Paper P1 Performance Operations

Variance analysis is a standard management accounting technique, but too many P1 candidates struggle to apply it because they don't bother to understand what all the variances actually mean

By the examiner for paper P1

Students tend to find the P1 exam difficult because the information given in the scenarios and the requirements vary considerably from question to question. Rote learning for this paper, therefore, will not be effective.

Section C of the exam often includes a question requiring a variance analysis. I have invariably been disappointed by how badly most candidates have performed on answering such questions, particularly because it's a core area of the syllabus that they should see as their bread and butter. Post-exam guides have stated that students tend to try to learn by rote for this subject, rather than understanding what they are trying to achieve. Variance analysis is not about learning formulas; it's about working out what the variances mean. Once these are understood, the figures necessary to calculate them usually become clear.

Let's attempt question 3 in section C of the November 2011 P1 paper, which required candidates to perform a variance analysis. Here is the scenario it gives, along with part A of the requirement:

TP makes wedding cakes that are sold to specialist retail outlets, which decorate the cakes according to the customers' specific requirements. The standard cost per unit of its most popular cake is as follows:

Direct material:		$
Ingredient A	4kg at $25 per kg	100
Ingredient B	3kg at $22 per kg	66
Ingredient C	2kg at $11.50 per kg	23
Direct labour:	3 hours at $12 per hour	36
Variable overhead:	3 hours at $8 per hour	24
Standard cost:		249

The budgeted production for the period was 10,000 units.

Actual results for the period were as follows:

Production: 9,000 units.

'I have invariably been disappointed by how badly most candidates have performed on answering variance analysis questions'

Direct material:		$
Ingredient A	35,000kg	910,000
Ingredient B	28,000kg	630,000
Ingredient C	27,000kg	296,000
Direct labour:	30,000 hours	385,000
Variable overhead:		230,000

The general market prices at the time of purchase for ingredient A and ingredient B were $23 per kg and $20 per kg respectively.

TP operates a just-in-time (JIT) purchasing system for ingredients and a JIT production system. Therefore, there was no inventory during the period.

Prepare a statement that reconciles the flexed budget material cost and the actual material cost. Your statement should include the material price planning variances and the operational variances, including material price, material mix and material yield (12 marks).

The first thing to note is that a reconciliation statement is required. Many candidates didn't produce a statement and, while this omission was treated fairly leniently in the marking, the post-exam guide for that paper warned that this might not always be the case. Such questions test not only your ability to calculate variances, but also your ability to calculate the appropriate variances that will explain the difference between the budget figures and the actual figures.

In addition, the reconciliation should be between the "flexed budget material cost" and the actual material cost. The original production budget was 10,000 units, but only 9,000 units were actually made. Therefore we need to reconcile the budget cost of 9,000 units – i.e. the flexed budget – with the actual cost of 9,000 units.

The second part of the requirement makes it clear which variances need to be calculated: the material price planning variances and the operational variances, including the material price, material mix and material yield variances. Despite this, a disappointingly high number of candidates wasted a lot of valuable time calculating labour variances and variable overhead variances. This may have been because questions they had practised during their revision required the reconciliation of profit or contribution. It is important to read the question requirements carefully, because no marks will be awarded for performing calculations that are not required. Other candidates,

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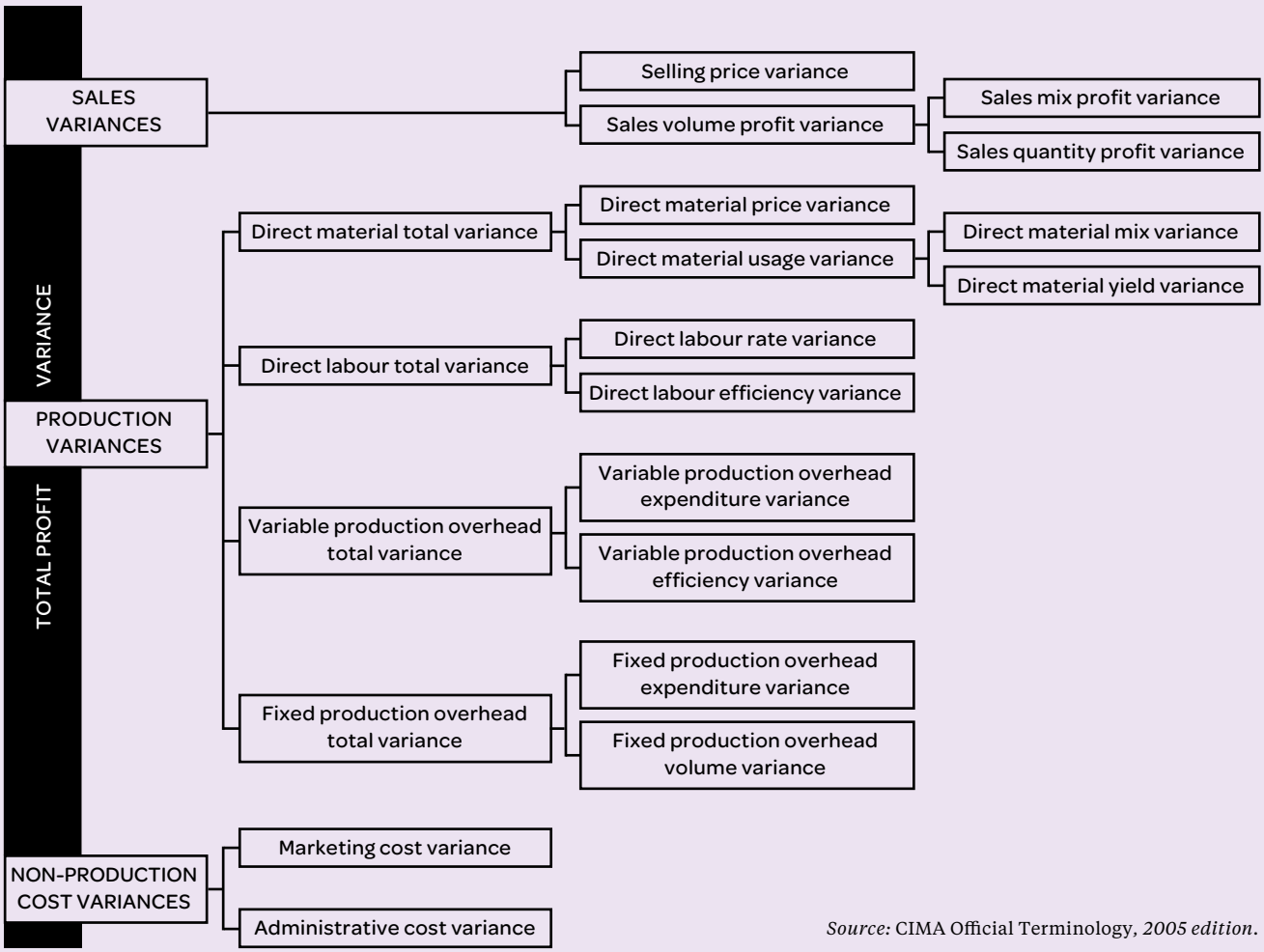
while they didn't calculate labour or overhead variances, worked out the material usage variance. This meant that there was a duplication of variances, because the material usage variance is a combination of the material mix variance and the material yield variance.

The diagram below shows the chart of variances using absorption costing principles. The same applies under marginal costing, except that the sales variances will relate to contribution and there will be no further breakdown of the fixed production overhead total variance.

Many questions on variance analysis require the reconciliation of budget and actual profit. They will ask candidates to show variances in as much detail as possible. If the scenario involves a firm selling multiple products and/or a product that requires a mix of different inputs, you should calculate sales mix and sales quantity variances and/or material mix and yield variances. But you should not then also calculate the sales volume variance and the material usage variance, as this would result in duplication and it would be impossible to reconcile the budget and actual figures.

Chart of variances using absorption costing principles



Source: CIMA Official Terminology, *2005 edition*.

Further reading *CIMA Official Study Text – Performance Operations* (2011-12 edition), CIMA Publishing, 2011.

Let's now consider the variance calculations. The reconciliation statement is as follows:

		$
Flexed budget material cost (original standard)	9,000 units x $189	1,701,000
Material price planning variance – ingredient A	36,000kg x ($25/kg – $23/kg)	72,000 favourable
Material price planning variance – ingredient B	27,000kg x ($22/kg – $20/kg)	54,000 favourable
Flexed budget material cost (revised standard)		1,575,000
Material price operational variance – ingredient A	(35,000kg x $23/kg) – $910,000	105,000 adverse
Material price operational variance – ingredient B	(28,000kg x $20/kg) – $630,000	70,000 adverse
Material price variance – ingredient C	(27,000kg x $11.50/kg) – $296,000	14,500 favourable
Material mix variance	Workings to follow	74,500 favourable
Material yield variance	Workings to follow	175,000 adverse
Actual material cost		1,836,000

The first step is to calculate the flexed budget material cost. This should be based on 9,000 units and the original standard material cost – i.e. the total cost of ingredients A, B and C, which is $189.

The next step is to calculate the material planning variances. The scenario makes it clear that the general market prices of the ingredients at the time of purchase were different from the original standard cost, so we need to adjust the original standard to reflect these changes. The price of ingredient A has fallen from $25 to $23 per kg, resulting in a favourable variance of $2 per kg, since the revised budget will be lower than the original budget. Each unit requires 4kg of ingredient A, so for 9,000 units the standard amount of ingredient A will be 36,000kg, resulting in a favourable total planning variance of $72,000. The same calculation can be performed for ingredient B, for which the market price has also fallen by $2 per kg. If we then deduct the favourable variances from the original standard we end up with a revised materials budget of $1,575,000.

The next step is to calculate the operational variances. The first one we must deal with, price variance, compares the standard cost of the actual quantity of material purchased with the actual cost of what was purchased. The reason for using the actual quantity purchased is that we are trying to isolate the effect of price changes – that is, exclude any effect of usage gains or losses. We therefore multiply the actual quantity of each

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ingredient purchased by the revised standard cost and compare this with the actual cost. Note that the operational variances use the revised standard, as we are trying to assess operational efficiency, which makes it necessary to exclude any planning variances since these are not within the operational manager's control.

Normally, the next material variance to calculate would be the material usage variance. But, as this process uses a number of ingredients, we need to calculate the material mix and material yield variances. The material mix variance calculates the effect on cost resulting from any change to the standard mix of input materials. It is concerned solely with the effect of changes to the mix, so it compares the actual quantity of material used at the standard mix with that used at the actual mix. The total quantity of material used was 90,000kg and the standard mix was 4kg of A to 3kg of B to 2kg of C. We therefore take 90,000kg and apply the standard mix – the result of which is shown in the second column of the table below. Column three shows the actual ingredients at the actual mix (given in the scenario). Column four shows the variance, which is favourable ("Fav" in the table) for A and B, as the actual input was lower than the standard. For C it is adverse ("Adv"), as the actual input was higher than the standard – that is, more of C than expected was used in the mix. Note that the total of the variance column will always be zero. We then multiply the variances in kg by the standard costs – and again it's the revised standard costs that should be used, because we are calculating an operational variance.

An alternative method for calculating the mix variance, which uses the difference between the revised standard cost and the weighted-average standard cost in column five, can also be used and would be equally acceptable.

Material mix variance calculation

Ingredient	Actual input at standard mix (kg)	Actual input at actual mix (kg)	Variance (kg)	Standard cost ($/kg)	Variance ($)
A	40,000	35,000	5,000 Fav	23	115,000 Fav
B	30,000	28,000	2,000 Fav	20	40,000 Fav
C	20,000	27,000	7,000 Adv	11.50	80,500 Adv
	90,000	90,000			74,500 Fav

EXAM DOS AND DON'TS

Do read the question requirements carefully.

Do answer the question that you have been asked, not the one that you'd like to have been asked.

Do practice answering past exam questions, but **don't** assume that all future questions will cover exactly the same ground.

Don't rely on rote learning – understand what you are calculating and why you are calculating it.

The final variance to calculate is the material yield. This measures the effect on cost of any difference between the actual usage of material and the standard required for the output produced. The workings are as follows:

- Standard weight of material per cake = 9kg.
- 9,000 cakes x 9kg = 81,000kg.
- Actual usage = 90,000kg.
- Variance = 9,000kg Adv.
- Weighted-average standard cost per kg = $19.444.
- Variance = 9,000kg x $19.444/kg = $175,000 Adv.

Here, the yield variance of 9,000kg is valued at the weighted-average standard cost per kg, which is calculated by dividing the revised material cost of $175 per unit by 9kg per unit. Once again, it's the revised standard cost that is used, as this is an operational variance.

Alternatively, the material yield variance can be calculated by comparing the output that should have been produced from the material input with the actual output. The workings are as follows:

- 90,000kg should produce 10,000 cakes.
- 9,000 cakes were actually produced.
- Yield variance = 1,000 Adv
- Standard material cost per unit = $175.
- Yield variance = 1,000 x $175 = $175,000 Adv.

Once all the variances have been calculated, the final task is to work out the actual material cost. For this, you add the actual cost given in the scenario for all three ingredients. This should be calculated independently of the variances, just in case you have made an error in working out any of these variances. But, once you have calculated the actual material cost, you can then check that the budget material cost, plus and minus all the variances, gives the same figure. If it doesn't, then you have made a mistake somewhere and you'll need to check your variance calculations.