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SCMPE

Additional *Questions*

This compiler includes newly added questions by ICAI in May 21 SM & Nov 20 RTP.

ICAI has also added some Past RTPs, MTPs and Exam Questions in May 21 SM which are not included in this compiler since those are already covered in the Main Question Bank provided with the class to all of you.

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ADDITIONAL QUESTIONS

Chapter 1

Question 1

The following are the income statements of two firms in the same industry.

	Firm WD (₹)	Firm WG (₹)
Revenues	20,00,000	40,00,000
Less: Variable costs	9,00,000	24,00,000
Contribution margin	11,00,000	16,00,000
Less: Fixed costs	7,00,000	12,00,000
Profit before taxes	4,00,000	4,00,000

Required

IDENTIFY the strategy (cost leadership vs. differentiation) followed by two firms. JUSTIFY your classification.

Answer

Higher contribution margin ratio exhibited by firm WD indicates that firm WD is following a **differentiation strategy** while firm WG appears to be more focused on cost leadership. This is also substantiated by higher fixed costs i.e. R&D, innovation etc. for each sale ₹ in firm WD. Innovation allows a firm to command premium prices and earn more contribution per sales ₹. However, innovation is expensive.

	Firm WD	Firm WG
Contribution margin/ Sales	0.55	0.40
Fixed costs/ Sales	0.35	0.30
Profit margin/ Sales	0.20	0.10

Question 2

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

Answer

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.

Chapter 2

Question 3

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 2019-20:

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 2020-21, 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 2019-20 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.

Answer

- (i) Cost of Quality Statement

For the year 2019-20

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.

Question 4

Rohni Steel Company produces three grades of steel - super, good and normal grade. Each of these products (Grades) has high demand in the market and company is able to sell as much as it can produce these products.

The furnace operation is a bottle-neck in the process. The company is running at 100 % of capacity. The company wants to improve its profitability. The variable conversion cost is ₹100 per process hour. The fixed cost is ₹48,00,000. In addition, the Cost Accountant was able to determine the following information about the three products (grades):

	Super Grade	Good Grade	Normal Grade
Budgeted Units Produced	6,000	6,000	6,000
Total process hours per unit	12	12	10
Furnace hours per unit	6	5	4
Unit Selling Price	₹3,600	₹3,400	₹3,000
Direct Material cost per unit	₹2,100	₹1,900	₹1,720

The furnace operation is part of the total process for each of these three products. Thus furnace hours are the part of process hours.

Required

- (i) DETERMINE the unit contribution margin for each product.
- (ii) Give an ANALYSIS to determine the relative product profitability, assuming that the furnace is a bottleneck.
- (iii) Managements wishes to improve profitability by increasing prices on selected products. At what price would super and good grades need to be offered in order to produce the same relative profitability as normal grade steel?

Answer

- (i) **Contribution Margin per unit**

Particulars	Super Grade (₹)	Good Grade (₹)	Normal Grade (₹)
Selling Price per unit	3,600	3,400	3,000

Less: Variable Conversion Cost per unit	1,200 (₹100 × 12 hrs.)	1,200 (₹100 × 12 hrs.)	1,000 (₹100 × 10 hrs.)
Less: Direct Material Cost per unit	2,100	1,900	1,720
Contribution Margin per unit	300	300	280

- (ii) The contribution margin per unit may give false signals when an organization has production bottlenecks. Instead, Company should use the contribution margin per bottleneck hour to determine relative product profitability, as follows:

Particulars	Super Grade	Good Grade	Normal Grade
Contribution Margin per unit (₹)	300	300	280
Furnace Bottleneck hrs. per unit	6	5	4
Contribution Margin per furnace hour	50	60	70

Analysis

The Super and Good Grade steel have the highest contribution margin per unit (₹300); however, the normal grade has the highest contribution margin per furnace hour (₹70). Thus, using production bottleneck analysis indicates that the Normal Grade is actually more profitable at a ₹70 contribution margin per furnace hour than Super Grade's ₹50 or Good Grade's ₹60 contribution margin per furnace hour.

Therefore, the company would want to sell product in the following preference order:

- I. Normal Grade
- II. Good Grade
- III. Super Grade

- (iii) One way is to revise the pricing would be to increase the price to the point where all three products produce profitability equal to the highest profit product. This would be determined as follows:

Contribution Margin per furnace hour for Normal Grade =

$$\frac{\text{Revised Price of Super Grade - Variable Cost per unit of Super Grade}}{\text{Furnace Hours of Super Grade per unit}}$$

Or

$$₹ 70 = \frac{\text{Revised Price of Super Grade} - ₹(1,200 + 2,100)}{6 \text{ hrs.}}$$

$$\text{Or, } ₹ 420 = \text{Revised Price of Super Grade} - ₹ 3,300$$

Super grade steel would require a revised price of **₹3,720** in order to deliver the same contribution margin per bottleneck hour as does Normal Grade steel.

Contribution Margin per furnace hour for Normal Grade =

$$\frac{\text{Revised Price of Good Grade - Variable Cost per unit of Good Grade}}{\text{Furnace Hours of Good Grade per unit}}$$

Or

$$₹ 70 = \frac{\text{Revised Price of Good Grade} - ₹(1,200 + 1,900)}{5 \text{ hrs.}}$$

Good grade steel would require a revised price of **₹3,450** in order to deliver the same contribution margin per bottleneck hour as does Normal Grade steel.

Question 5

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 is 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.

Answer

(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 throughput accounting ratio of Product D (i.e. above 1.0)**. TA ratio could be improved by:

- Increasing the selling price of the 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 bottleneck, 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). 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 credit-worthiness. 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 macro-economic 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 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 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 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) 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.

Chapter 4

Question 6

X is a leading toy manufacturing firm. Having commenced its commercial operations in the year 1990, the firm has a state-of-the-art manufacturing facility in India. It sells toys through retail outlets and the firm's website. X has been pioneering the concepts of quality and safety in toys and has been instrumental in raising the quality standards of toys in the Indian Market.

X's mission is to influence parents to spend on toys that enable every child to grow with quality toys that contributes to his/ her wholesome development.

X procures the materials from a number of different suppliers. All of the purchased material are dispatched to its warehouse located at its factory and are held there unless they are moved to production. After production is completed, finished toys are moved to X's retail outlets by its own vehicles. Each week, the vehicles follow the same time schedule regardless of the weight they are carrying. Finished toys that are sold through the X's website are dispatched to its distribution centre.

X has recently got the contract to manufacture a new toy that is 'Ty-Z', a mini cartoon based on a character from a famous international animated film. X has not been given any target price, hence is free to set the selling price of 'Ty-Z', however, must pay a royalty of 10% of the selling price to the film director. X is also planning to sell 'Ty-Z' through its retail outlets.

X has decided to follow a target costing technique for 'Ty-Z'. Marketing manager has determined the selling price to be around ₹1,750 per 'Ty-Z'. X needs a margin of 26% of the selling price of 'Ty-Z'.

For the estimated costs per 'Ty-Z' refer Annexure.

Required

DISCUSS three primary activities of value chain through which X can minimise gap if any.
Annexure

Estimated Costs per 'Ty-Z'

	₹
Material C	150.50
Material D	122.50
Other Material	see note below
Labour (0.4 hours at ₹1,050 per hour)	420.00
'Ty-Z'- specific production overhead cost	132.30
'Ty-Z'- specific selling and distribution cost	166.60
Note- Each 'Ty-Z' requires 0.70 kg of 'other materials'. These 'other materials' are procured from a supplier at a cost of ₹280 per kg and around 5% of all purchased materials are found to be downgraded.	

Answer

In case of X, there is a **cost gap of Rs. 78.22**. Where a gap exists between the current estimated cost levels and the target cost, it is essential that this gap be closed. Cost gap can be removed by **reducing the cost over all the Value Chain** through the development of the spirit co-operation and understanding among all members of organizations associated with the product from suppliers, producers, customers, agents and service providers.

In Xs Value Chain, three primary activities are:-

Inbound logistics

These are activities concerned with receiving, storing and distributing the inputs (raw

material) to the production process. The relationship with supplier is a key component in this process. Currently, X procures materials from multiple suppliers and stores these materials in its store. **Shifting to a just-in-time (JIT) system technique** in procurement of materials could possibly save substantial storage costs provided the JIT supplier must agree to take the responsibility for the good quality of materials supplied. This will also become a source of savings because downgraded items will be removed. However, X might have to pay additional payout to a supplier for JIT purchasing to work.

Outbound logistics

These activities involve collecting, storing and distributing the products to the customers. At X, scheduled transportation of toys to retail outlets is outbound logistics activity. Potentially, the scheduled transportation of toys to retail outlets every week is not an efficient way. Such deliveries do not consider whether toy is required at retail outlets or not, hence X may possibly deliver toys to retail outlets those do not need toys and suffer unnecessary transportation costs.

X should plan to **implement EDI system** that will help it to improve warehousing and logistics by automatically tracking inbound shipments as well as outbound products. Adopting EDI, X can not only improve processes but also streamline inventory management across many channels. However, it will require setup time and a learning curve to implement the same.

Marketing and sales

Marketing and sales provide the means by which the customers are made aware of the product. At X, the sales of toys via its retail outlets and website are marketing and sales activities.

X is planning to sell 'Ty-Z' via retailers. If X **sales 'Ty-Z' through its website** rather than through retail outlet, significant cost could easily be avoided. Simultaneously, X will be able to expose itself to **attract international customers** to buy 'Ty-Z' as product is based on character from a famous international animated film.

Overall, X may create a cost advantage by **reconfiguring** the Value Chain. Reconfiguration means structural changes such a new production process, new distribution channels or a different sales approach as discussed above.

Workings

Statement Showing Computation of Cost GAP

	₹
Sales Price	1,750.00
Less: Royalty @10%	175.00
Less: Profit @26%	455.00
Target Cost 'Ty-Z'	1,120.00
Material C	150.50
Material D	122.50
Labour (0.40 hours at ₹1,050 per hour)	420.00
Other Material (0.70 kg × ₹280 per kg) / 0.95	206.32
Production Overheads Cost	132.30
Distribution and Sales Cost	166.60
Estimated Cost 'Ty-Z'	1,198.22
Cost Gap	78.22

Question 7

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.

Answer

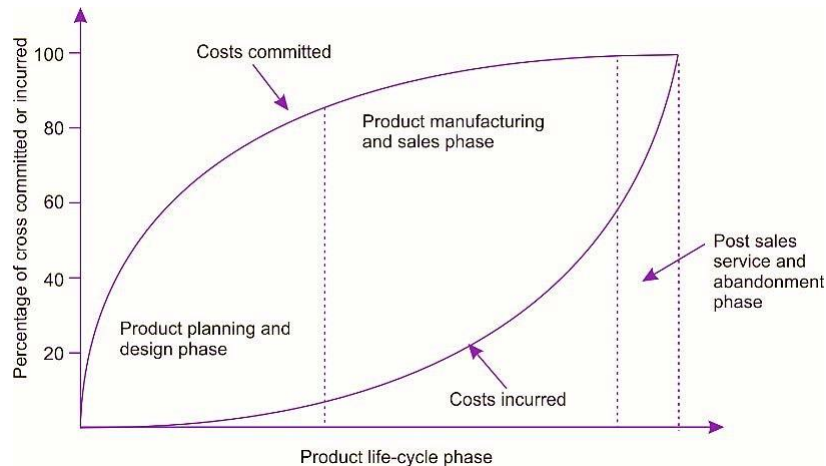
(i) Statement Showing Budgeted Life-Cycle Operating Income

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	32,00,000
Fixed	1,12,00,000
Marketing Costs:	
Batch (₹24 × 2,500* batches)	60,000
*Assuming 1 Batch = 96 Pcs.	
Fixed	8,00,000
Distribution Costs:	
Variable (₹ 240 × 2,40,000)	5,76,00,000
Fixed	45,00,000
Customer Service Cost (₹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 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.

Question 8

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/-.

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 focusing on environmental sustainability provides opportunity to KOA Limited for reducing costs?

Answer

- (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. Environment 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 stakeholder as corporate citizen.

- (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 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 wastes 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 sell on the open market, thereby actually generating revenue.

Chapter 6

Question 9

A company manufactures cycles for both adults and children. Given below is information about cycles made for children–

Particulars	Traditional CVP Analysis	Activity Based CVP Analysis
Monthly Demand and Production	10,000 units	10,000 units
Selling Price	₹8,000 per unit	₹8,000 per unit
Variable Cost per unit	₹7,500 per unit	₹7,500 per unit
Fixed Cost p.m. (as identified under each cost system)	₹ 10,00,000 p.m.	₹ 8,00,000 p.m.

Fixed costs of ₹10,00,000 per month under Traditional CVP analysis are those that do not vary with respect to volume. Following an Activity Based Costing study, fixed cost that do not vary as per volume or any other cost driver has been identified to be ₹8,00,000 per month. The study revealed a milling machine is used to cut metal into steer support. Production of these steer support takes place in batches of 25 units. Once a batch for children's cycle is finished, the next batch would be that for adult cycles. Therefore, after each batch there would be a set-up change. If 10,000 children's cycles have to be produced, number of set-ups required = 10,000 steer support / 25 per batch = 400 set-ups. Each set-up costs ₹500, comprising of material costs like change of oil, jig etc. This cost was previously pooled together with fixed cost under traditional CVP analysis.

Required

- (i) FIND the break-even point per month and profit per month under the traditional CVP method and the Activity Based CVP method.
- (ii) As a plant manager, you would like to keep the number of set-ups minimum since they reduce the capacity of the machine. Suppose that at any time the milling machine can be used to produce other type of cycles like adult cycles, sports cycles etc. Therefore, you propose to increase the batch size of children's steer support to 50 units in one batch. The number of set-ups will reduce from 400 (10,000 units / 25 units) to 200 (10,000 units / 50 units). Due to larger batch production, additional inventory storage area would be required to store that will cost the company ₹50,000 per month extra. ANALYSE the impact on BEP (units per month) and profits per month.
- (iii) When should labour cost be factored into the calculation of cost of a set-up? Explain.
- (iv) How can the number of set-ups and cost of each set-up impact flexibility of the milling machine? Explain.

Answer

- (i) Break-even point (units per month) and profit per month under traditional CVP analysis:

Selling Price per unit	₹8,000
Variable Cost per unit	₹7,500
Contribution per unit	₹500
Fixed Cost per month	₹10,00,000

Break-even Point (per month in units) = Fixed Cost p.m. / Contribution p.u. = ₹10,00,000 / ₹500 per unit	2,000 units
Monthly Demand (units)	10,000 units
Profit per month = {Monthly demand (units) × Contribution per unit} – Fixed Cost per month = (10,000 × ₹500 per unit) - ₹10,00,000	₹40,00,000

Break-even point (units per month) and profit per month under Activity Based CVP method. Number of units produced per batch is 25. Therefore, number of set-ups will be 10,000 units / 25 units = 400 per month.

Selling Price per unit	₹8,000
Variable Cost per unit	₹7,500
Contribution per unit	₹500
Fixed Cost per month (per Activity Based method)	₹8,00,000
Break-even Point (per month in units) = {Fixed Cost p.m. + (number of set-ups × cost per set-up)} / Contribution p.u. = {₹8,00,000 + (400 × ₹500 per set-up)} / ₹500 per unit = ₹10,00,000 / ₹500 per unit	2,000 units
Monthly Demand (units)	10,000 units
Profit per month = {Monthly demand (units) × Contribution per unit} – (Fixed Cost per month + Set-up cost per month) = (10,000 × ₹500 per unit) – (₹8,00,000 + ₹200,000) = ₹50,00,000 – ₹10,00,000	₹40,00,000

Although, the BEP units and the profit per month are the same under both methods, Activity Based method has brought forth the point that there are 400 set-ups being performed per month. This would give the management more information to work with in order to improve operations.

- (ii) Break-even point (units per month) and profit per month under Activity Based CVP analysis: Batch size increased from 25 to 50 units, monthly set-ups reduce from 400 to 200 per month.

Selling Price per unit	₹8,000
Variable Cost per unit	₹7,500
Contribution per unit	₹500
Fixed Cost per month (per Activity Based method) Additional cost p.m. for inventory storage = ₹50,000	₹8,50,000
Break-even Point (per month in units) = {Fixed Cost p.m. + (number of set-ups × cost per set-up)} / Contribution p.u. = {₹8,50,000 + (200 × ₹500 per set-up)} / ₹500 per unit = ₹9,50,000 / ₹500 per unit	1,900 units
Monthly Demand (units)	10,000 units
Profit per month = {Monthly demand (units) × Contribution per unit} – (Fixed Cost per month + Set-up cost per month) = (10,000 × ₹500 per unit) – (₹8,50,000 + ₹1,00,000) = ₹50,00,000 – ₹9,50,000	₹40,50,000

Analysis

It can be concluded by increasing the batch-size, the capacity of the machine can be increased. The time freed by reducing set-ups from 400 per month to 200 per month can now be used to produce parts for other cycles. Since the number of set-ups would reduce, so will the monthly set-up costs. Even after off-setting the increase in storage cost, profits have increased by ₹50,000 per month (₹40,50,000 - ₹40,00,000 per month). Consequently, break- even point has reduced from 2,000 units per month to 1,900 units per month. This reduction is due to the savings in the overall set-up costs due to lower number of set-ups.

- (iii) Inclusion of labor cost in the cost of set-up would depend on their availability:
 - (a) Cost of temporary labour hired for particular set-up or cost of outsourcing of set-up activities would be included in set-up costs.
 - (b) Cost of permanent labour used for set-up, who are otherwise idle would not be included in set-up costs since the salaries paid to them has to be incurred anyway, it is a sunk cost.
 - (c) However, where permanent labour is used for set-up, who are otherwise fully engaged in the production process and additional labour supplies are unavailable in the short term, and where no further overtime working is possible, the opportunity cost of labour needs to be considered along with the hourly labour rate.
- (iv) Set-ups reduces the production utility of a machine. Lower number of set-ups or lower set-up time can improve the utilization of the machine. This also gives the company flexibility to keep changing the batches produced at the milling machine to cater to children’s cycles and adult cycles as per its requirement. The other factor that impacts flexibility of production would be the set-up costs. Lower the set-up costs, higher the flexibility to change batches produced at milling machine to cater to each type of cycle.

Question 10

ABC Limited specializes in the manufacture of chemical intermediaries in a very competitive business environment. ABC is a public listed company, with majority of its shareholders being institutional investors like mutual funds, banks and insurance companies.

It is located in a water scarce zone in Tamil Nadu. There are restrictions on the tapping and usage of groundwater under the relevant laws. Penal provisions of the law will apply in case of violations. The production process requires water and the amount of water that the company can draw is limited to 19,000 kilo-litres (1 Kilo-litre is 1,000 litres). Purchase of water is not an option as availability is highly erratic and exorbitant on cost.

The company manufactures two types of chemicals “A” and “B” and these are sold in kilograms. The company is in the process of making the business plan for the year 2021.

Based on the actual operating data for 2020 and taking into consideration the inflation and possible price increases that it can obtain from the market, the following product costing details have been arrived at:

Product	A	B
Capacity Volume kg. (not inter-changeable)	8,25,000	9,30,000
Selling Price per kg.	₹2,000	₹1,000
Variable Cost per kg.	₹1,500	₹650
Water (litre/ kg.)	12.5	10

Under the relevant income tax laws prevalent, companies with a turnover of ₹250 Cr.

(Crores) or less are taxed at a lower rate of 25% as against the normal 30%. The company intends to keep its sales for 2021 equal to ₹250 Cr. or slightly lesser to avail this concessional income tax benefit.

With capacity constraints, the company has calculated that it would be still beneficial for the company to stick to ₹250 Cr. as only a marginal increase in turnover is possible over ₹250 Cr.; after a higher tax @30%, the PAT would be still lower than the PAT arrived at after doing just ₹250 Cr. and availing the lower income tax rate.

CFO asked management consultant to work out the volumes in kg. of products "A" and "B" which would give an optimal (maximum) contribution given the constraints on capacity, water usage and turnover to avail the concessional income tax benefit.

Consultant work out with the following product mix using Linear Programming. She also proposes another mix which does not meet the constraint on water usage where the company could end up drawing excess water than permitted by 113 kilo-litres but would result in an increase of ₹30 lacs in contribution. She says that it is easily possible to do this by managing reporting to the water authorities.

Product		Optimal	Suggested
A (Volume in kg.)		8,00,000	7,85,000
B (Volume in kg.)		9,00,000	9,30,000
Contribution in ₹Cr.		71.5	71.8
	Constraints		
Sales	<= 250 Cr.	250	250
Volume of "A" in kg.	<= 8,25,000	8,00,000	7,85,000
Volume of "B" in kg.	<= 9,30,000	9,00,000	9,30,000
Water usage (in KL)	<= 19,000	19,000	19,113

Required

The CFO is not satisfied with the calculations. He wants you (Sr. Finance Manager) to come up with a proper DISCUSSION.

Answer

Primary goal of investor –owned firms is shareholder wealth maximisation, which translates to stock price maximisation. Management Consultant’s plan is looking good for the ABC as there is a positive impact on the profitability (₹30 lacs) of the company. Also, ABC operates in a competitive environment so for its survival, it has to work on plans like above.

There is second side of coin that cannot also be ignored i.e. **business ethics**. It is easily possible to manage drawing of excess water, but it is not an ethical practice as the company has responsibilities towards use of natural resources like water and protecting the environment.

Besides, a whistle-blower complaint to the water authorities can land the company into trouble in terms of penalties, a financial impact and also such penalties are disallowed for income tax purposes. It is possible that such a violation may be reported in the media causing disrepute to the name of the company. It can also make investors in the share market stay away from the company as it has ethical governance issues. The company will face challenges in obtaining other government approvals when it will plan expansion as this violation may have to be reported on the applications seeking approvals.

Overall

May be ABC would able to earn profit due to this plan in short run but it will tarnish the image of the ABC which would hurt profitability in long run. Therefore, before taking any decision on this plan, ABC should analyse both qualitative and qualitative factors.

Chapter 7

Question 11

Bosch Ltd. has developed a special product. Details are as follows: The product will have a life cycle of 5,000 units. It is estimated that market can absorb first 4,500 units at ₹ 64 per unit and then the product will enter the "decline" stage of its life cycle.

The company estimates the following cost structure:

Direct Labour..... ₹ 6 per hour

Other variable costs..... ₹ 19 per unit

Fixed costs will be ₹ 40,000 over the life cycle of the product. The 'labour rate' and both of these costs will not change throughout the product's life cycle.

The first batch of 100 units will take 1,000 labour hours to produce. There will be an 80% learning curve that will continue until 2,500 units have been produced. Batches after this level will each take the same amount of time as the 25th batch. The batch size will always be 100 units.

Required

CALCULATE average selling price of the final 500 units that will allow the company to earn a total profit of ₹ 80,000 from the product if average time for 24 batches is 359.40 hours.

(Note: Learning coefficient is -0.322 for learning rate of 80%). The values of Logs have been given for calculation purpose: log 2 = 0.30103; log 3 = 0.47712; log 5 = 0.69897; antilog of 2.534678 = 342.51; antilog of 2.549863 = 354.70; antilog of 2.555572 = 359.40; antilog of 2.567698 = 369.57

Answer

Average 'Selling Price' of the final 500 units

Particulars	Amount (₹)
Direct Labour [(8,867.50 hrs. + 241.90 hrs. × 25 batches) × ₹6]	89,490
Add: Other Variable Costs (5,000 units × ₹19)	95,000
Add: Fixed Costs	40,000
Total Life Cycle Cost	2,24,490
Add: Desired Profit	80,000
Expected Sales Value	3,04,490
Less: Sales Value (4,500 units × ₹64)	2,88,000
Sales Value (Decline Stage) ... (A)	16,490
Sales Units (Decline Stage) ... (B)	500
Average Sales Price per unit ... (A) / (B)	32.98

Workings

(i) The cumulative average time per batch for the first 25 batches

The usual learning curve model is

$$y = ax^b$$

Where

$$y = \text{Average time per batch (hours) for } x \text{ batches}$$

- a = Time required for first batch (hours)
x = Cumulative number of batches produced
b = Learning coefficient

The Cumulative Average Time per batch for the first 25 batches

$$\begin{aligned}y &= 1,000 \times (25)^{-0.322} \\ \log y &= \log 1,000 - 0.322 \times \log 25 \\ \log y &= \log 1,000 - 0.322 \times \log (5 \times 5) \\ \log y &= \log 1,000 - 0.322 \times [2 \times \log 5] \\ \log y &= 3 - 0.322 \times [2 \times 0.69897] \\ \log y &= 2.549863 \\ y &= \text{antilog of } 2.549863 \\ y &= 354.70 \text{ hours}\end{aligned}$$

(ii) The time taken for the 25th batch

$$\begin{aligned}\text{Total Time for first 25 batches} &= 354.70 \text{ hours} \times 25 \text{ batches} \\ &= 8,867.50 \text{ hours} \\ \text{Total Time for first 24 batches} &= 359.40 \text{ hours} \times 24 \text{ batches} \\ &= 8,625.60 \text{ hours} \\ \text{Time taken for 25th batch} &= 8,867.50 \text{ hours} - 8,625.60 \text{ hours} \\ &= 241.90 \text{ hours}\end{aligned}$$

Chapter 8

Question 12

LNG Limited has three divisions. Its desired rate of return is 14%. The operating assets and income for each division are as follows:

Divisions	Operating Assets (₹)	Operating Income (₹)
L	19,20,000	3,45,600
N	10,50,000	1,73,250
G	12,30,000	1,67,280
Total	42,00,000	6,86,130

LNG Limited has ₹ 8,00,000 of additional cash to invest in one of its divisions. The divisional managers have identified investment opportunities that are expected to yield the following ROIs-

Divisions	Expected ROIs for additional investment
L	16%
N	12%
G	15%

Required

- (i) CALCULATE ROIs at present for each division and STATE which division manager is currently providing the highest ROI.
- (ii) Based on ROI, IDENTIFY the division manager who would be the most eager to accept the additional investment funds.
- (iii) Based on ROI, IDENTIFY the division manager who would be least eager to accept the additional investment funds.
- (iv) STATE the division that offers the best investment opportunity for LNG limited.
- (v) DISCUSS the conflict between requirements (ii) and (iv) above.
- (vi) ADVISE how the residual income performance measure could be used to motivate the managers to act in the best interest of the company.

Answer

- (i) Present ROI of each division

Divisions	Operating Assets (₹)	Operating Income (₹)	ROI
L	19,20,000	3,45,600	18%
N	10,50,000	1,73,250	16.5%
G	12,30,000	1,67,280	13.6%

The division manager of L division is currently providing the highest ROI of 18% among the three divisions.

- (ii) The manager of division G would be most eager to accept the additional fund of ₹ 8,00,000 because of ROI of the proposed investment is more than the present ROI of 13.6% and the acceptance of the proposal would increase the division's ROI.
- (iii) The managers of division L and N, both would be reluctant to invest the additional fund of ₹ 8,00,000. Because the return on the proposed project is 16% for L and 12% for N against their existing ROI of 18% and 16.5% respectively.
However, the manager of division N would be least likely to accept the additional investment because the proposed ROI of the project is 4.5% less than present ROI.
- (iv) Division L offers the best investment opportunity of 16% for LNG limited.
- (v) Lack of goal congruence between divisions and organisation as a whole is the reason.

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.

In requirement (ii) decision of managers of division G is in the best interest of the division but at the expense of their company, resulting sub optimisation; whereas in requirement (iv) decision is taken from the perspective of LNG limited as a whole.

- (vi) To avoid sub optimisation, the divisional performance can be measured using Residual Income (RI). Since under RI divisional managers don't reject the proposed projects with lower returns than existing rate of return of division, hence in the interest of organisation as a whole division is ready to accept the investment projects with the returns equal to or greater than the predetermined required rate of return (i.e. 14%). RI being absolute measures have shortcoming too that performance of divisions with different sizes can't be compared.

Question 13

Olderhelp India is a leading charity working with and for the disadvantaged elderly for over 5 decades. Olderhelp advocates for their needs for universal pension, quality healthcare, action against elder abuse and many more. Olderhelp collects donations and funds and utilises them for the welfare of elders. The governing body of Olderhelp has setup four performance objectives for the three months to 30 Sep 2020:

- to achieve a level of donation of ₹30,00,000
- to keep advertisement cost not more than 3% of donation
- to keep welfare cost more than 85% of donation
- to achieve 90% of respite care requested from the community
- Actual results were as follows:

	July	Aug	Sep
Donation (₹)	7,00,000	13,00,000	11,00,000
Advertisement Costs (₹)	17,500	52,000	33,000
Elder's welfare cost (₹)	5,74,000	10,92,000	979,000
Respite care requests (days)	1,120	1,140	1,200
Respite care provided (days)	896	1,003	1,104

- The aim is to serve elder needs in a holistic manner, enabling them to live active, dignified and healthier lives.

Requirement

PREPARE a statement to assist the manager in evaluation performance against objectives and COMMENT on the performance.

Answer

Statement Showing Performance

	July	Aug	Sep
Advertisement cost as a percentage of donation	2.5%	4%	3%
Target percentage of Advertisement cost of donation	3%	3%	3%
Welfare cost as a percentage of donation	82%	84%	89%
Target percentage of welfare cost as a percentage of	85%	85%	85%

donation			
Respite care provided	80%	87.98%	92%
Target percentage of respite care	90%	90%	90%

Comment

Total donation received ₹31,00,000 (=₹7,00,000+₹13,00,000+₹11,00,000) have exceeded the target ₹30,00,000. Though there is no fix trend of receiving fund while it is noticeable that there were special fundraising activities in Aug which generated highest receipt.

Advertisement costs have been within the target of 3% in July and Sep but exceeded the target in Aug, more information is needed to establish why this occurred.

For the month of July and Aug the welfare cost are less than the target, while for the month of September Olderhelp have exceeded the target of expenditure of cost.

The improvement in the respite care provided by Olderhelp has been steady and for the month of september the target has exceeded.

Chapter 12

Question 14

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.

Answer

(i) Traditional Variances

$$\begin{aligned}
 \text{Usage Variance} &= (12,000 \text{ lt.} - 12,800 \text{ lt.}) \times ₹ 15.00 \\
 &= ₹ 12,000 \text{ (A)} \\
 \text{Price Variance} &= (₹ 15.00 - ₹ 16.40) \times 12,800 \text{ lt.} \\
 &= ₹ 17,920 \text{ (A)} \\
 \text{Total Variance} &= ₹ 12,000 \text{ (A)} + ₹ 17,920 \text{ (A)} \\
 &= ₹ 29,920 \text{ (A)}
 \end{aligned}$$

Operational Variances

$$\begin{aligned}
 \text{Usage Variance} &= (12,000 \text{ lt.} - 12,800 \text{ lt.}) \times ₹ 16.00 \\
 &= ₹ 12,800 \text{ (A)} \\
 \text{Price Variance} &= (₹ 16.00 - ₹ 16.40) \times 12,800 \text{ lt.}
 \end{aligned}$$

$$\begin{aligned}
 &= ₹ 5,120 (A) \\
 \text{Total Variance} &= ₹ 12,800 (A) + ₹ 5,120 (A) \\
 &= ₹ 17,920 (A)
 \end{aligned}$$

Planning Variances

$$\begin{aligned}
 \text{Controllable Variance} &= (₹ 15.40 - ₹ 16.00) \times 12,000 \text{ lt.} \\
 &= ₹ 7,200 (A) \\
 \text{Uncontrollable Variance} &= (₹ 15.00 - ₹ 15.40) \times 12,000 \text{ lt.} \\
 &= ₹ 4,800 (A) \\
 \text{Total Variance} &= ₹ 7,200 (A) + ₹ 4,800 (A) \\
 &= ₹ 12,000 (A)
 \end{aligned}$$

Reconciliation

$$\begin{aligned}
 &= ₹ 17,920 (A) + ₹ 12,000 (A) \\
 &= ₹ 29,920 (A)
 \end{aligned}$$

- (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. 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.

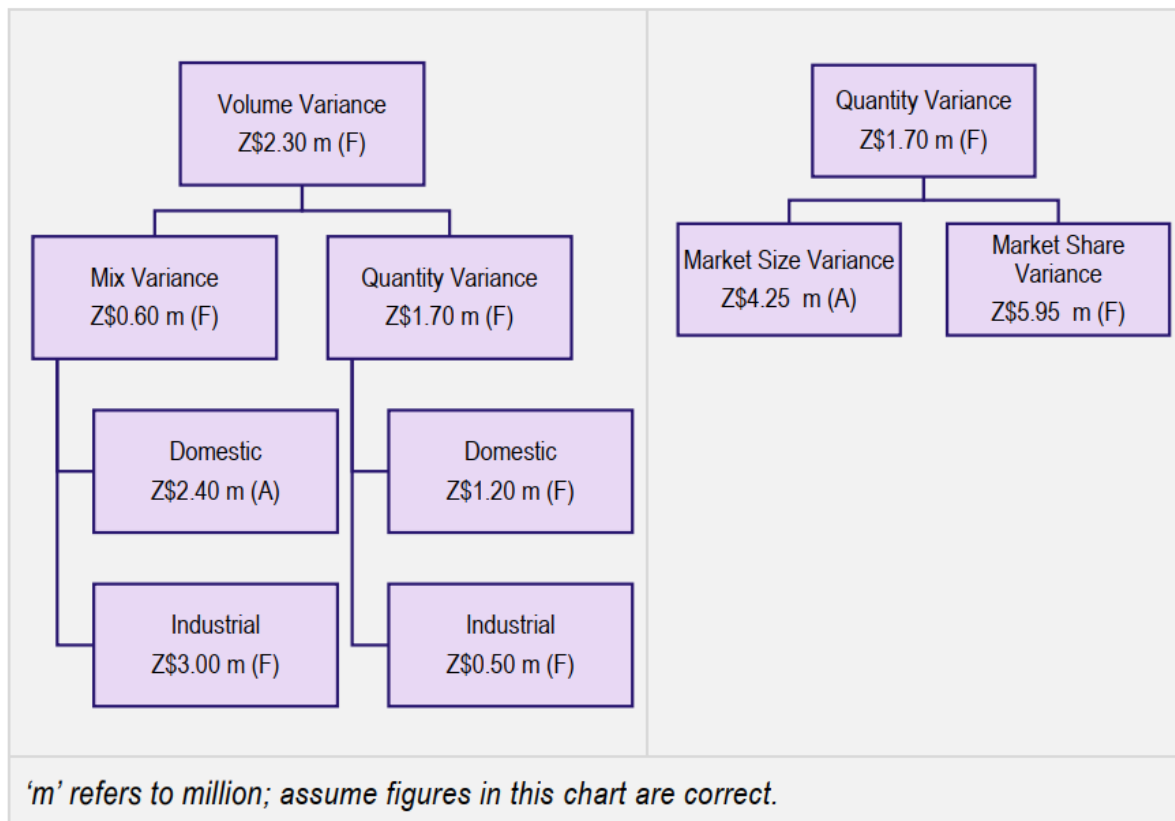
Question 15

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 2021-

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 2020, a marketing research estimated market volume for industrial and domestic flooring at 8 m Rolls. Actual market volume for 2021 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:



Required

Assuming yourself as a performance management expert of ZM, the CEO has asked you to:

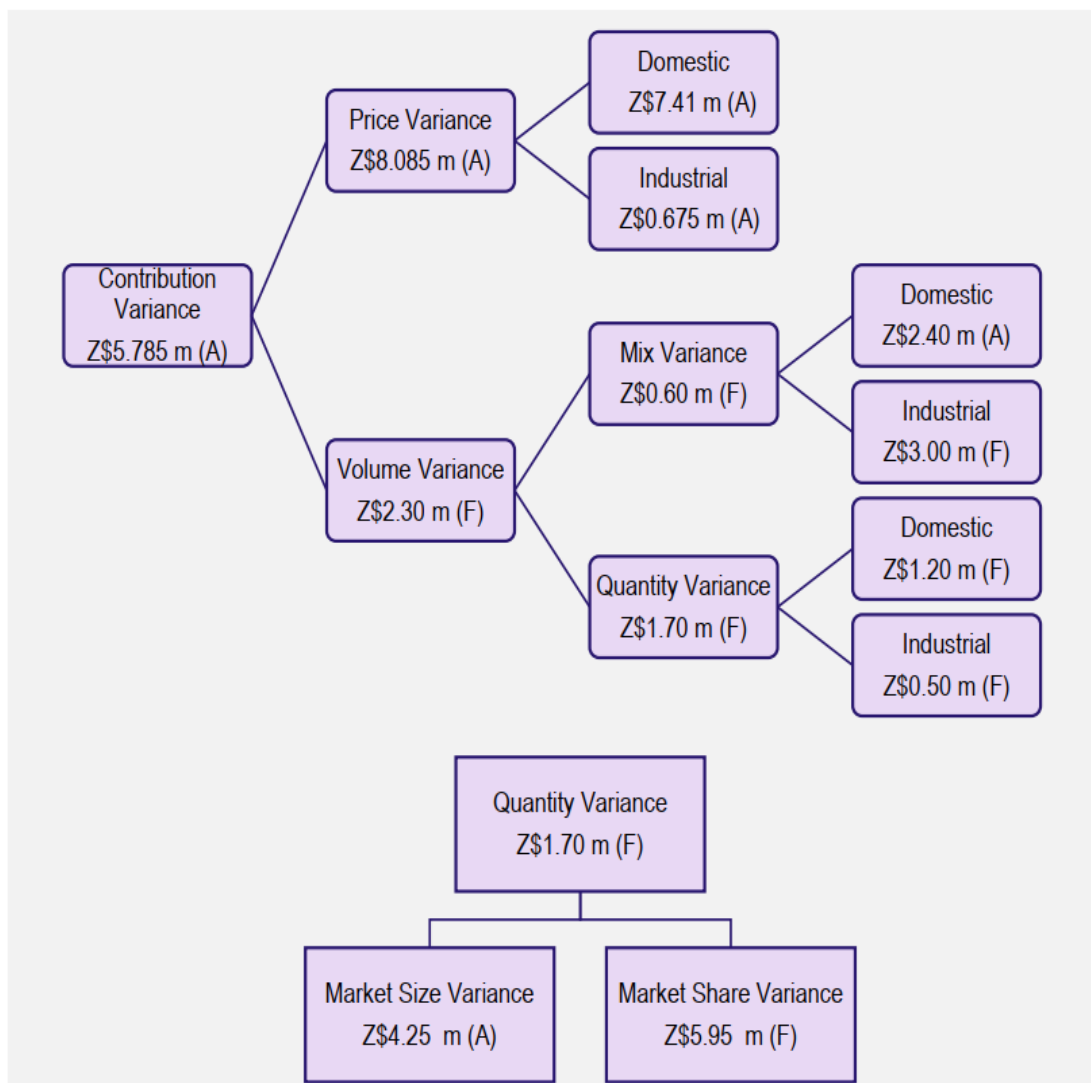
- (i) ANALYSE the variances computed by the accountant;
- (ii) ADVISE strategic inputs on 'two types of flooring rolls' to help out her in strategic decision making.

Answer

(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 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 competitor's distribution issues, better customer services, or growth in overall market. Further insight into reasons of quantity variance can be gained by analyzing market share and size variances. ZM gain 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 accountant has missed 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 the both varieties were sold 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, 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 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 roll is 5% lower than the expectations. However, 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 price 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 2021. This is a threat to profitability of business. The management has to understand the reasons behind this shrinkage. For example, dwindling demand maybe 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

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

SCMPE

MODIFIED QUESTIONS

Question 1 (Question 5 of Chapter 3 in QB)

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'.

Answer

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

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

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%

Question 2 (Question 6 of Chapter 3 in QB)

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

14 February 2020, Friday

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'.

Answer

Calculation of Planned Production Time

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

$$\begin{aligned}
 \text{Availability Ratio} &= \left\{ \frac{445 \text{ mins.} - 45 \text{ mins.}}{445 \text{ mins.}} \right\} \times 100 \\
 &= 89.89 \% \\
 \text{Actual Production} &= 140 \text{ tablets per shift} \\
 \text{Standard time} &= 2.5 \text{ minutes} \\
 \text{Standard Time Required} &= 140 \text{ units} \times 2.5 \text{ minutes} \\
 &= 350 \text{ minutes} \\
 \text{Actual Time Taken} &= 445 \text{ mins.} - 45 \text{ mins.} \\
 &= 400 \text{ minutes} \\
 \text{Performance Ratio} &= \left\{ \frac{350 \text{ mins.}}{400 \text{ mins.}} \right\} \times 100 \\
 &= 87.50\% \\
 \text{Quality Ratio} &= \left\{ \frac{140 \text{ tab.} - 20 \text{ tab.}}{140 \text{ tab.}} \right\} \times 100 \\
 &= 85.71\% \\
 \text{Thus, OEE} &= 0.8989 \times 0.8750 \times 0.8571 \\
 &= 67.41\%
 \end{aligned}$$

Question 3 (Question 8 of Chapter 3 in QB)

KIWI Ltd. manufactures spare parts and can be called "high volume based" manufacturing environment. The company is using the system of TPM for maintaining and improving the integrity of manufacturing process. There are several different automated manufacturing machines located in the plant, through which manufacturing of spare parts are done and supplied to cater the demand in the market.

A 12- hour shift is scheduled to produce a spare part in KIWI Ltd. as shown in the schedule below. The shift has three 15- minute breaks and a 10- minute clean up period.

Production Schedule for Automated machine NZ 10:

Cycle: 10 (seconds),
 Spare parts Manufactured: 3,360,
 SCRAP: 75,
 Unplanned Downtime: 36 minutes

Required

CALCULATE OEE (Overall Equipment Effectiveness) and comment on it.

Answer

Calculation of Planned Production Time

	Mins.
Total time (12 hrs. × 60 mins.)	720
Less: Planned downtime	
break (3 × 15 mins.)	45
clean up time	10
Planned Production Time	665

$$\begin{aligned}
 \text{Availability Ratio per shift} &= \left\{ \frac{665 \text{ mins.} - 36 \text{ mins.}}{665 \text{ mins.}} \right\} \times 100 \\
 &= \mathbf{94.59 \%} \\
 \text{Actual Production} &= 3,360 \text{ parts} \\
 \text{Standard time} &= 10 \text{ seconds} \\
 \text{Standard Time Required} &= 3,360 \text{ parts} \times 10 \text{ seconds} / 60 \\
 &= 560 \text{ minutes} \\
 \text{Actual Time Taken} &= 665 \text{ mins.} - 36 \text{ mins.} \\
 &= 629 \text{ minutes} \\
 \text{Performance Ratio} &= \left\{ \frac{560 \text{ mins.}}{629 \text{ mins.}} \right\} \times 100 \\
 &= \mathbf{89.03\%} \\
 \text{Quality Ratio} &= \left\{ \frac{3,360 \text{ parts} - 75 \text{ parts}}{3,360 \text{ parts}} \right\} \times 100 \\
 &= \mathbf{97.77\%} \\
 \text{Thus, OEE} &= 0.9459 \times 0.8903 \times 0.9777 \\
 &= \mathbf{82.34\%}
 \end{aligned}$$

Comment

Since the OEE of KIWI Ltd is very close to 85% i.e. world class performance level, company should take measures to improve it and strive to attain 85% level. Availability Ratio of machine NZ 10 is 94.59% exceeding the ideal value of > 90% which is good but the Performance and Quality Ratios need attention as they are below their ideal values of > 95% and > 99% respectively.