use as for some of our products we can utilize one of several equally suitable chemicals and we always plan to use such chemical which will lead to cheapest production costs. However due to sharp market movements, we are frequently trapped by the sharp price changes which lead to the choice of expensive alternative at the end."

Required

To check the reality in the content of the mail, you asked, the management accountant of the company:

(i) to CALCULATE the material variances for Agrofresh by using

- Traditional Variance Analysis
- Planning and Operational Variances

(ii) to ANALYSE how planning and operational variances approached the variances.

(iii) to ANALYSE how the advanced variances are useful to your organisation.

Variance Analysis in Activity Based Costing

5. Krishna is Chief Financial Officer of millets.com, an internet company that enables customer to order for delivery of different millets by accessing its website. Krishna is concerned with the efficiency and effectiveness of the financial function. He collects the following information for three finance activities in 2023.

Rate per unit of Cost Driver

Activity	Activity Level	Cost Driver	Static Budget Amount (₹)	Actual Amount (₹)
Receivables	Output unit	Remittance	6.39	7.50
Payables	Batch	Invoices	29.00	28.00
Travel expenses	Batch	Travel claims	76.00	74.00

The output measure is the number of deliveries which is the same as the number of remittances. The following additional information are also given:

	Budgeted	Actual
Number of deliveries	10,00,000	9,48,000
Delivery Batch size	5	4.468
Travel expenses Batch size	500	501.587

Required

CALCULATE the flexible budget variances for 2023 to :

(i) Receivable Activities

(ii) Payable Activities

(iii) Travel expense Activities

(Ignore fractions in all calculations)

6. WDG Limited uses activity-based costing to allocate variable manufacturing overhead costs to products. The company identified three activities with the following information for last quarter:

Activity	Standard Rate	Standard Quantity per unit produced	Actual Costs	Actual Quantity
Indirect Materials	₹20 per kilogram	0.5 kilogram per unit	₹9,40,000	48,000 kilogram
Product Testing	₹3 per test minute	10 minutes per unit	₹22,50,000	7,40,000 test minutes
Energy	₹0.20 per minute of machine time	4 minutes of machine time per unit	₹70,000	3,60,000 minutes of machine time

The company produced 80,000 units in the last quarter. Company policy is to investigate all variances above 5% of the flexible budget amount for each activity.

Required

(i) CALCULATE variable overhead expenditure variance and variable overhead efficiency variance for each of the activities using activity-based costing. Clearly indicate each variance as favourable or unfavourable / adverse.

(ii) INTERPRET the results of variable overhead efficiency variance as calculated in (i) above in respect of indirect materials and product testing activity.

(iii) IDENTIFY the variances that should be investigated according to company policy. Show calculations to support your answer.

7. JPY Limited produces a single product. It has recently automated part of its manufacturing plant and adopted Total Quality Management (TQM) and Just-in- Time manufacturing system. No inventories are held for material as well as for finished product. The company currently uses standard absorption costing system. Following are related to fourth quarter of 2023-24:

	Budget	Actual
Production and Sales	1,00,000 units	1,10,000 units
Direct Materials	2,00,000 kg. @ ₹30/kg	2,50,000 kg. @ ₹31.20/kg.
Direct Labour Hours	25,000 hrs. @ ₹300/ hr	23,000 hrs. @ ₹300/ hr.
Fixed Production Overhead	₹3,20,000	₹3,60,000

Production overheads are absorbed on the basis of direct labour hours.

The CEO intends to introduce activity based costing system along with TQM and JIT for better cost management. A committee has been formed for this purpose. The committee has further analysed and classified the production overhead of fourth quarter as follows:

	Budget	Actual
Costs:		
Material Handling	₹96,000	₹1,24,000
Set Up	₹2,24,000	₹2,36,000
Activity:		
Material Handling (orders executed)	8,000	8,500
Set Up (production runs)	2,000	2,100

Revision of standards relating to fourth quarter were made as below:

	Original Standard	Revised Standard
Material Content *per unit*	2 kg	2.25 kg
Cost of Material	₹30 per kg	₹31 per kg
Direct Labour Hours	15 minutes	12 minutes

Required

(i) CALCULATE Planning and Operational Variances relating to material price, material usage, labour efficiency, and labour rate.

(ii) CALCULATE overhead expenditure and efficiency variance using Activity Based Costing principles.

Reconciliation of Profit

8. Established in the year 1999, **FF Company** is the pioneer of fast food in Southampton. It delivers a truly fresh, affordable, made to order sandwiches, burger, and other meal in a friendly and relaxed environment. The popularity of the sandwiches, burger etc. continued to grow over the decades but one thing remained the same and that was its core values and principles:

- Always provide exceptional service to valued guests;
- Provide the highest quality menu items at a price everyone can afford and enjoy; and
- Keep operating costs low and ensure to have great systems in place and never stop improving.

It provides a comfortable place for people to unwind over interesting conversations. From the beginning, as it continues to grow, it is guided by passion for delighting customers by serving fresh, delicious food right in front of customer.

The performance report* for FY 2023-24 was presented at the management committee meeting as follows:

Particulars	Budget	Actual	Variance
Sales / Production (no. of burgers)	2,00,000	1,65,000	(35,000)
Sales (£)	10,50,000	8,46,450	(2,03,550)
Less: Variable Costs (£)	6,33,000	5,37,075	95,925
Less: Fixed Costs (£)	1,57,500	1,65,000	(7,500)
Profit	2,59,500	1,44,375	(1,15,125)

** burger segment*

The Management Accountant of FF believed that the size of the fast-food market deriving the budget number of burgers to be sold is over-estimated. He has computed the value of the sales volume contribution planning variance to be 26,062.50 adverse.

Further, the report also included customer's feedback and the majority of comments were regarding delay in service time. One of feedback was as follows:

"I ordered two burgers at 2:10 pm. After half an hour (30 minutes) of waiting I called the waiter and asked him what happened? he told me that he will check with kitchen. I got the order after 45 minutes of waiting, this cafe is not good in delivery time"

The budgeted data shown in the table is based on the assumption that total market size would be 4,00,000 units.

Required

(i) PREPARE a reconciliation statement of budgeted profit to actual profit through marginal costing approach in as much detail as possible.

(ii) EXPLAIN the implications of the reconciliation statement.

(iii) Management is worried about customer's feedback. ADVISE measures to improve delivery service time.

Interpretation of Variances

9. NZSCO Ltd. uses a standard costing system for manufacturing its single product 'ANZ'. Standard Cost Card per unit is as follows:

	(₹)
Direct Material (1 kg per unit)	20
Direct Labour (6 hrs @ ₹8 per hour)	48
Variable Overheads	24

Actual and Budgeted Activity Levels in units for the month of Feb'24 are:

	Budget	Actual
Production	50,000	52,000

Actual Variable Costs for the month of Feb'24 are given as under:

Direct Material	10,65,600
Direct Labour (3,00,000 hrs)	24,42,000
Variable Overheads	12,28,000

Required

INTERPRET Direct Labour Rate and Efficiency Variances.

10. T-tech is a Taiwan based firm, that designs, develops, and sells audio equipment. Founded in 1975 by Mr. Boss, firm sells its products throughout the world. T-tech is best known for its home audio systems and speakers, noise cancelling headphones, professional audio systems and automobile sound systems. Extracts from the budget are shown in the following table:

Home Audio System Division
Jan'2024

System	Sales (units)	Selling Price `	Standard Cost (per System) ₹
3,000 W PMPO	1,500	18,750	12,500
5,000 W PMPO	500	50,000	26,250

The Managing Director has sent you a copy of an email he received from the Sales Manager 'K'. The content of the email was as follows:

"We have had an outstanding month. There was an adverse Sales Price Variance on the 3,000 W PMPO Systems of ₹ 22,50,000 but I compensated for that by raising the price of 5,000 W PMPO Systems. Unit sales of 3,000 W PMPO Systems were as expected but sales of the 5,000 W PMPOs were exceptional and gave a Sales Margin Volume Variance of ₹ 23,75,000. I think I deserve a bonus!"

The managing Director has asked for your opinion on these figures. You got the following information:

Actual results for Jan' 2024 were:

System	Sales (units)	Selling Price ₹
3,000 W PMPO	1,500	₹17,250
5,000 W PMPO	600	₹53,750

The total market demand for 3,000 W PMPO Systems was as budgeted but as a result of suppliers reducing the price of supporting UHD TV System the total market for 5,000 W PMPO Systems raised by 50% in Jan'2024.

The company had sufficient capacity to meet the revised market demand for 750 units of its 5,000 W PMPO Systems and therefore maintained its market share.

Required

(i) CALCULATE the following Operational Variances based on the revised market details:

- Sales Margin Mix Variance
- Sales Margin Volume Variance

(ii) COMMENT briefly on the measurement of the K's performance.

11. Aquatic Feed (AF) is the leading manufacturer of fish and other sea animal feed. AF has made its credit pioneering effort and service for over one decade in development of culture, processing and exports with its state-of-art fish feed and processing plants. Hallmark of AF is constant upgradation of aquaculture technology bringing latest developments in the field to the doorstep of the Indian aquaculture farmer. It stands as a leading provider of high quality feed, best technical support to the farmer and caters to the quality standards of global customers.

One of its fish feed product is "B" which is produced by mixing and heating three ingredients: B_1, B_2 and B_3. It uses a standard costing system to monitor its costs.

The standard material cost for 100 Kg. of "B" is as follows:

Ingredients	Standard Qty. (Kg)	Cost per Kg. (₹)	Cost per 100 Kg. of "B" (₹)
B_1	42	3	126
B_2	62	6	372
B_3	21	2	42
	125		540

Notes

- B_1, B_2 and B_3 are agricultural products. Their quality and price change significantly every year. Standard prices are determined at the average market price over the last three years. AF has a purchasing manager responsible for purchasing and pricing.
- The standard mix is decided by the Managing Partner having 15 years' rich experience in aquaculture field. The last time this was done at time of launching the "B" that was six years back. The standard mix has not been changed since.
- Mixing and heating process are subject to some evaporation loss.

In current month 4,605 Kg. of "B" was produced, using the following ingredients:

Ingredients	Actual Qty. (Kg)	Cost per Kg. (₹)	Total Cost of "B" (₹)
B_1	2,202	2.8	6,165.60
B_2	2,502	7	17,514
B_3	921	2	1,842
	5,625		25,521.60

At every month end, the production manager receives a statement from the Managing Partner. This statement contains material price and usage variances for the month and no other feedback on the efficiency of the processes is provided.

Required

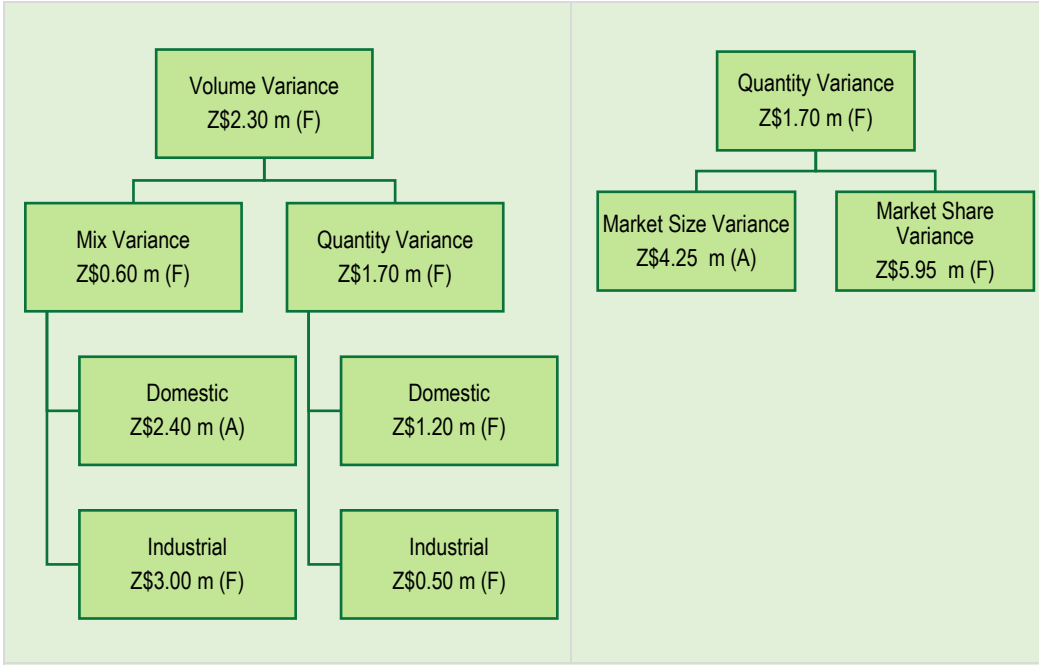
EVALUATE the performance measurement system in AF.

12. ZM Inc. is a family run business based in Country Z. It is a manufacturer of two types of flooring rolls, one for industrial usage and the other for domestic residential use, throughout mainland of Country Z. The company started with the production of residential domestic flooring. It is now an established player in this market. In the recent years, the company pioneered into making flooring rolls for industrial usage. The management has the following information about the budgeted and actual data for 2024-

Particulars	Static Budget			Actual Result		
	Industrial	Domestic	Total	Industrial	Domestic	Total
Unit Sales in Rolls ('000)	200	600	800	270	570	840
Contribution Margin (Z$ in millions)	10.00	24.00	34.00	12.825	15.390	28.215

In late 2023, marketing research estimated market volume for industrial and domestic flooring at 8 m Rolls. Actual market volume for 2024 was 7 m Rolls. Actual sales trend of ZM Inc. is indicative of the sales trends for individual products in the future years, it is likely that they might continue to sell a similar sales trajectory.

A newly appointed accountant has computed following variances from the above data:



'm' refers to million; assume figures in this chart are correct.

Required

Assuming yourself as a performance management expert of ZM, the CEO has asked you to:

(i) ANALYSE the variances computed by the accountant;

(ii) ADVISE strategic inputs on 'two types of flooring rolls' to help out her in strategic decision making.

ANSWERS/ SOLUTIONS

1. (i) Traditional Variances

Usage Variance	=	(2,500 Kg – 2,700 Kg) × ₹1.50
	=	₹300 (A)
Price Variance	=	(₹1.50 – ₹2.40) × 2,700 Kg
	=	₹2,430 (A)
Total Variance	=	₹300 (A) + ₹2,430 (A)
	=	₹2,730 (A)

(ii) Operational Variances

Usage Variance	=	(2,500 Kg – 2,700 Kg) × ₹2.25
	=	₹450 (A)
Price Variance	=	(₹2.25 – ₹2.40) × 2,700 Kg
	=	₹405 (A)
Total Variance	=	₹450 (A) + ₹405 (A)
	=	₹855 (A)

Planning Variances

Controllable Variance	=	(₹2.00 – ₹2.25) × 2,500 Kg
	=	625 (A)
Uncontrollable Variance	=	(₹1.50 – ₹2.00) × 2,500 Kg
	=	1,250 (A)
Total Variance	=	₹625 (A) + ₹1,250 (A)
	=	₹1,875 (A)
Reconciliation	=	₹855 (A) + ₹1,875 (A)
	=	₹2,730 (A)

A Planning Variance simply compares a revised standard to the original standard. An Operational Variance simply compares the actual results against the revised amount. Controllable Variances are those variances which arises due to inefficiency of a cost centre /department. Uncontrollable Variances are those variances which arises due to factors beyond the control of the management or concerned department of the organization.

Planning variances are generally *not controllable*. Where a revision of standards is required due to environmental/ technological changes that were not anticipated at the time the budget was prepared, the planning variances are truly *uncontrollable*. However, standards that failed to anticipate known market trends when they were set will reflect faulty standard-setting: it could be argued that these variances were *controllable* at the planning stage.

2. (i) (a) Traditional Variances

Usage Variance = (27,500 Kgs. – 27,225 Kgs.) × ₹10
= ₹2,750 (F)

Price Variance = (₹10 – ₹9.50) × 27,225 Kgs.
= ₹13,612.50 (F)

Total Variance = ₹2,750 (F) + ₹13,612.50 (F)
= ₹16,362.50 (F)

(b) Operational Variances

Usage Variance = (26,125 Kgs. – 27,225 Kgs.) × ₹9.70
= ₹10,670 (A)

Price Variance = (₹9.70 – ₹9.50) × 27,225 Kgs.
= ₹5,445 (F)

Total Variance = ₹10,670 (A) + ₹5,445 (F)
= ₹5,225 (A)

Planning Variances

Usage Variance = (27,500 Kgs. – 26,125 Kgs.) × ₹10
= ₹13,750 (F)

Price Variance = (₹10 – ₹9.70) × 26,125 Kgs.
= ₹7,837.50 (F)

Total Variance = ₹13,750 (F) + ₹7,837.50 (F)
= ₹21,587.50 (F)

(ii) Interpretation

It is important to note that an innovation in technology is outside the control of Ski Slope and is, by nature, a planning 'error'. Equally, the better negotiation of a price should be recognised as an operational matter. Operational variances are self-evidently under the control of operational management, so operational efficiency must be assessed with only these figures in mind. The material procurement department has clearly done well by negotiating a price reduction beyond the market dip. One might question the quality of the ice, as the usage variance is adverse (possibly the ice fails to cover the field and so more is required). Obviously, the favourable price variance is smaller than the adverse usage variance, thus, overall performance is quite poor. A supervisor cannot assess variances in isolation from each other.

3. Comment

As the management accountant states, and the analysis (W.N.1) presents, the overall variance for the KONI is nil. The cumulative adverse variances exactly offset the favourable variances i.e., sales price variance and circuit designer's efficiency variance. However, this traditional analysis does not clearly show the efficiency with which the KONI operated during the quarter, as it is difficult to say whether some of the variances arose from the use of incorrect standards, or whether they were due to efficient or inefficient application of those standards.

In order to determine this, a revised ex post plan should be required, setting out the standards that, with hindsight, should have been in operation during the quarter. These revised ex post standards are presented in W.N.2.

As seen from W.N.3, *on the cost side*, the circuit designer's rate variance has changed from adverse to favourable, and the price variance for circuit X, while remaining adverse, is significantly reduced in comparison to that calculated under the traditional analysis (W.N.1); *on the sales side*, sales price variance, which was particularly large and favourable in the traditional analysis (W.N.1), is changed into an adverse variance in the revised approach, reflecting the fact that the KONI failed to sell at prices that were actually available in the market.

Further, variances arose from changes in factors external to the business (W.N .4), which might not have been known or acknowledged by standard-setters at the time of planning are beyond the control of the operational managers. The distinction between variances is necessary to gain a realistic measure of operational efficiency.

W.N.1

KONY India Ltd.

Quarter-1

Operating Statement

Particulars	Favourable RM	Adverse RM	RM
Budgeted Contribution			26,000
Sales Price Variance [(RM 79 - RM 50) × 2,000 units]	58,000	---	
Circuit X Price Variance [(RM 2.50 – RM 4.50) × 21,600 units]		43,200	
Circuit X Usage Variance [(20,000 units - 21,600 units) × RM 2.50]		4,000	
Circuit Designer's Rate Variance [(RM 2 - RM 3) × 11,600 hrs.]		11,600	
Circuit Designer's Efficiency Variance [(12,000 hrs. - 11,600 hrs.) × RM 2.00]	800		NIL
Actual Contribution			26,000

W.N.2

Statement Showing Original Standards, Revised Standards, and Actual Results for Quarter 1

	Original Standards (ex-ante)		Revised Standards (ex-post)		Actual	
Sales	2,000 units × RM 50.00	RM 1,00,000	2,000 units × RM 82.50	RM 1,65,000	2,000 units × RM 79.00	RM 1,58,000
Circuit X	20,000 units × RM 2.50	RM 50,000	20,000 units × RM 4.25	RM 85,000	21,600 units × RM 4.50	RM 97,200
Circuit Designer	12,000 hrs. × RM 2.00	RM 24,000	12,000 hrs. × RM 3.125	RM 37,500	11,600 hrs. × RM 3.00	RM 34,800

W.N.3

Statement Showing Operational Variances

Particulars	RM	RM
Operational Variances		16,500 (A)
Sales Price [(RM 79.00 - RM 82.50) × 2,000 units]	7,000 (A)	
Circuit X Price [(RM 4.25 - RM 4.50) × 21,600 units]	5,400 (A)	
Circuit X Usage [(20,000 units – 21,600 units) × RM 4.25]	6,800 (A)	
Circuit Designer Rate [(RM 3.125 - RM 3.00) × 11,600 hrs.]	1,450 (F)	
Circuit Designer Efficiency [(12,000 hrs.– 11,600 hrs.) × RM 3.125]	1,250 (F)	

W.N.4

Statement Showing Planning Variances

Particulars	RM	RM
Planning Variance		16,500 (F)
Sales Price [(RM 82.50 - RM 50.00) × 2,000 units]	65,000 (F)	
Circuit X Price [(RM 2.50 - RM 4.25) × 20,000 units]	35,000 (A)	
Circuit Designer Rate [(RM 2.00 - RM 3.125) × 12,000 hrs.]	13,500 (A)	

4. (i) Traditional Variances

Usage Variance = (12,000 lt. – 12,800 lt.) × ₹ 15.00
= ₹ 12,000 (A)

Price Variance = (₹ 15.00 – ₹ 16.40) × 12,800 lt.
= ₹ 17,920 (A)

Total Variance = ₹ 12,000 (A) + ₹ 17,920 (A)
= ₹ 29,920 (A)

Operational Variances

Usage Variance = (12,000 lt. – 12,800 lt.) × *₹ 16.00*
= ₹ 12,800 (A)

Price Variance = (₹ 16.00 – ₹ 16.40) × 12,800 lt.
= ₹ 5,120 (A)

Total Variance = ₹ 12,800 (A) + ₹5,120 (A)
= ₹ 17,920 (A)

Planning Variances

Controllable Variance = (₹ 15.40 – ₹ 16.00) × *12,000 lt.*
= ₹ 7,200 (A)

Uncontrollable Variance = (₹ 15.00 – ₹15.40) × *12,000 lt.*
= ₹ 4,800 (A)

Total Variance = ₹ 7,200 (A) + ₹ 4, 800 (A)
= ₹ 12,000 (A)

Reconciliation = ₹ 17,920 (A) + ₹ 12,000 (A)
= ₹ 29,920 (A)

Direct Material Usage Operational Variance using *Standard Price*, and the Direct Material Price Planning Variance based on *Actual Quantity* can also be calculated. This approach reconciles the Direct Material Price Variance and Direct Material Usage Variance calculated in part.

(ii) Traditional variance analysis is applied based on the assumption that whole of the variance is due to operational deficiencies and the planning associated with setting the original standard is perfectly correct. But this assumption is not practical. When the conditions are volatile and dynamic, traditional variances need to be analysed into planning and operational variances. Planning variances try to explain the extent to which the original standard needs to be adjusted to reflect changes in operating conditions between the current situation and that imagined when the standard was originally derived. Planning variances are generally *not controllable and may need to revise to cater the changes due to* environmental/ technological changes at a later stage. In certain situation planning variances can be considered *controllable* as well. Whereas operational variances explain the extent to which adjusted standards have been achieved. Operational variances are calculated after the planning variances have been established and are thus a realistic way of assessing performance. So, it indicates a reality check of traditional variance analysis.

In AGF, as per traditional approach total variances are ₹29,920 (adverse), out of which ₹17,920 (adverse) accounts for total operational variance and ₹12,000 (adverse) is for total planning variance. It is necessary to analyse planning variances further. The planning variance of ₹12,000 (adverse) can be divided into an *uncontrollable* adverse variance of ₹4,800 and a *controllable* adverse variance of ₹7,200. Similarly, total operational variance can be sub classified as adverse price variance of ₹5,120 and adverse usage variance of ₹12,800. This analysis gives a clearer indication of the inefficiency of the purchasing function by the concerned department. The performance of the staff of the purchasing department should be evaluated/ rewarded based on variances which are *controllable*. If an adverse *uncontrollable* variance of ₹4,800 is reported in the performance reports this is likely to lead to dysfunctional motivation effects to the purchase department.

(iii) In today's cutthroat competition, managers must react quickly and accurately to the changes in technology, price fluctuation, consumer tastes, laws and regulations, economic conditions, political conditions, and international conditions etc. which are changing rapidly and dramatically. Accordingly, management accountant should be able to provide necessary inputs by a proper analysis of the things that pertains to his/her area like effect of changes in price. The unique features of advanced variance analysis are that it considers *different market conditions* and *changes in the dynamic environment*.

Moreover, advanced variances classify variances into *controllable* and *uncontrollable* variances and help the management to find out reasons for adverse variances so that corrective action can be taken. Similarly, if any adverse variances have arrived, because of changes in the market condition like inflation, it has to be differentiated from the other variances.

AGF is a type of organization where management of performance can be done only through advanced variance analysis. Advanced variance analysis of AGF shows that it has adverse planning variance as well as adverse operational variance. Further, the emergence of *controllable* and *uncontrollable* variances makes it a perfect case of advance variance analysis in AGF. In AGF, sharp price changes which lead to the choice of expensive alternative and efficiency of purchase department need to be analyzed, reported, and dealt separately by the joint effort of the management accountant and the top management. Hence, advanced variance analysis in AGF is an absolute necessity.

5. Activity-based costing, flexible-budget variances for finance function activities:

(i) Receivables

'Receivables' is an output unit level activity. Its flexible-budget variance can be calculated as follows:

Flexible Budget Variance

= Flexible Budget Costs – Actual Costs

= ₹6.39 × 9,48,000 – ₹7.50 × 9,48,000

= ₹60,57,720 – ₹71,10,000

= ₹10,52,280 (A)

(ii) Payables

'Payables' is a batch level activity.

	Static-Budget Amounts	Actual Amounts
a. Number of deliveries	10,00,000	9,48,000
b. Batch size (units per batch)	5	4.468
c. Number of batches (a / b)	2,00,000	2,12,175
d. Cost per batch	₹29	₹28
e. Total payables activity cost (c×d)	₹58,00,000	₹59,40,900

Step 1: The number of batches in which payables should have been processed

= 9,48,000 actual units / 5 budgeted units per batch

= 189,600 batches

Step 2: The flexible-budget amount for payables

= 1,89,600 batches × ₹29 budgeted cost per batch

= ₹54,98,400

The flexible-budget variance can be computed as follows:

Flexible-Budget Variance

= Flexible-Budget Costs – Actual Costs

= 1,89,600 × ₹29 – 2,12,175 × ₹28

= ₹54,98,400 – ₹59,40,900

= ₹4,42,500 (A)

(iii) Travel Expenses

Travel expenses is a batch level activity.

	Static-Budget Amounts	Actual Amounts
a. Number of deliveries	10,00,000	9,48,000
b. Batch size (units per batch)	500	501.587
c. Number of batches (a / b)	2,000	1,890
d. Cost per batch	₹76	₹74
e. Total travel expenses activity cost (c×d)	₹1,52,000	₹1,39,860

Step 1: The number of batches in which the travel expense should have been processed

= 948,000 actual units/ 500 budgeted units per batch

= 1,896 batches

Step 2: The flexible-budget amount for travel expenses

= 1,896 batches × ₹76 budgeted cost per batch

= ₹1,44,096

The flexible budget variance can be calculated as follows:

Flexible Budget Variance

= Flexible-Budget Costs – Actual Costs

= 1,896 × ₹76 – 1,890 × ₹74

= ₹1,44,096 – ₹1,39,860

= ₹4,236 (F)

6. (i) Indirect Materials

Efficiency Variance = Cost Impact of *undertaking activities* more/ less than *standard*

= (0.50kg. × 80,000units – 48,000 kg.) × ₹20

= ₹1,60,000 (A)

Expenditure Variance = Cost impact of paying more/ less than standard for actual activities undertaken

= 48,000kg. × ₹20 – ₹9,40,000

= ₹20,000 (F)

Product Testing

Efficiency Variance = Cost Impact of *undertaking activities* more/ less than *standard*

= (10 mins. × 80,000 units – 7,40,000 mins.) × ₹3

= ₹1,80,000 (F)

Expenditure Variance = Cost impact of paying more/ less than standard for actual activities undertaken

= 7,40,000mins × ₹3 – ₹22,50,000

= ₹30,000 (A)

Energy

Efficiency Variance = Cost Impact of *undertaking activities* more/ less than *standard*

= (4 mins. × 80,000 units – 3,60,000 mins.) × ₹0.20

= ₹8,000 (A)

Expenditure Variance = Cost impact of paying more/ less than standard for actual activities undertaken

= 3,60,000mins × ₹0.20 – ₹70,000

= ₹2,000 (F)

(ii) Indirect Materials

WDG actually spent 48,000 kg. or 8,000 kg. more than the standard allows. At a predetermined rate of ₹20 per kg., efficiency variance is 1,60,000 (A). Since the actual quantity was higher than the standard, the variance is unfavorable. This adverse variance, could have been caused by the inferior quality, result of carelessness handling of materials by production workers or could be as a result of change in methods of production, product specifications or the way in which quality of the product is checked or controlled.

Product Testing

Favorable efficiency variance amounting to ₹1,80,000 indicates that fewer testing minutes were expended during the quarter than the standard minutes required for the level of actual output. This may be due to employment of a higher skilled labor or improvement of skills of existing workforce through training and development leading to improved productivity etc.

(iii) Flexible Budget

Indirect Materials	= (0.50 kg. × 80,000 units) × ₹20 = ₹8,00,000	= ₹8,00,000× 5% = ₹40,000
Product Testing	= (10 mins. × 80,000 units) × ₹3 = ₹24,00,000	= ₹24,00,000 × 5% = ₹1,20,000
Energy	= (4 mins. × 80,000) × ₹0.20 = ₹64,000	= ₹64,000 × 5% = ₹3,200

Efficiency Variance for all the three activities are more than 5% of their flexible budget amount. So, according to the company policy, efficiency variances should be investigated.

Alternative

Statement Showing Identification of Variances to be investigated

	Calculation	Variance % of Flexible Budget	Criteria	Investigate Y or N
Indirect Materials				
Efficiency Variance	$\left(\frac{1,60,000}{8,00,000}\times 100\right)$	20%	5%	Y
Expenditure Variance	$\left(\frac{20,000}{8,00,000}\times 100\right)$	2.5%	5%	N
Product Testing				
Efficiency Variance	$\left(\frac{1,80,000}{24,00,000}\times 100\right)$	7.5%	5%	Y
Expenditure Variance	$\left(\frac{30,000}{24,00,000}\times 100\right)$	1.25%	5%	N
Energy				
Efficiency Variance	$\left(\frac{8,000}{64,000}\times 100\right)$	12.5%	5%	Y
Expenditure Variance	$\left(\frac{2,000}{64,000}\times 100\right)$	3.125%	5%	N

7. (i) Workings

Factor	Original Standards (ex-ante)		Revised Standards (ex-post)		Actual (1,10,000 units)	
Material	1,10,000 units×2 kgs. ×₹30	₹66,00,000	1,10,000 units×2.25 kgs. ×₹31	₹76,72,500	2,50,000 kgs. ×₹31.20	₹78,00,000
Labour	1,10,000 × 15/60 hrs.× ₹300	₹82,50,000	1,10,000 × 12/60 hrs.× ₹300	₹66,00,000	23,000 hrs.× ₹300	₹69,00,000

Material

Traditional Variances

Usage Variance = (2,20,000 Kgs. – 2,50,000 Kgs.) × ₹30
= ₹9,00,000 (A)

Price Variance = (₹30.00 – ₹31.20) × 2,50,000 Kgs.
= ₹3,00,000 (A)

Total Variance = ₹9,00,000 (A) + ₹3,00,000 (A)
= ₹12,00,000 (A)

Planning Variances

Usage Variance = (2,20,0000 Kg. – 2,47,500 Kg.) × ₹30
= ₹8,25,000 (A)

Price Variance = (₹30 – ₹31) × **2,47,500 Kgs.**
= ₹2,47,500 (A)

Total Variance = ₹8,25,000 (A) + ₹2,47,5000 (A)
= ₹10,72,500 (A)

Operational Variances

Usage Variance = (2,47,500 Kg. – 2,50,000 Kg.) × **₹31**
= ₹77,500 (A)

Price Variance = (₹31.00 – ₹31.20) × 2,50,000 Kg.
= ₹50,000 (A)

Total Variance = ₹77,500 (A) + ₹50,000 (A)
= ₹1,27,500 (A)

Direct Material Usage Operational Variance using *Standard Price*, and the Direct Material Price Planning Variance based on *Actual Quantity* can also be calculated. This approach reconciles the Direct Material Price Variance and Direct Material Usage Variance calculated in part.

Labour

Traditional Variances

Efficiency Variance = (27,500 hrs. – 23,000 hrs.) × ₹300
= ₹13,50,000 (F)

Rate Variance = (₹300 – ₹300) × 23,000 hrs.
= NIL

Total Variance = ₹13,50,000 (F) + NIL
= ₹13,50,000 (F)

Planning Variances

Efficiency Variance = (27,500 hrs. – 22,000 hrs.) × ₹300
= ₹16,50,000 (F)

Rate Variance* = (₹300 – ₹300) × **22,000 hrs.**
= NIL

Total Variance = ₹16,50,000 (F) + 0
= ₹16,50,000 (F)

Operational Variances

Efficiency Variance = (22,000 hrs. – 23,000 hrs.) × **₹300**
= ₹3,00,000 (A)

Rate Variance = (₹300 – ₹300) × 23,000 hrs.
= NIL

Total Variance = ₹3,00,000 (A) + 0
= ₹3,00,000 (A)

Direct Labour Efficiency Operational Variance using *Standard Rate*, and the Direct Labour Rate Planning Variance based on *Actual Hours* can also be calculated. This approach reconciles the Direct Labour Rate Variance and Direct Labour Efficiency Variance calculated in part.

(ii) Material Handling

Efficiency Variance

= Cost Impact of *undertaking activities* more/ less than *standard*

= (8,800 orders* – 8,500 orders) × ₹12

= ₹3,600 (F)

(*) $\left(\frac{8,000\ \text{orders}}{1,00,000\ \text{units}}\right) \times 1,10,000\ \text{units}$

Expenditure Variance

= Cost impact of paying more/ less than standard for actual activities undertaken

= 8,500 orders × ₹12 – ₹1,24,000

= ₹22,000 (A)

Setup

Efficiency Variance

= Cost Impact of *undertaking activities* more/ less than *standard*

= (2,200 runs* – 2,100 runs) × ₹112

= ₹11,200 (F)

(*) $\left(\frac{2,000\ \text{runs}}{1,00,000\ \text{units}}\right) \times 1,10,000\ \text{units}$

Expenditure Variance

= Cost impact of paying more/ less than standard for actual activities undertaken

= 2,100 runs × ₹112 – ₹2,36,000

= ₹800 (A)

8. (i) Statement of Reconciliation - Budgeted Vs Actual Profit

Particulars	£
Budgeted Profit	2,59,500
Less: Sales Volume Contribution - Planning Variance (Adverse)	26,062.50
Less: Sales Volume Contribution - Operational Variance (Adverse)	46,912.50
Less: Sales Price Variance (Adverse)	19,800
Less: Variable Cost Variance (Adverse)	14,850
Less: Fixed Cost Variance (Adverse)	7,500
Actual Profit	1,44,375

Workings

Basic Workings

Budgeted Market Share (in %) = $\frac{2,00,000}{4,00,000}$ = 50%

Budgeted Contribution = £10,50,000 – £6,33,000 = £4,17,000

Average Budgeted Contribution (*per unit)*

= $\frac{£4,17,000}{2,00,000}$ = £2.085

Volume Contribution Planning = Budgeted Market Share % × (Actual Industry Sales Quantity *in units* – Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)

⇒ £26,062.50 (A) = 50% × (Actual Industry Sales Quantity *in units* – 4,00,000 units) × £2.085

⇒ Actual Industry Sales Quantity = 3,75,000 units

Actual Market Share (in %) = $\frac{1,65,000}{3,75,000}$ = 44%

Standard Sales Price *per unit* = $\frac{£10,50,000}{2,00,000}$ = £5.25

Actual Sales Price *per unit* = $\frac{£8,46,450}{1,65,000}$ = £5.13

Standard Variable Cost *per unit* = $\frac{£6,33,000}{2,00,000}$ = £3.165

Actual Variable Cost *per unit* = $\frac{£5,37,075}{1,65,000}$ = £3.255

CALCULATION OF VARIANCES

Sales Variances

Volume Contribution Operational	=	(Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)
	=	(44% – 50 %) × 3,75,000 units × £2.085
	=	£46,912.50 (A)
Price	=	Actual Sales – Standard Sales
	=	Actual Sales Quantity × (Actual Price – Standard Price)
	=	1,65,000 units × (£5.13 – £5.25)
	=	£19,800 (A)

Variable Cost Variances

Cost	=	Standard Cost for Production – Actual Cost
	=	Actual Production × (Standard Cost *per unit* – Actual Cost *per unit*)
	=	1,65,000 units × (£3.165 – £3.255)
	=	£14,850 (A)

Fixed Cost Variances

Expenditure	=	Budgeted Fixed Cost – Actual Fixed Cost
	=	£1,57,500 – £1,65,000
	=	£7,500 (A)

(ii) Implications of Reconciliation Statement

In the revised statement, the sales volume variance has been detailed by the way of two variances i.e., planning and operational variances. This kind of detailed information assists the company to check, which kind of variances are under the management control, and which are not. FF has adverse volume contribution planning variance, and the reason could be the environmental / market changes, that was not anticipated at the time of budget preparation, so they are not under management control and hence, no one is responsible for this. On the other hand, the sales volume contribution operational variance was under control of the managers, and they should be held responsible for the same. The reason of adverse sales volume contribution operational variance could be unsuccessful direct selling efforts/marketing efforts. FF has adverse sales price variance as well. It indicates that the burgers were sold for lower price than standard. The reason of this could be unforeseen market competitive price, tapping new market etc.

Further, revised reconciliation statement delivers little information about the variable cost and fixed cost variances. They both are adverse. Fixed cost consists of many items such as salaries, annual maintenance cost, rent and insurance etc. Often fixed cost items are not affected in short run in response to change in the level of activity, but they might change in response to other factors such as price. This may cause increase expenditure on fixed overheads. A meaningful analysis of fixed cost variance requires a line to line comparison of budgeted cost with actual cost.

In case of FF, the variable cost may be made up of large individual different items such as vegetables, gas, indirect labour, regular maintenance cost etc. Control of variable cost also requires line by line analysis for each individual item. The adverse variable cost variance simply reveals that FF incurred more on variable cost than expected. However, it is necessary to take into consideration the causes of this adverse variance, which is beyond the control of the management, for instance, the unusual price hike in vegetables in case of unseasonal rainfall.

(iii) Measures to Improve Fast Food Delivery Service Time

Customers expect that their food order to be delivered quickly. From customer's feedback in the question, it is evident that FF has a problem in food delivery, due to which, customers go unsatisfied. The reason of late delivery could be non- availability of raw material on time or employees not working properly etc. The reason of employees not working properly could be job dissatisfaction which may be due to improper working conditions, low salary, or no reward for overtime etc.

In order to reduce delivery time, raw material should be made available in stock based on daily requirement. FF may follow quantitative approach to inventory problems, which lays down clear guidelines that when to re-order or alert the management in exceptional situations.

In addition, FF must also address the issues related to employee and involve them in a loop. FF could improve the employee satisfaction with proper working conditions, better pay, training, and growth opportunities.

Moreover, it is important that customers should be informed about approximate delivery time since this will reduce customer's anxiety and will proactively reduce any complaints over long waits for delivery of food. If unexpected delays occur, it is important to communicate with customers, apologies for the delay and inform them about the new approximate delivery time along with valid reason.

In addition to this, FF can also introduce pagers or install electronic board displaying ticket number or self- serve kiosk allowing customers to roam around or order in advance so that they do not have long waiting time.

9. Interpretation

Direct Labour Rate Variance

Adverse Labour Rate Variance indicates that the labour rate per hour paid is more than the set standard. The reason may include among other things such as:

(1) While setting standard, the current/ future market conditions like pending labour negotiation/ cases, has not been considered (or predicted) correctly.

(2) The labour may have been told that their wage rate will be raised, or a bonus will be paid if they work efficiently.

Direct Labour Efficiency Variance

It indicates that the workers have produced actual production quantity in less time than the time allowed. The reason for favourable labour efficiency variance may include among the other things as follows:

(1) While setting standard, workers efficiency could not be estimated properly, this may happen due to non-observance of time and motion study.

(2) The workers may be new in the factory; hence, efficiency could not be predicted properly.

(3) The foreman or personnel manager responsible for labour efficiency, while providing his/ her input at the time of budget/ standard, has adopted conservative approach.

(4) The increase in the labour rate might have encouraged the labours to do work more efficiently.

In this particular case, it may have happened that since labour payment has been increased labour efficiency has also been increased. In a nutshell because of additional labour rate (Adverse), labour efficiency has gone up (Favourable)

Workings

Labour Rate Variance = Standard Cost of Actual Time – Actual Cost

= (SR × AH) – (AR × AH)

Or

= (SR – AR) × AH

= (₹8.00 – ₹8.14*) × 3,00,000 hrs.

= ₹42,000 (A)

(*)

$$\text{Actual Labour Rate per hour} = \frac{\text{Actual Paid}}{\text{Actual Hours}}$$

$$= \frac{₹\,24,42,000}{3,00,000\,hrs.}$$

= ₹8.14

Labour Efficiency Variance = Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time

= (SH × SR) – (AH × SR)

Or

= (SH – AH) × SR

= (3,12,000$ hrs. – 3,00,000 hrs.) × ₹8.00

= ₹96,000 (F)

($)

Standard Hours = Actual Production × Std. hrs. per unit

= 52,000 units × 6 hrs.

= 3,12,000 hrs.

10. (i) Statement Showing Sales Margin Mix Variance

System	Standard Margin per unit (₹)	Actual Qty. (units)	Revised Actual Quantity (units)	Difference	Variance (₹)
3,000 W PMPO	6,250	1,500	1,400	+100	+6,25,000 (F)
5,000 W PMPO	23,750	600	700	-100	23,75,000 (A)
Total		2,100			17,50,000 (A)

Statement Showing Sales Margin Volume Variance

System	Standard Margin per unit (₹)	Actual Qty. (units)	Budgeted Quantity (units)	Difference	Variance (₹)
3,000 W PMPO	6,250	1,500	1,500	0	-
5,000 W PMPO	23,750	600	750	-150	35,62,500 (A)
Total		2,100			35,62,500 (A)

(ii) A Planning Variance simply compares a revised standard (that should or would have been used if planners had known in advance what was going to happen) to the original standard. A planning variance is considered as not to be controllable by management.

The market size is not within the control of the sales manager and therefore variances caused by changes in the market size would be regarded as planning variances.

However, variances caused by changes in the selling prices and consequently the selling price variances and market shares would be within the control of the sales manager and treated as operating variances.

The market size variance compares the original and revised market sizes. This is unchanged for 3,000 W PMPO Systems so the only variance that occurs relates to the 5,000 W PMPO Systems and is ₹59,37,500 (F) [250 systems × ₹23,750].

It is vital to make this distinction because as can be seen from the scenario the measurement of the 'K''s performance is incomplete if the revised market size is ignored.

The favourable volume variance of ₹23,75,000 referred to in the 'K''s e-mail is made up of two elements, one of which, the market size, is a planning variance which is outside his control. It is this that has caused the overall volume variance to be favourable, and thus 'K' is not responsible for the overall favourable performance.

It has been stated in the question that "The total market demand for 3,000 W PMPO Systems was as budgeted but as a result of suppliers reducing the price of supporting UHD TV System the total market for 5,000 W PMPO Systems raised by 50% in Jan'2024. The company had sufficient capacity to meet the revised market demand for 750 units of its 5,000 W PMPO Systems and therefore maintained its market share. Thus, Budgeted Ratio has been taken 2:1 (1,500:750) instead of 3:1 (1,500:500) for computation of "Revised Actual Quantity (RAQ)".

11. The statement reported, ₹2,062 adverse material price variance. The responsibility for controlling the materials price variance is usually the purchasing manager's. Undoubtedly, in current scenario, the price of materials is largely beyond his or her control; however, the price variance can be influenced by such factors as quality, quantity discounts, distance of supplier's location, and so on. These factors are often under the control of the purchase manager. The production manager is responsible for material usage and cannot be held responsible for the material price variance.

Since total usage variance reported, ₹1,406 favourable, production manager could assume good performance. However, if usage variance is considered in more detail, through the mix and yield calculations, it can be observed that variance was driven by a **change in the mix** and by using a mix of ingredients which was different from standard, it has resulted in a saving of ₹840; Similarly, it has led to a favourable yield. It is worthwhile to note that changing the mix could impact the product quality and sales as well, however, no information has been given about this.

Prices and quality of three agriculture ingredients are changing significantly every year. Using ex ante prices and usage standards can implicit an outdated view of variances. Failing to separate variances caused by uncontrollable factors and planning errors from variances caused by controllable factors can be demoralizing for the managers.

In addition, managers are not involved in setting the standard mix and the same has not been changed for six years despite continuous changes in the quality and prices of the ingredients. This can also mislead the managers i.e., to carryout control activities which are based on the outdated standards.

Furthermore, a true image is missing in relation to managers' performance as statement does not include any feedback or comments on the variances. Even no follow up is being taken on the same.

Overall, it appears that AF is not having comprehensive performance measurement system, and this could adversely impact the firm in long run.

Workings

Price Variance

Input	Actual Qty. (Kg)	Std. Cost (₹)	Actual Cost (₹)	Difference (₹)	Variance (₹)
B_1	2,202	3	2.8	0.20	440 (F)
B_2	2,502	6	7	1 (A)	2,502 (A)
B_3	921	2	2	-	-
	5,625				2,062 (A)

Usage Variance

Input	Standard Qty. (Kg)	Actual Qty. (Kg)	Difference (Kg)	Std. Cost (₹)	Variance (₹)
B_1	1,934	2,202	268 (A)	3	804 (A)
B_2	2,855	2,502	353 (F)	6	2,118 (F)
B_3	967	921	46 (F)	2	92 (F)
	5,756	5,625	131 (F)		1,406 (F)

Mix Variance

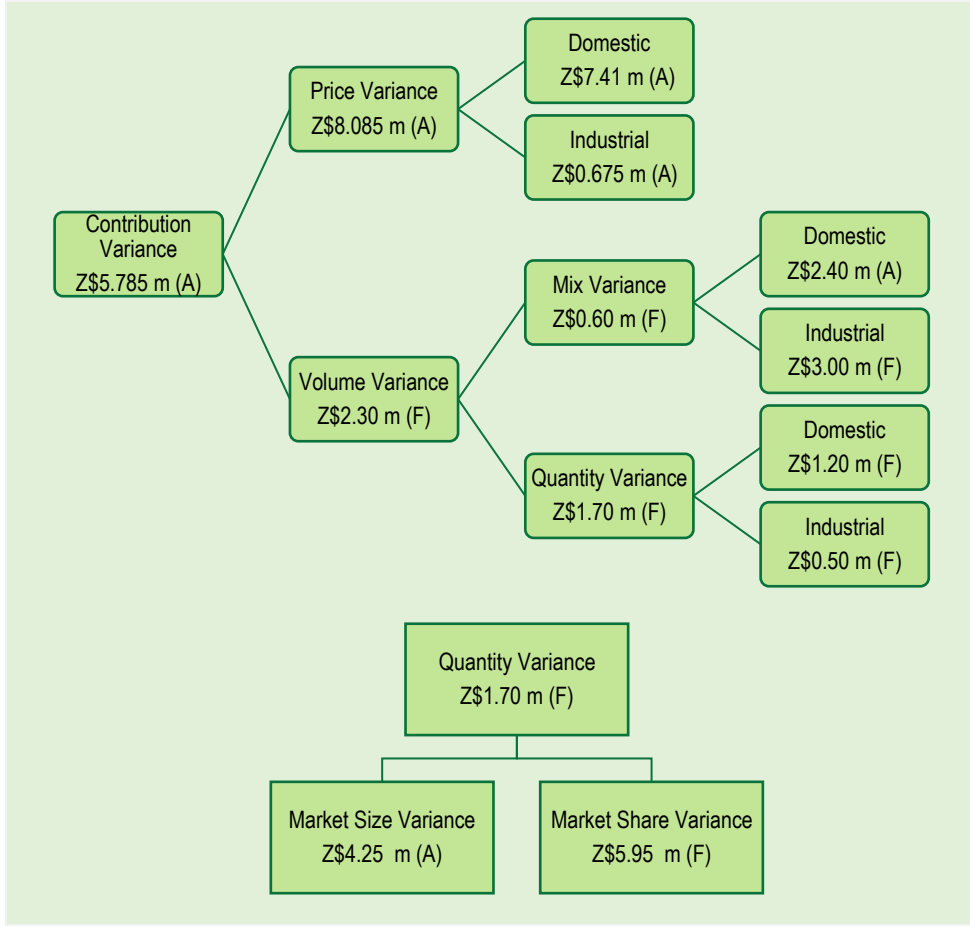
Input	Rev. Actual Qty. (Kg)	Actual Qty. (Kg)	Difference (Kg)	Std. Cost (₹)	Variance (₹)
B_1	1,890	2,202	312 (A)	3	936 (A)
B_2	2,790	2,502	288 (F)	6	1,728 (F)
B_3	945	921	24 (F)	2	48 (F)
	5,625	5,625	NIL		840 (F)

Yield Variance

Input	Standard Qty. (Kg)	Rev. Actual Qty. (Kg)	Difference (Kg)	Std. Cost (₹)	Variance (₹)
B_1	1,934	1,890	44 (F)	3	132 (F)
B_2	2,855	2,790	65 (F)	6	390 (F)
B_3	967	945	22 (F)	2	44 (F)
	5,756	5,625	131 (F)		566 (F)

12. (i) Analysis of Variances

It can be seen that total unit sales increased by 40,000 rolls resulted in a favorable volume variance. Therefore, a potential increase of Z$2.3 m in contribution margin was achieved as a result of the change in sales volume compared with budgeted volume. The volume variance is further divided into a mix and quantity variance. In the case of ZM, mix variance came out to be Z$0.60 m favorable and the quantity variance came out to be favorable Z$1.70 m. Favorable mix variance Z$0.60 m indicates that the sales mix shifts toward the industrial flooring rolls i.e. high contribution product. ZM sold 40,000 more rolls than were budgeted, resulting in Z$1.70 m favorable quantity variance. Therefore, it is necessary to identify the reasons behind the increase in sales. The reasons may be the competitor's distribution issues, better customer services, or growth in the overall market. Further insight into reasons for quantity variance can be gained by analyzing market share and size variances. ZM gained 2 market share percentage points from 10% budgeted share to the actual share of 12%. The Z$5.95 m favorable market share variance may be the effect of the decline in *contribution margin rate*. The impact of changing market size on contribution margin can be traced through market size variance. Market size variance is Z$4.25 m adverse as actual market size decreased 12.5% compared to budgeted market size. Further, it appears that the accountant has failed to compute the *price variance,* which is a substantial part of the analysis. If we look closely at the data given, the price variance for domestic as well as industrial roll can be computed without difficulty. The price variance for domestic flooring rolls as well as industrial flooring rolls is unfavorable; this indicates that both varieties were sold at a lower margin than standard. This throughout analysis shows a negative impact of Z$ 5.785 m on contribution margin for which price variance is the main contributor. Revised structures after the computation of price variance are as under:



Workings

Contribution Price Variance

Product	Actual Qty. (units'000)	Actual Contribution per unit (Z$)	Standard Contribution per unit (Z$)	Difference (Z$)	Variance (Z$)
Domestic	570	27.00	40.00	-13.00	7.41 m (A)
Industrial	270	47.50	50.00	-2.50	0.675 m (A)
Total	840				8.085 m (A)

(ii) Strategic Inputs

The actual sale of industrial flooring rolls is 35% higher than projections. However, the actual contribution margin of Z$47.5 is *marginally lower* than standard contribution margin of Z$50 per unit. This indicates that ZM may have *cut its selling price to maintain or gain market share*. Therefore, industrial flooring rolls are in the **Growth Phase** of product life cycle. Due to the increase in demand, there is a possibility of higher sales and profits to be made in future years.

Similarly, the actual sale of domestic flooring rolls is 5% lower than the expectations. However, the actual contribution margin is Z$27 per roll i.e. 32.5% lower than the standard contribution margin. This indicates that ZM may have sold these at *substantially reduced prices* to maintain the sales volume. Therefore, the domestic residential flooring rolls might be in the **Decline Stage** of product life cycle.

The market size for flooring rolls has reduced from an expectation of 80 lacs rolls to 70 lacs rolls. Therefore, the market size has shrunk significantly by 12.5% for the year 2024. This is a *threat to the profitability* of the business. The management has to understand the reasons behind this shrinkage. For example, dwindling demand may be on account of cheaper substitutes available for flooring rolls. The management has to take cognizance of this threat to business. A positive for ZM is that its actual market share for flooring rolls was higher than expected at 12%. An increase in market share would have a beneficial impact on the company's profitability. Also, despite the shrinkage in market size, demand for industrial flooring rolls seems to be on the rise. This could be an *opportunity* for the management to consider.

As explained above, the industrial flooring rolls seem to be in the Growth Stage of product life cycle, while the domestic residential rolls are in the Decline Stage. Industrial flooring rolls have a higher contribution margin per roll as compared to domestic residential rolls. Accordingly, ZM may consider *phasing out domestic flooring rolls* and *concentrate on industrial flooring rolls*. In view of shrinking market conditions, it would be more profitable to phase out the weaker product and concentrate on the fast-moving and profitable product. At the same time, since domestic flooring roll still has *significant demand*, the strategy to phase out this product may have to be done in a *phased* and *well-planned manner*. In view of the shrinking market size, ZM should not end up losing its market share due to phasing out domestic flooring rolls.

For Your Conceptual Understanding

"Budgeted Vs Actual Figures"

Product	Budgeted Qty. Rolls ('000)	Standard Cont. *per Roll* (Z$)	Budgeted Cont. (Z$' in millions)	Actual Qty. Rolls ('000)	Actual Cont. *per Roll* (Z$)	Actual Cont. (Z$ 'in millions)	Revised Actual Qty. ('000)
Dom.	600	40	24.00	570	27	15.390	630 (840×75%)
Ind.	200	50	10.00	270	47.5	12.825	210 (840×25%)
	800		34.00	840		28.215	840

Contribution Mix Variance

Product	Standard Contribution per unit (Z$)	Actual Qty. (units'000)	Revised Actual Quantity (units'000)	Difference ('000)	Variance (Z$)
Domestic	40	570	630	-60	2.40 m (A)
Industrial	50	270	210	+60	3.00 m (F)
Total		840			0.60 m (F)

Contribution Quantity Variance

Product	Standard Contribution per unit (Z$)	Revised Actual Quantity (units'000)	Budgeted Quantity (units'000)	Difference ('000)	Variance (Z$)
Domestic	40	630	600	+30	1.20 m (F)
Industrial	50	210	200	+10	0.50 m (F)
Total		840			1.70 m (F)

Market Size Variance

= Budgeted Market Share % × (Actual Industry Sales Quantity *in units* – Budgeted Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)
= 10% × (70,00,000 Rolls – 80,00,000 Rolls) × Z$ 42.50
= Z$ 4.25 m (A)

Market Share Variance

= (Actual Market Share % – Budgeted Market Share %) × (Actual Industry Sales Quantity *in units*) × (Average Budgeted Contribution *per unit*)
= (12% – 10 %) × 70,00,000 Rolls × Z$ 42.50
= Z$ 5.95 m (F)

NOTES

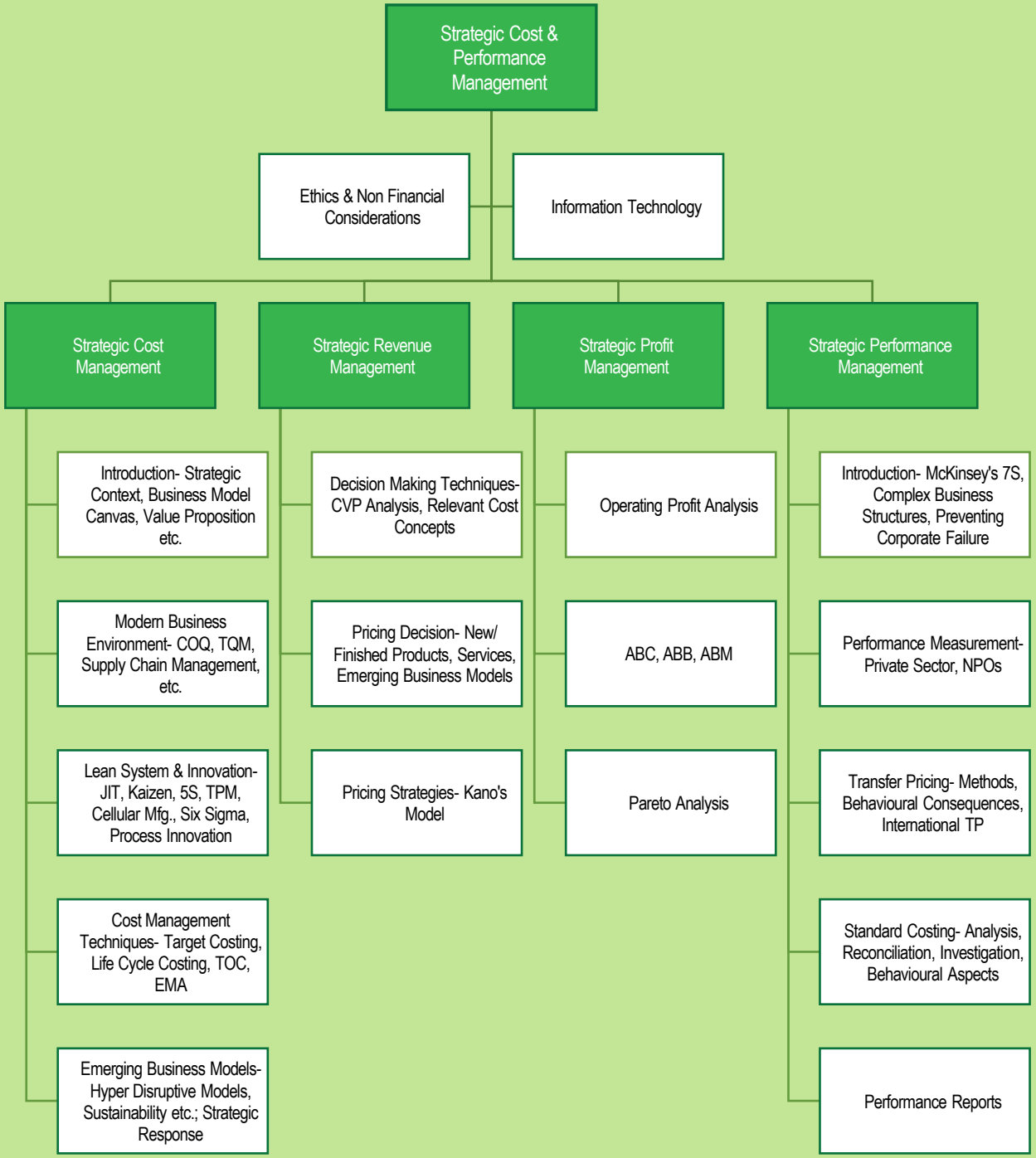
CHAPTER 14

CASE STUDY

LEARNING OUTCOMES

After studying this chapter, you will be able to:

- EVALUATE appropriate cost management and performance management techniques in case studies and other exercises which simulate real-life business situations to enhance the quality of decision-making and the creation of shareholder value
- UNDERSTAND the links between cost management, performance management and strategic management within the context of an organisation's strategy



ESSENTIALS FOR CASE STUDY

Case Study is not about the quantity, but the quality.

Prepare a plan for each issue.

Decide what models to use and prioritize the issues.

Identify the impact and alternative actions that could be taken, as well as the relevant concepts and calculations required.

Answer should have a logical flow.

Offer a detailed analysis of the issues and conclude with sound, well justified recommendations.

Not to spend too much time on calculations. Do not place too much attention and time on the presentation.

Quality of discussion on each issue which is most important, not the ranking order. Discuss each of the issues in depth, explaining their impact.

Do not leave any of the issue undecided.

Recommendations should include ‘what to do', 'why to do it' and 'how to do it’.

Identify ethical issues and then briefly justify.

Recommendation should appear at the end of the report.

Practice makes perfect.

CS-1: POTER'S FIVE FORCES

Safe and Wise Advisory Limited (SWAL) *is well established financial planning & risk advisory firm of the country with nation-wide presence. SWAL is engaged in selling third party products be it financial products or insurance products (life assurance only). Financial advisory business of SWAL is doing well and contributing to the half of gross revenue of group and two-third of overall group's bottom line, but insurance brokerage business is not performing as per expectation. 'Independent and impartial advice' to client is unique selling point of SWAL.*

SWAL was established by Mr. Kaushal Jaiswal around two decade ago (when life-assurance business goes private), at then it was one division business i.e., assurance brokerage business. Mr. Kaushal Jaiswal is dynamic leader and presently leading the company as CEO, apart from being major shareholder of the company.

SWAL is widely acknowledged in market for two distinct features, first being presence wide across the nation, in form of 'sub-agency offices' equipped with professionally trained sale staff headed by financial planner or advisor, where customer can take advise and discuss opinion prior to investing/ buying any insurance or financial product. SWAL has 'sub-agency offices' in 580 cities, towns and blocks. Locations are semi-commercial in nature but prominent. SWAL has practice signing 30-year lease, when so ever taking and 'sub-agency office' on lease in order to reduce the lease cost and bring stability.

Secondly, SWAL sold product of all third parties, hence provide a range of products to its client to choose from. In 2014, SWAL signed a 15 year's agency agreement with all 23 life insurance companies recognised then. SWAL's tagline is also depicting the same 'we are ethically committed to understand and deliver your needs'. SWAL believes in organic growth and listed on stock market 3 years back to float additional capital to fund more 'sub-agency offices'.

22 out of these 23 life assurance companies are private and registered themselves with regulatory between the year 2004-2013 for a period of 25 years. Considering the default by few insurance firms and increasing customer complaints, regulator of insurance business in country tightens the registration criteria and harden the norms.

Typically, each of 'sub-agency office' comprises three regular and one contractual employee. One being financial planner/ advisor, 2 sales and relationship officer and contractual worker in role of support staff and vested with miscellaneous clerical responsibilities. The on-roll number of employees engaged in assurance brokerage business has been increased to 1,564 from 720 five year ago (up-till 3 years ago number was 845 but since expansion of 'sub-agency' office division it is around 1,500).

Market trend is changing, since the SWAL commence the business. Each of such insurance company, now has their own network of branch offices to sale their insurance product directly; that too at more prominent locations. SWAL counter this step by highlighting its 'independence and impartial advice' practice, although SWAL managed to retain the revenue at same level, but this result in low profitability of 'sub-agency office' business. Now these insurance companies are not authorising any new agent.

Being in service industry and further in order to ensure wider market reach to compensate the loss of profitability in 'sub-agency office' business, SWAL has established own 'E-platform'- 'Policy at you click' to sell the insurance product with total staff of 50 professionals: as a separate division under insurance brokerage business from 'sub-agency office' division. 'E-platform' division is prospering but 'sub-agency office' business is certainly in trouble.

Supported by revenue figures given below (in '000 Crores), analysts reach to conclusion that growth in the assurance brokerage business is slowing down both for SWAL and industry overall–

Market Size/Year	2023-24	2022-23	2021-22	2020-21	2019-20
SWAL's assurance brokerage business	326	320	312	298	280
Total market size of life assurance	2,240	2,198	2,122	2,004	1,960

Revenue earned by each division of assurance brokerage business (in term of age of the client), is shown in table below for year 2023-24–

Division/Age	20-30	30-40	40-50	50-60	60+	Total
'Sub-agency office' division	2	25	38	164	51	280
'E-platform' division	8	28	8	2	0	46
Total Business of SWAL						326

Since the profitability of 'sub-agency office' division is declining, hence the strategic review committee of board of directors are concerned about the company's declining profitability due to poor performance of 'sub-agency office' division and suggest that the 'sub-agency office' division should be sold off and that SWAL shall re-position its assurance business as an online solution.

Extract from financial statement for agency office division only (figures in '000 Crores) –

Particulars/Year	2023-24	2022-23	2021-22
Revenue	280	272	250
Profit before interest and tax	18	16	31
Shareholder's' Equity	156	150	150
8% Long term debt	78	64	50
Current Liabilities	455	437	395
Current Assets	605	565	540

Applicable tax rate is 22%. The nature of cost incurred by 'sub-agency office' division is more or less balanced between the variable and fixed. Fixed costs are largely committed in nature.

But the CEO is not agreed to the suggestion made by strategic planning committee, because CEO is of belief that SWAL's USP or original business model is 'sub-agency offices' through which they ensure 'independence and impartial advice' to their clients.

In next board meeting, board is expected to pass resolution on this agenda item in order to decide either to continue or sale the 'sub-agency office' division.

Required

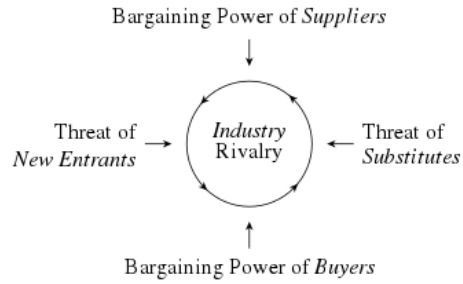
(i) ASSESS the competitive environment of life-assurance business of SWAL (including 'sub-agency office' division). ***[present only two appropriate points for each phase of assessing the environment]***

(ii) EVALUATE the case for holding the 'sub-agency office' division, backed by financial viability among other criteria. ***[present only two appropriate points for each monetary and the non-monetary issue]***

Solution

(i) Michael E Porter, in 1980 in his book "Competitive strategy: Techniques' for analysing industries and competitors" suggested **five force model** to assess the *competitive environment* of an industry. The five forces which are enumerated by this model are the bargaining power of suppliers; the bargaining power of customers (buyers); the threat of new entrants; threat of substitute products; and the level of rivalry among current competitors in the industry.

This model is also named as porter's five force analysis. Since each of these five forces *affect the competitiveness of business,* hence can be used to assess the potential of any organisation or entity; life-assurance business of SWAL (including 'sub-agency office' division) is not an exception to this.



The bargaining power of suppliers

Number of suppliers will decide the dominance they possess in term of bargaining power regarding the price of good and service they supply to business. In case of 'sub-agency office' division following factors will affect the suppliers' power–

Control over Value Chain – By adopting the strategy of forward integration the insurance companies them-selves getting into the direct sale through own network of branch offices in order to enhance their margin or reducing the margin earned by SWAL's 'sub-agency office' division. Since number of insurance companies are neither too less nor too much, hence bargaining power of insurance companies; in terms of percentage brokerage, they offered to SWAL is *moderate*.

Importance of product – SWAL is also dealing in financial product's marketing and advisory, which contribute 50% of group sales and around 67% of group's profit; thus, assurance business which is no doubt significant but *only choice (business) available* to SWAL. Hence, bargaining power of supplier is *moderate*.

Substitution among the brand – Life assurance product offers similar utility to client; hence easily substitutes among the brands, means if insurance company 1 charge lesser premium then insurance company 2, client will buy assurance of company 1. No doubt switching is less viable once policy subscribed. Since SWAL's 'sub-agency' division is offering the product from all 23 insurance companies, hence bargaining power of suppliers become *low*.

Supply of other factors – Other factor such 'sub-agency offices', which are largely on lease, has 30-year lease, this will reduce the lease cost as well as bargaining power of landlord apart from bringing stability.

(Any Two Points)

The bargaining power of customers

Whether seller is price taker or makes, this is outcome of bargaining power of customers (true sense competition). If the bargaining power is high seller will become price taker, else he is price maker. Following factors affect the bargaining power of customers of SWAL's 'sub-agency' division–

Number of buyers – In assurance industry the buyers are large (in comparison to few numbers of suppliers) and diversified, hence their bargaining power is *low***.**

Standardised products – Since the life assurance is the product, which is standard from prospective of core functionality, hence buyers can easily substitute brands and can negotiate to reasonable extent.

Switching – Once policy subscribed can't be easily switched with another, hence due to high switching cost bargaining power reduced to some extent at-least.

(Any Two Points)

The threat of new entrants

Although entry of a new firm to the industry/ market depends upon the level of entry barriers, but if new entity enters into the industry; it will surely bring additional capacity which enhance the stiffness of competition; hence become a kind of threat. In case of 'sub-agency office' division, there are some major barriers to entry–

Less number of new life-assurance licenses by regulator due to tough regulations – As mentioned in the case that after considering the default by few insurance firms and increasing customer

complaints, regulator of insurance business in country has tighten the registration criteria and harden the norms; hence this may act as entry barrier and reduce the threat of new entrants.

Less number of new insurance agent due to no new authorisation by insurance companies – As market is revamping, the agents is becoming competitor to the insurance companies and as mentioned insurance companies stopped authorising new insurance agents, hence this will act an entry barrier for new insurance agents, which is a great positive for SWAL's 'sub-agency office' division and intact the competitive advantage.

Learning curve and economies of scale – Since all the 23 insurance companies dealing in life assurance and SWAL are 10 to 20 years old organisations; hence learning curve and economies of scale (shared services for the 580 offices - presence in 580 cities) which they are enjoying may become entry barriers for new firm. Since new firms require huge capital to be at par to such learning curve and economies of scale.

(Any Two Points)

Threat of substitution

Substitution means the product from some other industry which can render the same function which life assurance is rending. The threat of substitute product is *quiet low*.

Competitive rivalry

The level of competition among the players to acquire or retain the market share directly affects the profitability in an industry. Following factor is affecting the competitive rivalry–

Number of competitors and respective market size – Since there are good number of competitors, hence competition will be intense; may cutthroat rivalry. Presently SWAL's insurance business represent 14.55% of market share (in 2023-24) in comparison to 14.29% of market share five year ago, without any major variation, hence possibility of gaining new market share is limited that too at high cost (in form of advertisement and more after sale services).

Lack of differentiation – Standardise product results in high rivalry, since the life assurance is standard product hence rivalry may be high on account of easy substitution effect among the different brands.

Slow market growth – If market is growing at high rate, rivalry may be stiffer or may be moderate; because everyone has reasonable opportunity to grow. The moment growth stagnated rivalry become stiffer because no one wish to lose market share. The industry life cycle curve is flatter here, because during last four years overall industry wide CAGR (compounded annual growth rate) of life assurance business is 3.39%, whereas year-on-year growth from 2022-23 to 2023-24 is 1.91%. Although potential is limited, but competition is still high.

Exit barriers – If the exit cost for player to move out of industry is high, it will have to be in industry and fight for survival, which may make competition tougher. Since agency agreement and lease agreement is already signed by SWAL hence, it becomes difficult to exit from the business, hence need to participate in competition to retain the share.

(Any Two Points)

(ii) Case for holding the 'sub-agency office' division

The strategic review committee suggests that the SWAL's 'sub-agency office' division should be sold off and that SWAL shall re-position its assurance business as an online solution, but the same suggestion firstly needs to be evaluated in terms of *financial perspective* among the other criteria.

The growth in life assurance business is stagnated and industry is in maturity stage of industry life cycle. This is evident from industry size and growth in the same. During last four years overall industry wide CAGR (compound annual growth rate) of life assurance business is 3.39%, whereas year-on-year growth from 2022-23 to 2023-24 is 1.91%. The moment growth stagnated rivalry become stiffer because no one wish to lose market share. Hence, there is intense competition in market. In cases where market witnesses intense competition, operating efficiently is essential and reduction in cost become *key success factor*; in order to offer competitive deals to clients and retain market share.

Hence it becomes need of hour, that we review the operating processes followed at 'sub-agency offices' to check whether they are efficient or not, in order to ensure greater profitability rather thinking to sale off the entire 'sub-agency office' division.

Now, move to *financial analysis*, which suggests it is beneficial to hold back 'sub-agency' division.

Contribution to the group – Insurance business is contributing 50% of top-line of overall group revenue (and 1/3rd of bottom line), and around 86% (280/ 326) of this comes from 'sub-agency office' division and 'E-platform' division contribute only remaining 14%.

Profitability – Margins are positive. There are two major parameters to evaluate profitability further on–

- Operating profit *(EBIT/ Revenue)* – No doubt, operating profit shrink from 12.4% to 6.43% in three years' time frame. But as earlier quoted, margin is positive and secondly, there is sign of recovery as well. EBIT increased in absolute terms (from 16 to 18).
- Return on capital employed *(ROCE) [EBIT / (Equity + Long Term Debt)]* – No doubt, ROCE shrink from 15.5% to 7.69% in three years' time frame. But reduction in EBIT is not only a reason, another major reason for decline is also change in capital structure. Long term debt is increased in absolute terms (from 50 to 78).

Liquidity – Current ratio *(Current Assets / Current Liabilities)* being reasonable measure of liquidity indicates enough liquidity in 'sub-agency office' division to meets it obligation. There is minor decline from 1.367 times to 1.33 times. Component analysis of working capital can be performed for greater insight.

Gearing (Debt / Equity) – Gearing ratio depicts the financial leverage**,** a measure of risk**.** Gearing ratio, no doubt increased as result of introduction of debt, from 1/3 to 1/2, but under control.

(Any Two Points)

Some *other quasi-finance* and *significant factors* relevant to the decision of sale of 'sub-agency office' division and full focus on 'E-platform' division–

Client's demography – Clients from all age groups from 20 to 60+ are clients of SWAL's assurance brokerage business. 66.56% (217/326) of revenue coming from clients with 50+ years of age, and 99% (215/217) out of them are associated through 'sub-agency offices', hence holding of 'sub-agency' division become essential. Secondly, clients from all age group may not find it convenient to shift to 'E-platform' 'Policy at you click' and their resistance may result in losing business. Thirdly, they have easily available substitute, because competitors also have branch offices which will give them same feel.

Resistance from employees – Out of 1,564 on-roll employees of assurance brokerage business, only 50 are associated in 'E-platform' division- 'Policy at you click', rest all in 'sub-agency office' division. If SWAL re-structure itself fully as online solution for life assurance then also can't absorb all the employees, many of them need to be retrenched. Resistance will be there in both the cases, because transferred employee may not have requisite skill set, result in poor quality of service and no job satisfaction to employee. Whereas in case of retrenched workers redundancy cost will become additional financial burden. This can be seen as exit barrier.

Legal aspect in term of pre-closure of lease - SWAL has practice to sign 30-year lease, when so ever taking and 'sub-agency office' on lease in order to reduce the lease cost and bring stability. It started the business 2 decades ago and expanded it 3 years ago and many of leases are active right now, in case of pre-closure, it may be possible to bear additional financial burden as per terms of lease agreement.

Loosing USP – **'**Independence and impartial advice' with presence wide across the nation, in form of 'sub-agency offices' equipped with professionally trained sale staff headed by financial planner or advisor, where customer can take advise and discuss opinion prior to investing/ buying any insurance or financial product is USP for SWAL's assurance brokerage business. By disposing the 'sub-agency office' division this central idea, with which SWAL was established may be washed out.

(Any Two Points)

In nutshell, the life assurance market has matured in recent years, and result in low growth potential and lower profitability but still yielding positive numbers. Hence, sale of 'sub-agency' division will adversely hit the revenue as well as profitability.

Important Note

- This is a comprehensive "Case Study" covering various aspects of 'Porter's Five Forces' model. Students are required to present only two relevant points for each force properly linked with the Case. More points have been given than asked for in the requirement to "assist" students.
- Conceptually correct and brief explanation is sufficient for each step or point.

CS-2: COMPETITIVE ADVANTAGE

BA *is the second largest airline in the Country "X". Aviation industry in the Country "X" is growing fast. In 2011, 45 million people travelled to/ from/ or within the Country "X". By 2020 that doubled to 100 million. This number is expected to treble to 300 million by 2030. Also, by 2025, Country "X" is expected to be the third largest air transport market in the world, behind the US and China.*

Government is trying to meet the significant growth potential of aviation Industry. However, it will create challenges also for the airline industry and its industry partners.

Government also wants to ensure that broader business and policy environment should not place hurdles which inhibit growth and reduce the level of benefits that aviation can deliver to the nation. The industry, its supply chain partners, and the government and policy makers have a clear mandate to work in collaboration towards the common goal of ensuring that aviation's economic and social benefits are fulfilled.

Despite of operating in World's fastest growing market BA struggles for passengers. Also, BA is facing following problems:

- *Aviation Turbine Fuel (ATF) prices constitute about 40% of operational costs in Country "X" and are taxed higher here than anywhere else in the World. The Central government charges 14% duty on ATF. While the state government pile on their own local tax that can go as high as 29%.*
- *The currency depreciation is hitting Airline harder. About 25% to 30% of their costs, excluding ATF, are dollar denominated, from aircraft lease rents, maintenance costs to ground handling and parking charges abroad etc.*
- *With the entry of Low Budget Carriers, full-service carrier like BA that have higher overhead costs have been forced to offer discount to passengers looking for great bargain.*
- *Continuous improvements in tourism infrastructure, tourism policies, human resources development, airport infrastructure density are among the areas that could further enhance Country "X"'s competitiveness. Ease of doing business over the last five years has risen.*
- *The intense competition among domestic airlines carriers, the need to capture a slice of the ever-expanding market and passenger price sensitivity makes the airlines difficult to raise ticket prices.*

Together, these factors have now plunged Country "X"'s aviation industry to its most precarious phase in the last three years or so.

BA is facing huge competition as a "year of sharp U-turns" for "X"'s aviation industry from record profit in Financial Year 2019-20 to mega losses, resulting in direct need of recapitalisation. BA has been appealing to the government for a decade for a reduction in taxes on fuel, but all in vain. ATF is 35-40% more expensive in Country "X" than in the rest of the world, because of relatively high tax rates.

Required

ADVISE the strategy that BA should follow in order to gain superior performance and competitive advantage over its competitors.

Solution

In consideration to Michael Porter's theory about creating a superior performance and competitive advantage, a firm's overall competitive advantage derives from the difference between the *value it offers to customer* and its *cost of creating that customer value*. In order to survive and prosper in industry, firm must meet two criteria– they *must supply what customers want* to buy and they *must survive competition*.

To attain superior performance and attain competitive advantage, firm must have *distinctive competencies*. Distinctive competencies can take any of the following two forms:

Relative low-Cost advantage– under which customers gain when a firm's total costs undercut those of its average competitor.

An offering or differentiation advantage– If customer perceive a product or service as superior, they become more willing to pay a premium price relative to the price they will have to pay for competing offerings.

Low Cost Advantage (Cost Leadership)

BA can enjoy relative cost advantage if its total costs are lower than those of its competitors. This relative cost advantage enables a business to do one of the following:

– Charge a lower price than its competitors for its services to gain market share and still maintain current profitability; or

– Match with the price of competing services and increase its profitability.

Cost reductions in BA can be achieved through yield management with variable pricing depending on capacity utilization with careful monitoring; application of computer and communication technology in cost effective way i.e. selling seats via the internet rather than through travel agents; trimming overhead costs by using lower cost out-of-town airports, no printed tickets, seat allocations, or free meals and drinks; efficient operations i.e. fast turnaround times for aircraft to improve utilization; and no exceptions policies to reduce the cost of handling exceptions (e.g. no flexibility for passengers who arrive late). Cost economies can also be realized from large scale operations. However, it is important to note that as soon as more firms strive to become the cost leader, rivalry become so fierce that the consequences for the profitability in the industry are disastrous.

Differentiation Advantage

It occurs when customers perceive that a business services offering is of higher quality, involves fewer risks and/or outperform services offered by competitors. In other words, customers perceive the service offered by a business to be superior. For example, differentiation may include a firm's ability to deliver services, and other factors that provide unique customer value. BA is a multinational passenger airline. It can adopt a differentiation approach by offering passengers a higher-quality experience than many of its rivals. This allows it to charge a premium for its flights compared to many other airlines.

A differentiation advantage can be achieved by offering enhanced features such as prime landing slots can be obtained at major airports around the world; using superior and advance technology; well-maintained, clean, and comfortable aircraft; training in customer care and the recruitment of high-quality staff; providing complementary services such as in-flight entertainment, high-quality food, and drink. Customer value can also be increased by *subjective features* such as brand image, advertising based on quality of service provided. However, differentiator cannot ignore its cost position. If costs are too high the premium price are nullified.

On successfully differentiated its offering, management of BA may exploit the advantage in one of two ways viz., either increase price until it just offsets the cost of improvement in customer benefits, thus *maintaining* current market share; or price below the "full premium" level to *build* market share.

Alternatively, BA may focus on geographical region and short point to point flights to reduce costs. Michael Porter enlightens focus as attaining low cost or product differentiation for a *particular* buyer group, segment of product line, or geographic market rather than for the industry as a whole. The focuser can attain competitive advantage within a niche, because large firms are either not attracted to niche or have ignored the potential. The narrow focus in itself though is not adequate for a competitive advantage. The firms need to optimize the strategy on two variants: cost focus and differentiation focus. One risk of a 'focus strategy' is that broadly targeted competitors devastate the segment once it becomes economically attractive.

In addition, the currency depreciation is hitting Airlines harder and international overhead costs have risen, the BA should attempt to increase the number of internal domestic flights. Moreover, ATF cost can also be lowered by investment in fuel saving modern Airbuses, however, the reduction in operating costs may outweigh the capital equipment costs.

To gain competitive advantage BA may also assess Value Shop Model. Value Shop generates value by organizing resources (e.g. people, knowledge, and skills) and deploying them to solve specific problems, for example, delivering airline services to the passengers or delivering a solution to the business problem. Shops are organized around making executing decisions- identifying and assessing problems or opportunities, developing alternative solutions or approaches, choosing one, executing it and evaluating results.

In this way, the above discussed strategies may be more appropriate for helping BA in achieving superior performance and competitive advantage over its competitors.

Practical Insight

Southwest Airlines (SA) targeted on a geographic region and short point-to- point flights to reduce costs. Even though it offered no-frills service (no-frills or no-frills service is one for which the non-essential features like food, entertainment, printing of boarding pass etc. have been removed to keep the price low) and was based in secondary airports, SA improved quality relative to the *limited set of competing alternatives* by offering direct flights rather than connecting flights requiring changing planes at large hub airports. The SA also offered better on-time performance and friendly amenities.

CS-3: TRIPLE BOTTOM LINE

*A preliminary investigation for the **Vidyut Dam Project** was completed in 1962 in a South-Asian country (here-in-after referred as country) and its design was completed in 1973 with a 600 MW capacity power plant. Construction began in 1979, but was delayed due to economic, environmental and social impacts. In year 1987, technical and financial assistance was provided by the neighbouring country to said country after signing of MoU, but this was interrupted just a year later with political instability. Hence, said country was forced to take control of the project and at the first, it was placed under the direction of the irrigation department of concerned home state of said country. However, in July 1989 the Vidyut Hydro Development Corporation Limited (VHDCL) was formed to manage 1,900 MW Vidyut Hydro Power Complex; wherein 75% stake held by union government and remaining 25% stake by concerned home state government. The 1,900 MW Vidyut Hydro Power Complex comprises of **Vidyut Dam & 1,000 MW Vidyut Hydro Power Plant (250MW×4)**, Beejuree HEP (400 MW), and Vidyut PSP (500 MW).*

*The **Vidyut Dam** is a 260.61 m (855 ft) multi-purpose high rock and earth-fill embankment dam on the Karaka River near Chapala town. Its length is 574.85 m (1,886 ft), crest width 20.11 m (66 ft), and base width 1,128.06 m (3,701 ft). The dam creates a reservoir of 4.0 cubic kilometres (~32,00,000 acre ft).*

*The **1,000 MW Vidyut Hydro Power Plant (**Vidyut HPP) was **commissioned** in 2007-08 as a multipurpose project, with variable speed features which can optimize the round-trip efficiency under varying water levels in its reservoirs. Power is distributed to 10 northern states (including concerned home state) of said country. The complex will afford irrigation to an area of 2,71,139 hectares (=6,70,000 acres), irrigation stabilization to an area of 6,07,028 hectares (=15,00,000 acres), and a supply of 270 million imperial gallons ($1.23 \times 10^6 m^3$) of drinking water per day. 162 million gallons of drinking water for around 4 million people of the neighbouring state, apart from 108 million gallons of drinking water for around 3 million people of the concerned home state. Due to regulated releases from the Vidyut storage reservoir, the existing downstream hydro projects are also benefited by way of augmentation in generation at no additional cost to them. Concerned home state also gets 15% of generated power as free. The total expenditure for this project was USD 1 billion. Since 2007-08, which was the first year of operation, VHDCL has been a profit making company.*

The Vidyut Dam has been the object of protests by environmental organizations and local people of the region. The protest was against the displacement of town inhabitants and environmental consequences of the weak ecosystem. "We don't want the dam. The dam is the mountain's end" was the prominent slogan.

The relocation of nearly 1.5 lakh people or may be even more, from the area has led to protracted legal battles over resettlement rights and, ultimately, resulted in the project's delayed completion despite the fact that land acquisition was started in 1980. There is no master plan for rehabilitation nor even a clear estimate of the number of people affected. According to the 2003 status report of the public work department of Chapala town, the Dam replaced 15,550 families. This estimate excludes a large number of people who lost their lands but have not been officially recognised as project affected. Among those officially recognised, allotted with land of poor quality or with multiple ownership claims.

Near to year 2006, while filling of the reservoir has led to the reduced flow of Karaka River's water from the normal 1,000 cu ft/s (28 m^3/s) to a mere 220 cu ft/s (6.3 m^3/s). This reduction has been central to local protest against the dam, since the Karaka River is considered sacred river whose waters are crucial to religious beliefs.

Old Chapala town shifted and named as New Chapala Town (NCT) which is semi-ultra-modern hill station at height of 1,555-1,855 m above MSL, with better road network and district head quarter (shifted to NCT, earlier about 65 kms away from Chapala). NCT equipped with better health (got 80 bed modern hospital against 25 bed hospital in old Chapala, and also got 5 primary health centres with additional 75 bed facility in total) and education facilities (hostel facility of 900 students, degree college with university campus which can accommodate 440 residential students and faculties, and against 1 inter college in old Chapala, 5 inter-college established (one in NCT and 4 in nearby villages). This all done at project cost.

In addition to the human rights concerns, the project has spurred concerns about the environmental consequences of locating such a large dam in the fragile ecosystem of the foothills of great mountain range. There are further concerns regarding the dam's geological stability. The Vidyut dam is in a major geologic fault zone. This region was the site of a 6.7 magnitude earthquake in September 1992, with an epicentre 55 km (34 mi) from the dam. Dam proponents claim that the complex is designed to withstand an earthquake of 8.4 magnitude, but some seismologists say that earthquakes with a magnitude of 8.5 or more could occur in this region. Were such a catastrophe to occur, the potentially resulting dam-break would submerge numerous towns downstream, whose populations total near half a million.

In spite of concerns and protestation, operation of the Vidyut Dam continues and is completed. But VHDCL was aware of these and tried to respond in a constructive way. The spirit of CSR initiative is depicted by its CSR initiative title 'VHDC Sahridaya' (Corporate with a Human heart), wherein focus areas are:

- *Shiksha - Education Development*
- *Svasth - Nutritional Health and Sanitation and Drinking Water Projects*
- *Nipun - Livelihood Generation and Skill Development Initiatives*
- *Unnaati - Rural & Infrastructure Development*
- *Yogy - Empowerment Initiatives*
- *Srrishti - Environment Protection Initiatives*

Out of these 'VHDC Srrishti" has some special mentions, 'Environment Focused Initiatives' is working with three objectives Soil & Water Conservation, Green Energy Generation & Technology Promotions and Environment Protection & Promotion.

To conserve soil and water VHDCL is working on water harvesting and water harvesting tanks (capacity 3,000 litres each) were installed in the project affected villages for rainwater harvesting. Through this activity, beneficiaries were able to store almost 9 lakh litres of rainwater during monsoon. In addition, VHDCL under this program installed more than 730 LED based Solar Street Lights and more than 180 LED based Solar High Mast Lights in near-by towns and villages in year 2019-20. Moreover, to promote plantation of different fruit, fodder, and medicinal plants, VHDCL planted 2,70,202 plants/sampling till now.

VHDCL has won many awards in last decade in different categories including CSR domain, but most recent and relevant (for case study) among them are→

- *HR Platinum Award for Training Excellence in 2019-20*
- *National CSR Leadership Award 2020*
- *CSR Innovation and Leadership Award 2020*

It not only recognition in term of awards, VHDCL has obtained following Certifications:

- *ISO 9001:2015 Certification (Quality Management System).*
- *ISO 14001:2015 Certification (Environment Management System).*
- *OHSAS 18001:2007 Certification (Occupational Health and Safety Management System).*

Required

*As part of policy initiative, if VHDCL is willing to implement the Triple Bottom Line (TBL) reporting initiative; then **ADVISE** the management regarding dimensions of TBL, and what are perspectives composed by different dimensions of TBL. Also, enumerate the challenges, expected benefits, and initiatives under each dimension in context of Vidyut Dam & Vidyut Hydroelectric Power Plant (1,000 MW).*

Solution

British business author **John Brett Elkington** in year **1994** coined the term **TBL.** Every business needs to be **sustainable, rather than** only **profitable**. A business is said to be sustainable, when management makes sustainable business decisions. To consider sustainability of business decision there are three bottom lines i.e. **People, Planet and Profit** (also known as dimensions of TBL), instead of single bottom line (i.e. Profit).

Here-in VHDCL, shows *strong commitment for CSR* through the certification (regarding quality, environment and safety) they obtained and also through the awards they won (in the domain of CSR and Training).

Dimensions (sets) of TBL

(i) **People,** the **social equity** bottom line relates to corporate governance, motivation, incentives, health and safety, human capital development, human rights and ethical behaviour.

The project has major concerns about the **displacement of town inhabitants,** followed by reduction in flow of Karaka River from the normal 1,000 cu ft/s (28 m^3/s) to a mere 220 cu ft/s (6.3 m^3/s). Former concern is more significant than the later concern, because later was of short duration; it is obvious when the reservoir is filled to its maximum capacity, the flow of the river will again become normal. Regarding the displacement, it is mentioned in the case itself that according to the 2003 status report of the public work department, the Dam replaced 15,550 families. Further, this estimate excludes a large number of people who lost their lands but have not been officially recognised as project affected. Even those officially recognised, allotted with land of poor quality or with multiple ownership claims. This concern substantiates in absence of a full-proof master plan.

It is not the case that local resident were/are in complete distress, they were/are compensated with **alternative and better facilities** and **remedies** as well that too at **project cost**, which includes the:

- Development of hill station to attraction for tourism – The New Chapala Town (NCT) is developed with semi-ultra-modern facility at height of 1,555-1,855 m above MSL as pre-planned hill station which will attract the tourist. By creation of lake due to the impoundment of the reservoir of Vidyut Dam, scope of water sports is there. Hotels, Guides and Tour and travels will cause *employment opportunities* for locals.
- Better road network leads to *ease of living* and *improved communication channels* which also help in establishing suitable industries according to environmental aspects.
- Shifting of district head quarter to NCT results in reduction of distance of travel by town residents to reach to district head quarter for any task by about 65 kms, hence *life of locals will be further eased*.
- *Improved health facilities* - NCT equipped with better health facilities. It got 80 bed modern hospital against a 25-bed hospital situated in old Chapala town. Apart from this also got 5 primary health centres with additional 75 bed in total.
- *Improved Education facilities* in term of hostel facility of 900 students and increase in number of inter-colleges.

Not only the local resident (directly affected), ***other too got benefit from project***, such as 250 cusecs (~162 million gallons per day) of water supply to neighbouring state, which will meet drinking water need of around 4 million people, apart from 167 cusecs (~108 million gallons per day) of water supply to concerned home state, which will meet the drinking water need of around 3 million people. Power is also distributed to 10 northern states (including concerned home state) of said country.

VHDCL showed social commitment through Shiksha, Svasth, Nipun, Unnaati, and Yogy as part of their CSR initiative.

(ii) **Planet,** the **environmental** bottom line measures the impact on resources, such as air, water, ground and emissions to determine the **environmental impact** and **ecological footprints**.

The project has spurred concerns about the **environmental consequences** of locating such a large dam in the fragile ecosystem of the foothills of great mountain range, which will result in **weak ecosystem** and concerns over a **catastrophe to occur** (due to earthquake - the potential dam-break). Regarding the later concern, it is also mentioned in the case that the Vidyut dam is in a major geologic fault zone. This region was the site of a 6.7 magnitude earthquake in September 1992, with an epicentre 55 km from the dam. In response to which the Dam proponents claim that the complex is designed to withstand an earthquake of 8.4 magnitude, but some seismologists say that earthquakes with a magnitude of 8.5 or more could occur in this region. Were such a catastrophe to occur, the potentially resulting dam-break would submerge numerous towns downstream, whose populations total near half a million.

The major environmental **benefit** is generation of 1,000 MW (3,532 MU of Annual Energy) of **environment friendly** peaking power.

In order to leave improved environment footprint and to trade-off the environmental loss caused during construction, VHDCL through **initiative** 'VHDC Srrishti' working on:

- *Rainwater Harvesting* – It has installed the necessary infrastructure in the affected areas to harvest almost 9 lakh litres of rainwater during monsoon.
- *Green Energy Generation & Technology Promotions* through installing LED based Solar Street Lights and LED based Solar High Mast Lights.
- *Environment Protection & Promotion* through plantation of 2,70,202 samplings so far, of different fruit, fodder, and medicinal plants.

(iii) **Profit,** the **economic** bottom line refers to measures maintaining or improving the company's success in terms of adding value to shareholders.

It is an inherent feature (rather project specific concern) of hydro power projects that the duration of construction is quite lengthy and huge capital outlay is involved. In case of Vidyut Dam too, Construction began in 1979, but was delayed due to economic impact apart from social and environmental pressure. In 1987, technical and financial assistance was provided by the neighbouring country, but this was interrupted years later with political instability. Project then placed under the direction of the irrigation department of concerned home state of said country. However, in July 1989 the Vidyut Hydro Development Corporation Limited (VHDCL) was formed to manage such 1,900 MW Vidyut Hydro Power Complex; wherein 75% stake held by union government and remaining 25% stake by concerned home state government. The total expenditure for this project was USD 1 billion. Since 2007-08, which was the first year of operation, VHDCL is a profit making company.

The initiative includes the feature of variable speed, the 1,000 MW Vidyut HPP has variable speed features which can optimize the round-trip efficiency under varying water levels in its reservoirs to keep the *cost of operation low*.

The quantifiable economic benefits include:

- The generation of 1,000 MW (3,532 MU of Annual Energy) of environment friendly peaking power. This will no doubt lead to industrial and agricultural growth in the northern region.
- 15% of generated power will be given free to the concerned home state, apart from power as per their share, where the distress is caused due setting up of the project. Hence, the state has economic benefit from the project too.
- Irrigation of 2.71 lakhs hectares of area, beside irrigation stabilization of 6.07 lakhs hectares. Hence, supporting other economic activities as well indirectly.

To conclude, the project largely seems **sustainable** as running in *profit* since it was operational, leaving minimal and positive *environmental* footprint, and also payback *society* (especially directly affected local population) with alternate better facilities and compensation (may be with few minor exceptions or irregularity on case-to-case basis).

CS-4: PERFORMANCE MEASUREMENT IN NOT FOR PROFIT SECTOR

*The world fame **Taj Mahal** is situated on the banks of Yamuna River in the city of Agra, Uttar Pradesh, known for its beautiful design and is counted as one of the Seven Wonders of the World; the city attracts a lot of tourists from all around the world. The Tourism is one of the main sources of livelihood for its residents. Consequently, cleanliness and maintenance of garden area within the Taj Mahal campus is of prime importance in order to sustain and develop this industry.*

The local government has recently employed a contractor to clean and maintain the garden area within the Taj Mahal campus. The contractor uses cleaning machines pulled by horses to avoid pollution. The contractor has been selected through an online competitive tendering/bidding process. Majority of the litter comprises of plastic waste (bags, bottles etc.) while some portion also includes glass, aluminium cans, paper and cardboard. A detailed log is held by the contractor about the waste that has been cleaned, time taken for the clean-up, number of horses used, etc. This log is also checked and signed by local government officials. This record is used to process payments at the end of the month.

In addition to contracting, the local government has also placed bins at various locations within the campus for the public to dispose their waste. The Nagar Nigam's workers clean these bins every morning. Again, detailed logs of the manpower and other resources employed are kept by the respective department. In addition, the government has· started a mobile messaging system, whereby the public can message ·the concerned department if 'they find litter anywhere in the campus. Depending on whether it is from overflowing bins or scattered waste, the Nagar Nigam's workers will take action to clean it within 12 hours. A detailed log of these operations is also maintained. Patrons can also suggest measures for improving cleanliness on the above-mentioned areas.

Due to its importance to the economy, the local government has allotted substantial budget for these operations. At the same time, it is essential to know if this is sufficient for the purpose of maintaining the cleanliness of the campus. Therefore, the government wants to assess whether the city is getting, "good value for money" from expenditure. The "value for money" concept can be looked at from three perspective's: (i) economy, (ii) efficiency and (iii) effectiveness. The internal audit department that has been requested to undertake this study has requested for guidelines on whether the audit should focus on economy and efficiency of the Taj Mahal campus cleaning operations or on· effectiveness of the same. Economy and efficiency audit assess whether the same level of service can be procured at lower cost or resources while effectiveness audit assess whether better service can be procured at same cost.

Depending on the outcome of the audits, if required, Policy decisions like requesting for additional funding from the state government, alternate policy measures like levying penalty for littering etc. can be taken.

Required

(i) RECOMMEND guidelines to assess economy, efficiency and effectiveness of Taj Mahal and campus cleaning operations.

(ii) IDENTIFY challenges involved in assessment of effectiveness.

(iii) RECOMMEND general guidelines, how the audit team may conclude the audit based on the combined outcomes of economy, efficiency and effectiveness.

Solution

(i) Economy, efficiency and effectiveness are three dimensions of value for money. Economy and efficiency audit of an operation focuses on the consumption of resources and the output achieved. Whereas effectiveness audit of an operations focuses on the comparison of outputs achieved with the desired level of output.

Economy

The Dimension of economy assesses the financial aspects of the activity i.e. are the objectives of the activity being achieved at reasonable cost?

To look at economy of cleaning and maintaining (of the garden area in-side the campus of Taj-Mahal) operations, the *cleaning expenses need to be bifurcated* into different cost centres such as payments made to the contractor, the expenses of emptying waste from bins, and mobile messaging system. At this stage only the *competitive tendering process may be reviewed* to ensure that the contractor getting the order is offering the required quality of service at the lowest price, similar way bins are procured at lowest possible price etc.

Further subcategories of these expenses into cost head such as labour, material, disposal van expenses etc. also need to be collated from the cost records. (This will help in comparison over a period as well).

Then afterwards, these shall be *compared to the budgets* that were approved by the local government of Agra. If the quality of cleaning has been achieved, by staying within budget, the operation is economical. However, if the actuals exceed the budgeted, then government shall make *comparison of cost with cost of similar cleaning operation*. On comparison, if found that cost incurred by Agra local government is more; then the cleaning operations are said to be non-economical, and these may not be efficient too.

Efficiency

Efficiency assesses the volume of input consumed to derive the desired output i.e., are the resources and funds being consumed to get maximum output?

Efficiency of cleaning and maintaining operations can be determined by *checking the log records* maintained for cleaning operation by the contractor and municipality workers. These would have details of activities carried out and the resources utilized for each of them.

For each of these services (be it cleaning and maintaining garden or emptying out bins or mobile messaging system), *the cost drivers can be identified*, and certain metrics can be developed for analysis. For example, cost of cleaning per square metre of garden can be computed or cost of emptying each bin can be computed or cost to respond each call.

While analysing these activities, certain *operational considerations* have to be given. For example, certain stretches or corners of the garden (where landscaping structure is complex) may take more time or resources to clean. Cost of emptying and re-clean the bin used for dry and wet waste may be different. Therefore, if resources for operations are disproportionate for certain parts of the gardens, then multiple categories of garden shall be formed and cost for

each category need to be worked out. But data to get this information will depend on the extent of details maintained in the logs. This information has to be tracked over some period of time in order to understand trends in operations and related expenses.

The data collected from the mobile messaging system should also be investigated. Frequency and area of the campus regarding which complaints are frequent or maximum? Reasons for these lapses need to be taken from the contractor (for cleaning the garden) and the concerned Nagar Nigam workers (for emptying bins) in order to find out whether resources are being employed properly.

Effectiveness

As mentioned earlier that effectiveness of cleaning and maintaining operations would focus on how the actual cleanliness of garden area inside the campus compares with the desired level as laid out when budget was allocated. To assess whether performance has been met, the target.

To begin with, it should be clear as to *what constitutes litter*. From an operational angle, it would be difficult to clean out every bit of dry leaf (falling from tree) lying on garden floor. However, it is possible to pick up every plastic bag or bottle or empty soft drink *can*. Hence, the government authorities must be clear on what constitutes litter? and *tolerance level* for each type of litter e.g., tolerance level of aluminium *can* and dry leaves will be different, because few of dry leaf may left behind even after cleaning. *Quantity of waste collected* would be the indicator to make the above assessment.

Certain other parameters like *safety standards* can also be defined. Safety problems could be cuts from sharp objects like glass. Assessment has to be made whether these standards have been met.

For this, the primary source of information about cleanliness would be *feedback from the patrons*. These could be in the form of complaints received directly or those through the mobile messaging system would provide data to work out the metrics. This would be an indicator of "customer satisfaction". The measure for can be how many mobile messages are responded within the time-cap of 12 hours. Other inputs could also be the suggestions given by the patrons about the ways to improve cleanliness.

Observation by making surprise visits to inspect immediately after the cleaning operations would also provide sufficient evidence about the effectiveness of operations.

(ii) Challenges Involved in assessment of effectiveness would be:

- *Defining what constitutes litter?* These are subjective guidelines, the perception of which may differ from person to person. One can consider dry leaves that have fallen from trees as litter, others may not.
- Establishing the tolerance level of waste (litter) or acceptable level of cleanliness? High amount of *subjectivity* is also involved in determination of level.

- Frequency of cleaning and when to measure the effectiveness, it is obvious the cleanliness will not be at same level throughout the day.
- Certain forms of litter out of operational control such as animals' or birds' dropping, are also considered as part of litter, or ignored when effectiveness is measured. Basically, what matrix of desired objective contain is critical to determine the level of effectiveness.
- Indicator of effectiveness- There has to be a conscious civic sense of duty not to litter, failing which this initiative will most likely be ineffective. Therefore, while measuring performance for effectiveness, *collection of more litter does not necessarily indicate effective operations*. More litter requires more cleaning and more resources, therefore is actually not a positive indicator of effectiveness. On the contrary, in the long run, less litter collected to maintain the desired level of cleanliness would be a good indicator of effectiveness.

(iii) The outcome of the audits can indicate achievement of any or none of the three parameters of economy, efficiency and effectiveness of cleaning and maintaining (of the garden area in-side the campus of Taj-Mahal) operations. To form an integrated conclusion based on the different outcomes of individual audits, the audit team may consider the following guidelines:

(a) Has the objective of the cleaning operation been achieved as per the *guidelines in the relevant policy or white paper* (based upon which budget is allocated)? i.e., have the operations been effective?

(b) If the answer to (a) is yes, are the expenses within *budget*. If so, then the operations are economical and efficient. Given that the operations have been effective at the same time economy and efficiency have been achieved, the team can conclude that the cleaning operations policy has been a success.

A cost-over run can also be justified if the operations have been effective. In that case, the audit team has to conclude whether all expenses incurred are indeed justified and that the resources have been put to the best possible use. If not, can the operations be made more economical or efficient?

(c) If the answer to (a) is no, the operation has not been effective, then next question is → is the difference from the target is marginal or huge? If the operations have not been entirely effective, but only by a marginal gap say 95% success, then analysis of expenses can be made similar to the point (b) mentioned above. However, if the operations have been ineffective to a larger extent, then the cleaning drive initiative has been ineffective. The local government has to look at *alternate solutions* of tackling the problem. These could include imposing heavy penalty for littering, requesting for additional funding from the state government to employ better resources etc.

Therefore, it can be seen that achievement of one objective does not automatically lead to achievement of other objectives. A *holistic approach* would be needed to draw conclusions about the performance of the cleaning operations.

CS-5: PRICING STRATEGY

ITB *is a multi-brand diversified conglomerate corporation that deals in a wide range of industries, from hotels to FMCG; from paper to tobacco; from IT solutions to agro/agri (AGRO) business through its different divisions and departments, which are working independently. Managers of some of these divisions are accountable for their cost and revenue, while in others they are additionally accountable for the capital employed too. ITB is still diversifying its business.*

FMCG Division

In the recent quarter, the FMCG Division of ITB launched ***moonfeast*** *dream cream biscuits, which are flavoured twin cream biscuits. These biscuits are available in two different sizes of packing or price ₹5 for 35 grams and ₹10 for 80 grams. Division decided the price considering the cost it incurred and a preferred margin. The margin stipulated by manager for two years period.*

The market segment relevant to such cream biscuits is highly competitive and hostile, customers are price sensitive too, but the segment has a turnover value of nearly ₹4.5 crores during such recent quarter. Response to ***moonfeast*** *dream cream biscuits is merely reasonable. The Division is looking forward to launching a range of flavours. A report containing investment requirements regarding the new flavours sent to corporate head office for approval. As per market research report of a trade association, during the same quarter total of around 375 MT biscuit was sold in the relevant segment.*

AGRO Division

A high-yield variety of hybrid maize seed ***HY-10*** *was developed after incurring the huge R&D cost, nearly ₹2.35 crores by AGRO Division. Maize is largely a Rabi crop and seed rate depends upon the factors like purpose, seed size, season, plant type, sowing method (For winter and spring maize seed rate of 8-10 kg/acre is desired, whereas for sweet corn, baby corn, and pop-corn seed rate of 8, 16, and 7 kg/acre is respectively desired).* ***HY-10*** *committed and provide high yield and big-deep grains; also reduces the seed rate requirements to 80%-90% of aforementioned.* ***CP-555*** *was a prominent seller prior to the lunch of* ***HY-10*** *and its 4 kg packing was sold for in the range of ₹1,450-1,500 generally. Other players are also working on developing HYV maize seeds.*

AGRO Division has lined up many such more development projects which are duly approved by the divisional head, and some are in pipeline. ***HY-10*** *approved by the regulator and government authorities three seasons ago and available for commercial sale thereafter in the market.* ***HY-10*** *sold in a pack of 2, 10, and 25 kgs only. Figures pertaining to these three seasons are tabled below–*

Season	Revenue (thousand ₹)	Volume of sale (quintal)
First	7,460	149.2
Second	13,185	293.0
Third	12,460	311.5

ITB Hotels

ITB hotels are known for state of art amenities and great hospitality. The occupancy rate ranges from 70% to 80% on average, but for few metropolitan locations, the occupancy touches to 90% to 100%. ITB hotels follow tariff policy, wherein tariff is based upon the cost of living of individual city (wherein hotel is located) and occupancy rate (of the individual hotel) when customer check-in. Dr. Angel Gupta who is a regular guest at ITB in Mumbai (due to her medical conferences) surprised to see the variation between the tariffs. She was charged ₹5,400 per night when her stay during the trip falls on weekdays and ₹8,000 when it falls on weekends.

Required

(i) COMMENT on the ITB's organisational structure and its appropriateness.

(ii) DEFINE responsibility accounting and responsibility centre.

(iii) EXPLAIN profit centre and investment centre.

(iv) IDENTIFY the nature of FMCG and AGRO Divisions from the preview of responsibility accounting.

(v) EVALUATE the pricing strategies adopted (along with appropriateness, and set of advice where it seems inappropriate) by–

a) FMCG Division

b) AGRO Division

c) ITB Hotels

(Support your answer with facts and figures (calculation thereof) given in the case)

Solution

(i) **Organisational Structure** outlines the roles of individuals in the organisation and decides the way in which authority and responsibility are allocated among them and how they are coordinating with each other to attain organisational objectives.

ITB is following the divisional structure wherein various divisions operating autonomously. Since divisions are operating independently hence may be termed as strategic business units (SBUs). Due to high autonomy, the *decision-making process is usually decentralized*.

This type of organisation structure is fit for growing companies that are diversifying because it's easy to bolt on another division. Since ITB is a multi-brand diversified conglomerate corporation that deals in a wide range of industries and still diversifying its business hence the divisional form of organisational structure best fits ITB.

Mind it, in divisional structure too, some functional departments are working horizontally throughout the organisation and known as corporate function or shared/support services, such as Accounts and HR & Payroll, etc.

(ii) **Responsibility accounting** is that type of management accounting that collects and reports planned actual accounting information in terms of responsibility centers. A responsibility centre is a specific unit of an organisation assigned to a manager who is held responsible for its operation and resources. The division can be designate as either of cost, profit, revenue, or investment centre depending upon the responsibility (accountability) assigned to its manager (s)/ divisional manager.

(iii) **Profit Centre and Investment Centre.**

Wherein the manager of division is accountable for the cost and revenue of division it shall be categorised as profit centre. Thus, the performance of such division shall be measured in terms of the difference between the revenues and costs (the absolute amount of profit).

But wherein manager is additionally (apart from cost and revenue) accountable for the capital employed too –categories as investment centre. The performance of an investment centre can be measured by appraising profit/return in relation to the investment base of centre, ROI, RI, and EVA are some prominent financial performance measures.

(iv) **FMCG Division** is a profit centre because it decided its own prices as well as a cost but for investment, it has to take the *approval of the head office*, as it is mentioned in the case that a report containing investment requirement regarding the new flavours sent to corporate head office for approval. Moreover, the desired margin, which is used to determine the price also stipulated by the manager only.

AGRO Division is an investment centre because it takes investment decisions on its own, without the intervention of head office, as it is mentioned in the case that AGRO Division has lined up many such more development projects which are duly approved by the divisional head, and some are in pipeline.

(v) (a) **FMCG Division**

FMCG Division determines the prices based upon the cost it incurred and desired margin stipulated by manager. Hence, pricing strategy (hence the decision) adopted is the cost-plus margin approach.

Concept Insight

It is important to note the **limitations of cost-plus margin** approach:

- It ignores the price charged by the competitors,
- It also ignores the price which customer ready to pay, and
- Enterprise not looking towards cost control and management.

FMCG Division determines the two different prices of moonfeast dream cream biscuits; ₹5 for 35 grams and ₹10 for 80 grams; hence the price ranges from ₹ 125 to ₹ 142.86 per kg in comparison to an average price of ₹120 per kg only (see the working note below) charged by other players in the relevant segment.

It is mentioned in the case that the market segment relevant to such cream biscuits is highly competitive and hostile, customers are price sensitive too; hence selling them

product at a premium price (which more than the average price) is not a good strategy to penetrate into the market and acquire market share. This is the reason that response to moonfeast dream cream biscuits is merely reasonable.

Hence it is advisable for divisional managers of the FMCG Division to pick the penetration strategy, which means keep the prices low initially (in comparison to average market price or near rival) to gain the market share (and product acceptance), once market share reach a reasonable level then prices can be reinstated to normal level (the average market price).

Note – *FMCG Division can practice techniques like Target costing, Kaizen to bring the cost down to reduce the price and sell the product at or lower than market-led prices.*

Working note– Determination of price charge by other players in the relevant segment during the said quarter.

Turnover – ₹4.5 crores

Quantity sold – 375 MT (Metric Ton) - since 1 MT is equal to 1,000 kg hence 3,75,000 kg biscuits were sold during the said quarter.

Average price per kg – ₹4.5 crores / 3,75,000 kg = ₹120 per kg.

(b) AGRO Division

The price charged by the AGRO Division for HY-10 during three previous sessions are tabled below, which depicts AGRO Division use the strategy of price skimming in the case of HY-10 because the prices were initially high (₹500 per kg) and continually decline thereafter (₹450 then ₹400 per kg). The price initially charged for HY-10 was much more than the price range of ₹362.5-375 per kg that CP-555 charged which was a prominent seller prior to lunch of HY-10.

Season	Revenue (in thousand ₹)	Volume of sale (in quintal)	Volume of sale (in kg)	Price per kg (in ₹)
First	7,460	149.2	14,920	500
Second	13,185	293.0	29,300	450
Third	12,460	311.5	31,150	400

Price skimming seems an appropriate strategy for the AGRO Division because HY-10 was developed after incurring the huge R&D cost (nearly ₹2.35 crores), that need to be recovered in few early years because some other players are also working on developing HYV maize seeds; if once they developed HYV maize seeds then ITB may not be in a position to charge the high price to recover its R&D cost from the product.

Customer (formers) might not mind paying a high price for HY-10 because it committed and actually provide high yield and big-deep grains and also reduce the seed rate requirements to 80%-90% of normal requirement.

(c) Hotels

The tariff charged by ITB hotels is based upon the cost of living of an individual city (wherein the hotel is located) and occupancy rate (of the individual hotel) when customers check-in. It means ITB is relying upon the strategy of differential pricing.

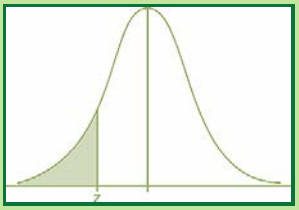
One of the factors that determine the price in the case of ITB hotels is occupancy rate. It means ITB considers the importance of capacity constraints. The practice of charging a higher price for the same product or service when the demand for it approaches the physical limit of the capacity to produce that product or service is known as peak-load pricing.

The pricing strategy seems appropriate largely, but for regular guests like Dr. Gupta, it may be annoying.

Peak–load pricing, on one hand, generates high profit for ITB at the same time it brings equilibrium in demand and supply. But guests like Dr. Gupta, who is a regular guest of ITB may not be happy with differential pricing (tariff ₹5,400 per night on weekdays and ₹8,000 per night on weekends) on account of the peak load factor. The impact of peak-load pricing will be more likely to be seen in those metropolitan locations when the occupancy rate touches 90% to 100%.

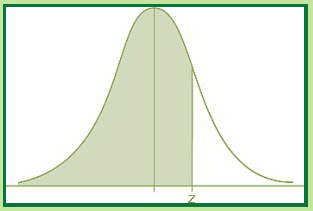
NOTES

STANDARD NORMAL CUMULATIVE PROBABILITY TABLE



Cumulatively Probabilities for NEGATIVE z-Values

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	00004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	00048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	00084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	01423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0,1762	0.1736	0.1711	0.1685	0.1660	0.1635	01611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641



Cumulatively Probabilities for POSITIVE z-Values

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	08133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	08997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	09854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	09938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

LOGARITHMS

N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170						5	9	13	17	21	26	30	34	38
						0212	0253	0294	0334	0374	4	8	12	16	20	24	28	32	36
11	0414	0453	0492	0531	0569						4	8	12	16	20	23	27	31	35
						0607	0645	0682	0719	0755	4	7	11	15	18	22	26	29	33
12	0792	0828	0864	0899	0934						3	7	11	14	18	21	25	28	32
						0969	1004	1038	1072	1106	3	7	10	14	17	20	24	27	31
13	1139	1173	1206	1239	1271						3	6	10	13	16	19	23	26	29
						1303	1335	1367	1399	1430	3	7	10	13	16	19	22	25	29
14	1461	1492	1523	1553	1584						3	6	9	12	15	19	22	25	28
						1614	1644	1673	1703	1732	3	6	9	12	14	17	20	23	26
15	1761	1790	1818	1847	1875						3	6	9	11	14	17	20	23	26
						1903	1931	1959	1987	2014	3	6	8	11	14	17	19	22	25
16	2041	2068	2095	2122	2148						3	6	8	11	14	16	19	22	24
						2175	2201	2227	2253	2279	3	5	8	10	13	16	18	21	23
17	2304	2330	2355	2380	2405						3	5	8	10	13	15	18	20	23
						2430	2455	2480	2504	2529	3	5	8	10	12	15	17	20	22
18	2553	2577	2601	2625	2648						2	5	7	9	12	14	17	19	21
						2672	2695	2718	2742	2765	2	4	7	9	11	14	16	18	21
19	2788	2810	2833	2856	2878						2	4	7	9	11	13	16	18	20
						2900	2923	2945	2967	2989	2	4	6	8	11	13	15	17	19
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	393	4409	4425	440	4456	2	3	5	6	8	9	11	13	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	12
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10

38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6471	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7768	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8169	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	9639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8639	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5

80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	4	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9997	9996	0	1	1	2	2	3	3	3	4

ANTILOGARITHMS

N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
.01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
.02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
.03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	1	2	2	2
.04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	1	1	1	1	2	2	2	2
.05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	2	2	2	2
.06	1148	1151	1153	1156	1159	1161	1164	1167	1119	1172	0	1	1	1	1	2	2	2	2
.07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
.08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	3
.09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	3
.10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	3
.11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	2	2	2	2	3
.12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	2	2	2	2	3
.13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	2	2	2	3	3
.14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	2	2	2	3	3
.15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	2	2	2	3	3
.16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	2	2	2	3	3
.17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	2	2	2	3	3
.18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	2	2	2	3	3
.19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	2	2	3	3	3
.20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	2	2	3	3	3
.21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	2	2	2	3	3	3
.22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	2	2	2	3	3	3
.23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734	0	1	1	2	2	2	3	3	4
.24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774	0	1	1	2	2	2	3	3	4
.25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	2	2	2	3	3	4
.26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	2	2	3	3	3	4
.27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	2	2	3	3	3	4
.28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	2	2	3	3	3	4
.29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	2	2	3	3	4	4
.30	1995	2000	2004	2009	2014	2018	2023	2028	2032	2037	0	1	1	2	2	3	3	4	4
.31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2084	0	1	1	2	2	3	3	4	4
.32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	2	2	3	3	4	4
.33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	2	2	3	3	4	4
.34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2234	1	1	2	2	3	3	4	4	5
.35	2239	2244	2249	2254	2259	2265	2270	2275	2280	2286	1	1	2	2	3	3	4	4	5
.36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2339	1	1	2	2	3	3	4	4	5
.37	2344	2350	2355	2360	2366	2371	2377	2382	2388	2393	1	1	2	2	3	3	4	4	5

.38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2449	1	1	2	2	3	3	4	4	5
.39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	1	1	2	2	3	3	4	5	5
.40	2512	2518	2523	2529	2535	2541	2547	2553	2559	2564	1	1	2	2	3	4	4	5	5
.41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	2	2	3	4	4	5	5
.42	2630	2636	2642	2649	2655	2661	2667	2673	2679	2685	1	1	2	2	3	4	4	5	6
.43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748	1	1	2	3	3	4	4	5	6
.44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812	1	1	2	3	3	4	4	5	6
.45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	2	3	3	4	5	5	6
.46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	2	3	3	4	5	5	6
.47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	2	3	3	4	5	5	6
.48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	2	3	3	4	5	6	6
.49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	2	3	3	4	5	6	6
.50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6	7
.51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
.52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
.53	3388	3396	3404	3412	3420	3428	3436	3443	3451	3459	1	2	2	3	4	5	6	6	7
.54	3467	3475	3483	3491	3499	3508	3516	3524	3532	3540	1	2	2	3	4	5	6	6	7
.55	3548	3556	3565	3573	3581	3589	3597	3606	3614	3622	1	2	2	3	4	5	6	7	7
.56	3631	3639	3648	3656	3664	3673	3681	3690	3698	3707	1	2	3	3	4	5	6	7	8
.57	3715	3724	3733	3741	3750	3758	3767	3776	3784	3793	1	2	3	3	4	5	6	7	8
.58	3802	3811	3819	3828	3837	3846	3855	3864	3873	3882	1	2	3	4	4	5	6	7	8
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.61	4074	4083	4093	4102	4111	4121	4130	4140	4150	4159	1	2	3	4	5	6	7	8	9
.62	4169	4178	4188	4198	4207	4217	4227	4236	4246	4256	1	2	3	4	5	6	7	8	9
.63	4266	4276	4285	4295	4305	4315	4325	4335	4345	4355	1	2	3	4	5	6	7	8	9
.64	4365	4375	4385	4395	4406	4416	4426	4436	4446	4457	1	2	3	4	5	6	7	8	9
.65	4467	4477	4487	4498	4508	4519	4529	4539	4550	4560	1	2	3	4	5	6	7	8	9
.66	4571	4581	4592	4603	4613	4624	4634	4645	4656	4667	1	2	3	4	5	6	7	9	10
.67	4677	4688	4699	4710	4721	4732	4742	4753	4764	4775	1	2	3	4	5	7	8	9	10
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.72	5248	5260	5272	5284	5297	5300	5321	5333	5346	5358	1	2	4	5	6	7	9	10	11
.73	5370	5383	5395	5408	5420	5433	5445	5458	5470	5483	1	3	4	5	6	8	9	10	11
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.75	5623	5636	5649	5662	5675	5689	5702	5715	5728	5741	1	3	4	5	7	8	9	10	12
.76	5754	5768	5781	5794	5808	5821	5834	5848	5861	5875	1	3	4	5	7	8	9	11	12
.77	5888	5902	5916	5929	5943	5957	5970	5984	5998	6012	1	3	4	5	7	8	10	11	12
.78	6026	6039	6053	6067	6081	6095	6109	6124	6138	6152	1	3	4	6	7	8	10	11	13
.79	6166	6180	6194	6209	6223	6237	6252	6266	6281	6295	1	3	4	6	7	9	10	11	13

.80	6310	6324	6339	6353	6368	6383	6397	6412	6427	6442	1	3	4	6	7	9	10	12	13
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.82	6607	6622	6637	6653	6668	6683	6699	6714	6730	6745	2	3	5	6	8	9	11	12	14
.83	6761	6776	6792	6808	6823	6839	6855	6871	6887	6902	2	3	5	6	8	9	11	13	14
.84	6918	6934	6950	6966	6982	6998	7015	7031	7047	7063	2	3	5	6	8	10	11	13	15
.85	7079	7096	7112	7129	7145	7161	7178	7194	7211	7228	2	3	5	7	8	10	12	13	15
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.87	7413	7430	7447	7464	7482	7499	7516	7534	7551	7568	2	3	5	7	9	10	12	14	16
.88	7586	7603	7621	7638	7656	7674	7691	7709	7727	7745	2	4	5	7	9	11	12	14	16
.89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	9	11	13	14	16
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.91	8128	8147	8166	8185	8204	8222	8241	8260	8279	8299	2	4	6	8	9	11	13	15	17
.92	8318	8337	8356	8375	8395	8414	8433	8453	8472	8492	2	4	6	8	10	12	13	15	17
.93	8511	8531	8551	8570	8590	8610	8630	8650	8670	8690	2	4	6	8	10	12	14	16	18
.94	8710	8730	8750	8770	8790	8810	8831	8851	8872	8892	2	4	6	8	10	12	14	16	18
.95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
.96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	6	8	11	13	15	17	19
.97	9333	9354	9376	9397	9419	9441	9462	9484	9506	9528	2	4	7	9	11	13	15	17	20
.98	9550	9572	9594	9616	9638	9661	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
.99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20