ACCOUNTING FOR DECISION MAKING

Diploma stage examination

5 December 2007

MARKING SCHEME

AT THE HEART OF YOUR CAREER

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Question 1

Syllabus A2, A4 and C1 Study Units 2,3,4,7 and 14

(a) Produce an investment appraisal to show the net present value of the two options proposed. Comment upon your result and recommend what action should be taken by the University.

The two options are: Option 1 – use of pool cars; Option 2 – use of minibuses.
Both options involve the introduction of new mileage rates.

Calculation of savings

Journey	Distance	No of journeys	Mileage	Cost £
Univ. College-Meadows	6	2,600	15,600	3,900
Univ. College-Manor House	10	4,200	42,000	10,500
Meadows-Manor House	12	12,000	144,000	36,000
Meadows-Univ. College	1	3,200	19,200	4,800
Manor House-Univ. College	10	4,800	48,000	12,000
Manor House-Meadows	12	11,000	132,000	3,000
TOTAL			400,800	100,200

Option 1 will save 60% of mileage – 240,480 miles at a cost of £60,120 *1*

Option 2 will save 80% of mileage – 320,640 miles at a cost of £80,160 *1*

The remaining miles will be charged at the reduced rate of 15p a saving of 10p per mile.
Option 1 saves 400,800 – 240,480 = 160,320 miles = £16,032
Option 2 saves 400,800 – 320,640 = 80,160 miles = £8,016 *1*

Option 1 – use of pool cars

	0 £	1 £	2 £	3 £
Savings				
Mileage		(60,120)	(60,120)	(60,120)
Rate reduction		(16,032)	(16,032)	(16,032)
		(76,152)	(76,152)	(76,152)
Costs				
One off payt.	84,000			
Lease	16,500	16,500	16,500	
Fuel		18,000	18,000	18,000
Servicing		1,500	1,500	1,500
Tax and insurance		1,800	1,800	1,800
Administration		4,000	4,000	4,000
	100,500	41,800	41,800	25,300
Net cash flow	100,500	(34,352)	(34,352)	(50,852)
PV factor	1.0000	0.9662	0.9335	0.9019
Present value	100,500	(33,1890)	(32,068)	(45,863)

Net present value of Option 1 = **(£10,612)** *3*

Option 2 – use of minibuses

	0	1	2	3	4	5
	£	£	£	£	£	£
Savings						
Mileage		(80,160)	(80,160)	(80,160)	(80,160)	(80,160)
Rate reduction		(8,016)	(8,016)	(8,016)	(8,016)	(8,016)
		(88,176)	(88,176)	(88,176)	(88,176)	(88,176)
Costs						
One off payt.	84,000					
Lease	12,600	12,600	12,600	12,600	12,600	
Fuel		24,048	24,048	24,048	24,048	24,048
Servicing		1,000	1,000	1,000	1,000	1,000
Tax and insurance		2,000	2,000	2,000	2,000	2,000
Staff		21,000	21,000	21,000	21,000	21,000
Administration		2,000	2,000	2,000	2,000	2,000
	96,600	62,648	62,648	62,648	62,648	50,048
Net cash flow	96,600	(25,528)	(25,528)	(25,528)	(25,528)	(38,128)
PV factor	1.0000	0.9662	0.9335	0.9019	0.8714	0.8420
Present value	96,600	24,665	23,830	23,024	22,245	32,104

Net present value of Option 2 = **(£29,268)** *3*

This analysis shows that each of the options has a positive NPV and that Option 2 has a higher NPV than Option 1. However, the analysis covers different time periods for each option. In this case the Equivalent Annual Annuity or Cost (EAA or EAC) should be calculated.

EAA Option 1 = 10,621/2.8016 = £3,791
EAA Option 2 = 29,268/4.5150 = £6,482 *2*

This confirms that Option 2 is the preferable option. The recommendation is that the university goes ahead with this option. *1*

(12)

(b) Identify and discuss the main areas of uncertainty in the data used in your calculations and suggest how you might take that uncertainty into account. Discuss how you would test the sensitivity and the certainty of your calculations. Produce calculations to illustrate two possible approaches, and comment upon your results.

There is uncertainty regarding some of the data used in the NPV calculation. The main areas of uncertainty relate to:

- The number of journeys being taken at the moment. This is because the information is taken from a sample which has an estimated 95% accuracy.
- Reaction of staff to the proposals – in particular the number who would participate in the buy out scheme and the reductions in mileage claims of 60% and 80% as a result of the schemes being introduced.
- There may be other uncertainties but they would lie within the normal variations due to cost estimation.

1 mark for each area identified, plus 1 mark for discussion up to an overall maximum of 4

The first area identified does have a probability assigned to it and this could be used as a basis for recognising the extent of the uncertainty in the calculations. The other areas have no specific quantification attached to them, but clearly there is some risk in accepting the reduction in mileage claims figures.

There are a number of ways that uncertainty could be taken into account. The use of a certainty equivalent might be considered in this case. This could be done by weighting the savings figures which are based upon the sample by 0.95. This would allow for a more conservative view to be taken.

2 marks for discussion of certainty equivalents

The other main approach that could be taken is to use sensitivity analysis. This would involve testing some of the key assumptions which are made about the data used in the calculation to see whether changes in those assumptions would have an impact upon the overall result. The main areas here which could be tested would be

- The assumptions on number of journeys (as above).
- Assumptions on reductions in mileage.
- Assumptions on take up of reduced rate/buy out scheme.

This would involve varying the figures used to test the effect on the overall NPVs calculated. For example, the reduction in mileage figure could be varied from 60% (Option 1) to a range between 50-70%. The NPV would be recalculated accordingly. Alternatively, the calculation could be set upon a spreadsheet and tested to see how far the variable would have to change in order to reduce the NPV to a zero figure.

Up to 4 marks for discussion of use of sensitivity analysis

Calculations

Certainty equivalents allow for adjustment to risk. In this case the data used to calculate the number and extent of journeys made on inter-site travel was based upon a sample of travel and subsistence claims. It is judged to have 95% accuracy. Certainty equivalents could be used to reduce the risk involved with these figures.

Estimated mileage is 400,800. Using a certainty equivalent of 0.95 this figure would be 380,760.

Savings would be 60% of 380,760 = 228,456 = £57,114 (option 1)
And 80% of 380,760 = 304,608 = £76,152 (option 2)

Rate reduction effect would be
380,760 – 228,456 = 152,304 =£15,230 (option 1)
380,760 – 304,608 = 76,152 = £7,615 (option 2)

Annual savings for option 1 would reduce by 76,152 – (57,114 + 15,230) = 76,152 – 72,344 = £3,808
Annual savings for option 2 would reduce by 88,176 – (76,152 + 7,615) = 88,176 – 83,767 = £4,409 *1*

Nb these calculations can also be produced more directly by simply calculating 95% of the savings.

Option 1 over 3 years – PV of annuity of £3,808 = 3,808 x 2.8016 = £10,668
Revised NPV = 12,698 – 10,668 = £2,030 *1*

Option 2 over 5 years – PV of annuity of £4,409 = 4,409 x 4.5151 = £19,907
Revised NPV = 29,269 – 19,907 = £9,363 *1*

EAA option 1 = £2,030/ 2.8016 = £720.59
EAA option 2 = £9,363/ 5.5151 = £1,697.70 *1*

The result remains the same. Both options produce a positive NPV and option 2 is favoured ahead of option 1. *1*

Another approach would be to use sensitivity analysis. This could be done in a number of ways and will need to be marked on merit. The basic approach would be:

- Either to vary the assumptions on the effects of the options on inter-site mileage claims or take up by staff of the buy out scheme. This could involve varying the figures by 5% or 10% + or -.
- Or to calculate the variation needed to reduce the positive NPV to zero.

No calculations are provided here due to the variety of possibilities.

Up to 5 marks are available for a sensitivity analysis but this is subject to an overall maximum of 8 marks for calculations

(18)

(c) Provide an additional briefing note addressing the concerns of the Vice Chair and the student representative.

It is important that this response is in the form of a briefing note. It should address the concerns.

1 mark for use of relevant format

There are two main concerns being expressed and which should be addressed. The briefing note should concentrate upon these issues.

Professor of Economics (also Vice Chair of the Committee)

His concerns are:

- No account taken of non financial factors in the appraisal
- Specific concern that there was to be no consideration of the effect of the proposals on the use of staff time.

1 mark for summarising the issues raised and ensuring that they are addressed

These can be addressed by:

- Reference to university policy that only investments in excess of £500,000 would incorporate the identification and quantification of non financial factors (usually through a WBA).
- Below this level the assumption would be that it would not represent good value for money to spend too many resources on researching non financial factors.
- If this were to be done in this case it might set a precedent which could prove to be costly for the university in the long run.
- The issue of valuing staff time etc is a difficult one and in using techniques such as cost benefit analysis this has often proved to be unhelpful or inaccurate.
- Could suggest that the staff issue should be considered in qualitative terms when this decision is being taken.

1 mark for each valid point up to a maximum of 4

Student representative

Her concerns:

- This is probably split between two issues. The first is the effect that this might have on the Students' Union finances and following on from this, if the Union minibus were to be suspended from service, the impact upon those students needing to move from one site to another. The student also mentions the use of WBA.

1 mark for summarising the issues

These can be addressed by:

- The same point can be made with regard to the use of WBA.
- The financial effect is relatively small. The university could offer to help the Students' Union to bridge the perceived gap and could discuss some alternative arrangements for running the minibus service.
- It is in the interest of both the Union and the university to find a solution to this potential problem.

1 mark for each valid point up to a maximum of 3

Note that this question may produce a range of different responses and points. It should be marked sympathetically with this in mind. Other relevant points should be rewarded.

(10)

(40)

Question 2

Syllabus C2 Study Unit 13

(a) Using the above data analyse the decisions that RCS will need to take. Identify the options available and the implications of each option based upon estimates of cost and risk. Advise RCS on the best course of action to take.

This question can be answered without using a decision tree but it is not advisable. However, if a candidate comes up with the correct answer in terms of options, outcomes and risk assessment they should be given credit. Similarly, the decision tree may be presented in slightly different ways and this variation should be accepted as long as the results are correct.

The basic logic of the diagram is shown over the page. This identifies fifteen optional paths. These are shown below with financial outcomes and probabilities where relevant.

Option	£	%	EV
Other buildings – no bid – HQ – no bid	0	-	
Other buildings – no bid – HQ – bid – win	91,372	60	
Other buildings – no bid – HQ – bid - lose	(35,000)	40	40,832
Other buildings – bid – advanced – lose – HQ – no bid	(25,000)	30	
Other buildings – bid – advanced – lose – HQ – bid - win	66,372	15	
Other buildings - bid – advanced - lose -HQ – bid - lose	(60,000)	15	3,186
Other buildings - bid – advanced – win – HQ – bid –win	150,620	49	
Other buildings - bid – advanced - win – HQ – bid – lose	24,248	21	112,708
Other buildings - bid – advanced - win – HQ – no bid	59,248	70	
Other buildings – bid – similar - win – HQ – no bid	53,186	50	
Other buildings - bid - similar - win – HQ – bid - win	144,558	35	
Other buildings – bid - similar - win – HQ – bid - lose	18,186	15	106,646
Other buildings – bid – similar – lose – HQ – bid – win	81,372	25	
Other buildings – bid –similar – lose - HQ – bid – lose	(45,000)	25	18,186
Other buildings – bid – similar – lose – HQ – no bid	(10,000)	50	

Present values of annual surpluses

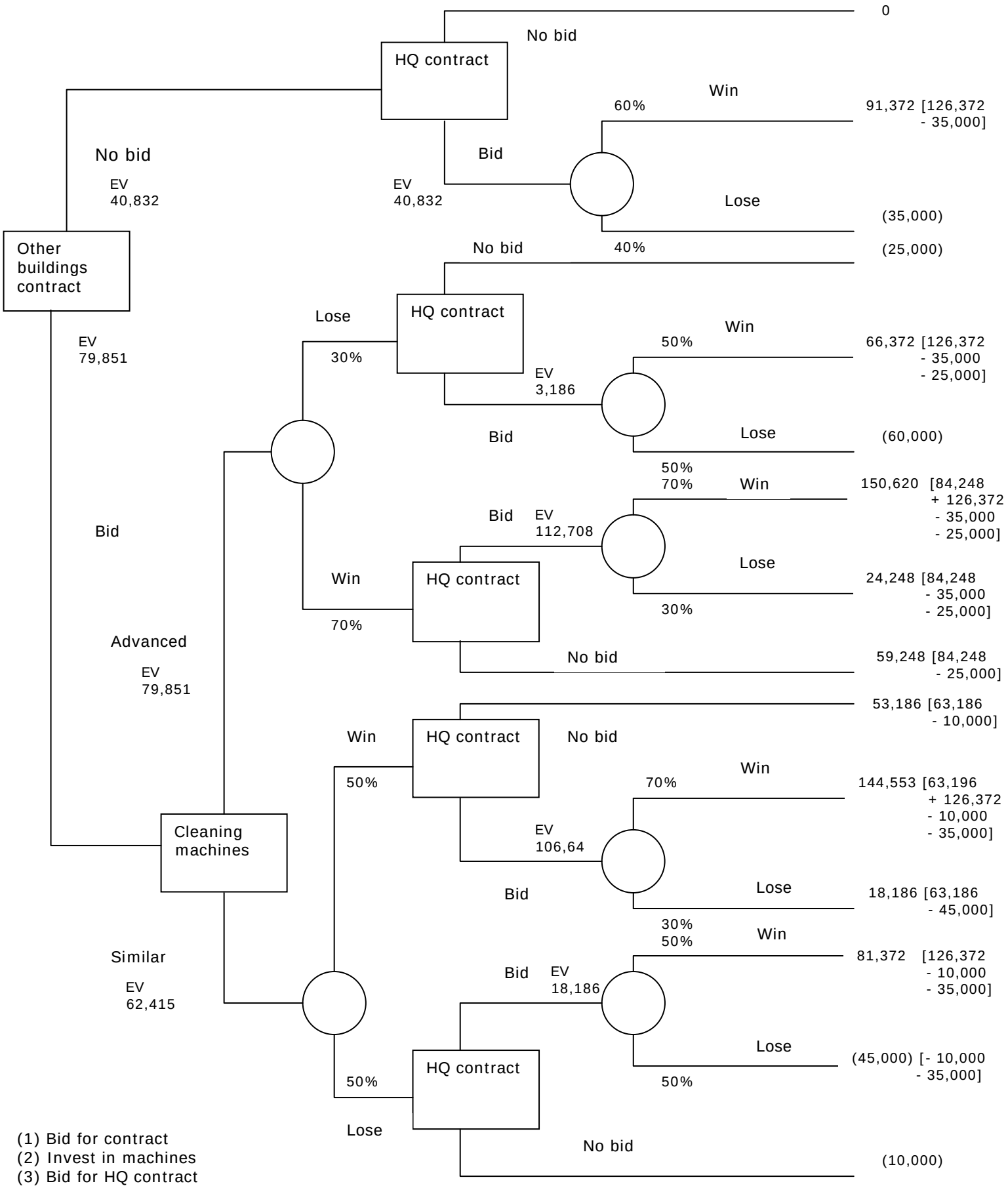
£15,000 over 5 years @ 6% = 15,000 x 4.2124 = £63,186
£20,000 over 5 years @ 6% = 20,000 x 4.2124 = £84,248
£30,000 over 5 years @ 6% = 30,000 x 4.2124 = £126,372

The initial EVs indicate in each case that the HQ contract should be bid for.

The EV of investing in the advanced machines is £79,851
The EV of investing in the similar machines is £62,416

Therefore the EV of bidding for the OB contract is £79,851 compared with an EV of £40,823 if this contact is not bid for.

On this analysis RCS should bid for the initial Other Buildings contract, they should purchase the more advanced machines and they should continue to bid for the HQ contract.



(1) Bid for contract
(2) Invest in machines
(3) Bid for HQ contract

Marks to be awarded as follows –
2 marks for calculation of NPVs of annual surpluses
3 marks for identifying all of the optional paths
4 marks for calculating the financial implications of each of these paths
4 marks for EVs
1 mark for overall conclusion

(14)

(b) Assess the usefulness and validity of your advice, taking into account the strengths and weaknesses of your adopted approach.

This advice must be viewed taking into account the potential strengths and weaknesses of the approach taken.

The advice to follow the chosen path would apply to the risk neutral decision maker. The same advice should be given to reflect other attitudes, as this planned approach could give rise to the highest returns, as well as the lowest.

2 marks for comments on advice

The benefits of using this approach are that
- It identifies all the options available.
- It helps to make sense of complex events.
- It produces expected values as a basis for decision making and also assigns probabilities to alternative courses of action.

On the other hand
- It only produces expected values.
- Analysis is reliant on predictions of probabilities.
- Could give a false validity due to "psychology of numbers".
- May be a need to take other factors into account.
- Probabilities may change as the decision making process proceeds.

Up to 4 marks for strengths and weaknesses

(6)

(20)

Question 3

Syllabus E2 Study Unit 19

(a) Calculate the effects of each of the three options and advise Laserop on the course of action they should take.

The initial bottleneck activity is the surgery.

Option 1
The current contribution being made is 15,000 x (500 – 180) = £4.8m.

If capacity were increased to 18,000 this would increase the contribution by 3,000 x 320 =£960,000

The cost of the option is £240,000. The net benefit of this option would be £960,000 - £240,000 = £720,000 *1*

Option 2
This would have no effect on the current bottleneck activity and would cost £200,000. The increased capacity of 25,000 would match the capacity of the final stage. *1*

Option 3
The contribution on this additional work would be less than the current level, ie it would be (500 – 400) = £100 compared with the current level of £320. However, this would allow for up to 6,000 additional treatments which would generate additional contribution of 6,000 x 100 = £600,000. *1*

Option 1 would be the preferred option as it generates the greater additional contribution. If Option 3 were to be carried out there are two possibilities. The first is that 5,000 extra treatments could be carried out bringing the capacity to 20,000 and matching the capacity of the first stage. This would increase contribution by an additional £500,000. The second possibility is that 6,000 extra treatments could be carried out, but this would mean carrying out Option 2 in order to increase the capacity of the first stage to 25,000.

The new extra treatments would generate additional contribution of 4,000 x 100 = £400,000, but this would be partly offset by the cost of Option 2 which would be £200,000.

In summary the advice to Laserop would be to go with all three of the options. The position would then be that stage 2 would still be the bottleneck activity with a capacity of 24,000 treatments (compared with 25,000 for stages 1 and 3). An additional 9,000 treatments would be carried out (3,000 with a contribution of £320 and 6,000 with a contribution of £100). The benefit of the additional contribution would be netted against the costs of £440,000 (£240,000 + £200,000).

The overall financial benefit would be (320 x 3,000) + (100 x 6,000) – 440,000 = £1,120,000

3 marks for identifying the implications of the three options and for calculating the overall financial effect plus 1 mark for advice to Laserop to an overall of 4

(7)

(b) Outline and describe the process that should be used in the management of bottleneck resources. What are the three key measures used in the theory of constraints?

The process is normally shown as a four step process

- Recognise that the bottleneck resource determines the throughput contribution of the business as a whole.
- Look for and find the bottleneck resource by identifying resources with large quantities of stock awaiting processing.
- Keep the bottleneck activity busy and sub-ordinate all no-bottleneck resources to the bottleneck resource.
- Take action to increase the bottleneck efficiency and capacity with the objective of increasing the throughput contribution less the incremental costs of the actions.

1 mark per step up to a maximum of 3
Alternative descriptions will be rewarded if correct

The three key measures are:

- Throughput contribution – sales minus direct materials costs.
- Investment (stock) – direct materials stock, work-in-progress and finished goods stock, R and D costs and costs of equipment and buildings.
- Operating costs (all operating costs other than direct materials costs to earn throughput contribution).

1 mark per measure up to a maximum of 3

(6)

(c) What are the main limitations of this approach? Illustrate with reference to an organisation familiar to you how this approach can be applied in the public sector.

The main limitations are:

- The approach is short term and decisions may be made which are not right in the longer term.
- Problems with long run management of costs are ignored.
- It does not attempt to identify and manage cost drivers.
- It may be limited in its applicability.

1 mark per point up to a maximum of 3

Candidates need to consider how the approach might be used in a public sector context. Whilst there are a number of reasons (mainly given above) why its use might be problematical, there are areas of activity where it could be used. The approach could be used in the public sector where there are clear outputs which are produced as part of a process. Examples could include the processing of planning applications and benefit claims and the treatment of patients requiring surgical procedures.

Up to 4 marks for discussion but only if relevant examples/illustrations used

(7)

(20)

Question 4

Syllabus D1 and D2 Study Units 15 and 16

(a) Calculate the ROI for each of the divisions and show how the Du Pont method can facilitate comparison between them.

ROI

Division A – Profit/ investment = 20%
Division B – Profit/ investment = 20% *2*

This suggests that each division is performing exactly the same from a financial point of view.

The Du Pont method allows for further analysis as follows:

Division A – Sales/ Investment x Profit/ Sales = 3200/2000 x 400/ 3200
= 1.6 x 12.5% = 20% *1*

Division B – Sales/ Investment x Profit/ Sales = 3000/2500 x 500/ 3000
= 1.2 x 16.7% = 20% *1*

Division B is making a higher return on sales but it is not generating sales from its assets as effectively as Division A. This is as you would expect given the different nature of the two divisions of the business.

1 mark for each relevant comment up to a maximum of 2

(6)

(b) Explain what the balanced scorecard involves and indicate the main arguments for and against its use.

The balanced scorecard originated in the work of Kaplan and Norton in 1992. It is a performance management framework which includes non financial and financial measures within a single report. The original model proposed four distinct but inter-related perspectives (these may be shown in the form of a diagram).

- Financial perspective.
- Customer perspective.
- Internal business perspective.
- Innovation and learning perspective.

The model identifies the major goals relative to the business for each perspective and translates these goals into specific and measurable performance targets. These goals should be derived from the overall mission and objectives of the organisation. (Later work by Kaplan and Norton proposed a different model for the no for profit sector – this is not relevant to this question and should not be given credit.)

Up to 4 marks for a good description of what the balanced scorecard model is and for identifying the four main perspectives

Arguments for and against:

For:
- Allows for a whole view of the organization through combining financial and non financial performance.
- Provides this whole view in the form of a single report.
- Relates targets to organizational objectives and mission.
- Forms basis for effective performance management.

Against:
- Relies upon ability to identify relevant measures.
- Data collection may be difficult and expensive.
- May result in diverting focus from real issues to measurable targets.

1 mark for each point up to a maximum of 4
Other relevant points may be rewarded
Answers should include points for and against
No more than 3 marks for answer which provides only points for or against

(8)

(c) How might the balanced scorecard be used by Cheesyswedes? Should Cheesyswedes adopt this approach?

Answers to this section must relate to the scenario and the specific situation of Cheesyswedes. Generic answers are not acceptable. A good answer would discuss how the company would go about identifying goals and targets relevant to the four perspectives, and how they would identify and collect relevant data.

1 mark for general points relating to the use of the balanced scorecard
plus 1 mark for discussion of each of the four perspectives up to an overall of 5

Candidates should indicate whether they feel the company should adopt this approach. But their answer must be justified by argument. *1*

(6)

(20)

Question 5

Syllabus B3 Study Unit 9

(a) Calculate the price at which the contribution from the voucher scheme would be maximised.

The price at which contribution would be maximized may be calculated in two ways, using either the mathematical pricing model or the tabular (trial and error) method.

Mathematical pricing model

The demand curve is given by:
$P = a – bQ$

At a price of £16 per tonne the demand for vouchers would be 10,500. The price that would reduce demand to zero is 16 + (10,500 ÷ 1,500 x 2) = £30 per tonne. *1*

This gives:
$P = 30 – 2/1500Q$
$P = 30 - 0.000133Q$ *1*

MC is variable cost = 11

$R = P \times Q = 30Q – 0.00133Q^2$ *1*

MR can be determined by differentiating R to give:
$MR = 30 – 0.00266Q$ *1*

Price is optimized where MR = MC

$30 – 0.00266Q = 11$ *1*

Re-arrange to:
$Q = 19 \div 0.00266 = 7143$ *1*

The price which would attract this level of demand is
$P = 30 – (2/1500 \times 7143) = 20.48$ *1*

This would be rounded down to £20 per tonne.

Alternatively, this can be calculated using the tabular method:

Price £	Demand tonnes	Revenue £	Variable cost £	Net contribution £
8	16,500	132,000	181,500	(49,500)
10	15,000	150,000	165,000	(15,000)
12	13,500	162,000	148,500	13,500
14	12,000	168,000	132,000	36,000
16	10,500	168,000	115,500	52,500
18	9,000	162,000	99,000	63,000
20	7,500	150,000	82,500	67,500
22	6,000	132,000	66,000	66,000
24	4,500	108,000	49,500	58,500
26	3,000	78,000	33,000	45,000
28	1,500	42,000	16,500	25,500
30	0	0	0	0

7 marks for correct table in sufficient detail to lead to the same answer as the mathematical model. If the table is not sufficiently precise marks should be withheld and a maximum of 5 marks awarded

(7)

(b) Compare the financial position with that required to meet the Council's recycling targets, and comment upon the situation.

A price of £20 per tonne would generate a contribution of £67,500 but would only create demand for 7,500 tonnes of waste material. This is below the Council's target figure of 9,500 tonnes.

In order to meet the target the price would have to be either £16 or £17. The table shows that £16 would generate a contribution of £52,500 and demand for 10,500 tonnes; and it can be calculated that £17 would produce a demand of 9,750 tonnes leading to contribution of £58,500. £17 would be preferable. This would cost the Council £9,000.

The Council would have to decide on how important the waste targets are and how much they would be willing to forego in income in order to achieve them. They would also have to assess how reliable they feel the forecasts of demand are and whether a price of £16 is more certain to lead them to meeting their targets.

3 marks for calculation and comparison plus 1 mark for comment up to an overall of (4)

(c) What are the strengths and weaknesses of this approach and how appropriate is it to Wittonshire County Council in these circumstances? Describe two alternative approaches which might have been used and comment upon them.

Strengths include:

- Provides an objective answer which indicates price to be changed for maximum financial benefit.
- Takes account of demand as well as revenue and costs.
- Relatively simple to use.

Weaknesses may be:

- Relies upon accuracy of data used to identify the demand curve.
- Assumes price is only or main influence on demand.
- Assumes a linear relationship between demand and price.
- Assumes that financial success is main objective.
- Assumes that costs increase on a linear basis.

1 mark for each relevant strength or weakness up to a maximum of 3 (must include at least one strength and/or one weakness)

Given these strengths and weaknesses the applicability of the approach should be applied to Wittonshire County Council in the scenario outlined. The exercise has taken account of the likely effects of price upon demand for vouchers and data has been collected directly from potential users. The data is reasonably reliable but there is naturally some element of risk involved in using it. There may be other factors which influence demand, such as location, opening times etc, but it can be assumed that the data has taken account of the effects of most of these. The linear relationship is probably unrealistic and is therefore an oversimplification of the true position. This is likely in respect of both demand and the effect upon variable/marginal costs. It is important that the County Council is aware of the potential weaknesses in the approach and takes account of these in the way in which the technique is used to inform their decisions.

1 mark for each point up to a maximum of 2

There are other methods of price determination which could be used in this situation. These include:

- Cost plus pricing (various methods).
- Target prices.
- Differential prices.
- Life cycle pricing etc.

Two methods should be chosen and briefly described. The main comment is that other methods will not take into account the effects on demand and therefore would not be so useful in this situation where the impact on demand needs to be measured and is an important part of the decision making process.

1 mark for each alternative described up to a maximum of 2, plus 2 marks for relevant comment, up to an overall maximum of 4

(9)

(20)