



Performance Pillar

P2 – Performance Management

Thursday 1 September 2011

Instructions to candidates

You are allowed three hours to answer this question paper.
You are allowed 20 minutes reading time before the examination begins during which you should read the question paper and, if you wish, make annotations on the question paper. However, you will not be allowed, under any circumstances , to open the answer book and start writing or use your calculator during this reading time.
You are strongly advised to carefully read ALL the question requirements before attempting the question concerned (that is all parts and/or sub-questions).
ALL answers must be written in the answer book. Answers written on the question paper will not be submitted for marking.
You should show all workings as marks are available for the method you use.
ALL QUESTIONS ARE COMPULSORY.
Section A comprises 5 questions and is on pages 2 to 5.
Section B comprises 2 questions and is on pages 6 to 9.
Maths tables and formulae are provided on pages 11 to 14.
The list of verbs as published in the syllabus is given for reference on page 15.
Write your candidate number, the paper number and examination subject title in the spaces provided on the front of the answer book. Also write your contact ID and name in the space provided in the right hand margin and seal to close.
Tick the appropriate boxes on the front of the answer book to indicate which questions you have answered.

P2 – Performance Management

TURN OVER

SECTION A – 50 MARKS

[Note: The indicative time for answering this section is 90 minutes.]

ANSWER ALL FIVE QUESTIONS IN THIS SECTION. EACH QUESTION IS WORTH 10 MARKS. YOU SHOULD SHOW YOUR WORKINGS AS MARKS ARE AVAILABLE FOR THE METHOD YOU USE.

Question One

HZ is reviewing the selling price of one of its products. The current selling price of the product is \$45 per unit and annual demand is forecast to be 130,000 units at this price. Market research shows that the level of demand would be affected by any change in the selling price. Detailed analysis of this research shows that for every \$1 increase in selling price, annual demand would reduce by 10,000 units and that for every \$1 decrease in selling price, annual demand would increase by 10,000 units.

A forecast of the costs that would be incurred by HZ in respect of this product at differing activity levels is as follows:

Annual production and sales (units)	100,000	160,000	200,000
	\$000	\$000	\$000
Direct materials	280	448	560
Direct labour	780	1,248	1,560
Variable overhead	815	1,304	1,630
Fixed overhead	360	360	360

The company seeks your help in determining the optimum selling price to maximise its profits.

Required:

- (a) **Calculate** the optimum forecast annual profit from the product. *(6 marks)*
- (b) **Explain** the effect on the optimal price and quantity sold of independent changes to:
- (i) the direct material cost per unit; *(2 marks)*
- (ii) the annual fixed overhead cost. *(2 marks)*

(Total for Question One = 10 marks)

Note : If Price (P) = a - bx then Marginal Revenue = a - 2bx

Question Two

DTG is a management accounting consultancy that specialises in providing services to small businesses that do not have in-house expertise in management accounting techniques. Its clients vary in size and operate in many different sectors including manufacturing, retail and service industries. Although they are different, all clients require similar services most of which are provided by DTG's team of employed accountants and support staff. Occasionally DTG will engage the services of specialists on a one-off contract basis to help to solve the problem faced by a particular client.

Before accepting clients, DTG will meet with them to discuss their requirements and to agree the basis of their fees.

DTG has an ongoing relationship with many of its clients. This level of involvement within the client's business enables DTG to foresee potential problems for the client and offer further services. This works well for the clients and particularly well for DTG who gain a considerable number of new assignments in this way.

New clients tend to be initially for "one-off" assignments. Working with new clients requires time and effort to be invested to become familiar with the client's business and procedures. DTG hopes to form a relationship and attract more assignments and referrals from each client it works with.

Required:

Explain how Customer Life Cycle costing could be used by DTG.

(Total for Question Two = 10 marks)

Question Three

In order to compete globally many companies have adopted Kaizen Costing. Consequently they are changing their performance measurement systems and are abandoning standard costing systems as they think traditional standard costing and variance analysis is of little use in the modern environment.

Required:

Discuss why Kaizen Costing could be more useful for performance measurement than standard costing and variance analysis in such companies.

(Total for Question Three = 10 marks)

Question Four

GRV is a chemical processing company that produces sprays used by farmers to protect their crops. One of these sprays is made by mixing three chemicals. The standard material cost details for 1 litre of this spray is as follows:

	\$
0.4 litres of chemical A @ \$30 per litre	12.00
0.3 litres of chemical B @ \$20 per litre	6.00
0.5 litres of chemical C @ \$15 per litre	<u>7.50</u>
Standard material cost of 1 litre of spray	<u>25.50</u>

During August GRV produced 1,000 litres of this spray using the following chemicals:

600 litres of chemical A costing \$18,000

250 litres of chemical B costing \$8,000

500 litres of chemical C costing \$8,500

You are the Management Accountant of GRV and the Production Manager has sent you the following e-mail:

I was advised by our purchasing department that the worldwide price of chemical B had risen by 50%. As a result, I used an increased proportion of chemical A than is prescribed in the standard mix so that our costs were less affected by this price change.

Required:

(a) **Calculate** the following operational variances:

(i) direct material mix and

(3 marks)

(ii) direct material yield

(2 marks)

(b) **Discuss** the decision taken by the Production Manager.

(5 marks)

(Total for Question Four = 10 marks)

Question Five

ZJET is an airline company that operates both domestically and internationally using a fleet of 20 aircraft. Passengers book flights using the internet or by telephone and pay for their flights at the time of booking using a debit or credit card.

The airline has also entered into profit sharing arrangements with hotels and local car hire companies that allow rooms and cars to be booked by the airline's passengers through the airline's web site.

ZJET currently measures its performance using financial ratios. The new Managing Director has suggested that other measures are equally important as financial measures and has suggested using the Balanced Scorecard.

Required:

- (a) **Discuss** how the Balanced Scorecard differs from traditional financial performance measurement. *(4 marks)*
- (b) **Explain** THREE non-financial performance measures (ONE from EACH of THREE different perspectives of the Balanced Scorecard) that ZJET could use as part of its performance measurement process. *(6 marks)*
- (Total for Question Five = 10 marks)*

(Total for Section A = 50 marks)

End of Section A

Section B starts on page 6

TURN OVER

SECTION B – 50 MARKS

[Note: The indicative time for answering this section is 90 minutes.]

ANSWER *BOTH* QUESTIONS IN THIS SECTION. EACH QUESTION IS WORTH 25 MARKS. YOU SHOULD SHOW YOUR WORKINGS AS MARKS ARE AVAILABLE FOR THE METHOD YOU USE.

Question Six

WTL manufactures and sells four products: W, X, Y, and Z from a single factory. Each of the products is manufactured in batches of 100 units using a just-in-time manufacturing process and consequently there is no inventory of any product. This batch size of 100 units cannot be altered without significant cost implications. Although the products are manufactured in batches of 100 units, they are sold as single units at the market price. WTL has a significant number of competitors and is forced to accept the market price for each of its products. It is currently reviewing the profit it makes from each product, and for the business as a whole, and has produced the following statement for the latest period:

Product	W	X	Y	Z	Total
Number of:					
units sold	100,000	130,000	80,000	150,000	
Machine hours	200,000	195,000	80,000	300,000	775,000
Direct labour hours	50,000	130,000	80,000	75,000	335,000
	\$	\$	\$	\$	\$
Sales	1,300,000	2,260,000	2,120,000	1,600,000	7,280,000
Direct materials	300,000	910,000	940,000	500,000	2,650,000
Direct labour	400,000	1,040,000	640,000	600,000	2,680,000
Overhead costs	400,000	390,000	160,000	600,000	1,550,000
Profit /(Loss)	<u>200,000</u>	<u>(80,000)</u>	<u>380,000</u>	<u>(100,000)</u>	<u>400,000</u>

WTL is concerned that two of its products are loss making and has carried out an analysis of its products and costs. This analysis shows:

1. The sales of each product are completely independent of each other.
2. The overhead costs have been absorbed into the above product costs using an absorption rate of \$2 per machine hour.
3. Further analysis of the overhead cost shows that some of it is caused by the number of machine hours used, some is caused by the number of batches produced and some of the costs are product specific fixed overheads that would be avoided if the product were discontinued. Other general fixed overhead costs would be avoided only by the closure of the factory. Details of this analysis are as follows:

	\$000	\$000
Machine hour related		310
Batch related		230
Product specific fixed overhead:		
Product W	500	
Product X	50	
Product Y	100	
Product Z	<u>50</u>	700
General fixed overhead		<u>310</u>
		<u>1,550</u>

Required:

- (a) **Prepare** a columnar statement that is more useful for decision making than the profit statement prepared by WTL. Your statement should also show the current total profit for the business. *(8 marks)*
- (b) **Prepare** a report to the Board of WTL that:
- (i) **Explains** why your statement is suitable for decision making; *(4 marks)*
 - (ii) **Advices** WTL which, if any, of its four products should be discontinued in order to maximise its company profits. *(4 marks)*
- (c) **Calculate** the break even volume (in batches) for Product W. *(4 marks)*
- (d) **Explain** how WTL could use Value Analysis to improve its profits. *(5 marks)*
- (Total for Question Six = 25 marks)*

Section B continues on page 8

TURN OVER

Question Seven

TY comprises two trading divisions. Both divisions use the same accounting policies. The following statement shows the performance of each division for the year ended 31 August:

Division	T \$000	Y \$000
Sales	3,600,000	3,840,000
Variable Cost	<u>1,440,000</u>	<u>1,536,000</u>
Contribution	2,160,000	2,304,000
Fixed Costs	<u>1,830,000</u>	<u>1,950,000</u>
Operating Profit	<u>330,000</u>	<u>354,000</u>
Capital Employed	3,167,500	5,500,000

Division Y manufactures a single component which it sells to Division T and to external customers. During the year to 31 August Division Y operated at 80% capacity and produced 200,000 components. 25% of the components were sold to Division T at a transfer price of \$15,360 per component. Division T manufactures a single product. It uses one of the components that it buys from Division Y in each unit of its finished product, which it sells to an external market.

Investment by Division T

Division T is currently operating at its full capacity of 50,000 units per year and is considering investing in new equipment which would increase its present capacity by 25%. The machine has a useful life of three years. This would enable Division T to expand its business into new markets. However, to achieve this it would have to sell these additional units of its product at a discounted price of \$60,000 per unit. The capital cost of the investment is \$1.35bn and the equipment can be sold for \$400m at the end of three years.

Division T believes that there would be no changes to its cost structure as a result of the expansion and that it would be able to sell all of the products that it could produce from the extra capacity. It is company policy of TY that all divisions use a 10% cost of capital to evaluate investments.

Required:

- (a) **Prepare** an analysis of the sales made by Division Y for the year ended 31 August to show the contribution earned from external sales and from internal sales.

(3 marks)

- (b) Assuming that the current transfer pricing policy continues,

- (i) **Evaluate**, using NPV, the investment in the new equipment from the perspective of Division T;

(8 marks)

- (ii) **Evaluate**, using NPV, the investment in the new equipment from the perspective of TY.

Ignore taxation and inflation.

(4 marks)

- (c) **Discuss** the appropriateness of the current transfer pricing policy from the perspective of EACH of the divisional managers AND the company as a whole.

(10 marks)

(Total for Question Seven = 25 marks)

(Total for Section B = 50 marks)

End of question paper

Maths tables and formulae are on pages 11 to 14

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PRESENT VALUE TABLE

Present value of 1 unit of currency, that is $(1+r)^{-n}$ where r = interest rate; n = number of periods until payment or receipt.

Periods (n)	Interest rates (r)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149

Periods (n)	Interest rates (r)									
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.079	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026

CUMULATIVE PRESENT VALUE TABLE

Cumulative present value of 1 unit of currency per annum, Receivable or Payable at the end of each year for n years $\frac{1-(1+r)^{-n}}{r}$

Periods (n)	Interest rates (r)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514

Periods (n)	Interest rates (r)									
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870

FORMULAE

PROBABILITY

$A \cup B = \mathbf{A \text{ or } B}$. $A \cap B = \mathbf{A \text{ and } B}$ (overlap).
 $P(B | A)$ = probability of B , given A .

Rules of Addition

If A and B are mutually exclusive: $P(A \cup B) = P(A) + P(B)$
If A and B are not mutually exclusive: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Rules of Multiplication

If A and B are *independent*: $P(A \cap B) = P(A) * P(B)$
If A and B are **not independent**: $P(A \cap B) = P(A) * P(B | A)$

$$E(X) = \sum (\text{probability} * \text{payoff})$$

DESCRIPTIVE STATISTICS

Arithmetic Mean

$$\bar{x} = \frac{\sum x}{n} \quad \bar{x} = \frac{\sum fx}{\sum f} \quad (\text{frequency distribution})$$

Standard Deviation

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{n}} \quad SD = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2} \quad (\text{frequency distribution})$$

INDEX NUMBERS

Price relative = $100 * P_1/P_0$ Quantity relative = $100 * Q_1/Q_0$

Price:
$$\frac{\sum w * \left(\frac{P_1}{P_0}\right)}{\sum w} * 100$$

Quantity:
$$\frac{\sum w * \left(\frac{Q_1}{Q_0}\right)}{\sum w} * 100$$

TIME SERIES

Additive Model

$$\text{Series} = \text{Trend} + \text{Seasonal} + \text{Random}$$

Multiplicative Model

$$\text{Series} = \text{Trend} * \text{Seasonal} * \text{Random}$$

FINANCIAL MATHEMATICS

Compound Interest (Values and Sums)

Future Value S , of a sum of X , invested for n periods, compounded at $r\%$ interest

$$S = X[1 + r]^n$$

Annuity

Present value of an annuity of £1 per annum receivable or payable for n years, commencing in one year, discounted at $r\%$ per annum:

$$PV = \frac{1}{r} \left[1 - \frac{1}{[1 + r]^n} \right]$$

Perpetuity

Present value of £1 per annum, payable or receivable in perpetuity, commencing in one year, discounted at $r\%$ per annum:

$$PV = \frac{1}{r}$$

LEARNING CURVE

$$Y_x = aX^b$$

where:

Y_x = the cumulative average time per unit to produce X units;

a = the time required to produce the first unit of output;

X = the cumulative number of units;

b = the index of learning.

The exponent b is defined as the log of the learning curve improvement rate divided by log 2.

INVENTORY MANAGEMENT

Economic Order Quantity

$$EOQ = \sqrt{\frac{2C_o D}{C_h}}$$

where: C_o = cost of placing an order
 C_h = cost of holding one unit in inventory for one year
 D = annual demand

LIST OF VERBS USED IN THE QUESTION REQUIREMENTS

A list of the learning objectives and verbs that appear in the syllabus and in the question requirements for each question in this paper.

It is important that you answer the question according to the definition of the verb.

LEARNING OBJECTIVE	VERBS USED	DEFINITION
Level 1 - KNOWLEDGE What you are expected to know.	List State Define	Make a list of Express, fully or clearly, the details/facts of Give the exact meaning of
Level 2 - COMPREHENSION What you are expected to understand.	Describe Distinguish Explain Identify Illustrate	Communicate the key features Highlight the differences between Make clear or intelligible/State the meaning or purpose of Recognise, establish or select after consideration Use an example to describe or explain something
Level 3 - APPLICATION How you are expected to apply your knowledge.	Apply Calculate Demonstrate Prepare Reconcile Solve Tabulate	Put to practical use Ascertain or reckon mathematically Prove with certainty or to exhibit by practical means Make or get ready for use Make or prove consistent/compatible Find an answer to Arrange in a table
Level 4 - ANALYSIS How are you expected to analyse the detail of what you have learned.	Analyse Categorise Compare and contrast Construct Discuss Interpret Prioritise Produce	Examine in detail the structure of Place into a defined class or division Show the similarities and/or differences between Build up or compile Examine in detail by argument Translate into intelligible or familiar terms Place in order of priority or sequence for action Create or bring into existence
Level 5 - EVALUATION How are you expected to use your learning to evaluate, make decisions or recommendations.	Advise Evaluate Recommend	Counsel, inform or notify Appraise or assess the value of Advise on a course of action

Performance Pillar

Management Level Paper

P2 – Performance Management

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