



Management Level Paper

## P2 – Performance Management September 2014 examination

### Examiner's Answers

Note: *Some of the answers that follow are fuller and more comprehensive than would be expected from a well-prepared candidate. They have been written in this way to aid teaching, study and revision for tutors and candidates alike.*

These Examiner's answers should be reviewed alongside the question paper for this examination which is now available on the CIMA website at [www.cimaglobal.com/p2papers](http://www.cimaglobal.com/p2papers)

The Post Exam Guide for this examination, which includes the marking guide for each question, will be published on the CIMA website by early October at [www.cimaglobal.com/P2PEGS](http://www.cimaglobal.com/P2PEGS)

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### SECTION A

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#### Answer to Question One

##### Rationale

The question examines candidates' knowledge, understanding and application of linear programming.

The learning outcomes tested are:

Part (a) A2(b), *interpret variable/fixed cost analysis in multiple product contexts to break-even analysis and product mix decision making, including circumstances where there are multiple constraints and linear programming methods are needed to identify 'optimal' solutions.*

Part (b) A2(c), *discuss the meaning of 'optimal' solutions and how linear programming methods can be employed for profit maximising, revenue maximising and satisfying objectives.*

### Suggested Approach

Candidates needed to carefully read the question and use the information to relate their answers to the scenario. In part (a) candidates were required to interpret the graph given to find the optimal solution given the slope of the iso-profit line. Candidates then needed to use the formulae for the two lines that intersect at the optimal point and determine using simultaneous equations the production plan.

In part (b) candidates were required to apply their knowledge of graphical solutions to determine the impact of a change of selling price for Product X.

(a)

The optimal solution can be found using the iso-contribution line at point C of the feasible region, at the intersection of the 'Labour' and 'Material A' resource constraint lines.

Material A:  $5x + 2y = 10,150$  -- equation 1

Labour:  $3x + 4y = 8,400$  -- equation 2

Multiply equation 1 by 2 to give equation 3

$$10x + 4y = 20,300 \text{ -- equation 3}$$

Equation 3 minus equation 2 gives:

$$7x = 11,900$$

$$x = 1,700$$

Substitute into equation 2.

$$5,100 + 4y = 8,400$$

$$4y = 3,300$$

$$y = 825$$

$$\text{Contribution} = 62x + 36y$$

$$\text{Contribution } \$135,100$$

$$\text{Fixed costs } (\$70,000)$$

$$\text{Profit } \$65,100$$

(b)

If the optimum moved to Point B the gradient of the iso-contribution line would be the same as that of the labour constraint line.

The gradient of the labour constraint line is given by  $3x$  and  $4y$ . Therefore if the contribution from Y is \$36 the contribution from X would have to be \$27 for the contributions to be in the ratio  $3X:4Y$ .

The current contribution from X is \$62 per unit and therefore the minimum change in the selling price of Product X needed to move the optimum plan to Point B is a decrease of \$35 per unit.

**Note:** an alternative method of calculating the answer is to calculate the production plan at Point B (640 X and 1620 Y) and equating the contribution from that plan with what would be earned at Point C (keeping the selling price of Y constant).

## Answer to Question Two

### Rationale

The question examines candidates' knowledge and understanding of flexible budgets and the learning curve.

The learning outcomes tested are:

Part (a) C2(c), *evaluate performance using fixed and flexible budget reports.*

Part (b) B1(e), *apply learning curves to estimate time and cost for new products and services.*

### Suggested Approach

Candidates needed to carefully read the question and use the information to relate their answers to the scenario. In part (a) candidates needed to calculate the time required to produce 256 units before using this information to prepare a flexible budget and revised performance report. In the second part of the question candidates then needed to calculate labour efficiency planning variance.

In part (b) candidates needed to ascertain that direct the labour cost was \$4,000 and the labour time of 160 hours before then working out an average time per unit. This figure should then be used to find the eighth root of the proportion that the average labour time per unit for 256 units is compared to that for the first unit.

(a)

(i)

#### Performance report for the first month of production

	Original budget	Revised budget	Actual	Variance
Production volume (units)	300	256	256	44 A
	\$	\$	\$	\$
Direct material cost	11,400	9,728	10,500	772 A
Direct labour cost	15,000	5,510	4,000	1,510 F
Variable overhead cost	6,000	2,204	1,750	454 F
Fixed costs	<u>125,000</u>	<u>125,000</u>	<u>115,000</u>	<u>10,000 F</u>
Total	<u>157,400</u>	<u>142,442</u>	<u>131,250</u>	<u>11,192 F</u>

Budgeted production time was expected to take:

$$y = ax^b$$

$$a = 2$$

$$x = 256$$

$$b = -0.152$$

Average time for first 256 units = 0.861 hours

Total time for 256 units = 220.416 hours

(ii)

256 units x 2 hours (original standard) 512 hours

256 units at the revised standard 220.416 hours

291.584 hours

Standard labour cost per hour		\$25
Labour efficiency planning variance		\$7,290 favourable

(b)

Actual direct labour cost	\$4,000	
Actual direct labour time	160 hours	(divide by \$25 per hour)
Average time for 256 units	0.625	(divide by 256)
% of original average	31.25	
Learning rate	86.5%	Take the eighth root of .3125

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### Answer to Question Three

#### Rationale

The question examines candidates' knowledge and understanding of cost of quality reports. The learning outcomes tested is B1(d), *prepare cost of quality reports*.

#### Suggested Approach

Candidates needed to carefully read the question and use the information to relate their answers to the scenario. In part (a) candidates needed to calculate the quality cost impact of the various issues detailed in the scenario and then prepare a cost of quality report allocating the calculated costs under the appropriate headings.

In part (b) candidates were required to explain the role of the cost of quality report in developing a TQM culture at JMM. Candidates needed to explain the specific ways in which the cost of quality report could be used to support a TQM culture.

(a)

#### Cost of Quality Report

	Volume	Rate	Cost
	_____	\$	\$
<b>Prevention costs</b>			
Supplier review			<u>60,000</u>
<b>Appraisal costs</b>			
Equipment testing	400	30	<u>12,000</u>
<b>Internal failure costs</b>			
Down time			375,000
Manufacturing rework	800	380	<u>304,000</u>
Total internal failure costs			<u>679,000</u>
<b>External failure costs</b>			
Customer support	500	58	29,000
Warranty repair	650	2,600	<u>1,690,000</u>
Total external failure costs			<u>1,719,000</u>
<b>Total quality costs</b>			<u><u>2,470,000</u></u>

(b)

A Total Quality Management (TQM) culture is one where all departments and staff are committed to a process of continuous improvement. The aim is to achieve a zero defect position where products are delivered on a consistently high quality basis and the focus of the organisation is on improving processes to attain this state.

The reporting of quality costs highlights the cost of quality activities at JMM. Highlighting quality activities and reporting on money spent on quality failures goes to reinforce the TQM ethos. The cost of quality report can also clearly display the relationship between conformance costs (prevention and appraisal costs) and non-conformance costs (internal failure and external failure costs) and the drivers of a reduction in the overall spending on quality. JMM has a significantly higher spend on non-conformance costs than conformance costs. JMM should increase prevention and detection activities in order to try and reduce the spend on non-conformance costs. High levels of non-conformance costs also carry the risk of damaging the reputation of JMM and could seriously impact the future viability of the company as a high quality car manufacturer. This emphasis and measurement of quality costs will ensure staff are focussed on appropriate indicators to embed the TQM culture.

In order for TQM to be successful, all staff at JMM must be engaged in the improvement process and share in the continuous improvement ethos. As displayed by the disparity between conformance costs and non-conformance costs, JMM is not a TQM company at present. In order to establish a reputation as a high quality car manufacturer JMM must ensure staff are focussed on quality and attitudes changed toward the importance of conformance activities. A cost of quality report communicates this vision to all staff and places the focus on quality. The cost of quality report is therefore a vehicle for communicating and facilitating the change in the corporate culture.

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## Answer to Question Four

### Rationale

The question examines candidates' knowledge and understanding of the non-financial perspectives of the balanced scorecard.

The learning outcome tested is:

C3(b), *discuss the role of non-financial performance indicators.*

### Suggested Approach

Candidates needed to read the question carefully and understand the context in which this question is set. In part (a) candidates needed to provide a reasoned explanation of the shortcomings of using financial performance indicators alone to assess the performance of an organisation.

In part (b) suitable performance measures were required for each of two perspectives. Candidates needed to ensure their chosen measure was aligned to the objectives of the organisation and explain their choices of measure.

#### (a)

Financial performance indicators are 'lag' indicators. The financial impact, in terms of sales revenue or profitability, of a decision taken at an organisation will be reported some time after that decision has been made.

Many financial performance indicators provide little insight into the business as they could be said to be the product of decisions made and actions taken possibly long before the period in which they are reported and/or considered. They provide very little linkage to the strategy of the business and may invoke 'short termism' and overlook motivation, quality, efficiency and other drivers of success.

Financial performance indicators are vulnerable to manipulation and to the choice of accounting policies (such as depreciation and inventory valuation).

#### (b)

Customer perspective: The primary purpose of the training courses that TSH provides is to help students pass their examination papers. Student examination pass rate is a key measure that will attract and retain students. Students passing exams will result in those students continuing their professional education with that college. Students passing exams will also generate advocates for that college as successful students tell their friends and colleagues about their experience. This in turn will attract further students to the college, thus delivering on TSH's stated strategic objective.

Learning and growth perspective: The success of new innovations in teaching and learning at TSH is a determinant of student satisfaction and exam success. If students are finding these new learning resources valuable this will likely lead to an increase in the effectiveness of the learning delivery at TSH and in turn the students' satisfaction with their experience. A measure to assess the success of the new innovations introduced by TSH is the number of times a student has logged in to their account and used the software provided.

Note: measures from two perspectives were required. Answers did not have to be from the perspectives used above.

## Answer to Question Five

### Rationale

The question examines candidates' knowledge, understanding and application of target costing and the value chain.

The learning outcomes tested are:

Part (a) B1(h), *explain how target costs can be derived from target prices and the relationship between target costs and standard costs.*

Part (b) B1(j), *discuss the concept of the value chain and the management of contribution/profit generated throughout the chain.*

### Suggested Approach

Candidates needed to carefully read the question and use the information to relate their answers to the scenario. In part (a) candidates needed to calculate a target cost and then work through the information in the scenario to produce a forecast cost before calculating the cost gap.

In part (b) candidates were required to discuss how PBB could reduce costs in three primary activities in its value chain. Candidates were required to provide specific examples directly related to the scenario of how costs could be reduced. A discussion was required of the primary activity in the value chain where cost savings could be made, along with the related cost saving initiative.

(a)

	\$	
Sales price	25.00	
25% profit margin	<u>6.25</u>	
Target cost	18.75	
	\$	Working
Component A	2.15	
Component B	1.75	
Materials	2.50	1
Labour (0.4 hours at \$15 per hour)	6.00	
Production overhead cost	1.89	
Distribution and sales cost	2.38	
Royalty fee	<u>3.75</u>	2
Forecast cost	<u>20.42</u>	
Cost gap	<u><u>1.67</u></u>	

#### Workings

1.  $0.6\text{kg} \times \$4 \text{ per kg} = \$2.40$   
 $\$2.40 \times (1/0.96) = \$2.50$

2.  $\$25 \times 0.15 = \$3.75$

(b)

#### Inbound logistics

The receipt and storage of components and materials from suppliers are Inbound Logistics activities in PBB's value chain. PBB currently purchases components and materials from a number of suppliers and stores these in a raw materials store. Switching to a just-in-time (JIT) system of purchasing could potentially save significant storage costs. The JIT supplier must take the responsibility for the quality of products supplied, This could also potentially provide a source of savings as substandard items are removed. However, this should be contrasted with the premium PBB may expect to pay to a supplier that is willing to establish the close relationship required for JIT purchasing to work.

#### Outbound logistics

Scheduled deliveries of toys to retail outlets are outbound logistics activities at PBB. The scheduled transportation of toys each week is potentially an inefficient method of providing products to retail outlets. The scheduled deliveries do not take into consideration toy requirements at retail outlets thus PBB is potentially delivering to retail outlets that do not require toys and incurring excessive transportation costs. An ERP system is likely to deliver longer term efficiencies at PBB.

#### Marketing and sales

At PBB, this includes the sale of Toy Z through its network of retail outlets. Cost could potentially be reduced by offering the toy for sale via the PBB website. As well as cost savings this could potentially deliver higher revenues. The internet sales channel could potentially attract international customers to the merchandise from the international hit children's film.

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## SECTION B

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### Answer to Question Six

#### Rationale

The question examines candidates' knowledge, understanding and application of pricing based on profit maximisation in imperfect markets and feedforward control and feedback control.

The learning outcomes tested are:

Part (a): A3(a) *apply an approach to pricing based on profit maximisation in imperfect markets.*

Part (b): A2(d), *analyse the impact of uncertainty and risk on decision models based on CVP analysis.*

Part (c): C1(a), *explain the concepts of feedback and feed-forward control and their application in the use of budgets for planning and control.*

#### Suggested Approach

Candidates needed to carefully read the question and use the information to relate their answers to the scenario. In part (a) candidates were required to apply their knowledge of the profit maximisation model in order to calculate the maximum total profit possible given changes to the variable costs and fixed costs. Candidates needed to identify the variable cost of a four person Premium Family Ticket, i.e. 4 x \$11.50, to correctly calculate the contribution-maximising ticket price. The maximum possible contribution and the relevant fixed cost should then be compared to the current contribution to determine if the machine should be hired or not.

In part (b) candidates were required to discuss the sensitivity of their recommendation in part (a) to a change in the number of Standard Tickets sold per day. Candidates were required to calculate the sensitivity and discuss the implications of the result for PPP. The discussion element of the requirement needed to be specific to PPP.

In part (c) candidates were required to compare and contrast the use of feedforward control and feedback control in relation to the budgetary process of PPP.

(a)

Calculation of current profit

Ticket type	Pre-booked	Standard	Premium Family
Persons per ticket	1	1	4
Price per ticket \$	29	39	185
Number of tickets	1,500	8,000	675
Days in the month	30	30	30
Revenue \$	1,305,000	9,360,000	3,746,250
Variable costs \$	562,500	3,000,000	1,012,500
Contribution \$	742,500	6,360,000	2,733,750

	\$
Total contribution	9,836,250
Fixed costs	<u>(6,500,000)</u>
<b>Total profit</b>	<b><u>3,336,250</u></b>

If equipment is hired:

Variable cost	\$12.50 x 0.92 = \$11.50 per person
Fixed costs	\$6,500,000 + \$250,000 = \$6,750,000

				$p = a - bx$	
MR =	$a - 2bx$				
MC =	46.00	$(11.50 \times 4)$		p =	185
				x =	675
X =	685.00				
				Change in p	5.00
P =	183.00			Change in x	25
				Therefore	
				b =	0.2
				a =	320

	Pre-booked	Standard	Premium Family
Persons per ticket	1	1	4
Price per ticket \$	29	39	183
Number of tickets	1,500	8,000	685
Days in the month	30	30	30
Revenue \$	1,305,000	9,360,000	3,760,650
Variable costs \$	517,500	2,760,000	945,300
Contribution \$	787,500	6,600,000	2,815,350
	\$		
Total contribution	10,202,850		
Fixed costs	(6,750,000)		
<b>Total profit</b>	<b>3,452,850</b>		

Profit is expected to increase by \$116,600.

Alternative method:

Original contribution from Premium Family Tickets	\$ 2,733,750
Revised contribution from Premium Family Tickets	<u>2,815,350</u>
Increased contribution from Premium Family Tickets	81,600
Reduced variable costs on other tickets 3,562,500 x 8%	285,000
Hire fee	<u>-250,000</u>
Net benefit	116,600

(b)

Change in profit required	\$116,600
Contribution per Standard ticket (\$39 - \$11.50)	\$27.50
Number of Standard tickets (\$116,600 / \$27.50)	4,240
Reduction in tickets per day (4,240 / 30)	141.33
Sensitivity (141.33/8,000)	1.8%

Sales of Standard Tickets would have to fall by 1.8% for each day of the month for the decision to hire the equipment to change. The management of PPP expected to sell 8,000

Standard Tickets per day before the competitor's action; a reduction of only 1.8% is probable. Unexpected changes in the weather along with many other factors could potentially cause a drop in sales of tickets. The management of PPP should also consider the assumptions that the demand forecasts are based on and the impact on the customer experience of hiring the machine before taking the decision.

(c)

Feedback control involves the comparison of actual results against an expected position. Where there is difference between the actual and expected position the variance is investigated. The information provided by the feedback control enables further action to be taken and therefore a modification in subsequent periods to achieve the required results.

At PPP, the comparison of actual results against the budget set at the start of the year is an example of feedback control. Feedback is reactionary and is based on historical data.

Feedforward control uses a latest forecast of results to compare to a required position. The latest expectation is usually generated in the light of information that was not available at the time the original plan was set. This differs from feedback control because the latest forecast is an estimation of future results and its aim is to proactively anticipate any issues.

The comparison of the latest forecast position with the required position is an example of feedforward control at PPP. The latest demand information is based on different assumptions than those used in the original plan and as such PPP will pre-empt the impact of these changes by assessing variances between the forecast and the required position.

Feedback control compares an actual position to a plan and bases the change to future actions on the information underlying the difference. However, the reasons for the differences experienced in the past may not be a determinant for future results. Feedforward control compares a latest forecast to a required position. This differs from feedback in that the latest forecast comparator can be a changing position rather than the static actual or budget. However, in order for the latest assumptions incorporated into the forecast to be valid they should be continually updated to ensure the integrity of the feedforward control.

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## Answer to Question Seven

### Rationale

The question examines candidates' knowledge, understanding and application of alternative measures of performance for responsibility centres in the context of a professional services organisation, and international transfer pricing.

The learning outcomes tested are:

Part (a) and (b): D2(b), *discuss revenue and cost information in appropriate formats for profit and investment centre managers, taking due account of cost variability, attributable costs, controllable costs and identification of appropriate measures of profit centre 'contribution'*;

Part (c): D2(c), *discuss alternative measures of performance for responsibility centres.*

Part (d): D3(d), *discuss in principle the potential tax and currency management consequences of international transfer pricing policy.*

### Suggested Approach

Candidates needed to carefully read the question and use the information to relate their answers to the scenario. In part (a) candidates were required to calculate the ROCE and RI for Division M for two years. Candidates needed to produce forecast figures for the second year.

In part (b) candidates needed to apply their knowledge of Return on Investment (ROI) and Residual Income (RI) metrics to perform calculations based on revised figures as a result of a capital investment opportunity.

In part (c) candidates needed to apply their knowledge of capital investment decisions and the possible conflict with performance measures. Candidates needed to be aware of the behavioural consequences of using ROCE and RI to assess performance.

In part (d) candidates were required to apply their knowledge of international transfer pricing and the methods of pricing acceptable to taxation authorities.

(a)

#### 2014

$$\text{ROCE} = 2,030 / 3,200 = 63.4\%$$

$$\text{RI} = 2,030,000 - (3,200,000 \times 5\%) = \$1,870,000$$

#### 2015

	\$'000	
Gross profit	5,380	
Other operating costs	3,190	3,350-(4,000 x 20%)+(3,200 x 20%)
Operating profit	2,190	
Capital employed	2,560	

$$\text{ROCE} = 2,190/2,560 = 85.5\%$$

$$\text{RI} = 2,190 - (2,560 \times 5\%) = \$2,062,000$$

(b)

If Division M were to undertake the project, the incremental impact would be:

	\$'000	
Revenue	750	
Costs	625	225 + (2,000 x 20%)
Operating profit	125	
Capital employed	1,600	2,000 – (2,000 x 20%)

This would result in the following calculations for the performance metrics for 2015:

$$\text{ROCE} = (2,190 + 125) / (2,560 + 1,600) = 55.6\%$$

$$\text{RI} = 2,315 - (4,160 \times 5\%) = \$2,107,000$$

(c)

Assessing performance on ROCE alone could potentially lead to dysfunctional decisions being taken by divisional managers. Division M would continue to increase its ROCE in 2015 had the investment not been made. This is due to Division M generating the same level of profit as in 2014 but from a lower asset base (the asset base will have had a further year of depreciation). RI offers no further insight in this case. As with ROCE, it suggests that Division M has improved its performance in 2015.

By undertaking the new project, Division M will earn an additional \$45,000 of residual income signalling the value of the expansion to Division M and MNP. Conversely, the ROCE falls from 63.4% in 2014 to 55.6% in 2015 when the expansion project is included in the forecast results. In this specific example, RI would motivate the Divisional manager to undertake the project but this might not always be the case.

RI is an absolute measure and therefore does not facilitate comparison of the performance of the separate divisions by MNP. RI and ROCE both suffer from using historical accounting figures. The use of historic financial information is unlikely to enlighten MNP as to the underlying drivers of performance and it would be useful to include a range of non-financial performance indicators as lead indicators of future financial performance.

Capital investment opportunities should be appraised using Net Present Value. The NPV of the project is calculated as:

	\$
Annual cash inflow	750,000
Annual cash outflow	<u>225,000</u>
Net annual cash inflow	525,000
5 year annuity factor @ 5%	4.329
Present value of cash inflows	2,272,725
Capital investment	<u>2,000,000</u>
Net present value	<u>272,725</u>

The net present value of the project is positive and therefore the project should be undertaken. The impact of the project on a division's ROCE or RI should not be part of the decision criteria.

(d)

International transfer prices should be based on the “arm’s length” price principle. An arm’s length price is one that would have been arrived at by two unrelated companies acting independently. There are three methods that the tax authorities would accept:

1. The comparable uncontrolled price method (which uses externally verified prices of similar transactions involving unrelated companies)
2. The resale price method (which deducts a percentage from the selling price of the final product to allow for profit) can be used when goods are ‘sold on’ with little further processing
3. The cost-plus method: an arm’s length gross margin is established and is applied to the seller’s manufacturing cost.

Guidelines state that whenever possible the comparable uncontrolled price method should be used and if there is no market price, preference should be given to cost-plus.

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