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**Course Code: BBM 211**

**Course Title: Cost Accounting**

Instructional materials for distance learning students

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## **COURSE OUTLINE**

### **BBM 211: COST ACCOUNTING**

**Pre-requisites:** BBM 114 and BBM 125

**Purpose:** To provide the student with the knowledge of important concepts and techniques needed by managers in planning, control, management and decision making in business organization

**Course Objectives:** By the end of the course unit the student should be able to:-

- Explain the importance of costing in the management of organizations
- Apply basic costing techniques to account and accumulate input costs to various operating activities of organizations
- Differentiate the different types of costing systems and their applications to different organizations and situations
- Explain the importance of budgeting and responsibility accounting in management of organizations

#### **Lesson 1& 2 (Week 1)**

##### **Introduction to Cost Accounting**

- Definition of and Scope of Cost Accounting
- Purpose of Cost Accounting
- Cost classifications

#### **Lesson 3 & 4 (Week -3)**

##### **Cost Estimation and Forecasting**

- Methods used in Cost Estimation and Forecasting

##### **Material Issue and Stock Control**

- Steps in Procurement of Materials
- Stocktaking
- Issue of Materials to the Production Department
- Cost minimization through Economic Order Quantity (EOD)
- Setting Material Levels

#### **Lesson 5 (Week 4-5)**

##### **Labour Costing**

- Classification of Labour Cost
- Employees Psyche
- Gross Earning Calculation
- Method of Labour Remuneration

#### **Lesson 6 (Week 6 – 7)**

##### **Overheads and Overhead Absorption**

- Bases of Overhead Apportionment
- Overhead Absorption

##### **Continuous Assessment Test (CAT 1)**

#### **Lesson 7 (Week 6- 9)**

##### **Costing Systems**

- Job Costing
- Contract Costing
- Process costing

#### **Lesson 8 & 9 (Week 10-13)**

##### **Standard Costing & Variance Analysis**

- Purpose of Standard Costing
- Budgetary Control and Standard Costing
- Setting Standard Selling Price and Margin
- Definition of Variance Analysis

- Material Cost Variance
- Labour Cost Variances
- Variable Overhead Variances
- Fixed Overhead Variances
- Sales Margin Variance
- Sales Margin Quantity Variance

**Recommended Text Books:**

- Horngren C.T and Foster, G: (1997), *Cost Accounting: A Managerial Emphasis*, (9<sup>th</sup> Edition)
- T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles ltd, Guildford and King's Lynn
- N.A Saleeni (2009) *Cost Accounting Simplified*, Printwell industries ltd.

**Text Books for further Reading:**

- Horngren C.T Sundrem G L and Stratton W. O; (1996), *An introduction to Management Accounting*, Prentice Hall International Inc

**Other support materials:** Various applicable manuals and journals; variety of electronic information resources as prescribed by the lecturer

## LESSON ONE: INTRODUCTION TO COST ACCOUNTING

**Purpose** The main object of this lesson is to introduce the learner to cost accounting uses of cost information; cost concepts and the differences between cost accounting and financial accounting

### Specific Objectives

By the end of the lesson the learner should:

- (i) Define cost accounting
- (ii) Understand the range of information that could be supplied by the cost accounting system.
- (iii) Know the relationships of cost accounting to management accounting and financial accounting
- (iv) Understand how raw data are transformed into information

### 1.1 Definition of and Scope of Cost Accounting

Cost accounting (commonly) termed 'costing' may be defined as:

*'The establishment of budgets, standard costs and actual costs of operations, activities or products; and the analysis of variances, profitability, or the social use of funds'*

The accounting system of any organization is the foundation of the internal financial information system. Management needs a variety of information to plan, to control and to make decisions. Information regarding the financial aspects of performance is provided by the costing system. Examples of information provided by a typical costing system and how it is used are given in the following table and the following paragraphs.

Information provided by costing system	Possible uses by management
Cost per unit of production or service or for a process	As a factor in pricing decisions, production planning and cost control
Cost of running a section, department or factory	Organization planning, decisions on alternative methods, wages cost control
Wages costs for unit of production or per period of production.	Production planning, decisions on alternative methods, wages cost control
Scrap/rectification costs	Material cost control, production planning
Cost behaviour with varying levels of activity	Profit planning, make or buy decisions, cost control

Table 1.1 Examples of costing information and uses

*Cost accounting and control*

An important part of the management task is to ensure that operations, departments, processes and costs are under control and that the organization and its constituent parts are working efficiently towards agreed objectives. Although there are numerous other control systems within an organization, for examples production control, quality control, inventory control, the costing system is the key financial control system and monitors and the results of all activities and all other control systems. The detailed analysis and location of all expenditures, the calculation of job and product costs, the analysis of losses and scrap, the monitoring of labour and departmental efficiency and outputs of the costing system provide a sound basis of information for financial control.

#### Cost accounting and financial accounting

Financial accounting can e defined as:

*‘The classification and recording of the monetary transactions of an activity in accordance with established concepts, principles, accounting standards and legal requirements and their presentation, by means of profit and loss account, balance sheets and cash flow statements, during and at the end of accounting period’*

Financial accounting originated to fulfil the stewardship function of businesses and this is still an important feature. Most of the external financial aspects of the organization, e.g., dealing with accounts payable and receivables, preparation of final accounts etc., are dealt with by the financial accounting system. Of course internal information is also prepared, but in general it can be said that financial accounting presents a broader, more overall view of the organization with primary emphasis upon classification according to type of transaction rather than the cost and management accounting emphasis on the function, activities, products and processes and on internal planning and control information.

#### Difference between financial accounting and cost accounting

Financial accounting	Cost accounting
Provides information to external users	Provides information to internal users
Produces general purpose financial statements	Produces special statements and reports
Must conform to generally accepted accounting principles	Must conform to information needs of management
Provides accounting data in monetary terms	Provides accounting data in monetary and non-monetary terms
Financial statements are prepared on yearly	Cost statements and reports are prepared

or half yearly basis	more frequently i.e. weekly and daily basis
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### *Management Accounting*

Management accounting is defined as:

*‘The application of professional knowledge and skill in the preparation and presentation of accounting information in such a way as to assist management in the formulation of policies and in the planning and control of operations of the undertaking’.*

The provision of information required by management for such purposes such as:

- a) Formulation of policies
- b) Planning and controlling the activities of the enterprise
- c) Decision taking on alternative courses of action
- d) Disclosure to those external to the entity
- e) Disclosure to employees
- f) Safeguarding assets

Management accounting uses both financial and cost information to advise management in planning and controlling the organization.

The objectives of the various facets of accounting have been given above and differences. And the differences discussed. However, it must be realized that all form part of the financial information system of an organization and in many organizations the various facets are totally integrated with no artificial divisions between them.

## **1.2 Purpose of Cost Accounting**

The main purpose or advantages of cost accounting are

- (i) *Cost ascertainment.* The costs of producing different goods or services must be ascertained accurately. These costs consist of material cost, labour costs and overheads.
- (ii) *Controlling.* This is the process by which management makes sure that intended and desired results are consistently and continuously achieved. This consists of; establishing of standards, comparison of results against standards and correction of deviations.
- (iii) *Disclosure of waste.* Costs incurred for the production of any commodity can be determined in advance in view of the past experience. If actual costs are higher than the expected or standard costs then this excessive costs can be analyzed. These excessive costs may be due to wastage of raw materials or idle labour time.



- (iv) *Decision making* management is responsible for decisions regarding what goods/services should be produced and in which quantity. Cost accounting information provides information for making these decisions.
- (v) *Cost control* this is an important function of management. Material cost, labour cost and overheads must be maintained at desirable levels. Cost accounting principles are used to eliminate unnecessary costs.
- (vi) *Evaluation of alternatives* Management is frequently confronted with decisions involving choice from different alternative courses of action e.g., whether to make or buy a product, whether to continue or discontinue a product/service etc. Cost accounting provides information as to how future costs and revenues will be affected under each alternative thus assisting management in taking an appropriate selection.
- (vii) *Planning* is the process of setting objectives and then determining the steps required to attain them. It is the activity by which managers analyze present conditions to determine ways of reaching the desired future. Planning requires appropriate information and cost accountants makes analysis of costs of past operations. These costs are adjusted to reflect changes in products, technology, volume, production efficiency, input cost etc.
- (viii) *Pricing of products and projects* This involves determination of prices of new products adjustment in prices of existing products as well as determination of bid prices for contracts. The decision of setting prices is based on cost data collected.
- (ix) *Measurement of efficiency* Cost data are used to measure the efficiency of an organization in utilization of resources employed in production process.
- (x) *Inventory management* costing assists in inventory management by keeping accurate and complete records of materials from time they enter into premises till the time they are used in production process.
- (xi) *Evaluation of profitability* Costing provides information for evaluating the profitability of an activity, department or the entire organization.

#### *Conditions for Effective Costing System*

A costing system is designed in accordance to the requirements of the organization. The system should simple, economical and practicable. The main conditions are:

- (i) There must be a proper system of store and stock control
- (ii) There must co-operation and co-ordination among the staff members of the organization.

- (iii) The wages procedure must be proper and satisfactory. Labour costs should be charged to respective jobs accurately.
- (iv) Standard printed forms must be used for recording the receipts of materials and issues, recording labour hours worked and calculations and other activities of the organization.
- (v) The overheads must be recorded accurately and these must be charged to respective production departments
- (vi) The costing department must be established. The responsibilities and duties of cost accountant should be clearly stated.
- (vii) The cost accounts and financial accounts should be maintained in a way that results can be reconciled easily.

### **1.3 Summary**

- (i) Cost accounting is concerned with the ascertainment and control of costs
- (ii) The purpose of cost accounting is to provide detailed information for control, planning and decision making.
- (iii) To be of use, costing information must be appropriate, relevant, timely, well presented and sufficiently accurate for the purpose intended.
- (iv) Cost accounting and management accounting are closely related.
- (v) The emphasis of financial accounting is upon classification by type of transaction and type and type of expenditure rather than the functional analysis of cost accounting.
- (vi) Cost, financial and management accounting all contribute to the financial information system of an organization and increasingly in practice are totally integrated.

### **1.3 Review Questions**

1. Define cost accounting?
2. Give six examples of costing information and its uses
3. What is the relationship between costing, management accounting and financial accounting?
4. Describe the main purposes of cost accounting

### **1.4 References**

T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles Ltd, Guildford and King's Lynn (Pages 1-6)  
Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries Ltd. (Pages 1-21)



## LESSON TWO: COST CLASSIFICATION

**Purpose:** the main object of this lesson is to introduce the learner to various methods of cost classification and the reason behind these classifications.

### Specific Objectives

By the end of the lesson the learner should:

- (i) Define the term cost classification and the explain the rational
- (ii) Describe the various cost classifications

### 2.1 A Cost

This may be defined as:

‘The amount of expenditure (actual or notional) incurred on, or attributable to, a specified thing or activity.’

At the simplest level, cost includes two components, quantity used and price, ie,

Cost = quantity used x price

Cost units

The cost unit to be used in any given situation is that which is most relevant to the purpose of the cost ascertainment exercise. This means that in any one organization numerous cost units may be used for particular parts of the organization or for differing purposes.

The main elements of costs are:

- a) Raw material this usually form a high proportion of the total cost of production
- b) Labour
- c) Overheads

### 2.2 Classification of Costs

Classification is the process of grouping costs recording to their common characteristics. Classification of cost is done in order to be concise of every cost incurred in the process of manufacture so that such costs can be accurately recorded, monitored and controlled. They are various ways of grouping cost:-

1. *Function classification* A business has to perform a number of functions e.g. manufacture, administration, selling, distribution and research. On this basis costs are classified into the following;
  - a) *Manufacturing /production / factory cost* This are costs related to the manufacturing process e.g. material cost, labour, cost and factory cost such as rent, depreciation of machinery, power and lighting etc.

b) *Administrative costs* include all expenditure incurred in formulating policies, directing the organizations and controlling the operation of an undertaking such as audit fee, office rent, salaries etc.

c) *Selling cost* are costs of seeking to create and stimulate demand and to serve orders e.g. advertising, salaries and commission of salesmen etc.

d) *Distribution expenses* are cost incurred to avail the product to the final consumer. E.g. packing cost, carriage outward, warehousing cost etc.

e) *Research and development cost* this is the cost of searching new and improved products and methods. E.g. wages and salaries of research staff, payment to outside research organizations etc.

## 2. Classification according to behaviour or variability

- a) *Fixed cost* – This is a cost which does not vary with activities or output. It remains constant within the relevant range as shown in Figure 2.1. A relevant range is range within which relationship between cost and activity hold.

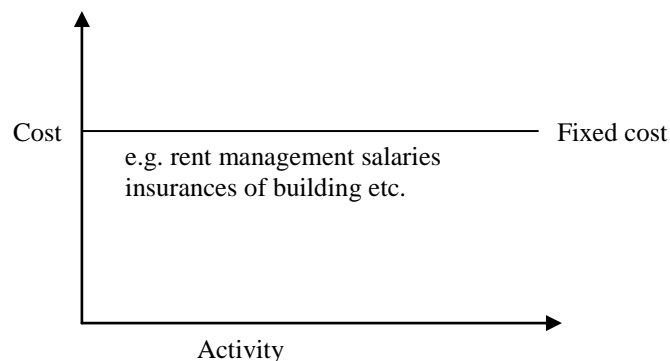


Figure 2.1 Fixed costs

- b) *Variable cost* is costs that vary in direct proportion to the volume of output. When volume of output increases variable cost also increases and vice versa as indicated in Figure 2.2.

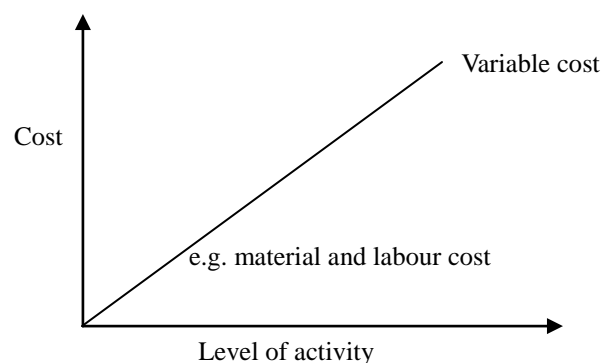


Figure 2.2 Variable costs

- c) *Semi variance cost* These are costs that are partially fixed and partially variable. A semi-variable cost has often a fixed element below which it will not fall at any level of output. The variable element is a semi-variable cost changes either at a constant rate or in lumps. E.g. electricity bill which has a fixed element in it below which it cannot follow and a variable element that changes based on the power consumptions as shown in Figures 2.3 and 2.4.

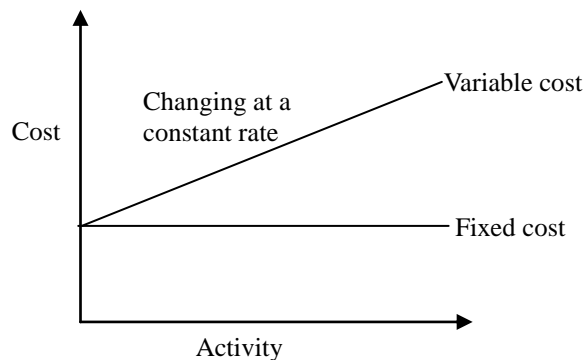


Figure 2.3 Fixed element

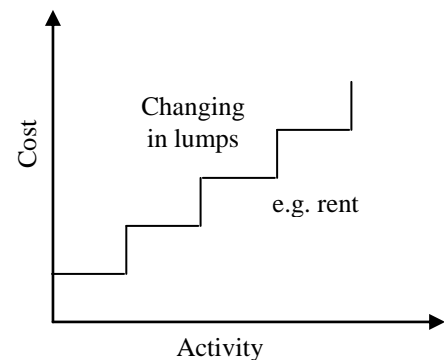


Figure 2.4 Changing in lumps

### 3. Product cost and period cost

- a) *Product cost* is costs necessary for production and can not be incurred in case there is no production. They include; cost of direct materials, direct labour and some of the factory overhead. They are called production costs because they are included in the course of production.
- b) *Period costs* are costs which are not necessary for production and they are written as expenses in the period in which they are incurred. They are incurred for a time period and are charged to the income statement for the period e.g. rent salary of company executives, travel expenses etc.

### 4. Classification according to identifiability with the product

- a) *Direct costs* are costs which are incurred for and may be conveniently identified with a particular cost unit process or department such as direct labour, direct materials etc.
- b) *Indirect costs* are costs which can not be conveniently identified with a particular cost unit process or department. They are general cost incurred for the benefit of a number of cost unit or cost centres such as salary paid to a factory foreman.

### 5. Classification according to controllability

- a) *Controllable costs* are costs that may be directly regulated by a given level of managerial influence. E.g. variable costs are generally controllable by department heads.

- b) *Uncontrollable costs* are costs that cannot be influenced by the action of a specified member of the enterprise e.g. fixed cost like rent are generally uncontrollable.
6. *Special cost for managerial decision making*
- a) *Relevant costs* are costs which changes from one decision to the next and as such relevant cost will be affected by the decision being made under different alternatives. In decision making management will be concerned with those costs that differ from one decision to another.
- b) *Sunk or irrelevant cost* These are cost which have been already been incurred in the past and cannot be changed. They are irrelevant in decision making.
- c) *Incremental cost / differential costs* This is an increase or decrease in cost as a result of an alternative course of an action.
- d) *Marginal or variable cost* It is the cost of producing an extra unit of a commodity.
- e) *Replacement cost* This market value of replacing an existing asset.
- f) *Opportunity cost* It is the sacrifice involved in accepting the alternative under consideration.
7. *Classification according to time*
- a) *Historical costs* are costs ascertained after they have been incurred. They are the actual costs which are only available after completion of the manufacturing process.
- b) *Predetermined costs* They are future costs that are ascertained in advance of production on the bases of all specified factors affecting cost.

### *Concepts of Cost accounting*

*Cost per unit* this may be unit of a product service all time in relation to which cost may be ascertained all expressed. There are the things that the business is set up to provide which cost to ascertained. E.g. kilowatt in case of power consumption meals in case of a hotel passages in case of transport.

*Profit centre* `this may be defined as subdivision within an organization operating on a self contained bases. Usually it will be a cost and an income earning subdivision hence producing profit measurable as a return on capital employed.

## **2.3 Review Questions**

1. What is meant by the tem 'classification of costs'? Explain various types of cost classifications.
2. Write short notes on
  - a) Cost unit

- b) Cost centre
- c) Profit centre
- d) Cost behaviour

## **2.4 References**

Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 22-43)

T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles ltd, Guildford and King's Lynn (Pages 20-26)



### LESSON THREE: COST ESTIMATION AND FORECASTING

**Purpose:** To introduce the learner the various techniques which can be used to separate mixed costs and to formulate linear prediction equation in the form  $y = a + bx$ . The equation is to be used to estimate and forecast future cost.

#### Specific Objectives

By the end of the lesson the learner should:

- (i) Explain the terms 'cost estimation and forecasting'
- (ii) Describe the various methods of cost estimation

#### 3.1 Methods used in Cost Estimation and Forecasting

Cost estimation is a procedure used to measure costs of various items used in the process of production. While cost forecasting is the process of accurately determining in advance the cost that will be incurred in the process of manufacturing a particular product over a given future period. There are various methods that can be applied by management accounts in cost estimation and forecasting. The methods that can be used for this purpose are:-

- a) *Accounts classification (separating mixed costs)* entails the examination of accounts and regards and classifying each item of expenditure into fixed, variable and semi variable. Although the method is quick and inexpensive and it is considerably subjective and inaccurate.
- b) *Industrial engineering (cost estimation and forecasting)* this is considered is the most scientific method of establishing a cost standard. Work study techniques are applied to determine levels of input needed to satisfy given levels of outputs. Those, inputs are then turned into standards in order to estimate product cost in the future.

##### *Advantages*

- 1. It enables an organization to determine the most effective way to apply resources.
- 2. Standard can be set using efficient usage.
- 3. There is control of operation by comparing actual results with the expected results

##### *Disadvantages*

- 1. It is costly to use as it involves experts.
- 2. It is not effective for controlling many types of overhead costs.
- 3. It is not easy to apply in non-manufacturing activities since relationship between cost and output cannot be determined.

c) *High – low method (used for separating cost and cost estimation and forecasting).*

This method examines cost at high and low levels making an assumption that the increase in cost between the two levels is directly due to the increase in activity and therefore represent the variable cost. Two previous accounting periods are chosen one with the highest activity level and other lowest activity level.

*Steps involved*

- i) Select highest and the lowest activity level.
- ii) Select corresponding highest cost and lowest corresponding cost.
- iii) Obtain the difference in cost and the difference in activity level.
- iv) Divide the difference in cost by difference in activity to get the rate of variable cost.
- v) Compute fixed cost by subtracting variable from total cost.
- vi) Formulate linear prediction equation.

*Example 3.1*

The following data is provided:

Batch Size	Labour Cost (Sh)
15	180
12	140
20	230
17	190
12	160
25	300
22	270
9	110
18	240
30	320

*Required:* Formulate linear prediction equation and estimate total cost for a batch of 35.

*Solution*

	Cost		Activity
High	320	} Fixed cost	30
Lowest	110		9
	210		21

Rate of variable cost =  $\frac{210}{21} = 10$  = per batch size

21

Computation of fixed cost

Total cost 320

V. C. sh  $10 \times 30$  300

20

$Y = a$  (fixed cost) +  $bx$  (rate of v)

$Y = 20 + 10x$

$= 20 + 10 \times 35$

$= \underline{370}$

*Example 3.2*

Nixon an automobile technician has been operating a garage in Mombasa for the past two years. A year ago he converted part of his garage to a welding shop making and selling metal doors and windows. He had anticipated that the cost of the welding shop would primary be final but has realized that the welding cost increased with the increase in with number of

Period	No. of welding job assignment	Total cost '000' in sh
September 2008	280	700
October 2008	800	860
November 2008	1240	110
December 2008	1000	960
January 2009	600	720
February	920	910
March 2009	860	880
April 2009	1200	260

welding job assignments. The costs of welding job assignments are as follows.

*Required:* Formulate an equation to estimate the total cost of the welding shop and compute the cost of undertaking 1256 assignments using:

- (i) High – low method
- (ii) Simple linear regression method

*Solution* (using High-low method)

	Cost	Activity
High	110,000	1,240
Low	<u>700,000</u>	<u>280</u>
	490,000	960

$$\text{Rate of variable cost} = \frac{490,000}{960} = 427.08$$

Total cost	700,000
Variable costs (V.C) sh 427.08 x 280	<u>(119,583)</u>
Fixed costs (F.C)	580,417

$$Y = a (\text{fixed cost}) + bx (\text{rate of } v)$$

$$Y = 580,417 + 427.08x$$

$$\text{Estimation: } y = 580,417 + 427.08 \times 1,256 = 116,829.1$$

#### *Advantages of the high low method*

1. It is easy to use.
2. The lowest and the highest item will cover the relevant range.
3. It takes into account possible extremes of cost.

#### *Disadvantages*

1. It is not logical to use two points to represent all the points.
  2. The estimated cost function poorly describes the actual cost relationship.
  3. Costs are not properly matched with the independent variable.
- d) *Linear regression analysis* is a mathematics technique from which the case function  $y = a + bx$  can be derived. It is commonly known as the method of mixed squares because the mathematics that is used tries to equate the sum of squared distances above the line of best fit to those below it. A regression equation utilizes historical data to estimate the relationship between the dependent variable  $y$  and one or more independent variables.

The method tries to estimate mathematically the line of best fit.

In obtaining the values of  $a$  and  $b$  the following equations are used:

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$a = \frac{\sum y - b \sum x}{n}$$

Where  $n$  is the number of pairs of data.

#### *Example 3.3*

The following data relates too Warp limited which process a single data type of a chemical.

Overhead processing cost for the last 13 accounting periods each of four weeks has been as follows.

Period	(X) Output Unit (000)	(Y) Overhead Sh (000)	XY	X <sup>2</sup>	Y <sup>2</sup>
1	120	770	92,400	14,400	592,900
2	150	820	123,000	22,500	672,400
3	160	810	129,600	25,600	656,100
4	170	830	141,100	28,900	688,900
5	200	960	192,000	40,000	921,600
6	170	900	153,000	28,900	810,000
7	200	940	188,000	40,000	883,600
8	200	950	190,000	40,000	902,500
9	180	940	169,200	32,400	883,600
10	160	870	139,200	25,600	756,900
11	140	800	112,000	19,600	640,000
12	150	820	123,000	22,500	672,400
13	140	790	110,600	19,600	624,100
	2,140	11,200	1,863,100	360,000	9,705,000

*Required:* Devise a formula to assist in the preparation of overhead budget for the following years.

$$b = \frac{13 \times 1,863,100 - (2,140 \times 11,200)}{13 \times 360,000 - (2,140)^2}$$

$$= \frac{252,300}{100,400} = 2.513$$

$$a = \frac{(11,200 - 2.513 \times 2,140)}{13} \times 1000$$

$$= 447.87 \times 1000 = 447,870$$

$$y = 447,870 + 2.51x$$

*Coefficient of correlation (r)*

Correlation means a relationship between two variables. The strength of linear relationship between two variables is determined by the use of a coefficient of correlation. Two pairs of data may be positively or negatively correlated as shown in Figures 3.1 and 3.2.

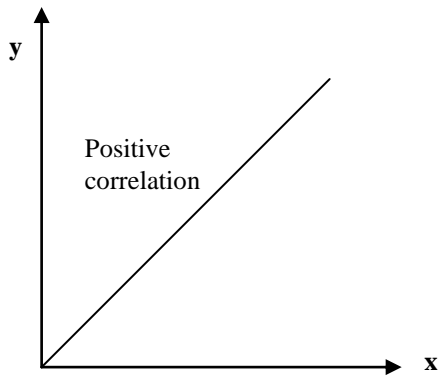


Figure 3.1 Positive correlation

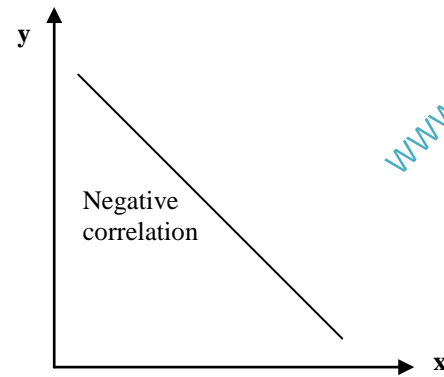


Figure 3.2 Negative correlation

Correlation coefficient range between 1 and -1. The closer the correlation coefficient to positive one the strong is the positive correlation and the more close correction coefficient is to negative 1 the strong is the negative correction. Correlation coefficient is given by the following formular.

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{\{n \sum x^2 - (\sum x)^2\} \{n \sum y^2 - (\sum y)^2\}}}$$

$$= \frac{13 \times 1,863,100 - 2140 \times 11200}{\sqrt{\{13 \times 360000 - (2140)^2\} \{13 \times 970,500 - (11200)^2\}}}$$

$$= \frac{252300 \times 1000}{\sqrt{\{13 \times 360000 - (2140)^2\} \{13 \times 970,500 - (11200)^2\}}}$$

$$= \frac{252300}{\sqrt{100400 \times 25000}}$$

$$= 0.9352$$

*Coefficient of determination ( $r^2$ )* this is used to determine how much of the change in y is a result of change in x. It is obtained by squaring coefficient of correlation. From the coefficient calculated, above the coefficient of determination is  $(0.9352)^2 = 0.87$  or 87%. It means that 87% of the change in overhead cost is due to output other factors cause 13% change in the overhead cost.

e) *Scatter graph* is a graphical method of data estimation. Two pairs of data are plotted as single points on a graph and then joined using the line of best fit. The gradient of the line

of best fit is the rate of variable cost and the y intercept represent fixed cost as indicated in Figure 3.3. Compared to other methods it is inaccurate and subjective.

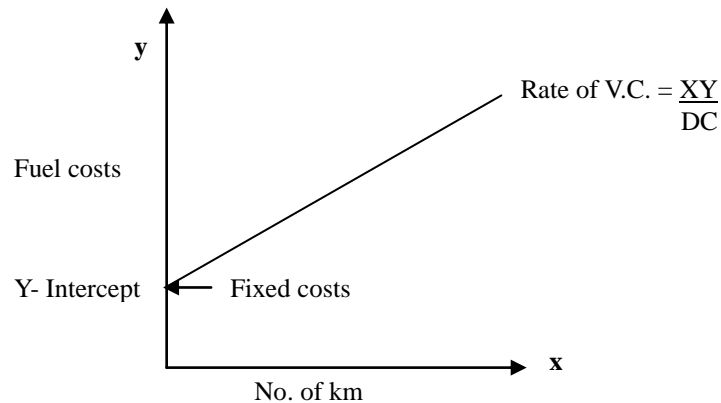


Figure 3.3 Line of best fit

- f) *Learning curve theory* also referred to as improvement curve theory. It occurs when new methods are introduced or new products are made. It is based on proposition that as workers continue doing the same job over and over again experience is gained the time taken to complete a job or a unit of a product reduces by a certain constant referred to as learning coefficient. It is therefore possible to determine time taken or time to be taken to complete certain number of units and hence the cost of labour learning effect and effect labour cost.

### 3.2 Review Questions

1. Briefly explain methods that can be used in cost estimation
2. The costs incurred in two periods were as under

Period	Costs Kshs	Units produced
1	25,000	2,000
2	30,000	2,500

Find out the fixed and variable costs of these two periods

3. The information given relates to Wasp Ltd., which manufactures a single type of chemical. Overhead processing costs for the last thirteen accounting months (of four weeks each) have been as follows:

Period	Overhead cost Sh. '000'	Output '000 tones
1	770	120
2	820	150
3	810	160
4	830	170

5	960	200
6	900	170
7	940	200
8	950	200
9	940	180
10	870	160
11	800	140
12	820	150
13	790	140

Required:

Describe a formular to assist in predicting the overhead budget for the thirteen months

### 3.3 References

Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 325-327)



## LESSON FOUR: MATERIAL ISSUE AND STOCK CONTROL

**Purpose:** the main object of this lesson is to introduce the learner to various methods of accounting for material issue from the stores and valuation of closing stock

### Specific Objectives

By the end of the lesson the learner should:

- (i) Describe the steps involved in purchasing of materials
- (ii) Explain types of purchasing systems
- (iii) Understand the principles of material control
- (iv) Know the elements of storekeeping and stocktaking

### 4.1 Steps in Procurement of Materials

1. Requisition by user department using the purchase requisition note.
2. Selection of suppliers inviting tenders and giving the tender to the best bidder.
3. The purchase department orders the goods using the local purchase order.
4. Delivery of goods.
5. Inspection of goods using inspection notes.
6. Accepted goods are received in the stock.
7. Issue of materials to the factory or the user department.

### 4.2 Purchasing Systems

- a) *Centralized system* In this case the duty and responsibility of purchasing is done by one purchaser in purchasing department.
- b) *Decentralized system* the duty and responsibility of purchasing is placed with individual branch department or geographical department.

#### *Advantages of centralized system*

- i) Less expensive since few activities are concentrated in one department.
- ii) There is better control because of effective and efficient monetary.
- iii) There is more accountability.
- iv) There is bulk buying hence economies of scale are enjoyed.
- v) Fewer staffs are employed.
- vi) There is expertise in buying due to specialization.

**N/B:** The advantages of centralization are the disadvantages of decentralization.

#### *Advantage decentralization*

- i) Reduces risk since purchasing is spread to many department.
- ii) It is specialized in terms of specific material requirement.
- iii) There is accountability.
- iv) Less bureaucratic.
- v) There are 6 minimum production breakdown due to the short time required in having the materials.

*N/B: The advantages of decentralized are the disadvantages of centralization.*

### **4.3 Stocktaking**

There are two approaches to the task of stocktaking; periodic (usually annual and continuous

#### *Periodic Stocktaking*

The objective of periodic stocktaking is to find out the physical quantities of materials of all types at a given date. This is a substantial task even in a modest organization and becomes difficult if not impossible task in a large firm. The following factors should be considered:

- (i) Adequate number of staff should be available who should receive clear and precise instructions on the procedures
- (ii) Ideally the stock take should be done on a weekend so as not to interrupt with production
- (iii) The stock take should be organized into clearly defined physical areas and the checkers should count or estimate all materials in the area.
- (iv) Adequate technical assistance should be available to identify materials, part no's etc. far greater errors are possible because of wrong classification than wrong counting.
- (v) Great care should be taken to ensure that only valid stock items are included and their correctness.
- (vi) The quantities of each material should be checked against the stock record to expose any gross errors which may be due to stocktaking errors or faults or error in recording system.
- (vii) The pricing and extension of stock sheets, where done manually, should be closely controlled. Frequently the pricing and value calculations are done by computer, the only action necessary being to input quantities and stock and part numbers.

#### *Continuous stock taking*

To avoid disruptions caused by periodic stock taking and to be able to use better trained staff, many organizations operate a system whereby a proportion of stock is checked daily so that over the year all stock is checked at least once and many items particularly the major value of

fast moving items, would be checked several time. Where continuous stock taking is adopted, it is invariably carried out by staff independent from the storekeepers.

Continuous stock taking is absolutely essential when an organization uses what is known as the perpetual inventory system. This is a stock recording system whereby the stock balance is shown on the record after every stock movement, either issue or receipt. With this system the balances on the stock record represent the stock on hand and the balances would be used in monthly and annual accounts as the inventory system is functioning correctly and that minor stock discrepancies are corrected.

#### *Just-in-time (JIT) systems*

JIT were developed in Japan, notably at Toyota, and are considered as one of the main contributions to Japanese manufacturing success.

The aim of JIT systems is to produce the required items, of high quality, exactly at the time they are required. JIT systems are characterized by the pursuit of excellence at all stages with a climate of continuous improvement.

A JIT environment is characterized by:

- a) A move towards zero inventory
- b) Elimination of non-value added activities
- c) An emphasis on perfect quality i.e. zero defects
- d) Short set-ups
- e) A move towards batch size of one
- f) 100% on time deliveries
- g) A constant drive for improvement
- h) Demand- pull manufacture

Production only takes place when there is actual customer demand for the product so JIT works on a pull-through basis which means that products are not made to go into stock.

#### *Benefits from JIT*

- (i) Lower investment required in all forms of inventory
- (ii) Space savings from the reduction in inventory and improved layouts.
- (iii) Greater customer satisfaction resulting from higher quality better deliveries and greater product variety
- (iv) The buffers provided by traditional inventories masked other areas of waste and inefficiency, supplier unreliability and so on. Elimination of these problems improves performance dramatically.

- (v) The flexibility of JIT and ability to supply small batches enables companies to respond more quickly to market changes and to be able to satisfy market niches.

#### 4.4 Issue of Materials to the Production Department

Materials may be purchased in different batches at different prices. When they leave the store they need to be valued for the purpose of attaching value to units produced and for the purpose of valuing the stock that remains. Various methods that can be used for this purpose are:

- i) First in first out (FIFO)
- ii) Last in first out (LIFO)
- iii) Weighted Average Method
- iv) Simple average method
- v) Others

A store, ledger card is used to show materials issues out of the store.

*First In First Out (FIFO)* Under this method the price of batch that come first into the store is used until all the units in the batch are exhausted when the price of the next batch is used and so on.

##### *Exercise 4.1*

The following information is provided

Jan 1: Purchased 10 units @ sh10/=

Jan 3: Purchased 12 units @ sh11/=

Jan 5: Issued 20 units

Jan 8: Purchased 15 units @ sh12/=

Jan 9: Issued 10 units

Jan 13: Purchased 20 units @ sh11/=

Jan 17: Issued 8 units

Jan 19: Issued 9 units

Jan 21: Purchased 16 units @ sh13/=

Jan 25: Purchased 10 units @ sh12/=

Jan 28: Issued 16 units.

Jan 30: Purchased 12 units @ sh13/=

Jan 31: Issued 8 units.

*Required:* Using FIFO compute the value of issues and closing stock at 31<sup>st</sup> January using a store ledger card.

Store Ledger Card: FIFO method

Date	Receipts			Issues			Balance		
	Unit	Unit Price	Amount	Unit	Unit Price	Amount	Unit	Unit Price	Amount
Jan 1	10	10	100				10	10	100
Jan 3	12	11	132				22	11	232
Jan 5				10	10	100	2	11	22
				10	11	110			
Jan 8	15	12	180				2	11	22
							12		180
									202
Jan 9				2	11	22	7	12	84
				8	12	96			
Jan 13	20	11	220				7	12	84
							20	11	220
									304
Jan 17				7	12	84	19	11	209
				1	11	11			
Jan 19				9	11	99	10	11	110
Jan 21	16	13	208				10	11	110
							16	13	208
									318
Jan 25	10	12	120				10	11	110
							16	13	208
							10	12	120
									438
Jan 28				10	11	110	10	13	130
				6	13	78	10	12	120
									250
Jan 30	12	13	156				10	13	130
							10	12	120
							12	13	150
									406
Jan 31				8	13	104	2	13	26
							10	12	120
							12	13	156
									302

Value of closing stock

2 units @ sh 13      26

10 units @ sh 12      120

12 units @ sh 13      156

24 Units                      302

*Last in first Out (LIFO)* Under this method issues are made using the price of batch that come last into the store until that batch has exhausted then, the price of the next is used and so on.

*Exercise 4.2:*

Using the details of the previous example shows stores ledger card using LIFO

Stores Ledger card: LIFO Method

Date	Receipts			Issues			Balance		
	Unit	Unit Price	Amount	Unit	Unit Price	Amount	Unit	Unit Price	Amount
Jan 1	10	10	100				10	10	100
Jan 3	12	11	132				10	10	100
							12	12	132
							} 232		
Jan 5					12 } 20 8 }	11 } 20 10 }	2	10	20
Jan 8	15	12	180				2 } 17 12 }	10 } 17 12 }	22 } 200 180 }
Jan 9				10	12	120	2 } 7 5 }	10 12	20 } 80 60 }
Jan 13	20	11	220				2 } 27 5 }	10 12	20 } 300 60 }
							20	11	220
Jan 17				8	11	88	2 } 19 5 }	10 12	20 } 212 60 }
							12	11	132
Jan 19				9	11	99	2 } 10 5 }	10 12	20 } 113 60 }
							3	11	33
Jan 21	16	13	208				2 } 26 5 }	10 12	20 } 321 60 }
							3	11	33

							16	3	208
Jan 25	10	12	120				2 5 3 16 10	10 12 11 13 12	20 60 33 208 120
Jan 28				10 6	12 13	120 78	2 5 3 10	10 12 11 13	20 60 33 130
Jan 30	12	13	156				2 5 3 10 12	10 12 11 13 13	60 33 20 130 156
Jan 31				8	13	104	2 5 3 10 4	10 12 11 13 13	20 60 33 130 52

*Value of closing stock*

2 units @ sh 10	20
5 units @ sh 12	60
3 units @ sh 11	33
10 units @ sh 13	130
<u>4 units @ sh 13</u>	<u>52</u>
<u>24</u>	<u>295</u>

*Weighted Average Method* Under this method a weighted average price is calculated every time materials are received into the store and that price is used in the valuation of issues until a new batch is received into the store when another weighted average price is calculated.

This formular is used

$$\text{Weighted average Price} = \frac{\text{Value of issues}}{\text{No. of units in stock}}$$

#### Exercise 4.3

Using details of previous example shows stores ledger card using weighted average price.

Date	Receipts			Issues			Balance		
	Unit	Unit Price	Amount	Unit	Unit Price	Amount	Unit	Unit Price	Amount
Jan 1	10	10	100				10	10	100
							}		100
Jan 3	12	11	132				10	10	100
							12	11	132
							}		232
Jan 5				20	10.5	210	2	10.5	21
Jan 8	15	12	180				2	10.5	21
							15	12	180
							}		201
Jan 9				10	11.8	100.89	10	11.12	112.1
Jan 13	20	11	220				7	11.8	82.6
							20	11	220
							}		302.
Jan 17				8	11.21	89.66	19	11.21	212.99
Jan 19				9	11.21	100.89	10	11.21	112.1
Jan 21	16	13	208				10	11.21	112
							16	13	208
							}		320.1
Jan 25	10	12	120				10	11.21	112.1
							16	13	208
							10	12	120
							}		440.1
Jan 28				16	11.58	185.31	32	11.58	254.76
Jan 30	12	13	156				22	11.58	254.76
							12	13	156
							}		410
Jan 31				8	12.5	96.64	24	12.5	300

The value of closing stock

$$24 \text{ units @ } 12.5 = 300$$

*Simple average* in this case a simple average price of the items in store is calculated and used in making issues unit another batch is received when a simple average price is calculated.

#### Exercise 4.4



Using data in previous example show a stores ledger card using simple average.

Date	Receipts			Issues			Balance		
	Unit	Unit Price	Amount	Unit	Unit Price	Amount	Unit	Unit Price	Amount
Jan 1	10	10	100				10	10	100
Jan 3	12	11	132				10 } 12 } <sup>22</sup>	10 } 11 } <sup>232</sup>	100 } 132 }
Jan 5				20	10.5	210	2	10.5	21
Jan 8	15	12	180				2 } 15 } <sup>17</sup>	10.5 } 12 } <sup>201</sup>	21 } 180 }
Jan 9				10	11.25	112.5	7	11.25	78.75
Jan 13	20	11	220				7 } 20 } <sup>27</sup>	11.25 } 11 } <sup>298.75</sup>	78.75 } 220 }
Jan 17				8	11.125	89	19	11.125	211.38
Jan 19				9	11.125	100.125	10	11.125	111.25
Jan 21	16	13	208				10 } 16 } <sup>26</sup>	11.125 } 13 } <sup>319.25</sup>	111.25 } 208 }
Jan 25	10	12	120				10 } 16 } <sup>36</sup> 10	11.125 } 13 } 12 }	111.25 } 208 } 120 }
Jan 28				16	12.04	192.64	20	12.04	240.8
Jan 30	12	13	156				22 } 12 } <sup>24</sup>	12.04 } 13 }	144.48 } 156 }
Jan 31				8	12.04	96.32	12 } 12 } <sup>24</sup>	12.04 } 13 }	144.48 } 156 }

The value of closing stock

12 units @ 12.04

12 units @ 13

24                      300.48

#### Exercise 45

Tido ltd buys and sells products Q3. It values stock on the basis of LIFO. As at 1<sup>st</sup> June 2001 stock in hand consisted of 4500 units which was acquired at sh 50 per unit. The operations for the month were as follows.

Date	Purchase	Sales
1	5000 @ sh 48	6000 @ sh 60
4		
5	5500 @ sh 49	
7	4000 @ sh 50	
11		7000 @ sh 61
12	5000 @ sh 50	
13	6000 @ sh 47	
18		7000 @ sh 61
19		8000 @ sh 64
20	6000 @ sh 49.50	
21		5000 @ sh 65
22	7000 @ sh 50	
25	6000 @ sh 49	
26	2000 @ sh 47	
28		500 @ sh 60
29		14000 @ sh 64

The company incurred operating of sh 450,000 during the month.

Required

4.Store ledger

5.Closing stock valuation

6.Trading account for the month

Date	Receipts			Issues			Balance		
	Unit	Unit Price	Amnt	Unit	Unit Price	Amount	Unit	Unit Price	Amount
B/F 1	5000	48	240000				4500	50	225000
							5000	48	240000
4				4500	50	22500	3500	48	168,000
				1500	48	72000			
5	5500	45	249500				3500 <sup>9000</sup>	48	168000
							5500	45	247000
7	4000	50	200000				3500	48	168000
							5500	45	247000

							4000	50	200000	
11				3500	48	168000	2000	45	90000	} 290000
				3500	45	157500	4000	50	200000	
12	5000	50	250000				2000	45	50000	} 540000
			0				4000	50	200000	
							5000	50	250000	
13	6000	47	282000				2000	45	90000	} 822000
			0				4000	50	200000	
							5000	50	250000	
							6000	47	282000	
18				2000	45	90000	4000	50	200000	} 48200
				4000	50	200000	6000	47	282000	
				1000	50	50000				
19				4000	50	200000	2000	47	94000	}
				4000	47	188000				
20	6000	49.5	297000				2000	47	94000	} 39100
			0				6000	49.7	297000	
21				2000	47	94000	3000	49.5	148500	
				3000	49.5	148500				
22	7000	50	350000				3000	49.5	148000	} 498500
			0				7000	50	350000	
25	6000	49	294000				3000	49.5	148000	} 792500
			0				7000	50	350000	
							6000	49	294000	
26	2000	47	94000				3000	49.5	148500	} 886500
							7000	50	350000	
							6000	49	294000	
							2000	47	94000	
28				500	49.5	24750	2500	49.5	123.750	} 861750
							7000	50	350000	
							6000	49	294000	
							2000	47	94000	
29				2500	49.5	123750	1500	49	73500	} 167500



			0				2500	49	122500	
							5000	50	250000	
13	6000	47	28200				3500	50	175000	829500
			0				2500	49	122500	
							5000	50	250000	
							6000	47	282000	
18				6000	47	282000	3500	50	175000	49750
				1000	50	50000	2000	49	122500	
							4000	50	200000	
19				4000	50	200000	2000	50	100000	
				2500	49	122500				
				1500	50	75000				
20	6000	49.5	29700				2000	50	100000	397000
			0				6000	49.5	297000	
21				5000	49.5	247500	2000	50	100000	149500
							1000	49.5	495000	
22	7000	50	3500				2000	50	100000	499500
							1000	49.5	495000	
							7000	50	350000	
25	6000	49	29400				2000	50	100000	793500
			0				1000	46.5	495000	
							7000	50	350000	
							6000	49	294000	
26	2000	47	94000				2000	50	100000	887500
							1000	49.5	485000	
							7000	50	350000	
							6000	49	294000	
							2000	57	94000	
28				500	47	23500	2000	50	100000	864000
							1000	49.5	485000	
							2000	50	300000	
							6000	49	294000	
							1500	47	705000	

29				1500	47	70500	2000	50	705000	} 174000
				6000	49	294000	1000	49.5	100000	
				6500	50	325000	500	50	250000	

The value of closing stock

2000 units	@	50	
1000 units	@	49.5	
<u>500 units</u>	@	<u>50</u>	
3500			174500

Trading account

Sales		2984000
Less closing stock	174500	
Purchases	2278500	
Less open stock	225000	
Gross profit		657000
Less opening cost		450000
Net profit		207500

Reconciliation

Profit as per LIFO	207000
Less: Difference in doing stock	(7000)
Profit as per FIFO	200000

*Other methods of material issue*

- Highest in first out (HIFO)* In this case issues are priced at the highest price existing in store.
- Next in first out (NIFO)* Issues are valued at the price of the next items on order.
- Market price/replacement price* in this case issues are made in that price in which materials can be obtained from the market.
- Standard price* in this case a standard price is agreed which is used in valuing issues.

#### 4.5 Cost Minimization through Economic Order Quality (EOD)

There are four cost associated inventory

- i) *Purchase cost* is the cost charged by the suppliers for the items purchased.
- ii) *Holding / carrying cost* is the cost incurred as a result of having inventory item in the business.  
e.g. - Opportunity cost of capital tied up in stock  
- Insurance and security cost  
- Refrigeration and conditioning  
- Ware housing changes.  
- Maintenance of machinery
- iii) *Ordering cost* is the cost of bringing stock items into the store. They include loading and off loading charges cost of purchasing department, transport etc.
- iv) *Stock out cost or shortage cost* is the cost incurred as a result of not having inventory items in stock. E.g. production disruption which may lead to lower production, lost discounts cost of speeding up orders and deliveries, lost customer good will.

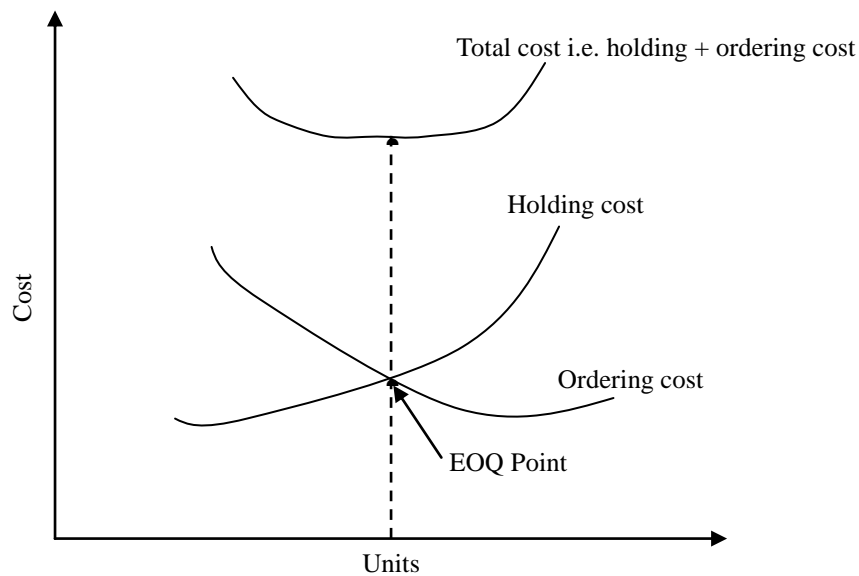
##### *Economic Order Quality (EOQ)*

This refers to the optimum number of units should be ordered every time an order is made so as to minimize total stock cost.

##### *Assumptions / limitation of EOQ*

1. Replenishment is instantaneous (Q). There is no lead time. Lead time is the time taken between ordering and delivery.
2. No safety stock.
3. Demand is known in advance and it is constant.
4. Purchasing cost and cost per order are constant i.e. there are not affected by factors like discount.
5. Stock is replaced in equal batches.
6. Cost per order is constant irrespective of quantity.
7. Stock holding / carrying cost is a function of average inventory.
8. No stock out cost.

### EOQ Model



### EQ – The model explained

The EOQ point is

- The minimum point of the total cost curve hence calculus can be used to determine EOQ by determining the turning point of the total cost curve.
- EOQ point is also given by the point of intersection between holding cost ordering cost i.e. at EOQ holding cost is equal to ordering cost.

### EOQ formular

Mathematical derivation of EOQ using calculus let:

Cost per order be  $C_O$

Annual demand be  $D$

Quantity per order  $Q$

Holding cost per unit  $C_H$

Holding cost = average inventory x holding per unit  
 $= \frac{Q}{2} \times C_H$

Ordering cost = No. of orders x cost per order

No. of orders =  $\frac{\text{Annul demand}}{\text{Quantity per order}} = \frac{D}{Q}$

Ordering cost =  $\frac{D}{Q} \times C_O$

Total cost = Ordering cost + Holding

$TC = \frac{D}{Q} \times C_O + \frac{Q}{2} C_H$



$$TC = D.CoQ^{-1} + \frac{Q}{2} \cdot CH$$

$$\frac{dTC}{dQ} = -D.CoQ^{-2} + \frac{CH}{2}$$

$$0 = -DCoQ^{-2} + \frac{CH}{2}$$

$$2 \times D.CoQ^{-2} \pm \frac{CH}{2} \times 2$$

$$2DCoQ^{-2} = CH$$

$$Q^{-2} = \frac{CH}{2DCo}$$

$$Q^{-2} = \frac{2DCo}{CH}$$

$$Q = EOD$$

Where D – Arrival demand

O – Ordering cost per order

H – Holding cost per unit

$$Q = \sqrt{\frac{2DCO}{CH}}$$

$$Q = \sqrt{\frac{2DO}{H}}$$

#### Exercise 4.6

You are provided with the following data.

Annual demand 4000kg

Cost per unit sh 2

Cost per order sh 50

Holding cost 20% of cost per unit

Required: Calculate EOG

$$EOQ = \sqrt{\frac{2DO}{H}} = \sqrt{\frac{2 \times 4000 \times 50}{2}} = 1000$$

H 2 x 20%

### Exercise 4.7

Bora Supermarket carries on its operations in Kisumu town. On annual basis it orders 480,000 pens from a Nairobi based distributor. A packet of twenty four pens delivered to Bora's warehouse costs Sh.480 including transport charges. The supermarket borrows money from BHK bank at an interest rate of 10% per annum to finance its inventories.

The supermarket also incurs Sh.1, 500 to place an order for the pens and Sh.8 carrying cost for each pen.

Required:

- (i) Economic order quantity (EOQ) for the pens
- (ii) Total cost at the economic order quantity
- (iii) For orders of 72,000 pens and above, the distributor has offered a discount rate of 10% on delivery price.

Advise the management of the supermarket on whether to take advantage of the discount offer.

### Solution

Annual demand	sh480, 000
Holding costs	sh 480
Cost per order	sh 1500
Carrying cost for each per	sh 8

$$EOQ = \sqrt{\frac{2DO}{H}} = \sqrt{\frac{2 \times 480,000 \times 1500}{480}} = 1732 \text{ units}$$

Total cost = stock holding cost + ordering cost

$$480 + 1500 = 1980$$

Annual demand	sh 480,000
Cost per pen	sh 20
Interest rate on loan	10%
Cost per order	sh 1500
Holding cost	sh 8
Interest per pen = 10% x 20 = 2	
Holding cost = 2 + 8 = 10	

$$EOQ = \sqrt{\frac{2DO}{H}} \\ = \sqrt{\frac{2 \times 480,000 \times 1500}{10}} \\ = 12,000 \text{ units}$$

Total cost = purchase cost + orderly cost + holding cost

$$\begin{aligned} & \frac{D.C}{Q} + \frac{Q}{2} + H \\ & = 480,000 \times 20 + \frac{480,000}{12000} \times 1500 + \frac{12000}{2} \times 10 \\ & = 9,720,000 \end{aligned}$$

Cost per changes to  $20 \times 90\% = 18$

Holding cost will be  $10\% \times 18 = 1.8$

Holding cost plus interest =  $8.1.8 = 9.8$

$$\begin{aligned} T.C &= 480,000 \times 18 + \frac{480,000}{72,000} \times 1500 + \frac{72000}{2} \times 9.8 \\ &= 9,002,800 \end{aligned}$$

*Advise:* They should take advantage of the discount offer as it has lower cost.

#### Exercise 4.8

A company is reviewing its stock and has the following alternatives available for evaluating the optimal order size for item number 1287

1. Purchase stock twice monthly, 100 units
2. Purchase monthly, 200 units
3. Purchase every three months, 600 units
4. Purchase every six months, 1,200 units
5. Purchase annually, 2,400 units

It is ascertained that the purchase price per unit is Sh.80 for deliveries up to 500 units. A 5% discount is offered by the supplier on the whole order where deliveries are 301 up to 1,000 and 10% reduction on the total order for deliveries in excess of 1,000.

Each purchase order incurs administration costs of Sh.50. Storage, interest on capital and other costs are Sh.25 per unit of average stock quantity held.

*Required:*

Advise management on the optimum order size

#### Solution

Calculate the total costs for the option.

TC = purchases cost + orderly cost + holding cost

Optional 1

$$= 80 \times 100 \times 12 \times 2 + \frac{2400}{100} \times 500 + \frac{100}{2} (25)$$

$$= 205,250$$

Optional 2

$$= 80 \times 200 \times 12 + \frac{2400}{200} \times 500 + \frac{200}{2} \times 25 = 200,500$$

Optional 3

$$\text{Discount} = 80 \times 5\% = 4$$

$$= 76 \times 600 \times 4 + \frac{2400}{600} \times 500 + \frac{600}{2} \times 25$$

$$= 191,900$$

Optional 4

$$\text{T.C} = 72 \times 1200 \times 2 + \frac{2400}{1200} \times 500 + \frac{1200}{2} \times 25 = 188,800$$

Optional 5

$$\text{T.C} = 72 \times \frac{2400}{2400} + 2400 \times 500 + \frac{2400}{2} \times 25 = 203,300$$

The optimum order is 1200 units every six months. The management should order from optional 4 because the total cost is lowest. The order of lowest to highest is: optional 4, 3, 2, 1 and 5

#### 4.6 Setting Material Levels

A business organization must not have too much of the stock or too little of it.

*Problems:*

- Tie up capital in the stock.
- There is risk of obsolesce
- Costly in terms of storage facilities.

On the other hand, having too little of the stock may have the following problems

- Lost customer goodwill.
- Costly in terms of speeding up orders.
- Low production which may lead to losses.

*Various levels of stock are as follows*

1. *Reorder level* is the level at which new or fresh materials or stock is ordered to be requisitioned. In fixing reorder level the worst is assumed. i.e. The will be maximum consumption and maximum lead time.

Reorder level = maximum consumption x maximum lead time.

*Factors to consider in setting reorder level*

- i) Policy of the business
  - ii) Availability of stock e.g. seasonal variations of stock.
  - iii) Perishability of the stock.
  - iv) Demand of the commodity i.e. existing and future.
  - v) Economies of scale e.g. discount.
2. *Minimum stock level* is the level below which stock must not be allowed to fall.  
Re-order level – normal consumption x normal lead time.
  3. *Maximum stock level* is a level beyond which stock must not be to raise  
Max stock level = reorder level + reorder quantity – minimum consumption x minimum lead time
  4. *Average stock level* is the average of the maximum stock level and the minimum stock level.

$$\text{A.S.L.} = \frac{\text{Minimum stock level} + \text{Max stock level}}{2}$$

2

#### *Exercise 4.9*

Below is the consumption per week of a certain item

Maximum consumption	400kg
Normal / average consumption	300kg
Minimum consumption	200kg
Re-order / lead time	4 – 6 days
Re-order quantity	1500kg

*Required:* R.L; Min stock level, max stock level, average stock level.

- i) R. L = Max consumption x max level time  
 $400 \times 6 = 2400\text{kg}$
- ii) Minimum stock level =  $2400 - (300 \times 5) = 900\text{kg}$
- iii) Maximum stock level =  $2400 + 1500 - (200 \times 4) = 3100$
- iv) Average stock level =  $(900 + 3100) \times \frac{1}{2} = 2000$

#### 4.7 Review Questions

1. Pamalat Ltd., operate seven days a week and deals in the sale of bolts and nuts. The company undertook the following transactions during the month of March 2010

Purchase for the month of March 2010

Date	Quantity (units)	Price per unit (Sh.)
13	1,000	38
20	1,200	39
25	1,600	40
28	500	38

Sales for the month of March 2010

Date	Quantity (units)	Price per unit (Sh.)
3	350	46
4	500	45
16	400	46
24	900	43
26	1,900	44

Additional information

1. The closing stock for the Month of February 2010 was 2,500 units valued at Sh.90, 000.
2. The following returns were made by the customers:
  - 14 March: 75 units which had been sold on 3 March.
  - 27 March: 175 units which had been sold on 24 March
3. On 22 March 2010, the officer in charge of stock detected a shortage of 50 units.
4. Operating expenses for the month of March 2010 amounted to Sh. 4,500.
5. The company uses the last in first out (LIFO) method to value stock.

Required: (i) Store ledger card for the month of March 2010

(ii) Trading and profit and loss account for the month ended 31 March 2010

2. Explain the terms:

- (i) Re-order level
- (ii) Re-order quantity

List factors that must be considered when determining the re-order level

3. A company has provided the following data in respect of its major raw material:

	Units per week
--	----------------

Maximum consumption	1200
Normal consumption	900
Minimum consumption	600
Re-order period	4-6 weeks
Re-order quantity	6000 units

Required:

- (i) Re-order level
  - (ii) Minimum stock level
  - (iii) Maximum stock level
4. Explain the assumptions behind the determination of Economic Order Quantity (EOQ)

#### 4.7 References

Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 68-82)

T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles ltd, Guildford and King's Lynn (Pages 27-66)

## LESSON FIVE: LABOUR COSTING

**Purpose:** Labour is the physical and mental energy applied by human beings in the process of manufacture of a product or service. It is important to understand how the cost of labour is accounted for in this process. This lesson introduces the learner to various method of labour costing.

### Specific Objectives

- (i) Know the main categories of remuneration
- (ii) Understand the feature of time based systems
- (iii) Know the features of Incentive schemes
- (iv) Be able to distinguish between straight and differential piecework

### 5.1 Classification of Labour Cost

Labour costs are classified into the following classes;

- i) Direct and indirect labour cost.
- ii) Fixed and variable labour costs.
- iii) Controllable and non controllable labour costs.

#### *Direct and Indirect Labour Costs*

- i) *Direct labour costs* are defined as cost of remuneration for employees' efforts and skills applied directly to a product a saleable service and which can be identified separately in a product.
- ii) *Indirect labour costs* are defined as those labour costs which are not charged directly to a product. The analysis of labour into direct and indirect will depend upon the circumstances under review. The following example illustrates this problem.
  - a) The wage paid to a work who assembles components is a direct labour costs.
  - b) Wages paid to work moving component for a range of product from one part of the factory to another is indirect cost.
  - c) Wages paid to a supervising in a production department e.g. tire building is indirect labour cost.

#### *Over time and incentive bonuses*

The second problem relates to the classification of direct and indirect labour cost of that part which relates to overtime pay and incentives bonuses.

Over time pay: This is normally paid at a premium rate of pay e.g. a worker who works in excess of normal time on a week day may be paid as over time and half the normal rate.

The rate may double on a Sunday.



### Exercise 5.1

Consider a situation where a worker works 10hrs on job when his normal working day is 7 hrs with a basic pay of £3 and overtime which is £1 ½ sh the normal rate. His gross earning per day may be calculated in the following two ways.

Normal pay  $£3 \times 7 \text{ hrs} = 21$

Overtime  $£4.5 \times 3 = 13.5$

$21 + 13.5 = £34.5$

Method 2 (Assume job was taking 10hrs)

Normal pay  $= 3 \times 10 = £30$

Premium  $1.5 \times 3 = \underline{4.5}$   
£34.5

### Explanation

Although the total overtime paid is £13.5, it may be that the relevant cost to the company is £4.5 which was paid because the last three hours spent on the job were during overtime hours. This is known as the premium pay element of overtime payment.

The assumption is that the job was expected to take 10hrs with a labour cost of £30. The problem relates to the reason of 3hrs being during overtime and who was responsible for this: The options are as follows:

- a) Overtime was worked at the special request of the customer to have the job finished by a specific date. In this case the overtime premium is a direct labour cost of the job.
- b) The overtime was worked because of lack of efficiency of department working on the job. In this case the overtime premium pay is an indirect labour and it is an overhead of the department.
- c) The overtime was worked due to delay cost by another department in having the job available. In this case the overtime premium pay is an indirect labour cost which should be charged as an overhead of the department responsible for the delay.
- d) The overtime was worked as a general company policy to work in excess of the normal hours. In this case the overtime pay is an indirect labour cost and should be charged to the general factors overhead of the department in which it is incurred.

### Fixed and Variable Labour Cost

It is where costs are classified in relation to their behaviour as activity level changes.

- a) *Fixed labour costs* are costs of remuneration for employees' efforts and skills which does not change with activity level e.g. a case where worker is paid a weekly irrespective of the output achieved.
- b) *Variable labour costs* are costs of remuneration for employees' effort and skills which depend on the level of output achieved e.g. where wages are paid at a rate per unit produced. Labour cost behaviour is important when considering its relevancy in:
- Quantification of future business plans.
  - Control of the operations of the business.
  - Making of decisions about future operations of the business.

### Exercise 5.2

A new product will require an assembly operation which will be undertaken by an employee who will be paid a basic salary of £105 of 35hrs pay week plus 20pens (£0.2) per unit assembled. He is guaranteed his basic wage even if output falls the expected weekly target of 350 units.

If weekly output is in excess of 350 units, the employees will be paid for overtime at rate of £45 for every additional 10 units plus the 20 pens per unit assembled.

### Required

- Calculate the planned labour cost in each case where the weekly output is focused at 300 units, 350 units and 400 units.
- The first week results in the assembly were 370 units for which the employee has actual gross earning of pounds £192.5. Prepare information for control which shows whether the actual wages paid were in line with the planned level wage cost.
- The company can arrange to subcontract output in excess of 350units per week to an outside who will charge for £55 per 100units should they subcontract or use their own employee.

### Solution

#### 1. Planned wage cost

Output	300	250	400
Basic pay	105	105	105
Bonus (20pens) (0.2 x 300)	60	70	80
Overtime (50/10) x 4.5	-	-	22.5
	<u>1165</u>	<u>175</u>	<u>207.5</u>

#### 2. Wage cost for 370 units

Basic pay	105
-----------	-----

Bonus	74
Overtime ( $20/10 \times 4.5$ )	<u>9</u>
	<u>188</u>

No. it appears that extra hours were worked in excess of the expected requirement. It gives information to management who are supposed to investigate.

Use of own employees (100units)

Bonus £ $0.2 \times 100$	20
Overtime $^{100}/_{10} \times 4.5$	45
	65
Subcontracting	£55

They should sub contract

#### *Controllable and non Controllable Labour Costs*

a) *Controllable labour costs* are costs which can be influenced by the actions of a person in whom authority for such control is vested. e.g. supervisory cost.

b) *Non controllable* labour costs are costs of labour which can not be influenced by actions of a person in whom authority for such control is vested. The following examples illustrate the degree in to which control of labour costs may be exercised.

1. Where the employee is paid on straight piece work bases. A fixed rate per product unit then the time taken per product will be influenced by a number of factors such as efficiency of the employee, degree of supervision, efficiency in the follow of materials used etc. Such factors are controllable to varying degree by different management members and functions.
2. Where the employee is paid a fixed weekly wage there is no control over the wage paid to the employee. The control will focus on ensuring the product or a service is achieved as efficiently as possible. E.g. in case of production of quality limited models, emphasis will be on quality rather the speed of output.
3. Where the employee is in a service department e.g. a fitter in the maintenance department paid at a rate per hour worked. The basic working week may be agreed as part of employer -employee negotiation e.g. through working hour per day for 5 day week. The control over the use of this time will be the responsibility of the engineer in charge of the maintenance department. He can direct the fitter to carry out maintenance work of a routine nature or in the event of a machine breakdown. In some extent however, the control of over the use of filter time will be in the hand of others. A manager in the

production department may require agent repair and may necessity working extra at a premium rate of pay.

## 5.2 Employees Psyche

Employees psyche means morale which may be high or low. High morale leads to high productivity and low morale means low production and may cause staff turnover. Turnover means employees leaving the organization for several reasons e.g. redundancy, greener pastures etc. The replacement of labour will be cost to the firm. Labour turnover in an organization is expressed as a percentage referred to as *labour turnover rate*. It is computed as

$$\text{Labour turnover rate} = \frac{\text{No. of leavers} \times 100}{\text{Total employment}}$$

The higher the turnover rate the higher the cost and vice versa. High labour turnover will have adverse effects in a number of areas which involves:

1. Recruitment and replacement of staff which involves:
  - Advertising for vacancies.
  - Interviewing and selection of staff.
  - Placement in appropriate job positions.
2. Training of new staff which involves additional cost both as a direct result of training and as consequence of a relative inefficiency of the work during the training period. This is caused by:-
  - Training meaning that the employee will have to attend a course, enroll for correspondence course, attend day classes at college or training centre.
  - During training employees may require on the job training where a skilled employee supervises their progress. This means that the company is paying the skilled supervision for non productive roles.
  - Partly trained employee will be less efficient than fully trained employees and thus extra cost will be incurred by the company such as increased scrap unit, reduction in output rate and need for overtime working to meet output targets.
3. High turnover rate may necessitate the use of high grade labour on lower grade work until replacements are made. The company will probably have to pay the high grade employees their normal rate of pay.

4. They can be an overall lowering of morale as a result of high labour turnover to the remaining employees and hence low production.

#### *Control of labour turnover*

The reasons for labour turnover may be analyzed by cause into controllable and non controllable.

#### *Controllable factors*

1. Terms and condition of employment e.g. rate of pay, working hours.
2. Poor working conditions e.g. excess noise, dirt heat/cold etc.
3. Lack of amenities e.g. rest rooms and wash up facilities.

#### *Non controllable factors*

1. Retirement
2. Change in family circumstances
3. Career progression desires
4. Redundancy e.g. replacement labour by machines.

### **5.3 Time Keeping and Time Analysis**

The efficiency and accuracy of recording and analysis of labour time is relevant for the control of labour cost. The interrelatedness of activity involved should be recognized as shown in Figure 5.1

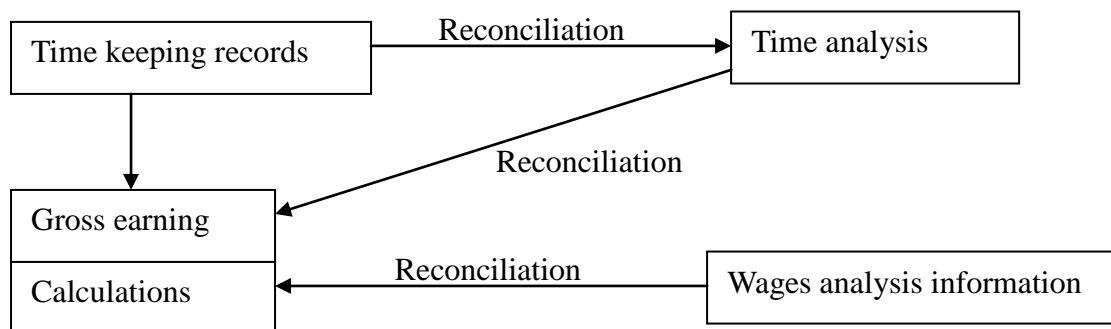


Figure 5.1 Interrelatedness of Activity

#### *Time Keeping Records*

Payment should only be made to employees who have actually spent time in the work place and at the agreed rate. Overtime premiums should be applied where applicable supervisors should ensure that employees paid fixed salaries always work within the required time. They should have a detailed record of time spent on the firm for workers paid on hourly basis. They should sign in and out shifts. They should also have a clock which must be signed by the supervisor before being forwarded to the wage department.

### *Time Analysis*

The employee should complete a daily or weekly shift where they record hours worked and idle hours. Every shift must be authorized by the supervisor. The analysis of employees' time will facilitate

1. The correct charge of direct labour cost to each job.
2. The correct charge of indirect labour cost to cost centre.
3. The calculation of employees' bonuses.
4. Control of labour cost by job and cost centres.
5. Measurement of efficiency.

### **5.4 Gross Earning Calculation**

This will be undertaken in the wages department. The outline of the routine jobs done by this department includes:

1. To check if the clock card is dually completed and authorized.
2. Reconcile the total clock hours with the time shift analysis.
3. Calculation of any bonus entitlement.
4. Adding any shift premium allowance.

*Wages analysis information* it done by the cost and management accounting department. It involves comparison of actual wage cost and the expected wage cost and then taking collective measures.

### **5.5 Method of Labour Remuneration**

Employers wish to be paid according to the method of labour remuneration which offers the best compromise between.

1. Minimizing labour cost per product unit.
2. Stability of labour cost per unit throughout a wide activity range.
3. Ability to attract and keeping high quality employees and minimize labour turnover rate.
4. Maximizing output of products of a consistent quality.

Employee – employees would wish a method of remuneration which will give.

- a) Ability to increase earnings through increased efforts.
- b) Stability of earnings from week to week.
- c) Guaranteed weekly minimum wage.
- d) Ability to concentrate on job satisfaction rather than quantity of output.

### *Methods of Remuneration*

1. Time rate

2. High wages plan
3. Measured day work
4. Straight piece work.
5. Premium bonus schemes.
6. Standard hours / minutes.
7. Group bonus schemes.

*Time rate* is used where a flat rate per hour is paid with overtime paid for at a premium. It works well where speed and accuracy are the main factors.

*High wages plan* where the wages per hour is set at a high level with an intention attracting efficient and highly motivated employees.

*Measured day work* Here the level of standard payment is set e.g. as a hundred percent. Each worker is then graded in the band of output efficiency. Weekly earnings are paid as fixed sums corresponding to the efficiency band. Workers are granted payment of their week according to their weekly band irrespective of the output achieved.

#### *Exercise 5.3*

Measured day work is used as the bases of remuneration where weekly wages are paid according to efficiency band as follows.

Efficiency band (%)	weekly wage
71 – 80	105
81 - 90	120
91 – 100	135
101 – 110	150
111 – 120	165

The output achieved by a worker during a four week period is as follows.

Week	Output in unit
1	880
2	960
3	780
4	1090

1000 units is equal to 100% efficiency.

Required: Calculate his total pay.

*Solution*

Week	% Output	E.B	Weekly wage
1	88	81 – 90	120
2	96	91 – 100	135
3	78	71 – 80	105
4	109	101 – 110	150
			510

*Straight piece work* Workers are paid same rate per unit of a commodity produced.

*Differential piece work* Under this scheme the rate per unit increases as output level increase.

*Exercise 5.4*

The output achieved by employees A and B is 330 units and 470 units respectively during the week ended 28<sup>th</sup> January. Calculate the earnings for each employee where the method of remuneration is;

- Straight piece work where a rate of 30 pence is paid.
- Straight piece with guaranteed minimum wage of £ 120 per month.
- Differential piece work where rate per unit are

0 – 400	30 pence
401 – 450	35 pence
Over 450	40 pence

*Solution*

£ 1 = 100 pence

i) Worker A

$$330 \text{ units} \times £0.3 = 99$$

Worker B

$$470 \times £0.3 = 141$$

ii) Worker A = 120

Worker B = 141

iii) Differential

$$\text{Worker A} = 330 \times £ 0.3 = 99$$

$$\text{Worker B} = 400 \times £ 0.3 = 120$$

$$= 50 \text{ unit} \times 0.35 = 17.5$$

$$20 \text{ unit} \times 0.4 = 8 \quad = 145.5$$



*Premium bond* under this method time is allowed for a job and a bonus is paid based on the time saved in relation to the standard time allowance. This is done in the following ways.

a) *Halsey premium scheme* Total earning = Hours worked x Rate x  $\frac{1}{2}$  x Time saved x Rate

b) *Halsey weir bonus* Total earning = Hours worked x Rate x  $\frac{1}{3}$  x Time saved x Rate

c) *Rowan bonus scheme*

$$\text{Total earning} = \text{Hours worked} \times \text{Rate} + \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time save} \times \text{Rate}$$

### Exercise 5.5

s. Kamau complete a job in 45 hours for which 60 hors were around. His wage per hour is 16/=. Calculate S. Kamau total wag according to:

i) Halsey premium scheme

ii) Halsey wier scheme

iii) Rowan bonus scheme

### Solution

i) T.E =  $45 \times 16 + \frac{1}{2} \times 15 \times 16 = 840$

ii) T.E =  $45 \times 16 + \frac{1}{3} \times 15 \times 16 = 800$

iii) T.E =  $45 \times 16 + \frac{45}{60} \times 15 \times 16 = 900$

*Standard hours / minutes* In this case each task is studied and a standard time allowance is estimated. Output made of different seizes of products can be expressed as single measure.

i.e. Standard hours or standard minutes

Earnings are calculated as follows.

Standard hours/minutes x rate per standard hour /minute.

### Exercise 5.6

The budgeted and actual output of J. Adam for the week ended 28<sup>th</sup> January was as follows:

Product	A	B	C
Budget	160	120	30
Actual	140	80	110

He works a 40 hour week and is paid at £3 per standard hour of output achieved. The standard time around per unit of each product is as follows.

Product	Standard time in min
---------	----------------------

A	6
B	10
C	8

*Required:* Calculate Adams gross earnings for the week end 28<sup>th</sup> January

Product	Std minutes	Actual production	Std hours achievement
A	6	140	14
B	10	80	13 <sup>1</sup> / <sub>3</sub>
C	8	110	14 <sup>2</sup> / <sub>3</sub>
			42

$$\text{Earnings} = 42 \text{ Std Hrs} \times \text{£}3 = \text{£}126$$

*Group bonus scheme* In this case bonus is payable to all members of the group who have produced the bonus is then shared equally by the members.

#### Exercise 5.7

Three members work as team and are paid a daily bonus which is based on the output of the group. The group works 7 hours a day and the standard output rate of the team is 50 units per hours the bonus is calculated as follows:-

- Production in excess of the standard is calculated daily.
- 75% of this excess is considered the teams share.
- The bonus is shared at rate of 60 pence per unit to be shared equally among them.

The output of the team on A Monday when a 7 hour day was worked was 394 units.

*Required:* Calculate the bonus payable to each member

$$\text{Std production } 50 \text{ units} \times 7 \text{ hrs} = 350$$

$$\text{Output on a Monday} - 394$$

$$\text{Excess production} - 44$$

$$\text{Terms share } 75\% \times 44$$

$$\text{Bonus: } 33 \text{ units} \times \text{£} 0.6 = \text{£}19.8$$

$$\text{Each members share} = \text{£} \frac{19.8}{3} = \text{£} 6.6$$

3

#### Exercise 5.8

1 (a) Briefly explain the factors that should be taken into account consideration when designing incentive schemes

(b) . Zawadi Ltd. is a small scale company which manufactures a range of plastic commodities. In order to manufacture a lunch box, the following five manual processes are required:

Process	Time required per lunch box (minutes)	Wage rate per hour (Sh.)
1	15	65
2	25	50
3	10	40
4	30	35
5	20	30

The weekly production target is 7,200 lunch boxes packed in cartons containing twelve lunch boxes. The company's working week has 40 hours.

Required:

- (i) Number of casual workers required for each of the processes.
- (ii) Labour incurred per week to manufacture 7,200 lunch boxes.
- (c). The following information was provided by the supervisor of Bidii Ltd:

- i) Task of moulding flower pots is assigned to two casual workers, Moraa and Mogake.
- ii) Moraa is required to mould 189 flower pots while Mogake is required to mould 204 flower pots for which the time is twenty standard minutes and fifteen minutes per unit respectively.
- iii) Basic wage rate is Sh.400 per hour for each of the casual workers.
- iv) For every hour saved, a bonus is paid out at 59% of the basic wage rate.
- v) Overtime hours are paid at an additional  $\frac{1}{3}$  (one third) over the basic rate.
- vi) The basic working week has 42 hours.

Although six flower pots moulded by Moraa and four by Mogaka were scrapped, all the moulded flower pots were paid for.

Required: For each of the casual workers, calculate the:

- (i) Basic pay.
- (ii) Overtime pay.
- (iii) Bonus pay.
- (iv) Gross wages
- (v) Cost per flower pot moulded.

*Solution*

- a) Factors to consider when deciding incentive schemes
  - i. Ability to attract high quality personnel.
  - ii. Ability to produce high quality products
  - iii. Stability of cost per unit

iv. One that minimizes staff turnover

B) No. of casual workers

Process	Time per lunch box	Total hours	Casual worker
1	15	$\frac{15 \times 7200}{60}$	$1800\text{hr}/40\text{hr} = 45$
2	25	$\frac{25 \times 7200}{60}$	$\frac{3000}{40} = 75$
3	10	$\frac{10 \times 7200}{60}$	$\frac{1200}{40} = 30$
4	30	$\frac{30 \times 7200}{60}$	$\frac{3600}{40} = 90$
5	20	$\frac{20 \times 7200}{60}$	$\frac{2400}{40} = 60$

i) Labour cost

Process	Hour	Rate	Total
1	1800	65	117000
2	3000	50	150000
3	1200	40	36000
4	3600	35	126000
5	2400	30	72000

C) Basic pay

Moraa 42 hours x sh 400 = 16,800

Mogaka 42hours x sh 400 = 16,800

ii) Overtime pay

Moraa  $\frac{189 \text{ pots} \times 20 \text{ min}}{60}$  = 63hrs

Mogaka  $\frac{204 \times 15 \text{ min}}{60}$  = 51hrs

Time saved: Moraa x 50% = 200

Mogaka 51 – 319 = 12

Bonus 400 x 50% = 200

$$\text{Moraa } 18\text{hr} \times 200 = 2400$$

Gross wages

$$\text{Moraa} = 16,800 + 1600 + 3600 = 22,000$$

$$\text{Mogaka} = 168 + 2400 = 19,200$$

Cost per flower pot

$$\text{Moraa} = \frac{22,000}{189} = 116.40$$

$$\begin{aligned} \text{Mogaka: } 192 - (400 \times 3\text{hrs}) &= 18,000 \\ &= 18000/204 = 88.24 \end{aligned}$$

## 5.6 Review Questions

1. What is meant by labour cost? Discuss to differentiate between direct and indirect labour cost.
2. What does “costing for labour” mean? Explain the role of costing department with reference to labour cost.
3. What does “accounting for labour mean? Explain the role of accounting department with reference to labour cost.
4. Explain the various methods of computing wages
5. Discuss the advantages and disadvantages of time rate method.
6. Write short note on: (a) High time rate for overtime, (b) Piece rate with guaranteed time rate, (c) Differential time rate.
7. Discuss the advantages and disadvantages of incentive schemes
8. Under a premium bonus scheme, workers receive a guaranteed basic hourly minimum rate plus a bonus of 50% of time saved, which is paid at the basic hourly rate, is applicable to accepted (good) output only. No penalty is imposed on the rejected output. The following details are available for the month of January 2010:

	Agnes	Beth	Cate
Time allowed per unit (hrs)	1/4	1/6	1/2
Units produced	474	684	185
Units rejected	54	84	25
Time taken (hrs)	78	72	80
Basic pay per hour (Sh)	6	6	3

Required:

From the information, calculate for each employee

- a) Bonus hours and the amount of bonus pay
- b) The gross wages earned
- c) The labour cost of each good unit produced (to the nearest 10 cents)

8. The following details relate to the labour cost chargeable to Job M-25

Time allowed 30 hours

Time taken 24 hours

Wage rate Sh.20 per hour

Required:

Calculate the labour cost chargeable to the job in respect of an employee who is paid according to: (i) Halsey scheme

(ii) Halsey-Weir scheme

(iii) Rowan-scheme

## 5.7 References

T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles ltd, Guildford and King's Lynn (Pages 67-87)

Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 96-123)

## LESSON SIX: OVERHEADS AND OVERHEAD ABSORPTION

**Purpose:** To introduce the learner to production overheads and methods of charging overheads to products, departments or processes.

### Specific Objectives

By the end of the lesson the learner should be able to:

- i) Define overheads
- ii) Describe methods of charging overheads to the final product
- iii) Explain different types of overheads

### 6.1 Introduction

This is the total costs of indirect material, indirect labour and indirect expenses.

Overheads may be charged to:

- a) Production cost centres e.g. marking, finishing, parking etc.
- b) Service cost centres e.g. maintenance, power stores etc.
- c) Other non-productive cost centres e.g. administration and selling and distribution cost centres.

#### *Overhead Analysis*

Overhead costs may be analyzed into:

- a) Those costs which are directly identifiable with a single cost centre e.g. wages paid to indirect workers who work solely in one cost centre such as the mixing department.
- b) Those costs which are incurred as single figure and are then shared amongst the cost centres that made use of the costs e.g., electricity payable to KPLC has to be shared by all departments that benefited out of the bill.
- c) The total cost of a single department e.g. the maintenance department will have various cost charged to it for indirect materials, indirect labour and other expenses.

All such costs are classified as overheads and thus recharged to the user departments.

#### *Terms used*

**Allocation** it is a term used where the overhead cost item is be charged to a specific cost centre without the need for any estimation procedure e.g. the salary of a sales manager will be allocated to the selling overhead cost centre.

**Apportionment** occurs when the total value of an overhead item is shared between two or more cost centres. An appointment bases which reflects the benefits and extracted by a cost centre must be used e.g., rent payable may be apportioned on the bases of area of occupancy.

*Reapportionment* occurs when service department cost are charged to user department e.g., the maintenance department overheads are totaled and then charged to user department which may include other services or non productive department.

A *reciprocal service charge* is a situation where service department provides services to each other as they continue to serve productive departments e.g., where maintenance department uses power and the power department requires maintenance work on its machinery.

*Absorption* is a term used for the method by which overhead costs are charged to cost units.

#### *Purposes of overhead cost analysis*

1. It helps to control expenditure. This is done by comparing actual levels of overheads with expected levels.
2. It helps in charging overhead cost to cost units.
3. It helps in valuation of work in progress. This is because work in progress must include overheads in addition to material and labour costs.
4. Help in the valuation of abnormal loss to be charged on the income statement
5. Help in profit measurement in determining total cost as overheads are also include before comparing total cost with sales.
6. Decision making: Decision makers will need to know the amounts of overhead involved before making a decision e.g. a decision to subcontract.

## **6.2 Bases of Overhead Apportionment**

Appointment of overheads is supposed to be done using appropriate bases of appointment of overheads such as:

	Bases of appointment	Overhead to which a base is applied
1	Area	Rent, rates, lighting, depreciation of building and insurance of building.
2	Book value	Depreciation of plant and machinery, insurance plant and repair and maintenance.
3	No. of employees	Expense of personal office, canteen, welfare of employees and supervision.
4	Weight of materials	Material handling expense, store keeping and packing.
5	Technical estimates	Power consuming and water usage.
6	Sales revenue	Advertising and selling and distribution



7	Direct wages	Staff training and provident contribution.
8	Number of radiator s	Heating expenses

*Factors to consider when choosing the bases of appointment*

1. The base should be equitable.
2. The base should be practical i.e. applicable to a particular overhead.
3. It must be economical.
4. It must ensure accuracy

*Overhead analysis sheet / overhead distribution schedule*

This is used to apportion, allocate and reapportion overheads. It appears as follows

Column	1. Name of the overhead
	2. Base of appointment
	3. Amount of overhead
	4. Units of the base
	5. Rate per unit
	Others department

#### Exercise 6.1

Across Fabricators Ltd has three production departments. The following is the company's factory budget for its next financial year, commencing 1<sup>st</sup> July 2009

		Sh '000'
Factory maintenance dept	1	270
	2	250
	3	350
Consumable stores dept	1	750
	2	1100
	3	550
Power		1,000
Rates		1,200
Heat and lighting		6,000
Insurance: Buildings		750
Machinery		500
Vehicles		300
Depreciation machinery		300

Motor vehicle

150

The following information is also available

Department	1	2	3
Effective power	40%	35%	25%
Area occupied	300	400	300
Book value of building '000'	20000	1000	20000
Book value of machinery '000'	25000	10000	15000
Book value motor vehicles. '000'	10000	30000	10000
labour hours '000'	500	1000	500

The cost card of job No. 888 has the following details

Details	1 (sh)	2 (sh)	3 (sh)
Direct materials	1,000	1,500	750
Direct labour	500	1,000	1,250
Labour	40	50	30

*Required*

- Prepare an overhead analysis sheet to show overhead of each department and overhead per hour of each department.
- Show total cost of job No. 888

Overhead analysis sheet

Overhead	Base	Amount	Unit cost	Rate per unit	1 sh (000)	2 sh (000)	3 sh (000)
Maintenance	Direct	-	-	-	270	250	350
Consumable stores	Direct	-	-	-	750	1100	550
Power	Effective power	1000	100	10	400	350	250
Rates	Area	1200	1000	1.2	360	480	360
Heat	Area	600	1000	0.6	180		
Insurance Build.	Value	730	50000	15	300	150	300
Insurance Mach.	Value	500	50	10	250	100	150
M.V	Book V	300	50	6	60	180	60
Depreciation M	Book V	300	50	6	150	60	90
M.V	Book V	150	50	3	30	90	30
					2,750	3,000	2,320

Overheads rates =  $\frac{\text{Total overheads per department}}{\text{Labour hours}}$

Labour hours

Dept 1 =  $2750000 / 500000 = \text{sh } 5.5$

Dept 2 =  $3000000 / 1000 = \text{sh } 3$

Dept 3 =  $2320,000 / 500000 \text{ sh } 4.64$

Total cost	sh	sh
Material cost		
Dept 1	1000	
2	1500	
3	750	3250
Direct labour cost		
Dep 1	500	
2	1000	
3	1250	2750
Overheads		
Dep 1	40 x 5.5	
2	50 x 3	
3	30hr x 4.64	509.2
		6,509.20

*Re-apportionment* is the name used when overheads of service department are totaled and the reappportionment to the productive department that benefited from services of the service department. In this cases service department exist purely to serve productive departments and they do not offer services to each other.

*Reciprocal service charges* In this case there exist service department which service each as they service productive departments. To apportion overheads of services departments to the productive department two methods are used.

1. Repeated distribution method
2. Algebraic or simultaneous equation method

*Repeated distribution method* In these case overheads of service departments are apportioned repeatedly to the production department until the amount remain under the service department is negligible.

*Algebraic or simultaneous equation methods* this entails formation of equations to determine total overhead cost of service departments after determination of the total overheads apportionment to the productive departments

### Exercise 6.2

A manufacturing company has three production department and two services department, overhead allocated to each of this department are as follows:

Product dept	Sh	Sh
A	120,000	
B	195,000	
C	260,000	575,000
Service depts.		
X	68,000	
Y	27,000	95,000
		670,000

A technical assessment for the apportionment of cost of service department show?

Dept	A	B	C	X	Y
X	25%	38%	32%	-	5%
Y	40%	27%	18%	15%	-

Required

Apportion the service department cost using this method

- Repeated distribution method.
  - Simultaneous or algebraic method
- i) Repeated distribution method

				Service departments	
	A	B	C	X	Y
Overheads	120000	195000	260000	68000	27000
Overhead 'X'	17000	25840	21760	(68000)	3400
Overhead 'Y'	12160	8208	5472	4560	(30400)
Overhead 'X'	1140	1732.8	1459.2	(4560)	228
Overhead 'Y'	91.2	61.56	41.04	34.2	(228)

Overhead 'X'	8.55	13	10.9	(34.2)	1.71
	150399	230356	288743		

ii) Algebraic or simultaneous equation methods

Equations are formed as follows

Overhead of 'X' =  $68000 + 0.15y$

Overhead of 'Y' =  $27000 + 0.05x$

i)  $X = 6800 + 0.15y$

ii)  $Y = 27000 + 0.05x$

$$X = 68000 + 0.15 (27000 + 0.05x)$$

$$X = 68000 + 4050 + 0.0075x$$

$$X = 0.0075x = 72050$$

$$X = \frac{72,050}{0.9925} = 72,594$$

$$Y = 27000 + (0.05 \times 72594.45) \\ = 30629.72$$

Appointment

	A	B	C
Overheads	120,000	195,000	26,000
Overhead 'X'	18148.75	27586.1	23230.4
Overhead 'Y'	12252	8270.1	5513.4
	150,400.75	230,856.2	288,743.8

*Sequential allocation method* this is a method of apportioning overheads of service department to productive departments whereby apportionment is done starting with the service department having the highest overhead going to the one having the lowest.

*N/B:* The service department offering the service also gets a share of the other service department overhead.

### 6.3 Overhead Absorption

Absorption is changing of overheads to cost units. There are various methods used in this case.

- Percentage on prime cost.
- Percentage on direct wages
- Percentage on direct material cost.

- iv) Rate per direct labour hour.
- v) Rate per machine hour.
- vi) Rate per unit of output.
- vii) A combination of methods

N/B: Whenever possible the bases chose should reflect the benefits extracted by a cost unit.

#### *Percentage on prime cost*

Under this method budgeted production overhead is expressed as a percentage of the budgeted prime cost. i.e. overhead absorption rate =  $\frac{\text{Budgeted overhead}}{\text{Budgeted prime cost}} \times 100$

Budgeted prime cost

The percentage obtained as then applied to the prime cost of each job in order to obtain overhead absorbed.

#### Exercise 6.3

The total budgeted cost up 30<sup>th</sup> June 2009 is as follows:

Direct materials	8000
Direct labour	4000 (1600hr @ £2.5)
Production O.H	18000

Calculate the production overhead absorbed by job ABC where details are:

	£
Direct material	10
Direct labour	100

$$\text{Overhead rates} = \frac{18000}{1200 \text{ (prime cost)}} \times 100 = 150\%$$

$$\text{Overheads } 150\% \times 110 = 165$$

$$\text{Total cost} = 10 + 100 + 165 = 275$$

#### 1. Percentage on client material cost

In this case budgeted production overhead cost is expressed as a percentage of direct material cost i.e.

$$\text{Overhead absorption rate} = \frac{\text{Budgeted O.H}}{\text{Budgeted material cost}} \times 100$$

The percentage obtained is applied to the direct material cost of each of job to get the overhead absorbed.

### Exercise 6.3

Using the details of illustration one calculates overhead absorbed by job ABC using percentage on direct material cost.

$$\text{O.A.R} = \frac{18000}{8000} \times 100 = 225\%$$

Total cost of ABC

	£
Material cost	10
Labour cost	100
Overhead $\frac{225}{100} \times 10$	<u>22.5</u>
	132.5

*NB:* Unless production overhead is deemed to be principally incurred in the acquisition, storage and initial of direct materials this method does not give an equitable charge to each job.

### 2. Percentage on direct labour cost

Here the budgeted overheads are expressed as a percentage of direct labour cost i.e.

$$\text{O.A.R} = \frac{\text{Budgeted O.H}}{\text{Budgeted labour cost}} \times 100$$

The percentage is then applied to the direct cost of each job.

### Exercise 6.4

Using the details of the previous example determine total cost of job ABC

$$\text{O.A.R} = \frac{18000}{4000} \times 100 = 450\%$$

Total cost of ABC

	£
Material cost	10
Labour cost	100
Overhead $\frac{450}{100} \times 100$	<u>450</u>
	560

This method may be distorted where components of direct wage e.g. bonus payments are not specially related time. Also if wage cost fluctuates this method tend to penalize jobs requiring highly paid skilled labour. This method solve use rate per direct labour hour.

### 3. Rate per direct labour hour

In this case budgeted overheads are expressed in terms of rates per every budgeted hour i.e.

$$\text{O.A.R} = \frac{\text{Budgeted overheads}}{\text{Budgeted labour hours}}$$

#### Exercise 6.5

Using details of illustration one determines the total costs of job ABC using rate per direct labour hour.

$$\text{OAR} = \frac{18000}{1600} = 11.25$$

Total cost	
Material cost	10
Labour cost	100
Overhead sh 11.25 x 40hrs	<u>450</u>
	<u>560</u>

### 4. Rate per machine hour

This method is used where a machine is the focal point in a cost centre.

The machine may be semi automated in which case the operators are machine minders whose wage cost are treated as production overheads.

$$\text{O.A.R} = \frac{\text{Budgeted overhead}}{\text{Budgeted machine hours}}$$

The rate is the applied to the number of machine hours on the job obtain overheads absorbed.

#### Exercise 6.6

Consider a cost centre where budgeted production overhead is sh 60,000 and budgeted machine hours 4000. Calculate absorption rate.

$$\text{O.A.R} = \frac{60,000}{4,000} = \text{sh}15$$



The number of machine hours utilized by the particular will be recorded and production overhead absorbed at ksh 15 / machine hour.

#### 5. Rate per unit of output

This method may be used where there is a single output unit from the cost centre or where the operations performed in the cost centre are the same per unit of output.

$$\text{O.A.R} = \frac{\text{Budgeted overheads}}{\text{Budgeted output units}}$$

#### Exercise 6.7

Consider a cost centre where budgeted production overhead is sh 10,000 and budgeted output 25,000 units

Calculate the absorption rate.

$$\text{O.A.R} = \frac{10,000}{25,000} = \text{£}0.4 / \text{units}$$

#### 6. A combination of rate

A department may have work performed on it and overheads may arise as a result of a multiplicity of factors in the departments.

This may necessity use of a combination of methods to ensure equitable distribution of the overheads

#### Exercise 6.8

1. The budgeted cost for the period ended 31<sup>st</sup> March 2009 was as follows:

	£
Material cost	8000
Wage cost	4000 (1600hrs @ 2.5)
Overheads	25000

2. 20% of production overhead cost is deemed to be related to the acquisition storage and issue of direct materials.

The remaining 50% is dimmed to be labour related.

3. Details related job X are:

	£
Direct material cost	120
Direct labour cost	100 (40hrs @ 2.5)

*Required:* Calculate the production overhead absorption by job X where absorption methods are percentage on direct material cost.

- Rate per direct labour hours.
- A combination of rates which rate to data i.e. 2 above

$$\text{OAR} = \frac{25000}{8000} \times 100 = 312.5\%$$

$$\text{Rate per direct labour} = \frac{25000}{1600} = 15.625$$

Direct materials = 120

Direct labour = 100

Overheads

Material 312.5 x 120

Labour 100 x 40

Material related 20% x 25000 = 5000

Labour related 80% x 25000 = 20,000

Overhead rates

$$\text{Material relate} = \frac{5000}{8000} \times 100 = 62.5$$

$$\text{Labour related} = \frac{20000}{1600} = 12.5$$

Total cost of job X	£
Material cost	120
Labour cost	100
Material related 62.5 x 120	75
Labour related 12.5 x 40	<u>500</u>
Total cost	<u>795</u>

Activity and absorption of overheads

Activity machine hrs	Total fixed overheads	Total variable	Total O.H costs	Average per machine hours		
				Fixed	Valuable	Total
100	500	300	800	5	3	8
150	500	450	950	3.33	3	6.33
200	500	600	1100	2.5	3	5.50
250	500	750	1250	2	3	5.0
300	500	900	1400	1.67	3	4.67

The table shows that the variable overhead absorbed per machine hour is constant (sh3) irrespective of activity. The fixed overhead cost per machine hour depends on the activity level used as the base. E.g. If 100 machines hours sh 5 per machine hour must be charged in order to absorb total fixed overhead of sh 500.

#### *Importance*

1. Production overhead is absorbed to jobs in accordance with predetermined rates per machine hour.
2. The activity level used in the calculation of absorption rate must be estimated as accurately as possible.
3. Therefore it means if the actual number of machine hours from the number used in the calculation in the calculation of the absorption rate over or under absorption of fixed overheads will occur this problem does not occur with variable overheads as the incidents of cost varies with activities.

#### *Exercise 6.9*

Using the data from the table assume that the production, overhead absorption rate was calculate when an activity of 200 machine hours were estimate prepare and summary showing any or under absorption of overhead cost where actual machine hours turns out to be 150 and 250 machine hours.

*Solution*      Determination of over / under absorption of O.H.

150 hrs	Fixed	Variable	Total
Absorbed	$150 \times 2.5 = 375$	$150 \times 3 = 450$	$5.5 \times 150 = 825$
Actual	500	450	950
Over / under absorption O.H	(125)	0	(125)

250 hrs	Fixed	Variable	Total
Absorbed	$250 \times 2.5 = 625$	$250 \times 3 = 750$	$250 \times 5.5 = 1325$
Actual	500	750	1250
Over / under absorption O.H	(125)	Nil	(125)

### Exercise 6.10

Gome Engineering Ltd. Employees job order cost system. The company use predetermined overheads rates in rime manufacturing overheads to jobs. The following additional information is presented by the company's cost accountant.

- The company has two departments P and R. The predetermined overhead rates is based on machine hours for Dept P and direct labour cost for Dept R.

As at 31<sup>st</sup> January 2003 the cost accountant made the following estimates for the year.

	Dept P	Dept R
Direct labour hours	36000	80000
Machine hours	120000	18000
Direct labour cost	270000	340000
Manufacturing overheads	408000	1024000

- The companies cost records show the following information on job YJ 648.

	Dept P	Dept R
Direct labour hours	72	140
Machine hours	210	36
material placed in production	824	460
direct labour cost	548	1180

*Required*

- a) Complete the predetermined overhead rates that should be used during the year in Dept P and R.
- b) Compute the total overhead cost applied in job EFJ 648.
- c) Calculate the cost of job FJ 648 and the cost per unit if the job contains 120 units.
- d) As at 31<sup>st</sup> Dec 2003 the company records revealed the following information in relation to each department.

	Dept P	Dept R
Direct labour hours	32000	84000
Machine hours	110000	19200
Direct labour cost	240000	656000
Manufacturing O. H.	380000	1040000

Calculate the amount of under / over applied overheads in each department and for the company as a whole.

- a) Overhead rates

$$\text{Dept P} = \frac{\text{Budgeted overhead}}{\text{Budgeted labour hour}} = \frac{408000}{120000} = 3.4$$

$$\text{Dept R} = \frac{1024000}{640,000} \times 100 = 160\%$$

- b) Overheads of each dept

$$\text{Dept P} = 3.4 \times 210 = 714$$

$$\text{Dept R} = 160\% \times 1180 = \frac{1888}{2602}$$

- c) Total cost of job YJ 648

Material cost	sh	sh
Dept P	824	
Dept R	460	1284
Labour cost		
Dept P	548	
Dept R	1180	1728

Overheads

Dept P	714	
Dept R	1888	2602
		5614

$$\text{Cost per unit} = \frac{5614}{120} = 46.78$$

d) Determination of overhead / under absorption

	Dept P	Dept R	Total
Absorbed	11000 x 3.4 = 374000	160% x 656,000 = 1049600	
Actual	380000	1040000	
Over / under absorption	6000	9600	3600

#### 6.4 Review Questions

1. Define overheads. Explain various classifications of overheads
2. What is overhead allotment? Discuss the various stages of overhead allotment
3. What is overhead analysis? Distinguish between overhead allocation and overhead apportionment
4. Explain the different bases of apportionment of overheads
5. Discuss the procedure of charging of overheads of services department to production departments
6. Maendeleo Clothing Factory has four departments; A, B and C are production department, and D, is a service department. The actual costs for the financial year ended 31 December 2007 were as follows

	Shs
Rent	20,000
Repairs of plant	12,000
Depreciation of plant	9,000
Light and power	2,000
Supervision	30,000
Repairs to building	8,000

The following information about the departments is available and is used as a basis for distribution of costs.

	Departments			
	A	B	C	D
Area sq metres	1500	1100	900	500
Number of employees	20	15	10	5
	Shs	Shs	Shs	Shs
Wages paid	120,000	80,000	60,000	40,000
Value of plant	300,000	180,000	120,000	

Required: Apportion the above costs to the four departments and indicate the basis of apportionment in each case

## 6.5 References

Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 124-157)

## LESSON SEVEN: COSTING SYSTEMS

**Purpose:** To introduce the learner to various methods of charging overheads to jobs and units.

### Specific Objectives

By the end of the lesson the learner should.

- i) Explain the steps involved in activity based costing
- i) Describe job costing
- ii) Explain contract costing

### 7.1 Activity Based Costing

The traditional methods of overhead absorption assume that all overheads relates to production volume. In reality however, volume may contribute to 5% the overheads. The other overheads may relate to non productive activities. Activity Based Costing is a method of charging overheads to jobs and units on the basic of activities. Overheads are charged on the basis of the number of activity drive costs e.g. if the activity is ordering, overheads may be charged on the basic of the number of orders required for each job.

#### *Steps in A.B.C*

1. Identify organization major activities.
2. Identify the factors which determine the size of the costs of an activity. These are known as cost drivers examples include

Activity	Cost driver
Ordering	Number of orders
Material handling	Number of productions
Dispatching	Number of dispatches

Where overhead costs vary with production volume, volume related overhead method may be used e.g. machine or labour hours.

3. Collect cost of each activity into a pool or cost centres.
4. Charge support overheads to products on the basis of the numbers of cost drivers e.g. if the activity is ordering and the cost per order is sh 500 a job that has 10 orders will be charged  $500 \times 10 = 5000$ .

#### *Exercise 7.1*

A company manufactures products L and M using the same equipment and similar processes. An extract of the production data for these products in one period is as follows.



	L	M
Quantity (in units)	5000	7000
Direct labour hours per unit	1	2
Machine hours per unit	3	1
Set ups in the period	15	60

Overhead costs	shs
Related machine hrs	220000
Related to production set ups	20000
Related to handling of orders	<u>45000</u>
	<u>285000</u>

### Required

Calculate the production overhead to be absorbed by one of each other product using the following costing methods.

- A traditional costing approach using direct labour hour rate to absorb overhead.
- An activity based costing approach using suitable cost drivers to trace overheads to products.

### Solution

Total labour hours

$$L = 5000 \times 1 = 5000\text{hrs}$$

$$M = 7000 \times 2 = \underline{14000\text{hrs}}$$

$$19000$$

$$\text{Overhead rate per hour } \frac{285000}{19000} = \text{Kshs } 15$$

$$\underline{19,000}$$

Activity based rates

i) Related to machine hrs

Total machine hours

$$L = 3 \times 5000 = 15000$$

$$M = 1 \times 7000 = \underline{7000}$$

$$22000\text{hrs}$$

$$\text{Rate} = \frac{220,000}{22,000} = \text{sh } 10 \text{ per machine house}$$

$$22,000$$

ii) Related to productions set run set ups

Number of sets

L – 10

M – 40

Rate –  $\frac{20000}{50}$  shs 400 per set up

50

iii) Related to handling orders

Number of orders

L – 15

M –  $\frac{60}{75}$

75

Rate =  $\frac{45000}{75}$  shs 600 per handling

75

One product may require more machine hours and other may require more labours hours. Departmental or product evaluation will be difficult wrong estimates will be rejected in the whole organization.

## 7.2 Job Costing

This is a method of costing where cost units can be identified separately and costed individually. Each job must be of a reasonably big size and it is given a number. In this case all the costs incurred are charged to each jobs of they related to the job.

Job costing is applied in the case of

1. Job order costing.
2. Batch order costing
3. Contract order costing

Also in operation costing i.e.

4. Process costing.
5. Joint and by product costing
6. Service costing

*Job order costing* is part of job costing normally applied to relatively small cost units e.g. repair of a motor vehicle in a workshop.

Steps taken to ascertain total cost and the price to charge

1. All the direct costs are charged to the job.
2. A share of overheads of each cost centre is charged by means of absorption rates.
3. When the job is complete it is put into the finished goods stores at factory cost.

4. When the job is delivered:-
  - a) A share of administrative and selling overheads are charged.
  - b) The difference between total costs and selling is the profit.

*Batch costing* it is a special type of costing whereby a cost unit consider of a group of identical items. In batch costing a job consists of units of similar products normally covered by a single number e.g. a catch of 5,000 text books. The procedure of batch costing is very similar to factory job costing or job order costing. It is a common method in engineering components industry, software clothing, printing etc.

#### *Exercise 7.2*

- a) Mauzo Ltd. Has four production department; designing machinery welding and assembling. The budgeted overheads of the company were fixed as follows as at 1<sup>st</sup> January 2007.

Department	Budgeted overhead	Overhead absorption base
Designing	960,000	labour hrs (budgeted 8000hrs)
Machinery	2760000	Machine hrs (budgeted 200,000)
Welding	1200000	Labour hrs (budgeted 40000hrs)
Assembling	600000	labour hrs (budgeted 30000hrs)

#### *Additional information*

1. Selling and administrative overheads are 20% of factory cost.
2. At the beginning of May 2007 the company received a batch order of one of the company production. The company estimated to incur the following costs in relation to this batch.
  - Materials shs 37000
  - Labour 128hrs of designing at shs 27 per hr
    - 492 hrs of matching at shs 30 per hr
    - 90 hrs of welding at shs 27 per hr
    - 175 hrs of assembling at shs 20 per hr

Direct expense shs 6350

3. The company charges customers mark-up of 331/3

#### *Required*

- i) The overhead absorption rate for each department.
- ii) The total cost of the batch.
- iii) The selling price per unit if the batch order was for 125 units

#### *Solution*

#### *Overheads rates*

Designing	= $\frac{960,000}{80000}$	sh 12/hr
Machining	= $\frac{27600000}{200000}$	sh 13.8per hour
Welding	= $\frac{1200000}{40000}$	sh 30per hr

Assembling	= $\frac{600000}{30000}$	sh 20 per hr
------------	--------------------------	--------------

Total cost of the batch

Material cost		37,000
Labour		
Designing (128x27)		3,456
Machinery (492x30)		14,760
Welding (90x27)		2,430
Assembling (175x20)		3,500
Direct expenses		6,330
Overheads		
Designing (128 x 12)	1,536	
Machining (492 x 13.8)	6,789.6	
Welding (90 x 30)	2,700	
Assembling (175 x 20)	3,500	14,525.6
Total factory cost		82,021.6
Administrative cost		<u>16,404.32</u>
		<u>98,425.92</u>

Profit mark-up  $33 \frac{1}{3} \times 98425.92 = \text{sh } 32,808.64$

Total sales 131234.56

Selling price per unit =  $\frac{131234.56}{125} = \text{sh } 1,049.88$

125

### 7.3 Contract Costing

This is part of job costing applied to those projects which are of a constructional in nature and where the period of completion is relatively long. The main examples include construction of

building dams, bridges, roads etc. Contracts are normally large in size and extend over more than one accounting period. A significant part of the work is done at the customer's site. A separate contract account is maintained for each individual contract. All costs incurred in order to complete a contract are charged to the specific contract.

#### *Types of contract*

1. *Fixed price contract* it is where the contractor agrees with the contractee for a fixed contract price.
2. *Cost plus contract* In this case the contractor is reimbursed all the costs incurred plus a certain amount of money to cater for his profit. Such contractors are undertaken for the production of special products that are rarely manufactured.
3. *Fixed price contract subject to escalation clause* In this case the contractor is agrees with the contractor for a fixed contract price subject to escalation clause. This clause is provided to cover any changes in price of raw materials which can lead to a change in the price of the contract. However the contract is required to produce enough evidence of the excess cost incurred.

#### *Methods of accounting for contracts*

The principle problem relating to the accounting for constructional contracts is the allocation of revenue and the related cost to the duration of the contract.

Normally two methods are used:

1. Completed contract method
2. Percentage of completion method

*Completed Contract Method* In this case revenue is recognized when the contract is completed or it is substantially complete costs and progress payments are accumulated during the cause of the contract but revenues are not recognized until the contact activity is substantially complete. The risk of recognizing profit that may not have been earned is minimized under this method.

#### *Definition of terms*

##### *1. Direct expenses*

They are incurred in addition to direct material and direct labour.

They include hire charges of plant and machinery site office expenses site power etc.

They are direct because they are easily identifiable with a particular contract.

##### *2. Direct materials*

Materials charged to a specific contract may be classified as material issued from the store and materials purchased for a contract from the local market. Materials purchased and taken

to the site direct together with those taken from the store are debited to the contract account. If some materials are returned to the store, the contracts account is credited. Material remaining on site re valued on cost and carried forward to the next period.

3. Direct wages paid and accrued are debited in the contract account.

#### 4. Overheads

They include site telephone, electricity, repairs with etc. Overheads incurred on a specific contract are debited to the contract account or other overheads incurred for the company as a whole are apportioned on a suitable basis to all the contracts.

#### 5. Plants

This includes cranes, truckers, lorries etc., if plant is on lease basis leasing charges are directly charged to the contract account. If plant is purchased then purchase cost is charged to the contract for which it is purchased. At the end of the year or on the completion of the contract, the contract account is credited with the value of plant at that time. Depreciation is charged to the respective contract account. If plant is moved frequently from one contract to another then, each contract is charged with depreciation of the plant at a certain rate.

#### 6. Sub contract

Sometimes the contractor can assign some work to a subcontractor e.g. electrical work. The payment is charged to the debit of contract account.

#### 7. Architects certificates

Usually an architect inspects the work done periodically and certifies that the work is complete. He issues a certificate used by the contractor to claim payment. He is usually appointed by the contractee.

#### 8. Retention

A specific percentage of the work certified is usually withheld by the client and paid on completion. This is known as retention money. The purpose is to ensure that the work is completed by the contract to the satisfaction of the client and all defects are rectified. The amount retained is shown as debts in the books of the contractor.

#### Recognizing profit

When a contract extends over a number of years, it may be necessary to take profit each year in order to avoid wide fluctuations in the contract's profit. Under completed contract method the following approaches are adopted.

1. No profit is recognized at the very early stages of the contract.

Early stages between 1% - 49%

Percentage of completion is obtained as follows:

Working certified x 100

Contract price

2. When the contract is in its maturity the following formula is used to recognize profit.

$$\frac{2}{3} \text{ notional profit} \times \frac{\text{cash recurred}}{\text{Work certified during the period}}$$

Notional price = contract price – estimate total cost

Maturity stage is between 50% - 79% complete

3. When the contract is meeting completion this approach is used.

$$\text{Notional profit} \times \frac{\text{work certified}}{\text{Contract price}}$$

The stage of completion is between 80% - 99%

Accounting entries

		Dr.	Cr.
1	Direct materials to the site	Contract A/C	Stock / purchase A/C
2	Direct wages	Contract A/C	Cash / bank A/C
3	Direct expense	Contract A/C	Cash / bank A/C
4	Material returned to stock	Stock A/C	contract
5	Material unused at site	Stock A/C	Contract
6	Purchase of plant	Contract A/C	Cash / bank
7	Work certified	Contract A/C	Contract A/C
8	Payment received by contractor	Bank / cash A/C	Contract A/C
9	Profit of work certified (whole contract)	Contract A/C	P&L A/C
10	Estimated contract loss	P & L	Contract

Work in progress valuation

Method 1	sh
Cost to date	xxx
Add profit recognized	xxx
Less cash received	(xxx)

W.I.P. xxx

#### Method 2

Retention money xxx

Add: work not certified xxx

Less profit provision (xxx)

WIP xxx

#### Exercise 7.3

HZ Construction Company acquired a contract for the construction of a dual carriage way from Nairobi at cost of 200 million. The data relating to the contract for year ended 31<sup>st</sup> December 2009 was as follows.

	Sh '000'
Material issued to site	80000
Material purchase locally	15700
Direct wages paid	15800
Direct wages accrued	350
Plant purchased and installed	48800
Direct expenses paid	1780
Direct expenses accrued	70
Electricity charges	180
Materials returned to store	850
Work certified	150000
Cost of work not certified	3800
Material in site at 31/12/09	5330
Value of plant on 31/12/09	41500

The company had received from the client payment amounting to 126 million.

Required:

- (i) Contract account
- (ii) Contractee account
- (iii) Balance sheets extract showing work in progress.

Solution



Hz Construction Co. Ltd

Contract Account for the Year Ended 31<sup>st</sup> Dec 2009

	'000'		
Stock material to site	80,000	Stock return	850
Stock material purchased		Stock material on site	5330
Bank: Direct wages paid	5800	Plant on site c/d	41500
Add accrued	350	Cost to date	105000
Bank: Plant	48800		
Bank direct expense	1780		
Add accrued	1850		
Electricity	180		
	152,680		152,680
Cost to date b/d	105,000	Work certified	150,000
Notional profit c/d	48,800	Work not certified	3800
	153,800		153800
P & L	27,328	Nortional profit b/d	48800
Profit provision	21,472		
Material b/d	5,330	Wages b/d	350
Plant b/d	41,500	Direct Expense b/d	70

Contractees A/C

	'000'		'000'
Contract A/C	150,000	Bank cash received	126,000
	—	Retention	24,000
	150,000		150,000

Computing of W.I.P method 1

Cost to date	105,000
Add profit taken	27,328
Less: Cash received	<u>(126,000)</u>

	<u>6,328</u>
Method 2	
Retention money	24,000
Add work not certified	3,800
Less: Profit provision	<u>21,472</u>
	<u>6,328</u>

#### Balance sheet extract

	'000'		'000'
Assets		Liabilities	
W.I.P	6,328	Wages accrued c/d	350
Materials on site	5,330	Expenses c/d	70
Plant on site	41,500		52738
	53,158		53,158

*Percentage of Completion Method* Under this method revenue is recognized as a contract activity progresses. Costs incurred up to a certain stage are merged with revenues resulting from the work done. A percentage of completion is completed which guides on whether to recognize profit or not. The following approaches to calculate the percentage of completion.

#### 1. Unit approach

$$\frac{\text{Units completed to date}}{\text{Total contract units}} \times 100$$

#### 2. Value approach

$$\frac{\text{Value of work certified to date}}{\text{Total contract price}} \times 100$$

#### 3. Cost approach

$$\frac{\text{Cost incurred to date}}{\text{Estimated total cost}} \times 100$$

#### 4. Effort supplied approach

$$\frac{\text{Machine labour hrs}}{\text{Total machine / labour hrs}} \times 100$$

The following should be noted under this method.

1. No profit should be recognized when the percentage of completion is less than 20%.

2. When the contract is substantially complete 99% complete all profit should be recognized.
3. In case of estimated contract loss i.e. estimated total cost exceeding the contract prize then loss should be recognized in total in the P & L irrespective of the stage of completed. This loss should be charged in the P & L subtracted from work in progress.
4. This method is consistent with accrued bases of accounting though it is subject to risk of errors in the estimate.
5. Normally the cost approach is used by many firms.

*Stages to be followed in applying the method*

1. Determine the stage of completion using any of the discussed method.
2. Determine the total estimated profit by adopting this method.

$$\text{Notion profit} = \text{Contract price} - \text{Estimate total cost}$$

3. In order to calculate the profit to be recognized in the recounts this approach is used.

$$\text{Percentage of completion} \times \text{Notion profit}$$

4. Calculate the value of work in progress using the following schedule.

	Sh
Cost to date	xxx
Add: profit recognized	xxx
Less: billings to date	(xxx)
W.I.P	xxx

5. Determine the amount due from the contract as follows

	Sh
Billings to date	xxx
Less collection: cash received	(xxx)
Clients / debtors	<u>xxx</u>

6. Prepare P & L extract as follows

	Sh
Profit recognized	xxx
Less operating expenses	(xxx)
Net profit / loss	xx

7. Prepare balance sheet extract showing work in progress.

### Summary of accounting entries

		Dr.	Cr.
1	cost of contract incurred	Cost of contract A/C	Cash A/C
2	Billings to the client	Client A/C	Billings of contract A/C
3	Collections made	Cash A/C	Contracted / client A/C
4	Expenses incurred	Operating expenses A/C	cash A/C
5	Contract profit	Earning contract	P & L

### Exercise 7.4

A small bridge is to be constructed by the beginning of the year at a fixed price of sh 900,000 with estimates contract cost of sh 750,000 in year one. The following summaries are presented.

	Year 1	Year 2	Year 3
Cost to date	125,000	495,000	145,000
Cost to completion	625,000	155,000	0
Billings to customer	110,000	565,000	225,000
Collections	90,000	520,000	265,000
Operating expenses	15,000	30,000	225,000

Required:

- Prepare a statement showing the profit recognized in each year.
- Balance sheet extract.
- Journal entries to account for the extraction

### Stage 1: Percentage of completion

	Year 1	Year 2	Year 3
Cost to date	125,000	495,000	145,000
Cost to completion	625,000	155,000	0
	750,000	650,000	145,000
% completion	$\frac{1250000}{750000} \times 100$	$\frac{520,000}{650,000} \times 100$	$\frac{145,000}{145,000} \times 100$
	750000	65000	145000

16.67%                      76.15%                      100%

Stage 2: Notional profit

	Year 1	Year 2	Year 3
Cost to date	900000	900000	900000
Less total contract cost	750000	650000	145000
Notional profit	150000	250000	755000

Stage 3: Profit recognized

Year 1	Year 2	Year 3
	76% x 238000	100% x 755,000
	= 190,000	= 755,000

W.I.P

	Year 1	Year 2	Year 3
Cost to date	125,000	495,000	145,000
Add profit	-	190,000	255,000
Less Billings to date	110000	565,000	225,000
WIP	15000	120,000	675,000

Client account	Year 1	Year 2	Year 3
Billings to date	110,00	565,000	225,000
Less: Collections	90,000	520,000	265,000
	20,000	450,000	40,000

Balance sheet extract

Assets	Year 1	Year 2	Year 3
W.I.P	150,000	120,000	675,000
Clients	20,000	450,000	
Liabilities			
Clients	-	-	40,000
	35000	165	635,000

## Journal entries

	Year 1		Year 2		Year 3	
	Dr.	Cr.	Dr.	Cr.	Dr.	Cr.
	'000'	'000'	'000'	'000'	'000'	'000'
1 Cost of contract in date						
Contract	125		495		145	
Cash A/C		125		495		145
2 Billing to the client						
Client	110		565		225	
Billing contract		110		565		225
3 Collection made						
Cash	90		520		265	
Contract / Client		90		520		265
4 Expenses incurred						
Expense A/C	15		30		225	
Cash		15		30		225
5. Contract profit						
Earnings on contract	-		190		755	
P & L		-		190		755

## Exercise 7.5

- Explain the difference between a fixed price contract and cost plus contract.
- Njenga Limited is a construction Co. whose financial year end is 31<sup>st</sup> March

The information provided was extracted from the books of the company in contraction with three construction contracts undertaken by the company during the financial year ended

31<sup>st</sup> March 2005

	Contract No. 468	Contract No. 465	Contract No. 470
	sh '000'	sh '000'	sh '000'
Contract price	3600	4800	2500
Cost incurred up to 31/3/04	1800	3000	1500
Cost incurred during the year	600	1000	500
Estimated cost of the contract	3000	5200	2300

Total billings to date	2800	4500	1500
Total cash received to date	3600	4200	1700
Total profit reported on the			
Contract to date	360	30	(20)
General adm. Expenses	60	120	30

### Required

Using the percentage of completing method of accounting for long term construction contract:

1. Calculate profit/less realized on each contract for the year ended 31<sup>st</sup> March 2005.
2. Prepare profit and loss extract for each contract for year ended 31<sup>st</sup> March 2005.
3. Prepare balance sheet extract as at 31<sup>st</sup> March 2005.

#### Step 1: Percentage of completion

	468	469	470
	'000'	'000'	'000'
Cost to 31/3/2004	1800	3000	1500
Cost during the year	600	1000	500
Further cost to completion	600	1200	300
Total contract cost	3000	5200	2300
Percentage of completion	$\frac{2400}{3000} \times 100 = 80\%$	$\frac{4000}{5200} \times 100 = 77\%$	$\frac{2000}{2300} \times 100 = 87\%$

#### Determination of notional profit

	468	469	470
Contract price	3600	4800	2500
Less contract cost	3000	5200	2300
Notional profit / Loss	600	400	200

# Profit / loss recognizable

to date	80% x 600	(400)	87% x 200
	480		174
Less previously recognized profit	(360)	(30)	
Add previously recognized loss			20
Profit & loss A/c	120	(430)	194

## Profit and loss extract

	468	469	470
	'000'	'000'	'000'
Profit / loss recognized	120	(430)	194
Less: adm expense	(60)	(120)	(30)
Net profit / loss	60	550	164

## Determination of WIP

	468	469	470
	'000'	'000'	'000'
Cost to date	2400	4600	2000
Less profit recognized in the P&L	120	-	194
Less loss recognized to P&L	-	(430)	-
Less: Billings to date	2800	(4500)	(1800)
	280	930	394

## Determination of debtors A/C

	468	469	470
	'000'	'000'	'000'
Billings to date	2800	4500	1800
Less: Collections	2600	4200	1700
	200	300	100



#### Balance sheet extract

Assets			
W.I.P	-	-	394
Client A/C	200	300	100
Liabilities			
W.I.P	280	930	-

### 7.4 Process Costing

This is a form of operations costing used in cost where cost are passed through a series of processes before the product is finally completed. An inherent feature of process costing is that the output of one process becomes the input of the other process. In case of process costing all the cost direct and indirect are charged to the specific process. Process costing is normally used by industries which manufacture identical products such as chemicals, soap, spirits paper paint or products biscuits textiles etc.

#### Elements of process costing

##### 1. Raw materials

Material re divided into.

- a) Input materials
- b) Materials added

Input materials are those materials introduction into the first process and materials added are those added into subsequent processes. The cost of all materials, input and added is debited in the process account.

##### 2. Labour cost

Labour cost of each process in debited in the process account.

Labour cost is usually low in process costing due to automation.

##### 3. Direct cost

These are expenses incurred in respect of my particular process.

##### 4. Production overheads

In case of production overheads each and every process is debited with a fair share of this production overhead.

#### Process loss scrap and waste

#### Process loss

This is divided into two:

#### Normal loss

This represents loss which is expected under normal conditions.

It is loss which is unavoidable in view of nature of the production processes. e.g., loss due to evaporation. Sometimes normally lost items are sold as scrap e.g. small pieces of cloth. Obtained when designing a skirt or a shirt may be sold pillows etc.

*N/B:* A fundamental feature of process costing is the determination of cost per unit of transfer from one process to the next. This cost per unit is influenced by the value of normal loss i.e. whether normal loss has value or not.

Obtaining cost per unit of transfer

1. Where normal loss has no scrap value

$$\text{Cost per unit} = \frac{\text{Total process cost}}{\text{Expected units after normal loss}}$$

2. Where normal loss has a scrap value

$$\text{Cost per unit} = \frac{\text{Total process cost} - \text{scrap value of normal loss}}{\text{Expected units after normal loss}}$$

*N/B:* If normal loss has no sales proceeds or the sales proceeds are less than the cost the amount of cost not recovered becomes part of the cost of the goods units.

#### Abnormal loss

It represents a loss which occurs under abnormal circumstance. It is loss which cannot be foreseen e.g. loss due plant break down power failure industrial accident, inefficiency of worker use of defective low materials.

*N/B:* Abnormal loss items are valued at the cost of good units.

Accounting entries	Dr.	Cr.
1. When abnormal loss arise	Abnormal loss A/C	Process A/C
2. Sales of abnormal loss item	Bank / cash A/C	Abnormal loss
3. Loss being the difference		
Value of abnormal loss & sales	P & L	Abnormal loss

#### Exercise 7.6

In the manufacture of product vitality 2000 kgs of material at kshs 5kg we supplied to process I. Labour cost amounted to sh 3,000 and production overheads sh 2,300, normal loss has been estimated at 10% . The actual product after process was 1750kg.

Required: Prepare process 1 account

### Production statement

	Units
Normal loss	200
Actual output	1750
Abnormal loss	<u>50</u>
Input	2000kg

### Process 1 account

	QTY	UNIT PRICE	AMT		QTY	UNIT PRICE	AMT
Input material	2000	5	10000	Normal loss	200	-	-
Labour cost			3000	Abnormal loss	50	8.5	425
Production O.H			2300	Transfer to process 1	1750	8.5	14875
	2000		15300		2000		15300

### Abnormal loss account

	Qty	Unit price	Amt		Qty	Unit price	Amt
Process A/C	50	8.5	425	P & L	50	8.5	425

### Normal loss account

	Qty	Unit price	Amt		Qty	Unit price	Amt
Process A/C	200	-	-				

$$\text{Cost per unit} = \frac{\text{Total process cost}}{\text{Expected out after normal costs}} = \frac{15300}{1800} = 8.5$$

### Exercise 7.7

Using the same data as above show process I account where normal loss has a scrap value of sh1.8 per kilo.

### Process 1 Account

	QTY	UNIT PRICE	AMT		QTY	UNIT PRICE	AMT
Input	2000	5	10000	Normal loss	200	1.8	360
Labour cost			3000	Abnormal loss	50	8.3	415
Production O.H			2300	Transfer to process II	1750	8.3	14525
	2000		15300		2000		15300

### Abnormal loss

	Qty	Unit price	Amt		Qty	Unit price	Amt
Process A/C	50	8.3	415	Bank	50	1.8	90
				P & L			325
	50		415		50		415

### Normal loss account.

	Qty	Unit price	Amt		Qty	Unit price	Amt
Process A/C	200	1.8	360	Bank			360

### Abnormal gain

Abnormal gain arises when actual loss is less than expectation.

Abnormal gain reduces units saleable as scrap double entry.

	Dr	Cr.
i) When abnormal gain arises A/C	Process A/C	Abnormal gain
ii) Saleable value of abnormal gain	Abnormal gain A/C	Scrap debtors A/C
iii) Value of gain	Abnormal gain A/C	P & L

### Exercise 7.8

Using information above with scrap value being sh1.8 per kilo and output being 1800kg.

### Production statement

	Units
Normal loss	200
Output	1830
Abnormal gain	(30)
Input	2000

### Process Account

	QTY	UNIT PRICE	AMT		QTY	UNIT PRICE	AMT
Input	2000	5	1000	Normal loss	200	1.8	360
Labour cost			3000				
Production O.H			2300	Transfer to process II	1830	8.3	15189
Abnormal gain	30	8.3	249				
			15189				15189

$$\text{Cost per unit} = \frac{15300}{1800} - 360 = 8.3$$

### Abnormal loss account

	Qty	Unit price	Amt		Qty	Unit price	Amt
Scrap debtors	30	1.8	54	Process A/C	30	8.3	249
P & L			195				

### Normal loss account

	Qty	Unit price	Amt		Qty	Unit price	Amt
Process A/C	200	1.8	360	Scrap debtors			300

Scrap debtors account

Normal less	360	Abnormal gain	54
		Bal loss	306
	360		360

### 7.5 Process Costing Work in Progress

Work in progress (W.I.P) means units in a process which are some proportional way complete. The proportion complete may be that of material labour or even expenses. A fundamental feature of process costing is to obtain cost per a whole unit. To be able to do this, that which is incomplete has to be expressed to the equivalent of what is complete e.g., incase of 500 half complete drum in turn of material labour and expenses they can be expressed 250 fully complete drums if in the same process there were a 1000 fully complete drums that total effective or equivalent units equal to 100 + 250

If the cost of the process was 12,500

The cost per drum will be =  $\frac{12,500}{1,250} = 10$

#### Exercise 7.9

In a specific period production and cost data was as follows:

Production was 1,600 full complete units and 400 partly complete units.

The degree of completion of the 400 units WIP was as follows.

Materials	100%
Labour cost	60%
Production overhead	40%

The total incurred was:

Material	56400
Labour	14720
Production overhead	8800

#### Required

- Calculate total equivalent unit
- Cost per unit of complete units
- Show the value of W.I.P

#### Solution

- Calculate total equivalent unit

Elements of cost	Fully complete	Equivalent units	Total equivalent
Materials	$100\% \times 1600 = 1600$	$100\% \times 400 = 400$	2000
Labour	$100\% \times 1600 = 1600$	$60\% \times 400 = 240$	1840
Expenses	$100\% \times 1600 = 1600$	$40\% \times 400 = 160$	1760

b) Cost per unit of complete units

Elements of cost	Total equivalent cost	Total cost	Cost per unit
Materials	$1600 + 400 = 2000$	56400	28.2
Labour	$1600 + 240 = 1840$	14720	8
Expenses	$1600 + 160 = 1760$	8800	5
		79,920	41.2

c) Show the value of W.I.P

Cost of fully complete

1600 @ 41.2 = 62920

Cost of W.I.P = 14000

Total cost = 79920

Valuation of Opening Work in Progress

They are two ways of valuating opening W.I.P in a given process.

a) Weighted average method / average cost method.

b) First in first out method (FIFO)

Weighted average method (features)

a) The opening work in progress loses their identity and become part of the current period production.

b) The cost incurred in the opening work in progress becomes part of current period cost.

Used when:

a) The percentage of completion of opening W.I.P is not given.

b) When cost of opening W.I.P is analyzed by elements of cost.

Preparation of a statement of expected production

Method I

	Units	Units
Opening W.I.P	xxx	
Transfer from previous process / input	xxx	xxx
Less Closing W.I.P		xxx

Expected production (xxx)  
xxx

Method II

	Units
Transfer to the next process	xxx
Add total scraps	<u>xxx</u>
Expected production	xxx

Determination of total equivalent units

1. In case of abnormal loss

Total equivalent = Completed units + Equivalent in closing W.I.P + Equivalent units in

Abnormal loss

2. Incase of abnormal gain

Total equivalent units = Completed units + Equivalent in closing W.I.P - Units in

Abnormal

gain

**N/B:** Abnormal gain is assured to be 100% complete for all element of cost.

## 7.6 FIFO Method

Features

1. Units completed in the previous period do not become part of the current period production i.e. the units are said to have retained their identity.
2. The cost of opening W.I.P does not become part of the current period cost.

The method is used when:

The degree of completion of opening W.I.P has been provided.

1. The cost of opening W.I.P is given as lump sum i.e. it is not analyzed by elements of cost.

Steps to follow

1. Determination of expected production  
 Similar to that of weighted.
2. Determination of total equivalent units

The productive depends on whether there is abnormal loss or abnormal gain.

In case of abnormal loss



Total equivalent = Completed units + Closing equivalent unit in closing W.I.P +  
 Equivalent units in abnormal loss – Equivalent unit in opening W.I.P completed in the  
 previous period.

In case of abnormal gain

Total equivalent = Completed units + Equivalent units in closing W.I.P. – Unit in Abnormal  
 gain

- Equivalent units in opening W.I.P completed in the previous period.

## 7.7 Joint and By-Product Costing

*Joint product costing* these are products regarded to having substantially equal economic values and which arise from the semi process e.g.

- i) In case of an oil refinery joint products include diesel, petrol, paraffin and lubricant.
- ii) In the case of meat processing joint products include various grades of meat.
- iii) In the case of dairy products joint products include butter, cream and ghee.

*Apportionment of joint cost*

A problem arises as to how cost incurred before separating the products is to be apportioned to the joint products. There are three methods adopted in this case:

- i) *Physical unit bases* In this case costs are apportioned according to the physical weight of the products. The method is suitable where products have an almost equal economic value.
- ii) *Sales value bases* In this case joint costs are apportioned according to the relevant sales value of the products. It is more suitable where items have different economic values e.g. in the case of silver, diamond.
- iii) *Net realizable* In this case joint costs are apportioned on the base of sales valueless post separation cost.

*Exercise 7.10*

The following data relates to three products XYZ

	X	Y	Z
Sales (sh)	240000	180000	150000
Selling cost (sh)	35000	45000	10000
Weight (kg)	180	240	150

Joint cost incurred were 350000

*Required:* Calculate profit made by each product apportioning joint costs on

- i) Sales value bases

ii) Physical unit bases

Apportionment of joint costs

Total sales = 240 + 180 + 150 = 570000

$$X = \frac{240000}{570000} \times 350000 = 147368.42$$

$$Y = \frac{180000}{570000} \times 350000 = 110526.32$$

$$Z = \frac{150000}{570000} \times 350000 = 92105.26$$

Determination of profit

Product	Sales	Share of joint cost	Selling cost	Total cost	Profit
X	240000	147368.42	35000	182368.42	57631.58
Y	180000	110526.32	45000	155526.32	24473.68
Z	150000	92105.26	10000	102105.26	47894.74

Apportionment of joint cost

Physical sales

$$X = \frac{180}{570} \times 350000 = 110526.31$$

$$Y = \frac{240}{570} \times 350000 = 147368.42$$

$$Z = \frac{150}{570} \times 350000 = 92105.26$$

Determination profit

Product	Sales	Share joint cost	Selling cost	Total costs	Profit
X	240000	110526.31	350000	145526.31	94473.69
Y	180000	147368.42	45000	192388.45	12388.40
Z	150000	92105.26	10000	102105.26	47894.74

Exercise 7.11

A process with joint costs of 50,000 produced two products P & Q both of which need further processing before sale. Relevant information as follows.

Product	Output	Further processing	S.P. per
P	3000	45000	155
Q	2000	30000	1175

*Required:* determine profit of each product using sales values less post separation cost.

*Solution*

Sales value less post separation cost

	Sales	Post sep cost	N.R.V
P	3000 x 155	465000 – 45000	420000
Q	2000 x 117.5	235000 – 3000	205000
			625000

Apportioning of joint cost

$$P: \frac{420000}{625000} \times 500000 = 336000$$

$$Q: \frac{205000}{625000} \times 500000 = 164000$$

Product	Sales	Share joint cost	Selling cost	Total cost	Profit
P	465000	336000	45000	381000	84000
Q	235000	164000	30000	194000	41000

Determination of total joint cost

Material cost 240000kg x 30	7200000
Labour cost sh9000 x 90	810000
Variable overhead 9000 x 45	405000
Fixed overhead	<u>405000</u>
Total	8820000
Less value of normal loss 240000 x 15	<u>360000</u>
Total joint cash	8460000

Share of joint cost

Physical weight

$$\text{Output} = 240000 - 24000 = 216,000$$

Output of each product	Unit	Sales value
------------------------	------	-------------

X	$\frac{5}{10} \times 216000$	$108000 \times 225$	24300000
Y	$\frac{3}{100} \times 216000$	$64800 \times 180$	11664000
Z	$\frac{2}{100} \times 216000$	$43200 \times 150$	6480000
			31944000

Apportionment of joint costs

Physical cost

$$Y \quad \frac{108000}{216000} \times 8460000 = 4230000$$

$$Y \quad \frac{64800}{216000} \times 8460000 = 2538000$$

$$Z \quad \frac{43200}{216000} \times 8460000 = 1692000$$

Apportionment of joint costs

$$X \quad \frac{2430000}{42444000} \times 8460000 = 4843511.45$$

$$Y \quad \frac{11664000}{42444000} \times 8460000 =$$

$$Z \quad \frac{6480000}{42444000} \times 8460000 =$$

Total processing on further processing

Input 216000	8460000
Further processing 216000 x 15	<u>3240000</u>
	11700000

Less value of normal loss

Total joint cost	11700000
------------------	----------

Determine of output

Normal loss is  $10\% \times 216000 = 21600$

Output is  $216000 - 21600 = 194400$

	Output of cash product		Sale value
A	$\frac{5}{10} \times 194400$	$97200 \times 270$	26244000
B	$\frac{3}{10} \times 194400$	$58320 \times 225$	13122000
C	$\frac{2}{10} \times 194400$	$\frac{38880}{194400} \times 180$	6998400

## 7.8 By-Product Costing

A by product is a supplementary / secondary product which arises incidentally in the production of the main product and whose sales value is lower compared to the main product. In case of iron and steel manufacture the by-products are is furnace which is used in cement and brick manufacture. In case of meat trade by products are bones and grease. In case of timber trade by products are sawdust, small timber off cuts and barks. There are four ways of dealing with by-products in the books of account.

### 1. Net realizable value method

In this case the net realizable value of the by-product is detected from the total cost of the main product.

- Receipts from the sale of the by-products are treated as incidental sources of income and taken to the general profit and loss account.
- The sales of a by-product are added to the sales of the main product.
- The by-product is treated as a joint product.

### Exercise 7.12

During a period 3000 units of a main product were produced at sh 60 per unit. Total production were sh 125000. A by product was produced together with main product. This by-product was 100 units and it was sold for sh 55 per unit post separation cost of this by product were sh 500. Calculate the production cost and profit of the main product.

#### Cost and profit of the main product

Cost	sh	sh
Less: NRV of the by product		125000
Sales 100 x 55	5500	
Less post separation cost	500	
Net releasable value		<u>5000</u>
Net cost of the main product		<u>120000</u>
Profit		60000
Sales 3000 x 60		180000

### 7.9 Service Costing

This can be defined as a form of operations costing which applies where standardized services are provided by an undertaking or a service cost centre within an undertaking. Service costing therefore is applied by organization which provides services rather than tangible goods examples include:

- i) Road railway and air transportation.
- ii) Power generation
- iii) Hospitals  
Local government services
- iv) Hotel accommodation and Restaurant services may also be provided within an organization by department e.g. stores, maintenance, canteen etc.

A principle problem in service cost is the determination of suitable cost unit to express cost. Each organization has a suitable cost unit for this purpose. Some common cost units used in respect of some services is as shown below.

Service	Cost unit used
1. Transport	Tonne-km, passenger seat, passenger km etc
2. Hospital	Hospital bed, patient days, No of operations etc
3. Electricity	Kiwalts – hours
Hotel	Occupied bed per night
4. Restaurant	Meals serviced

Examples of cost in various service organizations

1. In case of a transport organization the main cost include, fuel consumption, vehicle, depression, vehicle repairs and maintenance, wages of drivers and conductors, insurance of vehicle etc.
2. Canteen / restaurant. The cost involved include:
  - i. Cost of meat, fish and poultry, vegetables, cakes, tea, sugar etc.
  - ii. Wages and salaries of supervisors, waitresses, kitchen assistant etc.
  - iii. Miscellaneous e.g. rent, gas, electricity, crockery and cutlery maintenance.
3. Clinic – Cost include, salary of a nurse, cost of medicine, cost of equipment, clearing etc.

### 7.10 Review Questions

1. Distinguish between job costing system and processing costs
2. Define activity based costing.
3. Define job costing. Explain the main types of job costing
4. What is contract costing? Discuss the important features of contract costing.
5. Define process costing. Explain the main elements of process costs
6. Kampala bottlers produce schweppes after three distinct processes. The following information is obtained from the account for a period.

Processes				
Items	Total	ii	ii	iii
	Shs	Shs	Shs	Shs
Direct material	2,200	1,800	300	100
Direct wages	400	100	200	100
Direct expenses	500	300	-	200

Production overhead incurred is Shs.800 and recovered on 200% of direct wages. Production during the period was 100kg. There were no opening stocks or closing stocks. Prepare process cost accounts.

### 7.11 References

Saleemi N.A (2009) *Cost Accounting Simplified*, Printwell industries Ltd. (Pages 199-271)

## LESSON EIGHT: STANDARD COSTING

**Purpose:** To introduce the learner to standard costing technique of cost accounting. This will enable the learner to compare the standard cost of each product or service with actual cost to determine the efficiency of operation so that any remedial action may be taken immediately.

### Specific Objective

By the end of the lesson the learner should be able to:

- (i) Define standard costing and standard cost
- (ii) Know how standards relate to budgets
- (iii) Understand how standards are set and recorded
- (iv) Explain the advantages and disadvantages of standard costing

### 8.1 Introduction

Standard costing can be defined as “the preparation of standard costs and their use to clarify the financial results of a business, particularly by the measurement of variations of actual costs from standard cost and the analysis of the causes of the variations for the purposes of maintaining maximum efficiency by executive action.” The essential purpose of analysis of the variances is to explain their causes by tracing them to their source. Standard Costing is planned, generally established well before production begins, and provides management with goals to attain (planning) and a basis for comparison with actual results (control). Standard Costs are costs per unit while a budget is total costs. Standard Costs are also known as planned costs, predicted Costs and scheduled costs.

*Standard Costing involves:*

- i) The setting of standards
- ii) Ascertaining actual results
- iii) Comparing standard and actual results
- iv) Investigating the variances and taking appropriate actions.

### 8.2 Purpose of Standard Costing

Cost information may be used for different purposes.

*Cost control*

It aids management in:

1. Production of a unit of usable product at the lowest possible cost at predetermined quality standards;



2. Making periodic comparisons of actual costs with standard costs to measure performance and correct inefficiencies.

#### *Inventory Costing*

Inventories costed at standard must be adjusted if necessary to approximate actual cost on external financial statements.

#### *Budgetary Planning*

Standard Costs are useful in developing a budget.

Budget = Standard Costs x Volume or activity levels

#### *Product pricing*

1. Selling price of a unit and the cost per unit are closely related and may effect each other.
2. When selling price increases and if sales decrease, then unit cost increases.
3. When selling price decreases and if sales increase, then unit cost decreases.
4. Management attempts to achieve the best combination of price and volume to maximize profits.

#### *Record – keeping*

May decrease when recording standard costs

### **8.3 Budgetary Control and Standard Costing**

Budgetary control is concerned with comparison of estimated and actual results of a department, company or country. Standard costing is concerned with comparison of estimated and actual results of manufacturing a product or providing a service. It means budgetary control is concerned with the organization as a whole while the standard costing is concerned with one unit of production or service. The budgetary control is not dependent on standard costing. The budgets can be prepared for a future period and control can be exercised by a frequent comparison of actual results with the budgeted results. For this purpose standard costing is not essential.

Let us further look at comparison of budgets and standards:-

Budgets and standards are not the same thing. They are set up for different purposes.

#### *Similarities:*

Following are certain fundamental principles which are common to both standards and budgets.

1. They are both prepared prior to give period of times as a plan to be pursued during that period i.e. establishment of performance targets.
2. Comparison of actual with plan.

3. The analysis of significant deviation of causes.
4. Departmental Heads may be made accountable for the performance of their departments which is monitored by either Budgetary Control or standard cost reporting.
5. The application of above principles to cost units is termed standard costing, whereas the application of these principles to a department or to the business as a whole is termed budgetary control.

#### *Differences*

1. *Conceptual*: Standard cost is predetermined cost of cost unit, while the budgeted cost is the predetermined cost of producing a number of units i.e. it is a total concept.
2. *Completeness*: Standard Costs are normally set only for the manufacturing function. Budgets can be set for all functions.
3. *Emphasis*: Standards emphasis the cost to be anticipated under expected working exceeded conditions, whereas the budgets emphasizes the cost targets that should be exceeded.
4. *Purpose*: The purpose of standard cost is to determine what individual costs might be within a prescribed set of working conditions. The purpose of budget is to forecast requirements in terms of man power, finance, production, sales etc to attain a given objective.
5. *Analysis*: Any significant variation from standards, whether favourable or unfavourable is analyzed, invested and reported so that corrective action may be taken. But in budgets if the actual cost is less than budgeted cost, it is accepted as good performance as the variance is not normally investigated.

#### *Historical cost*

Historical or actual cost is that which is actually incurred on the production of a commodity or providing a service. The costs taken in previous chapters were historical costs.

#### *Standard cost*

Standard cost means a predetermined cost. It can be defined as “an estimated cost of a cost unit, prepared in advance of production or supply, correlating a technical specification of materials and labour to the prices and wages ratio estimated for a selected period of time, with the addition of an appointment of the overheads expenses estimated for the same period within a prescribed set of working conditions.”

In other words it is a predetermined calculation of how much costs should be under specified working conditions. The standard cost is based on past experience and technical aspects of

goods produced. A standard cost card for each product is maintained in the organization. This card shows the details of material cost, labour cost and production overheads in respect of one unit of products. The main purpose of establishing a standard cost is to compare this cost with actual cost in order to evaluate the performance of the enterprise. Standard costs are revised from time to time in view of changed circumstances.

#### *Types of standards*

There are four types of standards. These are explained as under:-

##### *a) Basic Standards*

These are the standards which do not change from year to year. In these standards, prices level of efficiency and other factors remain the same over a period of time. A basic standard may be defined as “A standard established for use over a long period from which a current standard can be developed.”

These standards do not take into consideration the current situation so these are not realistic.

##### *Ideal Standards*

Usually this standard cannot be attained and leads to unfavourable variances as it assumes:

1. Minimum prices for all costs (Direct Material, Direct Labour and Factory OH).
2. Optimal usage of Direct Material, Direct Labour and Factory OH.
3. 100% manufacturing capacity.

Thus, these are based on perfect operation conditions. It is assumed that the ideal level of efficiency is achieved. It means there are no breakdowns, no material wastages, no labour idle times and so on.

An ideal standard can be defined as “A standard which can be attained under the most favourable conditions.

Ideal standards are difficult to apply because the conditions, on which these standards are based, cannot be fulfilled.

##### *b) Attainable Standard*

Can be met because it recognizes:

1. Good overall price but not necessarily the lowest price for all costs.
2. Direct labour is not 100% efficient.
3. Normal spoilage will occur.
4. Manufacturers do not operate at 100% capacity.

Most companies presently use attainable standards but a new manufacturing environment is development that emphasizes ideal standards.

##### *c) Expected Standards*

These are also known as attainable standards. These are based on normal operating conditions and an allowance is made for average wastages and inefficiencies. In this case, it is assumed that there will be some loss of production due to power failure, machinery breakdown or labour turnover etc. an expected or attainable standard unit of work is carried out efficiently, a machine properly operated or material properly used.” These standards are more realistic and easy to apply. These can be used for product costing, for cost control, for stock valuation and as a basis for budgeting. These standards have some provisions for wastages and inefficiency but it does not mean that it should encourage employees for making excuses for not achieving their targets.

#### *Current standards*

These standards are set for use over a limited period to reflect current conditions. These standards are normally used in the situations when the inflationary trends are very common. In this case, the standards are revised on monthly basis. A current standard may be defined as, “A standard established for use over a short period of time, related to current conditions.”

These standards are not practicable in most of the circumstances.

#### *The use of standards*

The type of standards used affects the level of variances. Expected or attainable standards are more realistic and these must be used in normal circumstances. The setting of standards also depends on forecasting skill. The variances may also arise due to forecasting errors. This fact should be also taken into consideration while analyzing the variances. The following facts must be considered in standard costing:-

- i) The standard costs must be estimated accurately and correctly.
- ii) These must be revised from time to time.
- iii) The costs must be based on expected standard costs.
- iv) The variance between standard costs and actual costs must be analyzed and the tolerance limits must be also specified.
- v) The main causes for variances beyond tolerance limits must be explained clearly.

#### *Advantages of standard costing*

The advantages to be derived from a system of standard costing are as follows:-

1. *Effective cost control.* The most important advantage of standard costing is that it facilitates the control of cost. Control is exercised by comparing actual performance with standards and taking corrective action.
2. *Helps in Planning.* Establishing standards is a very useful exercise in business planning which instills in the management a habit of thinking in advance.

3. *Provides incentives:* The standards provide incentives and motivate to work with greater effort. This increases efficiency and productivity.
4. *Fixing prices and formulating policies:* Standard costs are a valuable aid to management in determining prices and formulating production policies.
5. *Facilitates delegation of authority:* Delegation of authority and fixing responsibility for performance may be identified directly with the persons concerned.
6. *Facilitates Co-ordination:* While establishing standards, the performance of different departments such as production, sales, purchases etc is taken into account. Thus through the working of standard cost system, co-ordination of various functions is achieved.
7. *Cost Reduction:* By fixing standards, certain inefficiencies are reduced, such as material wastage, idle time, lost machine hours, etc.
8. *Valuation of stocks:* Standard costing simplifies the valuation of stock because the stock is valued at standard cost.
9. *Management by exception:* Reporting of variance is based on the principle of management by exception. Only variances beyond a predetermined limit may be considered by the management for corrective action. This also reduces the cost of preparing reports.
10. *Economical and simple:* Standard costing is an economical and simple means of cost accounting and generally results in a saving in the cost of costing system.

*Other advantages of standard costing are:-*

- i) Standard costs are used to prepare the budget. The quantities to be produced or sold are multiplied by standard cost per unit and standard selling price per unit to find out the cost and sales. It helps to prepare budget accurately.
- ii) Actual results are compared with standard or predetermined figures. If the actual costs are higher than standard cost, it shows unfavourable trend and vice versa. It can be determined whether the actual performance is satisfactory or not.
- iii) When the variances are analyzed, the causes of these variances can be determined. If these variances are due to inefficiency of some employees then the disciplinary action can be taken against them. This procedure helps to improve the overall performance of the organization.
- iv) Only the variances which exceed acceptable tolerance limits need to be investigated by management with a view to control action. In this way, the principle of “management by exception” is operated.

- v) Standard costs can provide a valuable aid to management in determining prices and formulating policies. However, great care must be taken in this regard.

*Disadvantages of standard costing*

Standard costing system may suffer from certain disadvantages.

1. The system may not be appropriate to the business.
2. Ineffective for control purposes if not understood properly by the managers and other staff members. Therefore, the staff may not be capable of operating the system.
3. A business may not be able to keep standards up-to-date. In other words, a business may not revise standards to keep pace with the frequent changes in manufacturing conditions. Therefore, in rapidly changing situations, the standards become out of date and lose their effect.
4. Inaccurate and unreliable standards cause misleading results and thus may not enjoy the confidence of the users of the system.
5. Operation of the standard costing system is a costly affair and small firms cannot afford it. To install and keep up to date the system of standard costing (Revision of Standard) may be very expensive and time consuming.
6. Standard costing is expensive and unsuitable in job order industries manufacturing non-standardized products.

*Setting standards (or establishment of standards)*

The standards in respect of selling price and production costs are set. Standard costs are ascertained for each element of cost and the main procedures involved in setting standards are explained as under:

*Direct Material Standard*

*Direct materials price (rate) Standard*

The unit price of Direct Material purchased should be contingent upon sales forecast. Suppliers need to know an estimate of total quantity to determine amount of discount. Also, need quality and delivery standards before a standard price per unit can be set.

Material prices and materials usage are set for each product. The quantity of material required for one unit of any product is obtained from technical and engineering specifications. The standard quantity of raw material includes an allowance for normal loss in production due to evaporation or other technical reasons. The material prices are provided by the purchasing department. These prices are set in view of anticipated changes, carriage, quantity and cash discount and any other factors which will influence material costs.

Price changes must be considered in determining the standards. Can use weighted average of prices, or preferred alternative is to change the standard when prices change.

A separate standard must be established for each material. It is determined by the cost accounting and/or the purchasing departments. A separate department is established as established standards is a time consuming process.

Direct materials efficiency (usage) standard predetermined specification of the quantity of direct materials that should go into the production of one finished product. Individual standards must be established for each direct material.

#### *Direct labour*

##### *Direct Labour Standard classified as:*

Direct labour price (rate) standards are predetermined rates of pay for a period usually established by union contract or by management and/or personnel if non union influenced by type of job and experience. Any personnel if non union influenced by type of job and experience. Any pay rate increases during the year must be considered in determining the standards. It can use weighted average of pay rates, or preferred alternative is to change the standard when pay rates increase.

Direct labour efficiency standards are set in respect of direct labour cost. There are different grades of labour and wage rates payable to different grades of labour are set by the personnel department. These rates are taken as standard rates per hour. The number of labour hours required to produce one unit of any product are set in conjunction with technical experts.

#### *Overheads*

The overheads standards are set separately for variable overheads and fixed overheads. The variable overheads are set mostly in terms of labour hours. Variable overhead absorption rate per labour hour is calculated as under:-

$$\begin{array}{lcl} \text{Standard variable} & & \text{Budgeted variable} \\ \text{Overhead} & = & \frac{\text{overheads}}{\text{Budgeted Standard hours}} \\ \text{Absorption Rate} & & \end{array}$$

This overhead absorption rate is multiplied by the number of standard hours required for the production of a specific number of units of any product in order to find out the standard variable overhead cost.

Fixed overheads relate to time and these are constant for a specific year irrespective of fluctuations in the level of output.

The standard fixed overheads are determined on the basis of the following considerations:-

- a) The total cost of fixed overheads for a specific period.
- b) The budgeted production for a specific period
- c) The number of hours expected to be worked during a specific period.

Fixed overhead absorption rate is calculated as under:-

Fixed overhead =  $\frac{\text{Budgeted fixed overheads}}{\text{Budgeted standard hours}}$

Absorption rate

*Factory overhead standards*

Factory OH cost pool includes Indirect Materials, Indirect labour, factory rent, factory depreciation, factory equipment depreciation etc. to prepare the standard usually involves input from many department and managers. Standard costing establishes a single standard cost / unit which is applied despite fluctuations in activity.

Budgets are commonly used in controlling factory overhead costs. Fixed budgets show anticipated costs at one level of activity. Flexible Budget show anticipated costs at different levels of activities.

*Establishing Standards for a Process cost and job order cost system*

In a process cost system separate standards are established for Direct Material, Direct Labour and factory OH for each product. If there is more than one department, indirect standards are set for each department; the manager for that department is held accountable for the standard.

In job order cost system, standards are set for Direct Material, Direct Labour, and factory OH for each job.

#### **8.4 Setting Standard Selling Price and Margin**

A standard selling price is set for each product. The setting of a standard price is an integral decision. The standard selling price depends upon various factors like anticipated demand for a product, competition from other manufacturers, production cost, and inflationary trend and so on. The difference between the standard cost and standard selling price is the standard margin. When marginal costing principles are used then the term standard marginal cost is employed.

A simple standard cost card is shown as under:-

Standard Cost Card

Product Zed

Per Unit

Direct materials		Shs	Shs
Material A	15kg. at Shs 8 per kg	120	



Material B	6kg. At Shs 10 per kg.	<u>60</u>	180
Direct labour			
Grade I labour	5 hour at Shs 8 per hr	40	
Grade II Labour	3 hours at Shs 6 per hr	18	58
Variable Overheads			
Shs 3 per labour hour			24
Fixed Overhead			
Per unit of product			18
Production cost			280
Selling and Administration			
Overheads – 25% of production cost			70
Total cost			350
Profit (20% of total cost)		<u>70</u>	
Selling price		<u>420</u>	

### 8.5 Review Questions

1. Define standard costing. Distinguish between budgetary control and standard costing
2. Distinguish between historical and standard cost
3. Discuss various types of standards
4. Explain the advantages and disadvantages of standard costing
5. Describe the main procedure involved
6. What is standard cost card? Give the layout of a standard cost card.
7. “The most important factor to remember is that standard costs reflect what should be for stated conditions and volume of output”.

*Required:*

- a) The three types of standard costs and the basis assumptions underlying each one of them
  - b) The usefulness of each of the three standard costs in (a) above.
  - c) How standard costs may effectively be used as a control tool.
8. “Budgetary control can be operated even without adoption of standard costing”

*Required:*

- i) Explain both budgetary control and standard costing and show how the former is not dependent on the latter.

9. From the information given below you are required to:

- a) Prepare a standard cost sheet for one unit and enter on the standard sheet the costs to show sub-total for:

- (i) Prime cost
- (ii) Variable production cost
- (iii) Total production cost
- (iv) Total cost

- b) Calculate the selling price per unit allowing for a profit of 15% of the selling price.

The following data are given:

Budgeted output for the year 9800 units

Standard details for one unit

Direct materials 40 square metres at Sh.53 per square metre

Direct wage:

Bonding department 48 hours at Sh.25 per hour

Finishing department 30 hours at Sh.19 per hour

Budgeted costs and hours per annum:

<u>Variable overheads</u>	Sh.	Hours
Bonding department	3,750,000	500000
Finishing department	1,500,000	300000
<u>Fixed Overheads</u>		
Production	3,960,000	
Selling and distribution	1,960,000	
Administration	980,000	

## 8.6 References

T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles Ltd, Guildford and King's Lynn (Pages 415-425)

N.A Saleeni (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 368-381)

## LESSON NINE: VARIANCE ANALYSIS

**Purpose:** To equip learners with practical pointers to the causes of off-standard performance so that management can improve operations, efficiency, utilize resources more effectively and reduce costs.

### Specific Objectives

At the end of this lesson the learner should:

- (i) Know what is meant by variance and analysis and its purpose
- (ii) Understand the relationship of variances
- (iii) Be able to calculate basic material, labour, and overhead variances

### 9.1 Definition of Variance Analysis

The process by which the total difference between standard and actual cost is sub-divided into various parts is known as variance analysis. It may be also defined as, “The analysis of variances arising in a standard costing system into their constituent parts.” A variance is the difference between the standard cost and actual cost. In variance analysis, the variance is further subdivided into material variance, labour cost variance and overhead variance. The variances may rise due to various reasons. The variances may be adverse or favourable. When actual cost is greater than standard cost, the variance is known as adverse or unfavourable. On the other hand, when actual cost is less than standard cost then the variance is favourable. These variances may be also known as minus (adverse) or plus (favourable) variances.

### 9.2 The Purpose of Variance Analysis

The main purpose of variance analysis is to control the activities of an organization more effectively. Variances highlight to management that everything has not gone to plan. They highlight that problems may exist and direct management attention to them. If management is aware that there have been departures from standards (expectations) they will be in a position to take action to correct such departures. Significant adverse variances will, if left unchecked, have an adverse effect on profitability. If favourable variances arise, they should be investigated. It is possible that a favourable variance has arisen because of some unknown factor that could in the future be used to the advantage of the business. In variance analysis, the difference between standard cost and actual cost is calculated. The reasons for this variance are established by the management. The variance may arise due to carelessness of some employees or due to some other factors beyond the control of the employees. If the variances arise due to inefficiency of employees then the appropriate measures can be taken

by the management to avoid such situation in the future. If the variance is favourable and it is due to greater efficiency and devotion of some employees then the management should encourage such employees. The responsibility of the various variances can be assigned to some employees then the management should encourage such employees. The responsibility of the various variances can be assigned to some particular individuals. In U.S.A. standard costing system and budgetary control are known as responsibility accounting. The variance analysis helps the management to improve the performance of the enterprise, to increase efficiency, to utilize resources more effectively and too reduce costs.

#### *Structure of variances*

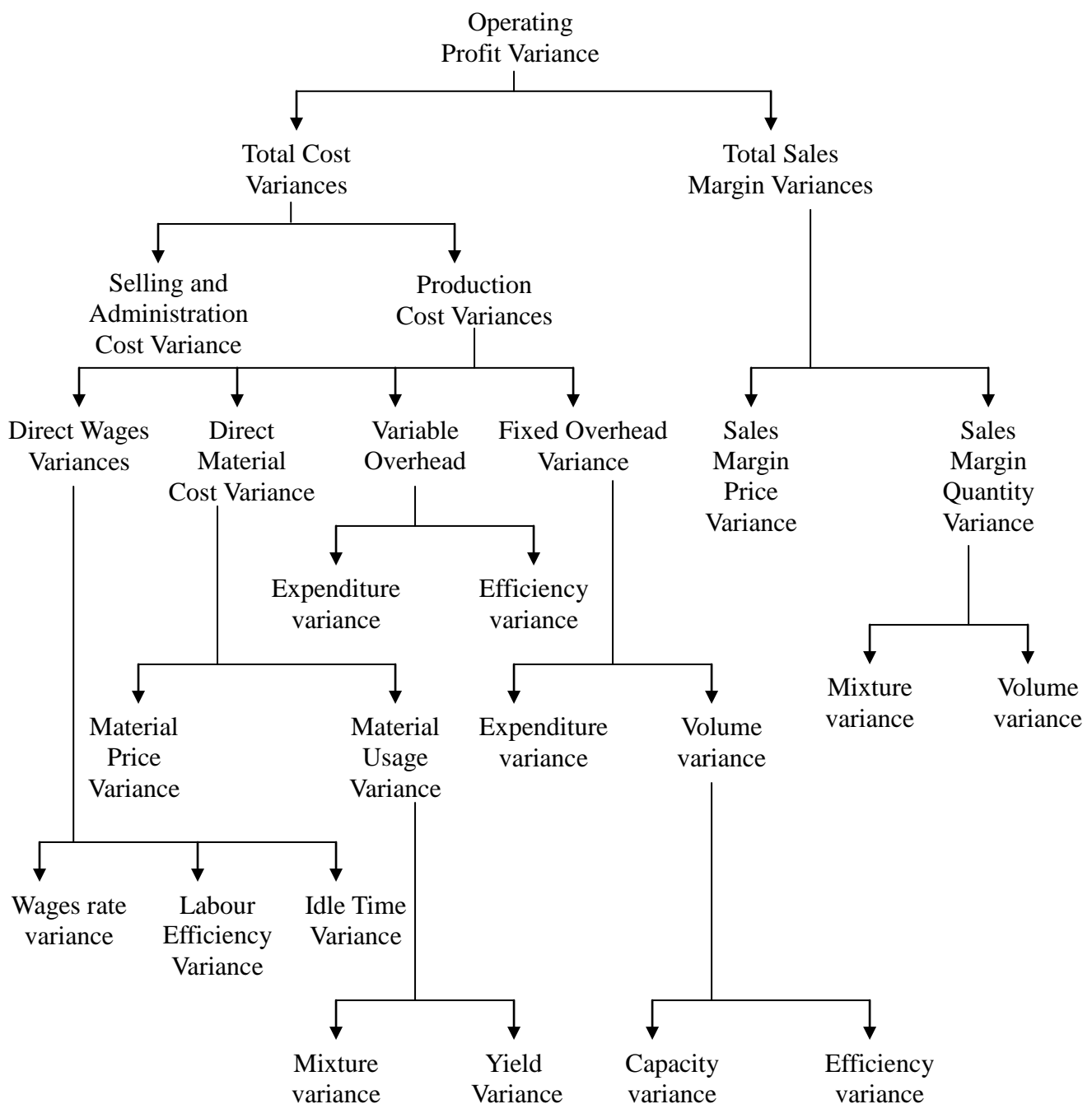


Figure 9.1 Structure of variances

### Calculation of variances

Variances will occur if in any given production period the actual costs vary from the standard costs. For example, if the price paid for material bought during a given production period, differed from the standard (expected) price for that material, a material price variance will arise. Similarly if the amount of material actually used exceeded the standard (expected) usage a material usage variance will arise.

The total difference between budgeted profit and actual profit for a specific period is subdivided into various parts. These parts relate to material, labour, overheads and sales variances. The particular variances which are computed in any given organization are those which are relevant to its operations.

The operation profit variance is the difference between budgeted and actual operating profit for a specific period. This variance is the sum of all other variances i.e. cost variances and sales variances. The structure or framework of all variances and sales variances. The structure or framework of all variances is shown by the help of the following chart as indicated in Figure 9.1.

From the chart, we can identify that the variances basically arise from two aspects i.e. quantities and prices. The basic variances relate to these two aspects i.e. quantities and price. The basic variances relate to these two aspects only. These can be summarized as under:-

	Price Variance	Quantity Variance
Direct materials	Price	Usage
Direct labour	Rate	Efficiency
Variable overhead	Expenditure	Efficiency
Fixed overhead	Expenditure	Volume
Sales	Price	Quantity

These variances are described as under:-

### 9.3 Material Cost Variance

This is the difference between the standard direct material cost of the actual production volume and the actual cost of direct material. This is the sum of material price variance and material usage variance.

*(a) Material price variance*

This is the difference between the standard price and actual purchase price for the actual quantity of material. It can be calculated at the time of purchase or the time of usage.

Generally, the former is preferable. It is calculated as under:-

Actual x Actual quantity – (Standard price x Actual quantity)

The main causes of this variance are:-

- i) Rise or fall in prices.
- ii) Buying inferior or superior quality instead of planned quality.
- iii) The effects of quality discounts due to buying smaller or larger quantities instead of planned quantities.

*(b) Material usage variance*

This is the difference between the standard quantity specified for the actual production and the actual quantity used, at standard purchase price. It is calculated as under:-

Standard price (Actual quantity – Standard quantity)

The main causes of this variance are:-

- (i) Greater or lower yield as compared to standard or expected yield.
- (ii) Greater or lower quantity of scrap as compared to anticipated quantity.
- (iii) The use of inferior or superior quality of material.

*Exercise 9.1*

Assume Company A, manufacturers highly specialized plastic container (product X72) for the chemical industry. Each of the containers will require a certain amount of raw material that will require a certain amount of labour time to produce and will incur certain production overhead costs.

*Direct material*

The standard cost for the material content of a product will consist of two parts – the standard (expected) quantity of material that will be needed and the standard (expected) price of that material.

Assume that the container referred to above requires a standard of 4 kilograms of raw material and that the price of the material is expected to be shs 3 per 1=kilogram.

Standard Material Cost = Standard Quantity x Standard Price = 4 kilograms x shs 3 per kilogram – shs 12.

*Direct labour*

The standard cost for the labour cost of a product will consist of two parts – the standard (expected) time required to make the items and the standard (expected) rate of pay for the operatives.

Assume that the container referred to above requires a standard of 5 hours to make and that the rate of pay is expected to be shs 3.60 per hour.

Standard Labour Cost = Standard Time x Standard Rate of Pay = 5 hours x shs 4 per hour = shs 20.

#### *Production overheads*

Production overheads, whether they are variable or fixed in nature are normally absorbed into the cost of a product on some predetermined basis.

For example, labour hours, machine hours or as a percentage of prime cost. Assume that in the case of Company A variable overhead is absorbed at a rate of Shs 3 per labour hour.

The standard variable overhead cost of the container would be = 5 hours at shs 1 per hour = shs 5 and the standard fixed overhead cost of the container would be = 5 hours at shs 3 per hour – shs 15.

#### *Standard cost card*

From the above information the following standard cost card could be constructed:

#### *Standard Cost Card*

Product: Plastic Container X72		Shs
Direct material	4 kilogram @ Shs 3. per kilogram	12
Direct labor	5 hours @ Shs 4 per hour	20
Variable overhead	5 hours @ Shs 1 per hour	5
Fixed overhead	5 hours @ Shs 3 per hour	15
Standard production cost		52

#### *Exercise 9.2*

The material standard for one unit of product Z is 3 kg at shs 5 per k.g. 14,000kg were used at a cost of Shs 84,000 and 4,000 units were produced. Calculate the material cost variances.

#### *Answer*

Material price variance

$$(A.P \times A.Q) - (S.P. \times A.Q)$$

$$\text{Shs } 84,000 - (\text{Shs } 5 \times 14000)$$

$$\text{Shs } 84,000 - \text{shs } 70,000 = \text{Shs } 14,000 \text{ A}$$

Material usage variance

$$S.P (A.Q - S.Q)$$

Shs 5 (14000 – 12000)

Shs 5 (2000) = shs 10,000 A

$$\begin{aligned}\text{Material cost variance} &= \text{Material price variance} \\ &+ \text{Material usage variance} \\ &= \text{Shs 14,000 A} + \text{Shs 10,000 A} \\ &= \text{Shs 24,000 A}\end{aligned}$$

Check

$$\begin{aligned}\text{Material cost variance} &= \text{Actual cost} - \text{Standard cost} \\ \text{Standard cost per unit of Z} &= \text{Shs 5} \times 3 \text{ kg} \\ &= \text{Shs 15} \\ \text{Standard cost of 4000 units} &= \text{Shs 15} \times 4000 \\ &= \text{Shs 60,000} \\ \text{Actual cost of 4000 units} &= \text{Shs 84,000} \\ \text{Material cost variance} &= \text{Shs 84,000} - \text{shs 60,000} \\ &= \text{Shs 24,000 A}\end{aligned}$$

Where:-

- F = Favourable
- A = Adverse
- AP = Actual price
- AQ = Actual quantity
- SQ = Standard quantity
- SP = Standard price

Standard quantity for one unit of Z is 3 kg and for 4000 units of Z, it is 12,000 kg (i.e. 3kg x 4000).

### Exercise 9.3

The material standard for one unit of product 'Y' is 2 tons at Shs 150 per ton. 11000 tons were used at a cost of shs. 1,760,000 and 6000 units were produced. Calculate material cost variances.

Answer:

$$\begin{aligned}\text{Material Usage Variance} &= (\text{A.P} \times \text{A.Q}) - (\text{S.P} \times \text{A.Q}) \\ &= \text{Shs 1,760,000} - (\text{shs 150} \times 11000) \\ &= \text{Shs 1,760,000} - \text{Shs 1,650,000} = \text{Shs 110,000 A}\end{aligned}$$



Material Usage Variance

$$= S.P (A.Q - S.Q)$$

$$= \text{Shs } 150 (11,000 - 12,000)$$

$$= \text{Shs } 150 (1000) = \text{Shs } 150,000 \text{ F}$$

Note:  $S.Q = 2 \text{ tons} \times 6000 \text{ units} = 12000 \text{ tons}$

In this case, material usage variance is favourable because standard quantity is greater than actual quantity.

$$\begin{aligned} \text{Material cost variance} &= \text{shs } 110,000 \text{ A} + \text{Shs } 150,000 \text{ F} \\ &= \text{Shs } 40,000 \text{ F} \end{aligned}$$

Check

$$\begin{aligned} \text{Standard cost per unit of 'Y'} &= \text{Shs } 150 \times 2 \text{ tons} \\ &= \text{Shs } 300 \end{aligned}$$

$$\begin{aligned} \text{Standard cost of 6000 units of 'Y'} &= \text{Shs } 300 \times 6000 \\ &= \text{Shs } 1,800,000 \end{aligned}$$

$$\begin{aligned} \text{Material cost variance} &= \text{Shs } 1,760,00 - \text{Shs } 1,800,000 \\ &= \text{Shs } 40,000 \text{ F} \end{aligned}$$

It is favourable because actual cost of 6000 units is smaller than standard cost

#### Exercise 9.4

The material standard for one unit of product 'X' is  $2 \frac{1}{2}$  units at Shs 20 per unit. 16000 units were bought at Shs 18.50 per unit but only 15000 units were used to produce 65000 units of products 'X', 1000 units of materials left in stock at the end of the period. Calculate the material cost variances.

Answer

When the quantity of material purchased is different than quantity used then material price variance is calculated on the basis of quantity purchased but material usage variance is calculated on the bases of quantity consumed.

Material price variance

$$\begin{aligned} &= (A.Q \times A.P) - (S.P \times A.Q) \\ &= (\text{Shs } 18.50 \times 16,000) - (\text{Shs } 20 \times 16,000) \\ &= \text{Shs } 296,000 - \text{Shs } 320,000 = \text{Shs } 24,000 \text{ F} \end{aligned}$$

In this case, material price variance is favourable because actual price is lower than standard price.

Material usage variance

$$\begin{aligned}
&= S.P (A.Q - S.Q) \\
&= \text{Shs } 20 (15,000 - 16,250) \\
&= \text{Shs } 20 (1250) = \text{Shs } 25,000 \text{ F} \\
&\text{S.Q for 6500 units} = 2 \frac{1}{2} \text{ units} \times 65000 \\
&\quad = 16250
\end{aligned}$$

In this case standard quantity is greater than actual quantity so material usage variance is favourable.

#### 9.4 Labour Cost Variances

This is the difference between the standard direct labour cost and the actual direct labour cost incurred for the production achieved. This is the sum of labour rate variance and labour efficiency variance.

##### (a) Labour Rate Variance

This is the difference between the standard and actual direct labour hour rate per hour for the total hours worked. It is calculated as under:

$$(\text{Actual rate} \times \text{Actual hours}) - \text{Standard rate} \times \text{Actual hours}$$

The main causes of these variances are:-

- i) Higher or lower rate paid to the workers as compared to standard rate.
- ii) Different grades of labourers used than planned.
- iii) Payment of bonus or overtime to the workers not anticipated in advance.

##### (b) Labour Efficiency Variance

This is the difference between the standard hours for the actual production achieved and the hours actually worked, valued at the standard labour rate. It is calculated as under:-

$$\text{Standard labour rate} (\text{actual hours} - \text{standard hours})$$

The variance arises due to the following reasons:-

- i) Lower or higher efficiency of workers than anticipated
- ii) Poor supervision
- iii) Use of inferior quality of materials or machine problems.
- iv) The attitude of workers.

##### (c) Idle Time Variance

Sometimes, there is idle time variances also. These variances arise when some wages are paid for idle time. This variance is also adverse. It is calculated as under:-

$$\text{Idle time} \times \text{Standard labour rate.}$$

#### Exercise 9.5

Calculate the labour cost variances from the information set out below:

Standard rate per hour Shs 10

Standard time per unit 2 hours

Time worked 4250 hours

Time paid (4326 hours) Shs 42,500

Production achieved 2180 units

*Answer*

Labour rate variance

$$\begin{aligned}
 &= (A.R \times A.H) - (S.R. \times A.H) \\
 &= \text{Shs } 42500 - \text{shs } 10 \times 4326 \\
 &= \text{Shs } 42500 - \text{shs } 43260 = \text{shs } 760 \text{ F}
 \end{aligned}$$

Labour efficient variance

$$\begin{aligned}
 &= S.R (A.H - S.H) \\
 &= \text{Shs } 10 (4250 - 4360) \\
 &= \text{Shs } 10 (110) = \text{Shs } 1100 \text{ F}
 \end{aligned}$$

Idle time variance

$$\begin{aligned}
 &= S.R (\text{Idle time}) \\
 &= S.R (\text{Time paid} - \text{Time worked}) \\
 &= \text{Shs } 10 (4326 - 4250) \\
 &= \text{Shs } 10 (76) = \text{Shs } 760 \text{ A}
 \end{aligned}$$

Labour cost variance = Labour rate variance

+ Labour efficiency

Variance + idle time

Variance

$$= \text{Shs } 760 \text{ F} + \text{Shs } 1100 \text{ F}$$

+ Shs 760 A

$$= \text{Shs } 1100 \text{ F}$$

Check

Labour cost variance = A.C – S.C

$$= \text{Shs } 42,500 - (\text{Shs } 20 \times 2180)$$

$$= \text{Shs } 42,500 - 43,600$$

$$= \text{Shs } 1100 \text{ F}$$

Standard cost per unit = Shs 10 x 2 hours

$$= \text{Shs } 20$$

Where:

A.H. = Actual hours

S.H = Standard hours

S.R = Standard Rate

A.R = Actual rate

A.C = Actual cost

S.C = Standard cost

Standard hours = Standard hours per unit a Actual Production

$$= 2 \times 2180$$

$$= 4360$$

*Note:*

Labour rate variance is calculated on the basis of time paid and labour efficiency variance on the basis of time worked.

*Exercise 9.6*

Calculated the labour cost variances from the following information:-

Standard rate per hour Shs 8

Standard time per unit 2 ½ hours

Time worked 42000 hours

Time paid at shs 9 per hour 50000 hours

Production achieved 18000 units

*Answer*

Labor efficiency variance

$$= (A.R \times A.H) - (S.R \times A.H)$$

$$= (\text{Shs } 9 \times 50,000) - (\text{shs } 8 \times 50000)$$

$$= \text{Shs } 450,000 - \text{Shs } 400,000 = \text{Shs } 50,000 \text{ A}$$

Labour efficiency variance

$$= S.R (A.H - S.H)$$

$$= \text{Sh. } 8 (42,000 - 45,000)$$

$$= \text{Shs } 8 (3,000) = \text{Shs } 24,000 \text{ F}$$

*Note:*

Standard hours = 2 ½ hours x 18,000 units

$$= 45000 \text{ hours}$$

Idle time variance

$$\begin{aligned}
 &= \text{S.R (Idle time)} \\
 &= \text{S.R (Time paid – Time worked)} \\
 &= \text{Shs } 8 (50,000 - 42,000) \\
 &= \text{Shs } 8 (8,000) = \text{Shs } 64,000 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 \text{Labour Cost Variance} &= \text{A.C} - \text{S.C} \\
 &= (\text{A.R} \times \text{A.H}) - (\text{S.C per unit} \times \text{units produced}) \\
 &= (\text{Shs } 9 \times 50,000) - (\text{Shs } 20 \times 18,000) \\
 &= (\text{Shs } 450,000 - \text{Shs } 360,000) \\
 &= \text{Shs } 90,000 \text{ A} \\
 \text{S.C per unit} &= \text{Shs } 8 \times 2 \frac{1}{2} \text{ hours} \\
 &= \text{Shs } 20
 \end{aligned}$$

## 9.5 Variable Overhead Variances

This is the difference between the standard variable overhead cost for the production achieved and the actual variable overhead incurred. In other words, this is the difference between the actual variable overheads incurred and the variable overheads absorbed. This variance is simply the over or under absorption of overheads. This is the sum of variable overhead expenditure variance and variable overhead efficiency variance.

### (a) Variable Overhead Expenditure Variance

This is the difference between the actual overheads incurred and the allowed variable overheads based on the actual hours worked. It is calculated as under:-

$$\text{Actual variable overhead} - \text{V.O.A.R} \times \text{Actual labour hours}$$

Where:

V.O.A.R = Variable overhead absorption rate.

This variance may arise due to rise or fall in overhead expenditure as a result of some unexpected changes.

### (b) Variable Overhead Efficiency Variance

This is the difference between the allowed variable overheads and the absorbed variable overhead. It is calculated as under:-

$$\text{V.O.A.R (Actual hours – Standard hours)}$$

The main cause of this variance is the difference between actual hours and standard hours

### Exercise 9.10

Calculate the variable overhead variances from the information below:-

Standard cost per hour	Shs 8
Standard time per unit	5 hours
Actual production	220 hours
Labour hours worked	1200
Cost incurred	Shs 10300

*Answer*

Variable Overhead Expenditure Variance

$$= \text{Actual V.O.H} - \text{V.O.H.A.R} \times \text{Actual labour hour}$$

$$= \text{Shs } 10300 - \text{shs } 8 (1200)$$

$$= \text{Shs } 10300 - \text{Shs } 9600 = \text{Sh. } 700 \text{ A}$$

Variable Overhead Efficiency Variance

$$= \text{V.O.H.A.R} (\text{Actual hours} - \text{Standard hours})$$

$$= \text{Shs } 8 (1200 - 1100)$$

$$= \text{Shs } 8 (100) - \text{shs } 800 \text{ A}$$

Note: Standard hours = Standard hours per unit x units produced

$$= 5 \times 220$$

$$= 1100$$

Variable overhead cost = Variable overhead expenditure variance + Variable overhead Efficiency variance.

$$= \text{Shs } 700 \text{ A} + \text{Shs } 800 \text{ A}$$

$$= \text{Shs } 1500 \text{ A}$$

Check

Variable Overhead

$$\text{Cost variance} = \text{A.C} - \text{S.C}$$

$$\text{S.C} = \text{S.C per unit} \times \text{Units produced}$$

$$\text{S.C per unit} = \text{Shs } 8 \times 5$$

$$= \text{Shs } 40$$

$$\text{Total Standard Cost} = \text{Shs } 40 \times 220$$

$$= \text{Shs } 8,800$$

$$\text{Variable O.H. cost variance} = \text{Shs } 10300 - \text{Shs } 8800$$

$$= \text{Shs } 1500 \text{ A}$$

## 9.6 Fixed Overhead Variances

This is the difference between the standard cost of fixed overhead absorbed in the production achieved, whether completed or not and the fixed overhead attributed and charged to that period. This simply represents under or over absorption. This is the sum of fixed overhead expenditure variance and fixed overhead volume variance.

### (a) Fixed overhead expenditure variance

This is the difference between the budget cost allowances for production for a specified control period and the actual fixed expenditure attributed and charged to that period. It is calculated as under:

Actual expenditure – Budgeted expenditure

### (b) Fixed overhead volume variance

This is that portion of the fixed production overhead variance which is the difference between the standard cost absorbed in the production achieved, whether completed or not, and the budget cost allowance for a specified control period. This is the sum of fixed overhead efficiency variance and fixed overhead capacity variance. It is calculated as under:-  
Standard cost (Actual production – Budget production) per unit.

The main cause of this variance is the difference between actual level of production and budgeted production.

### (c) Fixed overhead efficiency variance

This is that portion of the fixed production overhead volume variance which is the difference between the standard cost absorbed in the production achieved, whether completed or not, and the actual labour hours worked, valued at the standard hourly absorption rate. It is calculated as under.

F.O.A.R. (Actual hours – Standard hours)

Or

Standard cost per unit (Actual quantity – Standard quantity)

Where:

F.O.A.R. = Fixed overhead absorption rate.

### (d) Fixed Overhead Capacity Variance

This is that portion of the fixed production overhead volume variance which is due to working at higher or lower capacity than standard. Capacity is often expressed in terms of

average direct labour hours per day, and the variance is the difference between the budget cost allowance and the actual labour hours worked, valued at the standard hourly absorption rate. It is calculated as under:-

F.O.A.R. (Actual hours – budgeted hours)

Or

$$\text{Standard cost Per unit} = \left\{ \begin{array}{cc} \text{Budgeted} & - \text{Standard} \\ \text{production} & \text{production} \end{array} \right\}$$

Note: Fixed overhead      Fixed overhead efficiency variance

Volume variance = + Fixed overhead capacity variance

### Exercise 9.11

Calculate the fixed overhead variance from the information set out below:-

Standard cost per hour	Shs 15
Standard hours per unit	2 hours
Budgeted Production	400 units
Actual production	360 units
Labour hours worked	780 hours
Costs incurred	Shs 13,800

*Answer*

Fixed Overhead Expenditure Variance

= Actual expenditure – Budgeted expenditure

= Shs 13,800 - Shs 30 (400)

= Shs 13,800 – Shs 12,000 = Shs 1800 A

Note:

$$\begin{aligned} \text{Budgeted expenditure} &= \text{Standard hours per unit} \\ &\quad \times \text{Standard cost per hour} \\ &\quad \times \text{Budgeted production} \\ &= 2 \times \text{Shs 15 (400)} \\ &= \text{Shs 12,000} \end{aligned}$$

Fixed Overhead Volume Variance

$$\text{Standard Cost per unit} = \left[ \begin{array}{cc} \text{Actual} & - \text{Budgeted} \\ \text{production} & \text{production} \end{array} \right]$$



$$\begin{aligned}
 &= \text{Shs } 30 (360 - 400) \\
 &= \text{Shs } 30 (40) \qquad \qquad \qquad = \text{Shs } 1200 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 \text{Note: Standard cost per unit} &= \text{Shs } 15 \times 2 \\
 &= \text{Shs } 30
 \end{aligned}$$

#### Fixed Overhead Efficiency Variance

$$\begin{aligned}
 &= \text{Standard cost (Actual hours - Standard hours) per hour} \\
 &= \text{Shs } 15 (780 - 720) \\
 &= \text{Shs } 15 (60) = 900 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 \text{Note: Standard hours} &= \text{Standard hours per unit} \times \text{units produced} \\
 &= 2 \times 360 \\
 &= 720
 \end{aligned}$$

#### Fixed Overhead Capacity Variance

$$\begin{aligned}
 &= \text{Standard cost} \left[ \begin{array}{cc} \text{Actual} & - & \text{Budgeted} \\ \text{Per hour} & \text{hours} & \text{hours} \end{array} \right] \\
 &= \text{Shs } 15 (780 - 800) \\
 &= \text{Shs } 15 (20) \qquad \qquad \qquad = \text{Shs } 300 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 \text{Note: Budgeted hours} &= \text{Standard hours per unit} \\
 &\quad \times \text{Budgeted production} \\
 &= 2 \times 400 \\
 &= 800
 \end{aligned}$$

Check

Fixed overhead	= Fixed overhead	Fixed overhead
Volume variance	efficiency variance	capacity variance
1200 A	= 900 A	+ 300 A

$$\begin{aligned}
 \text{Total fixed overhead} &= \text{A.C} - \text{S.C} \\
 &= \text{Shs } 13,800 - \text{Shs } 10,800 \\
 &= \text{Shs } 3,000 \text{ A}
 \end{aligned}$$

Note: SC = Standard x Actual Production  
 Cost per unit  
 = Shs 30 x 360  
 = 10,800

Check

Total fixed overhead = Fixed overhead expenditure variance  
 Fixed overhead Volume variance  
 shs 3,000 A = Shs 1800 A + Shs 1200 A  
 = 3,000 A

### 9.7 Sales Margin Variance

The standard sales margin is the difference between the standard selling price of a product and its standard cost. It is also known as the standard profit for the product.

Total sales margin variance is the difference between the budgeted margin from sales and the actual margin when the cost of sales is valued at the standard cost of production. This is the sum of sales margin price variance and sales margin quantity variance.

#### (a) Sales margin price variance

This is that portion of the total sales margin variance which the difference between the standard margin per unit and the actual margin per unit for the number of units sold in the period. It is calculated as under:-

$$\text{Actual sales} - (\text{Standard selling price} \times \text{Actual sales quantity})$$

#### (b) Sales Margin Quantity Variance

This is that portion of the total sales margin variance which is the difference between the budgeted number of units sold and the actual number sold valued at the standard margin per unit. It is calculated as under:-

$$\text{Standard Sales margin} \left( \text{Actual Sales Quantity} - \text{Budgeted sales Quantity} \right)$$

Or profit

#### Exercise 9.12

From the following information, calculate the sales variances.

Standard selling price per unit	Shs 30
Standard cost per unit	Shs 25

Budget sales	2000 units
Actual sales (units)	2200 units
Actual sales (value)	Shs 63,800

Answer:

Sales Margin Price Variance

$$\begin{aligned}
 &= \text{Actual Sales} - \text{Standard selling price (Actual sales in units)} \\
 &= \text{Shs } 63,800 - \text{Shs } 30 (2200) \\
 &= \text{Shs } 63,800 - \text{Shs } 66,000 = \text{Shs } 2200 \text{ A}
 \end{aligned}$$

$$\begin{aligned}
 \text{Note: Actual selling price per unit} &= \frac{\text{Shs } 63,800}{2000} \\
 &= \text{Shs } 29
 \end{aligned}$$

Actual selling price per unit is lower than standard selling price, so this variable is adverse or unfavourable.

### 9.8 Sales Margin Quantity Variance

$$\begin{aligned}
 &= \text{Standard profit} \left( \begin{array}{cc} \text{Actual sales} & - & \text{Budgeted sales} \\ \text{in units} & & \text{in units} \end{array} \right) \\
 &\quad \text{Per unit} \\
 &= \text{Shs } 5 (2200 - 2000) \\
 &= \text{Shs } 5 (200) = \text{Shs } 1000 \text{ F}
 \end{aligned}$$

$$\begin{aligned}
 \text{Standard profit per unit} &= \text{Standard selling price} - \text{Standard cost} \\
 &= \text{Shs } 30 - \text{Shs } 25 \\
 &= \text{Shs } 5
 \end{aligned}$$

Actual sales in units are greater than budgeted sales in units, so this variance is favourable.

$$\begin{aligned}
 \text{Total sales variance} &= \text{Sales margin price variance} \\
 &\quad + \text{Sales margin quantity variance} \\
 &= \text{Shs } 2200 \text{ A} + \text{Shs } 100 \text{ F} \\
 &= \text{Shs } 1200 \text{ A}
 \end{aligned}$$

#### Exercise 9.13

Easy Wash Ltd. Produces powder soap for household use. The standard direct costs per carton containing 20 packets of one kilogrammes each are as follows:-

Raw Materials:

15kgs of Tallow @ Shs 10 per Kg.

10kgs of Caustic Soda @ Shs 16 per kg

Labour

20 hours @ Shs 5 per hour

Packaging Material:

20 packets @ 50 cents each

1 carton @ Shs 5 each

The monthly budget is for 1000 cartons. The overhead expenses which are all fixed are budgeted at Shs 40,000 and the standard selling price per 1 kg packet of soap Shs is 25.

The following details relate to October 2007 when 1,200 cartons of soap were produced and sold.

Shs

Sales 1200 cartons	552,000
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Raw materials:

Tallow 10800 kgs	129,600
------------------	---------

Caustic Soda 13200 kgs	198,000
------------------------	---------

Labour

26400 hours	145,200
-------------	---------

Fixed overhead expenditure	42,000
----------------------------	--------

Required:

- (a) Price and usage variances for each raw material
- (b) Labour rate and efficiency variances
- (c) Sales price and volume variances
- (d) Overhead expenditure variances

Answer

Easy Wash Ltd

(a) Price and Usage Variances

(i) Price Variance

$$\left( \begin{matrix} \text{Actual} \\ \text{Price} \end{matrix} \times \begin{matrix} \text{Actual} \\ \text{quantity} \end{matrix} \right) - \left( \begin{matrix} \text{Standard} \\ \text{price} \end{matrix} \times \begin{matrix} \text{Actual} \\ \text{quantity} \end{matrix} \right)$$

Tallow

$$= (\text{Shs } 129,600) - (\text{Shs } 10 \times 10,800) \\ = \text{Shs } 129,600 - \text{Shs } 108,000 = \text{Shs } 21,600 \text{ A}$$

Caustic Soda

$$= (\text{Shs } 198,000) - (\text{Shs } 16 \times 13,200) \\ = \text{Shs } 198,000 - \text{Shs } 211,200 = \text{Shs } 13,200 \text{ F}$$

Total Price Variance Shs 8,400 A

(ii) Usage Variance

$$\text{Standard Price} \left( \text{Actual quantity} - \text{Standard quantity} \right)$$

Tallow

$$\text{Shs } 10 (10,800 - 18,000 \text{ kg}) \\ \text{Shs } 10 (7,200) = \text{Shs } 72,000 \text{ F}$$

Caustic Soda

$$\text{Shs } 16 (13,200 - 12,000 \text{ kg}) \\ \text{Shs } 16 (1,200) = \text{Shs } 19,200 \text{ A}$$

Total usage variance = Shs 52,800 F

$$\text{Total Material cost variance} = \text{Shs } 8,400 \text{ A} + \text{Shs } 52,800 \text{ F} \\ = \text{Shs } 44,400 \text{ F}$$

(b) Labour Rate and Efficient Variance

(i) Labour rate variance

$$\left( \text{Actual Rate} \times \text{Actual Hours} \right) - \left( \text{Standard rate} \times \text{Actual Hours} \right) \\ = \text{Shs } 145,000 - (\text{Shs } 5 \times 26400 \text{ Hrs}) \\ = \text{Shs } 145,200 - \text{Shs } 132,000 = \text{Shs } 13,200 \text{ A}$$

(ii) Labour efficient variance

$$\text{Standard rate (Actual hours - Standard hours)} \\ = \text{Shs } 5 (26,400 - 24,000 \text{ hrs}) \\ \text{Shs } 5 (2,400) = \text{Shs } 12,000 \text{ A} \\ \text{Total labour cost variance} = \text{Shs } 25,200 \text{ A}$$

(c) Sale Price and Volume Variance

(i) Sale price variance

$$\left( \text{Actual} \times \text{Actual} \right) - \left( \text{Standard} \times \text{Actual} \right)$$

Price                      quantity                      price                      quantity

$$= (\text{Shs } 552,000) - (\text{Shs } 25 \times 20 \times 1200)$$

$$= \text{Shs } 552,000 - \text{Shs } 600,000 = \text{Shs } 48,000 \text{ A}$$

(ii) Sales Volume Variance

$$\begin{array}{l} \text{Standard} \\ \text{Profit per unit} \end{array} \left( \begin{array}{l} \text{Actual} \\ \text{Sales} \end{array} - \begin{array}{l} \text{Budgeted} \\ \text{Sales} \end{array} \right)$$

$$= \text{Shs } 35 \text{ per carton } (1,200 - 1,000)$$

$$= \text{Shs } 35 (200) = \text{Shs } 7,000 \text{ F}$$

Working

Calculation of Standard Profit	Shs
Standard selling price per carton (20 x Shs 25)	500

Standard Cost per carton	Shs
Tallow (15kg x Shs 10)	150
Caustic Soda (10kg x Shs 16)	160
Labour (20 Hours x 5)	100
Packing materials	
20 x Shs 0.50	10
Carton	5
Fixed O.H per	
Carton (Shs 40,000 / 1,000)	40
	<u>465</u>
Profit per carton	<u>35</u>

(d) Overhead Expenditure Variance

$$= \text{Actual expenditure} - \text{Budgeted expenditure}$$

$$= \text{Shs } 42,000 - \text{Shs } 40,000 = \text{Shs } 2,000 \text{ A}$$

Note: A means adverse

F means favourable

## 9.9 Statements Reconciling Budgeted Profit with Actual Profit

We have discussed above various cost variances and sales margin variances. Sometimes the budgeted profit and actual profit are given and the students are required to reconcile the

budgeted profit with actual profit after calculating various variances. The layout of a reconciliation statement is given as under:-

Statement Showing the Reconciliation of Budgeted Profit with Actual Profit

		Shs	Shs
Budgeted Profit			X
<u>Sales margin variances</u>		F A	
Sales margin price variance		X —	
Sales margin quality variance		— X	(x) A
Adjusted budgeted profit			X
Cost Variances:			
Direct materials	F A	F A	
Price	X —		
Usage	<u>— X</u>		
Total		X —	
Direct labour			
Rate	X X		
Efficiency	— X		
Idle time	<u>— —</u>		
Total		— X	
Variable overhead			
Expenditure	— X		
Efficiency	X —		
Total		— X	
Fixed overhead			
Expenditure	X —		
Efficiency	— X		
Capacity	<u>— X</u>		
Total		— X	(X) A
Actual profit			<u>X</u>

### Exercise 9.13

The budgeted and actual profit statements of ideal Manufacturers Ltd for the latest financial year are given below:-

#### Profit Statement

		Budgeted		Actual
		Shs		Shs
Sales		400,000		396,000
Less costs of sales	Shs		Shs	
Direct material	100,000		114,000	
Direct labour	80,000		76,000	
Variable overhead	40,000		50,000	
Fixed overhead	<u>20,000</u>	<u>240,000</u>	<u>24,000</u>	<u>264,000</u>
Trading profit		<u>160,000</u>		<u>132,000</u>

The following information is also relevant:-

- (i) The budgeted profit per unit sold was expected to be Shs 80 arrived at as follows:-

Shs

Selling price

Factory costs

Direct material – 10 units 50

@ Shs 5 per unit

Direct labour – 2 hours @ Shs 20 40

Per hour

Factory overheads

Variable: 2 hours @ Shs 10 20

Per hour

Fixed: 2 hours @ Shs 5 per hour 10 120

Budgeted profit 80

- (ii) The sales and production budget had been set at 2000 units. However, only 1800 were produced and sold at a price of shs 220 per unit.

- (iii) Actual inputs and costs incurred were as follows:-

Direct material: 19000 units at Shs 6 per unit

Direct labour : 4000 hours at Shs 19 per hour



Variable factory overhead incurred - Shs 50,000

Fixed factory overhead incurred - Shs 24,000

*Required*

Prepare a statement reconciling the budgeted profit of Shs 160,000 to the actual profit of Shs 132,000.

*Answer:*

Statement Showing the Reconciliation of Budgeted Profit with Actual Profit

			Shs
Budgeted profit			160,000
Sales margin variances	F	A	
	Shs	Shs	
Sales margin price variances	36,000	—	
Sales margin quality variance	—	16,000	<u>20,000</u>
Adjusted budgeted profit			180,000

Cost Variances	F	A	F	A	
	Shs	Shs	Shs	Shs	
Direct materials:					
Price	—	19,000			
Usage	—	5,000	—	24,000	
Direct labour					
Rate	4,000				
Efficiency	—	8,000		4,000	
Variable Overhead:					
Expenditure	—	10,000			
Efficiency	—	4,000		14,000	
Fixed Overhead					
Expenditure	—	4,000			
Volume	—	2,000		<u>6,000</u>	<u>(48,000)</u>
Actual profit					<u>132,000</u>

Workings

1. Sales margin price variance

$$= \text{Actual sales at actual price} - \text{Actual sales at standard price}$$

$$= \text{Shs } 396,000 - \text{Shs } 360,000 = \text{Shs } 36,000 \text{ F}$$

2. Sales margin quality variance

$$= \text{Standard profit} \left( \begin{array}{ccc} \text{Actual sales} & - & \text{Budgeted sales} \\ \text{Per unit} & & \text{in units} \end{array} \right)$$

$$= \text{Shs } 80 (1800 - 2000)$$

$$= \text{Shs } 80 (200) = \text{Shs } 16,000 \text{ A}$$

3. Material Price Variance

$$= (\text{A.P} \times \text{A.Q}) - (\text{S.P} \times \text{A.Q})$$

$$= \text{Shs } 114,000 - (\text{Shs } 5 \times 19,000)$$

$$= \text{Shs } 114,000 - \text{Shs } 95,000 = \text{Shs } 19,000 \text{ A}$$

4. Material usage Variance

$$= \text{S.P} (\text{A.Q} - \text{S.Q})$$

$$= \text{Shs } 5 (19000 - 18000)$$

$$= \text{Shs } (1000) = \text{Shs } 5000 \text{ A}$$

$$\text{S.Q} = 10 \times 1800 = 18000 \text{ units}$$

5. Labour rate Variance

$$= (\text{A.R} \times \text{A.H}) - (\text{S.R} \times \text{A.H})$$

$$= \text{Shs } 76000 - (\text{shs } 20 \times 4000)$$

$$= \text{Shs } 76000 - \text{Shs } 80000 = \text{Shs } 4000 \text{ F}$$

6. Labour efficiency Variance

$$= \text{S.R} (\text{A.H} - \text{S.H})$$

$$= \text{Shs } 20 (4000 - 3600)$$

$$= \text{Shs } 20 (400) = \text{Shs } 8000 \text{ A}$$

$$\text{S.H} = 2 \times 1800 = 3600 \text{ hours}$$

7. Variable Overhead expenditure Variance

$$= \text{Actual V.O.H.} - \text{V.O.H.A.R (Actual labour hours)}$$

$$= \text{Shs } 50,000 - \text{Shs } 10 (4000)$$

$$= \text{Shs } 50,000 - \text{Shs } 40,000 = \text{shs } 10,000 \text{ A}$$

8. Variable overhead efficiency variance

$$= \text{V.O.H.A.R. (A.H - S.H)}$$

$$= \text{Shs } 10 (4000 - 3600)$$

$$= \text{Shs } 10 (400) = \text{Shs } 4000 \text{ A}$$

9. Fixed overhead expenditure variance

$$= \text{Actual expenditure} - \text{Budgeted expenditure}$$

$$= \text{Shs } 24,000 - \text{Shs } 20,000$$

$$= \text{Shs } 4000 \text{ A}$$

$$\text{Budgeted overhead expenditure} = \text{Shs } 10 \times 2000$$

$$= \text{Shs } 20,000$$

Fixed overhead volume variance

$$= \text{Standard cost} \left( \begin{array}{c} \text{Actual} \\ \text{production} \end{array} - \begin{array}{c} \text{Budgeted} \\ \text{promotion} \end{array} \right)$$

Per unit

$$= \text{Shs } 10 (1800 - 2000)$$

$$= \text{Shs } 10 (200) = \text{Shs } 2,000 \text{ A}$$

## 9.9 Accounting Entries for Variances

The differences between standard and actual figures are called variances. These variances may be favourable or unfavourable. These are recorded into cost accounts. For this purpose, the following procedure is adopted:-

- Variances are calculated at the time of occurrence or when the respective element of cost is charged to production.
- Variances accounts are maintained for each type of variance.
- Transfers between the work in progress, finished goods and cost of sales are made at standard figures.
- Stock of raw materials, work in progress and finished goods are valued at standard cost.
- Unfavourable price or expenditure variances are credited to the respective control account and debited to the respective variances account. For example, adverse labour rate variance is debited to labour rate variance account and credited to wages control

account. Similarly, adverse material price variance is debited to material price variance account and credited to stores control account. Favourable price or expenditure variances are debited to respective control account and credited to respective variance account.

- f) Unfavourable usage or efficiency variances are debited to respective variance account and credited to work in progress account. For example, adverse material usage variance of adverse labour efficiency variance is debited to material usage variance account or labour efficiency account and credited to W.I.P account. If the usage or efficiency variances are favourable then debit W.I.P account and credit respective variance account.
- g) At the end of the year, the balances in the variance accounts are transferred to the profit and loss account. It means adverse variances are debited to the profit and loss account and favourable variances are credited to the profit and loss account.

#### *Exercise 10.14*

ABC Ltd. Makes and sells a single product, Z. The company operates a standard cost system and during a period, the following details were recorded:-

#### Operating Trial Balance

Shs Ss

Cost Ledger Control A/C		50,000
Stores control A/C (at Standard)	20,000	
Finished goods control A/C (at Standard)	<u>30,000</u>	<u>          </u>
	<u>50,000</u>	<u>50,000</u>

There was no opening W.I.P

The sales and production budget had been set at 1500 units. However, only 1400 units produced and sold at a price of sha 310 per unit. The budgeted fixed overhead was shs 30,000

The standard cost card for product 'Z' is:- per unit

	Shs
Direct materials (12kg @ Shs 10)	120
Direct labour (5 hours @ Shs 15)	75
Variable overheads (5 hours @ shs 5)	25
Fixed overheads (5 hours @ Shs 4)	20
	240
Standard profit	<u>60</u>

Standard selling price 300

During the period the following details were recorded:-

	Shs
Purchases of materials (19200 kg)	172,800
Direct wages (7200 hours)	115,200
Variable overheads	28,800
Fixed overheads	32,400

Material issues to production were 18200 kg

*Required:*

Using the above information, prepare all cost and variances accounts and a profit and loss account and a closing trial balance.

*Answer*

The first stage is to calculate variances.

Cost variances

Material price		shs
Material usage	= (19200 x Shs 10) – Shs 172800	= 19200 F
Labour efficiency	= Shs 10 (18200 – 16800)	= 14000 A
Labour rate	= Shs 15 (7,200 – 7,000)	= 3000 A
Variable O.H. expenditure	= (7200 x Shs 15) – Shs 115,200	= 7200 A
Variable O.H. efficiency	= Shs 5 (7200 – 7000)	= 1000 A
Fixed O.H expenditure	= Shs 32,400 – Shs 30,000	= 2400 A
Fixed O.H Volume	= Shs 20 (1400 – 1500)	= 2000 A

Sales Margin price = Shs 300 x 1400) – (shs 310 x 1400)  
= Shs 14000 F

*Note:*

In this question, sales margin quantity variance is not required because, actual sales are taken at standard price.

## Cost Accounts

### Cost Ledger Control A/C

	Shs		Shs
Sales	434,000	Balance b/f	50,000
Balance c/d	60,000	Purchases	172,800
		Wages	115,200
		Variables O.H	28,800
		Fixed O.H	32,400
		Profit	94,800
	<u>494,000</u>		<u>494,000</u>

### Stores Ledger Control A/C

	Shs		Shs
Balance b/f	20,000	W.I.P	182,000
Cost		Bal c/d	30,000
Led: Cont.	172,800		
Mat. Price			
Var:	<u>19,200</u>		
	<u>212,000</u>		<u>212,000</u>
Bal: b/d	30,000		

### Wages Control A/C

	Shs		Shs
Cost Ledger	115,200	Lab: rate	7,200
Cont. A/C		var:	
		W.I.P.	<u>108,000</u>
	<u>115,200</u>		<u>115,200</u>

# Variable O.H. Cont. A/C

	Shs		Shs
Cost Led:	28,800	W.I.P.	36,000
Cont. A/C			
V.O.H. Exp:	7,200		
Variance			
	<u>36,000</u>		<u>36,000</u>

# Fixed O.H Cont. A/C

	Shs		Shs
Cost Ledger	115,200	Lab: rate	7,200
Cont. A/C		var:	
		W.I.P.	<u>108,000</u>
	<u>115,200</u>		<u>115,200</u>

# W.I.P. Cont. A/C

	Shs		Shs
Store Cont. A/C	182,000	Mat: Usage Var.	14,000
Wages Cont. A/C	108,000	Labour Eff: Var	3,000
V.O.H Cont.		V.O.H. Eff. Var:	1,000
A/C	36,000	Finished Goods	336,000
Fixed O.H.	28,000	Cont. A/c	
Con. A/C			
	<u>354,000</u>		<u>354,000</u>

### Finished Goods Cont. A/C

	Shs		Shs
Bal b/f	30,000	Cost of sales	336,000
		A/C	
W.I.P A/C	336,000	BAL c/d	30,000
	<u>366,000</u>		<u>366,000</u>

### Cost of Sales A/C

	Shs		Shs
Fin: Goods 336,000		P & L A/C	336,000
Cont. A/C			
	<u>336,000</u>		<u>336,000</u>

### Sales A/C

	Shs		Shs
Sales margin	14,000	Cost Led:	434,000
price var:		Cont. A/C	
P & L A/C	420,000		
	<u>434,000</u>		<u>434,000</u>

### Variance Accounts

#### Material Price

	Shs		Shs
P & L A/C	19,200	Stores Cont. A/C	19,200
	<u>19,200</u>		<u>19,200</u>



### Material Usage

	Shs		Shs
W.I.P A/C	<u>14,000</u>	P & L A/C	<u>14,000</u>
	<u>14,000</u>		<u>14,000</u>

### Labour Rate

	Shs		Shs
W.I.P Cont.A/C	<u>7,200</u>	P & L A/C	<u>7,200</u>
	<u>7,200</u>		<u>7,200</u>

### Labour Efficiency

	Shs		Shs
W.I.P A/C	<u>3,000</u>	P & L A/C	<u>3,000</u>
	<u>3,000</u>		<u>3,000</u>

### V.O.H Expenditure

	Shs		Shs
P & L A/C	7,200	V.O.H Cont. A/C	7,200
			<u>7,200</u>
	<u>7,200</u>		

### V.O.H. Efficiency

	Shs		Shs
W.I.P A/C	<u>1,000</u>	P & L A/C	<u>1,000</u>
	<u>1,000</u>		<u>1,000</u>

### Sales Margin Price

	Shs		Shs
P & L A/C	<u>14,000</u>	Sales Cont.	14,000
	<u>14,000</u>	A/C	
			<u>14,000</u>

### F.O.H Expenditure

			Shs
Shs		P & L A/C	2,400
F.O.H	<u>2,400</u>		
Cont. A/C			<u>2,400</u>
	<u>2,400</u>		

### F.O.H Expenditure

	Shs		Shs
F.O.H	<u>2,000</u>	P & L A/C	2,000
Cont. A/C			
	<u>2,000</u>		<u>2,000</u>

## Profit Statement

Shs

Sales	420,000
Less: Cost of Sales (at standard)	<u>336,000</u>
Standard profit on actual sales	84,000
Add: sales margin price variance	<u>14,000</u>
	98,000

### Add: favorable cost variances

	Shs	
Material usage Var	19,200	
Variable O.H. expenditure Var:	<u>7,200</u>	<u>26,400</u>
		124,400

### Less: Adverse Cost Variances

Material usage Var:	14,000	
Labour rate var:	7,200	
Labour efficiency var:	3,000	
V.O.H efficiency var:	1,000	
Fixed O.H expenditure var:	2,400	
Fixed O.H volume var:	<u>2,000</u>	<u>29,600</u>
Actual profit		<u>94,800</u>

### Closing Trial Balance

	Shs	Shs
Cost ledger control A/C		60,000
Store cnt: A/C	30,000	
Finished goods cont: A/C	<u>30,000</u>	<u>        </u>
	<u>60,000</u>	<u>60,000</u>

## 9.10 Review Questions

1. What is variance analysis? Explain the purpose of variance analysis.
2. Explain the structure of variances by the help of chart.
3. Describe the main causes of the following variances

- a) Material cost variances
- b) Labour cost variances
4. Give the layout of a statement showing the reconciliation of budgeted profit with actual profit.
5. Describe the procedure of accounting entries of variances.
6. Explain the main variable overhead and fixed overhead variances.
7. Briefly explain the Direct Material Mix and yield variances.
8. Explain :-

Material usage variances

Material price variance

Wage efficiency variance

Wage rate variance

and calculate each variance from the following figures:-

Actual hours worked	5000 hours
Standard rate per hour	Shs 10
Actual wages paid	shs 55,000
Standard hours allowed	4850 hours
Actual price per kg	shs 1/50
Actual output	shs 20000 units
Standard quantity allowed	16000 kgs
Actual quantity used	15000 kgs
Actual quantity purchased	16500 kgs

### 9.11 References

- T. Lucy (2002) *Costing* 6<sup>th</sup> Edition Biddles ltd, Guildford and King's Lynn (Pages 426-481)
- N.A Saleeni (2009) *Cost Accounting Simplified*, Printwell industries ltd. (Pages 382-431)

**Mt Kenya****University**

**UNIVERSITY EXAMINATIONS 2010/2011  
SCHOOL OF BUSINESS & PUBLIC MANAGEMENT  
DEPARTMENT OF FINANCE & ACCOUNTING  
BACHELOR OF BUSINESS MANAGEMENT  
BBM 211 COST ACCOUNTING**

**July 2010****Time: 2 hrs**

*Answer Question **ONE** which is **COMPULSORY** and any other **TWO** questions*

**QUESTION ONE**

- a) Distinguish between cost accounting and financial accounting (4 marks)
- b) The following information relates to item P0031 stocked by 2010 products ltd., for the month of April 2010

Date	Receipts units	Issues units	Unit cost (Sh.)
April 3	2,400		18
4		3,200	
6	2,600		20
12		2,700	
14	3,000		22
18	2,800		21
20		2,200	
22	2,600		
25		3,800	
26	3,100		24
27	2,500		25
28	3,200		26
29		6,900	

The closing stock for March 2010 was a batch of 3,000 units received at a unit price of Ksh.19.

Required:

- i) Stores perpetual inventory for item P0031 for May under the LIFO system of stores issues. (14 marks)

- ii) Closing stock valuation (6 marks)
- c) Distinguish between the following cost accounting terminologies
- (i) Direct and indirect costs (2 marks)
  - (ii) Cost centre and cost unit (2 marks)
  - (iii) Joint products and by-products (2 marks)
- (30 marks)**

## QUESTION TWO

- a) Your Managing Director has received has a performance analysis statement from the cost accountant which he is unable to comprehend. He has therefore approached you with a view to reconciling the two statements and providing a more comprehensive analysis. The data available is as follows.

	Actual performance <u>2,700 units</u>	Flexible Budget <u>2,700 units</u>
Production and sales level	Sh.	Sh.
Sales	769,500	729,000
Manufacturing costs:		
Direct material	170,100	121,500
Direct labour	171,000	162,000
Variable overheads	112,500	81,000
Fixed overheads	<u>54,000</u>	<u>40,500</u>
	<u>507,600</u>	<u>405,000</u>
Gross margin	261,900	324,000

The following additional information is relevant:

1.
 

Budgeted gross margin per unit is Sh.120 computed as follows	Sh.
Prime costs	
Direct materials 6 units @ Sh. 7.50	45
Direct labour - 2 hours @ Sh.30	60
Factory overheads:	
Variable –on direct labour hour basis @ Sh.15	30
Fixed – on direct labour hour basis @ Sh.7.50	<u>15</u>
	<u>150</u>
Gross margin	<u>120</u>
Budgeted selling price	<u>270</u>
  3. The company's static budget provided for a production and sales level of 3,300 units.
  4. Actual inputs usage was as follows
    - Direct material – 18,900 units
    - Direct labour - 6,000 hours
- Required: Compute the following
- (i) Sales price variance
  - (ii) Material price and efficiency variances
  - (iii) Labour rate and efficiency variances
  - (iv) Variable overheads spending and efficiency variances
  - (v) Fixed overhead under applied and efficiency variances (15 marks)

- b) A reconciliation statement that explains the difference in the profit of Sh. 261,900 and Sh. 324,000 (5 marks)

**(20 marks)**

### QUESTION THREE

Write brief notes on the following

- a) Fixed and flexible budgets (10 marks)
- b) Controllable and uncontrollable costs (10 marks)

### QUESTION FOUR

Maendeleo Clothing Factory has four departments; A, B and C are production department, and D, is a service department. The actual costs for the financial year ended 31 December 2007 were as follows

	Shs
Rent	20,000
Repairs of plant	12,000
Depreciation of plant	9,000
Light and power	2,000
Supervision	30,000
Repairs to building	8,000

The following information about the departments is available and is used as a basis for distribution of costs.

	Departments			
	A	B	C	D
Area sq metres	1500	1100	900	500
Number of employees	20	15	10	5
	Shs	Shs	Shs	Shs
Wages paid	120,000	80,000	60,000	40,000
Value of plant	300,000	180,000	120,000	

Required: Apportion the above costs to the four departments and indicate the basis of apportionment in each case **(20 Marks)**

### QUESTION FIVE

- (a). The following details relate to the labour cost chargeable to Job M-25

Time allowed 30 hours

Time taken 24 hours

Wage rate Sh.20 per hour

Required:

Calculate the labour cost chargeable to the job in respect of an employee who is paid according to: (i) Halsey scheme

(ii) Halsey-Weir scheme

(iii) Rowan-scheme

(12 marks)

(b). Explain the duties of a cost accountant in an organization

(8 marks)

**(20 marks)**



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**UNIVERSITY EXAMINATIONS 2010/2011  
SCHOOL OF BUSINESS & PUBLIC MANAGEMENT  
DEPARTMENT OF FINANCE & ACCOUNTING  
BACHELOR OF BUSINESS MANAGEMENT  
BBM 211 COST ACCOUNTING**

**July 2010**

**Time: 2 hrs**

*Answer Question **ONE** which is **COMPULSORY** and any other **TWO** questions*

b. In what ways is cost accounting similar to financial accounting (5 marks)

c. A company is manufacturing 1000 Units of a product. The present costs and Sales data are as follows:

	Shs
Selling price per unit	10
Variable cost per unit	5
Fixed Cost	4,000

The management is considering the following alternatives:

- i. To accept an export order for another 200 units at Shs 8 per unit (hint these are extra sales) the expenditure of the export order will increase the fixed costs by Shs 500.
- ii. To reduce the production from present 1000 units to 600 units and buy another 400 units from the market at Shs 6 per unit. That will result in reducing the present fixed costs from Shs 4,000 to Shs 3,000.[Apply differential cost]

Which alternative should the management accept? Advise (8 marks)

d. State any four assumptions underlying Break-Even Points/Charts (Analysis) (4 marks)

e. Distinguish between job and contract costing. (4 marks)

f. Write explanatory notes on the following

- i. Fixed and flexible budget
- ii. Controllable and uncontrollable costs (4 marks)

**QUESTION TWO**

(i) Explain the different types of stores (5 marks)

(ii)The following transaction relate to material Z for the month of October 2009

Date	Quantity	Cost per unit	Quantity	Selling Price
Oct 2010	4 500	24		
Oct 3 <sup>rd</sup>	5000	26		
Oct 9 <sup>th</sup>			4000	30
Oct 11th	6000	25		
Oct 12th			3000	29

Oct 16 <sup>th</sup>				4500	31	
Oct 19 <sup>th</sup>	8 000	26		5000	32	
Oct 25 <sup>th</sup>	4000		23		3500	30
Date	purchases	cost	sales	selling		
Oct 31 <sup>st</sup>			3500			

NB. The closing stock on 30<sup>th</sup> September 2009 was valued of sh 10,000 for 500 units

Required

- Prepare the stores ledger account using last in first out method (10 marks)
- Prepare the trading profit and loss account taking into account selling expenses totaling Ksh 15, 500 (5 marks)

### QUESTION THREE

The following information is available from the books of Mokaya Manufacturing Company limited.

	Shs
<b>Inventories on 1 January 2009</b>	
Raw materials	50,000
Work in Progress	76,000
Completed Product	84,000
<b>Inventories on 31 December 2009</b>	
Raw materials	60,000
Work in progress	64,000
Completed products	90,000
Purchases of raw materials	560,000
Carriage inwards	14,000
Return of raw materials	26,000
Direct wages	160,000
Salaries(40% factory,30% office,30% sales)	120,000
Rent (30% factory, 30% office, 40% warehouse)	80,000
Factory power	30,000
Factory expenses	40,000
Administrative expenses	24,000
Selling and distribution expenses	36,000
Sales	1,300,000

**Required:**

- Prepare a production cost statement (12 marks)
- Prepare a profit statement (8 marks)

### QUESTION FOUR

Kegogi Construction Company has undertaken the construction of a bridge over river Osaosao for Metembe Municipal council. The value of the contract is Ksh 12,500,000 subject to retention of 20% until one year after the certified completion of the contract and final approval by the council engineer. The following are details as shown in the books on 30<sup>th</sup> June 2009

Labour at site	4,050,000
Material direct to site	4,200,000
Materials form store	812,000
Hire and used of plant	121,000
Direct expenses	230,000
Overheads allocated to contract	371,000
Materials in hand 30 <sup>th</sup> June 2009	78,000
Direct expenses * 30-6-2009	16,000
Work not yet certified at cost	165,000
Amount certified by engineer	11,000,000
Cash received on account	8,800,000

Required

- (a) Contract account (15 marks)
- (b) Contractee's account (2 marks)
- (c) Value of work- in- progress (3 marks)

#### QUESTION FIVE

(a). A company is reviewing its stock and has the following alternatives available for evaluating the optimal order size for item number 1287

1. Purchase stock twice monthly, 100 units
2. Purchase monthly, 200 units
3. Purchase every three months, 600 units
4. Purchase every six months, 1,200 units
5. Purchase annually, 2,400 units

It is ascertained that the purchase price per unit is Sh.80 for deliveries up to 500 units. A 5% discount is offered by the supplier on the whole order where deliveries are 301 up to 1,000 and 10% reduction on the total order for deliveries in excess of 1,000.

Each purchase order incurs administration costs of Sh.50. Storage, interest on capital and other costs are Sh.25 per unit of average stock quantity held.

*Required:*

Advice management on the optimum order size (12 marks)

(b). Briefly explain assumptions of equilibrium order quantity (8 marks)