



# ACCA

## Paper P5

# Advance Performance Management

Tuition Mock Examination

December 2011

Answer Guide

### Health Warning!

#### How to pass

Attempt the mock examination under exam conditions BEFORE looking at these suggested answers. Then constructively compare your answer, identifying the points you made well and identifying those not so well made.

If you got basics wrong then re-revise by re-writing them out until you get them correct.

#### How to fail

Simply read or audit the answers congratulating yourself that you would have answered the questions as per the suggested answers.

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## Question 1

### Tutorial help and key points

A favourite topic of the Examiner is to give various different ways in which a reward (in this case a bonus) could be awarded. The Examiner will have planned the numbers carefully to have different situations occurring, so think what these might be before you attempt the numbers.

### Marking Guide

<b>(a)</b> (1) ½ mark for each division	1½
(2) 1 mark for each division	3
(3) 1 for each cost driver and ½ for each division	5½
(4) 1 mark for each division and 1 mark for recharge	4
	<b>Max 14</b>
<b>(b)</b> 2 marks for each relevant discussion	<b>Max 6</b>
<b>(c)</b> (1) 3 marks for each year cash out flow	6
1 mark for expected value each year	2
2 marks for conclusion	2
	<b>Max 10</b>
(2) 2 marks for each suggestion	<b>Max 5</b>
	<b>Total max =35</b>

(a)

(i) Return on capital employed for divisions

	Division A	Division B	Service division
	\$m	\$m	\$m
Capital employed	<u>40</u>	<u>25</u>	<u>14</u>

ROCE = (net profit/capital employed) × 100%.

(1) Total cost on 50/50 basis

	\$m	\$m	\$m
Profit (before recharge)	10.0	8.0	-
Costs	-	-	(7)
Recharge	(3.5)	(3.5)	<u>7</u>
Net profit	<u>6.5</u>	<u>4.5</u>	-
ROCE	<u>16.25%</u>	<u>18.0%</u>	<u>Nil</u>

(2) **Total cost on 50/50 basis plus profit mark-up of 30%**

	<b>\$m</b>	<b>\$m</b>	<b>\$m</b>
Profit (before recharge)	10.000	8.00	
Costs	-		(7.00)
Recharge (\$3.5m (from (i)) × 130%)	<u>(4.550)</u>	<u>(4.55)</u>	<u>9.10</u>
Net profit	<u>5.450</u>	<u>3.45</u>	<u>2.10</u>
ROCE	<u>13.625%</u>	<u>13.80%</u>	<u>15.00%</u>

(3) Total cost using an activity-based cost approach

	<b>\$m</b>	<b>\$m</b>	<b>\$m</b>
Profit (before recharge)	10.00	8.00	
Costs	-		(7.0)
Recharge (W)	<u>(4.16)</u>	<u>(2.84)</u>	<u>7.0</u>
Net profit	<u>5.84</u>	<u>5.16</u>	<u>-</u>
ROCE	<u>14.60%</u>	<u>20.64%</u>	<u>Nil</u>

(4) **External supplier prices**

	<b>\$m</b>	<b>\$m</b>	<b>\$m</b>
Profit (before recharge)	10	8.0	
Costs			(7.0)
Recharge	<u>(2)</u>	<u>(4.5)</u>	<u>6.5</u>
Net profit	<u>8</u>	<u>3.5</u>	<u>(0.5)</u>
ROCE	<u>20%</u>	<u>14.0%</u>	<u>-3.57%</u>

**Working**

Service provided to	Cost driver	Cost \$m	Divisions	
			A \$m	B \$m
Sales	Customers	1.8	1.20	0.60
Advertising	Product types	2.4	0.96	1.44
Production	Batches	0.8	0.40	0.40
Administration	Employees	2.0	<u>1.60</u>	<u>0.40</u>
			<u>4.16</u>	<u>2.84</u>

**Sample calculation:** service provided to sales costs \$1.8m and is split in the ratio 10:5, so division A receives  $\$1.8m \times 10/15 = \$1.2m$  and division B receives  $\$1.8m \times 5/15 = \$0.6m$ .

(ii) **Acceptability of each of the change bases to divisions and the organisation**

Given that each Division has a 15% target return on capital employed:

- (1) **Division A** will not find either the 50/50 basis plus profit mark-up or the activity-based cost approach acceptable since they result in ROCEs below 15%. ROCEs in excess of 15% will be produced if the 50/50 basis or the external supplier prices bases are used, however. Division A is therefore likely to find only the **latter two bases acceptable**.
- (2) **Division B** will find the **50/50 basis and the activity-based cost approach basis acceptable** since they produce ROCEs for the division in excess of 15%. The 50/50 basis plus profit mark-up and the external supplier prices are unlikely to be acceptable, however, because ROCEs below 15% for division B result from their use.

- (3) The **service division** will find only the **50/50 basis plus profit mark-up acceptable** since this produces an ROCE of 15%. The 50/50 basis and activity-based cost approach produce unsatisfactory nil returns whereas the external supplier prices basis results in a negative return.

The organisation requires a charge base which motivates divisions to improve both divisional and organisational performance.

Neither of the 50/50 cost-based approaches are likely to be acceptable as the arbitrary nature of both the cost apportionment and the mark-up for the service division will not motivate the divisions to improve performance.

The organisation is unlikely to implement the ABC basis. Division B records its highest ROCE using this basis and so would probably make no efforts to economise on the use of resources. Division A, on the other hand, would probably attempt to minimise its use of the service in an attempt to improve its ROCE.

The most suitable basis is probably the external supplier prices. The use of this basis indicates that the service division should attempt to lower its costs to bring them in line with the external benchmark.

Given the difference between the recharges using the external supplier prices and the activity-based cost approach, it is evident that the service division may not be operating as efficiently and effectively as possible. For example, an external supplier would charge \$2m to service division A whereas the ABC approach indicates that it costs the service division \$4.16m to do the same.

**(iii) (1)**

Activity level	Closure 20X7			Closure 20X1		
	Current	+	-	Current	+	-
	\$m	20%	20%	\$m	20%	20%
	\$m	\$m	\$m	\$m	\$m	\$m
Contract fee (W1)	21.0	25.2	21.0	-	-	-
Variable costs (W2)	-	-	-	16.8	20.16	13.44
Fixed costs:						
lease (W3)	3.6	3.6	3.6	4.8	4.80	4.80
others (W4)		-	-	4.0	4.40	3.60
Sales of fixed assets	(0.5)	(0.5)	(0.5)	-	-	-
Cash outflow	<u>24.1</u>	<u>28.3</u>	<u>24.1</u>	<u>25.6</u>	<u>29.36</u>	<u>21.84</u>

Note. Depreciation is not a cash flow and so should not be included within the analysis.

**Expected value of closure in 20X7**

$$= \$((0.5 \times 24.1) + (0.2 \times 28.3) + (0.3 \times 24.1))m = \$24.94m \text{ cash outflow}$$

**Expected value of closure in 20X1**

$$= \$((0.5 \times 25.6) + (0.2 \times 29.36) + (0.3 \times 21.84))m = \$25.224m \text{ cash outflow}$$

If activity levels remain at their **current levels or were to increase by 20%**, the decision should be to **close the division now** since the cash outflow will increase in both instances if the division is kept open until 20X1. If **activity levels were to fall by 20%**, however, the division should be **closed in 20X1**.

An **expected value approach** would indicate that the division should be **closed in 20X7**.

## Workings

- 1 Contract fee at current activity level and at activity level 20% below current activity level =  $\$(5 + 5 + 5.5 + 5.5)\text{m} = \$21\text{m}$   
Contract fee at activity level 20% above current activity level =  $\$21\text{m} \times 1.2 = \$25.2\text{m}$
- 2 Variable cost at current activity level =  $4 \times \$4.2\text{m} = \$16.8\text{m}$   
Variable cost at activity level 20% above current activity level =  $\$16.8\text{m} \times 1.2 = \$20.16\text{m}$   
Variable cost at activity level 20% below current activity level =  $\$16.8\text{m} \times 0.8 = \$13.44\text{m}$
- 3 If closure is in 20X7, the early exit penalty of  $75\% \times 4 \times \$1.2\text{m} = \$3.6\text{m}$  must be paid
- 4 Other fixed costs at high activity level =  $\$4\text{m} \times 1.1 = \$4.4\text{m}$   
Other fixed costs at low activity level =  $\$4\text{m} \times 0.9 = \$3.6\text{m}$

**(2)** The following **additional financial and non-financial factors** could influence the decision strategy.

- 1 The quality and reliability of the service provided by the external supplier.
- 2 Possible problems of reforming an internal division with appropriate levels of expertise if the external supplier proves unreliable.
- 3 Effect on remainder of workforce of closure.
- 4 Costs not yet taken into consideration (redundancy costs, for example).
- 5 Possible external use of the service division premises if closure is now.
- 6 Loss of flexibility and control associated with internal provision if closure is now.

**(b)**

**(i) Transfer at existing market price**

The **ideal** transfer price should **reflect the opportunity cost of sale to the supply division and the opportunity cost to the buying division** (that is, the purchase price available externally and/or the contribution obtainable from the extra output that could be made and sold with the transferred items). This is known as the '**general rule**'.

Alpha division has an external market which fully utilises its production capacity, so the opportunity cost is the contribution it forgoes from external sales if it transfers to Beta division. There is no opportunity cost to Beta division: it makes no odds whether it buys internally or externally. The transfer price should be set at marginal cost plus contribution, which could be the same as the existing market price (subject to (ii)).

**(ii) Transfer at less than existing market price**

Alpha division may incur lower marginal costs if it transfers to Beta division, because it will **not be necessary to market** the product and **distribution** may be **cheaper**. If this applies, Alpha division could offer to transfer product

A to Beta division at less than the external market price and yet report the same total profit.

## Question 2

### Tutorial help and key points

Examiner's often get annoyed with students who fail to apply theory to the particular scenario that is given.

Make sure you give examples of TQM and JIT for SG, don't just repeat what is in the notes.

### Marking Guide

(a)	3 marks for definition and 2 marks for each area	Max 12
(b)	2 marks for each relevant point	Max 5
(c)	2 marks for each cost and example	Max 8
		<b>Total max =25</b>

### (a)

**Total Quality Management (TQM)** is the process of focusing on quality in the management of all resources and relationships within the organisation. It has two basic principles:

- (i) **Getting things right first time**, on the basis that the cost of correcting mistakes is greater than the cost of preventing them from happening in the first place.
- (ii) **Continuous improvement**, which is the belief that it is always possible to improve, no matter how high quality may be already.

### TQM and SG

TQM is a management technique, applicable to all of an organisation's activities, not just to production. It can therefore be applied to all of SG plc's activities, not just to food production.

- (i) **In relation to design.** Products and processes should be designed with quality in mind (so that faults are not incorporated from the outset). For example, SG would need to ensure that specifications for food were 100% correct.
- (ii) **In relation to food production.** The quality of output depends on the quality of input materials and so TQM would require procedures for acceptance and inspection of goods inwards and measurement of rejects. Inspection of output could take place at various key stages of the production process to provide a continual check that the production process is under control. Machines should be maintained so that quality production occurs.



- (iii) **In relation to sales.** Some sub-standard output will inevitably be produced. Customer complaints should be monitored in the form of letters of complaint, returned goods, penalty discounts and so on.
- (iv) **In relation to suppliers.** Supplier quality assurance schemes could be established so that suppliers would guarantee the quality of goods supplied. The onus would then be on the supplier to carry out the necessary quality checks or face cancellation of the contract.
- (v) **In relation to employees.** Quality should be the primary concern of every employee at every stage of production. Workers must therefore be empowered and take responsibility for the quality of SG's products, stopping the production line if necessary. Quality circles might be set up, perhaps with responsibility for implementing improvements identified by the circle members.
- (vi) **In relation to the information system.** The information system should be designed to get the required information to the right person at the right time.

**(b)**

**Just-in-time (JIT) systems incorporate:**

- (i) **JIT production**, which is a system driven by demand for finished products so that work in progress is only processed through a stage of production when it is needed by the next stage. The result is **minimal** (or in some cases non-existent) **inventories of work in progress and finished goods**.
- (ii) **JIT purchasing**, which seeks to match the usage of materials with the delivery of materials from external suppliers. This means that **material inventories** can be kept at **near-zero levels**.

Production management within a JIT environment therefore needs to **eliminate scrap and defective units** during production and **avoid the need for reworking of units**. **Defects stop the production line**, creating **rework** and possibly resulting in a **failure to meet delivery dates** (as **buffer stocks** of work in progress and finished goods are **not held**). **TQM** should ensure that the **correct product** is made to the **appropriate level of quality** on the **first pass through production**.

For JIT purchasing to be successful, the organisation must have confidence that the **supplier** will **deliver on time** and will deliver **materials of 100% quality**, that there will be no rejects, returns and hence **no consequent production delays**. This confidence can be achieved by **adopting supplier quality assurance schemes** and stringent **procedures for acceptance and inspection of goods inwards**, which are integral parts of TQM.

**(c)**

**Quality** costs can be classified in four ways

- (i) **Costs of internal failure** are costs arising within an organisation due to failure to achieve the quality specified. Examples relevant to the business of SG could include the cost of foods scrapped due to inefficiencies in goods inwards procedures, the cost of foods lost in process and the cost of foods rejected during any inspection process.
- (ii) **Costs of external failure** are costs arising outside the organisation of failure to achieve specified quality after transfer of ownership to the customer. SG

examples could include the cost of a customer complaints section and the cost of replacing and delivering returned foods.

- (iii) **Costs of prevention** represent the cost of any action taken to investigate, prevent or reduce defects and failures. Examples for SG could include the cost of training personnel in TQM procedures and the cost of maintaining quality control/inspection equipment.
- (iv) **Costs of appraisal** are the costs of assessing the level of quality achieved. Examples applicable to SG could be the cost of any goods inwards checks and the costs of any supplier vetting.

## Question 3

### Tutorial help and key points

There are some topics (such as Kaplan and Norton and Fitzgerald and Moon) where there are a number of areas of measurement, so the Examiner will put in numbers that allow calculations to be made for each area.

This particular question is looking at Lynch and Cross, but the principle is the same, there must be some numbers to do with cycle time, quality etc.

Also remember you will get most of the marks for commenting on the numbers, so add value, do not simply say the number has gone up or down.

### Marking Guide

(a)	2 marks for definition	2
	2 marks for discussion	2
		<b>Max 4</b>
(b)	3 marks for quantification	3
	3 marks for discussion	3
		<b>Max 6</b>
(c)	2 marks for each discussion	4
		<b>Max 4</b>
(d)	2 marks for each discussion	4
		<b>Max 4</b>
(e)	1 mark for each discussion	2
		<b>Max 2</b>
		<b>Total max =20</b>

### (a)

#### Corporate vision or mission

The question alludes to a view of business taken by Lynch and Cross, in whose 'performance pyramid' corporate vision is what defines the following.

- The **markets** in which an organisation will compete (such as UK business-to-business market for Widgets)
- The **bases** upon which it will compete (such as hand-made, high quality, high price Widgets or mass-produced, cheap and cheerful Widgets)

For the 'millennium' proposal Ochilpark's **market** has been defined both in terms of its key **competitors** and the **customers** with whom it can co-operate.

Ochilpark intend to compete on the following **bases**.

- (i) Offering **tailored** products that meet the **specific** design and quality requirements of customers.
- (ii) **Improving** the products and enhancing **flexibility continuously**.
- (iii) Providing effective after-sales service.

Presumably, each of these is an area in which competitors fall short of Ochilpark's vision.

**(b)**

**The proposal in financial and marketing terms**

In **marketing** terms the Millennium Proposal Schedule (MPS) indicates that the **market** as a whole is expected to **grow** by \$5m or about **4%**  $((125-120)/120)$  per year. **Ochilpark sales** are expected to **grow** by **20%**  $((18-15)/15)$  in 20X1 and by a further 11%  $((20-18)/18)$  in 20X2.

If this comes about Ochilpark's **market share** will grow each year as follows.

	<b>20X0</b>	<b>20X1</b>	<b>20X2</b>
Total market size (\$m)	120	125	130
Ochilpark plc sales (\$m)	15	18	20
Market share	12.5%	14.4%	15.4%

In **financial** terms **net profit** is expected to **grow** substantially from \$0.9m in 20X0 to \$7.45m in 20X2, partly because of the increase in the size of both the market and the company's market share, but mainly because of falling costs.

	<b>20X0</b>	<b>20X1</b>	<b>20X2</b>
Ochilpark plc sales (\$m)	15.00	18.00	20.00
Ochilpark plc – total costs (\$m)	<u>14.10</u>	<u>12.72</u>	<u>12.55</u>
Net profit (\$m)	<u>0.90</u>	<u>5.28</u>	<u>7.45</u>
Net profit/sales	<u>6.0%</u>	<u>29.3%</u>	<u>37.3%</u>

**(c)**

**External effectiveness**

As Lynch and Cross say, some performance measures (quality and delivery) are **external** and **important to the customer**.

- (i) **Quality** is measured in the MPS as a percentage of production that **achieves design quality standards**, and this is expected to increase from 95% in 20X0 to 98% by 20X1. Quality may also be reflected in the number of goods that are returned by customers as unsuitable (although poor quality may not always be the reason for a return). The percentage of **returns to deliveries** is expected to fall from 3% in 20X0 to 0.5% in 20X1. This is presumably also reflected in the cost of **after sales service**, which falls from \$1.5m in 20X0 to \$1.0m in 20X2, assuming that the cost savings are achieved because of higher quality and fewer returns, not because of a reduced level of other aspects of after-sales service.
- (ii) Customers are also likely to be pleased that by 20X2 **nearly all orders are delivered on the date promised**. The percentage of sales meeting the planned delivery date is expected to rise from 90% in 20X0 to 99% in 20X2. This may be reflected in the decrease in the cost of **after-sales service**: sales staff will spend less time chasing late deliveries on behalf of customers.

**(d)**

**Internal efficiency**

Lynch and Cross also identify **internal** performance measures (cycle time and waste). These are **invisible to the customer** but, as the question says, they do affect productivity and costs.

- (i) **Cycle time** is shown as an average number of weeks between an initial enquiry from a customer and delivery of the order. This falls by 0.5 weeks per year, from 6 weeks to 5 weeks. This represents an increase in productivity of nearly 17% over the two-year period. No doubt this helps the organisation to meet delivery dates, too, so the improvement in internal processes also contributes to external effectiveness.
- (ii) There are two measures of **waste**: wasted **materials** and **wasted time**. The percentage of components scrapped is expected to fall by 2.5% per year from 7.5% to 2.5%, while the amount of machine capacity used will rise from 90% to 98%. This enhanced productivity will be achieved by means of spending on appraisal and prevention procedures which, as explained in part (a), reduce the incidence of both internal and external failures.

**(e)**

**Links**

These have been discussed to some extent in the paragraphs above. Better internal processes lead to a higher quality product and lower costs. Externally, customers will be more satisfied and more likely to make repeat purchases, and the enhanced quality of the product and increased reliability of delivery systems.

## Question 4

### Tutorial help and key points

To obtain a high mark in the exam, think about why the Examiner has decided to set a particular topic in a particular industry.

For this question, why set a target costing question in the mobile phone industry? Because there are a lot of price sensitive customers and a lot of competitors.

Similarly, why set a life-cycle costing question in the mobile phone industry? Because many of the costs will be at the design stage before production even begins.

### Marking Guide

(a)	1.5 marks each for explanation	3
	2 marks for each relevant point	Up to 12
		<b>Max 15</b>
(b)	2 marks for explanation	2
	3 marks for tools	3
		<b>Max 5</b>
		<b>Total max =20</b>

(a)

### (i) Target costing

To **compete** effectively in today's competitive markets, such as that for mobile phones, organisations must **continually redesign their products** (launching new and ever more sophisticated mobile phones, for example), with the result that product life cycles are becoming much **shorter**.

The planning, development and design stages of a product are therefore critical to an organisation's cost management process because it is here that a large proportion of a product's life cycle costs are determined. **Cost reduction** at these **early stages of a product's life cycle**, rather than during the production process, is now one of the most **important** issues facing management accountants in industry.

One possible costing system to cope with this change is target costing.

### Traditional costing systems versus target costing

Traditionally, Moby is likely to develop a particular mobile phone, work out its production cost and set what it believes to be an appropriate selling price. The profit or loss drops out as the balancing figure.

The target costing approach is radically different. If Moby were to introduce it, a **mobile phone** would be **developed**, a **selling price based on capturing a target market share set** and a **profit based on the organisation's required levels of return established**. The **balancing figure** in the price/cost/profit relationship would be the product **cost**, a **target** that Moby would have to aim to achieve.

### **Target costing and a customer focus**

By considering the market and the price they are willing to pay, target costing therefore forces an organisation to **focus** more intently on **customers**. This contrasts with the traditional focus on suppliers.

### **Target costing and cost reductions**

Using target costing, all ideas for **cost reduction** would be **examined during the product planning, research and development processes**, ensuring that quality, reliability and other **customer requirements were built into the product from the outset**. Given the short life of Moby's products, minimum costs and customer satisfaction from product launch are of paramount importance to ensure maximum sales and maximum profit.

### **Target cost management**

Target costing is more **flexible** than traditional methods of control such as standard costing, which is likely to prove too rigid for a company such as Moby.

For example, **initial production costs**, determined by Moby's current technology and processes, would probably be **greater than the target cost**. But given the fast-moving nature of mobile phone technology, this could change rapidly. The company's management would therefore have to set **benchmarks** for improvement towards the target cost. The **learning effect** could be incorporated, probably an important factor in the manufacture of mobile phones.

These benchmarks, which could be incorporated into the **company's balanced scorecard**, would become increasingly more stringent as the target cost was reduced over the product life; cost savings would have to be actively sought and made continuously.

### **Limitations of target costing**

If **unrealistic and hence unachievable targets** were set, however, the workforce would **not be committed to them** or else would be **demotivated** if unable to achieve them. If, on the other hand, Moby management set them too low, the workforce would not be motivated to improve.

Moby's **current costing systems** may **be unable to provide the data needed** to operate target costing effectively, but in time the company would be able to build up enough relevant data to create cost tables. **Cost tables** are a very sophisticated version of standard cost setting data and can be used to predict the costs of even new products with an acceptable degree of accuracy.

## (ii) Life cycle costing

Life cycle costing is an alternative to the traditional approach to determining product profitability.

### Traditional approach to determining product profitability

Traditional management accounting practice at Moby would be **to report costs at the physical production stage** of the life cycle of a mobile phone; costs would not be accumulated over the entire life cycle. The **profitability** of a particular mobile phone would **not be assessed over its entire life but rather on a periodic basis**. **Costs** would tend to **be accumulated according to function**; research, design, development and customer service cost incurred on all products during a period would be totalled and **recorded as a period expense**.

### The life cycle approach

Using life cycle costing, however, Moby's **costs** would be **traced to individual products over complete life cycles**.

### The advantages of life cycle costing to Moby

- (1) Traditional **comparisons** between budgeted and actual costs on a month by month basis could be replaced **by comparing actual plus projected costs and revenues with original (or revised) budgeted life cycle costs and revenues** for a particular mobile phone. Such comparisons would allow for improved future decisions about product design, and would **show whether expected savings** from using new production methods or technology had been **realised**.
- (2) In the market within which Moby is operating, the duration **of product life cycles is decreasing** as the pace of technological change increases and consumer demand becomes more sophisticated. Increasing automation means **that up to 90% of product life cycle costs could be determined 'up front'**, by decisions made early with the product life cycle.

The introduction of life cycle costing would ensure **that initial product proposals were far more carefully costed** and that **the tightest cost controls were at the design stage** of potential new products, the point at which the majority of costs are committed.

Overall, the system would **assist in the planning and control of Moby's products' life cycle costs** and would **monitor spending and commitments to spend during the early stages** of the products' life cycles.

- (3) Life cycle costing **increases the visibility of costs** such as those associated with research, design, development and customer service, costs which traditionally are simply totalled and recorded as a period expense. Moby's research and development costs are likely to be particularly high and must be recovered quickly.
- (4) It also **enables individual product profitability to be more fully understood** as all costs are attributed to products. This would provide Moby with **more accurate feedback information on** its success or failure in developing new products, which is vital in its operating



environment, in which the ability to produce new and updated versions of its products is of vital importance to its survival.

### **Disadvantages of life cycle costing**

If product life cycles become too short, it may not be realistic for Moby to install a cost tracking system that **produces reports too late** for remedial action. Too much time might be spent on producing product budgets than merited by the potential benefits. If this is the case, Moby would be advised to rely on a range of non-financial indicators to help with monitoring and control of costs.

**(b)**

**Six Sigma** is a method for improving quality by removing defects and their causes in business processes. Six Sigma is normally executed by people known as Green Belts (part time), Black Belts (full time) and Master Black Belts (full time trainers and coaches).

Six Sigma is all about reducing the variation of a process. It requires an understanding of the relationship between input variables (Xs) and the dependent output variable (Y). The more standard deviations between the mean of the distribution of the results of a process and the specification limits (as imposed by the customer), the more capable is the process. A Six Sigma process means that 6 standard deviations fit on each side of the mean, between the mean and the specification limits. 6 Sigma equates in percentage terms to 99.9997% accuracy or to 3.4 defects per million opportunities to make a defect.

Which Sigma Level to strive for is dependent upon market conditions, competitors' performance and customer expectations. A good example is the airline industry, where it would be inconceivable that only 99% of flights landed safely. In contrast, most airline baggage handling processes are generally performing at 3 Sigma (93% accuracy).

Six Sigma has evolved into a powerful business philosophy and an instrument for driving cultural change. As is the case with Lean, Six Sigma also relies on the application and deployment of best management practice in a structured manner.

A common tool used in Six Sigma is **DMAIC** (explained below).

- **Define** the customer requirements that are Critical to Quality (CTQ) and map the process at a high level.
- Establish a valid **M**asurement system, collect the data and describe the distribution of the process data.
- **Analyse**. Determine the process capability and identify and validate root causes of variation using statistical tools.
- **Improve**. Develop and implement solutions.
- **Control**. Establish ongoing process controls to avoid the problem recurring by implementing control charts, assigning clear process ownership and documenting the improved workflow.

## Question 5

### Tutorial help and key points

A typical kind of exam question looking at what performance measures are important to different areas of the business. You must talk about why they would be important to a particular person.

### Marking Guide

(a)	1 mark for each focus measure	<b>Max 12</b>
(b)	1 mark for each relevant discussion	<b>Max 8</b>
		<b>Max = 20</b>

(a)

### Criteria and performance measures for each director

#### Research and development (R&D) director

The R&D director needs performance measures that must be able to measure how well products and services emerge that meet with new and current customers' approval. One measure may be the number of new products developed in a year. Another measure can be sales revenue from new services over a year. A third measure may look at individual innovations and how well they have performed in terms of sales.

#### Finance director (FD)

Investors are generally looking for earnings, growth in earnings, dividends and risk. This can be measured using financial performance measures that report capital growth or income generation.

**Residual income** or **RI** deducts a notional interest cost from a centre's profits to reflect the finance cost of funding. However, it is difficult to use to make comparisons between centres!

A common performance measure used is **ROCE**, which indicates how **productive the capital in the business is**. However ROCE does not necessarily take a **long-term view** as asset values can be manipulated to improve the ratio at the expense of future investment.

**NPV** is a measure that looks at the **long-term profitability of projects** measured by their cash flow and achieving a hurdle rate of return. This hurdle rate is a measure of the opportunity cost of the funds invested in the project. This shares a long-term perspective with the dividend model of valuation whereby the market value of a share is based on the income stream from future dividends.

Finally, **EVA** is a measure using economic profit that is current values by adjusting accounting profits for non-cash flow items and deducting a capital charge so it aims

to avoid understating asset values which is problem with ROCE and RI. EVA is more likely to develop goal congruence than ROCE where decisions are being made to acquire or sell assets. It is claimed that **EVA focuses on real wealth** thus satisfying shareholders. However it has a relatively short-term focus on performance, compared to measures such as NPV.

### **Human resources director (HR)**

**Measures** here need to **reflect the organisation's reputation with current and future staff**. These measures should be made against targets or prior period levels.

A typical performance measure may be **absenteeism**. Another measure can be the **number of applications** for each job vacancy. A final measure is **staff turnover**.

### **Corporate affairs (CA) director**

Measures need to indicate whether the organisation's reputation as socially responsible is founded. CSG could **measure** this by **chemical waste produced** in tonnes or by the cost of disposal.

Another measure could be **charitable donations made** to community and international charities. Finally CSG could monitor the **number of complaints received** concerning its business practices.

### **(b)**

#### **How growth is assessed and the advantages and issues of pursuing a growth objective**

Growth can be assessed across several areas.

#### **Revenue**

In the long term, growth in revenue is only valuable to investors if it means growth in profits. This requires control of cost.

#### **Profitability**

Profitability can be assessed using a range of financial measures such as margin or EBITDA. Growing profitability is more useful if it is related to the level of investment. So think about using measures such as ROCE or residual income, which relate performance to the underlying investment made. Comparisons of growth need to be made over time or with other measures. They are also useful if compared against other companies or industries.

#### **Return on investment**

A growing return on investment suggests that capital is being used more productively. Investors would use dividend payouts and capital growth to measure the return on investment.

#### **Market share**

Growth in market share is generally seen as a good thing as it can generate economies of scale.

### **Employee-based measures**

Shareholders are interested in productivity and profit per employee as measures. An increasing head count indicates success if people are needed to deliver a service but only if they are employed productively.

### **Number of products or services**

Growth in the number of products or services offered is only useful if these are **profitable**.

### **Cash flow**

This is one of the most important measures of growth as it determines how much the business has to invest.

### **Issues**

**Achieving growth of the business ultimately depends on making profits and having the resources available to fund that growth.** A business that does not strive for growth will stand still and is likely to fall behind its competitors who do pursue growth.

### **Advantages**

**Growth is allied to the long-term survival of the organisation.** A growing and profitable business can protect itself against environmental threats such as competition or unstable economic conditions. CSG operates in an economic environment that is prone to significant variations. So CSG would wish to go for growth to protect its position. However, a growing and profitable business may also become a desirable target for a takeover bid.