The Institute of Finance Management

Department of Accounting and Finance

Lecture Notes
Management Accounting
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Cost Accounting Techniques

1 Income Effect of Alternative Cost Accumulation System

Learning aims

Students should be able to

- Illustrate the overhead cost allocation and apportionment
- Understand the nature of marginal and absorption costing
- Differentiate between marginal and absorption costing
- Prepare profit statements based on marginal and absorption costing
- Explain the differences and reconcile the profits between marginal and absorption costing
- Explain the argument for and against marginal and absorption costing

1.1.1 Introduction

This section will explain and demonstrate the alternative cost accumulation system of marginal costing and absorption costing. The section will then recognize the alternative uses of cost accounting information and the appropriateness of each system to those uses.

1.1.2 Overhead Costs Allocation and Apportionment

Overhead costs are all **costs** on the income statement except for direct labour, direct materials, and direct **expenses**. Overhead costs are also known **as indirect costs;** including accounting fees, advertising, insurance, interest, legal fees, labor burden, rent, repairs, supplies, taxes, telephone bills, travel expenditures, depreciation, advertising, ordering costs, utilities etc.

Allocation and apportionment are methods that are used to assign various overhead costs to their respective cost centres. Allocation can only be used when the entire overhead cost is directly related to one product or department and apportionment is used when proportions of the overhead costs arise from a number of different products or departments.

1.1.3 Overhead Cost Allocation

Overhead cost allocation occurs when overhead costs are charged directly to the cost center. For example, if an air conditioning unit is used separately by one department, the entire cost of using the air conditioner will be allocated to that specific department. There are a number of conditions that needs to be met for an overhead to be allocated. These conditions are that the expense must have been caused by the cost centre and the specific amount of overhead costs should be known. Hence, allocation is the process of charging a cost directly to the source of the expenditure

1.1.4 Overhead Cost Apportionment

Overhead cost apportionment occurs when a specific cost cannot be directly identified with one specific cost centre. Any cost that does not belong to one product or department and is shared by several products/ departments will be divided among these departments using apportionment.

1.1.5 Difference between Allocation and Apportionment

Allocation and apportionment are methods that are used to divide up overhead costs among various cost centres depending on which product, department or cost centre each cost or portions of each cost belongs. The major difference between allocation and apportionment methods are that allocation is used when the overhead cost can be directly related to one product, department or cost centre, and apportionment is used when the overhead cost arises from a number of products or departments. In allocation, the entire amount of the overhead cost will be allocated to one product or department, and in apportionment proportions of the costs will be divided among their respective cost centre.

1.1.6 Overhead Costs Absorption

Absorption of overhead cost is also known as recovery, or application of overhead. Overhead cost absorption refers to the process of absorbing all overhead costs to a particular cost centre, product or department by the base applicable to the cost centre. This is the process by which overhead costs are included in total cost of a product or department.

The apportionment of overhead expenses is done by adopting suitable basis such as output, materials, prime cost, labour hours, machine hours etc. In order to determine the absorption of overhead in costs of jobs, products or department, a rate is calculated and it is called as "Overhead Absorption Rate" or "Overhead Rate." The overhead rate can be calculated as below:

$$\text{OAR(overhead absorption rate)} = \frac{\text{Total Budgeted Overhead of Cost Centre}}{\text{Base Applicable to the Cost Centre}}$$

1.1.7 Methods of Absorption of Overhead

There are a number of methods applicable for computing overhead absorption rate. The following are the various methods of absorbing "Overhead Cost" depending upon the suitable basis selected for the purpose

1. Direct Material Cost Method

2. Direct Labour Cost Method
3. Direct Labour Hours Method
4. Prime Cost Method
5. Unit of Output Method
6. Machine Hour Rate Method

1. **Direct Material Cost Method**: Under this method, the rate of absorption is calculated on the basis of direct material cost method. The rate of manufacturing overhead absorption is determined by dividing the overhead cost by the direct material cost. The result obtained the rate of absorption is expressed as percentage.
2. **Direct Labour Cost Method**: Direct Labour Cost Method is also termed as Direct Wages Method. Under this method direct wage rate can be determined by dividing the estimated factory overhead cost apportioned by the predetermined direct wages, and the result obtained is expressed as a percentage.
3. **Direct Labour Hours Method**: Under this method the rate is determined by dividing the production overheads by direct labour hours of each department. This method is designed to overcome the objections of direct labour cost method. This method is most suitable in such industries where the production is carried out manually or by skilled labours.
4. **Prime Cost Method:** Under this method, both direct material cost and direct labour cost are taken into account for determination of recovery rate. The actual or predetermined rate of factory absorption is computed by dividing actual or budgeted overhead expenses by the aggregate of direct material or direct labour cost of the department.
5. **Unit of Output Method**: This method is also termed as Production Unit Method or Cost Unit Rate Method. Under this method absorption rate is determined on the basis of number of units produced is known as Cost Unit Rate. The recovery rate is calculated by dividing the actual or budgeted factory overheads by the number of cost units produced.
6. **Machine Hour Rate**: Machine hour rate means the cost or expenses incurred in running a machine for one hour. It is one of the scientific methods of absorbing factory expenses where the process of manufacturing are carried out by machines. Under this method overhead costs are allocated on the basis of the number of hours a machine or machines are used for a particular job.

The following data will be used to demonstrate the calculation of various method of overhead absorption rate

Data relating to BM shop for December 2016

Total overhead costs	Shs. 60,000
Total direct labour hours	8,000
Total direct wages	Shs. 16,000
Total direct material used	Shs. 30,000
Total machine hours	12,000
Total units produced	450 units

Calculation of overhead absorption rate

- Direct labour hour overhead absorption rate (OAR)
  OAR = Shs. 60,000/ 8,000hrs = Shs. 7.50 per direct labour

- Direct wages overhead absorption rate (OAR)
  OAR= Shs. 60,000/Shs. 16,000 = 375% of wages

- Direct Material overhead absorption rate (OAR)
  OAR = Shs. 60,000/Shs. 30,000 = 200% of Material

- Prime cost overhead absorption rate (OAR)
  OAR= Shs. 60,000/Shs. 4,600 = 130% of prime cost

- Machine hour overhead absorption rate (OAR)
  OAR = Shs. 60,000/12,000 hrs = Shs. 5.00 per machine hours

- Cost unit overhead absorption rate (OAR)
  OAR = Shs. 60,000/450 units = Shs. 133 per unit produced

1.1.8 Applying the overhead absorption rate

The above example illustrates the most common methods of calculating overhead absorption rates but only one of them would be selected for each cost centre. The example shown below will illustrate the application of overhead absorption rate in the computation the cost of a product.

Unit XA in the BM shop

Direct material	Shs. 23.00
Direct wages	Shs. 27.50
Direct labour hours	12 hours
Machine hours	17 hours

To calculate the full cost of unit XA using a direct labour hours overhead absorption rate

		Shs
Direct material		23.00
Direct labour		27.50
Prime cost		50.50
Overhead cost	12 x Shs. 7.50	90.00
Full cost		**140.50**

Comparison of Alternative Base

Absorption base	OAR	Cost Data	Calculation	OAR per unit
Direct labour hour	Shs. 7.50	12	12 x Shs. 7.50	Shs. 90.00
Direct wages	375%	Shs. 27.50	3.75 x Shs. 27.50	Shs. 103. 13
Direct material	200%	Shs. 23	2 x Shs. 23.00	Shs. 46.00
Prime cost	130%	Shs. 50.50	1.3 x Shs. 50.50	Shs. 65.65
Machine hour	Shs. 5.00	17 hrs	17hrs x Shs.5.00	Shs. 85.00
Cost unit	Shs. 133	1 unit	1unit x Shs. 133	Shs. 133.00

1.1.9 Under Absorption and Over Absorption of Overheads

Absorption of overhead may be based either on the actual rate or predetermined rate. If the actual rates are used, the costs having been actually incurred and overhead absorbed are equal. But in the case of predetermined rates, the costs have been determined in advance of incurrence of the overhead expenditure. This may lead to difference of overhead incurred and overhead absorbed. Such a difference of Overhead is said to be under absorption of overhead or over absorption of overhead. According the term over absorption means that the

amount of overhead absorption is more than the actual overhead is said to be over absorption of overhead. The term under absorption of overhead means that the amount of overhead absorption is less than the actual overhead incurred is said to be under absorption of overhead.

Example 1

Company recovers its overheads based upon direct labour hours. The planned overhead expenditure is Shs. 2,500,000 per month and the planned direct labour hours are 1,000 per month. The results for the first 3 months were as follows:

	Month 1	Month 2	Month 3
Actual Overhead (Shs.)	4,000,000	5,000,000	3,500,000
Direct labour hours	1,000	2,000	2,000

Required:

(a) Compute the overheads absorption rate in each month;

(b) Compute the total overheads over/under-absorbed

Solution:

(a) The pre-determined overhead absorption rate:

= Budgeted overhead cost per month/Budgeted direct labours per month

=Shs. 2,500,000/1,000 hours=Shs. 2,500 per direct labour hour.

	Month 1	Month 2	Month 3
Actual Overhead (Shs.)	4,000,000	5,000,000	3,500,000
Direct labour hours (a)	1,000	2,000	2,000
Overhead Recovery per direct labour hour (b)	2,500	2,500	2,500
Overhead recovered or absorbed (a x b)	2,500,000	5,000,000	5,000,000

(b) The monthly over/under absorption of overheads is the difference between the overhead recovered or absorbed and the actual level of overhead for the period

	Month 1	Month 2	Month 3
Actual Overhead (a)	4,000,000	5,000,000	3,500,000
Overhead recovered (b)	2,500,000	5,000,000	5,000,000
Over/(under) absorbed overhead (a)-(b)	(1,500,000)	0	1,500,000

Example 2

Moro Limited is an engineering company which uses job costing to attribute costs to individual products and services provided to its customers. It has commenced the preparation of its fixed production overhead cost budget for 20X7 and has identified the following costs:

	(Shs.000)
Machining	600
Assembly	250
Finishing	150
Stores	100
Maintenance	80
	1 180

The stores and maintenance departments are production service departments.
An analysis of the services they provide indicates that their costs should be apportioned accordingly:

	Machining	**Assembly**	**Finishing**	**Stores**	**Maintenance**
Stores	40%	30%	20%	—	10%
Maintenance	55%	20%	20%	5%	—

The number of machine and labour hours budgeted for 20X7 is:

	Machining	Assembly	Finishing
Machine hours	50 000	4 000	5 000
Labour hours	10 000	30 000	20 000

Required

(a) Calculate appropriate overhead absorption rates for each production department for 20X7.

(b) Prepare a quotation for job number XX34, which is to be commenced early in 20X7, assuming that it has:

Direct materials costing Shs 2400

Direct labour costing Shs 1500

and requires:

	Machine hours	Labour hours
Machining department	45	10
Assembly department	5	15
Finishing department	4	12

and that profit is 20% of selling price.

(c) Assume that in 20X7 the actual fixed overhead cost of the assembly department totals Shs. 300, 000 and that the actual machine hours was 4,200 and actual labour hours were 30,700. Prepare the fixed production overhead control account for the assembly department, showing clearly the causes of any over-/under-absorption.

Solution

Example 3

A manufacturing company has two production cost centres (Departments A and B) and one service cost centre (Department C) in its factory.

A predetermined overhead absorption rate (to two decimal places of Shs.) is established for each of the production cost centres on the basis of budgeted overheads and budgeted machine hours.

The overheads of each production cost centre comprise directly allocated costs and a share of the costs of the service cost centre.

Budgeted production overhead data for a period is as follows:

	Department A	Department B	Department C
Allocated costs	Shs. 217,860	Shs. 374,450	Shs. 103,970
Apportioned costs	Shs. 45,150	Shs. 58,820	(Shs. 103,970)
Machine hours	13,730	16,110	
Direct labour hours	16,360	27,390	

Actual production overhead costs and activity for the same period are:

	Department A	Department B	Department C
Allocated costs	Shs 219,917	Shs 387,181	Shs. 103,254
Machine hours	13,672	6,953	
Direct labour hours	16,402	27,568	

70% of the actual costs of Department C are to be apportioned to production cost centres on the basis of actual machine hours worked and the remainder on the basis of actual direct labour hours.

Required:

(a) Establish the production overhead absorption rates for the period.

(b) Determine the under- or over-absorption of production overhead for the period in each production cost centre

Solution

(a)

	Department A	Department B
Allocated costs	Shs. 217,860	Shs. 374,450
Apportionment costs	Shs. 45,150	Shs. 58,820
Total dept. overheads	Shs. 263,010	Shs. 433,270
Overhead absorption rate	Shs.19.16 (Shs. 263,010/13,730)	Shs.26.89 (Shs 433,270/16,110)

(b)

	Dept. A Shs	Dept. B Shs	Dept. C Shs
Allocated costs	219,917	387,181	103,254
Apportionment of 70%[a]	32,267	40,011	(72,278)
Apportionment of 30%[b]	11,555	19,421	(30,976)
Total dept. overheads	263,739	446,613	
Overheads charged to prod	261,956 [c]	446,613 [d]	
Under/(over-recovery)	1,783	(9,253)	

Notes

[a] Allocated on the basis of actual machine hours

[b] Allocated on the basis of actual direct labour hours

[c] Shs.19.16 x 13,672 actual machine hours

[d] Shs.26.89 x 16,953 actual direct labour hours

1.1.10 Causes of Under or Overhead Absorption of Overhead

The following reasons for over and under-absorption of overheads:

- Actual overhead cost incurred may be more or less than the applied overhead cost.
- Actual machine hours, labour hours and output may be lower or higher than the budgeted or predetermined base.
- Seasonal fluctuations
- Wrong computation of overhead absorption rate, output and machine hours:
- Under or overutilization of production capacity

1.2 Absorption Costing and Marginal Costing

The main principles underlying the content of this section should be familiar to you from your earlier studies of **cost accounting**. You should already be able to apply a system of **marginal costing** and understand how it differs from **absorption costing**. Whereas absorption costing recognises fixed costs (usually fixed production costs) as part of the cost of a unit of output and hence as **product costs**, marginal costing treats all fixed costs as **period costs**.

1.2.1 Absorption Costing

Absorption costing is the cost system technique whereby the cost of a product or service is established by adding a share of fixed production overheads to direct costs. It is consistent with the requirements for stock valuation in financial reporting. It is usual to absorb production overheads only into product costs. Other overheads are written off as an expense when they arise. Production overhead costs are first allocated, then apportioned and finally absorbed into production costs (or service costs).

Absorption costing means that all of the manufacturing costs are absorbed by the units produced. In other words, the cost of a finished unit in inventory will include direct materials, direct labour, and both variable and fixed manufacturing overhead. As a result, absorption costing is also referred to as full costing or the full absorption method. The cost of a unit of product under the absorption costing system, therefore consists of

1. Direct materials
2. Direct labour and
3. Both variable and fixed production (manufacturing) overhead

Thus, absorption costing allocates a portion of fixed production overhead cost to each unit of product, along with the variable production costs.

Absorption Costing = Direct labour
+
Direct materials
+
Variable production overheads
+
Fixed production overheads

- In absorption costing, inventories of work-in-progress and finished goods are valued at their full production cost.
- In absorption costing, product profitability is measured as sales income from each product minus the full absorption costs of the product.

1.2.2 Marginal Costing

Marginal costing is another method of costing products or services and measuring profitability. Products or services are valued at their marginal cost (variable cost) only. Inventories of work-in-progress and finished goods are valued at their variable production cost. All fixed costs are treated as period costs and charged against profit in the period to which they relate.

- **Contribution** is the difference between sales and the variable cost of sales:

  Contribution = Sales – Variable cost of sales

  Contribution is short for 'contribution to fixed costs and profits'.

In a marginal costing system, the measure of product profitability is the total contribution earned by each product, without charging any fixed costs to the product. Changes in the volume of sales, or in sales prices, or in variable costs will all affect profit by altering the total contribution. Marginal costing techniques can be used to help management to assess the likely effect on profits of higher or lower sales volume, or the likely consequences of reducing the sales price of a product in order to increase demand, and so on.

It should be noted that, under this costing system fixed production overheads are charged in the period incurred as expenses, only variable production costs are charged to cost units. Under marginal costing only those costs of production those vary with output are treated as product costs. These would usually include the following;

1. Direct materials
2. Direct labour and
3. Variable portion of production overhead

However fixed production (manufacturing) overhead is not treated as a product cost under this costing system, rather than fixed production (manufacturing) overhead is treated as a period cost like selling and administrative expenses against the **aggregate contribution**.

The term 'contribution' mentioned above is the term given to the difference between Sales and Marginal cost. Thus

Marginal cost = Direct materials
+
Direct labour
+
Variable production overheads

1.2.3 Features of Absorption and Marginal Costing System:

The main features of absorption costing are as follows

- In absorption costing, items of inventory are costed to include a 'fair share' of fixed production overhead. In this case the value of ending inventory will be higher in absorption costing than in marginal costing.
- As a consequence of carrying forward an element of fixed production overheads in ending inventory values, the cost of sales used to determine profit in absorption costing will include some fixed production overhead costs incurred in a previous period but carried forward into beginning inventory values of the current period and exclude some fixed production overhead costs incurred in the current period by including them in ending inventory values.
- In absorption costing, 'actual' fully absorbed unit costs are reduced by producing in greater quantities,). Thus, Profit per unit in any period can be affected by the actual volume of production.
- In absorption costing, however, the effect on profit in a period of changes in both production volume and sales volume

The main features of marginal costing are as follows:

- **Cost Classification**: The marginal costing technique makes a sharp distinction between variable costs and fixed costs. It is the variable cost on the basis of which production and sales policies are designed by a firm following the marginal costing technique.

- **Stock/Inventory Valuation**: Under marginal costing, inventory/stock for profit measurement is valued at marginal cost. It is in sharp contrast to the total unit cost under absorption costing method.

- **Marginal Contribution**; Marginal costing technique makes use of marginal contribution for marking various decisions, Marginal contribution is the difference between sales and marginal cost. It forms the basis for judging the profitability of different products or departments.

1.2.3 Marginal and Absorption Costing Compared

Advantages of absorption costing

- Fixed production costs can be a large proportion of the total production costs incurred. Unless production overheads are absorbed into product

costs, a large proportion of cost would be excluded from the measurement of product costs.

- Absorption costing follows the matching concept (accruals concept) by carrying forward a proportion of the production cost in the inventory valuation to be matched against the sales value when the items are sold.
- It is necessary to include fixed production overhead in inventory values for financial statements; absorption costing achieves this.
- In job costing, absorption costing can help to decide on the price to quote to a customer for a job. The job cost estimate includes a share of overhead cost, and the price can be decided by adding a profit margin to this estimated cost. This method of 'cost plus pricing' can help to ensure that sales income is sufficient to cover all costs, fixed as well as variable.
- Analysis of under-/over-absorbed overhead may be useful for identifying inefficient utilisation of production resources.
- There is an argument that in the longer term, all costs are variable, and it is appropriate to try to identify overhead costs with the products or services that cause them. This argument is used as a reason for activity-based costing (ABC).

Disadvantages of absorption costing

- The apportionment and absorption of overhead costs is arbitrary.
- Absorption costing is dependent on the levels of output which may vary from period to period, and consequently cost per unit changes due to the existence of fixed overhead. Such changed costs are not helpful for the purposes of comparison and control.
- Profits vary with changes in production volume. For example, by increasing output, more fixed overhead is absorbed into production costs, and if the extra output is not sold, the fixed overhead costs are carried forward in the closing inventory value

Advantages and disadvantages of marginal costing

- Marginal costing has several advantages:
  - Simpler costing system, there is no requirement to apportion and absorb overhead costs.
  - Variable production cost is a more realistic estimate of inventory value than full production cost.

- Marginal costing reflects the behaviour of costs in relation to activity, i.e. when sales increase, the cost of sales rise only by the additional variable costs

- However, marginal costing has weaknesses:
  - When fixed costs are high relative to variable costs, and when overheads are high relative to direct costs, the marginal cost of production and sales is only a small proportion of total costs. A costing system that focuses on marginal cost and contribution might therefore provide insufficient and inadequate information about costs and product profitability.
  - Marginal costing is useful for short-term decision-making but not over the longer term.
  - The treatment of direct costs as a variable cost item is often unrealistic. When direct labour employees are paid a fixed wage or salary, their cost is fixed, not variable.
- Since both absorption costing and marginal costing have advantages and weaknesses as methods of measuring the costs and profitability of products and services, neither can be regarded as superior to the other.

  In view of the recognised weaknesses in both costing methods, new approaches to costing have been devised

1.2.4 Proforma Income Statements for Absorption and Marginal Costing

The following presentations of Performa show the presentation of information according to absorption and marginal costing techniques:

(a) Absorption costing

	Shs	Shs	Shs
Sales			xxx
Opening inventory (full production cost)		xxx	
Production costs:			
Direct materials	xxx		
Direct labour	xxx		
Production overheads absorbed	xxx		
		xxx	
Less closing inventory (full production cost)		xxx	
Production cost of sales:		Xxx	
Production overhead absorbed	xxx		
Production overhead incurred	xxx		
Over-absorbed/(under-absorbed) overheads		xxx	
cost of sale			xxx
Gross profit			xxx
Administration overheads incurred	xxx		
Selling and distribution costs incurred	xxx		xxx
Operating Profit			xxx

(b) **Marginal Costing**

	Shs	Shs	Shs
Sales			xxx
Opening inventory (marginal production cost)		xxx	
Variable production cost incurred:			
Direct materials	xxx		
Direct labour	xxx		
Variable production overheads	xxx	xxx	
Less closing inventory (marginal production cost)		xxx	
Variable production cost of sales		xxx	
Variable selling and distribution costs		xxx	
Total variable cost of sales			xxx
Contribution			xxx
Fixed costs (period costs)			
Fixed production costs	xxx		
Fixed administration costs	xxx		
Fixed selling and distribution costs	xxx		
Total fixed costs			xxx
Profit			xxx

1.2.5 Reconciliation Statement for Marginal Costing and Absorption Costing Profit

The net profit reported by absorption and marginal costing systems may not be the same owing to the differing treatment of fixed production overhead costs. As has been demonstrated above, whilst marginal costing systems treat fixed production overhead costs as period costs (i.e. a charge against profit in the period incurred), in absorption costing systems they are absorbed into the cost of goods produced and are only charged against profit in the period in which those goods are sold.

As a result, if quantities produced and sold in a period are not the same (i.e., if the levels of work-in-progress or finished goods stock change) a different profit will be reported by the two systems. The differing profits can be reconciled, and the

difference explained, by an analysis of the product of the stock change and the fixed production overhead absorption rate

Hence the difference in the profit reported by the two costing systems therefore results from the fixed production overhead cost that is carried forward in inventory in an absorption costing system. Then, the profit can be reconciled as follows;

	Shs
Marginal costing profit	xxx
Add (Closing stock – opening stock) x OAR (fixed prodn.)	xxx
= Absorption costing profit	xxx