

F5 - Activity based costing

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Section A of the F5 syllabus lists five specialist cost and management accounting techniques:

1. Activity-based costing
2. Target costing
3. Life-cycle costing
4. Back-flush accounting
5. Throughput accounting

This article, on activity based costing (ABC,) is the first of a series of three articles explaining and examining these techniques in some detail.

Conventional costing distinguishes between variable and fixed costs. Typically it is assumed that variable costs vary with the number of units output (and that these costs are proportional to the output level) whereas fixed costs do not vary with output. This is often an over-simplification of how costs actually behave. For example, variable costs per unit often increase at high levels of production where overtime premiums might have to be paid or when material becomes scarce. Fixed costs are usually fixed over certain ranges of activity only, then they often step up as additional manufacturing resources have to be employed to allow high volumes to be produced.

Variable costs per unit can at least be measured, and the sum of the variable costs per unit is the marginal cost per unit. These are the extra costs caused when one more unit is produced. However, there has always been a problem dealing with fixed production costs, such as factory rent, heating, supervision and so on. Making a unit does not cause more fixed costs, yet production cannot take place without these costs being incurred. To say that the cost of producing a unit consists of marginal costs only will understate the true cost of production and this can lead to problems. For example, if the selling price is based on a mark-up on cost, then the company needs to make sure that all production costs are covered by the selling price. Additionally, focusing exclusively on marginal costs may cause companies to overlook important savings that might be made by better controlling fixed costs.

The conventional approach to dealing with fixed overhead production costs is to assume that the various types of these costs can be lumped together and a single overhead absorption rate derived. The absorption rate is usually in terms of overhead cost per labour hour or cost per machine hour. This approach is likely to be an over-simplification, but it has the merit of being relatively quick and easy.

Look at the following example:

Budget		Ordinary units		Deluxe units
Units produced		20,000		2,000
Costs per unit:		\$		\$
Material		10		12
Labour	5 hours @ \$12/hour	60	6 hours at \$12/hour	72
Variable overhead	5 hours @ \$1/hour	<u>5</u>	6 hours @ \$1/hour	<u>8</u>
Marginal costs		<u>75</u>		<u>90</u>
Budgeted fixed production overheads are \$224,000.				

The budgeted labour hours must be 112,000 hours. This is derived from the budgeted outputs of 20,000 ordinary units each taking 5 hours (100,000 hours) and 2,000 deluxe units each taking 6 hours (12,000 hours).

Therefore, the fixed overhead absorption rate per labour hour is $\$224,000/112,000 = \$2/\text{hour}$.

The costing of the two products can be continued by adding in fixed overhead costs to obtain the total absorption cost for each of the products.

Budget		Ordinary units		Deluxe units
Units produced		20,000		2,000
		\$		\$
Marginal costs		75		90
Fixed overheads	5 hours @ \$2/hour	<u>10</u>	6 hours @ \$2/hour	<u>12</u>
Total absorption cost/unit		<u>85</u>		<u>102</u>

[For future reference note that the total costs accounted for if production goes according to plan will be = $20,000 \times 85 + 2,000 \times 102 = \$1,904,000$]

The conventional approach outlined above was satisfactory when:

1. Fixed costs were relatively immaterial compared to material and labour costs. That would have been the case in manufacturing environments which did not rely on sophisticated and expensive facilities and machinery.
2. Most fixed costs accrued with time.
3. There were long production runs of identical products with little customization.

However, much modern manufacturing relies on highly automated, expensive manufacturing plants. So much so that some companies do not separately identify the cost of labour because there is so little used. Instead, factory labour is simply regarded as a fixed overhead and added in to the fixed costs of running the factory, its machinery and the sophisticated information technology system which coordinates production.

Additionally, many companies rely on customization of products to differentiate themselves and to enable higher margins to be made. For example, Dell, a PC manufacturer has a web site which lets customers specify their own PC: memory size, disk capacity, processor speed etc. That information is then fed into their automated production system and the specified computer is built, more or less automatically.

Instead of offering customers the ability to specify products, many companies offer an extensive range of products, hoping that one member of the range will match the requirements of particular market segments, In the numerical example set out above, the company offers two products: ordinary and deluxe. The company knows that demand for the deluxe range will be low, but hopes that the price premium that it can charge will still allow it to make a good profit, even on a low volume item. However, the deluxe product could consume resources which are not properly reflected by the time it takes to make those units.

These developments in manufacturing and marketing mean that the conventional way of treating fixed overheads might not be good enough. Companies need to know what causes overheads and need to realise that many of its 'fixed costs' might not be fixed at all. They need to try to assign costs to products or services on the basis of the resources they consume.

For example, examination of the fixed overheads of \$224,000 shows that they consist of:

	\$
Batch set-up costs	90,000
Stores – material handling etc	92,000
Other (rent etc)	<u>42,000</u>
Total	<u>224,000</u>

Ordinary units are produced in long production, each batch consisting of 2,000 units. Deluxe units are produced in short production runs, each batch consisting of 100 units.

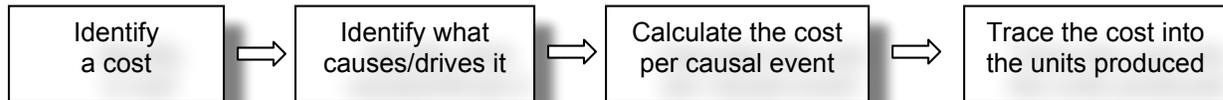
Each ordinary unit consists of 20 components; each deluxe unit of 30 components.

What we want to do is to get a more accurate estimate of what each unit costs to produce and to do this we have to examine what activities are necessary to produce each unit, because activities usually have a cost attached. This is the basis of activity based costing (ABC). The old approach of simply pretending that fixed costs are incurred because of the passage of time, and that they can therefore be accounted for on the basis of labour (or machine) time spent on each unit is no longer good enough. Diverse, flexible manufacturing demands a more accurate approach to costing.

The ABC process is:

1. Identify a distinct 'fixed' overhead cost

2. Identify what activity causes that cost. In ABC terminology that activity is the 'cost driver', but it might be better to think of it as the 'cost causer'
3. Work out the cost incurred each time the activity occurs
4. Determine how many units are made for each incidence of the cost causer. This is likely to vary for each type of unit.
5. Work out the cost that can be traced into each unit produced.



Applying these steps to the fixed cost breakdown shown above:

Batch set-up costs

1. Cost of setups = \$90,000
2. Cost driver (or cost causer) = each batch set-up (presumably)
3. The number of set-ups are:

For ordinary units	$20,000/2,000 = 10$
For deluxe units	$2,000/100 = \underline{20}$
Total set-up occasions	$\underline{30}$

Cost per set-up $90,000/30 = \$3,000$

4. Each set-up produces 2,000 ordinary units
Each set-up produces 100 deluxe units
5. Ordinary units: $\$3,000/2,000 = \1.50 per unit
Deluxe units: $\$3,000/100 = \$30/\text{unit}$.

Material handling costs

1. Cost of material handling
2. Cost driver will be number of components handled (presumably)
3. The number of material handling events for the year = $20 \times 20,000 + 30 \times 2,000 = 460,000$ (from the information given above).

Cost per material handling event = $\$92,000/460,000 = \0.20

4. Each ordinary unit takes 20 items of material
Each deluxe unit takes 30 items of material
5. Each ordinary unit will cost $\$0.2 \times 20 = \$4/\text{unit}$
Each deluxe unit will cost $\$0.2 \times 30 = \$6/\text{unit}$.

Other fixed overheads will have to be absorbed on a labour hour rate because there is no information provided that would allow a better approach:

$\$42,000/112,000 = \$0.375/\text{labour hour}$

The ABC approach to costing therefore results in the following:

Budget		Ordinary units		Deluxe units
Units produced		20,000		2,000
		\$		\$
Marginal costs (as before)		75.00		90.00
Fixed overheads:				
Set up		1.50		30.00
Material handling		4.00		6.00
Other	5 hours @ 0.375	1.875	6 hours @ 0.375	2.25
Total absorption cost/unit		<u>82.375</u>		<u>128.25</u>

[Check: total costs accounted for if all goes according to budget = 20,000 x 82.375 + 128.25 x 2,000 = \$1,904,000, as before]

Comparison of the approaches

	Ordinary units	Deluxe units
Total absorption cost/unit – conventional approach	<u>85.000</u>	<u>102.00</u>
Total absorption cost/unit – ABC approach	<u>82.375</u>	<u>128.25</u>

You will see that the ABC approach substantially increases the cost of making a deluxe unit. This is primarily because the deluxe units are made in small batches. Each batch causes an expensive set-up but that cost is then spread over all the units produced in that batch – whether few (deluxe) or many (ordinary). It can only be right that the effort and cost incurred in producing small batched is reflected in the cost per unit produced. There would, for example, be little point in producing deluxe units at all if their higher selling price did not justify the higher costs incurred.

In addition to better estimating the true cost of production, ABC will also give a better indication of where cost savings can be made. Remember, the title of paper F5 is 'Performance Management' implying that accountants should be proactive in improving performance rather than merely passively measuring costs. For example, a substantial part of the cost of producing deluxe units can be seen to be set-up costs (almost 25% of deluxe units total costs). Working on then principle that large cost savings are likely to be found in large cost elements, management's attention will be drawn to considering how this cost could be reduced. For example, is there any reason why deluxe units have to be produced in batches of only 100 units? A batch size of 200 units would dramatically reduce those set-up costs.

The traditional approach to fixed overhead absorption has the merit of being simple to calculate and apply. However, simplicity does not justify the production and use of information that might be wrong or misleading. ABC undoubtedly requires an organization to spend time and effort investigating more fully what causes it to incur costs, and then to use that detailed information for costing purposes. But understanding the drivers of costs must be an essential part of good performance management.