

Cost accumulation using absorption costing
(Relevant to AAT Examination Paper 3 Management Accounting)

Li Tak Ming, Andy

Deputy Head, Department of Business Administration, Hong Kong Institute of Vocational Education (Kwai Chung)

Introduction

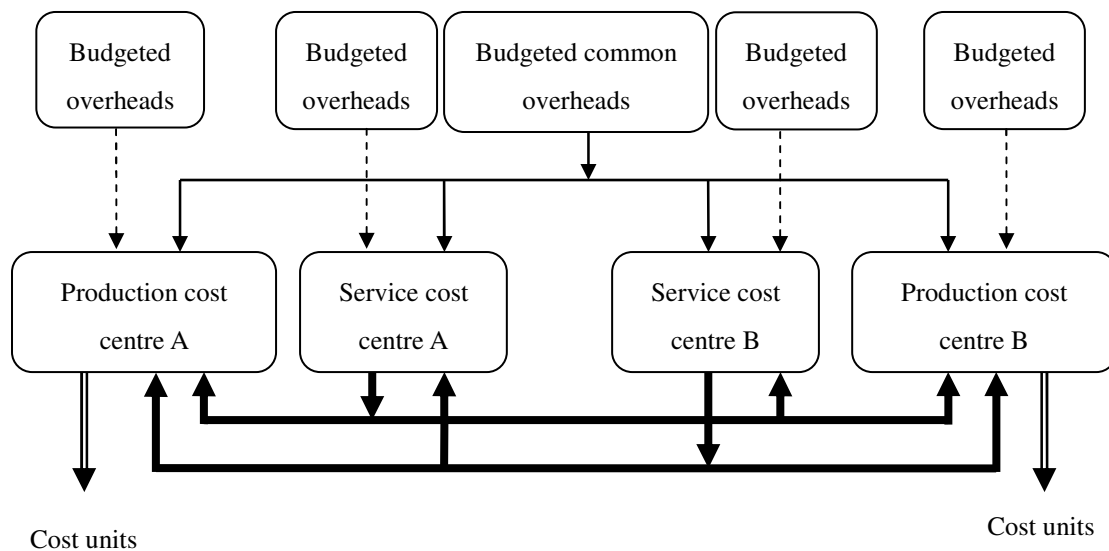
To calculate the full production cost of a product, we need to identify the direct costs (direct materials, direct labour and direct expenses) and the indirect costs (indirect materials, indirect labour and indirect expenses). Indirect costs relating to production are generally called production overheads. Direct costs can be directly identified with a specific product (cost unit). Production overheads cannot be directly identified with a specific cost unit or cost centre. Absorption costing is the most common way of dealing with overheads by assigning an appropriate share of the entity's total overheads in accordance with the required time and effort that has gone into producing the product.

Allocation and apportionment of overhead costs

Overhead costs are usually assigning to a product by a process of allocation, apportionment and absorption.

Figure 1 – Overheads allocation, apportionment and absorption using pre-determined overhead absorption rates

(Source: BAFS in the New World, Accounting – Elective Part 2 Cost Accounting, First Edition 2010, Pilot Publishing Company Ltd., Modified)



Notes:

- > Allocation of budgeted overheads to cost centres
- > Apportionment of budgeted common overheads to cost centres
- > Re-apportionment of budgeted overheads from service cost centres to production cost centres and service cost centres which provided reciprocal services for each other
- =====> Absorption of overheads to cost units using pre-determined overhead absorption rates (POAR)

Cost allocation is the process by which overhead costs are charged directly to a cost centre. For example, the salary of the assembly department foreman will be allocated solely to the assembly department.

Cost apportionment is the process of splitting a common cost between two or more costs centres in proportion to the estimated benefits received. For example, factory rent is split between four departments according to the respective floor areas that they occupy. The most common bases of apportionment are:

<i>Overhead costs</i>	<i>Apportionment basis</i>
Factory rent and rates	Floor area
Insurance, depreciation of plant and machinery	Book value of plant and machinery
Utilities	Consumption
Materials handling	Number of materials requisitions
Canteen and human resources	Number of employees

Example 1 (AAT Paper 3 Management Accounting, December 2010, Modified)

Aries Manufacturing Co. Ltd. provides the following budget information for its four departments for the coming year:

Departments:	Machining	Finishing	Canteen	Repairs	Total
Cost item:	\$'000	\$'000	\$'000	\$'000	\$'000
Allocated overheads	2,000	1,000	200	300	3,500
Factory rent and rates					1,200
Machine depreciation					600
Staff welfare					420

Related statistics and information for the coming year is given below.

Departments:	Machining	Finishing	Canteen	Repairs	Total
Floor area in sq. metres	1,000	2,000	800	200	4,000
Machine values in \$'000	3,000	1,500	200	300	5,000
Number of employees	100	500	40	60	700

Required:

Apportion the common overhead costs among the four departments and indicate the respective basis of apportionment.

	<u>Basis of apportionment</u>	<u>Production departments</u>		<u>Service departments</u>		<u>Total</u>
		<u>Machining</u>	<u>Finishing</u>	<u>Canteen</u>	<u>Repairs</u>	
		<u>\$'000</u>	<u>\$'000</u>	<u>\$'000</u>	<u>\$'000</u>	<u>\$'000</u>
Allocated overheads		2,000	1,000	200	300	3,500
Apportioned overheads:						
Factory rent and floor area rates		300	600	240	60	1,200
Machine depreciation	Machine value	360	180	24	36	600
Staff welfare	Number of employees	<u>60</u>	<u>300</u>	<u>24</u>	<u>36</u>	<u>420</u>
		<u>2,720</u>	<u>2,080</u>	<u>488</u>	<u>432</u>	<u>5,720</u>

Production and service cost centres

It is quite common for manufacturing companies to have both production and service cost centres. Production cost centres are cost centres that produce products: these include the assembly department, machining department and finishing department. Service cost centres are cost centres that provide supportive services to facilitate the production. They include the materials handling department, maintenance department and canteen. The cost of the service cost centres needs to be re-apportioned to the production cost centres before the total overhead costs of the production cost centres are absorbed into the product costs.

Re-apportionment of overheads of service cost centres

When the service cost centres provide services to production cost centres only, the overhead costs of the respective service cost centres will be apportioned to the production cost centres according to the consumption of services.

However, when the service cost centres provide reciprocal services to other service cost centres, the direct allocation method may be used when the inter-service re-apportionments are insignificant. Under this method, service centre costs are re-apportioned only to production cost centres: this ignores inter-service cost centre service re-apportionments.

The other two popular and fairer methods are the repeated distribution method (continuous allotment method) and the algebraic method (simultaneous equation method). Both methods split the overhead costs of the service cost centres between the service recipients on a more equitable basis before their respective costs are

apportioned to production cost centres.

Example 2 (AAT Paper 3 Management Accounting, December 2010, Modified)

Based on the information in Example 1.

The two service departments, the canteen and the repairs department, provide reciprocal services for each other and for the two production departments. The machining department is machine intensive while the finishing department is labour intensive. Other information is given below.

Departments:	Machining	Finishing	Canteen	Repairs	Total
Canteen charged to	30%	50%	-	20%	100%
Repairs charged to	70%	20%	10%	-	100%

Required:

Using (a) the repeated distribution method and (b) the algebraic method separately, apportion the overheads of the two service departments to the production departments. (All allocations are rounded up to the nearest thousand of dollars.)

(a) Using repeated distribution method:

	<u>Production departments</u>		<u>Service departments</u>		Total
	<u>Machining</u>	<u>Finishing</u>	<u>Canteen</u>	<u>Repairs</u>	
	\$'000	\$'000	\$'000	\$'000	\$'000
Allocated and apportioned overheads	2,720	2,080	488	432	<u>5,720</u>
Apportion canteen	146	244	(488)	<u>98</u>	
				530	
Apportion repairs	371	106	53	(530)	
Apportion canteen	16	27	(53)	10	
Apportion repairs	7	2	1	(10)	
Apportion canteen	<u>0</u>	<u>1</u>	<u>(1)</u>	<u>0</u>	
Budgeted overhead	<u>3,260</u>	<u>2,460</u>	<u>0</u>	<u>0</u>	<u>5,720</u>

(b) Using the algebraic method:

Let C be total overhead costs of canteen

Let R be total overhead costs of repairs

$$C = \$488,000 + 10\%R$$

$$R = \$432,000 + 20\%C$$

$$C = \$488,000 + 10\% \times (\$432,000 + 20\%C)$$

$$= \$488,000 + \$43,200 + 2\%C$$

$$98\%C = \$531,200$$

$$C = \$531,200 \div 98\%$$

= \$542,040, or \$542,000 (rounded to nearest thousand of dollars)

R = \$432,000 + 20% x \$542,040

= \$432,000 + \$108,408

= \$540,408, or \$540,000 (rounded to nearest thousand of dollars)

	<u>Production departments</u>		<u>Service departments</u>		Total
	<u>Machining</u>	<u>Finishing</u>	<u>Canteen</u>	<u>Repairs</u>	
	\$'000	\$'000	\$'000	\$'000	\$'000
Allocated and apportioned overheads	2,720	2,080	488	432	<u>5,720</u>
Apportion canteen	162	272	(542)	108	
Apportion repairs	<u>378</u>	<u>108</u>	<u>54</u>	<u>(540)</u>	
Budgeted overhead	<u>3,260</u>	<u>2,460</u>	<u>0</u>	<u>0</u>	<u>5,720</u>

Note: Both the repeated distribution method and the algebraic method yield the same answers.

Absorption of overhead costs to cost units

Once the overhead costs of all service cost centres are re-apportioned to production cost centres, the then overhead costs of all production cost centres are absorbed to cost units (products or services) on a fair and equitable basis.

The absorbed overhead costs are accumulated to the prime cost (direct materials, direct labour and direct expenses) to become the production cost.

Pre-determined overhead absorption rate (POAR)

Under absorption costing, the figure for overhead costs absorbed is not actual overhead costs but rather a value based on a budgeted figure estimated prior to the beginning of the budget period.

Most companies use a pre-determined, as opposed to the actual, overhead absorption rate because actual overheads are not known until the end of an accounting period. It is not realistic to wait until the end of the accounting period to determine the overheads to be allocated to the products. Products are made throughout the accounting year; the use of pre-determined rates enables overheads to be absorbed immediately after production, making it easier to determinate the total product cost. This is particularly needed when a price quotation has to be made.

When a pre-determined annual rate is used, the production overheads absorbed in each output unit tend to be averaged out over the year, while the actual production overheads per unit fluctuates between months.

The pre-determined overhead absorption rate for a production cost centre is calculated by dividing the budgeted overhead costs by the budgeted level of activity of the centre. The choice of absorption basis depends on the nature of the operation of

the production cost centre. Direct labour hours and machine hours are the most popular absorption bases.

Example 3 (AAT Paper 3 Management Accounting, December 2010, Modified)

Based on the information in Example 2.

The budgeted level activities of the two production cost centres for the coming year are:

Departments:	Machining	Finishing	Total
Machine hours	500,000	50,000	550,000
Direct labour hours	20,000	600,000	620,000

Required:

Calculate the appropriate budgeted overhead absorption rate (rounded to the nearest cent) for each production department for the coming year.

Budgeted overhead absorption rate:

Machining department:

$$\$3,260,000 \div 500,000 = \$6.52 \text{ per machine hour}$$

Finishing department:

$$\$2,460,000 \div 600,000 = \$4.10 \text{ per labour hour}$$

Cost accumulation using absorption costing

Example 4 (AAT Paper 3 Management Accounting, December 2010, Modified)

Based on the information in Example 3.

The company is asked to quote a price for an order. The direct costs are as follows:

Direct material	\$210,000
Direct labour	200 hours in the machining department, at \$40 per hour 12,000 hours in the finishing department, at \$50 per hour

The order also requires 10,000 machine hours' work in the machining department. It is the company's policy to add a mark up of 30% to the quotation price.

Required:

Calculate the selling price quoted for the order.

	\$	\$
Direct materials		210,000
Direct labour:		
Machining department ($\$40 \times 200$)		8,000
Finishing department ($\$50 \times 12,000$)		<u>600,000</u>
Prime cost		818,000
Production overheads:		
Machining department ($\$6.52 \times 10,000$)	65,200	
Finishing department ($\$4.10 \times 12,000$)	<u>49,200</u>	
		<u>114,400</u>
Production costs		932,400
Mark up (30%)		<u>279,720</u>
Selling price		<u>1,212,12</u>

References:

Colin Drury, Management and Cost Accounting, 7th Edition 2008, South-Western
Andy Tak-ming Li & Patrick Kin-wai Ho, BAFS in the New World, Accounting –
Elective Part 2 Cost Accounting, First Edition 2010, Pilot Publishing Company Ltd.