|  |  |
| --- | --- |
| **4** | **Cost Management Techniques** |

**Life Cycle Cost Question based on Target Costing & Learning Curve**

**Q1:** Cam Co manufactures webcams,devices which can provide live video and audio streams via personal computers. It has recently been suffering from liquidity problems and hopes that these will be eased by the launch of its new webcam, which has revolutionary audio sound and visual quality.

The webcam is expected to have a product life cycle of two years. Market research has already been carried out to establish a target selling price and projected lifetime sales volumes for the product. Cost estimates have also been prepared, based on the current proposed product specification. Cam Co uses life cycle costing to work out the target costs for its products. You are provided with the following relevant information for the webcam:

|  |  |
| --- | --- |
| Projected lifetime sales volume | 50,000 units |
| Target selling price per unit | $200 |
| Target profit margin | 35% |

Note: estimated lifetime cost per unit:

|  | **$** | **$** |
| --- | --- | --- |
| Manufacturing costs |  |  |
| Direct material (bought in parts) | 40 |  |
| Direct labour | 26 |  |
| Machine costs | 24 |  |
| Quality control costs | 10 |  |
|  |  | 100 |
| Non manufacturing costs |  | 60 |
| Estimated lifetime cost per unit |  | 160 |

The following information has been identified as relevant:

1. Direct material cost: all of the parts currently proposed for the webcam are bespoke parts. However, most of these can actually be replaced with standard parts costing 55% less. However, three of the base poke parts, which currently account for 20% of the estimated direct material cost, cannot be replaced, although an alternative supplier charging 10% less has been sourced for these parts.
2. Direct labour cost: the webcam uses 45 minutes of direct labour, which costs $34.67 per hour. The use of more standard parts, however, will mean that whilst the first unit would still be expected to take 45 minutes, there will now be an expected rate of learning of 90% (where ‘b’ = -0.152). this will end after the first 100 units have been completed.

**Required:**

1. Identify the target cost

$

1. Calculate the direct material cost per unit in light of the new information in point (1).

$

1. Calculate the average direct labour cost per unit in light of the new information in point (2).

$

1. The following statement have been made about Cam Co’s target costing system.
2. Target costing ensure that new product development costs are recovered in the target price for the webcam.
3. A cost gap is the difference between the target price and the target cost of the webcam

Which of the above statements is/are true?

* 1 only
* 2 only
* Neither 1 nor 2
* Both 1 and 2

1. Which of the following represents a possible method for closing the target cost gap for the webcam?

* Increase its selling price
* Employ more specialist staff in its production
* Redesign the webcam
* Increase the number of basepoke components

**Solution:(i) the correct answer is $130**

Target selling price per unit $200

Profit margin 35%

Target cost $200 – ($200 × 35%) = $130

**(ii) the correct answer is $21.60**

Direct material cost

Parts to be replaced by standard parts = $40 × 80% = $32

New cost of standard parts at 45% (100% - 55%) = $14.40

Unique irreplaceable parts (original cost) = $40 × 20% = $8

New cost = $8 x 90% = $7.20

Revised direct material cost = $14.40 + $7.20 = $21.60

**(iii) the correct answer is $10.98**

Direct labour

Y = axb

B = -0.152

The question states that a learning curve of 90% is expected to occur until the 100th unit has been completed.

Total labour time for first 100 units

X = 100

The question states that the first unit is expected to take 45 minutes (a = 45)

Y = 45 × 100-0.152

= 45 × (1/2.0137)

= 22.3460 minutes

Therefore labour time for 100 units = 22.3469 × 100

= 2,234.69 minutes

Labour time for the 100th unit

Time for 99 units

Y = 45 × 99-0.152

= 45 × (1/2.01065)

= 22.38082 minutes

Therefore, labour time for 99 units = 22.38082 × 99

= 2,215.70 minutes

Therefore, time for 100th unit = 2,234.69 – 2,215.70

= 18.99 minutes, say 19 minutes

Labour time for remaining 49,900 units × 19 = 948,100 minutes

Total labour time for 50,000 units = 2,234.69 + 948,100

= 950,334.69 minutes

Therefore total labour cost = (950,334.69/60) × $34.67 per hour

= $549,135

Average labour cost per unit = $549,135/50,000

= $10.98

**(iv) Neither 1 nor 2**

Cam Co’s target costing system may take product development costs into consideration, but recovery of product design and development costs is associated more with life cycle costing. Even with life cycle costing, recovery of design and development costs is not ensured: much depends on whether customers will buy enough webcams at the target price.

In target costing, a cost gap is the difference between the current estimate of the cost per webcam and the target cost that the Cam Co wants to achieve.

**(v) redesign the webcam**

Changes to selling price will have no effect upon target cost. The remaining options (employ more specialist staff; increase the number of bespoke components) would serve to increase the target cost gap rather than decrease it. If a product cannot be made within the target cost, so that a cost gap exists, the targets must be reduced, or the product redesigned.

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**Target Costing**

**Q2: Which two of the following method should be used to move a currently attainable cost closer to target cost?**

* Using standard components wherever possible
* Acquiring new, more efficient technology
* Reducing the quality of the product in question
* Making staff redundant

**Answer:** The correct answers are:

* Using standard components wherever possible
* Acquiring new, more efficient technology

To makes improvements towards the target cost, technologies and processes must be improved.

The use of standard components is a way of improving the production process.

Redundancy creates short-term costs such as redundancy pay-offs, may affect the quality of the product and customer service.

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**Q4: In target costing, selling price is determined as?**

* Standard cost plus a profit margin
* A competitive market price
* Backflush cost plus a profit margin
* Total cost plus a profit margin

**Answer:**The correct answer is: A competitive market price

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**Q9:** Storewell Industries Ltd. manufactures standard heavy duty steel storage racks for industrial use. Each storage rack is sold for `750 each. The company produces 10,000 racks per annum. Relevant cost data per annum are as follows:

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

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

**Required**

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

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

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

**Answer:**

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

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

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

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

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

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

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

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

Therefore, inefficiencies resulted in extra cost = 20,000 sq. ft. × `3.85 per sq. ft. = `77,000. If corrective action is taken, for 10,000 racks this translates to a saving of `7.70 per unit.

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

Labor cost per hr. = Actual cost/Actual labor hrs. = `10,00,000/10,000 hrs. = `10 per hr.

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

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

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

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

Some questions to raise may be:

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

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

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**Target Costing with Marketing Strategy**

**Q14:** Kowloon Toy Company (KTC) expects to successfully launch Toy “H” based on a Disney character. KTC must may 15% royalty on the selling price to the Disneyland. KTC targets a selling price of `100 per toy and profit of 25% on selling price.

The following are the cost data forecast:

|  |  |
| --- | --- |
|  | **`/toy** |
| Component H1 | 8.50 |
| Component H2 | 7.00 |
| Labour: 0.40 hr. @ ` 60 per hr. | 24.00 |
| Product Specific Overheads | 13.50 |

In addition, each toy requires 0.6 kg of other materials, which are supplied at a cost of `16 per kg. with a normal 4% substandard quality which is not usable in the manufacture.

**Required:** DETERMINE if the above cost structure is within the target cost. If not, what should be the extent of cost reduction?

**Solution**

Target Cost “H”

|  |  |
| --- | --- |
| **`/Toy** | |
| Target Selling Price | 100.00 |
| Less: Royalty @15% | 15.00 |
| Less: Profit @ 25% | 25.00 |
| Target Cost | 60.00 |

Cost structure “H”

|  |  |
| --- | --- |
| **`/Toy** | |
| Component H1 | 8.50 |
| Component H2 | 7.00 |
| Labour (0.40 hr. × ` 60 per hr.) | 24.00 |
| Product Specific Overheads | 13.50 |
| Other Material (0.6 kg/96% × `16) | 10.00 |
| Total Cost of Manufacturing | 63.00 |

Total Cost of Manufacturing is ` 63 while Target Cost is ` 60. Company KTC should make efforts to reduce its manufacturing cost by ` 3 to achieve Target Selling Price of `100.

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**Q15: Case Scenario**

Kaveri Ltd. (KL) is a manufacturer of bikes in India and it sells them in India and outside India. KL has just launched the World’s smallest and most affordable bike called ‘Zingaroo’. The bike is mounted with all- aluminium, single cylinder, air cooled, 99.2 cc engine. The engine makes just over 8 bhp power and 8 Nm of torque, but it stakes claim to be the fuel-efficient bike, with a claimed figure of 88 kmpl. It has been creating competition for two wheelers as none of the Indian companies as well as foreign companies, offer a bike for such a competitive price within the reachof middle class family.

KL has adopted target costing technique in manufacturing this bike. For KL, maintaining target- price was difficult. During the designing and production process of bike, input costs increased frequently. However, KL designed various components especially for bike to maintain the target price. Though, one curiosity how this can be done in the future when input costs are bound toincrease further.

Many environmentalists have opposed the manufacture of this bike, because they believe that mass production of small bike (about 2.5 lakh bike every year) will create heavy pollution. Many people believe that this small bike is not up to the safety standards due to lightweight and use of aluminium and plastic frames. The design of this bike is entirely different from that of other bikes.

This also causes a doubt that the existing bike mechanics would be able to repair or not. Durability of bike is another issue in the Indian environment. Further, performance of ‘Zingaroo’ more orless depends upon the condition of roads and traffic system.

After the launch of ‘Zingaroo’, many other national and international automobile companies are also planning to manufacture small bike which will create tough competition in near future.

**Required:** Now you being a strategic performance analyst of KL, answer the following questions:

1. IDENTIFY strategy which KL has adopted for ‘Zingaroo’ bike?
2. After adopting target costing, IDENTIFY issues and challenges faced by KL and suggestthe remedial action to be taken to solve these issues?

**Solution:**

1. KL has adopted Low Cost Strategy for “Zingaroo” bike since the main purpose of manufacturing this bike was to make it cheapest and affordable.
2. The issues and challenges faced by KL and their remedial action are as follows:

**Maintaining of Target Price**

‘Zingaroo’ bike is one of the world’s cheapest and smallest bike. Maintaining target-price proved to be a big challenge for the KL since input cost of bike are bound to increase further in future. The initial value engineering may not uncover all possible cost savings. Thus, Kaizen Costing may be designed to repeat many of the value engineering steps for as long as a bike is produced, constantly refining the process and thereby stripping out extra costs.

**Environmental Issues**

Many environmentalists have opposed the manufacture of bike as they believe that mass production of small bikes will create heavy pollution since automobile pollution is already a big problem for a country like India. For this issue, ‘Zingaroo’ bike can be prepared based on BS emission norms. These norms restrict the pollution created by any motor vehicle.

**Safety Issues**

Since ‘Zingaroo’ bike is made of aluminium and plastic frames so this may also create safety issues for the customers. For such issues, KL should meet safety standards. Further, KL should make people aware that ‘Safety is Primary’/‘Drive Safely’.

**Servicing/Repairing Facilities**

The design of ‘Zingaroo’ bike is entirely different from that of other bikes. This causes a doubt that the existing bike mechanics would be able to repair or not. For such problem, creation of a good network of service center can be a solution i.e. repair center should be established on required places.

**Durability**

Durability of ‘Zingaroo’ bike is another issue in the Indian environment. The performance ofbike more or less depends upon the condition of roads and traffic system. For such issues,tyre quality and hydraulic brake system should be compatible to the roads and traffic system.

**Global Competition**

After the launch of ‘Zingaroo’, many other national and international automobile companies are also planning to manufacture a small bike, which will be a big challenge for the KL in the near future. To face such competition, it may adopt Kaizen Costing technique. The cost reductions resulting from Kaizen Costing are much smaller than those achieved with Value

Engineering but are still worth the effort since competitive pressures are likely to force down the price of ‘Zingaroo’ over time, and any possible cost savings allow KL to still attain its targeted profit margins while continuing to reduce cost.

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**LIFE CYCLE COSTING**

**Q16:** F plc sells a product known as the YYU500. The YYU500 has seen sales growth of around 1% for the last two years, after strong growth in the previous five years. This is due to new products entering the market in competition with the YYU500.

F is therefore considering cutting its prices to be in line with its major rivals. It hopes that this will help it to maintain its market share. Market research indicates that this will now cause a significant increase in the level of sales, even though in previous years price cuts have had little effect on demand.

F is also planning to launch a promotional campaign to highlight the benefits of the YYU500 against its rival products.

Which stage of the product life cycle does the YYU500 appear to have reached?

1. Growth
2. Decline
3. Maturity
4. Introduction

**Solution:** The correct answer is C

The seeming saturation of the market and the increase in competition would suggest the product is at the maturity stage. This stage typically sees the volume of product sales become more sensitive to selling price changes.

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**Q17:** AJJ ltd has identified that all three of its main products are at the maturity phase of the product life cycle. Which of the following is AJJ likely to be experiencing due to this?

A. High, but declining sales

B. Growing numbers of competitors

C. Product diversification and differentiation strategies

D. Adoption of price skimming strategies

**Solution:** The correct answer is C

A would indicate products that are in decline. B would tend to occur during growth, while D would usually be part of the introduction/growth phase of the product life cycle.

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**Life Cycle Costing with Learning Curve**

**Q19:** Fit co. specializes in the manufacture of a small range of hi-tech products for the fitness market. They are currently considering the development of a new type of fitness monitor, which would be the first of its kind in the market. It would take one year to develop with sales then commencing at the beginning of the second year. The product is expected to have a life cycle of two years, before it is replaced with a technologically supplier product. The following cost estimates have been made.

|  | **Year 1** | **Year 2** | **Year 3** |
| --- | --- | --- | --- |
| **Units manufactured** |  |  |  |
| **And sold** |  | 1,00,000 | 2,00,000 |
| **Research & development costs** | $160,000 |  |  |
| **Product design costs** | $ 8,00,000 |  |  |
| **Marketing costs** | $ 1200000 | $ 1,000000 | $ 1,750,000 |
| **Manufacturing costs** |  |  |  |
| **Variable cost per unit** |  | $40 | $42 |
| **Fixed production costs** |  | $650000 | $1290000 |
| **Distribution costs:** |  |  |  |
| **Variable cost per unit** |  | $4 | $4.50 |
| **Fixed distribution costs** |  | @120000 | $120000 |
| **Selling costs:** |  |  |  |
| **Variable cost per unit** |  | $3 | $3.20 |
| **Fixed selling costs** |  | $180000 | $180000 |
| **Administration costs** | $200000 | $900000 | $1500000 |

Note: you should ignore the time value of money.

**Required:**

1. **Calculate the life cycle cost per unit.**
2. After preparing the cost estimates above, the company realizes that it has not taken into account the effect of the learning curve on the production process. The variable manufacturing cost per unit above, of $40 in year 2 and $42 year3 includes a cost for half-an-hour of labour.

The remainder of the variable manufacturing cost is not driven by labour hours. The year 2 cost per hour for labour is $24 and the year 3 cost is $26 per hour. Sub sequencing it has now been estimated that, although the first unit is expected to take 0.5 hours, a learning curve of 95 per cent is expected to occur until the 100th unit has been completed.

Calculated the revised life cycle cost per unit, taking into account the effect of the learning curve.

Note: the value of the learning co-efficient B, is -0-0740005.

**Solution:**

(b) Total labour time for first 100 units:

Y = ax2

B = -0.0740005

If x = 100, then y = 0.5 × 100 – 0.0740005

= 0.3556 hours per unit.

Total hours for 100 unist = 35.56 huors

Time for 99th unit

Y = 0.5 × 99 - .0740005

= 0.3559 hours per unit.

Total hours for 99 units = 35.23 hours

= 0.33 hours

The total labour cost over life of the product for year 2 is:

|  |  |
| --- | --- |
| 100 units at 0.3556 per unit = | 36 hours |
| 99900 at 0.33 hours per unit = | 32967 hours |
|  | **33003 hours** |

Giving a total cost $792072 (33003 hours at $24 per hour)

The total labor cost over life of the product for year 3 is $1716000 (200000 × 0.33 × $26).

**Total revised life cycle cost**

|  |  |
| --- | --- |
|  | **$** |
| Total labour cost | 2508072 |
| Other life cycle costs from (a) | 24690000 |
| Less Labour cost included in (a) | (3800000) |
| (100000 × 0.5 × $24 ) + (200000 × 0.5 × $26) |  |
| **Total revised life cycle costs** | **23398072** |
| Cost per unit = $23398072/300000 = $77.99 |  |

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**Life Cycle Costing & Pricing Policy**

**Q20:** P & G International Ltd. (PGIL) has developed a new product ‘α 3’ which is about to be launched into the market. Company has spent ` 30,00,000 on R&D of product ‘α 3’. It has also bought a machine to produce the product ‘α 3’ costing ` 11,25,000 with a capacity of producing 1,100 units per week.

Machine has no residual value.

The company has decided to charge price that will change with the cumulative numbers of units sold:

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

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

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

Unit variable costs are expected to be as follows:

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

PGIL uses just-in-time production system. Following is the total contribution statement of the product ‘a3’ for its Introduction and Growth stage:

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

**Required:**

1. PREPARE the total contribution statement for each of the remaining two stages of the product’s life cycle.
2. DISCUSS Pricing Strategy of the product ‘ α 3 ’.
3. FIND possible reasons for the changes in cost during the life cycle of the product ‘ α 3 ’.

Note: Ignore the time value of money.

**Solution**

1. **Total contribution statement**

**“Total Contribution-for remaining two stages”**

|  |  |  |  |
| --- | --- | --- | --- |
| **Particulars** | **Maturity** |  | **Decline** |
| Weeks | 31-50 | 51-70 | 71-110 |
| Number of units produced and sold | 22,000 | 22,000 | 22,000 |
| Selling price per unit (`) | 450 | 450 | 300 |
| Less: Unit Variable Cost (`) | 225 | 188 | 225 |
| Unit contribution (`) | 225 | 262 | 75 |
| Total contribution (`) | 49,50,000 | 57,64,000 | 16,50,000 |

**(ii) Pricing Strategy for Product α 3**

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

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

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

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

**(iii) Possible Reasons for the changes in cost during the life cycle of the product ‘α3 ’**

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

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

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

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

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

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

**Workings**

**Cumulative Sales along with Sales Price and Variable Cost**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Weeks** | **Demand per week** | **Total Sales** | **Cumulative**  **Sales** | **Selling Price**  **per unit ( )** | **Variable Cost**  **per unit ( )** |
| 1 - 10 | 220 | 2,200 | 2,200 | 750 | 375 |
| 11 - 20 | 550 | 5,500 | 7,700 | 600 | 300 |
| 21 - 30 | 825 | 8,250 | 15,950 | 525 | 300 |
| 31 - 50 | 1,100 | 22,000 | 37,950 | 450 | 225 |
| 51 - 70 | 1,100 | 22,000 | 59,950 | 450 | 188 |
| 71 - 80 | 880 | 8,800 | 68,750 | 300 | 225 |
| 81 - 90 | 660 | 6,600 | 75,350 | 300 | 225 |
| 91 - 100 | 440 | 4,400 | 79,750 | 300 | 225 |
| 101 - 110 | 220 | 2,200 | 81,950 | 300 | 225 |

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**Life cycle costing + Learning Curve**

**Q23:** A company is developing a new product with a 6-year life cycle. The following be the amount budgeted for manufacture and sale of the product.

|  |  |  |
| --- | --- | --- |
| **Year** | **Type of expenditure** | **Amount(`)** |
| 1-2 | **Initial Costs** | 1,40,000 |
|  | **R&D Costs** | 4,00,000 |
|  | **Design Costs** | 2,60,000 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Particulars** | **Fixed costs per annum (`)** | **Variable Costs per unit (`)** |
| 3-8 | **Manufacturing costs** | 4,00,000 | 45 |
|  | **Selling and distribution costs** | 3,20,000 | 60 |
|  | **After sales service costs** | 1,80,000 | 40 |

The company proposes to sell the product at `360 per unit. At this price, the company expects to sell 60,000 units pricing the product life cycle. If the price is to be reduced to 300, sales quantity will increase to 75,000 units. If the price increased to `450 per unit. Sales quantity will reduce to 5,000 units.

Present a product life cycle cost and revenue statement and advise what price will optimize the profits.

**Answer:**

|  |  |
| --- | --- |
| **Particulars** | ` |
| **Initial Expenditure** |  |
| **Initial costs** | 1,40,000 |
| **R&D Costs** | 4,00,000 |
| **Design Costs** | 2,60,000 |
| **Total** | 8,00,000 |
| **Recurring Cost** |  |
| **Fixed cost:** |  |
| **Production Cost** | 4,00,000 |
| **Selling and distribution** | 3,20,000 |
| **After sales service** | 1,80,000 |
| **Total (per annum)** | 9,00,000 |
| **Total Fixed cost for 6 years = ` 9,00,000 × 6** | 54,00,000 |
| **Variable Costs:** |  |
| **Production** | 45 |
| **Selling and distribution** | 60 |
| **After sales service** | 40 |
| **Total variable cost per unit** | 145 |

**The life cycle cost analysis is given in table**

**Life cycle cost analysis**

| **Particulars** | **Stage1** | **Stage 2** | **Stage3** |
| --- | --- | --- | --- |
| **Sales volume (units)** | 75,000 | 60,000 | 35,000 |
| **Selling price per unit (`)** | 300 | 360 | 450 |
| **Sales (`)** | 2,25,00,000 | 2,16,00,000 | 1,57,50,000 |
| **Initial Costs(`)** | 8,00,000 | 8,00,000 | 8,00,000 |
| **Fixed costs(`)** | 54,00,000 | 54,00,000 | 54,00,000 |
| **Variable Costs @ `145** | 1,08,75,000 | 87,00,000 | 50,75,000 |
| **Total Costs (`)** | 1,70,75,000 | 1,49,00,000 | 1,12,75,000 |
| **Life cycle profit (`)** | 54,25,000 | 67,00,000 | 44,75,000 |

The best price to be charged is `360 per unit where the profit is the maximum.

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**Q24:** Disc Sounds Ltd specialize in the manufacture of CD players. It is planning to introduce a new CD player specially designed to for young children. Development of the new CD player is to begin shortly, and Disc Sounds Ltd is in the process of preparing a product life cycle budget. It expects the new product to have a life cycle of 3 years and estimates the following costs:

|  | **Year 1** | **Year 2** | **Year 3** |
| --- | --- | --- | --- |
| Units manufactured and sold | 50,000 | 200,000 | 150,000 |
| CD player per batch | 400 | 500 | 500 |
| Price per CD player | £45 | £40 | £35 |
| R&D and design costs | £9000,000 | £100,000 | - |
| **Production costs** |  |  |  |
| Variable cost per CD player | £16 | £15 | £15 |
| Variable cost per batch | £700 | £600 | £600 |
| Fixed costs | £600,000 | £600,000 | £600,000 |
| **Marketing costs** |  |  |  |
| Variable cost per CD player | £3.60 | £3.20 | £2.80 |
| **Fixed costs** | **£400,000** | **£300,000** | **£300,000** |
| **Distribution costs** |  |  |  |
| CD player per batch | 200 | 160 |  |
| **Variable cost per CD player** | **£1** | **£1** | **£1** |
| Variable cost per batch | £120 | £120 | £100 |
| Fixed costs | £240,000 | £240,000 | £240,000 |
| Customer service costs per CD player | £2 | £1.50 | £1.50 |

Ignore the time value of money in your answer.

Requirements

1. Calculate the budgeted life cycle operating profit for the new CD player.
2. Market research has indicated that reducing the selling price by £3 each year would result in increased sales volume of 10 per cent each year. If sales increase by 10 per cent, Disc Sound Ltd plans to increase its production and distribution batch sizes by 10 per cent as well. Assuming all other cost remain the same should the price be reduced by £3?
3. Explain how an organization would benefit from a product life cycle costing exercise.

**Answer:**

1. Life cycle operating for the new disc player:

|  | **Year 1** | **Year 2** | **Year 3** | **Life cycle** |
| --- | --- | --- | --- | --- |
|  | **£000** | **£000** | **£000** | **£000** |
| Sales | 2,250 | 8,000 | 5,250 | 15,000 |
| R&D design | (900) | (100) |  | (1,000) |
| **Production costs** |  |  |  |  |
| Variable cost/CD | (800) | (3000) | (2,250) | (6,050) |
| Variable cost/batch | (87.5) | (240) | (180) | (507.5) |
| Fixed costs | (600) | (600) | (600) | (1,800) |
| **Marketing costs** |  |  |  |  |
| Variable cost/CD | (180) | (640) | (420) | (1,240) |
| Fixed costs | (400) | (300) | (300) | (1,000) |
| **Distribution costs** |  |  |  |  |
| Variable cost/CD | (50) | (200) | (150) | (400) |
| Variable cost/batch | (30) | (150) | (125) | (305) |
| Fixed costs | (240) | (240) | (240) | (720) |
| **Customer service** |  |  |  |  |
| Costs/CD | (100) | (300) | (225) | (625) |
| Operating profit | (1,137.5) | 2,230 | 760 | 1,852.5 |

1. Effect on operating profit when S.P reduced by £3 and volume increased by 10 per cent:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Year 1** | **Year 2** | **Year 3** |
| New selling price | £42 | £37 | £32 |
| Sales volume | 55,000 | 220,000 | 165,000 |
| Production batch size | 440 | 550 | 550 |
| Distribution batch size | 220 | 176 | 132 |

|  | **Year 1** | **Year 2** | **Year 3** | **Life cycle** |
| --- | --- | --- | --- | --- |
|  | **£000** | **£000** | **£000** | **£000** |
| **Sales** | 2,310 | 8,140 | 5,280 | 15,730 |
| **R&D design** | (900) | (100) |  | (1,000) |
| **Production costs** |  |  |  |  |
| **Variable cost/CD** | (880) | (3,300) | (2,475) | (6,655) |
| **Variable cost/batch** | (87.5) | (240) | (180) | (507.5) |
| **Fixed costs** | (600) | (600) | (600) | (1,800) |
| **Marketing costs** |  |  |  |  |
| **Variable cost/CD** | (198) | (704) | (462) | (1,364) |
| **Fixed costs** | (400) | (300) | (300) | (1,000) |
| **Distribution costs** |  |  |  |  |
| **Variable cost/CD** | (55) | (220) | (165) | (400) |
| **Variable cost/batch** | (30) | (150) | (125) | (305) |
| **Fixed costs** | (240) | (240) | (240) | (720) |
| **Customer service** |  |  |  |  |
| **Costs/CD** | (100) | (330) | (247.5) | (687.5) |
| **Operating profit** | (1,190.5) | 1956 | 485.5 | 1,251 |

Overall life cycle profit decreased by £600,000. Price should not be reduced unless there is a reduction in costs through economies of scales due to the 10 per cent increase in volume.

1. A life cycle costing exercise enables an organization to appraise the profitability over the whole life of the product rather than a product at a time. Thus product that are loss making initially but profitable in the longer term will be accepted. A large proportion of the costs are locked in at the design stage – a life cycle costing exercise will enable organizations to reconsider some of these costs at the R&D stage. It also enables management to focus marketing and promotion when required – at certain critical points of the life cycle.

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**Q25:** Generation 2050 Technologies Ltd. develops cutting-edge innovations that are powering the next revolution in mobility and has nine tablet smart phone models currently in the market whose previous year financial data is given below:

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

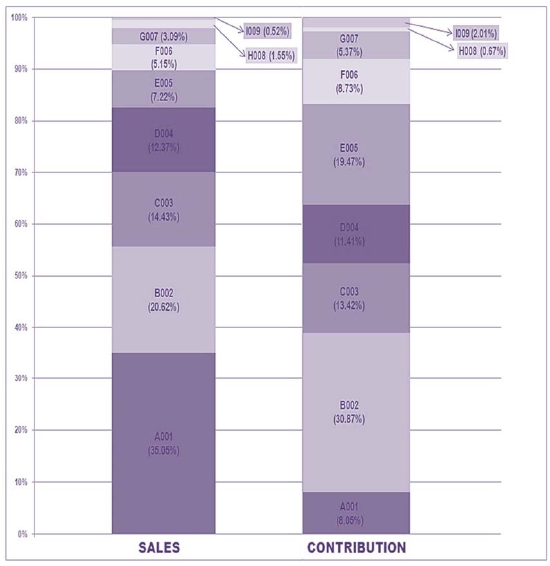
**Required:—**

1. Using the financial data, carry out a Pareto ANALYSIS (80/20 rule) of sales and contribution.
2. Discuss your finding with appropriate Recommendations.

**Solution:**

1. **“Pareto Analysis”**

| **Model** | **Sales**  **(`’000)** | **% of Total Sales** | **Cumula-tive Total** | **Model** | **Cont.**  **(`’000)** | | **% of Total Cont.** | | **Cumulative**  **Total %** | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pareto Analysis Sales | | | | Pareto Analysis Contribution | | | | | | |
| A001 | 5,100 | 35.05% | 35.05% | B002 | | 690 | | 30.87% | | 30.87% |
| B002 | 3,000 | 20.62% | 55.67% | E005 | | 435 | | 19.47%\* | | 50.34% |
| C003 | 2,100 | 14.43% | 70.10% | C003 | | 300 | | 13.42% | | 63.76% |
| D004 | 1,800 | 12.37% | 82.47% | D004 | | 255 | | 11.41% | | 75.17% |
| E005 | 1,050 | 7.22% | 89.69% | F006 | | 195 | | 8.73%\* | | 83.90% |
| F006 | 750 | 5.15% | 94.84% | A001 | | 180 | | 8.05% | | 91.95% |
| G007 | 450 | 3.09% | 97.93% | G007 | | 120 | | 5.37% | | 97.32% |
| H008 | 225 | 1.55% | 99.48% | I009 | | 45 | | 2.01% | | 99.33% |
| I009 | 75 | 0.52% | 100.00% | H008 | | 15 | | 0.67% | | 100.00% |
|  | 14,550 | 100.00% |  |  | | 2,235 | | 100.00% | |  |

**Diagram showing ‘Sales and Contribution”**

**Recommendation**

Pareto Analysis is a rule that recommends focus on most important aspects of the decision making in order to simplify the process of decision making. The very purpose of this analysis is to direct attention and efforts of management to the product or area where best returns can be achieved by taking appropriate actions.

Pareto Analysis is based on the 80/20 rule which implies that 20% of the products account for 80% of the revenue. But this is not the fixed percentage rule; in general business sense it means that a few of the products, goods or customers may make up most of the value for the firm.

In present case, five models namely A001, B002, C003, D004 account for 80% of total sales where as 80% of the company’s contribution is derived from models B002, E005, C003, D004 and F006.

Models B002 and E005 together account for 50.34% of total contribution but having only 27.84% share in total sales. So, these two models are the key models and should be the top priority of management. Both C003 and D004 are among the models giving 80% of total contribution as well as 80% of total sales so; they can also be clubbed with B002 and E005 as key models. Management of the company should allocate maximum resources to these four models.

Model F006 features among the models giving 80%of total contribution with relatively lower share in total sales. Management should focus on its promotional activities.

Model A001 accounts for 35.05% of total sales with only 8.05% share in total contribution. Company should review its pricing structure to enhance its contribution.

Models G007, H008 and I009 have lower share in both total sales as well as contribution. Company can delegate the pricing decision of these models to the lower levels of management, thus freeing themselves to focus on the pricing decisions for key models.

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**Q26:** The following information of manufacture and sale is obtained from the records of VEE AAR Ltd. For the 12 months ending 31.12.2008.

| Product | Contribution (`) |
| --- | --- |
| A | 500 |
| B | 200 |
| C | 1,500 |
| D | 75 |
| E | 100 |
| F | 125 |
| Total | 2,500 |

You are required to prepare a Pareto product contribution chart and comment on the results.

Solution:

Statement of Pareto Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Product | Contribution  (`) | Accumulated Contribution  (`) | % |
| C | 1,500 | 1,500 | 60 |
| A | 500 | 2,000 | 80 |
| B | 200 | 2,200 | 88 |
| F | 125 | 2,325 | 93 |
| E | 100 | 2,425 | 97 |
| D | 75 | 2,500 | 100 |
|  | 2,500 |  |  |

*Comment*: Product c and A constitutes 80% contribution. Hence, the management should improve the quality of these products and frame other policies for these products instead of framing the policies for all the products uniformly.

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**Q27:** In Pareto analysis, what is the 80/20 rule?

1. An approximate rule to the effect tha t20% of the products will provide 80% of sales
2. An approximate rule to the effect that an increase of 80% in costs will be reflected by a 20% decline in sales.
3. An approximate rule to the effect that 80% of wealth is held by 20% of the population
4. An approximate rule to the effect that the wealth of the richest 20% of the population equals that of the other 80%

II and III

II only

I only

I and III

**Answer:** The correct answer is: I and III

Rule I was first suggested by the economist Pareto in the context of the distribution of wealth. It is only very approximately observed in practice.

There is no such general guidance to the effect of rule II.

Rule III was initially suggested by the economist Pareto on the basis of his observations of social inequality.

Rule IV is incorrect because, according to the 80/20 rule, the richest 20% of the population owns 80% of the wealth, compared to only 20% owned by the rest of the population.

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**Q30:** Manish software developing company develops a new accounting software package, accounting. The following information are for a six-year life cycle.

**Year 1 & 2**

|  |  |
| --- | --- |
| Research and development costs | ` 3,00,000 |
| Design costs | `2,00,000 |

**Year 3 – 6**

|  |  |  |
| --- | --- | --- |
|  | **One-time set-up costs** | **Costs per package** |
| Production costs | 2,00,000 | 50 |
| Marketing costs | 1,40,000 | 40 |
| Distribution Costs | 1,00,000 | 30 |
| Customer-service costs | 1,60,000 | 60 |

**Situations**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **I** | **II** | **III** |
| Predicted demand (units) | 7,000 | 5,000 | 4,000 |
| Sale price per package (`) | 400 | 480 | 600 |

**Required:**

Prepare a statement Life Cycle Operating Income under different situations. Ignore tiem value money for computing life cycle revenue and costs. Comment on the results.

**Solution:**

**LIFE CYCLE OPERATING INCOME STATEMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| **Particulars** | **Units (Situation)** | | |
|  | **7,000 (i)** | **5,000 (II)** | **4,000 (III)** |
|  | ` | ` | ` |
| Sales | 28,00,000 | 24,00,000 | 24,00,000 |
| **Costs** |  |  |  |
| Research & Development | 3,00,000 | 3,00,000 | 3,00,000 |
| Design Costs | 2,00,000 | 2,00,000 | 2,00,000 |
| Pre Production Cost | 5,00,000 | 5,00,000 | 5,00,000 |
| **Production Costs** |  |  |  |
| One time | 2,00,000 | 2,00,000 | 2,00,000 |
| Variable @ `50 | 3,50,000 | 2,50,000 | 2,00,000 |
| **Marketing Costs:** |  |  |  |
| One Time | 1,40,000 | 1,40,000 | 1,40,000 |
| Variable @`40 | 2,80,000 | 2,00,000 | 1,60,000 |
| **Distribution Costs:** |  |  |  |
| One time | 1,00,000 | 1,00,000 | 1,00,000 |
| Variable @ `30 | 2,10,000 | 1,50,000 | 1,20,000 |
| **Customer service costs:** |  |  |  |
| One Time | 1,60,000 | 1,60,000 | 1,60,000 |
| Variable @ `60 | 4,20,000 | 3,00,000 | 2,40,000 |
| **Total** | **23,60,000** | **20,00,000** | **18,20,000** |
| **Profit (1-2)** | **4,40,000** | **4,00,000** | **5,80,000** |

Situation III shows that highest profit followed by and II. In that order. Hence 4,000 units level in recommended.

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**Q31:** Scovet Co has identified a market for a new product D for which the following estimated information is available:

1. Sales revenue for the years 20x2, 20x3 and 20x4 of $6m, $7m and $6m respectively. No sales are expected after 20x4. The unit selling price will be $10 throughout the period.
2. Contribution to sales percentage of 60% for each year.
3. Product specific fixed costs in the years 20x2, 20x3 and 20x4 of $2.5m., $2.2m and $1.8m respectively.
4. Capital investment of $4.5m on 1 January 20x2 with nil residual value at 31 December 20x4.

Note: ignore taxation and the time value of money.

**Required:**

1. Calculate the total profit of product D over its life.
2. Calculate the cost per unit of product D, which includes absorption of all product specific costs over the life of the product.

**Solution: Socvet Co**

1. Profit over the life of the product

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **1 Jan. 20x2** | **31 Dec 20X2** | **31 Dec. 20X3** | **31 Dec. 20X4** |
|  | **$m** | **$m** | **$m** | **$m** |
| Initial investment | -4.5 |  |  |  |
| Contribution (at 60%) | 3.6 | 4.2 | 3.6 |  |
| Fixed costs |  | -2.5 | -2.2 | -1.8 |
| Net cash flow | -4.5 | 1.1 | 2.0 | 1.8 |

Net cash flow and therefore profit 0.4 million.

Hence product D is visible on financial grounds since it generates positive profit over its life.

|  |  |
| --- | --- |
| Cost per unit | $ |
| Variable cost per unit ($10 x 0.4) | 4.00 |
| Fixed cost per unit (W) | 5.79 |
| Total cost per unit | 9.79 |

Working

|  | **$m** |
| --- | --- |
| Initial investment | 4.5 |
| Fixed costs: |  |
| 20X2 | 2.5 |
| 20X3 | 2.2 |
| 20X4 | 1.8 |
| Total production specific fixed costs | 11.0 |
| Budgeted sales units (millions) | 1.9 |
| Budgeted fixed cost per unit ($) | 5.79 |

|  |  |
| --- | --- |
|  | $m |
| Budgeted sales units: total revenue over the life of the product | 19 |
| Budgeted units (at $10 per unit) | 1.9 |

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**Q32:** MNP Co. Ltd. makes digital watches. The company is preparing a product life cycle budget for a new watch. Development on the watch is to start shortly. Estimates for new watch are as under.

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

**Required**

1. CALCULATE the budgeted life cycle operating income for, the new watch.

**OR**

SUGGEST the strategies to be adopted by the MNP Co. Ltd. to develop a new watch

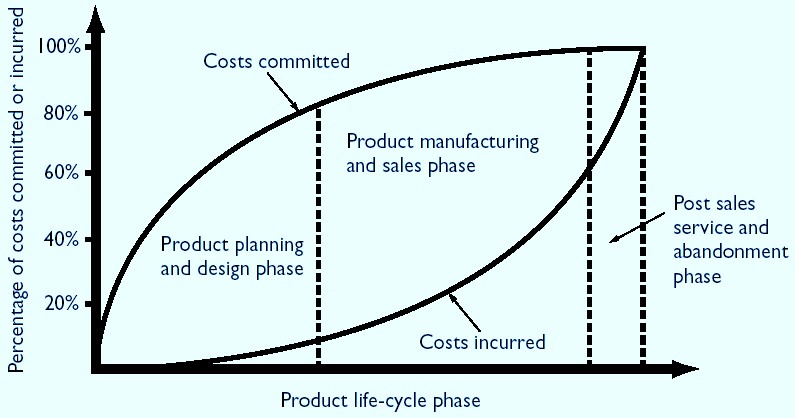
1. What percentage of the budgeted total product life cycle costs will be incurred by the end of the R&D and design stage?
2. An analysis reveals that 75% of the budgeted total life cycle costs of new watch will be locked in at the R&D and design stage. What are the implications for managing costs of the new watch?

**Solution:**

**Statement Showing Budgeted Life-Cycle Operating Income**

|  |  |
| --- | --- |
| **Particulars** | **(`)** |
| Revenues (`500 × 2,40,000 units) | 12,00,00,000 |
| *Less:* R&D and Design Costs | | 80,00,000 |
| Manufacturing Costs: | |  |
| Variable (` 120 × 2,40,000 units) | | 2,88,00,000 |
| Batch | | 32,00,000 |
| Fixed | | 1,12,00,000 |
| Marketing Costs: | |  |
| Batch (` 24 × 2,500\* batches)  \*Assuming 1 Batch = 96 Pcs. | | 60,000 |
| Fixed | | 8,00,000 |
| Distribution Costs: | |  |
| Variable (` 240 × 2,40,000) | | 5,76,00,000 |
| Fixed | | 45,00,000 |
| Customer Service Cost (`10 × 2,40,000) | | 24,00,000 |
| Total Costs | | 11,65,60,000 |
| Operating Income | | 34,40,000 |

Or



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

The pattern of cost commitment and incurrence will differ based on the industry and specific product introduced. For developing a watch, MNP Co. Ltd. needs to commit around 80,00,000 for its R&D and design Cost. So, Cost Management of MNP Co. Ltd can be most effectively exercised during the planning and design stage of its new watch and not at the manufacturing stage when the product design and processes have already been determined and costs have been committed. At this latter stage the focus is more on cost containment rather than on Cost Management. An understanding of life-cycle costs and how they are committed and incurred at different stages throughout a product’s life cycle of the watch will also led to the emergence of target costing, a technique that focuses on managing costs during a product’s planning and design phase.

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

=6.86%



## (iii) Implications:

An analysis reveals that 75%\* of the total product life-cycle costs of the new watch will be locked in at the end of the R&D and design stages when only 6.86% of the costs are incurred (as calculated in the above case). The implication is that it will be difficult to alter or reduce the costs of MNP digital watches once the design is finalised. To reduce and manage total costs, MNP must act to modify the design before costs get locked in. (Question states 75%, hence 75% is taken)

This question can be solved by taking appropriate assumption in respect of **Marketing Costs** and **Distribution Costs.**

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**Q33: Mould & Dies (M&D)** was established in 1980 and has enormous wealth of experience in the mould manufacturing industry and serves wide range of plastic moulds all over nation. Over the past decade, M&D has developed the reputation for quality products & services for customer focused approach. It deals in injection moulds, blow moulds, die sets, moulds base etc.

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

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

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

**Required**

(i) COMPUTE the product “M”’s ‘Life Cycle Cost’.

(ii) SUGGEST two ways to maximize “M’’s lifecycle return.

**Note:** Ignore time value of money

**Solution:**

**(i) Statement Showing “M’s Life Cycle Cost (80,000 units)”**

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

**(ii)** Following ways are suggested to maximize “M” lifecycle return:

**R&D Costs**

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

**Speed up the Product Launch**

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

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**Select all that Apply (Either True OR False)**

**Q34:** In the introduction stage, the product is unique and therefore the company can change a high price.

In the introduction stage, competitors will buy the product to carry out reverse engineering and see how the product works, so that they can develop their own similar, but different product.

In the introduction phase, the company will seek to avoid this competition by maintaining its selling price at the end of the introduction stage.

In the growth stage, the company will adopt a lower selling price to continue to attract new purchasers of the product.

* In the growth stage, if the product cannot be differentiated in other ways, the company may need further reductions in selling price to maintain growth.
* The growth stage is the ideal time to offer short term one-off offers of discounts for multiple purchases.
* In the maturity stage, the selling price of the product becomes unstable and the product is not financially viable anymore.
* In the decline stage, the product may continue to be sold provided its margin Is positive.
* If the product’s margin is not positive in the decline phase, the product may be bundled with other products or sold for less than its unit cost in order to clear the company’s inventory of what has become an obsolete product.

**Answer:**

* In the introduction stage, the product is unique and therefore the company can change a high price. **TRUE**

In the introduction stage, competitors will buy yhr product to cvarry out reverse engineering and see how the product works, so that they can develop their own similar, but different product. **TRUE.**

* In the introduction phase, the company wil seek to avoid this competition by maintaining its selling price at the end of the introduction stage. **FALSE:** the company will seek to avoid this competition by lowering it selling price towards the end of the intordcution stage, to deter competitors from entering the market and also to make its product more affordable to the wider market.
* In the growth stage, the company will adopt a lower selling price to continue to attract new purchasers of the product. **TRUE**
* In the growth stage, if the product cannot be differentiated in other ways, the company may need further reductions in selling price to maintain growth. **TRUE**
* The growth stage is the ideal time to offer short term one-off offers or discounts for multiple purchases. **FLASE** the maturity stage is the ideal time for this.
* In the maturity stage, the selling price of the product becomes unstable and the product is not financially viable anymore **FALSE.**
* In the decline stage the product may continue to be sold, provided its margin is positive. **TRUE**
* If the products margin is not positive in the decline phase, the product may be bundles with other products or sold for less than its become an obsolete product. **TRUE.**

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**Q35:** Solaries specialises in the manufacture of solar panels. It is planning to introduce a new slimline solar panel specially designed for small houses. Development of the new panel is to begin shortly and solaris is in the process of determining the price of the panel. It expects the new product to have the following costs.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Year 1** | **Year 2** | **Year 3** | **Year 4** |
| **Units manufactured and sold** | 2,000 | 15,000 | 20,000 | 5,000 |
|  | **$** | **$** | **$** | **$** |
| **R&D costs** | 1,900,000 | 100,000 | - | - |
| **Marketing costs** | 100,000 | 75,000 | 50,000 | 10,000 |
|  | **$** | **$** | **$** | **$** |
| **Production cost per unit** | 500 | 450 | 400 | 450 |
| **Customer service cost per unit** | 50 | 40 | 40 | 40 |
| **Disposal of specialist equipment** |  |  |  | 300,000 |

The Marketing Director believes that customers will be prepared to pay $500 for a solar panel but the Financial Director believes this will not cover all of the costs throughout the life cycle.

**Required**

Calculate the cost per unit looking at the whole life cycle and comment on the suggested price.

**Answer:-**

**Life cycle costs**

|  |  |
| --- | --- |
|  | **$’000** |
| **R&D (1,900 + 100)** | 2,000 |
| **Marketing (100 + 75 + 50 + 10)** | 235 |
| **Production (1,000 + 6,750 + 8,000 + 2,250)** | 18,000 |
| **Customer service (100 + 600 + 800 + 200)** | 1,700 |
| **Disposal** | 300 |
| **Total life cycle costs** | 22,235 |
| **Total production (‘000 units)** | 42 |
| **Cost per unit** | 529.40 |

The total life cycle costs are $529.40 per solar panel, which is higher than the price proposed by the marketing director. Solaris will either have to charge a higher price or look at ways to reduce costs.

It may be difficult to increase the price if customers are price sensitive and not prepared to pay more. Costs could be reduced by analysing each part of the cost throughout the life cycle and actively seeking cost savings; for example, using different materials, using cheaper staff or acquiring more efficient technology.

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**Q36: Match the following cost to the appropriate life cycle cost classification.**

|  |  |
| --- | --- |
| **Costs** | **Classifications** |
| Designs | Inventory costs |
| Energy costs | Acquisition costs |
| Warehousing | Maintenance costs |
| Transportation | Operation costs |
| Customer service | Product distribution costs |

**Answer:**

|  |  |  |
| --- | --- | --- |
| 1 | ***Cost*** | ***Classification*** |
|  | Design | Acquisition costs |
|  | Energy costs | Operation costs |
|  | Warehousing | Inventory costs |
|  | Transportation | Product distribution costs |
|  | Customer service | Maintenance costs |

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**Q37:** Life cycle costing is the profiling of cost over a product’s production life. **True or false?**

**Answer: False.** It also looks at development costs and so on which are incurred prior to production, and any dismantling costs, which are incurred once production ceases.

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**Q38:** Life cycle costing is particularly useful for products with a short expected life cycle. **True or false?**

**Answer: True.** When the life cycle is short, estimates of life cycles costs and revenues are likely to be easier, and life cycle costs should also be easier to monitor.

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**Q39: When are the bulk of a product’s life cycle costs normally determined?**

1. At the design/development stage
2. When the product is introduced to the market
3. When the product is in its growth stage
4. On disposal

**Answer: A** At the design/development stage.

The bulk of a product’s life cycle costs will be determined at the design/development stage (being designed in at the outset during product and process design, plant installation and setting up of the distribution network)

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**Q40: Indicate which of the following items would be included in the calculation of the life cycle costs of a product.**

1. Planning and concept design costs
2. Preliminary and detailed design costs
3. Testing costs
4. Production costs
5. Distribution and customer service costs

**Answer:** The correct answer are:

1. Planning and concept design costs
2. Preliminary and detailed design costs
3. Testing costs
4. Production costs
5. Distribution and customer service costs

Life cycle costs are incurred from design stage through to withdrawal from the market.

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**Q41:** The following details relate to a new product that has finished development and is about to be launched.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Development** | **Launch** | **Growth** | **Maturity** | **Decline** |
| **Time period** | Finished | 1 year | 1 year | 1 year | 1 year |
| **R&D costs** |  |  |  |  |  |
| **($m)** | 20 |  |  |  |  |
| **Marketing costs** |  |  |  |  |  |
| **($m)** |  | 5 | 4 | 3 | 0.9 |
| **Production** |  |  |  |  |  |
| **Cost per unit ($)** |  | 1.00 | 0.90 | 0.80 | 0.90 |
| **Production** |  |  |  |  |  |
| **Volume** |  | 1m | 5m | 10m | 4m |

* The launch price is proving a contentious issue between managers. The marketing manager is keen to start with a low price of around $8 to gain new buyers and achieve target market share. The accountant is concerned that this does not cover costs during the launch phase and has produced the following schedule to support this:

|  |  |  |
| --- | --- | --- |
| Launch phase: |  | $ million |
| Amortised R&D costs | (20 ÷ 4) | 5.0 |
| Marketing costs |  | 5.0 |
| Production costs | (1 million × $1 per unit) | 1.0 |
| Total |  | 11.0 |
| Total production (units) |  | 1 million |
| Cost per unit |  | $11.00 |

Prepare a revised cost per unit schedule looking at the whole life cycle and comment on the implications of this cost with regards to the pricing of the product during the launch phase.

**Solution:**

|  |  |  |
| --- | --- | --- |
| Lifecycle costs |  | **$ million** |
| Total R&D costs |  | 20.0 |
| Total marketing costs | (5 + 4 + 3 + 0.9) | 12.9 |
| Total production costs | (1 × 1 + 5 × 0.9 + 10 × 0.8 + 4 × 0.9) | 17.1 |
| Total lifecycle costs |  | 50.0 |
| Total production (units) | (1 + 5 + 10 + 4) | 20 million |
| Cost per unit | (50 ÷20) | $2.50 |

**Comment**

* The cost was calculated at $11 per unit during the launch phase. Based on this cost, the accountant was right to concerned about the launch price being set at $8 per unit.
* However, looking at the whole life –cycle the marketing manager’s proposal seems more reasonable.

The average cost per unit over the entire life of the product is only $2.50 per unit. Therefore, a starting price of $8 per unit would seem reasonable and would result in a profit of $5.50 per unit.

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