and some services cannot be provided at this price at all, one has to question whether it is right to use this as the target cost. A target cost which is unachievable could be demotivational for staff and one which is easily met will not provide an incentive to keep costs down. As regards the other operations, the target can be set at a level which is both achievable but feasible, so this should result in less of an issue.

It would be difficult to use target costing for new services

The private sector initially developed the use of target costing in the service sector with the intention that it should only be used for new services rather than existing ones. Considering the work that a hospital performs particularly, it would be difficult to establish target costs when there is no comparative data available, unless other hospitals have already provided services and the information can be obtained from them.

The costing systems at the Sickham UHS Trust are poor

If costs are to be analysed in depth, the analysis must be based on accurate and timely costing systems, which do not appear to currently exist at the Sickham UHS Trust. A large part of the hospitals' costs for services are going to be overhead costs and these need to be allocated to services on a consistent basis. This is not currently happening.

Example 1: ACCA adopted life cycle costing

Fit Co specialises 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 superior product. The following cost estimates have been made.

	Year 1	Year 2	Year 3
Units manufactured and sold		100,000	200,000
Research and development costs	TZS 160,000		
Product design costs	TZS 800,000		
Marketing costs	TZS 1,200,000	TZS 1,000,000	TZS 1,750,000
Manufacturing costs:			
o Variable cost per unit		TZS 40	TZS 42
o Fixed production costs		TZS 650,000	TZS 1,290,000
Distribution costs:			
o Variable cost per unit		TZS 4	TZS 4·50
o Fixed distribution costs		TZS 120,000	TZS 120,000
Selling costs:			
o Variable cost per unit		TZS 3	TZS 3·20
o Fixed selling costs		TZS 180,000	TZS 180,000
Administration costs	TZS 200,000	TZS 900,000	TZS 1,500,000

Note: You should ignore the time value of money.

Required:

(a) Calculate the life cycle cost per unit. **(6 marks)**

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(b) After preparing the cost estimates above, the company realises 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 TZS 40 in year 2 and TZS 42 in year 3, includes a cost for 0·5 hours of labour. The remainder of the variable manufacturing cost is not driven by labour hours. The year 2 cost per hour for labour is TZS 24 and the year 3 cost is TZS 26 per hour. Subsequently, it has now been estimated that, although the first unit is expected to take 0·5 hours, a learning curve of 95% is expected to occur until the 100th unit has been completed. Calculate 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. **(10 marks)**

(c) Discuss the benefits of life cycle costing. **(4 marks) (20 marks)**

ANSWER

4 (a) Life cycle cost per unit

• R & D costs	160,000
• Product design costs	800,000
• Marketing costs	3,950,000
• Fixed production costs	1,940,000
• Fixed distribution costs	240,000
• Fixed selling costs	360,000
• Administration costs	2,600,000
• Variable manufacturing costs (100,000 x 40 + 200,000 x 42)	12,400,000
• Variable distribution costs (100,000 x 4 + 200,000 x 4·50)	1,300,000
• Variable selling costs (100,000 x 3 + 200,000 x 3·20)	940,000
• **Total costs**	**24,690,000**

Therefore cost per unit = 24,690,000/300,000 = 82·30

(b) New life cycle cost

Total labour time for first 100 units:

$y = ax^b$

b = –0·0740005

If x = 100, then $y = 0{\cdot}5 \times 100^{-0{\cdot}0740005}$

= 0·3556 hours per unit.

Therefore total hours for 100 units = 35·56 hours

Time for 99th unit

$y = 0{\cdot}5 \times 99^{-0740005}$

= 0·3559 hours per unit.

Therefore total hours for 99 units = 35·23 hours

Therefore, time for 100th unit = 35·56 hours – 35·23 hours = 0·33 hours

Total labour cost over life of product:

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Year 2

100 units at 0·3556 per unit	36 hours
99,900 at 0·33 hours per unit	32,967 hours
	33,003 hours
at 24 per hour	792,072

Year 3

200,000 at 0·33 per unit	66,000 hours	
at 26 per hour	1,716,000	
Total revised life cycle cost		
Therefore total labour cost	2,508,072	
Other life cycle costs from (a)		24,690,000
Less labour cost included in (a)		(3,800,000)
(100,000 x 0·5 x $24) + (200,000 x 0·5 x $26)		
Total revised life cycle costs	**23,398,072**	

Therefore cost per unit = $23,398,072/300,000 = $77·99

(c) Benefits of life cycle costing

- The visibility of ALL costs is increased, rather than just costs relating to one period. This facilitates better decision-making
- Individual profitability for products is more accurate because of this. This facilitates performance appraisal and decision-making, and means that prices can be determined with better knowledge of the true costs
- More accurate feedback can take place when assessing whether new products are a success or a failure, since the costs of researching, developing and designing those products are also taken into account.

EXAMPLE 2: NBAA ADAPTED

(a) Vipuri Enterprises assembles and sells a range of components for motor vehicles. Vipuri is now considering a proposal to add a new component to its product range. This is a component for Nyumbu cars, which has been given an industrial code number Ny78. The company sees an opportunity to gain market share in Tanzania (the only market so far for Nyumbu cars) that is expected to grow considerably over time (when Nyumbu cars start to be exported), but already competition from rival producers is strong.

Component Ny78 would be produced by assembling a number of parts bought in from external suppliers, and would then be sold to manufacturers of Nyumbu cars. Vipuri Enterprises would use its current workforce of assembly workers to make the component. Production overheads are currently absorbed into production costs on an assembly hours basis.

Vipuri is considering the use of target costing for the new component.

REQUIRED:

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i. Explain briefly how target costing might be used in the development and production of a new product. **(3 marks)**

ii. Explain the benefits of adopting a target costing approach at an early stage in the development of a new product. **(3 marks)**

iii. If a target costing approach is used and a cost gap is identified for component Ny78, suggest possible measures that Vipuri might take to reduce the gap. **(4 marks)**

(b) Suppose you have been given the following cost information for the new component Ny78.

i. Part Al: Each unit of component Ny78 requires one unit of part Al. These bought-in parts are purchased in batches of 5,000 units, and the purchase cost is TZS.5,300 each plus delivery costs of TZS.2,750,000 per batch.

ii. Part A2: Each unit of components Ny78 requires 20 cm of part A2, which costs TZS.2,400 per meter to purchase. 1-lowever, it is expected that there will be some waste due to cutting and that 5% of the purchased part will be lost in the assembly process.

iii. Other parts for component Ny78 will also be bought in and will cost TZS.7,200 per unit of the component.

iv. Assembly labour: It is estimated that each unit of component Ny78 will take 25 minutes to assemble. Assembly labour, which is not in short supply, is paid TZS.24,000 per hour. it is also estimated that 10% of paid labour time will be idle time.

v. Production overheads. Analysis of recent historical costs for production overheads shows the following costs:

	Total production overhead *(TZS)*	**Total assembly labour hours worked**
Month 1	912,000,000	18,000
Month 2	948,000,000	22,000

Fixed production overheads are absorbed at a rate per. assembly hour based on normal activity levels. In a normal year, Vipuri works 250,000 assembly hours.

Vipuri estimates that it needs to sell component Ny78 at a price of not more than

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TZS.56,000 per unit to be competitive, and it is considered that an acceptable gross profit margin on components sold by the company is 25%. Gross margin is defined as the sales price minus the full production cost of sales.

REQUIRED:

Calculate the expected cost per unit of component Ny78 and calculate any cost gap that exists. **(10 marks) (Total: 20 marks)**

SUGGESTED SOLUTION

(a) (i) How to use target costing in the development and production of a new product

- When a company identifies a product that it wishes to make and sell, it must design the product in a way that will appeal to customers. A product design and specification must be prepared, based on a combination of technical considerations and market research.

- The component will also consider the price at which the product will be sold. The price that can be obtained will often depend on the price of similar rival products in the market, or on market research into customer attitude to price. This may be called the target price.

- The company should decide on the profit margin it would like to make from the product. The desired margin is subtracted from the target price to obtain a target cost.

- A cost estimate is then produced for the product if it is made to the planned design and specification and then this cost estimate is compared with the target cost. If the cost estimate is higher than the target cost, the difference is called a cost gap.
- When a cost gap exists, the company should re-consider the planned product design and look for ways of reducing the estimated cost to the level of the target cost – in other words, the aim should be to eliminate the cost gap before actual production of the new product item begins.

(Each points 0.6 mark = 3 marks)

Benefits of adopting target costing at an early stage of new product development

- Target costing should begin at an early stage in the product design and development process because the opportunity for reducing production costs is greatest at the design stage. If there is a cost gap, the product design can be amended. Because the measures to reduce costs are made at an early stage, it is easier to fund ways of reducing costs that do not take away significant value for the customer, (if costs are reduced in a way that reduces value for the customer, the target sales price will probably not be achievable).

- If target costing is introduced at a later stage in the product development, for example after the material components, product design features and production methods have been finally agreed, there are fewer opportunities for cost reduction.

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- Early adoption of target costing also helps to create a general awareness of the need for cost control, and it increases the probability that new products will be developed at a cost that allows the company to sell them at a competitive price whilst making an acceptable level of profit. It can therefore be argued that target costing improves the probability of commercial success (profitability) for new products. **(each points 1 mark = 3 marks)**

(iii) Possible measures for Vipuri to reduce the cost gap

- If a cost gap is identified early in the product design process, the team responsible for the product development (which should include marketing staff as well as production and R&D staff) should consider every aspect of the product design and planned production method to consider ways of reducing the costs.

- The aim should be to make changes in a way that does not remove significant value for the customer. For example, some aspects of the product, such as the materials or parts used, could be changed and parts that are less expensive used instead. Some features of the product design might be removed without loss of significant value.

- As an alternative (or in addition to) looking for cheaper or fewer parts to the product, cost savings might be achieved by identifying suppliers who are willing to provide parts at a lower cost, so that prices from suppliers are re-negotiated.

- It might be possible to change the production process in some ways to reduce the assembly time required per unit, or different assembly workers might be hired at a lower rate of pay per hour.

- Finding ways of reducing overhead costs can be difficult because indirect costs cannot be identified directly with specific products. However, if Vipuri uses target costing for new products, it would be surprising if it did not also employ methods of looking for savings in overhead costs (such as total quality management and continuous improvement). **(4 points 1 mark = 4 marks)**

(b) Calculation of Expected unit cost and cost gap for Ny78

Working:
Production overhead costs

Production Overheads	Hours	TZS
Month 1: Total cost	18,000	912,000,000
Month 2: Total cost	22,000	948,000,000
Difference	4,000	36,000,000

From the above, variable production overhead cost per hour = TZS.36,000,000/4,000 = TZS.9,000

Calculation on fixed overheads and fixed overhead absorption rate will thus be:

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Production Overheads	TZS
Month 1: Total cost of 18,000 hours	912,000,000
Variable cost (18,000 x TZS.9,000)	162,000,000
Therefore fixed costs per month	750,000,000

Annual fixed production overhead costs = TZS.750,000,000 x 12 = TZS.9,000,000,000
Fixed production overhead absorption rate = TZS.9,000,000,000/250,000 = TZS.36,000 per assembly hour

Cost estimate and cost gap estimate

Cost per unit of Ny78	TZS	Marks
Part A1: TZS.5,300 + (TZS.2,750,000/5,000)	5,850	1 mark
Part A2: 0.20 x TZs.2,400 x 100/95	505	1 mark
Other parts	7,200	1 mark
Assembly labour cost: 25/60 x TZs.24,000 x 100/90	11,111	1 mark
Variable overheads: 25/60 x TZS.9,000	3,750	2 marks
Fixed overheads: 25/60 x TZS.36,000	15,000	2 marks
Total estimated production cost	43,416	
Target cost (75% of TZS.56,000)	42,000	1 mark
Cost gap	(1,416)	1 mark

(10 marks) (Total: 20 marks)

Review Questions on Target Costing

QUESTION ONE – [Target Costing Concept Questions]

(a) What Target Costing is as applied in manufacturing and service industries?
(b) Explain the main steps involved in developing a target price and target cost for a product in a typical manufacturing company
(c) Suggest how a target cost gap might be closed
(d) State the characteristics of services and the difficulties in applying target costing in service industries
(e) State the benefits of target costing

QUESTION TWO – [Life cycle Costing Concept Questions]

(a) Briefly explain the meaning of Life cycle costing
(b) State and explain the stages of a product life cycle and their respective costs
(c) State the benefits of life cycle costing

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QUESTION THREE - CIMA ADAPTED [Target Costing & Learning Curve]

A company has developed a new product which it will launch next month. During the initial production phase, the company expects to produce 6,400 units in batches of 100 units. The first batch to be produced is expected to require 25 hours of direct labour. The following details are expected to apply throughout the initial production phase:

- Direct material cost per unit is expected to be $4
- Direct labour is to be paid $10 per hour
- A 90% learning curve is expected to apply
- Other variable costs are expected to be $2 per unit

Note: The learning index for a 90% learning curve is -0.1520

REQUIRED:

(a) **Calculate** the total variable cost of the 6,400 units of the new product. ***(4 marks)***

You have shown your calculation to the Finance Director who has now told you that the company needs to achieve a total variable cost target of $45,000 for the first 6,400 units in order to achieve its initial production phase profit target.

(b) **Calculate** the rate of learning at which the initial production phase profit target would be achieved, assuming no other cost savings can be made. ***(6 marks)*** **(Total 10 marks)**

QUESTION FOUR - ACCA ADAPTED [Target Costing, Life Cycle Costing & Learning Curve]

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, believing it to be more accurate to use an average cost across the whole lifetime of a product, rather than potentially different costs for different years. 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% selling price)	$70
Target cost per unit	$130
Estimated lifetime cost per unit (see note below for detailed breakdown)	$160

Note: Estimated lifetime cost per unit:

	$	$
Manufacturing costs		
Direct material (bought in parts)	40	
Direct labour	26	
Machine costs	21	
Quality control costs	10	
Rework costs	3	
	---	100

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Non-manufacturing costs		
Product development costs	25	
Marketing costs	35	

		60

Estimated lifetime cost per unit		160

The average market price for a webcam is currently $150.

The company needs to close the cost gap of $30 between the target cost and the estimated lifetime cost. 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 bespoke 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.

3. Rework cost: this is the average rework cost per webcam and is based on an estimate of 15% of webcams requiring rework at a cost of $20 per rework. With the use of more standard parts, the rate of reworks will fall to 10% and the cost of each rework will fall to $18.

REQUIRED:

(a) Recalculate the estimated lifetime cost per unit for the webcam after taking into account points 1 to 3 above. **(12 marks)**

(b) Explain the 'market skimming' (also known as 'price skimming') pricing strategy and discuss, as far as the information allows, whether this strategy may be more appropriate for Cam Co than charging one price throughout the webcam's entire life. **(8 marks) (20 marks)**

QUESTION FIVE - ACCA ADAPTED [with suggested solution]

The Chemical Free Clean Co (CFC Co) provides a range of environmentally-friendly cleaning services to business customers, often providing a specific service to meet a client's needs. Its customers range from large offices and factories to specialist care wards at hospitals, where specialist cleaning equipment must be used and regulations adhered to. CFC Co offers both regular cleaning contracts and contracts for one-off jobs. For example, its latest client was a chain of restaurants which employed them to provide an extensive clean of all their business premises after an outbreak of food poisoning.

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The cleaning market is very competitive, although there are only a small number of companies providing a chemical free service. CFC Co has always used cost-plus pricing to determine the prices which it charges to its customers but recently, the cost of the cleaning products CFC Co uses has increased. This has meant that CFC Co has had to increase its prices, resulting in the loss of several regular customers to competing service providers.

The finance director at CFC Co has heard about target costing and is considering whether it could be useful at CFC Co.

REQUIRED:

(a) Briefly describe the main steps involved in deriving a target cost. (3 marks)

(b) Explain any difficulties which may be encountered and any benefits which may arise when implementing target costing at CFC Co. (7 marks) (10 marks)

SUGGESTED SOLUTION

(a) Target costing steps deriving a target cost

Step 1: A product or service is developed which is perceived to be needed by customers and therefore will attract adequate sales volumes.

Step 2: A target price is then set based on the customers' perceived value of the product. This will therefore be a market based price.

Step 3: The required target operating profit per unit is then calculated. This may be based on either return on sales or return on investment.

Step 4: The target cost is derived by subtracting the target profit from the target price.

Step 5: If there is a cost gap, attempts will be made to close the gap. Techniques such as value engineering may be performed, which looks at every aspect of the value chain business functions with an objective of reducing costs while satisfying customer needs.

Step 6: Negotiation with customers may take place before deciding whether to go ahead with the project.

(b) Application of Target Costing at CFC Co Difficulties in implementation

1. CFC Co is a service company and in service companies, it is often more difficult to find a precise definition for some of the services. In order for target costing to be useful, it is necessary to define the service being provided. CFC Co actually provides a range of services to clients including specialist care wards at hospitals. This means that the definition of the services being provided will vary. Different target costs will need to be derived for the different services provided.
2. CFC Co has two types of clients: regular clients and one-off clients. Since the service for regular clients is being repeated, it should be relatively easy to set a target cost for these

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jobs. However, for the one-off jobs, there may not be any comparative data available and therefore setting the target cost will be difficult.

3. Similarly, some of the work available is very specialist. For example, cleaning restaurants and kitchens after an outbreak of food poisoning will require specialist techniques and adherence to a set of regulations with which CFC Co may not be familiar. It may be difficult to establish the market price for a service like this, thus making it difficult to derive a target cost.

Benefits of Target Costing to CFC Co

1. Target costing is useful in competitive markets where a company is not dominant in the market and therefore has to accept a market price for their products. CFC Co is operating in a competitive market and whilst the service offered by CFC Co is more specialist, it is clear from the recent drop in sales that price increases do lead to loss of customers. CFC Co cannot therefore ignore the market price for cleaning services and simply pass on cost increases as it has done. Target costing would therefore help CFC Co to focus on the market price of similar services provided by competitors, where this information is available.

2. If after calculating a target cost CFC Co finds that a cost gap exists, it will then be forced to examine its internal processes and costs more closely. It should establish why the prices of the products it uses have increased in the first place. If it cannot achieve any reduction in these prices, it should consider whether it can source cheaper non-chemical products from alternative suppliers. So, target costing will benefit CFC Co by helping it to focus on cost reduction and consequently customer retention.

Note: More points could be made and would earn marks.

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