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# Answers

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1 (a) To: Finance Director  
From: A Accountant  
Date: June 2011

Subject: Divisional performance issues at JHK and the introduction of a new information system

This report examines recent divisional performance issues. It begins by evaluating the performance of each division and offering a general consideration of the different measures of divisional performance.

The nature of transfer prices and suitable methods of transfer pricing the work of the service division back into the main manufacturing and sales division are reviewed. Finally, the impact of a unified corporate database and improved information systems are considered.

**Divisional performance evaluation**

	Manufacturing & Sales	Service
Controllable return on investment (Operating profit/Capital employed)	30%	16%
Residual income (\$m) (Operating profit less notional interest charge)	270	3
Non-controllable return on investment (PBT/Capital employed)	23%	13%
EVA™ (\$m)	158	1.1
NOPAT – WACC*Capital employed		
Operating profit	386	6.0
Add: other non-cash expenses	4	0.3
Less: tax	116	1.8
NOPAT	274	4.5

WACC – used notional interest rate

Both divisions are performing well. They make a healthy return on investment although we have no target rate with which to compare them. Also, both divisions make a positive residual income and economic value added which again implies healthy returns.

**Divisional performance measures**

The appropriate return on investment (controllable ROI) is calculated on profit before interest and tax divided by capital employed at the division. The profit figure excludes allocated head office costs as these are not controllable at divisional level. The residual income takes the same profit figure but subtracts a notional interest charge based on the capital employed by the division. Both divisions are offering good returns with positive RI and high controllable ROI, although there would normally be a target ROI set in order to compare to actual performance. The target would have to exceed the 9% cost of capital as it does not take account of necessary head office costs.

ROI is a simple, commonly used measure of divisional performance. However, it can encourage divisions to delay investment in new assets since this measure improves as assets are depreciated with age. RI offers the possibility of applying different costs of capital to divisions with different risk profiles. However, RI does not allow a clear comparison of performance between divisions since it is an absolute measure of performance.

Both ROI and RI have the disadvantage of being based on profit measures of performance rather than cash. Measures such as NPV use cash flows which are less subject to the interpretation of accounting rules and are more directly aligned with shareholder interests.

It is unclear that either of these measures will align with the overall performance measure of TSR, since it depends on share price and dividends paid.

EVA™ is an absolute performance measure like RI. It involves a more complex calculation than RI with many adjustments to the accounting figures of profit and net assets, such as the use of replacement costs for asset values and economic depreciation rather than accounting depreciation. (Here, the calculated figures are an estimate using the available information.)

Many of the EVA™ adjustments are intended to avoid distortion of results by accounting policies that are present in ROI and RI. Thus, EVA™ is more directly aligned with the objective of increasing shareholder wealth and so should help to ensure that there is congruence between the divisional and corporate goals. EVA™, like RI, has the advantage that by treating certain costs as investments it encourages appropriate capital expenditure.

However, EVA™ depends on historical data while shareholders will be focused on future performance. Unlike ROI, EVA™ and RI would not help to judge relative divisional performance at JHK as the divisions are not of similar size and so an absolute measure is not comparable.

**(b) Transfer pricing**

The transfer price is the price that the service division would charge to the manufacturing and sales division for its warranty servicing for which it would otherwise not receive any income. The objective of a transfer pricing system is to allow divisional management to be assessed on the basis of divisional profit and so provide them with motivation while retaining their autonomy. The transfer price should be set so that the decisions of the divisions individually are beneficial to the company as a whole. If divisions are in different tax regimes then the transfer price should minimise the overall company tax liability within the law.

The general rule for goal congruent decision-making is that transfer prices should be set with reference to the opportunity cost of sale to the selling division (service division) and the opportunity cost to the buying division (manufacturing and sales division). There are different situations if there is surplus capacity or a capacity constraint in the service division or if there is an external market for the service, since these affect the opportunities available to the divisions.

The two different methods of pricing the service division's work are now considered.

**Market based pricing**

The service division could consider an external market price since there is the opportunity to outsource and therefore, its managers would charge \$200. This would generate a reduced divisional profit to the company of \$0.59m from the warranty work as opposed to the profit from the current agreement of \$2.67m (see appendix for working). Thus it would still provide motivation for the service division to take the warranty work.

However, there would be savings if the work were kept internal to JHK, such as the overhead of negotiating and managing the contract with the local engineering firm. Doing the work internally would save these costs and so, a market price adjusted down for these savings would be appropriate. There is also the danger of outsourcing the service function in that the company loses control of a strategically important part of its offering to customers. It is clear that the warranty is a key selling point for JHK and it may not be able to control the quality of the repair work if this is outsourced.

A market price will guide the service division to the right decision on whether to continue to do the warranty work in-house or whether to outsource it and free capacity for other opportunities. If external work offers a better contribution than warranty work, the service division will automatically do external work. It will also measure profits at market-based prices. Thus, this method will provide motivation without a price being imposed by head office.

The volume and profitability of external work that may be available to the service division should also be investigated. If this were more profitable than internal work then this would suggest that the service division should prioritise this work and outsource if there is a lack of capacity to cover the internal work. It should be noted that the current quote from the outsourcer demands a minimum volume of work and so their work may need to be repriced.

**Cost based pricing**

The work could also be charged on the basis of the cost to the service division. The variable cost is \$135 on average per repair and so the \$10m contract represents a contribution for the division of \$4,654k (based on the expected 39,600 repairs per year). This represents a divisional profit of \$2,674k (see appendix for working).

The work could be charged at variable cost but then there would be no contribution to the service division's profits and so no incentive for the service division to do this work. It would, therefore, prioritise external sales over internal ones.

If a breakeven divisional profit was desired then a price of \$185 per repair should be charged as this covers fixed overheads in the division. Although it would not contribute to head office costs, service division managers would still be motivated to perform the warranty work. M/S division managers would accept any cost below the alternative of \$200 per repair for outsourcing the work.

It may be worth comparing a cost plus approach with the existing agreement. The service division would have to charge \$253 per repair in order to make the same divisional profit as it enjoys under the current agreement.

**Current pricing method**

The current fixed price charge provides a contribution to the division's fixed costs which will incentivise the service division. However, this may cause problems in quality since it is not related to the volume of work done by service and if there were a much higher number of repairs than expected then the service division might compromise quality in order to control costs.

**(c) New information system**

The executive information system (EIS) will bring a number of benefits in decision-making at the strategic level at JHK but at certain costs and with certain problems.

The benefits relate to improved decision-making as the EIS should allow drill-down access to the more detailed operational records but the initial presentation of data should be based on the key performance indicators for the company. This system should also be linked to external data sources so that senior management do not fall into the trap of only looking inwards in the organisation at the risk of ignoring wider issues in the business environment (for example, the demand for external servicing work and market prices of this work).

The new system will increase the amount of information and analysis that it will be possible for senior managers to perform. It will present opportunities for better decision-making using the more up-to-date information. However, it may present the problem of information overload for managers. Therefore, the system will need to be designed to give access to only those areas that it is appropriate for any given manager to see.

The data used in decision-making will be more robust as a single database will reduce the problem of redundancy where multiple copies of the same data are held on different systems. This will remove the danger of inconsistencies and reduce the storage required by the company.

The EIS would allow access to decision support systems such as large spreadsheet models built in order to pull data out of the database for use in forecasting and appraising projects (for example, warranty repairs forecasting is important for the current fixed fee contract between the sales and service divisions).

The EIS will also give access to tactical information such as budgets in order to help the executive control the business.

In order to gain the maximum benefit from the new system, executive managers will need to be trained and this training should occur just before the new system is available so that they are in a position to use it immediately.

Overall, the new system should provide valuable information if used correctly but the cost of the system must be weighed against the benefits of the system which will be mostly intangible and so difficult to measure (e.g. improved decision-making).

In conclusion of the report, the two suggested divisional performance measures do not align with the overall corporate strategy and it is recommended that the company use EVA™ as a more appropriate measure of performance. The current method of transfer pricing gives a good contribution to fixed costs in the service division but may not encourage both divisions to perform optimally from the perspective of the whole company. Further work needs to be undertaken to investigate the possibility of obtaining an additional stream of outside revenue for the service division.

#### Appendix:

	\$
Labour (per repair)	36
Variable divisional overhead (per repair)	24
Fixed divisional overhead (per repair)	50
Parts	75
So	
Variable cost (per repair)	135
Total cost (per repair)	185

Number of repairs per year

440,000 units where 9% need repairing every three years. Given continuous production, this means in total 39,600 will need warranty repairs each year.

	Current recharge agreement \$'000	Market pricing \$'000
Revenue	10,000	7,920
Variable costs	5,346	5,346
Contribution	4,654	2,574
Fixed costs	1,980	1,980
Divisional profit (before head office costs)	2,674	594
Cost plus price		
to give equivalent contribution to current recharge agreement	10m/39,600 =	\$252.53
to cover variable costs	5.346m/39,600 =	\$135.00
to give breakeven contribution		
to the division	(10m – 2.674m)/39,600 =	\$185.00

## 2 (a) Range and coherence of performance measures

The balanced scorecard is a tool to translate the overall vision of a company into objectives and performance metrics. It aims to ensure that the goals of the company flow from the strategy and that the performance measures on the scorecard are those that will serve the long-term interests of the business.

This approach will usually broaden the range of performance measures as it introduces four key perspectives: financial, customer, internal business process and learning and growth. Most businesses focus on the financial perspective (as at PT) with measures suited to the shareholders' interests. These measures also tend to concentrate on the immediate performance of the business in the last financial period and so can be accused of being short term. The scorecard broadens the range of measures by including those that view the business from the perspective of satisfying the customer both in terms of their needs and the ways in which the business can go about satisfying them (internal processes). The final area is focused on the sustainability of the company and its vision into the long term. Also, the use of these perspectives encourages companies to use non-financial measures as well as financial ones, for example, measures of quality in the customer perspective and measures of innovation in the learning and growth perspective.

The coherence of the scorecard to the vision of the company derives from the implementation process which involves first making the company's vision or strategy explicit, for example by strategy mapping. Then, by viewing the company through the four perspectives, performance measures are chosen that will relate to the achievement of the goals. An important feature

of the method is that these methods should aid the clear communication of the vision to the staff. It is important that in broadening the perspectives of performance measurement, the scorecard does not overwhelm with numbers. Therefore, the measures should be limited in number and clearly prioritised.

**(b) Evaluation of proposed performance measures**

The financial perspective has not been altered from the existing measures of strategic performance. These are appropriate to address the objectives of enhancing shareholder wealth, although it has been argued that measures such as economic value added or shareholder value added are better long-term measures of this topic. Also, it is more common to use share price and dividend per share to reflect total shareholder return. Additionally, measures of survival (cashflows) and growth (in eps) could be considered.

The customer perspective mainly seems to address the patient (end user) viewpoint. However, it should also reflect the concerns of those paying for the products (the government and insurers). Therefore, measures of cost in comparison to competitors would be appropriate.

The internal process perspective reflects appropriate measures of manufacturing excellence and efficiency in the testing process. This directly addresses the second of the board's objectives.

The learning and growth perspective would appear to be an obvious area to address the third objective on innovation. Again, the ranking of the measures is unclear and it would be surprising if training days were considered the principal measure. From the learning perspective, the improvement in the time to market from product to product and the improvement in a percentage of drugs finally approved would indicate improvement. It will be appropriate to benchmark these measures against industry competitors as well as internally.

It is not clear if the points in the proposed scorecard are already prioritised and it may be appropriate to reconsider the order of measures, for example, in the internal perspective, the measure of time to gain approval seems to be more directly relevant to the objective of efficiency of the development process.

The suggested scorecard does not consider the difficulty of collecting data on some of the non-financial measures. For example, the measurement of above-industry standard design and testing is likely to be subjective unless the company undergoes a regular quality audit which can be scored.

**(c) Stakeholders and their influence**

The key stakeholders of BDR are the government, the drug companies being tested, the healthcare providers and their funders, and the patients.

A measure of influence of different stakeholders could be obtained by considering the degree to which they have power to affect decisions in the company and the likelihood that they would exercise their power (their degree of interest in the decisions). (Mendelow's matrix would be a suitable technique to perform this analysis.)

The government is an influential stakeholder on this basis as they have power over senior appointments and the funding of BDR. They are unlikely to use this power having delegated authority to the trustees, unless they are provoked by some financial or medical scandal.

The drug companies will be highly interested in the day-to-day workings of BDR as it sets the testing environment without which the drug companies will not have products. However, they will have little influence in the decisions within BDR as BDR must be seen to be independent of them. Nevertheless, it is in BDR's interest to have a successful drug development industry in order to achieve its goal of encouraging new drug development.

The healthcare providers will have interest principally in the quality of the approval process so they can have confidence about the cures that they dispense. They will have limited influence, mainly through the pressure that they can bring to bear through the government.

The patients will be concerned that there is innovation so new cures are quickly and safely brought to market. As for the healthcare providers, the patients have limited secondary influence on decision-making in BDR.

**(d) Differences in the application of the balanced scorecard**

The objectives at BDR are less obviously financial than at PT. The use of the balanced scorecard approach will be of great use to BDR as it emphasises non-financial performance which fits with BDR's objectives relating to quality of drugs and the relationship with key stakeholders. This can lead to difficulty in setting quantifiable measures due to the soft issues involved, e.g. measuring the level of user understanding of the risk/benefit profile of products. There is also the danger of setting quantifiable measures which are then obsessively pursued without regard to the softer aims of the organisation. An example could be the need to encourage drug innovation at the expense of making sure that each new product was a material improvement on existing drug products.

BDR will have a more complex balanced scorecard than PT due to the diverse nature of important stakeholders. As a public service organisation, the customer perspective may be more significant. The principal stakeholder is the government and so there will be a complex, political dimension to measuring performance.

The primary objective at PT is financial while at BDR there are several key objectives among which there is no clear ranking. Stakeholders may have conflicting objectives, for example, patients want effective drugs but the same individuals as taxpayers/insurance premium payers may not be willing to foot the bill if the price is too high. This will lead to difficulties in setting priorities among the various measures identified on the balanced scorecard.

### **3 (a) Fitzgerald and Moon's building block approach**

The building block model is an analysis that aims to improve the performance measurement systems of service businesses such as APX. It suggests that the performance system should be based on three concepts of dimensions, standards and rewards.

Dimensions fall into two categories: downstream results (competitive and financial performance) and upstream determinants (quality of service, flexibility, resource utilisation and innovation) of those results. These are the areas that yield specific performance metrics for a company.

Standards are the targets set for the metrics chosen from the dimensions measured. These must be such that those being measured take ownership of them, possibly by participating in the process of setting the standard. The standard must be achievable in order to motivate the employee or partner. The standards must be fairly set, based on the environment for each business unit so that those in the lower growth areas of, say, audit do not feel prejudiced when compared to the growing work in business advisory.

Rewards are the motivators for the employees to work towards the standards set. The reward system should be clearly understood by the staff and ensure their motivation. The rewards should be related to areas of responsibility that the staff member controls in order to achieve that motivation.

### **(b) The current system**

APX's performance management system does not cover all the areas that the building block model would suggest are necessary. The downstream dimensions appear to be covered as the competitive performance (market share) and financial performance (revenue growth and profit margin) can be measured. However, the determinants of this performance appear less well covered with only the quality of service aspect handled by the customer satisfaction rating.

The standards are unclear from the information provided. It appears that the industry averages can be used to compare competitive performance but there are no figures for the industry on profitability. The measure must therefore be internal, comparing practice areas to each other. This may breach the fairness criterion as it is likely that business advisory can negotiate better fees than audit or tax due to market conditions being favourable from that area. No standard is mentioned on the document for quality of service.

The non-partner reward system at APX is related to performance as assessed by the line manager but this will be compromised by the limited measurement of the dimensions of performance. The partner reward system appears to be based on the level of responsibility of the partner and the performance of the whole firm rather than that individual's contribution to performance. Therefore, there is a strong probability that the reward level is not controllable by the partner and this may affect their motivation. For example, a tax partner may view the growth in recovery work as sufficient to merit reward to all partners and so not optimise the performance of their own area of the practice.

### **(c) Main building block improvements**

The first improvement obtained by using this model will be to ensure that all the key determinants of success in performance are being measured. The next benefit will be that the targets set for each measure are set in such a way as to engage the staff. Finally, the reward system will operate in a way to optimally motivate the individual staff members.

#### **Improvements to existing performance measurement system**

The existing performance measurement system requires measures for flexibility which address the speed of delivery of the service (e.g. a punctuality measure of percentage of jobs delivered on time), the customer's attitude (e.g. the existing customer service survey could be broken down to include the customer's perception of whether objectives were achieved) and the degree to which the practice handles busy periods (e.g. amount of overtime worked). It is surprising that APX does not seem to measure resource utilisation, for example, by considering the percentage of billable hours worked to the total working hours of the firm. This is a commonly used measure of the productivity of staff in accounting practices. Finally, the dimension of innovation is not measured. Innovation is an important source of competitive advantage. The efficiency of the innovation process can be measured by the time it takes to launch a new service once the initial customer need is identified. The outputs of innovation process within APX could be measured by the number of new customer initiatives launched or by the revenue that they generate.

- 4 (a) The BCG matrix breaks a business into its component units and then considers their performance in terms of the growth of the unit (usually measured by revenue) and the relative market share of each unit.

The sector growth and market share for each of ENT's divisions is as follows:

	2010	2011	2012	2013	
Growth in sector					
Restaurants		1.0%	1.0%	0.0%	
Cafes		9.0%	11.0%	9.0%	
Bars		-2.0%	-3.0%	-3.0%	
Dance clubs		6.0%	6.0%	9.0%	
Market share					
Restaurants	0.5%	0.5%	0.5%	0.6%	
Cafes	1.0%	1.0%	1.1%	1.2%	
Bars	3.5%	3.5%	3.5%	3.6%	
Dance clubs	11.0%	11.0%	10.9%	11.0%	
Relative market share					
Restaurants	0.17	0.17	0.18	0.19	Mkt leader 3.0%
Cafes	0.33	0.34	0.37	0.39	3.0%
Bars	1.17	1.17	1.18	1.22	3.0%
Dance clubs	0.73	0.73	0.73	0.73	15.0%

(Relative market share calculated as a ratio of division's market share to market leader's share. Figures calculated to nearest 0.1%)

Additionally,

	market growth (2011 – 2014) % pa	ENT divisional growth (2011 – 2014) % pa
Restaurant	0.67	4.67
Cafe	9.66	15.28
Bars (Shrunk)	-2.67	-1.34
Dance clubs	6.99	6.98

(Tutor note: There are more calculations given here than are needed for a good answer. They are intended to illustrate useful analysis of the data given.)

The restaurant and bar sectors are slow growth or in decline while the clubs and cafes appear to be growing at a pace well above the general economic expansion of 2% pa. ENT has a strong position in the bar and club sectors but is relatively small in the restaurant and cafe sectors.

Consequently, the restaurant division would be seen as a dog with low growth and poor market share which would make it a poor candidate for investment. A disposal could be considered unless there are other reasons to keep it (such as it acts as a feeder to dance clubs). The cafe division is a problem child where there is the possibility of good growth in the sector but the division lacks market share in such a fragmented market. The sector appears ripe for consolidation and so either the division should be financed to grow by acquisition or else sold on to another consolidator. The bar division is a cash cow as it has a strong share of a low growth sector. It will be managed for its cash generative capabilities and will be heavily cost controlled. Finally, the dance clubs represent another problem child with strong growth and a large market share (near the market leader). They would not be considered a star as they lack market leadership but would be considered an excellent candidate for investment to achieve that position.

This portfolio of divisions represents a good spread of businesses with the cash generative bar business supplying the financial resources for the development of the cafe and club businesses. It is unclear from this analysis how creative the company as a whole is at developing new businesses to replace the poorer performing entities.

- (b) The BCG matrix can be beneficial as it allows the company to view the prospects of its different divisions. A different style of management should be applied to each division based on this analysis. Those businesses which are in faster growing sectors will require more capital to be invested and may not generate cash as efficiently from profits. However, those businesses in slower growing mature markets should have a focus on cost control and cash generation. Business units identified as cash cows and, particularly, dogs should not be dismissed since if they are properly managed they can provide a rich source of cash as they are run down.

The performance management systems and metrics used by the divisions should therefore be adjusted to reflect this analysis. The metrics for high growth prospects of cafes and clubs will be based on profit and return on investment, while those in lower growth, such as the bar division, will be focused on margins and cash generation.

However, the BCG matrix is a very simple method of analysis. For example, using relative market share measured against the largest competitor, where a value of 1.0 is used as cut off between large and small, means there is only one star or cow per market. It was designed as a tool for product portfolio analysis rather than performance measurement. As a performance system, it seems to downgrade traditional measures of performance such as profit and shareholder wealth and therefore may not be well aligned with all of the key stakeholders' objectives. It should be seen as a starting point for considering the appropriate performance management for a business unit but not the final result.

Additionally, it may be that different products with each business unit may not fit the unit's classification. For example, the newly launched wine bar format seems to be in a higher growth sub-sector and so applying the performance systems and management style of a dog business would not be appropriate. It may also be difficult to distinguish the sectors from each other as, for example, it may be difficult to define the difference between a cafe and a restaurant. The model also fails to consider the links between the business units, for example, where the bars or cafes may serve as feeder businesses for late night dance clubs.

- (c) The existing remuneration system is primarily based on the division's performance compared to budget. It is likely that the management style will be highly cost conscious and conservative as a result. This would be appropriate for the bar and restaurant divisions which foresee low growth. However, this could present particular problems for the divisions that are or could be grown (cafes and clubs). They will require a more entrepreneurial managerial approach and, therefore, should be using long-term profit measures of performance in order to align the manager's motivation with the business unit's needs.

The chairman is also correct to be concerned about the broad measure of divisional performance (EVA™) and whether this is coherent with the budgetary approach to management reward in the divisions. There is the possibility that if the budgets are not set in order to maximise EVA™ then the overall objectives are not reflected in the reward system at divisional level.

## 5 Environmental cost categories

- (a) PLX will need to identify existing and new cost information that is relevant to understanding its environmental impact.

There are conventional costs, such as raw material costs and energy costs, which should be broadened to include the cost of waste through inefficiency. These and other conventional costs (such as regulatory fines) are often hidden within overheads and therefore will not be a high priority for management control unless they are separately reported.

There are contingent costs such as the cost of cleaning industrial sites when these are decommissioned. These are often large sums that can have significant impact on the shareholder value generated by a project. As these costs often occur at the end of the project life, they can be given low priority by a management that is driven by short-term financial measures (e.g. annual profit) and make large cash demands that must be planned at the outset of the project.

There are relational costs such as the production of environmental information for public reporting. This reporting will be used by environmental pressure groups and the regulator and it will demonstrate to the public at large the importance that PLX attaches to environmental issues.

Finally, there are reputational costs associated with failing to address environmental issues when consumer boycotts and adverse publicity lose sales revenue.

- (b) **Explanation and evaluation of techniques**

A lifecycle view consists of considering the costs and revenues of a product over the whole life of the product rather than one accounting period. For an oil refinery, this might be taken to be the useful life of the refinery. A lifecycle view may take profit or discounted cashflow as the principal measure of performance. This is particularly relevant for PLX given the planned redevelopment programme at the refinery which will highlight the decommissioning costs of such plant. This will aid future long-term investment planning at PLX.

Activity-based Costing (ABC) is a method of detailed cost allocation that, when applied to environmental costs, distinguishes between environment-related costs and environment-driven costs. At PLX, related costs would include those specifically attributed to an environmental cost centre such as a waste filtration plant, while driven costs are those that are generally hidden in overheads but relate to environmental drivers such as additional staff costs or the shorter working life of equipment (in order to avoid excess pollution in the later years of its working life). This will assist PLX in identifying and controlling environmental costs.

Input/output analysis (sometimes called mass balance) considers the physical quantities input into a business process and compares these with the output quantities with the difference being identified as either stored or wasted in the process. These physical quantities can be translated into monetary quantities at the end of the tracking process. Flow cost accounting is associated with this analysis as it reflects the movement of physical quantities through a process and will highlight priorities for efficiency improvements.

These techniques are not mutually exclusive and all can assist PLX in improving performance. However, cost/benefit analysis will need to be undertaken for each of the systems. This will be difficult, as benefit estimates will prove vague given the unknown nature of the possible improvements that may accrue from using the techniques. The non-financial benefits will include a better public image and reduced chance of protest by environmental groups and an improved relationship with the government who is likely to be a key supplier of crude oil to the business. Additionally, ABC and input/output analysis will require significant increases in the information that the management accounting systems collect and so incur increased costs. As a result, the decision to use these techniques is likely to be based on the balance between known costs and estimated strategic benefits of non-financial factors.



**(c) Lifecycle costing**

A traditional analysis of the costs of Kayplas might yield the product profit given in the original data. However, this ignores capital costs, environmental costs and the cost of decommissioning. A lifecycle analysis aims to capture the costs over the whole lifecycle of the product and it would show:

**Costs**

Production costs	82.3
Marketing costs	17
Development costs	8.6
	<hr/>
	107.9
Environmental costs	
Waste filtration	8.1
Carbon dioxide exhaust extraction	5.3
	<hr/>
	13.4
Other costs	
Decommissioning costs	18
	<hr/>
Total costs	139.3

This should be compared to revenues of \$149.4m and leaves only a small overall return on investment (surplus of \$10.1m). It should be noted that the decommissioning costs are estimated at \$18m in five years. It is likely that, given the difficulty in dealing with specialised equipment and the fact that environmental legislation may get stricter, this could easily be a significant underestimate. This could destroy all of the added value of the product.

The value of lifecycle costing often lies in the visibility it gives to costs that are determined in the early stages of the design of the product and, in this case, it emphasises the need to minimise the cost of decommissioning. This should be done in the design phase of the refinery extension.

The traditional product profit analysis shows a surplus of \$41.5m over the life of the product as it does not capture the environmental and decommissioning costs.

Additionally, if volumes of production can be ascertained, then a cost per unit of Kayplas could be calculated and this would assist in price setting.

- 1 (a)** 7 marks for calculation of ROI, RI and EVA.  
3 marks for ROI and RI: 1 for use of controllable profit; 1 for ROI and 1 for RI.  
3 marks for EVA:

Other non-cash expenses	0.5
Tax	0.5
Depreciation treatment	0.5
NOPAT	0.5
WACC used	0.5
EVA	0.5

Up to 2 marks for assessment of performance from the calculated numbers.

Up to 2 marks for comments on each measure.

Maximum of 12 marks.

- (b)** Transfer pricing system  
Up to 3 marks on transfer pricing system, 1 mark per point.

Calculations

Number of warranty repairs pa	1
Costs per repair	2
Contribution under current agreement	1
Contribution with market price	1
Prices for breakeven under cost plus	3

Up to maximum 7 marks.

Transfer pricing commentary

Up to 4 marks on evaluating transfer pricing at JHK.

Maximum 12 marks.

- (c)** Up to 4 marks for benefits. Up to 3 marks for problems.  
Maximum of 5 marks.

Up to 4 professional marks.

**Total 33 marks**

- 2 (a)** Up to 2 marks for a general definition of the method. 1 mark per point on the coherence of the range of measures with the strategy up to a maximum of 4 marks. Maximum of 4 marks.
- (b)** 1 mark per point. There is a wide range of good answer points to be made. Up to 8 marks for points made about the measures suggested (whether they cover the perspective intended) and also, if there are other suitable measures. Other marks are for linking the measures to the stated company objectives and commenting on the difficulty of collecting appropriate data and ranking the measures. Maximum of 10 marks.
- (c)** Up to 1.5 marks on each stakeholder. Answers must display a consideration of both the power and the likelihood of exercising it in order to score full marks. Maximum of 6 marks.
- (d)** 1 mark per point. In order to score highly, a candidate must give examples that are relevant to the scenario. Maximum of 7 marks.

**Total 27 marks**

- 3 (a) Taking each building block, up to 1·5 marks for a description. Maximum 4 marks.
- (b) Taking each building block, up to 3 marks for evaluating the existing system at APX. Maximum 8 marks.
- (c) Main improvements from use of model  
1 mark per point up to 3 marks.  
Specific suggestions for APX  
1 mark per point which must relate to the scenario by way of examples up to 7 marks.  
Maximum 8 marks.

**Total 20 marks**

- 4 (a) 4 marks for appropriate calculations. Up to 4 marks for an appropriate classification with reasons. Maximum of 7 marks.
- (b) Up to 2 marks on general benefits of BCG analysis. Up to 2 marks on how BCG can be applied in performance systems. Up to 5 marks on limitations of the BCG approach. To score well the comments must be illustrated by application to the scenario. Maximum of 7 marks.
- (c) 1 mark per point. Maximum of 6 marks.

**Total 20 marks**

- 5 (a) 1 mark per cost area discussed. Points must include examples of relevance to the scenario to score full marks. Maximum of 4 marks.
- (b) Up to 2 marks per technique – an explanation and its link to environmental performance. 3 marks for an evaluation of the techniques. Maximum of 9 marks.
- (c) 3 marks for calculation of lifecycle costs. Up to 2 marks for calculating the product profits of the two approaches. Up to 4 marks for discussion of improvements and issues identified by lifecycle costing. Maximum of 7 marks.

**Total 20 marks**