CA Final SPOM Set B – Strategic Cost & Performance Management
ICAI Module Questions Compilation

Chapter 6 - STRATEGIC REVENUE MANAGEMENT

Illustration 1

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 does not vary as per volume or any other cost driver has been identified as ₹ 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 cycles is finished, the next batch will be for adult cycles. Therefore, after each batch, there would be a set-up change. If 10,000 children's cycles have to be produced, the number of set-ups required is 10,000 steer support / 25 per batch = 400 set-ups. Each set-up costs ₹500, comprising material costs like change of oil, jig, etc. This cost was previously pooled together with the 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 to a minimum since they reduce the capacity of the machine. Suppose that at any time the milling machine can be used to produce other types 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, which would 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 the cost of a set-up? Explain.

(iv) How can the number of set-ups and the cost of each set-up impact the flexibility of the milling machine? Explain

Solution

(a) 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

(b) Break-even point (units per month) and profit per month under Activity Based CVP method. The number of units produced per batch is 25. Therefore, the 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, the 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 that by increasing the batch size, the capacity of the machine can be increased. The time freed by reducing setups from 400 per month to 200 per month can now be used to produce parts for other cycles. Since the number of set-ups will be reduced, so will the monthly set-up costs. Even after offsetting the increase in storage cost, profits have increased by ₹50,000 per month (₹40,50,000 - ₹40,00,000 per month). Consequently, the break-even point has been reduced from 2,000 units per month to 1,900 units per month. This reduction is due to the savings in overall set-up costs due to the lower number of set-ups.

(iii) Inclusion of labor cost in the cost of set-up would depend on their availability:

a) The cost of temporary labour hired for a particular set-up, or the cost of outsourcing set- up activities would be included in set-up costs.
b) The 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 have 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 reduce the production utility of a machine. A lower number of set-ups or a 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 requirements. The other factor that impacts flexibility in production would be set-up costs. The lower the set-up costs, the higher the flexibility to change batches produced at the milling machine to cater to each type of cycle.

Illustration 2

Catalyst Ltd. makes a single product with the following details:

Description	Current Situation	Proposed Change
Selling Price (₹ /unit)	10	
Direct Costs (₹ /unit)	5	
Present number of setups per production period, (Before each production run, setup is done)	42	
Cost per set up (₹)	450	Decrease by ₹ 90
Production units per run	960	1,008
Engineering hours for the production period	500	422
Cost per engineering hour (₹)	10	

The company has begun Activity Based Costing of fixed costs and has presently identified two cost drivers, viz. production runs and engineering hours. Of the total fixed costs presently at ₹ 96,000, after the above, ₹ 72,100 remains to be analyzed. There are changes as proposed above for the next production period for the same volume of output.

Required

(i) Compute units and production runs Catalyst Ltd. should produce in the changed scenario for break-even.

(ii) Advise whether Catalyst Ltd. should continue to break up the remaining fixed costs into activity-based costs.

Solution

Workings

Statement Showing 'Non-unit Level Overhead Costs'

Particulars	Current Situation	Proposed Situation
No. of Production Runs/ Setups	42	40 $\left(\frac{960\text{runs} \times 42\text{setup}}{1{,}008\text{units}}\right)$
Cost per Setup	₹450	₹360
Production Units per run	960 units	1,008 units
Production Units	40,320 (960 units × 42)	40,320
Engineering Hrs.	500	422
Engineering Cost per hour	₹10	₹10

Requirement of the Question

(i) Break Even Point (Changed Scenario)

Break Even Point

$$= \frac{\text{FixedCost} + (\text{SetupCost} \times \text{No.of Setups}) + (\text{EngineeringCosts} \times \text{No.of EngineeringHrs.})}{\text{Price} - \text{Unit VariableCost}}$$

$$= \frac{₹72{,}100 + (₹360 \times 40\ Setups) + (₹10 \times 422 hrs)}{(₹10 - ₹5)} = 18{,}144 \text{ units}$$

Break Even Point (No. of Production Runs)

$$= \frac{\text{BreakEven(units)}}{production(unit\ per\ run)}$$

$$= \frac{18{,}144\text{units}}{1008\text{ units}} = 18 \text{ runs}$$

(ii) A company should adopt Activity Based Costing (ABC) system for accurate product costing, as the traditional volume-based costing system does not take into account Non-unit Level Overhead Costs such as Setup Cost, Inspection Cost, and Material Handling Cost etc. Cost Analysis under the ABC system showed that while these costs are largely fixed with respect to sales volume, they are not fixed with respect to other appropriate cost drivers. If the remaining ₹72,100 fixed costs consist of only a small portion of these costs, ABC need not be applied.

However, it may also be noted that the primary study has resulted in cost savings. If the savings in cost are expected to exceed the cost of studying and implementing ABC, it may be justified. Further, it is pertinent to mention that ABC offers no increase in product-costing accuracy for single-product setting.

Note- "The use of activity-based costing does not mean that CVP analysis is less valuable. In fact, it becomes more valuable since it delivers more precise understandings concerning cost behaviour. These understandings produce better decisions. CVP analysis within an activity-based framework, however, must be improved".

Illustration 3

Expert Roadways Services Pvt. Ltd. is planning to run a fleet of 15 buses in Birpur City on a fixed route. The company has estimated a total of 2,51,85,000 passenger kilometers per annum. It is estimated that buses will have a 100% load factor. Buses are purchased at a price of ₹ 44,00,000 per unit, whose scrap value at the end of 5 years life is ₹ 5,50,000. The seating capacity of a bus, excluding a Driver's seat, is 42. Each bus can give a mileage of 5 kmpl. Average cost of fuel is ₹ 66 per liter. The cost of Lubricants & Sundries per 1,000 km would be ₹ 3,300. The company will pay ₹ 27,500 per month to the Driver and two attendants for each bus.

Other annual charges per bus: Insurance ₹ 55,000, Garage Charges ₹ 33,000, Repairs & Maintenance ₹ 55,000. Route Permit Charges upto 20,000 km is ₹ 5,500 and ₹ 2,200 for every additional 5,000 km or part thereof.

Required

(i) Calculate a suggested fare per passenger/km taking into account a markup on cost @20% to cover general overheads and sufficient profit.

(ii) The Transport Sector of Birpur is highly regulated. The Government has fixed the fare @ ₹1.35 for the next 2 years. COMMENT on the two year's profitability taking into consideration the inflation rate of 8%.

***Note**: Route permit charges are not subject to Inflation.*

Solution

(i) Statement Suggesting "Fare per passenger – km (Each Bus)"

Particulars	Cost per annum (₹)
Fixed Expenses:	
Insurance	55,000.00
Garage Charges	33,000.00
Depreciation	7,70,000.00
Running Expenses:	
Repair and Maintenance	55,000.00
Cost of Lubricants and Sundries	1,38,517.50
Fuel Cost	5,54,070.00
Salary of Driver and Two Attendants	3,30,000.00
Route Permit Charges	16,500.00
Total Cost per annum	19,52,087.50
Add: Markup @ 20% of Total Cost or 16.67% of Total Revenue	3,90,417.50
Total Revenue	**23,42,505.00**

Rate per passenger- km equals to ₹1.395 (23,42,505 / 16,79,000)

Workings

Total Passenger Kms	=	2,51,85,000
Total Buses	=	15
Passenger Kms per bus	=	16,79,000 (2,51,85,000 Kms / 15)
Total Passenger Capacity per bus	=	42 – 2
	=	40
Annual Distance Covered by a bus	=	41,975 Kms. (16,79,000Kms / 40)

(ii) Regulated Fare per passenger km is ₹1.35

Profitability Statement for Each Bus

Particulars	Year 1 (₹)	Year 2 (₹)
Fixed Expenses:		
Insurance	59,400.00	64,152.00
Garage Charges	35,640.00	38,491.20
Depreciation	7,70,000.00	7,70,000.00
Running Expenses:		
Repair and Maintenance	59,400.00	64,152.00
Cost of Lubricants and Sundries	1,49,598.90	1,61,566.81
Fuel Cost	5,98,395.60	6,46,267.25
Salary of Driver and Two Attendants	3,56,400.00	3,84,912.00
Route Permit Charges	16,500.00	16,500.00
Total Cost …[A]	20,45,334.50	21,46,041.26
Total Revenue (Regulated) …[B]	22,66,650.00	22,66,650.00
Profit …[B] – [A]	2,21,315.50	1,20,608.74
Profit to Total Revenue	**9.76%**	**5.32%**

The gross margin is showing a downward trend because the cost components have taken into account the effect of inflation, hence increasing year by year, but the total revenue has remained stagnant due to Government regulations, which resulted in reduction in gross margin per bus.

The company's gross margin to total revenue ratio has come out to be 9.76% and 5.32% in the first and second years, respectively, but initially, the company's desired gross margin to total revenue ratio is 16.67% to cover general overheads and sufficient profit. Though the amount of general overheads is not given, we can safely assume that they may also be subject to inflation, i.e., increase year by year. In such a case, the company needs to maintain or increase its gross margin per bus to maintain its net profit after general overheads, which is not possible in a regulated environment. The information about regulated fare in the given case is regarding the first two years only, but if this regulated fare scenario persists for further years, then the project may not be viable for the company

Case Scenario 1

Sprinter Sportswear is a multinational company that has a market presence in 23 countries. Yet the company does not own even a single factory. Production has been entirely outsourced to 175 factories located in places where the cost of operations is low. Factories cater entirely to Sprinter's procurement demands. These factories operate independently; Sprinter plays no role in their operations. Procurement from this supplier network is stored at distribution centers, from where dispatches are made to wholesalers of sportswear and apparel.

Recent news reports from some of the Third World foreign countries have indicated high child labor employment. Child labor, although against the law in these countries, is resorted to in order to keep the cost of operations low. Factories in these countries do not directly employ children. Instead, they subcontract the work to contractors. These contractors, in turn, hire children illegally without the local knowledge of local law enforcement authorities. In addition, working conditions in these factories are very unhygienic and oppressive.

Sprinter initially turned a blind eye to this problem since it only acts as a customer for these factories. Sprinter, as a company, has done nothing illegal as part of company operations. However, the

increased focus given to corporate social responsibility has forced the Board members to consider taking action against such factories.

Required

(i) Discuss why Sprinter Sportswear should attempt to address this issue.

(ii) Suggest some of the actions that the company can take to address this issue

Solution

(i) Work can be outsourced to locations in countries on the other side of the globe in order to achieve a low-cost advantage. A company may not be directly responsible for the faulty practices of its suppliers. However, modern organizations have a moral duty of care to a wider range of stakeholders who may not directly be related to the company. In this case, it owes a duty of care towards employees hired by factories within its supply chain. The issue it is dealing with relates to the exploitation of child workers by factories, perpetrated by subcontracting work to third party workers. While Sprinter Sportswear has not done anything illegal, it owes moral responsibility towards these children. Children have a right to education, because of which child labor is illegal in most countries. Since children are employed directly on account of the work that has been outsourced, Sprinter should attempt to address this issue. Also, any negative news about how its products are made could impact its business.

(ii) Sprinter should aim to make its products responsibly. Some actions it can take are:

- Sprinter can develop a Code of Conduct that details the acceptable standards for conducting business. These standards could relate to hiring practices, in which it can be specified that workers should be above a particular age to be employed for manufacturing a product. Others could relate to the workplace environment, safety, and environment sustainability. Sprinter should insist that suppliers implement these Codes of Conduct along with other laws. It should insist that the supplier be open to periodic inspection by Sprinter to ensure compliance with standards as per its Code.
- Sprinter can set up an audit team that regularly audits factories in the pre-sourcing and follow-up stages. Sprinter should do business only with factories that comply with its standards. Any offenders to the Code of Conduct in the follow-up stages should be appropriately liable to penalty or termination of contract for serious offences.
- Sprinter can list on its website location wise suppliers from whom it procures its products. It can even give information about products made by each of its suppliers, such as average age, worker diversity, etc. This will enable watch groups to know who the suppliers are and warn the company if there are any labor issues within these factories.

Illustration 4

Recently, the Ministry of Health and Family Welfare along with the Drug Control Department have come hard on health care centres for charging exorbitant fees from their patients. Human Health Care Ltd. (HHCL), a leading integrated healthcare delivery provider company is feeling the pinch of measures taken by authorities and facing margin pressures due to this. HHCL is operating in a competitive environment, so it's also difficult to increase patient numbers. The Management Consultant of the company has come up with some plan for cost control and reduction.

HHCL provides treatment under a package system where fees are charged irrespective of the number of days a patient stays in the hospital. The consultant has estimated 2.50 patient days per patient. He wants to reduce it to 2 days.

By doing this, the consultant has targeted savings in the general variable cost of ₹ 500 per patient day. Annually, 15,000 patients visit the hospital for treatment.

Medical Superintendent has some concerns with that of Consultant's plan. According to him, reducing the patient stay would be detrimental to the full recovery of patient. They would come again for admission, thereby increasing the current readmission rate from 3% to 5%; it means readmitting 300 additional patients. The company has to spend ₹ 25,00,000 more to accommodate this increase in readmission. But Consultant has found bless in disguise in this. He said every readmission is treated as new admission, so it would result in additional cash flow of ₹ 4,500 per patient in the form of admission fees.

Required

(i) Calculate the impact of the Management Consultant's plan on the profit of the company.

(ii) Also Comment on result and other factors that should be kept in mind before taking any decision

Solution

(i) Impact of Management Consultant's Plan on Profit of the HHCL

Human Health Care Ltd.
Statement Showing Cost Benefit Analysis

Particulars	₹
Cost:	
Incremental Cost due to Increased Readmission	25,00,000
Benefit:	
Saving in General Variable Cost due to Reduction in Patient Days [15,000 Patients × (2.5 Days – 2.0 Days) × ₹500)	37,50,000
Revenue from Increased Readmission (300 Patients × ₹4,500)	13,50,000
Net Incremental Benefit	26,00,000

(ii) Comment

Primary goal of investor-owned firms is shareholder wealth maximization, which translates to stock price maximization. The Management consultant's plan is looking good for the HHCL as there is a positive impact on the profitability of the company (refer to Cost Benefit Analysis). Also, HHCL operates in a competitive environment, so for its survival, it has to work on plans like above.

But there is also the second side of the coin that cannot also be ignored, i.e., human values and business ethics. Discharging patients before their full recovery will add discomfort and disruption to their lives, which cannot be quantified in money. There could be other severe consequences as well because of this practice. For gaining extra benefits, HHCL cannot play with the lives of patients. It would put a question mark on the business ethics of the HHCL. May be HHCL would be able to earn incremental profit due to this practice in the short run, but it will tarnish the image of HHCL which would hurt profitability in the long run.

So, before taking any decision on this plan, HHCL should analyze both quantitative as well as qualitative factors

Illustration 5

DBA, manufactures and sells 25,000 table fans annually. One of the components required for fans is purchased from an outside supplier at a price of ₹ 190 per unit. Annually, it purchases 25,000 components for its use. The Production Manager is of the opinion that if all the components are

produced at own plant, it is possible to maintain better quality in the finished product. Further, he proposed that the in-house production of the component with other items will provide more flexibility to increase the annual production by another 5,000 units. He estimates the cost of making the component as follows:

	₹ per unit
Direct materials	80
Direct labour	75
Factory overhead (70% variable)	40
Total cost	**195**

The proposal of the Production Manager was referred to the Marketing Manager for his remarks. He pointed out that to market the additional units, the overall unit price should be reduced by 5% and additionally ₹ 1,00,000 p.m. should be incurred for advertising. The present selling price and contribution per fan are ₹ 2,500 and ₹ 600 respectively. No other increase or decrease in all other expenses as a result of this proposal will arise.

Required

Since the making cost of the component is more than the buying cost, the Management asks you to:

(i) Analyse The Make Or Buy Decision On Unit Basis And Total Basis.

(ii) Recommend the most profitable alternative.

Solution

(i) DBA purchases 25,000 units of components to manufacture 25,000 fans annually. The external purchase price per component is ₹190 per unit. It has the option of manufacturing these components in house. The cost structure of manufacturing these components would be as below:

Cost Structure	**Cost per component unit (₹)**
Direct Materials	80
Direct Labor	75
Variable Factory Overhead (70% of ₹40)	28
Total	**183**

Analysis

If DBA decides to manufacture the components in-house, the following would be the financial impact:

a) Production Capacity will increase from 25,000 fans to 30,000 fans.

b) Currently, Variable Cost of Production of a fan would be ₹1,710 [(2,500 - 600) -190] per unit.

c) Fixed Factory Overhead of ₹12 per component would be incurred irrespective of whether the component is produced or not. Therefore, this cost is not considered.

d) The increase in advertising expenses would be ₹1,00,000 per month or ₹12,00,000 annually.

e) Overall, the selling price would be reduced from the current rate of ₹2,500 per fan to ₹2,375 (95% of ₹2,500) per fan.

f) Current contribution considering a procurement price of ₹190 per component unit, is ₹600 per fan. As calculated above, if produced in house, the variable cost would be ₹183 per component unit. This would result in an increase in contribution by ₹7 per fan (procurement price of ₹190 per component unit less variable cost of ₹183 per component unit). In addition, there is an impact of ₹125 on account of the reduction in selling price. Therefore, the contribution if component is produced in house would be ₹482 per fan (₹600+₹7-₹125).

To summarize above figures

Particulars	Procurement 25,000 Components		Produce 30,000 Components	
	Per Fan ₹	Total ₹	Per Fan ₹	Total ₹
Selling price per fan	2,500	6,25,00,000	2,375	7,12,50,000
Contribution per fan	600	1,50,00,000	482	1,44,60,000

Therefore, the incremental loss by switching to in house production (on a total basis) would be **₹17,40,000** (incremental loss ₹5,40,000 + additional advertising expenses ₹12,00,000). On a per unit basis, it would result in a **loss of ₹58 per fan.**

(ii) Recommendation

As explained above, if production increases from 25,000 fans to 30,000 fans, it would not be profitable to make these components in-house. Overall profit decreased by ₹17,40,000. However, DBA may prefer to make component, even though it could be financially beneficial to buy from an outside supplier. Sometimes qualitative factors become very important and can override some financial benefit. This can be coupled with uncertainty about the supplier's ability or intention to maintain the price, quality, delivery dates of the components, etc.

Alternatively, DBA may continue with the sale of 25,000 units without any price reduction and advertising expenses. The component required for the 25,000 fans may be produced internally at a cost of ₹183 per unit. In this situation, contribution shall be increased by ₹1,75,000 (₹7 ×25,000 units).

Illustration 6

XL Polymers, located in the Sahibabad Industrial Area, manufactures high quality industrial products. AT Industries has asked XL Polymers for a special job that must be completed within one week.

Raw material R1 (highly toxic) will be needed to complete AT Industries' special job. XL Polymers purchased the R1 two weeks ago for ₹ 7,500 for a job 'A' that was recently completed. The R1 currently in stock is the excess from that job, and XL Polymers had been planning to dispose of it. XL Polymers estimates that it would cost them ₹ 1,250 to dispose of the R1. The current replacement cost of R1 is ₹ 6,000.

Special job will require 250 hours of labour G1 and 100 hours of labour G2. XL Polymers pays their G1 and G2 employees ₹ 630 and ₹ 336 respectively for 42 hours of work per week.

XL Polymers anticipates having an excess capacity of 150 [G1] and 200 [G2] labour hours in the coming week. XL Polymers can also hire additional G1 and G2 labour on an hourly basis; these part- time employees are paid an hourly wage based on the wages paid to current employees.

Suppose that material and labour comprise XL Polymers's only costs for completing the special job.

Required

Calculate the 'Minimum Price' that XL Polymers should bid on this job?

Solution

Opportunity Cost of Labour - The G2 labour has zero opportunity cost as there is no other use for the time already paid for and is available. However, XL Polymers needs to pay an additional amount for G1 labour. This amount can be save if the special job were not there.

G1 labour:	
Hours Required	250
Hours Available	150
Extra Hours Needed	100
Cost per hour (₹630/42hrs)	₹15
Opportunity Cost	**₹1,500**

Thus, the 'Opportunity Cost of Labour' for completing the special job is ₹1,500.

Opportunity Cost of Material – XL Polymers has no alternative use for the R1, so they must dispose of it at a cost of ₹1,250. Thus, XL Polymers actually saves ₹1,250 by using the materials for AT Industries' special job. Consequently, the 'Opportunity Cost of Material' is - ₹1,250 (i.e., the opportunity cost of this resource is negative)

The minimum price is the price at which XL Polymers just recovers its 'Opportunity Cost'. XL Polymer's 'Total Opportunity Cost' is ₹250 (₹1,500 – ₹1,250). Accordingly, the minimum Price for the Special Job is ₹250.

Illustration 7

Rabi Ltd. is considering the discontinuance of Division C. The following information is given:

Particulars	Divisions A & B	Division C	Total
Sales (Maximum achievable) (₹)	41,40,000	5,17,500	46,57,500
Less: Variable cost (₹)	20,70,000	2,76,000	23,46,000
Contribution (₹)	20,70,000	2,41,500	23,11,500
Less: Specific avoidable fixed cost (₹)	14,49,000	4,14,000	18,63,000
Divisional Income (₹)	6,21,000	(1,72,500)	4,48,500

The rates of variable costs are 90% of the normal rates due to the current volume of operations. There is adequate market demand.
For any lower volume of operation, the rates would go back to normal rates.
Facilities released by discontinuing Division C cannot be used for any other purpose.

Required
Comment on the decision to discontinue Division C using the relevant cost approach.

Solution

As given in the problem, Rabi Ltd. is considering discontinuing Division C, perhaps by seeing Division C's income as a loss of ₹ 1,72,500. Discontinuance of Division C might save ₹4,14,000 on specific fixed costs to the company, but due to this decision, the company will not only be losing ₹ 2,41,500 contribution from Division C but also an additional burden of variable costs of ₹2,30,000 to Divisions A & B and Rabi Ltd. as a whole.

Let assess the decision of Rabi Ltd. with the help of the **Relevant Cost** approach

Particulars	Amount (₹)
Savings Due to Discontinuance	
Specific Fixed Cost	4,14,000
Total ...(A)	4,14,000

Loss/ Increase in Cost Due to Discontinuance		
Loss of Contribution		2,41,500
Increase in Variable Cost $\left(\frac{₹20,70,000}{90} \times 10\right)$		2,30,000
Total	...(B)	4,71,500
Excess of Loss Over Saving	...(B) – (A)	57,500

In a nutshell, considering the above analysis, we can conclude that the decision of discontinuing Division C will not be beneficial the Rabi Ltd., and it should review its decision on the basis of a relevant cost approach to reach the right decision.

Illustration 8

BNZ Ltd. is engaged in the manufacture of plastic bottles of a standard size and produced by a joint process of machines. The factory has 5 machines and is capable of producing 40 bottles per hour. The variable cost per bottle is ₹ 0.32 and the selling price is ₹ 0.80 each. The company has received an offer from another company for the manufacture of 40,000 units of a plastic moulded toy. The price per toy is ₹ 30 and the variable cost is ₹ 24 each. In case of the company takes up the job, it has to meet the expenses of making a special mould required for the manufacture of the toy. The cost of the mould is ₹ 1,00,000.

The company's time study analysis shows that the machines can produce only 16 toys per hour. The company has a total capacity of 10,000 hours during the period in which the toy is required to be manufactured. The fixed costs excluding the cost of construction of the mould during the period will be ₹ 10 Lakh. The company has an order for the supply of 3,00,000 bottles during the period.

Required

(i) Do you Advise the company to take up the order for manufacturing plastic moulded toys during the time when it has an order in its book for the supply of 3,00,000 bottles.

(ii) If the order for the supply of bottles increases to 4,00,000 bottles, will you Advise the company to accept the order for the supply of plastic moulded toys? State the reasons.

(iii) An associate company of BNZ Ltd. has idle capacity and is willing to take up the whole or part of the manufacturing of the plastic moulded toys on sub-contracting basis. The subcontract price inclusive of the cost of construction of mould is 28 per toy. Determine the minimum expected excess machine hour capacity needed to justify producing any portion of the toy order by the company itself rather than subcontracting.

Solution

Workings

Statement Showing "Contribution / Machine Hour"

	'Bottle'	'Toy'
Demand (units)	3,00,000	40,000
Sales (₹/u)	0.80	30.00
Less: Variable Cost (₹/u)	0.32	24.00
Less: Specific Fixed Cost (₹/u)	---	2.50
Contribution (₹/u)	0.48	3.50
Machine Hours Required per unit	0.025	0.0625
Contribution / Machine Hour	19.20	56.00

Advice on the Supply of 3,00,000/ 4,00,000 Bottles

(i) BNZ Ltd. can accept a plastic moulded toy's order as a sufficient number of hrs., i.e., 2,500 hrs. (10,000 hrs.- 3,00,000 bottles × 0.025 hrs.) are available and would be able to generate an additional benefit of ₹3.50 per unit on 40,000 units of toys, i.e., ₹1,40,000.

(ii) If the order for the supply of bottles increases to 4,00,000 bottles, then 2,500 more hrs. will be required to produce the additional bottles. BNZ Ltd. has to decide whether to utilize 2,500 hrs. for existing bottle order or for toy Order.

Machine time is a limiting factor. Therefore, the contribution per machine hour from both activities (i.e., bottles and toys) should be calculated to decide whether the order should be accepted. Contribution per hour is more in the case of toys (refer to workings). Therefore, BNZ Ltd. should utilize the remaining 2,500 hours for manufacturing toys rather than to fulfil the order for the supply of additional bottles.

Prioritizing production based on contribution per machine hour would maximize profits. However, existing order fulfilment is necessary for building a long term and sustainable customer relationship. Developing and maintaining long term and close relationships with profitable customers provides valuable benefits to the company. As the relationships between the company and customers grow, a customer who is satisfied with the company's products and services tends to commit to the relationship and buy more over time. The cost of keeping existing customers is less expensive than the cost of acquiring new ones.

Hence, BNZ Ltd. should take into consideration long term supplier relations before accepting the toy order based on financial consideration, as the contribution per hour is higher in the case of toys. Further, the company may also explore outsourcing opportunities for the production of toys.

(iii) Minimum number of toys needed to be manufactured to justify the increase in fixed cost of ₹1,00,000 to make the mould is 25,000 toys {1,00,000/ (₹28 - ₹24}. Thus, as long as the company has excess capacity available to manufacture more than 25,000 toys, it is cheaper to produce than to buy from a subcontractor

Minimum Expected Excess Capacity hours to justify = $\left(\frac{25{,}000\ toys}{16\ toys}\right)$ = 1,562.5 or 1,563 hrs.

Illustration 9 *(already covered in Concept Book)*

A company manufactures two products. Each product passes through two departments A and B before it becomes a finished product. The data for the year are as under:

	Product X	**Product Y**
Maximum Sales Potential (in units)	7,400	10,000
Product unit data:		
Selling Price p.u.	₹ 90	₹ 80
Machine hrs. p.u.		
Department A hrs. @ ₹ 40/ hr.	0.50	0.30
Department B hrs. @ ₹ 60/ hr.	0.40	0.45

Required

i. Find the optimum product mix.

ii. In view of the aforesaid production capacity constraints, the company has decided to produce only one of the two products during the year. Which of the two products should be produced and

sold during the year to maximize profit? FIND the number of units of that product and the relevant contribution.

Solution

(i) Calculation of the Optimum Production Mix

Statement Showing Limiting Factor

Particulars	Material	Hours in Department A	Hours in Department B
Required: X	14,800 kg.	3,700 hrs.	2,960 hrs.
Required: Y	20,000 kg.	3,000 hrs.	4,500 hrs.
Total Requirement	34,800 kg.	6,700 hrs.	7,460 hrs.
Available Resources	17,000 kg.	3,400 hrs.	3,640 hrs.
Shortage	17,800 kg.	3,300 hrs.	3,820 hrs.

Hence, all three resources are limiting factors.

Statement of Rank

Particulars	Product X	Product Y
Sales	90	80
Less: Direct Material	10	10
Dept. A	20	12
Dept. B	24	27
Contribution p.u.	36	31
Contribution per kg. of Raw Material	18	15.5
Rank	I	II
Contribution /hr. of Dept. A	72	103.33
Rank	II	I
Contribution /hr. of Dept. B	90	68.89
Rank	I	II

To find the optimum mix of products that will lead to maximum profits while taking into consideration a shortage of resources (i.e., constraints), we have to use Linear Programming.

To find the optimum mix of products that will lead to maximum profits while taking into consideration a shortage of resources (i.e., constraints), we have to use Linear Programming.

$Z_{max} = 36x_1 + 31x_2$

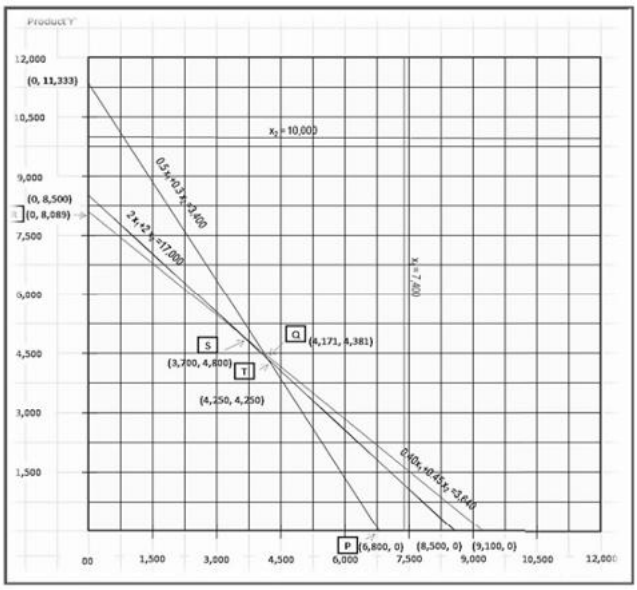
Subject to:

$$2x_1 + 2x_2 \leq 17{,}000 \quad \text{... (for material)}$$
$$0.5x_1 + 0.3x_2 \leq 3{,}400 \quad \text{... (for dept. A)}$$
$$0.4x_1 + 0.45x_2 \leq 3{,}640 \quad \text{... (for dept. B)}$$
$$x_1 \leq 7{,}400 \quad \text{... (demand constraint)}$$
$$x_2 \leq 10{,}000 \quad \text{... (demand constraint)}$$

So, different combinations of the product mix include,

Combination	x_1	x_2	Total Contribution (in ₹)	Rank
P	6,800	0	2,44,800	IV
Q*	4,171	4,381	2,85,967	-
R	0	8,089	2,50,759	III
S	3,700	4,800	2,82,000	II
T	4,250	4,250	2,84,750	I

Note (*) - Combination Q (4,171, 4,381) is not possible as it is satisfying three conditions out of the above four conditions. To produce combination Q (4,171, 4,381), the requirement of the material will be 17,104 Kgs. (2 Kg. × 4,171 units + 2 Kg. × 4,381 units). However, material is available for 17,000 Kgs. Accordingly, this combination is not possible.



The graphical solution for the problem is as given in the diagram,

Therefore, the optimum product mix = X 4,250 units and Y 4,250 units.

(ii) Statement Showing Product with Higher Contribution

Product	Maximum Demand (a)	Maximum Production by Dept. A (b)	Maximum Production by Dept. B (c)	Maximum Production with available materials (d)	Feasible Maximum Production (lower of a,b,c and d)	Contribution (₹)
X	7,400	6,800	9,100	8,500	6,800	2,44,800
Y	10,000	11,333	8,089	8,500	8,089	2,50,759

Therefore, Product Y should be produced at 8,089 units, resulting in a contribution of ₹2,50,759.

Example 1 – Profit Maximization Model

Aditya Heavy Engineering Ltd. (AHEL) produces its only product, A7. To manufacture a unit of A7, variable cost of Rs. 2,20,000 is incurred. Market research has indicated that at a selling price of Rs. 5,10,000 no order will be received, but the demand for A7 will be increased by two units with every Rs. 5,000 reduction in the unit selling price below Rs. 5,10,000.

Required
Determine the unit selling price for A7 that will maximize the profit of AHEL.

Solution
We assume that: Selling Price per unit of A7 is 'P', and the Quantity Demanded is 'Q'
The Marginal Cost of a unit of A7 is Rs. 2,20,000 Price Equation for 'A7'

P = a – bQ
P = 5,10,000 – (5,000 / 2) × Q

Revenue (R) = Q × [5,10,000 – 2,500 × Q]
= 5,10,000 Q – 2,500 Q2

Marginal Revenue (MR) = a – 2bQ

= 5,10,000 – 2 × (5,000 / 2) × Q
= 5,10,000 – 5,000 Q

Marginal Cost (MC) = 2,20,000
Profit is Maximum where Marginal Revenue (MR) equals to Marginal Cost (MC)
5,10,000 – 5,000 Q = 2,20,000
Q = 58 units

By Putting the Value of 'Q' in Price Equation, Value of 'P' is Obtained
P = 5,10,000 – (5,000/ 2) × Q
= 5,10,000 – 2,500 × 58 units
= 3,65,000

At Selling Price of Rs. 3,65,000 AHEL's Profit will be Maximum.

Illustration 10

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 the market can absorb the 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 the 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 the average time for 24 batches is 359.40 hours.
(Note: Learning coefficient is –0.322 for a 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

Solution

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 = Average time per batch (hours) for x 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

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

(ii) The time taken for the 25th batch

Total Time for first 25 batches	=	354.70 hours × 25 batches
	=	8,867.50 hours
Total Time for first 24 batches	=	359.40 hours × 24 batches
	=	8,625.60 hours
Time taken for 25th batch	=	8,867.50 hours − 8,625.60 hours
	=	241.90 hours

Case Scenario 2

Netcom Ltd. manufactures and sells a number of products. All of its products have a life cycle of less than one year. Netcom Ltd. uses a four-stage life cycle model (Introduction, Growth, Maturity and Decline).

Netcom Ltd. has recently developed an innovative product. It was decided that it would be appropriate to adopt a market skimming pricing policy for the launch of the product.
However, Netcom Ltd. expects that other companies will try to join the market very soon. This product is currently in the Introduction stage of its life cycle and is generating significant unit profits. However, there are concerns that these current unit profits will not continue during the other stages of the product's life cycle.

Required - Explain, with reasons, the changes, if any, to the unit selling price and the unit production cost that could occur when the products move from the previous stage into each of the following stages of its life cycle: (i) Growth (ii) Maturity.

Solution

Growth Stage
Compared to the introduction stage, the likely changes are as follows:

Unit Selling Prices:
These are likely to be reduced for a number of reasons:

- The product will become less unique as competitors use reverse engineering to introduce their versions of the product.
- Netcom may wish to discourage competitors from entering the market by lowering the price and thereby lowering unit profitability.
- The price needs to be lowered so that the product becomes attractive to different market segments, thus increasing demand to achieve growth in sales volume.

Unit Production Costs:
These are likely to reduce for a number of reasons:

- Direct materials are being bought in larger quantities, and therefore Netcom may be able to negotiate better prices from its suppliers, thus reducing unit material costs.
- Direct labour costs may be reduced if the product is labour intensive due to the effects of the learning and experience curves.
- Other variable overhead costs may be reducing as larger batch sizes reduce the cost of each unit.
- Fixed production costs are being shared by a greater number of units

Maturity Stage
Compared to the growth stage, the likely changes are as follows:

Unit Selling Prices:
These are unlikely to be reduced any longer as the product has become established in the marketplace. This is a time for consolidation, and whilst there may be occasional offers to tempt customers to buy the product, the selling price is likely to be fairly constant during this period.

Unit Production Costs:
Direct material costs are likely to be fairly constant in this phase and may even rise as the quantities required diminish compared to those required in the growth stage, with the consequential loss of negotiating power.
Direct labour costs are unlikely to be reduced any longer as the effects of the learning and experience curves have ended. Indeed, the workers may have started working on the next product, so their attention towards this product has diminished, with the result that these costs may increase.
Overhead costs are likely to be similar to those at the end of the growth phase, as optimum batch sizes have been established and are more likely to be used in this maturity stage of the product life cycle, where demand is more easily predicted.

TEST YOUR KNOWLEDGE

Question 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 time vale of money)

Solution

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.

Question 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.

Solution

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.

Question 3

The President of Automation Limited, 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.

Solution

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.

Question 4

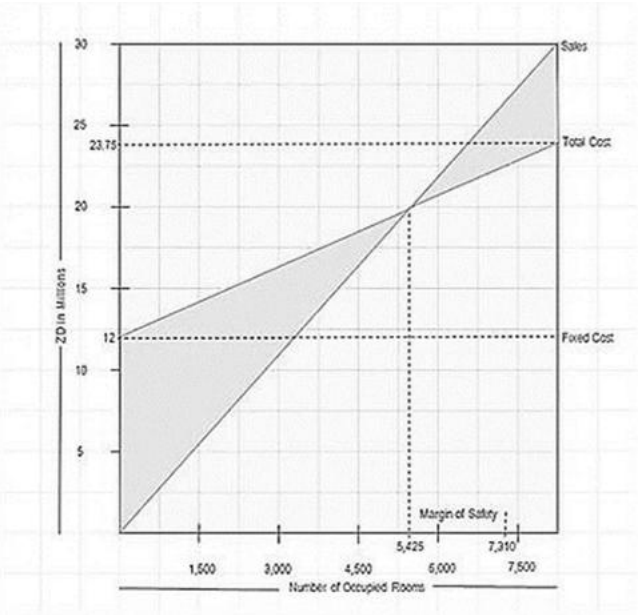
Hotel Nikko, Zeeland, an affordable leisure hotel resort is an ideal retreat to escape, unwind and enjoy peace of mind. Set amid expansive tropical greenery in the enclave of Zeeland, Hotel Nikko is designed for pleasure, where services reign supreme and Italian-style architecture of its 25 classic rooms 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 follow –

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 the following graph –



Note
Zeeland's home currency is the ZD.
Required
Analyze the profit improvement plan.

Solution

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 ZD 16,20,000. This in turn would decrease annual profits by ZD 16,20,000. 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.

Question 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. *(Ignore the time value of money.)*

Solution

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 cost hence not relevant

Question 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

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

Solution

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*

Question 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 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 Rs. 50 per unit.
Labour cost Rs. 40 per hour. For each unit two hours are required.
Other material cost Rs. 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 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.

Solution

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 Rs. 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.

Question 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)		**(1,58,500)**

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 *(*based on obsolescence).*
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.

Solution

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.

Question 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 tons 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.

Solution

(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 penalized.

(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.

Question 10

N_2 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. N_2 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"

N_2 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.

Solution
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, N_2 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, N_2 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, N_2 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 t he 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 N_2, it is worthwhile to know the current and future demand of fire extinguisher and factors influencing the growth of global fire extinguisher market. N_2 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, N_2 should evaluate whether shipment date is attainable or not. If the target shipment date could not be met, what will be the charges? Further, N_2 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, N_2 should accept the proposed contract only after due and careful consideration of above factors.

Question 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

Analyze the above situation And DETERMINE the best course of action.

Solution

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 $\left(\frac{₹\ 1,00,00,000}{2,00,000\ units}\right)$	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	V
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 budget.