MANAGEMENT ACCOUNTING

ACC313

Course Guide

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CONTENTS

INTRODUCTION

You are holding in your hand the course guide for ACC 313 (Management Accounting). The purpose of the course guide is to relate to you the basic structure of the course material you are expected to study as a student undertaking a basic course in Accounting in National Open University of Nigeria. Like the name 'course guide' implies, it is to guide you on what to expect from the course material at the end of studying the course material.

COURSE CONTENT

The course content consists basically of topics you are expected to learn in Management Accounting.

COURSE AIM

The aim of the course is to equip you with the necessary tools in understanding and applying basic cost and management accounting techniques.

COURSE OBJECTIVES

At the end of studying this course, among other objectives, you should be able to:

1. Say what cost accounting system means;
2. Compare cost accounting with financial accounting;
3. Distinguish between cost accounting and management accounting;
4. Discuss the different parts of a cost accounting system;
5. Highlight the necessity for cost accounting system;
6. Describe the concept of cost behaviour;
7. Identify the reasons for studying cost behaviour;

8. Describe the concept of relevant range of cost;
9. Identify the types of cost behaviour and describe a level of activity;
10. Define budget;
11. Identify various types of budget;
12. Outline budget preparation procedures;
13. Prepare the cash budget;
14. Learn the techniques used in budgeting;
15. Distinguish between forecast and budgets; and
16. Learn about the objectives and organisation of budgetary control.

COURSE MATERIAL

The course material package is composed of:

The Course Guide

The study units

Self-Assessment Exercises

Tutor-Marked Assignment

References/Further Reading

ASSIGNMENTS

Each unit of the course has self-assessment exercises. You will be expected to attempt them as this will enable you understand the content of the unit.

TUTOR-MARKED ASSIGNMENT

The Tutor Marked Assignments (TMAs) at the end of each unit are designed to test your understanding and application of the concepts learned. Besides, you would be assessed electronically, as a continuous assessment during the period of studying the course. This would make up 30 percent of the total score for the course. The other 70% would be determined by examination of the course at the end of the course.

SUMMARY

It is very important that you commit adequate effort to the study of the course material for maximum benefit. Good luck.

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Main Content

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TABLE OF CONTENTS

UNIT 1: GENERAL PRINCIPLES OF COSTING

CONTENTS

1.0 INTRODUCTION

In accounting terms, costing refer to a system of calculating the amount of money it takes to produce goods or operate a business. Generally, costs include variables such as cost of labor, cost of materials, cost of distribution and selling, taxes and administrative costs. It is important that managers figure out the manufacturing cost of a product before it goes into the production stage. Establishing product costs helps in

determining the selling price and Break-Even-Point (BEP) of goods. This system of determining costs also helps companies set the profit margin percentage on goods sold to the market.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Know the meaning of costing;
- Discuss the principles of costing; and
- Differentiate between Costing and Cost Accounting

3.0 MAIN CONTENT

3.1 MEANING OF COSTING

Costing may be defined as 'the technique and process of ascertaining costs'. According to Wheldon, 'Costing refers to classifying, recording, allocation and appropriation of expenses for the determination of cost of products or services and for the presentation of suitably arranged data for the purpose of control and guidance of management. It includes the ascertainment of cost forever order, job, contract, process, service units as may be appropriate. It deals with the cost of production, selling and distribution. From the above definition, it will be understood that costing is basically the procedure of ascertaining the costs incurred in the course of producing a product or service. As mentioned above, for any business organization, ascertaining of costs is must and for this purpose a scientific procedure should be followed. 'Costing' is precisely this procedure which helps them to find out the costs of products or services.

3.1.1 IMPORTANCE AND BASIC PRINCIPLES OF COSTING

As compared to financial accounting, the focus of cost accounting is different. In the modern days of cut throat competition, many business organizations pay attention towards their cost of production. Computation of cost on scientific basis and thereafter cost control and cost reduction is of paramount importance. Hence it has become essential to study the basic principles and concepts of cost accounting. These principles and concepts are discussed in the subsequent part of this unit.

Cost:- Cost can be defined as the expenditure (actual or notional) incurred on or attributable to a given thing. It can also be described as the resources that have been sacrificed or must be sacrificed to attain a particular objective. In other words, cost is the amount of resources used for something which must be measured in monetary terms. For example – Cost of preparing one cup of tea is the amount incurred on the elements like material, labour and other expenses; similarly cost of offering any services like banking is the amount of expenditure for offering that service. Thus cost of production or cost of service can be calculated by ascertaining the resources used for the production or services.

Cost Accounting:- Cost Accounting primarily deals with collection, analysis of relevant cost data for interpretation and presentation for solving various problems of management. Cost accounting takes into cognizance, the cost of products, service or an operation. It is defined as, 'the establishment of budgets, standard costs and actual costs of operations, processes, activities or products and the analysis of variances, profitability or the social use of funds'. Cost accounting is a combination of art and science, it is a science as it has well defined rules and regulations, it is an art as

application of any science requires art and it is a practice as it has to be applied on continuous basis and is not a onetime exercise.

Cost Accountancy:- Cost Accountancy is a broader term and is defined as, 'the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability as well as presentation of information for the purpose of managerial decision making. On the basis of the above definition, the following points will emerge: Cost accounting is basically application of the costing and cost accounting principles. This application is with specific purpose and that is for the purpose of cost control. Second, for ascertainment of profitability and also for presentation of information to facilitate decision making.

3.1.2 DIFFERENCE BETWEEN COSTING AND COST ACCOUNTING

Main differences between costing and cost accounting are given as under:

Basis of Distinction	**Costing**	**Cost Accounting**
1. Nature	It is a technique and process of ascertaining costs	It is regarded as a specialized branch of accounting.
2. Scope	The costing techniques include principles and rules which govern the procedure of ascertaining the cost of products/services	It involves classification, accumulation, assignment and control of costs.
3. Process	The process of costing consists of routines of ascertaining costs by historical or conventional costing, standard costing or marginal costing.	It involves establishment of budgets, standard costs or actual costs of operations, classification, recording and appropriate allocation of expenditure.

3.1.3 ESSENTIALS OF A GOOD COSTING SYSTEM

For availing of maximum benefits, a good costing system should possess the following characteristics.

A. Costing system adopted in any organization should be suitable to its nature and size of the business and its information needs.

B. A costing system should be such that it is economical and the benefits derived should be more than the cost of operating the cost system.

C. Costing system should be simple to operate and understand. Unnecessary complications should be avoided.

D. Costing system should ensure proper system of accounting for material, labour and overheads and there should be proper classification made at the time of recording of the transaction itself.

E. Before designing a costing system, need and objectives of the system should be identified.

F. The costing system should ensure that the final aim of ascertaining of cost as accurately possible should be achieved.

3.1.4 CLASSIFICATION OF COSTING

An important step in computation and analysis of cost is the classification of costs into different types. Classification helps in better control of the costs and also helps considerably in decision making. Classification of costs can be made according to the following basis.

A. Classification according to elements:- Costs can be classified according to the elements. There are three elements of costing, viz-a-viz: material, labour and expenses. Total cost of production/services can be divided into the three elements to find out the contribution of each element in the total costs.

B. Classification according to nature:- As per this classification, costs can be classified into Direct and Indirect. Direct costs are the costs which are identifiable with the product unit or cost centre while indirect costs are not identifiable with the product unit or cost centre and hence they are to be allocated, apportioned and then absorbed in the production units. All elements of costs like material, labour and expenses can be classified into direct and indirect.

They are mentioned below.

i. Direct and Indirect Material Costs:- Direct material is the material which is identifiable with the product. For example, in a cup of tea, quantity of milk consumed can be identified, quantity of glass in a glass bottle can be identified and so these will be direct materials for these products. Indirect material cannot be identified with the product, for example lubricants, fuel, oil, cotton wastes etc cannot be identified with a given unit of product and hence these are the examples of indirect materials.

ii. Direct and Indirect Labour Costs:- Direct labour can be identified with a given unit of product, for example, when wages are paid according to the piece rate, wages per unit can be identified. Similarly wages paid to workers who are directly engaged in the production can also be identified and hence they are

direct wages. On the other hand, wages paid to workers like cleaners, gardeners, maintenance workers etc. are indirect wages as they cannot be identified with the given unit of production.

iii. **Direct and Indirect Expenses:-** Direct expenses refers to expenses that are specifically incurred and charged for specific or particular job, process, service, cost centre or cost unit. These expenses are also referred to as chargeable expenses. Examples of these expenses are cost of drawing, design and layout, royalties payable on use of patents, copyrights etc. consultation fees paid to architects, surveyors etc. Indirect expenses on the other hand cannot be traced to specific product, job, process, service or cost centre or cost unit. Several examples of indirect expenses can be given like insurance, electricity, rent, salaries, advertising etc. It should be noted that the total of direct expenses is known as 'Prime Cost' while the total of all indirect expenses is known as 'Overheads'.

C. **Classification according to behaviour:-** Costs can also be classified according to their behaviour. This classification is explained below.

i. **Fixed Costs:-** Out of the total costs, some costs remain fixed irrespective of changes in the production level. These costs are referred to as fixed costs. The feature of these costs is that the total costs remain unchanged while per unit fixed cost varies with teh level of production. Examples of these costs are salaries, insurance, rent, etc.

ii. **Variable Costs:-** These costs are variable in nature, i.e. they change according to the level of production. Their variability is in the same proportion to the

production. For example, if the production units are 2,000 and the variable cost is #5 per unit, the total variable cost will be #10,000 (i.e. 2,000 x #5), if the production units are increased to 5,000 units, the total variable costs will be #25,000, i.e. the increase is exactly in the same proportion of the production. Another feature of the variable cost is that per unit variable cost remains unchanged while the total variable costs will vary. In the example given above, per unit variable cost remains #2 per unit while total variable costs change. Examples of variable costs are direct materials, direct labour etc.

iii. **Semi-variable Costs:-** Certain costs are partly fixed and partly variable. In other words, they contain the features of both types of costs. These costs are neither totally fixed nor totally variable. Maintenance costs, supervisory costs etc. are examples of semi-variable costs. These costs are also referred to as 'stepped costs'.

D. Classification according to functions:- Costs can also be classified according to the functions/activities. This classification can be done as mentioned below.

i. **Production Costs:-** All costs incurred for production of goods are known as production costs.

ii. **Administrative Costs:-** Costs incurred for administration are known as administrative costs. Examples of these costs are office salaries, printing and stationery, office telephone, office rent, office insurance etc.

iii. **Selling and Distribution Costs:-** All costs incurred for procuring an order are referred to as selling costs while all costs incurred for execution of order are distribution costs. Market research expenses, advertising, sales staff salary,

sales promotion expenses are examples of selling costs. Transportation expenses incurred on sales, warehouse rent etc. are examples of distribution costs.

iv. **Research and Development Costs:-** In recent times, research and development has become one of the important functions of a business organization. Expenditure incurred for this function can be classified as Research and Development Costs.

E. Classification according to time:- Costs can also be classified according to time. This classification is explained below.

I. Historical Costs:- These are the costs which are incurred in the past, i.e. in the past year, past month or even in the last week or yesterday. The historical costs are ascertained after the period is over. In other words it becomes a post-mortem analysis of what has happened in the past. Though historical costs have limited importance, still they can be used for estimating the trends of the future, i.e. they can be effectively used for predicting the future costs.

II. Predetermined Cost:- These costs relating to the product are computed in advance of production, on the basis of a specification of all the factors affecting cost and cost data. Pre-determined costs may be either standard or estimated. Standard Cost is a predetermined calculation of how much cost should be under specific working conditions. It is based on technical studies regarding material, labour and expenses. The main purpose of standard cost is to have some kind of benchmark for comparing the actual performance with the standards. On the other hand, estimated costs are predetermined costs based on past performance

and adjusted to the anticipated changes. It can be used in any business situation or decision making which does not require accurate cost.

F. Classification of costs for Management decision making:- One of the important functions of cost accounting is to present information to management for the purpose of decision-making. For decision making certain types of costs are relevant. Classification of costs based on the criteria of decision making can be done in the following manner:

I. Marginal Cost:- Marginal cost is the change in the aggregate costs due to change in the volume of output by one unit. For example, suppose a manufacturing company produces 10,000 units and the aggregate costs are #25,000, if 10,001 units are produced the aggregate costs may be #25,020 which means that the marginal cost is #20. Marginal cost is also termed as variable cost and hence per unit marginal cost is always same, i.e. per unit marginal cost is always fixed. Marginal cost can be effectively used for decision making in various areas.

II. Differential Costs:- Differential costs are also known as incremental cost. This cost is the difference in total cost that will arise from the selection of one alternative to the other. In other words, it is an added cost of a change in the level of activity. This type of analysis is useful for taking various decisions like change in the level of activity, adding or dropping a product, change in product mix, make or buy decisions, accepting an export offer and so on.

III. Opportunity Costs:- It is the value of benefit sacrificed in favour of an alternative course of action. It is the maximum amount that could be obtained at

any given point in time if a resource was sold or put to the most valuable alternative use that would be practicable. Opportunity cost of goods or services is measured in terms of revenue which could have been earned by employing that goods or services in some other alternative uses.

IV. **Relevant Cost:-** The relevant cost is a cost which is relevant in various decisions of management. Decision making involves consideration of several alternative courses of action. In this process, relevant costs are to be taken into consideration. In other words, costs which are going to be affected matter the most and these costs are referred to as relevant costs. Relevant cost is a future cost which is different for different alternatives. It can also be defined as any cost which is affected by the decision on hand. Thus in decision making relevant costs plays a vital role.

V. **Replacement Cost:-** This cost is the cost at which existing items of material or fixed assets can be replaced. Thus this is the cost of replacing existing assets at present or at a future date.

VI. **Abnormal Costs:-** It is an unusual or a typical cost whose occurrence is usually not regular and is unexpected. This cost arises due to some abnormal situation of production. Abnormal cost arises due to idle time or may be due to some unexpected heavy breakdown of machinery. They are not taken into consideration while computing cost of production or for decision making.

VII. **Controllable and Uncontrollable Costs:-** In cost accounting, cost control and cost reduction are extremely important. In fact, in the competitive environment, cost control and reduction are the key words. Hence it is essential to identify the

controllable and uncontrollable costs. Controllable costs are those which can be controlled or influenced by a conscious management action. For example, costs like telephone, printing stationery etc. can be controlled while costs like salaries etc. cannot be controlled at least in the short run. Generally, direct costs are controllable while uncontrollable costs are beyond the control of an individual in a given period of time.

VIII. **Shutdown Cost:-** These costs are the costs which are incurred if the operations were to close down and they will disappear if the operations are continued. Examples of these costs are costs of sheltering the plant and machinery and construction of sheds for storing exposed property. Computation of shutdown costs is extremely important for taking a decision of continuing or shutting down operations.

IX. **Capacity Cost:-** These costs are normally fixed costs which are incurred by a company for providing production, administration and selling and distribution capabilities in order to perform various functions. Capacity costs include the costs of plant, machinery and building for production, warehouses and vehicles for distribution and key personnel for administration. These costs are in the nature of long-term costs and are incurred as a result of planning decisions.

X. **Urgent Costs:-** These costs are those which must be incurred in order to continue operations of the firm. For example, cost of material.

3.1.5 COSTING METHODS AND TECHNIQUES

It is necessary to understand the difference between the costing methods and techniques. Costing methods are those which help a firm to compute the cost of

production or services offered by it. On the other hand, costing techniques are those which help a firm to present the data in a particular manner so as to facilitate the decision making as well as cost control and cost reduction. Costing methods and techniques are explained below.

Methods of Costing:- The following are the methods of costing.

I. **Job Costing:-** This costing method is used by firms which work on the basis of job work. There are some manufacturing units which undertake job work and are called job order units. The main feature of these organizations is that they produce according to the requirements and specifications of the consumers. Each job may be different from the other one. Production is only on specific order and there is no pre-demand production. Because of this situation, it is necessary to compute the cost of each job and hence job costing system may be applicable. In this system, each job is treated separately and a job cost sheet is prepared to find out the cost of the job. The job cost sheet helps to compute the cost of the job in phases and finally arrive at the total cost of production.

II. **Batch Costing:-** This method of costing is used in those firms where production is made on continuous basis. Each unit coming out is uniform in all respects and production is made prior to the demand, i.e. in anticipation of demand. One batch of production consists of the units produced from the time machinery is set to the time when it will be shut down for maintenance. For example, if production commences on 1st January 2007 and the machine is shut down for maintenance on 1st April 2007, the number of units produced in that period will be the size of one batch. The total cost incurred during that period

will be divided by the number of units produced and unit cost will be worked out. Firms producing consumer goods like television, air-conditioners, washing machines etc. use batch costing.

III. **Process Costing:-** Some of the products like sugar, chemicals etc. involve continuous production process and hence process costing method is used to work out the cost of production. The meaning of continuous process is that the input introduced in the process I travels through continuous process before finished product is produced. The output of process I becomes input of process II and the output of process II becomes input of the process III. If there is no additional process, the output of process III becomes the finished product. In process costing, cost per process is worked out and per unit cost is worked out by dividing the total cost by the number of units. Manufacturing companies that engage in the production of products such as sugar, edible oil, chemicals are examples of continuous production process and they use process costing.

IV. **Operating Costing:-** This type of costing method is used in service sector to work out the cost of services offered to the consumers. For example, operating costing method is used in hospitals, power generating units, transportation sector etc. A cost sheet is prepared to compute the total cost and it is divided by cost units for working out the per unit cost.

V. **Contract Costing:-** This method of costing is used in construction industry to work out the cost of contract undertaken. For example, cost of constructing a bridge, commercial complex, residential complex, highways etc. is worked out by use of this method of costing. Contract costing is actually similar to job

costing, the only difference being that in contract costing, one construction job may take several months or even years before completion while in job costing, each job may be of a short duration. In contract costing, as each contract may take a long period for completion, the question of computing of profit is to be solved with the help of a well-defined and accepted method.

3.1.6 TECHNIQUE OF COSTING

As mentioned above, costing methods are for computation of the total cost of production/services offered by a firm. On the other hand, costing technique helps to present the data in a particular format so that decision making becomes easy. Costing techniques also help for controlling and reducing the costs. The following are the techniques of costing.

I. **Marginal Costing:-** This technique is based on the assumption that the total cost of production can be divided into fixed and variable. Fixed costs remain same irrespective of the changes in the volume of production while the variable costs vary with the level of production, i.e. they will increase if the production increases and decrease if the production decreases. Variable cost per unit always remains the same. In this technique, only variable costs are taken into account while calculating production cost. Fixed costs are not absorbed in the production units. They are written-off to the Costing Profit and Loss Account. The reason behind this is that the fixed costs are period costs and hence should not be absorbed in the production. Secondly they are variable on per unit basis and hence there is no equitable basis for charging them to the products. This technique is effectively used for decision making in the areas like make or buy

decisions, optimizing of product mix, key factor analysis, fixation of selling price, accepting or rejecting an export offer, and several other areas.

II. **Standard Costing:-** Standard costs are predetermined costs relating to material, labour and overheads. Though they are predetermined, they are worked out on scientific basis by conducting technical analysis. They are computed for all elements of costs such as material, labour and overheads. The main objective of standard costing is to have a benchmark against the actual performance. This means that the actual costs are compared with the standards. The difference is called 'variance'. If actual costs are more than the standard, the variance is 'adverse' while if actual costs are less than the standard, the variance is 'favourable'. The adverse variances are analysed and reasons for the same are found out. Favourable variances may also be analysed to find out the reasons behind the same. Thus, standard costing is an important technique for cost control and reduction.

III. **Budgets and Budgetary Control:-** Budget is defined as, 'a quantitative and/or a monetary statement prepared prior to a defined period of time for the policies during that period for the purpose of achieving a given objective.' If we analyse this definition, it will be clear that a budget is a statement, which may be expressed either in monetary form or quantitative form or both. For example, a production budget can be prepared in quantitative form showing the target production; it can also be prepared in monetary terms showing the expected cost of production. Some budgets can be prepared only in monetary terms, e.g. cash budget showing the estimated receipts and payments in a particular period

can be prepared in monetary terms only. Another feature of budget is that it is always prepared prior to a defined period of time which means that budget is always prepared for future and a defined future.

For example, a budget may be prepared for next 12 months or 6 months or even for 1 month, but the time period must be certain and not vague. One of the important aspects of budgeting is that it lays down the objective to be achieved during the defined period of time and for achieving the objectives, whatever policies are to be pursued are reflected in the budget. Budgetary control involves preparation of budgets and continuous comparison of actual with budgeted so that necessary corrective measures can be taken. For example, when a production budget is prepared, the production targets are laid down in the same for a particular period. After the period is over, the actual production is compared with the budgeted and any deviation found will result to taking necessary corrective measures. Budget and Budgetary Control is one of the important techniques of costing used for cost control and also for performance evaluation. The success of the technique depends upon several factors such as support from top management, involvement of employees and coordination within the organization.

4.0 CONCLUSION

Costing methods or systems and reports, unlike financial accounting is expected to keep to accounting rules and standards. Consequently, there is wide variety in the costing systems of the different companies and sometimes even in different parts of the same company or organization.

5.0 SUMMARY

In this unit, you learnt the meaning of costing, importance and basic principles of costing**,** difference between costing and cost accounting**, e**ssentials of a good costing system**,** classification of costing and costing methods and techniques.

6.0TUTOR MARKED ASSIGNMENT

1. Discuss Costing Methods and Techniques.

2. Attempt a classification of costing

7.0 REFERENCES AND FURTHER READING

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UNIT 2 COST ACCOUNTING SYSTEMS

CONTENTS

1.0 INTRODUCTION

Cost accounting may be regarded as ``a specialised field of accounting which involves classification, accumulation, assignment and control of costs. Cost Accounting equally establishes budgets, standard costs and actual costs. It is a set of procedures used in refining raw data into usable information for management decision-making, for ascertainment of cost of products and services and its profitability. In addition, cost accounting is a Management Information System (MIS), which analyses the past, present and future data to provide the basis for managerial decision-making. Cost

Accounting is a system of foresight and not a post-mortem examination; it turns losses into profits, speeds up activities and eliminates wastes.

A cost accounting system that simply records costs for the purpose of fixing sales prices has accomplished only a small part of its mission. Cost accounts are indispensable to managing a factory and it is an important aid to modern management. In this Unit, therefore, we shall consider what cost accounting system really is, and compare between cost accounting and financial accounting. We shall also highlight the types of cost accounting as well as distinguish between cost accounting and management accounting. In addition, we shall focus on the parts of a cost accounting system, and concludes with the necessity for cost accounting system.

2.0 OBJECTIVES

After a careful study of this Unit, you should be able to:

- Say what cost accounting system means;
- Compare cost accounting with financial accounting;
- Distinguish between cost accounting and management accounting;
- Discuss the different parts of a cost accounting system; and
- Highlight the necessity for cost accounting system.

3.0 MAIN CONTENT

3.1 WHAT IS COST ACCOUNTING SYSTEM?

A cost accounting system (also called product costing system or costing system) is a framework used by firms to estimate the cost of their products for profitability analysis, inventory valuation and cost control. Estimating the accurate cost of products

is critical for profitable operations. Note that cost accounting is a process of collecting, recording, classifying, analysing, summarising, allocating and evaluating various alternative courses of action and control of costs. Its goal is to advise management on the most appropriate course of action based on cost efficiency and capability. Cost accounting provides the detailed cost information that management needs in order to control current operations and plan for the future.

Cost accounting information is commonly used in financial accounting information, but its primary function is for use by managers to facilitate making decisions.

Types of Cost Accounting include the following:

- Standard cost accounting
- Activity-based accounting
- Resource consumption accounting
- Throughput accounting
- Life cycle costing
- Environment accounting
- Target costing

Inventory valuation methods and cost accumulation methods are frequently referred to as cost accounting systems in the accounting literature. However, these methods are only parts of a system or subsystems. Cost accounting methods such as activity-based costing, job order costing, standard costing, process costing, throughput costing, direct costing, absorption costing, back- flush costing and historical costing must be combined with other cost accounting methods to form a cost accounting system.

3.2 COMPARISON BETWEEN COST ACCOUNTING AND FINANCIAL ACCOUNTING

Here, we shall highlight the comparison between cost accounting and financial accounting.

1. Financial accounting aims at finding out results of accounting year in the form of Profit or Loss Account and Statement of Financial Position. Cost accounting aims at computing cost of production/service in a scientific manner and facilitates cost control and cost reduction.
2. Financial accounting reports the results and position of business to government, creditors, investors, and external parties.
3. Cost accounting is an integral reporting system for an organisation's own management for decision-making.
4. In financial accounting, cost classification is based on type of transactions, for example, salaries, repairs, insurance, stores and others. In cost accounting, classification is basically on the basis of functions, activities, products, processes and on internal planning and control and information needs of the organisation.
5. Financial accounting aims at presenting "true and fair" view of transactions, Profit or Loss for a period and Statement of financial position (Balance Sheet) on a given date. It aims at computing "true and fair" view of the cost of production/services offered by the firm.

3.3 DISTINCTION BETWEEN COST ACCOUNTING AND MANAGEMENT ACCOUNTING

The distinction between cost accounting and management accounting may be made on the following bases:

1. **Scope:** Scope of cost accounting is limited to providing cost information for managerial uses. Scope of management accounting is broader than that of cost accounting as it provides all types of information. Thus, management accounting is an extension of cost accounting.
2. **Emphasis:** The main emphasis of cost accounting is on cost ascertainment and cost control to ensure maximum profit. On the other hand, the main emphasis of management accounting is on planning, controlling and decision-making so as to provide a basis for ascertaining profit of the entity.
3. **Techniques Employed:** Various techniques used by cost accounting include standard costing and variance analysis, marginal costing and cost-volume-profit analysis, budgetary control, uniform costing and inter-firm comparison. Management accounting also uses all these techniques of cost accounting, but in addition, it also uses techniques like ratio analysis, funds flow statement, statistical analysis, operations research and certain techniques from various branches of knowledge in mathematics and economics.
4. **Evolution:** Evolution of cost accounting is mainly due to the limitations of financial accounting. On the other hand, evolution of management accounting is due to the limitations of cost accounting. In fact, management accounting is an extension of the managerial aspects of cost accounting.

5. **Data Base:** Cost accounting is based on data derived from financial accounting, but management accounting is based on data derived from cost accounting, financial accounting and other sources.

In summary, cost accounting is that branch of accounting which aims at generating information to control operations with a view to maximising profits and efficiency of the company, and that is why it is termed ‘control accounting’. Conversely, management accounting is the type of accounting which assists management in planning and decision-making, and thus known as ‘decision accounting’.

SELF ASSESSMENT EXERCISE 1

What is Cost Accounting, and what are the differences between Cost Accounting and Management Accounting?

3.4 PARTS OF A COST ACCOUNTING SYSTEM

A cost accounting system requires five parts that include:

- An input measurement basis;
- An inventory valuation method;
- A cost accumulation method;
- A cost flow assumption; and
- A capability of recording inventory cost flows at certain intervals.

We shall look at them one after the other.

3.4.1 Input Measurement Bases

The bases of a cost accounting system begin with the type of costs that flow into and through the inventory accounts. There are three alternatives: pure historical costing, normal historical costing and standard costing.

- **Pure Historical Costing:** In pure historical cost system, only historical costs flow through the inventory accounts. Historical costs refer to the costs that have been recorded. These are costs for direct material, direct labour and factory overhead.
- **Normal Historical Costing:** Normal historical costing uses historical costs for direct material and direct labour, but overhead is charged, or applied to the inventory using a predetermined overhead rate per activity measure. Typical activity measures include direct labour hours, or direct labour costs. The amount of factory overhead charged to the inventory is determined by multiplying the predetermined rate by the actual quantity of the activity measure. The difference between the applied overhead costs and the actual overhead coasts represents the overhead variance.
- **Standard Costing:** In a standard cost system, all manufacturing costs or applied, or charged to the inventory using standard or predetermined prices, and quantities. The differences between the applied costs and the actual costs are charged to variance accounts.

3.4.2 Inventory Valuation Methods

The inventory valuation methods encompass the following:

- Throughput method
- Direct or variable method
- Full absorption method
- Activity-based method

i) **Throughput Method:** The throughput method was developed to complement a concept referred to as the Theory of Constraints (TOC). In this method, only direct material costs are charged to the inventory. All other costs are expensed during the period.

ii) **Direct or Variable Method:** In the direct (or variable method), only the variable manufacturing costs are capitalised, or charged to the inventory. Fixed manufacturing costs flow into expense in the period incurred. This method provides some advantages and some disadvantages for internal reporting.

iii) **Full Absorption Method:** Full absorption costing is a traditional method where all manufacturing costs are capitalised in the inventory, that is, charged to the inventory and become assets. This means that these costs do not become expenses until the inventory is sold.

iv) **Activity-Based Method:** Activity-based costing is a relatively new type of procedure that can be used as an inventory valuation method. The technique was developed to provide more accurate product costs. This improved accuracy is accomplished by tracing costs to products through activities.

3.4.3 Cost Accumulation Method

Cost accumulation refers to the manner in which costs are collected and identified with specific customers, jobs, batches, orders, departments and processes. The centre of attention for cost accumulation can be individual customers, the products produced within individual segments during a period, or the products produced by the entire plant during a period. The company's cost accumulation method(s) are influenced by

the type of production operation. The four accumulation methods are job order, process, back flush, and hybrid (or mixed) method.

- **Job Order:** In job order costing, costs are accumulated by jobs, orders, contracts, or lots. The idea is that the work is done to the customers' specifications.
- **Process:** Costs are accumulated by departments, operations, or processes in process costing. The work performed on each unit is standardised or uniform where a continuous mass production or assembly operation is involved.
- **Back Flush:** Back flush is a simplified cost accumulation method that is sometimes used by companies that adapt just-in-time (JIT) production systems. However, JIT is not just a technique, or a collection of techniques. JIT has a very broad philosophy that emphasises simplification and continuous reduction of waste in all areas of business activities.
- **Hybrid (or Mixed) Methods:** Hybrid or mixed systems are used in situations where more than one cost accumulation method is required. For example, in some cases, process costing is used for direct materials and job order costing is used for conversion costs (that is, direct labour and factory overhead). In other cases, job order costing might be used for direct materials, and process costing for conversion costs. These are sometimes referred to as operational costing methods.

3.4.4 Cost Flow Assumptions

A cost flow assumption refers to how costs flow through the inventory accounts, not the flow of work or products on a production line. This distinction is important

because the flow of costs is not always the same as the flow of work. The various types of cost flow assumptions include:

- Scientific identification (e.g., by job);
- First in, first out (FIFO);
- Last in, first out (LIFO); and
- Weighted average.

Costs flow through the inventory accounts by the job in a job order cost system which represents an example of specific identifications. The requirements of the various jobs determines the times of the cost flows. Simple jobs tend to move through the system faster than more complex jobs.

3.4.5 Recording Interval Capability

Inventory records can be maintained on a perpetual or periodic basis. Consequently, the perpetual inventory method provides a company with the capability of maintaining continuous records of the quantities of inventory and the costs flowing through the inventory accounts. The periodic method, on the other hand, requires counting the quantity of inventory before inventory records can be updated.

3.5 NECESSITY FOR COST ACCOUNTING SYSTEM

A company having a proper cost accounting system will help management in the following areas as highlighted:

1. The analysis of profitability of individual products, services or jobs.
2. The analysis of the different departments or operations.

3. The analysis of cost behaviour of various items of expenditure in the organisation. This will help in future cost estimation with reasonable accuracies.
4. It locates differences between actual results and expected results. Such differences can also be traced to the individual cost centres with the efficient cost system.
5. It will assist in setting the process so as to cover costs and generate an acceptable level of profit.
6. The effects on profits of increase or decrease in output or shutdown of a product line or department can be analysed with the adoption of efficient cost accounting system.
7. The costing records serve to analyse the final accounts of a company in such a way as to give a detailed explanation of the sources of profit or loss.
8. Cost accounting data generally serves as a base to which the tools and techniques of management accounting can be applied to make it more purposeful and management oriented.
9. The cost ascertainment, allocation, distribution, can be effectively made under efficient costing system.
10. Cost records serve as the base for Management Information System (MIS).
11. The cost system generates regular performance statements which management needs for control purposes.
12. Cost accounting system is not only applicable to manufacturing organisations or functions but also extended to service organisations and functions.

13. Cost comparisons between different departments, machines and alternative processes help management to maintain maximum efficiency as possible with the adoption of efficient cost system.
14. The cost information will help in making reliable estimates and will also help in submission of tenders.
15. Costing checks recklessness and avoids occurrence of mistakes.
16. It provides invaluable aid to management in performing its functions of planning, evaluation of performance, control and decision-making.
17. It helps in determination of break-in-points (BEP), that is, the level of activity where the firm reaches 'no profit, no loss' situation.
18. The costing system will aim at increasing operational efficiency and cost reduction, which helps the consumers in getting reduced prices.

4.0 CONCLUSION

Cost accounting is used by manufacturing firms to record production activities using a perpetual inventory system. In other words, it is an accounting system designed for manufacturing firms for tracking the flow of inventory continually through the various stages of production.

A typical cost accounting system works by tracking raw materials as they go through the production stages and slowly turn into finished goods in real time. When the raw materials are put into production, the system records immediately the use of materials by crediting the raw materials account and debiting the goods in process account, in as

much most products go through many stages of production before they can be called finished goods.

5.0 SUMMARY

In this Unit, we have:

- Considered cost accounting system as a framework used by firms to estimate the cost of their products for profitability analysis, inventory valuation and cost control;
- Provided a comparison between Cost Accounting and Financial Accounting;
- Distinguished between Cost Accounting and Management Accounting;
- Discussed the different parts of a Cost Accounting System; and
- Highlighted the necessity for cost accounting system

6.0 TUTOR-MARKED ASSIGNMENT

Discuss the different parts of a Cost Accounting System.

7.0 REFERENCES/FURTHER READINGS

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Unit 3: DETERMINATION OF COST BEHAVIOUR

Table of Content

1.0 INTRODUCTION

This is unit 3 of this course, Management Accounting, and it covers a period of one hour. During the course of this lecture, we shall look at the determination of cost

behaviour which will cover definition of cost, concept of cost behaviour level of activity, reasons for studying cost behaviour, concept of relevant range, basic principle of cost behaviour and the types of cost behaviour.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Describe the concept of cost behaviour
- Identify the reasons for studying cost behaviour
- Describe the concept of relevant range
- Identify the types of cost behaviour and describe a level of activity

3.0 MAIN CONTENT

3.1 Cost Behaviour Analysis

Good managers must not only be able to understand the conceptual underpinnings of cost behaviour, but they must also be able to apply those concepts to real world data that do not always behave in the expected manner. Cost data are impacted by complex interactions. Consider for instance the costs of operating a vehicle. Conceptually, fuel usage is a variable cost that is driven by miles. But the efficiency of fuel usage can fluctuate based on highway miles versus city miles. Beyond that tires wear faster at higher speeds, brakes suffer more from city driving, and on and on. Vehicle insurance is seen as a fixed cost, but portions are required (liability coverage) and some portions are not (collusion coverage). Further, if you have a wreck or get a ticket, your cost of coverage can rise. Now, the point is that assessing the actual character of cost behaviour can be more daunting than you might first suspect. Nevertheless,

management must understand cost behaviour, and this sometimes takes a bit of forensic accounting work.

3.2 Concept of Cost Behaviour

Cost behaviour is the study of the ways in which cost react or do not react to changes in the level of activity of an organisation. Knowledge of cost behaviour is the basis of all cost-volume-profit (C. V.P) analyses. When we know the behaviour of costs, then financial planning is made simpler.

Students Assessment Exercise

Identify some activities in your work place and state the reaction of cost to slight changes in the level of operation of this activity e.g. rent ... cost item, number of patients treated... activity. If the number of patients treated fluctuates in a period, would the rent paid on the patients' ward fluctuate accordingly?

3.3 Level of Activity

The level of activity is the amount of work done or the number of events that has occurred. The type of activity which influences cost varies according to the nature o work done in the organisation or department, and the nature of the items of cost whose behaviour is being analysed depending on the circumstance, the level of activity may refer to the volume of production in a period, the number of items sold, the value of items sold, the number of invoices issued, the number of invoices received the number and units of electricity consumed, etc.

Students Assessment Exercise

Identify what should be the level of activity in the following:

Barbers shop

Restaurant

Mechanic workshop

Lawyers Office

Airline ticketing office

Secondary school

Hospital

Railway station

Petrol station

3.4 Reasons for Studying Cost Behaviour

There are three principal reasons for studying how costs respond to changes in the level of activities:

- For the prediction of cost to facilitate budgetary and corporate planning
- For performance evaluation when a system of flexible budgetary control is in operation
- For the estimation of costs for various decision making processes e.g. pricing decisions make or buy decision, optimal product mix, shut-down decisions etc.

Students Assessment Exercise

Can you identify other reasons why cost behaviour should be studied?

3.5 Concept of Relevant Range:

This is the range in which all assumptions about the level of activities and cost will remain valid. Within this range, most items of cost will settle into a basic pattern or behaviour and cost can be classified into either fixed or variable cost.

Students Assessment Exercise

Have you ever heard of installed capacity before now? If you have, then think about a car that has the capacity to carry just five persons or a machine that can work continuously for just twelve hours., if you want the car to carry more than five persons, what do you think should be done?

3.6Basic Principles of Cost Behaviour

The basic principle of cost behaviour is that, as the level of activity rises, costs will usually rise. It will cost more to produce 2,000 units of an output than it will cost to produce 1,000 units of the same product.

This principle is common sense. The problem for the accountant, however, is to determine for each item of cost, as the level of activity increases:

- The ways in which the costs behave to changes in activity level; (i.e. are costs
- Fixed, varied, stepped or mixed
- By how much (i.e. what is the amount of fixed cost per period and what is the variable cost per unit of activity?)

For the purpose of this course, the level of activity for measuring cost will generally be taken to be the volume of production.

Students Assessment Exercise

State the accountants' interest in the study of the principle of cost behaviour.

3.7 Types of Cost Behaviour:

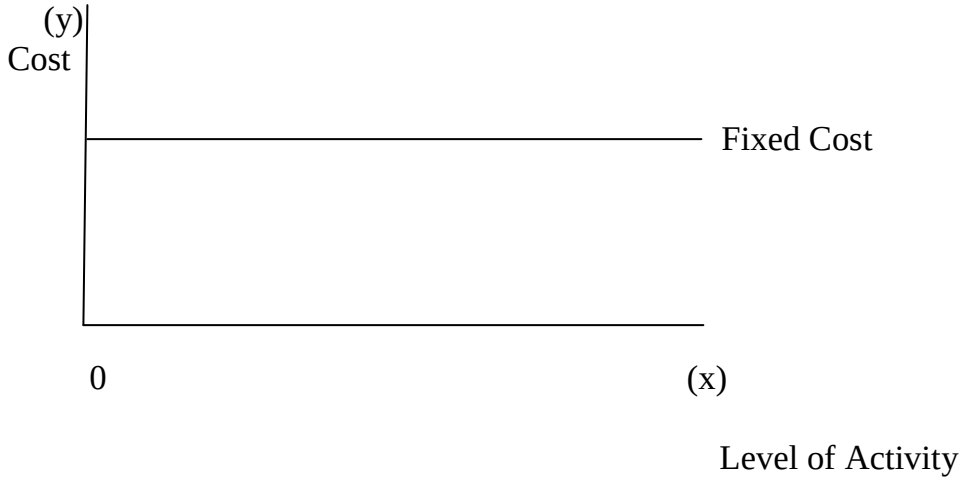
3.7.1 Fixed Costs:

Fixed costs are those costs, which do not vary with output or production level. They vary with the passage of time hence they are time or period cost. They remain constant

in given short term period and within relevant range of output. Fixed costs are costs of holding assets and other factors of production in readiness for production. A company when defining fixed cost should take the following factors into consideration:

- Controllability —All fixed costs are controllable in the long run. Some fixed costs are subject to management control in the short-run. Numerous fixed costs are determined annually by discretional management policies.
- Relevant range —Fixed cost must be related to a range of activity. A fixed cost would only remain constant only when level of operation is within relevant range.
- Period cost —Because they accrue with the passage of time, the amount of the fixed costs must be related at specified period of time. Fixed costs should be related to a financial year and expressed as a constant amount per month.
- Fixed in total but variable per units —A fixed cost is constant in total amount per period, but variable in terms of unit cost.

A sketch graph of a fixed cost would look like:



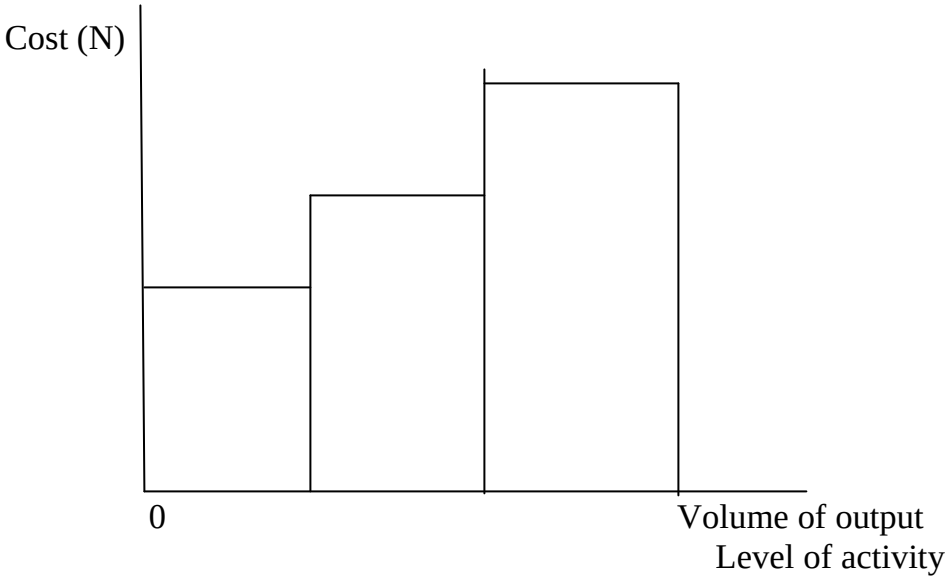
Examples of fixed costs. are:

- The salary per month of a supervisor
- The rent of a single factory building per month or per annum

3.7.2 Step Cost

This is a variant of the fixed cost. Many items of cost are fixed in nature but within certain levels of activity i.e. a relevant range. For example, the annual depreciation cost of a machine may be fixed if production remains below 1,000 units for machine that has a maximum capacity of 1,000 units, but if production is to exceed 1,000 unit, even by 1 unit, then a second machine would be required, and the annual depreciation cost on two machines would go up in a stepped manner.

A sketch graph of a step cost would look like:



Other examples of step cost area:

- Rent — where accommodation requirements increase, as output levels get higher.

- Basic wages — basic pay of employees is nowadays usually fixed, but as output rises, more employees are required.

3.7.3 Variable Costs

A variable cost is one, which tends to vary with the volume of output. The variable cost per unit is the same amount for each unit produced, which means that the amount of resources used and the price of these resources are constant for each additional unit produced. The total cost of a variable cost item would be shown graphically as follows:

3.7.4 Total Cost

This is the totality of costs: i.e. the addition of total variable cost plus total fixed cost, and its function is given as:

$Y= a+bx$

Where:

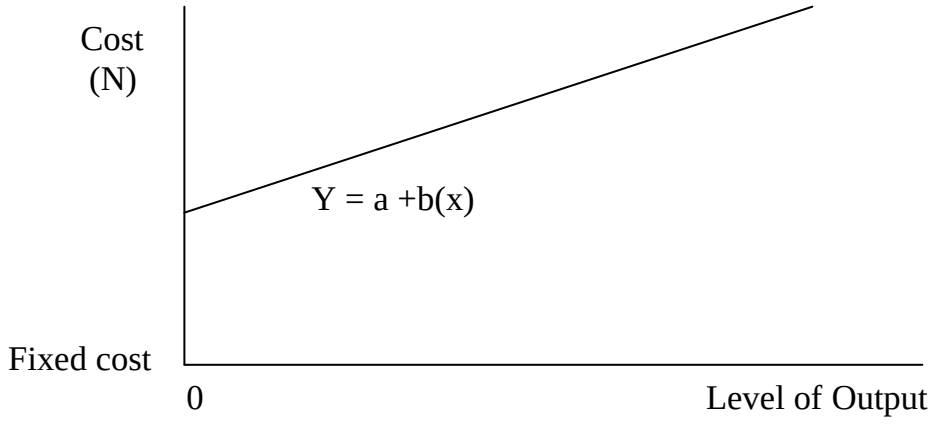
Y= total cost

a = fixed cost

b = variable cost per unit

= activity level

It is shown graphically as:



3.7.5 Mixed Costs

Mixed costs are also referred to as semi-variable or semi-fixed cost. They are cost items which are partly fixed and partly variable i.e. costs which contain a standing basic charge plus a variable charge per unit of consumption e.g. telephone bills, electricity bill, etc.

Students Assessment Exercise

Identify and sketch the graph of any other cost behaviours?

4.0 CONCLUSION

Cost behaviour has been demonstrated to be a veritable tool in understanding the effect of cost in response to changes in the volume of activity and to understanding the resulting impact of cost on profitability.

5.0 SUMMARY

In this unit attempts have been made to:

- Define cost;

- Describe the concept of cost behaviour;
- Identifying the reasons for studying cost behaviour;
- Describe the concept of relevant range;
- Describe a level of activity' and
- Identifying the types of cost behaviour.

6.0 TUTOR MARKED ASSIGNMENT

Explain the term cost behaviour and state the factors that would influence the behaviour of costs in response to changes in an organization's level of activity.

7.0 REFERENCES AND FURTHER READING

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Unit 4: ELEMENT OF COST AND COST ESTIMATION TECHNIQUES

Table of Content

1.0 INTRODUCTION

This is unit 4 of this course, Management Accounting, and it will cover a period of one hour. We shall be taking a look at elements of cost and the need for cost estimation and the various methods of cost estimation

2.0 OBJECTIVES

At the end of the unit you should be able to:

- Establish the need for cost estimation
- Describe the various cost estimation techniques
- State the various elements of cost

3.0 MAIN CONTENT

3.1 Definition of Cost

The scope of the term 'cost' is extremely broad and general. It is, therefore, not easy to define or explain this term without leaving any doubt concerning its meaning. Cost accountants, Economists and others develop this concept of cost according to their needs. This concept should therefore be studied in relation to its purpose and use. Some of the definitions of cost are given hereunder:

"A cost is the value of economic resources used as a result of producing a product or service" (WM. Harper)· Cost is "the amount of expenditure (actual or notional) incurred on or attributable to a given thing" (ICMA)· Cost is "an exchange price, a foregoing, a sacrifice made to secure benefit" (A tentative set of Broad Accounting Principles for Business Enterprises).

Students Assessment Exercise

Attempt your own definition of cost, and give an instance where it can be so used.

3.2 The Nature and Types of Cost Classification

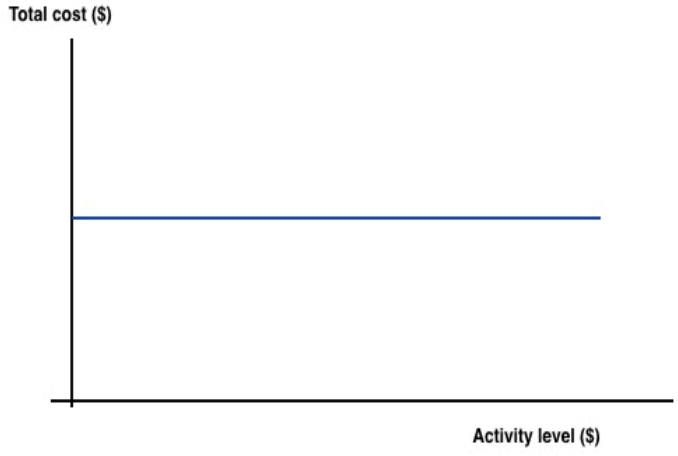
Costs can be classified in a number of different ways:

- By their **behavior**. Do they increase as an organisation gets busier or do they tend to stay the same? This is important when it comes to budgeting as it is essential to be able to predict how costs are likely to change.
- By their **location**. Where in the organisation are they incurred? For example, costs incurred in the factory are relevant to working out the cost of production. However, costs incurred in storing and delivering finished goods are not relevant to production.
- By their **function**. For example costs related to research and development, marketing, training, manufacturing.
- By the person **responsible** for their control. All costs need to be controlled and there should be a clearly identified person who is responsible for the control of each cost. For example, the managers of a branch might be held responsible for the costs incurred there.
- By their **type**. For example, material, labour, other production expenses, such as the cost of running machinery.
- By their **traceability**. Are they direct or indirect? Direct costs are closely related and traceable to each item produced. Indirect costs are not so easy to relate and trace to each unit of production.

3. 3 Fixed Costs: constant over a wide range of activity

An example would be the factory rent. It does not matter how many units are made, the rent is fixed.

On a graph, fixed costs would appear as:



Note that the cost per unit will decrease as the activity level decreases. For example, say that the rent was N10, 000 and 1,000 units were made. Then you could argue that it takes N10 rent to make a unit (N10, 000/1,000).

If, however, 10,000 units were made, the rental cost per unit would be only N1 (N10, 000/10,000). Higher production volumes are making better use of the fixed resource.

3.4 Variable Cost

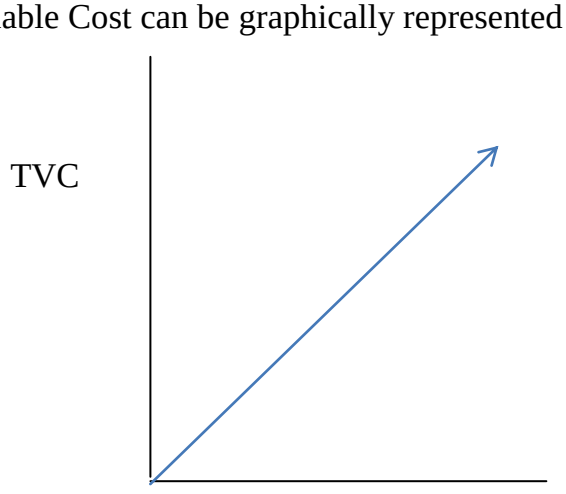
A variable cost is a cost that changes in relation to variations in an activity. In a business, the "activity" is frequently production volume, with sales volume being another likely triggering event. Thus, the materials used as the components in a product are considered variable costs, because they vary directly with the number of units of product manufactured. It is useful to understand the proportion of variable costs in a business, since a high proportion means that a business can continue to

function at a relatively low revenue level. Conversely, a high proportion of fixed costs require that a business maintain a high revenue level in order to stay in business.

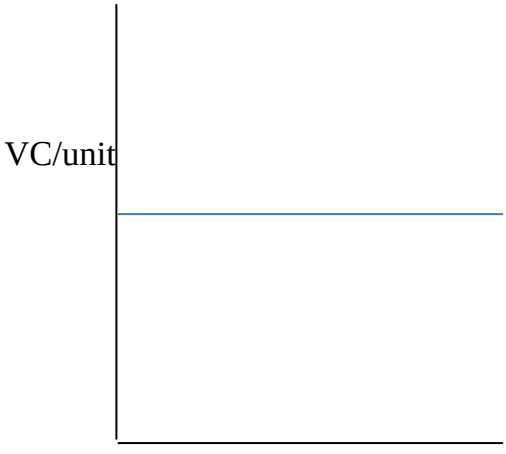
Here are a number of examples of variable costs, all in a production setting:

- **Direct materials**. The most purely variable cost of all, these are the raw materials that go into a product.
- **Piece rate labour.** This is the amount paid to workers for every unit completed (note: direct labour is frequently not a variable cost, since a minimum number of people are needed to staff the production area; this makes it a fixed cost).
- **Production supplies.** Things like machinery oil are consumed based on the amount of machinery usage, so these costs vary with production volume.
- **Billable staff wages.** If a company bills out the time of its employees, and those employees are only paid if they work billable hours, then this is a variable cost. However, if they are paid salaries (where they are paid no matter how many hours they work), then this is a fixed cost.
- **Commissions.** Salespersons are paid a commission only if they sell products or services, so this is clearly a variable cost.
- **Credit card fees.** Fees are only charged to a business if it accepts credit card purchases from customers. Only the credit card fees that are a percentage of sales (i.e., not the monthly fixed fee) should be considered variable.
- **Freight out**. A business incurs a shipping cost only when it sells and ships out a product. Thus, freight out can be considered a variable cost.

Variable Cost can be graphically represented thus:



No. of units produced

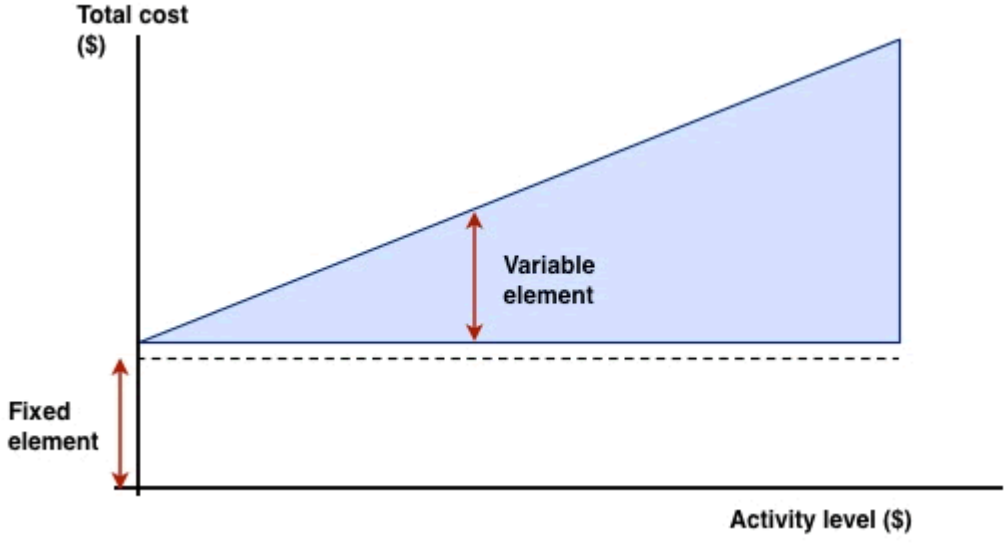


No. of units produced

3.5 Semi-variable costs have a fixed element and a variable element.

An example would be a telephone bill. Usually there is a fixed cost for the line rental then each minute of telephone calls causes an additional cost.

On a graph, fixed costs would appear as:



Stepped fixed costs: constant over a range of activity then a sudden increase, then constant again. An example would be the salary of supervisors. One supervisor for up to six workers, two for up to 12 workers, etc.

3.6 Total Cost:

Definition: Total cost is an economic measure that sums all expenses paid to produce a product, purchase an investment, or acquire a piece of equipment including not only the initial cash outlay but also the opportunity cost of their choices.

What is the meaning of total cost? The meaning of this term varies slightly depending on the content. For example, when using it to define production costs, it measures the total fixed, variable, and overhead expenses associated with producing a good. This is a fundamental concept for business owners and executives because it allows them to track the combined costs of their operations. It allows the individuals to make pricing and revenue decisions based on whether total costs are increasing or decreasing. Furthermore, interested individuals can dig into the total cost numbers to separate them into fixed costs and variable costs, and adjust operations accordingly to lower overall costs of production. Management also uses this idea when contemplating capital expenditures.

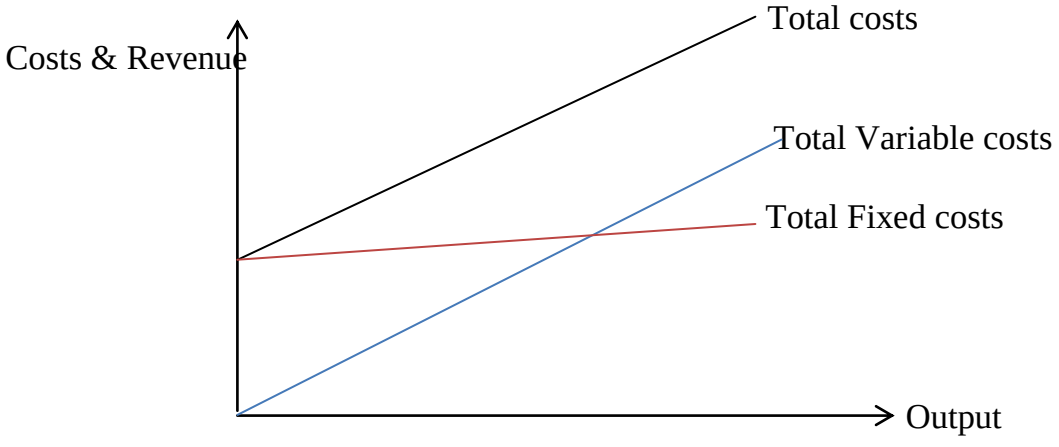
Total Cost can be graphically represented thus:

An example

Consider the following hypothetical example of a boat building firm. The total fixed costs (TFC), include premises, machinery and equipment needed to construct boats, and are £100,000, irrespective of how many boats are produced. Total variable costs (TVC) will increase as output increases.

OUTPUT	TOTAL FIXED COST	TOTAL VARIABLE COST	TOTAL COST
1	100	50	150
2	100	80	180
3	100	100	200
4	100	110	210
5	100	150	250
6	100	220	320
7	100	350	450
8	100	640	740

Plotting this gives us Total Cost, Total Variable Cost, and Total Fixed Cost.



3.1 Need for Cost Estimation

You would recall from unit 3 of the course that we said there exists a mixed cost or semi variable costs or semi-fixed cost. These are said to be costs which are partly fixed and partly variable i.e. a cost which is a composite of a standing basic charge plus a variable change per unit of consumption. If all costs are to be classified as either a

fixed cost or a variable cost, then a mixed cost has to be so separated into its variable and fixed costs components.

Imagine the telephone bill received from NITEL: Even in situations where the telephone is till out of service, you still receive a bill for the month. You would wonder where the charges came from. Well, it is the standing charge for having a line, which would carry a fixed charge. And in addition to this, you pay a constant variable charge per usage. The two changes would have been added together and sent to you as a bulk, which you may have to separate for planning purposes and budgeting.

3.2 Cost Estimation Techniques

3.2.1 Scatter graph method

Under this method, the coordinates of the cost and the associated level of activity in respect of historical records for a defined period of time are plotted on a graph. A line of best fit is then drawn usually across the coordinates crossing the cost axis. This technique fits a tread line to a series of historical data points and then projects the line into the figure for medium to long-term forecasts. Developing a linear trend line by a precise statistical method would require the use of the Least Square Method. This method results in a straight line that minimizes the sum of the squares of the vertical differences from the line of best fit.

A least square line is described in terms of its y-intercept (i.e. the height at which it intercepts -the y-axis); and its slope (i.e. the steepness or angle of the line). If the y-intercept and its slope can be computed, then the line can be expressed with the following equation.

y = a +b(x)

where:

y = computed value of the variable to be predicated (This is referred to as the dependent variable)

a =y — axis intercept

= slope of the regression line or the rate of change in y .i.e.ity

dx=values of a and b for nay regression line can be determined. The slope b is determined by:

Awy — ncy

fix' — nx2

where:

slope of the regression line

A = summation sign

values of the independent variable

values of the dependent variable

the average of the values of the x's

the average of the values of the y's

the number of observations

The y-axis intercept i.e. 'a' is computed as:

a = y — bx

Students Assessment Exercise

Year	**Units of power generator sold**
1992	74
1993	79

1994	80
1995	90
1996	105
1997	142
1998	122

You are required to draw a straight line trend (i.e. a line of best fit) to fit these data and forecast the 1999 demand.

SUGGESTED SOLUTION:

Let the periods be represented by simpler numbers i e

1992 by 1

1993 by 2

1994 by 3

1995 by 4

1996 by 5

1997 by 6

1998 by 7

YearXYX Xy (Time Period)		**(Unit demanded)**		
1992	1	74	1	74
1993	2	79	4	158
1994	3	80	9	240
1995	4	90	16	360
1996	5	105	25	525
1997	6	142	36	852
1998	7	122	49	854
		fix = 28	**Ay = 692**	**ax = 140**

$\frac{28}{7} = 4$

$ay = \frac{692}{7} = 98.86$

Since $b = \frac{5xy - rocy}{Ax\mathbf{2} - nx\mathbf{2}}$

$b = 3063 - \frac{(7)(4)(98.86)}{140 - 7(4\mathbf{2})}$

b= 295

28b= 10.54

and, a = y — bx

a = 98.86— 10.54(4)

a = 56.70

The least square trend equation is given *as:*

y = *a* + b(x)

y = 56.70 + 10.54(8)

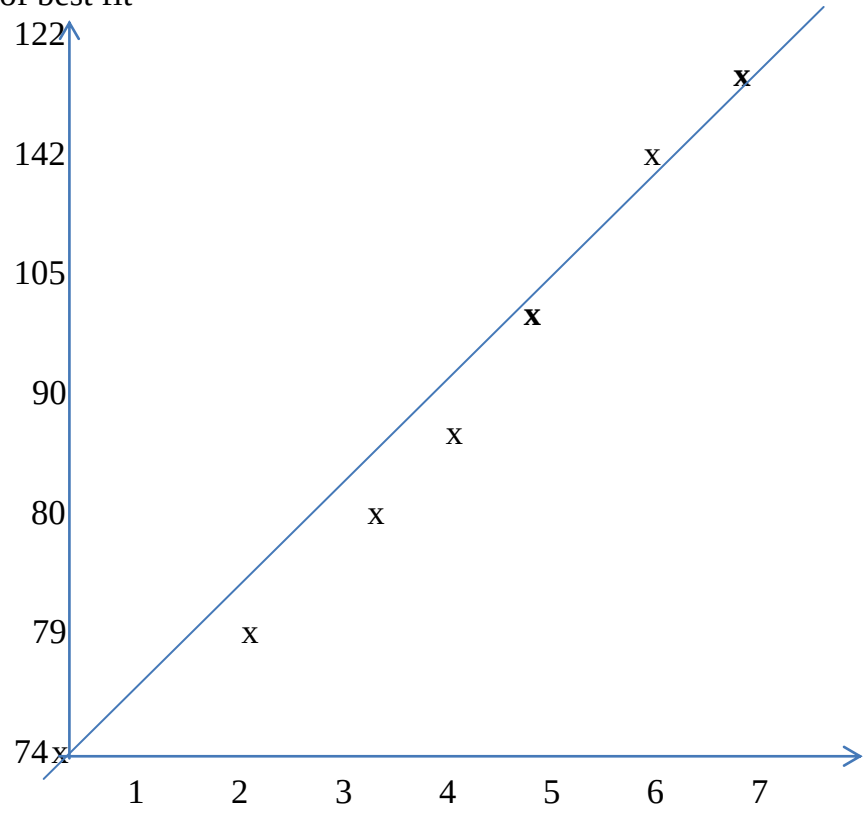
Please note that x here is period 8 i.e. 1999

y= 141.02

y= 141 generators

See graph below (Scatter Diagram)

Line of best fit



3.2.2 The High and Low Method

Under this method, a previous data relating to a defined period of time is extracted from the historical records and in particular, two previous data corresponding to the

highest level of activity during the same period and the lowest level of activity during the same period, together with their associated corresponding costs form the basis for the derivation of the cost function. The differences between the total cost of the high output and the total cost of the low output will be the variable cost of the different output levels.

Students Assessment Exercise

The costs of operating the maintenance department of ABC Manufacturing Nigeria Limited for the last four months have been given a§ follows:

	Output (Unit)	Total Cost (N)
1	111,000	7,000
2	115,000	8.000
3	113,000	7,000
4	97,000	6,000

You are required to compute the total cost for month five (5) when output is expected to be 7,500 standard hours.

SUGGESTED SOLUTION

Steps (a) Identify the highest activity and its corresponding total cost.

(b) Identify the lowest activity and its corresponding total cost

(c) Determine the difference in activities and the total costs

(d) The change in total cost due to the corresponding change in activities would be

The variable cost per standard hour

(e) Make necessary substitutions in either the high or low volume cost.

Standard Total Hours Cost

High output 8,000 115,000

Low output	6,000	97,000
	2,000	18,000

Variable cost per standard hour is

18,000

2,000 = N9 per standard hour (ie. 18,000/2,000)

Substituting in either the high or low volume cost:

	High		Low
			N
Total cost	115,000		97,000
Variable cost (8000 x 9)	72,000	(6,000 x 9)	54,000
Fixed cost	43,000		

The estimated cost of 7,500 standard hours of output would be:

Fixed cost	43,000
Total variable cost (7,500 x N9)	67,500
Total cost	110,500

4.0 CONCLUSION

Cost estimation technique has been demonstrated to be a useful tool to management in separating mixed cost into its variable cost and fixed cost demands which are very helpful for profits planning and budgets and budgetary control.

5.0 SUMMARY

In this unit, attempts have been made to establish the need for cost estimation and to describe some of the various cost estimation techniques.

6.0 TUTOR MARKED ASSIGNEMENT

IJK Nigeria Limited have computed its total factor overhead cost at the high and low levels

	Level of Activity	
	Low	High
Direct Labour Hours	50,000	75,000
Total factory overhead costs	142,000	176,000

Assume that the factory overhead costs above consist of indirect materials, rent and maintenance expenses. The company has analysed these costs at the 50,000 direct labour hours of activity, and has determined that at that level, these costs exist in the following proportions:

Indirect materials (variable)	50,000
Rent (fixed)	60,000
Maintenance (semi-variable)	32,000
	142,000

For planning purposes, the company wants to break the maintenance cost down into its variable and fixed elements.

You are required to determine:

(a) How much of the N176, 250 factory overhead costs at the high level of activity above consists of maintenance cost

(b) The cost formula for maintenance by means of the high-low method of cost analysis.

Discussion, solution and marking scheme

- The analysis of cost given in the body of cost is for the low level of activity at 50,000hours.
- Indirect materials is said to be a variable cost and records N50, 000. This means that it should be possible to establish the variable cost per hour, and this would be N50, 000 =N1 per hour.
- Rent is fixed at the low level at N60, 000. Since rent is a fixed cost, it is expected that it would remain constant even at a higher level of activity
- The total cost recorded at the high level is N176, 250. Out of this, N75, 000 is accounted for by indirect materials, which in variable N60, 000 is accounted for by rent which is fixed, therefore, the balance ofN41, 250 will be for maintenance.
- Maintenance cost at the high level of operation (75,000 hours) is N41, 250 and at the low level of operation (5,000 hours) is N32, 000. Maintenance cost is said to be a semi-variable cost.
- Therefore, we can adopt the high low method to separate it into its variable cost and fixed cost element and proceed to state the cost formula for maintenance.

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UNIT 5 BUDGETS AND BUDGETARY CONTROL

CONTENTS

1.0 INTRODUCTION

Every organization have plans; some plans are more formal than others and some organization's plan more formally than others but all makes same attempt to consider the risk and opportunities, which lie ahead, and how to confront them. In most businesses, this process is formalized at least in short-term, with considerable effort put into preparing annual budgets and monitoring performance against those budgets. Traditionally, budgets have been employed as devices to limit expenditure, but a much more useful and constructive view is to treat the budgeting process as a means for obtaining the most effective and profitable use of the company's resources via planning and control

2.0 OBJECTIVES

At the end of this unit, students should be able to:

- Define budget;
- Identify various types of budget;
- Outline budget preparation procedures;
- Prepare the cash budget;
- Learn the techniques used in budgeting;
- Distinguish between forecast and budgets; and
- Learn about the objectives and organisation of budgetary control.

3.1 DEFINITION OF BUDGET

A budget is defined as "a quantitative statement for a defined time which may include planned revenues, expenses, assets, liabilities and cash flow. This involves comprehensive and coordinated plans, expressed in the financial terms, for the operation and resources of an enterprise for some specific period in the future. A budget provides a focus for the organisation, aids the coordination of activities and facilitates control. Planning is achieved by means of a fixed master budget whereas control is generally exercised through the comparison of actual costs with a flexible budget" (CIMA). Budget is a financial and/or quantitative plan of operations for a forthcoming accounting period.

Many functional budgets [a budget of income or expenditure for individual functions of a business such as the sales budget, production budget, direct labour budgets, etc] are incorporated into a master budget."Budgets are designed to carry out various functions such as planning, evaluating performance, coordinating activities, implementing plans, communicating, motivating and authorizing actions. The last-

named role seems to predominate in government budgeting and not-for-profit budgeting, where budget appropriations serve as an authorisation and ceiling for management actions" [Horngren (2004).]

The purpose of a budget is to:

(i) Communicate ideas and plans to everyone affected by them. A formal system is necessary to ensure that each person is aware of what he or she is supposed to be doing. Communication might be one-way, that is, with managers giving order to subordinates; or there might be a two-way dialogue and exchange of ideas, this is between managers and subordinates.

(ii) Coordinate the activities of different departments or sub-units of the organization. This concept of coordination implies, for example, that the purchasing department should base its budget on production requirements, and that the production budget [that is, direct labour budget and machinery utilization budgets etc] should in turn be based on sales expectations. Although straight forward in concept, coordination, in practice, is remarkably difficult to achieve, and this often leads to 'sub-optimality' and conflict among departmental managers.

(iii) Establish a system of control by having a plan against which actual results can be progressively compared and variance analysed for prompt attention and action.

(iv) Motivate employees to improve their performances. The level of attainment usually incorporated in the budget is a realistic figure for the budget period.

Thornton, (1978) suggests that two levels of attainment could be fixed:

(i) a 'minimum expectations' budget, and

(ii) a 'desired standards' budget.

A budget is a means to an end, and not an end in itself. It is a short term plan that depicts the focus of a long term objective of the organisation. It covers area of responsibility of one specified person, so that his performance can be measured at the end of a budget period. It follows that the budget should be prepared in conjunction with those who are to be responsible for achieving the budgeted performance. In this way, a head of department translates his goal in the budgets. This approach offers motivation to the managers. This technique, with its stress on personality, differs from standard costing, for the latter is concerned with standards for products or services.

3.2 TYPES OF BUDGET

(a) Functional budgets

Functional budgets are prepared by the departmental heads. The order of importance in preparation of the budget depends on the budget limiting factor of the organisation. Where sales are considered critical to the success of the objectives, the sales budget is prepared first. Similarly, where source of raw material is restricted and in limited supply the raw material budget is prepared first.

The order of presentation suggests that the sales are critical and so sales budget is prepared before other budgets:

(i) Sales budget. This will incorporate decisions about selling prices and expected sales volume for each item of product (or service)

for all segments of the company's product or service;

(ii) The departmental budgets for marketing, sales and distribution would also be made at an early stage, because estimates of spending on sales promotion, advertising and salesmen, etc will be necessary to gauge the expected volume of sales;

(iii) Having prepared the sales budget, it should be possible to estimate production requirements in terms of quantity of raw materials, labour hours, machine hours etc. However, decision must first be taken about stocks of finished goods. A decision to increase stocks would mean that production for the period must exceed sales volume. On the other hand, a decision to reduce stock levels (so as to improve the organisation's cash position) would mean that production volume would be less than sales volume by the amount of the run-down in stocks. The level of stock to hold would depend on the variability in demand, lead-time for raw materials, etc.;

(iv) The production budget is then prepared, specifying the expected quantities of each product to be made, in each factory or manufacturing department, followed by the budgets of resources for production, that is,

- Materials usage budget for all types of materials, direct and indirect;
- Machine utilization budget for the operating hours required on each machine or group of machines;
- Labour budget (all grades of labour, direct and indirect in hours

and cost);

- Overhead cost centres budgets for production, administration, and research and development cost centres.

(v) A materials purchasing budget is also required, specifying the expected quantities and price of each stores item for raw materials bought-in components, stationery, etc. In order to prepare the purchases budget a decision must first be taken about stock level. Purchase requirements (in quantity) are the usage requirements, plus any increase in raw material stocks, or less any decrease in stocks;

(v) A capital expenditure budget, updated each year, covering a period of the next three to five years.

(vi) A working capital budget, specifying the changes in debtors and creditors during the year. Turnover periods would be estimated and the effect of any proposed decision on discounts or credit period allowances considered.

(vii) The cash budget cannot be prepared until the functional budgets in (i) to (vi) have been decided, prepared and agreed.

(b) Master budget

The master budget consolidates the position of all the functional budgets in the form of a budgeted trading and profit and loss account and a budgeted statement of financial position. Budgetary control relates expenditure to the person responsible for each function, thus affording an effective method of control. It is an important principle of the system that an executive is held

responsible only for expenditure within his control.

3.3 BUDGET PREPARATION AND APPROVAL PROCEDURES

3.3.1 Budgets Preparation Procedures

The business of any organisation must be conducted in an organised and orderly manner to achieve the desired results. Budget preparation is a serious activity of management and some time should be expended on it. In practice, top management may constitute a budget committee which could comprise:

(a) The Managing Director/ Chief Executive Officer as the Chairman

(b) Chief Accountant (or Director of finance) as the budget officer. He coordinates the preparation and readiness of other budgets and prepares the cash budget as well as the master budget. The chief accountant's knowledge of the interrelationship of the functioning of budgets puts him/her in an advantageous position to be the budget officer.

(c) The head of department or the line and service managers who prepares the functional budgets of the department.

It is a good management policy to have a pre-budgeting meeting where the guidelines for the new budget period are drafted, discussed and approved. This would include the requirements that the new budgets must meet the standard parameters.

3.3.2 Approval of the master budget

The budget committee will submit the master budget to the top management (usually the board of directors) for approval. If it is approved, the master budget will then become the blueprint for the activities of the budgeted period. If approval is not received, sections of the budget will have to be amended to incorporate any change or

review in emphasis so as to meet the requirements of top management. However, these requirements should be realistic. There are limits to the success which can be achieved. Some improvements may be possible for the following reasons:

- managers may have been too pessimistic in their estimates.
- padding or slack variables may have been built into the budget - that is estimates of costs may be overstated and activity understated so that the budget can be easily achieved.
- improvements in efficiency may be possible.
- additional sales promotion may yield positive results.
- it may be possible to increase productive capacity — although in many industries this could take considerable time.

3.4 PREPARATION OF BUDGETS

3.4.1 Cash Budget

A cash budget is a summary of the company's expected cash inflows and outflows over a given period of time. Cash is required in order to facilitate the achievement of a company's plans and intentions. Inadequate flow of liquidity will hamper efficiency and level of profitability of the firm. A company may be profitable but, still faces liquidity problems. Cash is a resource which should be effectively utilised in order to generate benefits for the company Cash budget shows the timing of expected cash flows. The benefits to be derived from the preparation of detailed cash budget are as follows:

(i) It provides early signals of potential deficit or surplus in order to take appropriate action,

(ii) It enables financial feasibility of plans to be ascertained.

(iii) It indicates the financial effects of policies within a firm.

(iv) It provides a base for monitoring actual activity. The frequent comparison of actual cash flow with budgeted cash flow will enable up-to-date information to be incorporated into budget revisions.

ILLUSTRATION

From the following data, prepare a cash budget for the first six months of 2005 for Super Industries Ltd:

(i) Budgeted Profit and Loss Accounts for the period ended 30 June, 2005.

	Jan ₦'000	Feb ₦'000	Mar ₦'000	April ₦'000	May ₦'000	June ₦'000
Sales	90	92	88	95	90	94
Less Purchases	54	56	50	60	52	55
Gross Profit	36	36	38	35	38	39
Less operating expenses:						
Selling expenses	(10)	(12)	(13)	(13)	(16)	(15)
Distribution expenses	(6)	(4)	(5)	(7)	(4)	(5)
Admin. expenses	(3)	(4)	(4)	(2)	(5)	(3)
Net profit	17	16	16	13	13	16

(ii) Sales for November and December 2004 were ₦85,000 and ₦90,000 respectively.

(iii) 40% of sales would be in cash, 30% each would be paid in 30 days and 60 days.

(iv) Purchases for November and December 2004 were ₦48,000 and ₦50,000 respectively

(v) 75% of purchases would be paid for immediately and the balance in two months time.

(vi) Selling expenses are to be settled in two equal installments in 30 and 60 days. December 2004 expenses are ₦15,000.

(vii) Distribution, expenses are payable one month in arrears while administration expenses are payable immediately.

(viii) Distribution expenses for December 2004 would be ₦5,000 while selling

expenses would be ₦8,000 for November 2004 and ₦9,000 in December 2004.

(ix) Balance in the bank on 31 December, 2004 is expected to be ₦28,000 overdrawn.

(x) The company intends to pay for the following:

- Company tax of ₦12,000 in February 2005
- A new generator costing ₦6,500 in March 2005
- Dividends of ₦20,000 in April 2005.

(xi) Some unserviceable vehicles would be sold in January 2005 for ₦8,000. Show all workings.

SUGGESTED SOLUTION

SUPER INDUSTRIES LIMITED

	Jan	Feb	March	April	May	June	Total
RECEIPT (N'000)							
Sales	88.5	90.8	89.8	92	90.9	93.1	545.1
Asset disposal	8.0						8
TOTAL	96.5	90.8	89.8	92	90.9	93.1	553.1
PAYMENT (N'000)							
Purchases	52.5	54.5	51.0	59.0	51.5	56.25	324.75
Selling expenses	7.5	12.5	11.0	12.5	13.0	14.5	71.0
Distribution exp.	5.0	6.0	4.0	5.0	7.0	4.0	31.0
Admin. expenses	3.0	4.0	4.0	2.0	5.0	3.0	21.0
Corporation tax	12.0	12.0					
Generator			6.5				6.5
Dividends				2.0			2.0
TOTAL	68.0	89.0	76.5	98.5	76.5	77.75	486.25
Net Cashflow	28.5	1.8	13.3	(6.5)	14.4	15.35	66.85
Opening balance	(28.0)	5.0	2.3	15.6	9.1	23.5	(28.0)
Closing balance	5.0	2.3	15.6	9.1	23.5	38.85	38.85

WORKINGS

	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	Mar. 2005	Apr. 2005	May 2005	June 2005
Sales								
Actual	85.0	90.0	90.0	92.0	88.0	95.0	90.0	94.0
40%	34.0	36.0	36.0	36.8	35.2	38.0	36.0	37.6
30%		25.5	27.0	27.0	27.6	26.4	28.5	27.0
30%	___		25.5	27.0	27.0	27.6	26.4	28.5
Total	34.0	61.5	88.5	90.8	89.8	92.0	90.9	93.1

	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	Mar. 2005	Apr. 2005	May 2005	June 2005
Purchase								
Actual	48.0	50.0	54.0	56.0	50.0	60.0	32.0	55.0
75%	36.0	37.5	40.5	42.0	37.5	45.0	39.0	41.25
25%			12.0	12.5	13.5	14.0	12.5	15.0
Total	36.0	37.5	52.5	54.5	51.0	59.0	51.5	56.25

Selling Expenses	Nov. 2004	Dec. 2004	Jan. 2005	Feb. 2005	Mar. 2005	Apr. 2005	May 2005	June 2005
Actual	-	15.0	10.0	12.0	13.0	13.0	16.0	15.0
50%	-	-	7.5	5.0	6.0	6.5	6.5	8.0
50%	-	-	-	7.5	5.0	6.0	6.5	6.5
			7.5	12.5	11.0	12.5	13.0	14.5

ILLUSTRATION

GSMA Limited expects sales of its airtime to amount to N800 million in January, N850 million in February and N950 million in March, 2004. Prepare an estimate of cash budget from these information for the three (3) months ended 31 March 2004 assuming the following:

(i) 10% of sales are cash sales with 5% discount

(ii) 3% discount is also given for credit sales when payment is received within 10 days, 25% of credit sales are paid within 10days.

(iii) Half of the remaining debtors paid in the month following sales.

(iv) The remainder paid two months following sale with the exception of bad debtors, who amount to 1% of total sales.

(v) The following expenses were incurred during the period:

	JAN ₦'000	FEB ₦'000	MARCH ₦'000
Salaries and wages	14,500	15,200	16,000
Printing of cards	2,300	4,200	4,500
Loan (Principal due)	80,000	185,000	220,000
Interest on loan	8,500	9,000	10,000

The following notes relate to these expenses:

- 10% of salaries are paid one month in arrears, 10% salaries and wages due as at the end of December 2003 not yet paid amounted to ₦1,200,000.
- Loan is paid as at when due while interest on loan is paid one month in arrears. Loan interest for the month of December 2003 is ₦7,900,000.
- Royalties are also paid one month in arrears. Royalties are 5% of total cash receipts and total receipts for December 2003 is ₦210,500,000.
- Administrative expenses are 5% of total sales and are paid in the month of sales.

SUGGESTED SOLUTION

GSMA LIMITED

WORKINGS	JAN ₦'000	FEB ₦'000	MARCH ₦'000
Total sales	800,000	850,000	950,000
10% cash sales	(80,000)	(85,000)	(95,000)
Credit sales	720,000	765,000	855,000
Payment within 10 days (25%)	(180,000)	(191,250)	(213,750)
	540,000	573,750	641,250
50% month following 10days	270,000	286,875	320,625
	270,000	286,875	320,625
Bad debt – 1% of sales	8,000	8,500	9,500
Payment 2 month after sales	262,000	278,375	311,125
10% cash sales without discount	80,000	85,000	95,000
Less 5% discount	4,000	4,250	4,750
	76,000	80,750	90,250
Credit sales within 10 days	180,000	191,250	213,750

Less 3% discount	5,400	5,738	6,413
	174,600	185,512	207,337
Admin expenses – 5% of sales	40,000	42,500	47,400
Salaries & wages 90%	13,050	13,680	14,400
10% arrears	1,200	1,450	1,520
Salaries & wages paid	14,250	15,130	15,920

GSMA LTD.
CASH BUDGET FOR THE PERIOD ENDED 31 MARCH 2004

RECEIPTS	JAN ₦'000	FEB ₦'000	MARCH ₦'000
Cash sales less discount	76,000	80,750	90,250
Credit sales less discount	174,600	185,512	207,337
Payment in the following month	-	270,000	286,875
Payments – 2 months after sale	-	-	262,000
Total cash receipts	250,600	536,262	846,462
PAYMENTS			
Salaries and wages	14,250	15,130	15,920
Printing of cards	2,300	4,200	4,500
Loan repayment	80,000	185,000	220,000
Interest repayment	7,900	8,500	9,000
Admin. expenses	40,000	42,500	47,500
Royalties	10,525	12,530	26,813
Total payment	154,975	267,860	323,733
Net Cash Flow	95,625	268,402	522,729
Opening Balance	-	95,625	364,027
Closing Balance	95,625	364,027	886,756

3.5 TECHNIQUES USED IN BUDGETING

3.5.1 Flexible budget

The C1MA defines a flexible budget as "a budget which is designed to change in accordance with the level of activity attained". A flexible budget recognises the existence of fixed, variable and semi-variable costs, and it is designed to change in relation to the actual volume of output or level of activity in a period. The principles underlying the flexible budget are:

(i) to prepare 'contingency plans' in advance. Flexible budgets are prepared for a range of activity rather than for a single level of activity (although the most probable activity level becomes unavoidable/desirable during the course of the year, management automatically adapts itself to the change by switching to a more appropriate flexible budget as the new budget master plan;

(ii) budgetary control. Flexible budgeting is fundamental to budgetary control. Control is not achieveable with a fixed budget. In fixed budgets control, the budgets prepared are based on one level of output, a level which has been carefully planned to equate sales and production at the most profitable rate. If the level of output actually achieved differs considerably from that budgeted, large variances will arise. Basically the idea of a flexible budget is that there shall be some standard of expenditure from varying levels of output.

The concept of flexible budget was to focus on how control could be achieved over the operations. In a flexible budget, overheads are analysed into three, namely:

(a) fixed;

(b) variable; and

(c) semi variable.

ILLUSTRATION

Sales director of Tayo Box Fabricators has become aware of the disadvantages of static budget. The director asks you as the Management Accountant to prepare a flexible budget for October 2005 for its main brand of boxes. The following data are available for the actual operation in September 2005:

Boxes produced and sold	4,500 units
Direct Materials costs	₦180,000
Direct Manufacturing Labour Costs	₦135,000
Depreciation and other fixed	
Manufacturing costs	₦101,400
Average selling price per box	₦ 140
Fixed marketing costs	₦ 62,700

Assume no stock of boxes at the beginning or end of the period. A 10% increase in the selling price is expected in October. The only variable marketing cost is a commission of N0.50k per unit paid to the manufacturer's representatives, who bear all their own costs of traveling, entertaining customers, etc. A patent royalty of N2 per box manufactured is paid to an independent design firm. Salary increases that will become effective in October are N12,000 per year for the production supervisor and N15,000 per year for Sales Manager. A 10% increase in direct materials prices is expected to become effective in October. No changes are expected in direct manufacturing labour wage rates or in the productivity of the direct manufacturing labour personnel standard

costs for any of its inputs.

You are required to:

Prepare a flexible budget for October 2005 showing budgeted amounts at each of these output levels of boxes, 4,000 units, 5,000 units and 6,000 units.

SUGGESTED SOLUTION

TAYO BOX FABRICATIONS LIMITED
FLEXIBLE BUDGET FOR THE MONTH OF OCTOBER, 2006

Activity Level	4,000 units ₦	5,000 units ₦	6,000 units ₦
Sales	616,000	770,000	924,000
Less			
Direct material cost	(176,000)	(220,000)	(264,000)
Direct labour cost	(120,000)	(150,000)	(180,000)
Marketing variable	(2,000)	(2,500)	(3,000)
Royalties	(8,000)	(10,000)	(12,000)
Variable costs	(306,000)	(382,500)	(459,000)
Contribution	310,000	387,500	465,000
Less: Fixed Costs	(266,350)	(266,350)	(266,350)
NET PROFIT	43,650	121,150	198,650

WORKINGS
STATEMENT OF COST

	SEPTEMBER ₦	**OCTOBER** ₦
Direct material cost	40.00	44.00
Direct labour cost	30.00	30.00
Marketing variable cost	0.50	0.50
Royalties	2.00	2.00
Total variable cost	72.50	76.50
Fixed Cost-Depreciation	101,400	101,400
Marketing	162,700	162,700
Increase in salary – production	-	1,000
Increase in salary – marketing	-	1,250
	264,100	266,350

Selling Price	140	154

3.5.2 Zero-based budget (ZBB) or "priority based budgeting"

ZBB is a budgeting technique which seeks to eliminate the draw backs of traditional incremental budgeting by taking the budgets for service or overhead centres back to a minimal operating level and then requiring increments above this level to be quantified and justified. 'A method of budgeting which requires each cost element to be specifically justified, as though, the budget related were being undertaken for the first time, without approval, the budget allowance is zero" CIMA

ZBB was introduced in the early 1970s in the United States by O. Phyrr. It gained prominence because of the fact that it is based on common sense. President Carter, the President of the United States, directed all US government departments to adopt this technique. ZBB is concerned with the evaluation of the costs and benefits of alternatives and, implicit in the technique, is the concept of opportunity cost. ZBB is applied in three stages

(i) The decision unit: This means subdividing the organisation to discrete sub-units where operations can be meaningfully and individually identified and evaluated.

(ii) The decision packages: Each decision unit manager submits no less than three budget packages namely (a) the lowest level of expenditure, (b) the expenditure required to maintain levels of activity. (c) the expenditure required to provide an additional level of service or activity.

(iii) Agreed packages will form the budget.

Advantages of ZBB

(i) Results in a more efficient allocation of resources to activities and departments.

(ii) It focuses attention on value for money

(iii) ZBB develops a questioning attitude which enables management to determine inefficiency.

(iv) It may lead to cost reduction.

(v) Managers performance can be monitored.

Disadvantages of ZBB

(i) ZBB is a time consuming process and generates volume of paperwork especially for the decision packages.

(ii) It requires management skill in both drawing decision packages and for the ranking process.

(iii) It encourages the wrong impression that all decisions have to be made in the budget.

(iv) Trade Union always go against ZBB, who prefer status quo to remain.

(v) Co-ordination of all activities may be difficult.

3.5.3 Activity based budgeting (ABB)

Activity based budgeting (ABB) which is also known as Activity Cost Management is defined as ` method of budgeting based on an activity framework and utilizing cost driver data in the budget-setting and variance feedback processes" (ICMA). It is a part of planning and control system which tends to support the objectives of continuous

improvement. ABB is a form of development of conventional budgeting system. It is also based on activity analysis techniques.

ABB FEATURES

(a) It recognises activities that drive costs with the aim of controlling the causes of cost directly rather than the costs themselves. It enables costs to be managed and understood in the long run.

(b) ABB differentiates and examines activities for their value adding potentials.

(c) The department activities are driven by demands and decisions which are beyond the control of the budget holder.

(d) It encourages immediate and relevant performance measures required than are found in conventional budgeting systems.

Advantages of ABB

(i) It provides stronger links between an organization's strategic objectives.

(ii) It has ability to tackle cross organisational issues through a participating approach.

(iii) It also uses activity analysis techniques which promotes continuous improvement.

3.5.4 Planning, Programming, Budgeting System (PPBS)

PPBS analyses the output of a given programme and also seeks for the alternatives to find the most effective means of reaching basic programme activities. PPBS involves the preparation of a long-term corporate plan that clearly establishes the objectives that the organization have to achieve. PPBS is the counter part of the long-term process for profit-oriented organisations.

Aims and Objectives of PPBS

(i) The aim of PPBS is to enable the management of a non-profit making organisation to make more informed decision about the allocation of resources to meet the overall objectives of the organisation.

(ii) It enables the management to identify the activities, functions or programmes to be provided thereby establishing a basis for evaluation of their worthiness,

(iii) PPBS provides information that will enable management to assess the effectiveness of its plans.

Stages In PPBS

(i) Calls for a careful specification and overall objectives are determined.

(ii) Identify programmes that will achieve these objectives and those programmes which are normally related to the major activities undertaken by government establishments.

(iii) The costs and benefits of each programme are determined, so that budget allocations can be made on the basis of the cost-benefit of the programme.

(iii) Analyses the alternatives to find the most effective means of reaching basic programme objectives.

(iv) This analytical procedure will be established as to systematically form part of budgetary control.

3.5.5 Continuous Budget/Rolling Budget

Continuous budget which is known as rolling budget is a system of budgeting that

involves continuously updating budgets by reviewing the actual results of a specific period in the budget and determining a budget for the corresponding time period. It has been described as an attempt to prepare targets and plans which are more realistic and certain by shortening the period of budget preparations. Under this method, instead of preparing a budget annually, there would be budget every three or six months so that as the current period ends, the budget is extended by an extra period; for example, if a continuous budget is prepared every three months, the first three months would be planned in great details and the nine months in lesser details, because of the greater uncertainty above the longer term future. This means that, if a first continuous budget is prepared for April to June, in details to March, in less detail a new budget will be prepared towards the end of June to cover June to September in details and October of the following year in lesser details.

Advantages

i. Management is made to be continuously aware of the budgetary process since the figures for the next 12 months are always available.

ii. It allows for more frequent assessment and revision of the budgets in the light of current trends particularly during the period of inflation, thus, the budget does not become quickly obsolete or outdated.

Disadvantages

i. Higher costs and efforts are required for continuous budgeting.

ii. It is time consuming in that, in each period, the whole procedures of preparing budgets have to be undertaken.

3.6 FORECAST

"The technique of business forecasting has been developed to give a logical and comprehensive means of providing management with information to determine the most advantageous plans which can be made within the anticipated resources of the business." (MA).Despite the uncertainty that exists about the future, business plans are prepared to resolve some of this uncertainty.

3.8.1 Distinction between forecast and budgets

A forecast states the events which are likely to occur in the future. A budget states the plans which the managers will endeavour to turn into actual events. It is a statutory executive order.

3.8.2 Forecasting procedures

There is more than one way of arriving at the sales forecasts. Probably the most satisfactory approach is to use all available methods; each result then provides a check on the others. Three possible approaches are:

(a) ***Assessments by staff of sales department:*** *Estimates* should be made by the individual salesmen and passed upwards to the sales manager. The advantage of this method is that individual salesmen can give consideration to the particular factors which are relevant in their areas.

(b) ***Mathematical analysis of past sales:*** *Such* analyses should indicate trends and seasonal variations. This information can be adjusted for known factors, such as increase advertising, to give a forecast of future sales.

(c) ***Senior management judgement:*** The senior management team, including production manager, administrative manager etc., will meet to discuss sales prospects. The approach brings a variety of skills and experience to the

forecasting exercise.

The sales budget will be determined by reference to the sales forecast. However, the budget should be prepared in the light of any constraints on the amount that can be produced.

3.9 BUDGETARY CONTROL

There is a difference between a budget and budgetary control/budgeting. A budget is just an integral part of budgetary control/budgeting. Budgetary control is defined thus: "a system of controlling costs which includes the preparation of budgets, coordinating the departments and establishing responsibilities, comparing actual performance with that budgeted and acting upon results, to achieve maximum profitability" (CIMA).

Budgetary control is also defined as 'the establishment of budgets relating the responsibilities of executive to the requirements of a policy, and the continuous comparison of actual with budgeted results either to secure by individual action the objective of that policy or to provide a basis for its revision. Certain fundamental principles can be outlined from the above definitions of budgetary control:

(a) Establish a plan or target of performance which co-ordinates all the activities of the business;

(b) Record the actual performance;

(c) Compare the actual performance with that planned;

(d) Calculate the differences or variances, and analyse the reasons for them; and

(e) Act immediately, if necessary, to remedy the situation.

3.9.1 The objectives of budgetary control

These are:

(a) To combine the ideas of all levels of management in the preparation of the budget;

(b) To co-ordinate all activities of the business;

(c) To centralize control;

(d) To decentralize responsibility of each of the manager involved;

(e) To act as a guide for management decisions, when unforeseeable conditions affect the budget;

(f) To plan and control income and expenditure so that maximum profitability is achieved;

(g) To direct capital expenditure in the most profitable direction;

(h) To ensure that sufficient working capital is available for the efficient operation of the business;

(i) To provide a yardstick against which actual results can be compared;

(h) To show management which action is needed to remedy a situation.

3.9.2 Organisation for budgetary control

These include:

(a) *The Preparation of an Organization Chart:* This defines the functional responsibilities of each member of management and ensures that he knows his position in the company and his relationship to other members.

(b) The *Budget Period* is the time to which the plan of action relates. Period

budgets cover a fixed period of time, most commonly one year. They will be divided into shorter time periods, known as: control periods, for purposes of reporting control. With a one-year period budget, control periods may be 4 weeks [13 periods each year] or one month [12 periods each year]. Long-term budgets [for example, capital expenditure budgets] may be for periods of up to five or ten years, or even longer.

(c) *Budget manual-The* organization for budgeting [and budgetary control] should be documented in a budget manual, which has been described as a "procedure or rule book which 'sets out standing instructions governing the responsibilities of persons, and the procedures, forms and records relating to the preparation and use of budgets". (CIMA)

Even though organisations are different, the content of a manual are:

(a) Description of budgetary planning and control;

(b) Goals of each level of the budgetary process;

(c) Association with long term planning;

(d) Nature of organogram depicting duties and level of budget officers;

(e) Analysis of relevant budgets and association with accounting activities;

(f) Description of principal budgets;

(g) Composition of budget committee and mode of operation;

(h) Modalities for the preparation and publication of budget;

(i) Designation and responsibility of the budget manager;

(j) Chart for codes;

(k) Design and nature of form; and

(l) Mode of operation especially where they concern procedures for accounting, preparation of reports and dead line for the submission of such reports/budgets.

(d) *Budget Committee:* The overall responsibility for budget preparation and administration should be given to a Budget Committee, normally chaired by the chief executive of the organization, with departmental heads or senior managers as members. The purpose of the committee is to:

(i) ensure the active co-operation of departmental managers, and to act as a forum in which differences of opinion can be argued out and reconciled;

(ii) ensure that managers in the organization understand what other departments are trying to do;

(iii) establish long-term plans around which the budgets should be built, and then to identify budget objectives;

(iv) review departmental budgets;

(v) during the year, examine reports showing actual performance compared with budget and expectations.

(e) *The Budget Officer: He* controls the budget administration on a day to day basis. He will be responsible to the budget committee and should ensure that its decisions are transmitted to the appropriate people and relevant data and opinions are presented for its consideration. He will normally also have the vital job of educating and selling the budget idea. Since the master budget is summarized in cost statements and financial reports the budget officer is

usually an accountant.

(f) *The Introduction of Adequate Accounting & Records: It* is imperative that the accounting system should be able to record and analyse the information required. A chart of accounts should be maintained which corresponds with the budget centres.

(g) The *General Instruction on Techniques to all concerned in Operating the System: Each* person must feel that he is capable of carrying out the budgeted programme.

(h) *Budget Centres: An* organisation's planned activities are divided into separate areas known as budget centres or cost centres. Each area selected as a budget centre must be clearly definable, and should be the natural responsibility of one particular manager [or supervisor]. A separate budget is prepared for each budget [or cost] centre. The 'budget centre budgets are known as departmental budgets. Departmental budgets are often used to build up budgets for overhead costs, that is:

(i) the production overhead budget will be compiled from separate budgets for the production departments, maintenance, production planning, quality control, etc

(ii) the administration budget will be compiled from separate budgets for personnel, finance, management services, data processing etc;

(iii) the selling and distribution budget will be the amalgamation of budgets prepared by sales office managers, marketing managers, warehouse and transport managers.

(iv) the research and development budget.

(i) *Principal Budget Factor: This* is also known as the key budgeting factor or limiting budget factor. The first task in budgeting is to identify the factors which impose limitation or ceilings on the level of activity. It is usually sales demand; but it may also be limitations on any resource-materials, labour, machine time, working capital, etc. Once this factor is defined, the rest of the budget can be prepared. It determines priorities functional budgets, for example, it may be material, labour or plant.

Management may not know in advance which is the principal budget factor. One method to identity this factor is to prepare a draft sales budget, and then consider whether any resource shortage prevents this level of sales from being met.

(j) *Level of Activity:* It will be necessary to establish the normal level of activity, that is, the level the company can reasonably be expected to achieve: quantity to produce, quantity to be sold, etc.

4.0 CONCLUSIONS

Budgeting or short term planning is the process by which the long term corporate plan is converted into action or activities. A budgetary system ensures co-ordination, assignment of responsibilities, communication, control, motivation, direction and goal congruency. This will help to avoid sub-optimality. A budgetary system must fulfill the following conditions for it to be successful: support of the top management, clear definition, full involvement of everyone at all levels, appropriate accounting system put in place and administration in a flexible manner.

5.0 SUMMARY

Every organization needs to plan and consider how to confront future potential risks and opportunities. In most organisations, this process is formalized by preparing annual budgets and monitoring performance against the budgets. Budgets are mainly a collection of plans and forecasts. They reflect the financial implications of business plans, identifying, the amount, quality and timing of resources needed.

6.0 TUTOR MARKED ASSIGNMENT

1. What is a master budget?

2. Mention three functions of a budget.

7.0 REFERNCES/FURTHER READINGS

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UNIT 6 STANDARD COSTING

CONTENTS

1.0 INTRODUCTION

In this unit, we shall look at a financial control system that enables the deviations from budget to be analyzed in detail, thus enabling costs to be controlled more effectively. This system of control is called standard costing. We shall consider how a standard costing operates and how the variances are calculated.

2.0 OBJECTIVES

At the end of this chapter, readers will be able to understand:

- The difference between standard cost and standard costing;
- The different types of standards and capacity levels;

- The standard costing techniques and the associated objectives;
- How to apply the various principles required for the computation of variances;
- The concept of standard hour and computation of the capacity, efficiency and activity ratios.
- How to apply the principles of marginal costing in standard costing.

3.0 MAIN CONTENT

3.1 A STANDARD COST

This is defined as "*the planned unit cost of the products, components or services produced in a period. The standard cost may be determined on a number of bases. The main uses of standard costs are in performance measurement control, stock valuation and in the establishment of selling prices".* (CIMA)

A standard cost, apart from being related to production costs, may also be looked at from the view point of selling and distribution costs, administration costs, etc.

A standard cost can be meaningful if based on good production systems, work methods and measurement, labour and material rate forecasts as well as peculiarities of materials required. Standard costs can be applied to both absorption and marginal costing techniques, in that:

(a) Fixed costs, under absorption costing, are determined on total basis and the machine hour or direct labour hour basis can be adopted to absorb them into the standard unit costs;

(b) The basis for determining the variable cost content of the direct materials and labour is the unit basis;

(c) Even though the variable overhead costs can be budgeted in total, they can be identified on a unit basis, thus ensuring the determination of hourly cost and unit cost.

3.2 STANDARD COSTING

This is a useful control technique based on the feedback control concept which ensures the determination of standard costs of products or services and compares them with the actual results and costs with the difference being referred to as a variance. This difference can be further explained by a process called variance analysis. The standard costing technique can be of use in a number of circumstances such as: where there is repetition of jobs and large production activities (process); service industries (hospital, merchandising) etc.

Reasons for adopting a standard costing technique

Some of the basic reasons for adopting a standard costing technique are:

(a) To encourage management and employees, since it ensures that they have to plan ahead;

(b) To serve as the basis for quoting for jobs or fixing prices;

(c) To ensure that performance improvement measures are adequately guided;

(d) To provide the basis for setting budgets;

(e) To ensure that standards are put in place and variances properly analysed in order to control costs;

(f) To provide the basis for allocating duties in order to check inefficiencies or take advantage of opportunities;

(g) To serve as basis for determining unprofitable ventures; and

(h) To ensure that stocks and work-in-progress are properly valued.

Drawbacks/Disadvantages of the technique:

The following are the disadvantages of standard costing;

(a) Lack of understanding of its application could bring about resistance from the employees.

(b) Confidence of the users may be eroded, especially where they become outdated.

(c) The technique may be very expensive to operate especially where technicalities are involved and set-up time is elongated.

(d) It may not be appropriate for business use, if standard costs are not properly determined.

3.3 SETTING OF STANDARDS

3.3.1 Types of Standards

Performance standards setting are a function of four basic standards:

(a) **Ideal Standards:** These are based on perfect operating conditions whereby there are no wastages, inefficiencies, idle-time, breakdown of machines etc. Variances relating to ideal standards are beneficial in showing aspects of the manufacturing process requiring verification, thus, bringing about some savings. Ideal standards are not necessarily of encouraging status in that staff may be of the opinion that the objectives are not achievable, therefore, resulting in less efforts being put into the work by the labour force.

(b) **Basic Standards:** These are standards which remained unaltered over a long

span of time and they may become outdated as a result of changes in technology, laws, norms etc. They can only be used to express changes in the level of efficiency or performance over a period of time as well as the trend of prices from period to period.

Nonetheless, the drawbacks are:

(i) The standard may become useless as a result of the changes in price and efficiency levels;

(ii) After the first year, the fixed overhead aspect of basic standard cost computed on annual basis from the budget, may have little or no impact.

(c) **Current Standards:** They are based on current conditions of service or production, for example, current losses, inadequacies etc. However, they do not seem to bring about a higher current level of performance.

(d) **Attainable/Expected Standards:** They are a function of normal operating circumstances, thus ensuring that some allowances are available for losses, wastages, inadequacies, etc. They make for a challenging situation for employees in as much as psychological awareness is created.

3.3.2 Capacity Levels

Since standards cannot be set on their own, it is therefore necessary for capacity levels that give meaning to standards set to be discussed 'here. The capacity levels include:

(a) **Full Capacity:** It is the "production volume expressed in standard hours that could be achieved if sales order, supplier and workforce were available for all installed work places" (CIMA). Under this circumstance, full capacity can be related to ideal standards with the assumption that labour shortages, shortfall in

supplies, equipment breakdown will not affect the smooth running of the production processes.

(b) **Practical Capacity:** This is "full capacity less an allowance for known unavoidable volume losses" (CIMA). Some examples of unavoidable losses are: repair time for equipment and plants, job resetting times, machine breakdown etc. Therefore, since full capacity is more than the practical capacity, the latter can be related to attainable standards.

(c) **Budgeted Capacity:** It is the "standard hours planned for the period, taking into account budgeted sales, suppliers and workforce availability " (CIMA). In effect, it is the labour hours and machine hours required to have the budgeted units and can be a function of current standards that are not peculiar to normal practical capacity over an extended period of time.

(d) **Idle Capacity:** This is the difference between the practical capacity and the budgeted capacity based on standard hours of output. This is the unutilized capacity that is not required, in that, the budgeted volume is less than the practical volume that could be achieved.

3.3.3 Need for Revising Standards

The unexpected change(s) in the economy as a result of change(s) in economic and socio-political situations could make for the unreasonableness of standard costs. It should be noted that the said change(s) could bring about inconsistency in the application of the standard costs which may eventually lead to a high cost of operation especially when inflation constitutes a determining factor. Therefore, in practice, the revision of standard cost should be done on a yearly basis, with the action being taken

at the beginning of every accounting year.

3.3.4 Shortcomings of Setting Standard Costs

The shortcomings that can be associated with the setting of standard costs may include:

(a) The significant influence of quantity discounts and cyclical price changes that may make it difficult to determine the prices of materials.

(b) If it is desired to have a mix of the constituents parts of materials, it may be difficult to determine the proportion of the mix of the constituent parts of the materials.

(c) It may not be easy to come up with the appropriate wage efficiency standard.

(d) The manner of introducing the issue of inflation into predetermined unit costs is also a matter of concern.

(e) Even though good materials may be expensive to obtain, the issue is how to determine the quality to be utilized per time may not be easy especially when there is the need to reduce material losses and spoilage

3.4 VARIANCE ANALYSIS

The process of further explaining the difference(s) between the actual costs or results and the predetermined costs or results is referred to as variance analysis. The various variances can be depicted in the form of a diagram in order to have an effective picture of what they look like. See figure 9.1 below:

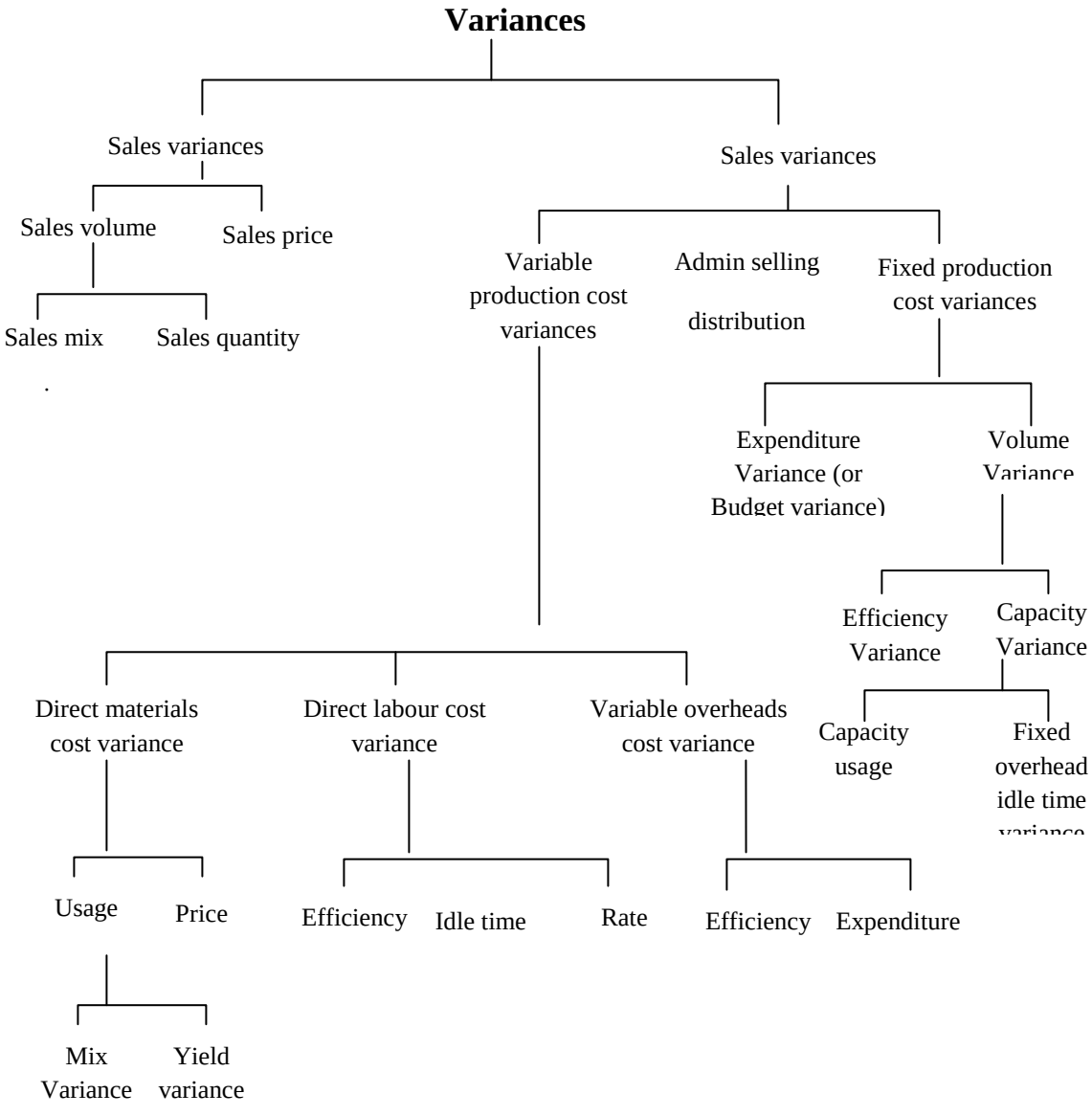


Figure 9.1: ***Summary of Variances***

3.4.1 Basic Variances

The basic variances can be categorised under four main headings:

(a) Sales volume variance.

(b) Sales price variance.

(c) Variable cost variances, that is, direct materials; direct labour and variable overheads (which can also be sub-divided into spending and efficiency variances).

(d) Fixed overhead cost variances, that is, expenditure and volume variances (which can be further categorised into efficiency and capacity variances (which can also be sub-divided into capacity usage and fixed overhead idle-time variance).

I **Sales Margin Variance** - is the difference between the predetermined margin from turnover and the actual margin derived when the cost of goods sold is based on the standard cost of manufacturing goods or products.

This can be further analysed into sales margin price variance and sales margin quantity variance with the objective of being able to control the profit from sales whereby all the products are expressed at standard production costs in order to carry out the sales margin variance analysis.

II Variable Cost Variances

Variable cost variances, in case of materials, labour or overheads, are all determined in the same manner. The total cost variance for each type of variable costs is classified as:

(a) Price, rate or expenditure variance, whereby:

(i) The actual price of a unit of raw material is different from the predetermined or standard price.

(ii) The actual rate per direct labour hour is different from the standard labour rate.

(iii) The actual rate per hour of expenditure on variable production overhead is not the same with the standard rate of spending.

(b) Efficiency or usage variance; that is,

Material usage variance:

(i) The quantity of materials put in to have the output is different from the standard or required usage.

(ii) Labour efficiency variance/variable overhead efficiency variance: The actual time of spending the output is different from the standard time allowed, with effects on both direct labour and variable production overhead costs. Direct labour efficiency variance and variable production overhead variance require the same number of hours

(iii) Labour idle time variance: This involves the actual hours for which no productive efforts were made. Thus, the direct labour costs are affected without any effect on variable overhead expenditure, since they are not incurred when idle time are being accounted for in term of the variance element.

It is important to note that price or expenditure variances are measured in money terms, for example, Naira, Cedis, etc. while efficiency variances are measured in quantities (hours, kilograms, litres etc) after which they are expressed in monetary terms at the standard cost per unit of labour, material or variable overheads.

III Fixed Cost Variance

The fixed cost variance is a function of the magnitude of fixed overhead over-absorbed in the production process. Thus:

(a) The manufacturing fixed cost volume variance is the difference

between predetermined and actual production volumes multiplied by the absorption rate in order to have the monetary values of the volume so involved.

(b) The difference between the actual and predetermined production volumes can be expressed in two ways:

(i) Since the efforts put in by the labour force will determine the degree of output, then, the fixed production overhead efficiency variance is the same as the direct labour efficiency variance.

(ii) If the actual hours involved are greater or less than the predetermined hours, thus resulting in more or less output and the predetermined hours put in represent normal capacity, then the capacity variance will be measured in standard hours and expressed in monetary terms at the standard absorption rate per hour.

3.4.2 Why Cost Variances?

3.4.2 Why Cost Variances?

Expected standards of performance are set for a firm's operations taking into account wastage and lost time. The standards try to be realistic by setting levels of attainable performance which do not necessarily correspond with current levels of performance, if management considers that any particular operation for which standards are set is not meeting its capability.

Variances show those situations where actual results are not as budgeted. They depict the difference between standard and actual for each element of cost and sometimes for sales. If actual operations outweigh the planned, a favourable variance is arrived at, (F) and where the reverse is the case, an adverse variance arises (A).

Computation of Variances

Variances may be computed as follows:

(a) Material cost variances

The material cost variance shows the difference between the actual costs incurred and the standard costs. It is calculated as Standard cost less actual cost, that is, (SC - AC).

These variances can be sub-analysed into price and usage variances so that the variance is attributed to the manager who has the responsibility for controlling it. Usage Variance can further be analysed into mix and yield. The standard cost is determined by multiplying the standard specified actual quantity of output by the standard cost per unit of output. Mathematically represented thus; (SQxSP) – (AQxAP)

(i) Material price variance

This is derived by multiplying the difference between the standard price and actual price by the actual quantity of materials purchased. It is calculated as: Actual Quantity (Standard Price – Actual Price).This variance may occur because of:

- Material price changes.
- Reduction in supply of materials.
- Ineffective purchasing policy.
- Non-availability of storage space.
- Insufficient funds.
- Purchasing mistakes.
- Reversal of specification standards.

(ii) Material usage variance

This is determined by multiplying the difference between the standard quantity and the actual quantity by the standard price of quantity used. The standard quantity is expressed as a function of the actual quantity produced at the standard specifications. It is calculated as SP (Standard Quantity – Actual Quantity)

The material usage variance can be sub-divided into mix and yield variances:

•**Material Mix Variance —** This can be computed by multiplying the difference between the standard specification of the material input and the actual mix used by the standard price. That is, SP (SM — AM).

•**Material Yield Variance** — This can be expressed as the difference between the standard yield and the actual yield from the materials used in production. That is, SC (AQSM - SQSM) or SP (SY-AY)

(b) **Wage Cost Variance**

Wage cost variance is the difference between the standard wage cost of actual output and the labour cost paid for. It is commonly separated into wage rate variance, an idle time variance and efficiency variance.

Standard cost is the actual quantities produced at standard hours specified multiplied by standard rate per hour. It is calculated as the difference between standard cost and actual cost, that is, SC — AC or (Standard Hour x Standard Rate) - (Actual Hour x Actual Rate)

•**Wage Rate Variance —**

This is the difference between the standard wage rate and the wage rate actually paid, multiplied by the actual hours worked, that is, Actual Hours (Standard Rate – Actual Rate).

The foreman is to ensure that the machines are operated by the employees with the requisite skills as the wage negotiation is a national policy and not that of an individual.

•**Wage Usage Variance**

This is as a result of the difference between standard labour hours of actual output and the labour hours actually paid for multiplied by the standard rate per hour, that is, SR (SH - AH). The wage usage variance can be sub-divided into an idle time and efficiency variance.

Standard hour (51-1) is the actual quantity of output based on specific standard hour.

•**Idle Time Variance** — This is the difference resulting from hours lost through unexpected situations, such as machine breakdown, lack of materials or tools, etc. (unexpected idle time multiplied by standard hour).
•**Efficiency Variance** – This is the variance resulting from the difference between the standard labour hours of actual output and the useful labour hours actually worked. This is represented by Standard Labour Cost of Actual output and standard cost of useful hours worked multiplied by the standard rate of pay; that is, SR (SH – AUH). Therefore, hours paid for less idle time equals Actual Useful Hours (AUH).

(c) **Variable Overhead Variance**

Variable overhead can be absorbed into production on the basis of units of output produced or standard hours used in production. Where standard hours are adopted as the strength for determining the level of activity, the variable overhead absorption rate can be computed as:

$$\text{OAR} = \frac{\text{Predetermined Variable Overhead}}{\text{Predetermined Standard Hours}}$$

Where the OAR = Overhead Absorption Rate

Therefore, the difference between the variable overhead absorbed for actual production and the actual variable overhead expenditure is termed the *total variable overhead variance.*

The variable overhead variance can be sub-divided into expenditure variance and efficiency variance.

•**Expenditure Variance:** This is as a result of the difference between actual cost and standard cost for the actual level of activity. It is to be taken that where the determination of level of activity is a function of the actual activity labour hours, the actual activity is the number of labour hours for which the work was performed. It is calculated as the difference between standard rate and actual rate multiplied by the actual hour.

•**Efficiency Variance:** This is as a result of the difference in the labour hours worked and the standard hours equivalent of actual production, multiplied by the standard cost or rate. It is expected that the activity level will be measured in labour hours for the purpose of determining the variable overhead absorption rate. Its formula is SR (SH - AH).

(d) Fixed Overhead Variance

Fixed Overhead cost is a cost that will not change within a giver level of activity, but overhead absorption rate per unit will be charged to products, Nonetheless, it is normal to compute a budgeted fixed overhead absorption rate whenever product cost and valuation of stock are required.

Fixed Overhead Absorption Rate (FOAR)

$$= \frac{\text{Predetermined Fixed Overhead}}{\text{Predetermined Standard Hours}}$$

Therefore, the difference between the fixed overhead absorbed by the actual production and the actual fixed overhead for the period is referred to as *total fired overhead variance.* Its formula is given as (SC - AC).

(i) Fixed Overhead Expenditure Variance - This is the difference between the actual and predetermined cost of overhead. The degree of spending on the fixed overhead is not affected by the volume of activity. Therefore, the difference between the standard overhead stated in the budget and the actual overhead incurred is referred to as expenditure variance. Budgeted Fixed Overhead (BFO) is the budgeted quantities at standard hours specified multiplied by standard rate per hour. Its formula is BFO - AFO.

(ii) Fixed Overhead Volume Variance — This is the difference between the standard fixed overhead elements of actual output and the standard fixed overhead in the budget. Its formulae is given as SR (BR - SH).

The fixed overhead volume variance can be further analysed into efficiency and capacity variances.

- **Efficiency Variance** - This is the difference in the standard efficiency and the efficiency actually attained. Its formulae is SR (SH - AUH) (Standard hours - Useful hours) x Standard Absorption Rate (SH - Actual Hours worked (AH)).

- Capacity Variance - This is the difference in the budgeted activity and the level of activity actually attained. That is, Standard Rate (Budgeted Hours - Actual Useful Hours).

(e) Sales Variance

A sales variance is used to give effect to the difference between budgeted sales and actual sales and can be further sub-divided into a sales price variance and sales volume variance.

These variances may be related to sales profit or sales contribution, with the assertion that those related to profit or contribution ensure the provision of effective information.

(i) **Sales Price Variance** - This variance is used to determine the effect of selling output above or below the predetermined selling price. Its formulae is: AQ (SSP - ASP).

(i) **Sales Volume Variances** - This variance is used to determine the effect on profit or contribution on selling more or less than the predetermined quantity. Its formulae is SP (BQ - A QS), where, BQ = budgeted quantity and AQS = actual quantity sold.

Where the valuation of the variance is based on the standard profit per unit, it shows the difference between budgeted standard profit and the standard profit earned on actual sales. On the other hand, if it is at standard selling price, it shows the difference between budgeted sales revenue and actual sales at a standard price.

Where the standard marginal costing is used, all final products are valued at a standard marginal cost, therefore, ensuring that all fixed overheads are treated as period costs against the contribution made in the budgeted period, thus making it impossible to absorb them into product costs.

The variances under the standard marginal costing approach are the same as those of the budgetary control where the standard costs are not existence:

(a) Since fixed overheads are not absorbed into product cost, then, there exists fixed overhead expenditure variance and no fixed volume variance.

(b) Sales volume variance can be computed, thus: volume variance in units multiplied by standard contribution per unit.

ILLUSTRATION

Dapo Ltd produces thatched roofs for houses. The budget for 2006 was as follows:

	₦	₦
Number of houses to be thatched		140 roofs
Revenue		6,000
Standard cost per roof:		
Direct materials:		
Thatch: 2 tons @ ₦400 per ton	1,800	
Other materials	1,300	
Direct labour 300 hours @₦5	1,500	
Variable production overhead		
300 hours @₦1.0	1,300	
Fixed production overhead:		
300 hours @₦7.0	2,100	
Standard cost		5,000
Standard profit.		1,000

Note:

(a) The budgeted fixed production overhead was ₦147,000, from which the standard absorption rate of $\frac{294,000}{(140 \times 300 \text{ hours})}$ = ₦7.00 per standard hour was derived

(b) Since one thatched roof equals 300 standard hours = ₦2,100.

(c) There is additional budgeted overhead for selling and administration of ₦30,000. This expenditure is regarded as a fixed cost.

Actual results in 2006 were as follows

Number of roofs thatched		150 roofs
Revenue (Selling price per roof 5,760)		₦864,000
Thatch:		
Purchase	360 tons, cost	₦133,200
Used	340 tons	
Other direct material, cost		1₦48,000
Direct labour:		N152,000 hours
Hours worked (active time)		N144,000 hours
Hours of idle time		N118,000 hours
Cost of hours paid for		₦288,000
Variable production overhead		1₦46,000
Fixed production overhead		₦304,000
Sales and administration overhead		1₦32,000

Required:

(a) Prepare an operating statement reconciling the budgeted profit with the actual profit. All closing stock are valued at standard cost.

(b) An explanation of the possible interdependence between variances.

SUGGESTED SOLUTION

DAPO LTD

(a) The budgeted profit, before deducting sales and administration costs was (140 x ₦1,000) = ₦140,000.

(b) The calculation of actual profit begins with:

	₦
Actual Sales	864,000
Less: Actual standard production	
Cost of sales (150 x ₦5,000)	750,000
Unadjusted profit	114,000

(c) From this unadjusted profit, adjustments are made for cost variances. All cost variances reported are written as an adjustment to the profit and loss account at the end of the accounting period.

Direct Materials

(i) *Direct material price variance*

This variance measures the actual purchase price for materials against the expected price:

	₦
360 tons of Thatch purchased should cost (360 x ₦400)	114,000
but did cost	133,200
Material price variance	110,800(F)

(ii) *Direct material usage variance*

This variance measures the efficiency in the usage or consumption of a material. Because it is a measure of efficiency (i.e. quantity) it must be measured in quantities –i.e. tons-and then valued in money terms by applying the standard cost per unit (ton) of material.

150 roots were made and should be use (x2)	N300 tons of thatch
they did use	N340 tons
material usage variance – (Thatch)	1N40 tons (A)
Valued at standard price	₦400 per ton
That is,	₦16,000(A)

Other Direct Materials Variance

Since we are not given the quantity of other materials per roof, nor the purchase price per unit of these other materials, the only variance we can calculate is the materials cost variance.

	₦
Actual cost of 150 roofs (other materials)	48,000
Standard (expected) cost of 150 roofs (x ₦300)	45,000

Other direct materials cost variance	43,000(A)

Direct Labour Variances

(a) The total cost variance for direct labour is:

	₦
Actual labour cost of 150 roofs	288,000
Standard labour cost of 150 roofs (x ₦1,500)	225,000
Direct labour cost variance	163,000(A)

This variance need not be calculated, because we can analyse it in greater depth as the sum of the rate, idle time and efficiency variances.

(b) *Direct labour rate variance* – This is the same type of variance as the materials price variance. It measures the actual price or rate paid per hour for labour against the actual rate per hour.

	₦
52,000 hours were paid for and cost	288,000
They should cost (x ₦5 per hour x 52,000)	260,000
Direct labour rate variance	128,000(A)

(c) *Idle time variance* – This is an inefficiency variance which is recorded in hours. It is valued in naira by applying the standard per hour; i.e.

8,000 hours (A) x ₦5 per hour = ₦40,000(A)

(d) *Direct Labour efficiency variance* – This variance measures the efficiency (or inefficiency) of labour. Since idle time is measured separately, we are concerned with efficiency in active hours worked. It is calculated in the same

way as the materials which is costed in N by applying the standard rate per hour.

150 roofs were made and should take (x 300)	45,000 hours
They did take (active hours)	44,000 hours
Direct labour efficiency variances	11,000hours(F)
Valued at standard rate	₦5 per hour
i.e.	₦5,000 (F)

(e) Summary

		₦
Rate variance	(b)	28,000(A)
Idle time variance	(c)	40,000(A)
Efficiency variance	(d)	15,000(F)
Total labour cost variance	(a)	63,000(A)

Variable Production overhead

(a) The total cost variance for variable production overhead is:

	₦
Actual cost of 150 roofs	46,000
Standard (expected) cost of 150 roofs (x N300)	45,000
Variable production overhead cost variance	11,000(A)

(b) It is usually assumed that variable overheads are incurred during **Active Working Hours**, but are not incurred during idle time. This means that the

company, in our example, has had to pay for 44,000 hours of variable overhead expenditure, and not 52,000 hours.

(c) Variable production Overhead Expenditure variance – following on from (b) the expenditure variance may now be calculated in the same way as the materials price and labour rate variances.

44,000 hours of variable overhead expenditure	₦
should cost (₦1.00)	44,000
they cost	46,000
Variable overhead expenditure variance	42,000(A)

In other words, during 44,000 active hours of work, the expected spending at the standard hourly rate would be ₦44,000. The actual hourly rate was in excess of this and the total excess amounted to ₦2,000.

(d) Variable Production Overhead Efficiency Variance – This is exactly the same, in hours, as the direct efficiency variance. This is 1,000 hours (F) and is valued in ₦1 at the standard rate per hour for variable overhead (₦1.00).

1,000 hours (F) x ₦1.00 per hour

Variable production overhead efficiency variance = ₦250(F)

(e) Summary

		₦
Expenditure variance	(c)	2,000(A)
Efficiency variance	(d)	1,000(F)
Total variable production overhead cost variance	(a)	1,000(A)

Fixed Production overheads

(a) In standard absorption costing, fixed overheads are absorbed into production costs at a standard cost per unit. For each roof that is thatched, a standard cost of ₦2,100 (300 standard hours of production) is applied to the cost of production.

(b) The standard cost of 150 roofs is therefore is 150 x ₦2,100 = ₦315,000. The actual cost of fixed production overhead was ₦304,000

	₦
Absorbed (Standard) fixed overhead	315,000
Actual fixed overhead	304,000
	11,000(F)

This over-absorbed overhead is the fixed production overhead total cost variance.

(c) Fixed production overhead expenditure variance:

	₦
Budgeted expenditure	294,000
Actual expenditure	304,000
Fixed production overhead volume variance	10,000(A)

(d) Fixed production overhead volume variance;

Budgeted production volume	140 roofs
Actual production volume	150 roofs
Volume variance	110roofs(F)
X Absorption rate (=standard rate)	₦2,100 per roof
	₦21,000 (F)

(e) Fixed production overhead efficiency variance – This is exactly the same as the labour efficiency variance (in hours) but is valued at the standard fixed overhead absorption rate per hour

Efficiency variance	1,000 hours(F)
Absorption rate per hour	₦7.00per hour
Fixed production overhead efficiency variance	₦7,000(F)

(f) Fixed production overhead capacity variance

	Hours
Budgeted hours of work (140 roofs x 300 hours)	42,000
Actual hours of work (active hour only)	44,000
Capacity variance	22,000hours(F)

2,000 hours more work was done than budgeted. The expected over-absorption of overhead as a result of this capacity variance = 2,000hours (F) x ₦7.00 per hour = ₦14,000 (F)

(g) Summary

	₦
Capacity variance (g)	14,000(F)
Efficiency variance (f)	17,000(F)
Volume variance (d)	21,000(F)
Expenditure variance (c) 10,000(A)	
Total fixed production overhead variance (b)	11,000(F)

Sales variance

(a) Sales Price Variance

	₦
150 thatched roofs should sell for x N6,000	900,000

They did sell for	864,000
Sales price variance	36,000(A)

(b) Sales Volume Variance

(i) In standard absorption costing, fixed overhead costs increase with output, and the standard cost of sales increases by the full standard cost for each extra unit sold. The sales volume (margin) variance is calculated by applying the Standard Profit per unit and not the contribution per unit.

(ii) Standard profit used because a fixed production overhead volume variance is calculated. This is a further difference, therefore, from the calculation of variances in other types of budgetary control.

- if a fixed production overhead volume variance is calculated, the sales volume variance is based on standard profit.
- where a fixed production overhead volume variance is calculated, the sales volume variance is based on standard contribution.

(iii) In our example:

Budgeted sales volume	140 roofs
Actual sales volume	150 roofs
Sales volume variances	110roofs(F)
X Standard profit per unit	Nx 1,000
Sales volume (margin) variance	₦10,000(F)

Sales and administration overheads are not absorbed into standard units costs. They are fixed costs, and the only variance is an expenditure variances.

	₦
Budgeted expenditure	30,000
Actual expenditure	32,000
Expenditure variance	12,000 (A)

Reconciliation of Operating Statement for 2006

	₦	₦	
Budgeted profit, before sales and admin. O/H(140 roofs x N1,000)			140,000
Overhead			
Sales variance			
Sales price	36,000 (A)		
Sales volume	10,000 (F)	26,000(A)	
Actual sales minus standard production			
Costs of sales			114,000
Cost variance	(F)	(A)	
Direct materials:			
Thatch price	10,800		
Thatch usage		16,000	
Other materials cost		13,000	
Direct labour:			
Rate		28,000	
Idle time		40,000	
Efficiency	5,000		

Variable Production overheads:			
Expenditure		12,000	
Efficiency	1,000		
Fixed production overheads:		10,000	
Expenditure	7,000		
Efficiency	14,000	99,999	
Capacity	37,800	99,0001	61,200(A)
			52,800
Less: increase in closing stock (20 x ₦400)			8,000
Actual profit before sales and admin overhead			44,800
Costs:			
Budgeted sales & admin costs	30,000		
Expenditure variance (30,000 – 32,000)	12,000		
			(32,000)
Actual profit			(12,800

Confirmation of Actual Result:	₦	₦
Revenue		864,000
Less Costs:		
Thatch	133,200	
Other materials	148,000	
Labour	288,000	
Variable production overhead	146,000	
Fixed production overhead	304,000	(819,200
		(144,800

Sales and admin. Overhead		1(32,000)
	b	112,800

3.4.3 Interdependence between variances

Interdependence between variances is a term adopted to describe the way in which the reason for one variance may be wholly or partly stated by the reason for another variance. In the example above:

(a) the material price variance for thatch was ₦10,800(F) and the usage variance ₦16,000(A). It is possible that by buying a cheaper type of thatch (and earning a favourable purchasing variance) the purchasing manager has obtained lower quality materials, which explains the adverse usage in production;

(b) the sales volume variance is favourable (by roofs), but in order to obtain the extra business, the selling price per roof may have been reduced. The favourable sales volume variance and the adverse sales price variance may, therefore be, to a certain extent, interdependent;

(c) the favourable efficiency variances (labour, variable and fixed production costs) may be the result of using more highly skilled labour which is paid higher rate per hour. The favourable efficiency variances and the adverse labour rate variance may be interdependent.

3.4.4 Cost Accounting Entries

Variances are written to a variance account. There may be separate variance accounts for materials price, materials usage, labour rate etc. or there may be one single account for all the variances.

You should check the following T accounts, carefully, but the basic principles are:

(a) material price variance is usually recorded in the stores account;

(b) labour rate variance is usually recorded in the wages account;

(c) material usage, labour efficiency and the idle time variances are recorded in the work in progress (WIP) account;

(d) the cost ledger control account, in a system where cost accounts and financial accounts are not integrated, represents all those items which appear in the financial accounts but which are excluded from the cost accounts (e.g. debtors, creditors, cash, reserves etc.)

SUGGESTED SOLUTION 9-2

(a) **Cost Ledger Control Account (CLC)**

	₦		₦
Sales account	95,600	Stores account	9,800
		Direct wages account	16,800
		Variable production Overhead account	2,600
		Fixed production o'hd a/c	42,300
		Sales admin. costs a/c	18,000
	0,0000	P & L a/c (profit)	6,100
	95,600		95,600

(b) **Stores Ledger Control Account**

	₦		₦
Purchases (CLC)	9,800	WIP (2,300kg x ₦4)	9,200
		Material Price variance	
	0000,	(Variance a/c)	9,600
	9,800		9,800

(c) **Direct Wages Control Account**

	₦		₦
CLC	16,800	WIP (8,500hrs x ₦2)	17,000

Rate variance (variance a/c)	09,200		09,600
	17,000		17,000

(d) **Variable Production Overhead Control A/C**

	₦		₦
CLC	2,600	WIP (8,000 hrs @ ₦0.3)	2,400
	0000,	Expenditure	9,200
	2,600		2,600

(e) **Fixed Production Overhead Control Account**

	₦		₦
CLC	42,300	WIP(8,000hrs at ₦3.70)	29,600
		Expenditure variance	4,560
	02000,	Capacity variance	88,140
	42,300		42,300

(f) **Sales And Administration Costs Account**

	₦		₦
CLC	18,300	Cost of sales a/c	18,000

(g) **Work in Progress Control Account**

	₦		₦
Stores account	9,200	Finished goods account (4,850 x ₦14)	67,900
Direct wages account	17,000	Idle time variance	1,000
Variable production overhead a/c	2,400		
Fixed production overhead a/c	29,600		
Labour efficiency variance	3,400		
Material usage variance	500		
Variable o'hd efficiency variance	510		
Fixed o'hd efficiency variance	16,290		95,60
	68,900		68,900

(h) **Finished Goods Control Account**

	₦		₦
WIP a/c	67,900	Cost of sales a/c	67,900

(i) **Cost of Sales Control Account**

	₦		₦
Finished goods a/c	67,900	P & L a/c	85,900
Sales and admin	18,000		18,000
	85,900		85,900

(j) **Sales Account**

	₦		₦
P & L Account	95,600	CLC	95,600

(k) **Variances Account**

	₦		₦
Stores a/c (Material price)	600	Direct wages (rate)	200
Variable overhead expenditure	200	Variable overhead efficiency (WIP)	510
Fixed overhead expenditure	4,560	Fixed overhead efficiency (WIP)	6,290
Fixed overhead capacity	8,140	Labour efficiency (WIP)	3,400
Idle time (WIP a/c)	1,000	Material usage (WIP)	500
	0000,0	P & L a/c	13,600
	14,500		14,500

(l) **Profit and Loss Account**

	₦		₦
Cost of sales account	85,900	Sales account	95,600
Variance account	3,600		
Profit (CLC)	96,100		09,600
	95,600		95,600

Note: That sales are recorded at the actual amount invoiced and that there are no sales variances at all in the accounts.

3.5 ADVANCED VARIANCES

3.5.1 Material Variances – Mix and Yield

In Section 3.4.1 of this unit, the basic material variances were explained. In some situations, it may be necessary to further analyse the materials usage variances into direct material mix variance and direct material yield variance. This may be possible in situations where the manufacturing process require a mix of various material inputs in order to achieve the expected output such as: production of paints, textiles, roofing sheets etc. As in a normal process, losses could be caused by pilferage, machine break downs, power failure, evaporation etc.

There are basically two approaches to analysing material usage variance into mix and yield variances. The first is the individual price method under which individual standard prices are adopted for the components and the second is that which involves the usage of weighted average price for all components.

3.5.2 Individual Price Method – (Direct materials mix variance)

This refers to a subset of the direct usage variance, applicable when materials are applied in a standard proportion showing the effect on cost of variations from the standard proportions." (CIMA)

Direct Material yield variance

"A subset of the direct materials usage variance applicable when materials are combined in standard proportion." (CIMA)

Mix and yield formulae (individual price method)

	Budgeted Cost		**Budgeted Cost**
Direct Materials	= of the actual quantity	minus	of the actual quantity of
Mixture Variance	of the actual mixture		the Budgeted mixture

	Budgeted Cost		**Budgeted Cost**
Direct Materials	= of the actual quantity	minus	of the Budgeted
	of the Budgeted		Quantity of the
	Mixture		Budgeted Mixture

Notes:

(a) The mix and yield variances use only budgeted prices.

(b) The change of expressions from actual to budgeted values

(c) The yield variance measures abnormal process losses or gains

3.5.3 Weighted Average Price Method (Alternative Method)

Direct materials mix variance is "the difference between standard quantity of inputs for the output achieved and the actual quantity used priced at the difference between individual standard prices and weighted average standard price." (CIMA). Direct materials yield variance is the difference between the standard quantity of inputs for the output achieved and the actual quantity used priced at the weighted average standard price.

3.5.4 Sales Margin Variances

Apart from the cost variance analysis carried out from control reasons, other factors required for the realisation of planned profit is the effect of the sales margin whether as profit margin in the case of absorption costing or the contribution margin where the marginal costing technique is applied. Under this circumstance, all products are valued at the standard factory cost in order to give effect to sales margin variance analysis. Therefore, the standard sales margin is actually the difference the budgeted selling price of a product and the related standard cost which could also be referred to as the budgeted profit for a product.

Total Sales margin variance

This is the difference between the standard margin from sales and the actual margin when the cost of sales is treated at the standard cost of production. This can be sub-analysed into the sales margin price and quantity variances.

Sales margin price variance

This is the difference between the standard margin per unity and the actual margin per unit for the quantity of units on sales in the period (CIMA).

Sales margin quantity variance

"The difference between the actual total number of units at the actual mix and the actual total number of units at standard mix valued at the standard margin per unit." (CIMA)

Sales margin volume variance

"That portion of the sales margin quantity variance which is the difference between the actual total quantity of units sold and the budgeted total number of units at the standard mix valued at the standard margin per unit." (CIMA)

ILLUSTRATION

Ijaodola Ltd. produces and sells three product brands of lime. In a period, the budgeted and actual results were as follows:

Budget

Products	Volume	Unit	Margin		Total	Total
Units	price		sales		margin	
		(₦)	(₦)		(₦)	(₦)
Small Jar	500	20	1 8		10,000	4,000
Medium Jar	250	30	12	1	7,500	3,000
Large Jar	150	50	20	1	2,500	1,000
	800				20,000	8,000

Actual

Products	Volume	Unit	Margin	Total	Total
Units	price		sales	margin	
		(₦)	(₦)	(₦)	(₦)
Small Jar	430	18	16	17,740	2,580
Medium Jar	230	34	15	17,820	3,450
Large Jar	140	48	18	11,9201,	720
	700			17,480	6,750

Required: Determine the following variances:

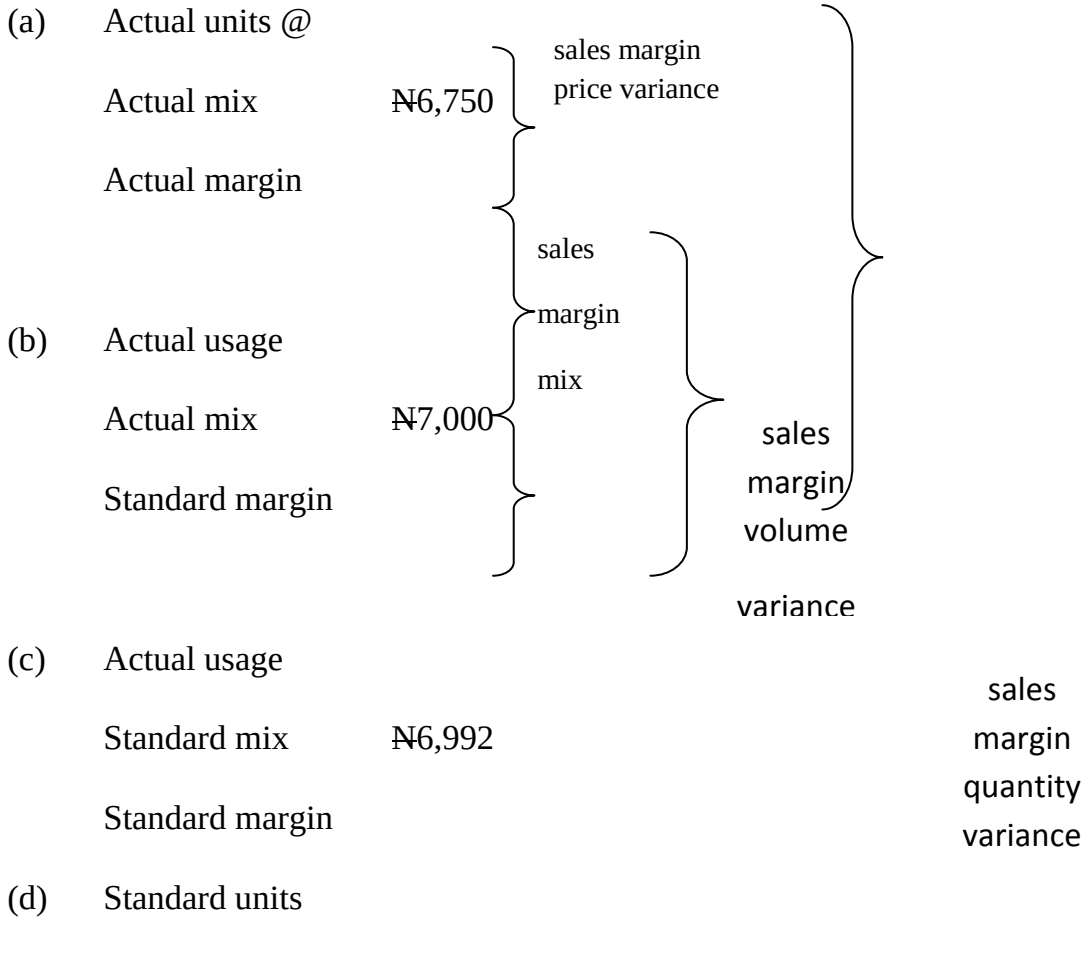
(a) Sales price

(b) Sales margin mix

(c) Sales margin volume

(d) Sales margin quantity variance

SUGGESTED SOLUTION 9-3



Note:

(a) This is as given in the question ₦6.750.

(b) It is the actual units in the actual proportions but at the standard margin, that is, ₦(430 x 8) + (230 x 12) + (40 x 20) = ₦7,000.

(c) It is the actual number of units sold (700) but as the standard proportions (62.5%, 31.25%, 0.0625%).

(d) This is as given in the question ₦8,000.

The sales margin variance is derived by comparing the standard state with the actual state, that is, ₦6,750 – ₦8,000 = ₦1,250A

3.6 STANDARD MARGINAL COST

It is noteworthy to state that the total absorption costing principles form the basis on which standard costing systems operate. However, the marginal costing principles can also be introduced into standard costing operations, hence being referred to as standard marginal costing. It can also be recalled that marginal costing operates on the contribution approach, whereby costs are separated into variable and fixed costs and the latter are not part of product costs but are treated as period costs. The standard marginal costing technique adopts the following principles and characteristics:

- Standards are evolved in the usual manner on standard cost card, without the inclusion of the fixed costs. The direct materials, direct labour, direct expenses and variable overheads are recorded on it.
- The standard selling price is determined by adding the budgeted contribution for every product to the budgeted marginal cost. Therefore, the budgeted sales margin is the budgeted contribution.

- The budgeted sales levels and fixed overhead cost can be used to come up with the budgeted profit statement for the subsequent operating period. The format would appear as below.

Budgeted Profit Statement for the Period ended

	₦
Budgeted sales	(XXX
(Budgeted no of units x budgeted selling price)	
Less: Budgeted cost of goods sold	(XXX)
(Budgeted no. of units x budgeted marginal cost per unit)	
= Budgeted Contribution	(XXX
Less Budgeted fixed costs	(XXX
Budgeted profit	(XXX

With the non-inclusion of the fixed overhead volume variance and the sub-analysed variances (the capacity and efficiency variances), the analysis of variances becomes easier

3.7 OPPORTUNITY COST APPROACH TO VARIANCES

These variances conform to the terminology of the Chartered Institute of Management Accountants. It is not uncommon in practice for additional 'special' variances to be included within a reporting system, to reflect the unique characteristics of a company's operations, that is, a flour or sugar manufacturer might include an item in his standard costs for losses due to damaged or broken packs. Nevertheless, most variance reporting systems conform on the whole to the conventional type. A school of theorists, however, has suggested a different approach to the calculation of variances. The leading proponent of this school is Professor Joel Demski.

Demski (1977) argues that existing internal accounting techniques of flexible budgeting and variance analysis are thought to be general purpose in nature, because of their emphasis on comparison between actual and planned results'. Analysis of differences between actual and planned results, leads to the taking of remedial action as well as learning. Unfortunately, the price of this generality is an accounting model that merely monitors performance relative to the original plan, except as signalled by implication or use of an adjusted budget. Put another way, because of its emphasis on comparison between actual and planned results, and consequent disregard of changes in these planned results, the traditional accounting model does not act as an opportunity cost system.

3.7.1 Opportunity Cost Approach

An opportunity cost approach 'compares what a firm actually accomplished during some planning period with what it deems on the basis of hindsight, it should have accomplished. It is an opportunity cost approach in the sense that what a firm actually accomplished during some planning period is what it should have accomplished in the ex-post optimum programme'. Demski therefore argues that in order to provide control information which guides managers towards better control decisions, it is necessary to show what realistically could have been achieved during a period, rather than what the possibly-out of-date budget plan intended to be achieved. 'Instead of comparing actual results with ex ante standard results, this system compares actual results with revised optimum results.

‘This implies that the proper standard to be used in supplying variance information is a standard based on actual conditions; that is ‘those that would have been incorporated in the original plan if the actual conditions had been known in advance.’ We shall call this an ex-post (currently attainable) standard.’ The opportunity cost approach considers:

(a) actual results;

(b) budgeted results; and

(c) ‘ex-post’ optimum results. Traditional variance analysis does not to do this.

9.7.2 Marginal Costing and Opportunity Costs

You may have noticed that in the previous examples, marginal costing variances were calculated, that is, sales volume variances were valued at contributed foregone and there are no fixed cost volume variances. This is because contribution foregone, in terms of lost revenue or extra expenditure incurred, is the nearest equivalent to opportunity cost which is readily available to management accountants (who assume linearity of costs and revenues within a relevant range of activity).

3.7.3 The Opportunity Cost of Capacity Variances

Horngren (1990) suggested that a ‘contribution foregone’ approach to reporting capacity variances would be preferable to the traditional absorption costing capacity variance.

ILLUSTRATION

The Master budget of Jones Ltd for 1988 is to make and sell 100 units of its product each month, at a contribution of ₦50 per unit. However, at the beginning of May, the scheduled production for the month was reduced to 95 units because of difficulties in

making sales to customers. Each unit takes 4 hours to make, and actual production and sales in May amounted to 90 units in 360 hours of work. Calculate the opportunity cost of the capacity variances.

SUGGESTED SOLUTION

(a) Scheduled production for May in the Master Budget 400 hours
Schedule production at the beginning of the month 380 hours
Marketing capacity variance 20hours(A)

At ₦50 per unit (₦12.5 per hour), the contribution foregone is ₦250 by the failure of the sales department to achieve the expected sales.

(b) Similarly;

Scheduled production at the beginning of the month 380 hours

Actual hours worked	360 hours
Production capacity	20hours (A)

The contribution foregone is ₦250 by the failure of the production department to meet its output targets.

(c)

	₦	₦
Budgeted Contribution		5,000
Opportunity cost of		
Marketing Capacity variance	250 (A)	
Production Capacity variance	250 (A)	1,500
Actual Contribution (90 units x ₦50)		4,500

3.7.4 The Opportunity Cost of Efficiency Variances

The same argument might be applied to efficiency variances. If inefficiency, by restricting output below what it should have been, also results in lost sales, the cost of inefficiency will include the contribution foregone by losing the sales.

ILLUSTRATION

Ayo Wale Ltd budgets to make and sell 200 units of its product during a period.

Unit costs are as follows:

	₦	₦
Sales		18
Direct materials	16	
Direct labour (5 hours per unit)	10	16
Contribution		12

During the period, the production department works for 1,000 hours and produced 175 units. The actual contribution was

	₦	₦
Sales (175 units at ₦18)		3,150
Direct Materials	1,000	
Direct Labour	2,000	3,000
Actual Contribution		1,150

Analyse the variance from an opportunity cost approach

SUGGESTED SOLUTION

175 units should take (x 5 hours)	1,875 hours
but did take	1,000
Efficiency variance	1,125 hours (A)
x₦2 per hour	₦250 (A)

Inefficiency of 125 hours (A) has also cost the company lost production and sales of 25 units, and the contribution foregone from these sales at ₦2 per unit is ₦50 (A).

	₦	₦
Budgeted Contribution		400
Efficiency Variance		
Labour costs	250 (A)	
Lost sales volume	150 (A)	
	300 (A)	
Material cost variance	150 (F)	250 (A)

Actual contribution 150

3.8 PLANNING AND OPERATIONAL VARIANCES

Traditional variances imply that actual performance is always at fault, as a result of the method of analysing variances between operational and planning factors that cause failure to achieve budgeted profit in that faulty standards could be identified separately. Planning and operational variances provide additional relevant information as they separate the variances into components which are the result of good planning and operation.

When planning, variances may not be separated, some elements which are uncontrollable may work against the planning system. It must however be remembered that the Planning and Operational approach does not make the traditional approach absolute, but rather make the information of things more relevant especially in controlling the operation of the organization. The main difficulty in this approach is the ability of the management to separate the total variances into their planning as well as operational sources, hence most organisations are slow in modifying their system in this direction.

3.8.1 Calculation of Planning and Operational Variances

In calculating planning and operational variances, we have to understand the following terms:

(a) **Ex-Ante:** this is the first target set.

(b) **Ex-Post:** this is the later situation during the year or immediately which were not foreseen during the first target (Budget);

(c) **Actual Result:** this is actual result at the end of the period.

Planning Variances = Ex-Ante – Ex-Post

Operational Variances = Ex-Post – Actual Result

Planning variances are those variances which are not within the control of management (Uncontrollable).

Operational variances are variances which are controllable by the management. Planning variances may be due to the following:

(a) New government policy on importation

(b) New government policy on taxation

(c) Inflation

ILLUSTRATION

In January 2004, Jaye Limited set a standard marginal cost for its major product at ₦50 per unit. The standard cost is re-calculated once each year. Actual production costs during August 2004 were ₦608,000 when 8,500 units were made. With the benefit of hindsight, the management of Jaye Limited realized that a more realistic standard cost for current conditions would be ₦80 per unit. The planned standard cost of ₦50 is unrealistically low:

SUGGESTED SOLUTION

With the benefits of hindsight, the realistic standard should have been ₦80. The variances caused by favourable or adverse operating performance, that is, the material

price and usage, labour rate and efficiency variances etc – should be calculated by comparing actual results against this realistic standard. Since the variance should then be a true reflection of operating performance, they will be called operational variances, that is, (Ex-post less Actual Result).

	₦
8,500 units should (realistically have cost (x ₦80)	680,000
But did cost	608,000
Total operating variances	172,000 F

The planning variance reveals the extent to which the original standard would be at fault (Ex-Ante less Ex-Post).

	₦
The original (ex-ante) standard cost 8,500units x ₦50 per unit	425,000
The realistic retrospective (ex-post) standard cost	
8,500 units x ₦80 per unit	680,000
Planning Variance	255,000

(Note: it is an adverse variance because the original standard was too optimistic, that is over-estimating the expecting profits by understating the standard cost).

	₦
Planning	255,000
Operating variances	(72,000)
Total	183,000

If traditional variance analysis had been used, the total cost variance would have been the same, but the 'blame' would all appear to lie on actual results and operating inefficiencies.

	₦
Standard cost (ex-ante) of 8,500 units (x ₦50)	425,000
Actual cost of 8,500 units	608,000
Total Cost Variance	183,000

Bromwich (1990) would argue that:

(a) the total cost variance reported by the traditional method would not be helpful for management control purposes;

(b) planning and operating variances give a better idea of why actual results failed to reach the original budget expectations. Operating variances may or may not be controllable, whereas planning variances tend to be uncontrollable. If the standard is wrong, no amount of control-action to adjust operating resources will reconcile actual results to the faulty budget. Nevertheless, planning variance reveals a severe weakness in a business organization in that failure to budget correctly may lead a company into severe financial difficulties or at best poor financial results for the accounting period. They need to be identified, albeit in hindsight, and eliminated as much as possible in future planning.

ILLUSTRATION

Ayo limited budgeted to sell 10,000 units of a new product during 2005. The budget sales price was ₦20 per unit, and the variable cost ₦6 per unit. Although actual sales in 2005 were 10,000 units and variable costs of sales were ₦60,000. Sales revenue was only ₦10 per unit. With the benefit of hindsight, it is realized that the budgeted sales price of N20 was hopelessly optimistic, and a price of N9 per unit would have been much more realistic.

Required: Analyse the variances into operating and planning variances.

SUGGESTED SOLUTION

AYO LIMITED

Budgeted Contribution	140,000 (₦14 per unit)
Actual contribution	40,000 (₦4 per unit)
Total Variances	50,000 (A)

The only variances are sales price variances.

Operating (Sales price) variance	₦
10,000 units sold for N10 each	100,000
but should (realistically) have been sold for N9 each	90,000
	10,000(F)

Planning (Sales price) variance:

	Volume	Sales Price	Variable Cost	Total Contribution	
			₦	₦	₦
Ex-ante (original) budget	10,000 units		20	6	140,000
Ex-post (realistic) budget	10,000 units		9	6	30,000
Planning Variance			11 A per unit		110,000 A

The total difference between budgeted and actual profit of N50,000 (A) can be analysed as:

	₦
Operating variance (sales price)	5,000 (F)
Planning Variance	55,000 (A)
	50,000 (A)

3.8.2 Importance and shortcomings of planning and Operational Variances

Even though, the conventional variances may not be analysed into the planning and operational elements, the importance cannot be underestimated and they include:

(a) Ensures an orderly manner of reviewing standards as well as the associated basis for setting them up.

(b) Prompts the realistic nature of standard costing and variance analysis, especially where circumstances change and are drastic.

(c) Ensures the usage of updated information, especially in the operational variances adopted for determining present levels of efficiency.

(d) Since standard costing as a technique is realistic and informative, its acceptability will be on the high side and encourage motivation.

(e) Since the planning efforts are enhanced, problem areas can be easily identified and actions takes as at when due.

Nonetheless, the shortcomings of the variances are:

(a) The responsibility centres may experience some form of pressure especially where interpretation are involved in terms of controllable and uncontrollable activities or internal or external factors affecting planning and operating duties.

(b) The determination and updating of additional variances entail many clerical and managerial efforts on a continuous basis.

(c) The determination of the ex-post element may be subjective, hence resulting in the allotment of the planning and operational causal factors being political in nature.

3.9 CONTROL RATIOS

The units of output can be shown in different variety of forms and for the purpose of standard costing. They are identified as a peculiar element/unit that is the standard hour which is referred to as the quantity of production that should be produced in an hour.

A standard hour is a measure of the work content in an hour and not that of time involved or taken to produce. For example, if 500 units of a product should be produced in one hour, then output of 2000 units is equivalent to 4 standard hours. Therefore, the relationship between standard hours and actual production can be expressed as control rations. These are used to show the degree of efficient or inefficient utilization of resources at the disposal of management. The following ratios can be computed:

(a) Activity Ratio

This ratio compares the actual level of production with the planned level of production.

It can be expressed as:

$$\frac{\text{Standard hours equivalent of actual production}}{\text{Budgeted hours}} \times 100$$

It is not a measure of efficiency, but indicates the level of activity which has, infact, been achieved.

(b) The Efficiency Ratio

The ratio measures the efficiency with which production has been achieved.

Actual time taken to achieve the actual production is compared with the time such production should have taken.

The efficiency ratio can be expressed as:

$$\frac{\text{Standard hours equivalent of actual production}}{\text{Actual hours worked}} \times 100$$

(c) The Capacity Ratio

This ratio assesses the utilization of the available capacity by comparing actual hours worked with budgeted hours.

$$\frac{\text{Actual hours worked}}{\text{Budgeted hours}} \times 100$$

It should be noted that:

Activity ratio = capacity ratio x efficiency ratio.

ILLUSTRATION

One of the departments of Lawal Company Limited produces two products "Gas oil" and "kerosene". The standard times for the production of the products are 30 minutes for Gas oil and 24 minutes for kerosene. The budget for July is 24,000 units of Gas oil and 10,000 units of kerosene. During the month, 12,000 labour hours were worked and 20,000 units of Gas oil and 8,000 units of kerosene were produced. You are required to compute:

1. The activity ratio;
2. The efficiency ratio;
3. The capacity ratio and interpret your results.

SUGGESTED SOLUTION

LAWAL LIMITED

The Standard hours equivalent to actual production for July is:

			Standard Hours
Gas oil	$\frac{20{,}000}{60} \times 30$	=	10,000
Kerosene	$\frac{18{,}000}{60} \times 24$	=	13,200
			13,200

The budget in terms of standard hours is:

			Budgeted Hours
Gas oil	$\frac{24{,}000}{60} \times 30$	=	12,000
Kerosene	$\frac{10{,}000}{60} \times 24$	=	15,000
			17,000

The control ratios are:

1. Activity Ratio = $\frac{\text{Standard hours}}{\text{Budgeted hours}}$

$$= \frac{13{,}200}{17{,}000} \times \frac{100}{1} = 77.6\%$$

This means that the actual level of production is less than the budgeted level by 22.6%

2. Efficiency Ratio = $\frac{\text{Standard hours}}{\text{Actual hours}}$

$$= \frac{13{,}200}{12{,}000} \times \frac{100}{1} = 110\%$$

This means that the actual level of production was achieved in less time than standard by working at a rate which was nearly 10% above the normal level of efficiency

3. Capacity Ratio = $\frac{\text{Actual hours worked}}{\text{Budgeted hours}} \times \frac{100}{1}$

$$= \frac{12{,}000}{17{,}000} \times \frac{100}{1} = 70.5\%$$

This means that the actual hour worked were less than the budgeted hours by 30%.

4.0 CONCLUSIONS

Standard costing involves comparing actual costs with predetermined costs. The various types of standard are: basic standard, ideal standard, attainable standard and current standard. Standards are expected to be reviewed on a periodic basis, for example, half yearly, or yearly. Variance analysis is the process of analysing the total difference planned and actual performance into its components parts. They should not be considered in isolation. The basic variances are those of material, labour and overhead. The basic material variances measure the differences between actual and standard wage rates and actual and standard labour efficiency.

A standard hour is a unit measure of production not of time. If total absorption principles of fixed and variable costs are absorbed into production, variances relating to both fixed and variable overheads will arise while in marginal costing only variable overheads are absorbed into production overheads. Material usage variance can be sub-divided into mix and yield variances. Sales marginal variances can be sub-divided into price and quantity variances. Traditional variances can be separated into planning and operational variances with the attendant benefits whereby planning variances seek to measure that part of the total variance which is due to planning deficiencies whilst the operating variances seek to measure operating as compared to a realistic current standard.

5.0 SUMMARY

In this unit, we have discussed the standard setting process. We then looked at the relationship between budgetary control and standard costing. Finally, we calculated material, labour, overhead and sales margin variance.

6.0 TUTOR MARKED ASSIGNMENT

1. What is the formula for calculating sales mix variance?
2. Explain “Ex-Ante” and “Ex-Post” as planning variances concepts.

7.0 REFERNCES/FURTHER READINGS

ICAN Pack, (2006). *Management accounting.* Lagos: VI Publishing Ltd.

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UNIT 7: DECISION MAKING UNDER CERTAINTY

CONTENTS

1.0 INTRODUCTION

The concept of marginal costing is based on the behavior of costs that vary with the volume of output. Sometimes marginal costing and direct costing are used interchangeably.

2.0 OBJECTIVES

In this unit, the readers will be able to understand:

- Marginal costing techniques and the preparation of operating statements using

marginal and absorption costing techniques;

- The principles of carrying out the cost-volume-profit (CVP) analysis for decision making;
- Break-even charts and profit graphs;
- The limiting factor and its effect on decision; and
- The applications of the concepts of relevant cost, opportunity cost, incremental cost, and differential cost to decision making.

3.0 MAIN CONTENT

3.1 DEFINITION OF MARGINAL COSTING

CIMA defines marginal costing "as a decision making technique used to determine the effect of cost on changes in the volume of time and output in a multi-product firm especially in the short run". Thus, it is a technique which emphasizes the variable cost of a product, that is, the direct material, direct labour, direct expenses and other variable overheads. It demands that fixed costs of the relevant periods are written off in full against the contribution. The contribution is the difference between the sales value and the variable or marginal cost of a product in a given period of time.

3.1.1 Marginal Costing Statement Format

The format showing the components of a marginal costing statement:

	N	N
Sales (a)		x
Direct material	x	
Direct labour	x	
Direct expenses	x	
Prime cost	x	
Production variable costs	x	
Production marginal cost (b)		x
Contribution - (a-b)		x

Fixed cost are excluded from the cost structure and therefore written off in the period.

3.1.2 Merits of marginal costing

Marginal costing is a technique which is of utmost importance to management decision making efforts. The following reasons are pertinent to this assertion:

(a) Profit volume ratio helps management to decide which products are most profitable.

(b) Contribution margin helps to decide whether:

  (i) To accept or reject a special order;

  (ii) To close down a line of product or business;

  (iii) To determine product profitability;

  (iv) To determine product mix using linear programming technique;

  (v) To make or buy or lease decisions on an item of plant and equipment; and

  (vi) To decide further processing decision particularly in relation to joint product cost.

(c) It assists in the pricing decision making process.

(d) Contribution approach can be used to forecast the units to be produced and sold.

(e) It facilitates the stock valuation for final accounts purposes.

3.1.3 Demerits of marginal costing

The difficulties associated with marginal costing are as follows:

(a) The analysis of costs into fixed and variable costs may be subjective for the purpose of costs classification.

(b) It places emphasis on the short run effects of costs, whereas, fixed costs will

vary in the medium and long term.

(c) It is impossible to determine strategic or long term decision in that, giving a product total cost data, it needs to be noted that in the final analysis (long run) fixed costs must be recovered.

(d) It focuses attention on the contribution level and the tendency to exclude fixed costs by the management may be disastrous.

3.2 ABSORPTION COSTING

Absorption costing is a method of costing stocks in which all production costs such as variable and fixed are included as part of the cost of items'. (Statement of Accounting Standard, No. 4). Absorption costing, therefore, is a technique in which all costs are absorbed into production cost, hence operating statements, prepared using this approach, does not distinguish between fixed and variable cost. It is an approach which allocates all production costs into individual products. Fixed production overhead are absorbed into products by establishing overhead absorption rate. This may result to over or under absorbed overhead, which is less or more than recovery of fixed overheads at planned or predetermined activity level.

3.2.1 (a) Absorption costing standard cost (where there is no opening and closing stock) card-format

	PER UNIT ₦	₦
Sales		x
Direct Materials	x	
Direct Labour	x	
Direct Expenses	x	
Prime Cost	x	
Production Variable Overhead	x	
(i) Marginal Cost	x	
Fixed Production overhead cost	x	
(ii) Total production cost of sales		

(Absorption cost)	(x)	
Gross Profit	xx	

(b) Absorption Costing Operating Statement (with opening & closing stocks).

	₦	₦
Sales		x
Opening Stock (valued at Absorption cost)	x	
Cost of Production (“ “ “)	x	
	x	
Less: Closing Stock (valued at absorption cost)	x	
Total Cost of sales		x
Gross Profit		x

3.2.2 Advantages of absorption costing

(a) It does not undermine the importance of fixed cost.

(b) It avoids fictitious losses being reported by representing product cost at full factory cost to bring the product to a point that its ready for use.

(c) It assists in arriving at total cost of production which is a basis for selling price decision process.

(d) It matches costs with revenues since fixed production cost are considered in the product cost.

(e) It represents current market trends and, therefore, it is widely accepted especially for tax purposes.

3.2.3 Disadvantages of absorption costing

(a) It does not help in decision-making.

(b) Production may be very difficult since there is element of fixed cost in the product cost.

(c) Calculation of under or over absorbed overhead may be problematic.

(d) It overbears the product cost with management administrative inefficiency

which may partly be represented in fixed cost.

(e) It does not conform with the matching principle which stipulates that all costs (fixed and variable) must be matched against revenue in the period concerned for determination of profit.

3.3 MARGINAL AND ABSORPTION COSTING COMPARED

3.3.1 Marginal Costing

Marginal Costing is a useful technique for studying the effects of changes in volume and type of output in a multi-product business. It is an accounting technique which determines the marginal cost by distinguishing between fixed and variable costs. The primary purpose of marginal costing is to provide information to management on the effects on costs and revenues of changes in the volume and type of output in the short run.

It can also be used in the system for recording and collecting costs. In this case, stocks are valued at variable cost and fixed costs treated as period costs in profit statements.

3.3.2 Absorption costing

Absorption costing is the approach used in all published accounts, and all financial accounting statements. It emphasizes a functional classification of costs, for example manufacturing, selling and distribution and financial costs. In contrast, marginal costing, or the contribution approach, highlights the behaviour of costs and classifies them accordingly, by identifying variable costs and fixed costs.

3.3.3 Further distinctions between the two techniques are presented in tabular form below:

Marginal Costing and Absorption Costing Techniques:

Marginal Costing	Absorption Costing
a. Fixed overheads are written off in a period. Treated as period costs	Fixed overhead are: a. Absorbed into production, such that part of fixed cost is carried to subsequent year by way of its inclusion in closing stock.
(b) Only variable costs are regarded as product cost	(b) Fixed production overheads form part of the product cost.
(c) Contribution is the main feature of the operating statement (sales less marginal cost = Contribution	(c) Contribution are treated as funds in which fixed cost are absorbed to arrive at profit.
(d) Distinction is made between fixed and variable costs.	(d) No distinction is made between fixed and variable costs.
(e) Stocks are valued at variable costs which exclude fixed costs.	(e) Stocks are valued at total production cost including fixed production overhead costs.
(f) It is used for decision making purposes.	(f) It is used for routine purposes.

It is imperative to say that the marginal costing approach (also known as the contribution approach) highlights the total contribution which forms a fund out of which fixed costs must be paid. The contribution per unit will be the same irrespective of the level of output. This approach does not attempt to imply a fixed overhead rate per unit rather fixed overheads do not change with the level of output, and therefore, should only be stated in total.

ILLUSTRATION

(1)	Absorption Costing Statement	₦'000	₦'000
	Sales		75
	Less: manufacturing cost of goods sold		45
	Gross profit		30

	Less: Selling costs		18.75
	Net profit		11.25
(2)	Marginal Costing Statement		
	Sales		75
	Less: Variable costs		30
	Contribution		45
	Less: Fixed Cost – manufacturing	15	
	- Selling	18.75	33.75
	Net Profit		11.25

The conventional absorption costing statement fails to differentiate between fixed and variable costs and, therefore, cannot be used for cost-volume-profit analysis. In addition, it is normal procedure to calculate the cost and profit per unit, based on absorption costing as illustrated below using the level of activity of 7,500 units:

	₦	₦
Selling price		10.00
Manufacturing cost	6.00	
Selling cost	2.50	8.50
Profit per unit		1.50

Assuming the level of activity increased to 9,000 units, the following results would be expected.

	Total ₦'000	Per Unit ₦'000
Sales		
Less: Manufacturing cost of goods sold	90	10,00
Gross profit	54	6,00
Less: Selling costs	36	4,00
Net profit	22.5	2,50
	13.5	1,50

ILLUSTRATION

Kike Nigeria Limited produces "Pomade" in 2004, and made the following data available. As Management Accountant, you are required to present to the management

of Kike Nigeria Limited the profit based on marginal costing and absorption costing.

Selling price	₦20.00 per unit
Variable manufacturing cost	₦8.00 per unit
Fixed manufacturing cost	₦20,000.00
Selling and administrative cost	Fixed ₦10,000
	Variable ₦4.00 per unit
Units produced	20,000 units
Units sold	19,000 units

SUGGESTED SOLUTION

(a) Absorption Costing Statement

	Per Unit ₦	₦	₦
Sales			380,000
Less: Cost of goods sold			
Variable manufacturing costs 20,000 units	8	160,000	
Fixed manufacturing cost	1	20,000	
	9	180,000	
Less: closing stock (500 units)	9	4,500	175,500
Gross profit			204,500
Less: Selling and administrative costs			86,000
Net profit			118,500

(b) Marginal Costing Statement

	₦	₦
Sales		380,000
Variable manufacturing costs of production-		
(20,000 units at N8)	160,000	
Less: closing stock (500 units N8)	4,000	
Variable manufacturing cost of goods sold	156,000	
Add: Variable selling and administrative costs	76,000	
Variable cost of goods sold		232,000
Contribution		148,000
Less: fixed costs:		
Manufacturing cost	20,000	
Selling and administrative cost	10,000	30,000
Profit		118,000

The difference in the operating statement of both techniques of ₦500, relates to the

valuation of the closing stock (₦4,500 – 4,000).

3.4 MARGINAL COSTING AND DECISION MAKING

Decision making is defined as making choices between future and uncertain alternatives. It must be emphasized that all decision making relates to the future and that a decision is a choice between alternatives in pursuit of an objective. Where no alternatives exist, no decision can be made and nothing can be done now that will alter the past. These fundamentals of decision making are of critical importance in determining what information the management accountant should supply to the decision maker.

3.4.1 The decision process

The overall decision process can be subdivided into stages:

(a) determination of objective(s);

(b) consideration of alternatives;

(c) evaluation of alternatives in the light of the objective(s); and

(d) selection of the course of action.

3.4.2 Types of decisions

Decision making is concerned with 'cost and revenues' or costs/benefits analysis. The assumption that level of activity will remain constant within the relevant range of output will not be maintained determines the type of decision reached by organizations. However, variation in unit variable costs or fixed costs might occur. Various types of decisions are:

(a) Routine planning decisions - These relate to budgeting decisions whereby fixed and variable costs are analysed together with revenues over a period.

(b) Short-run problem decisions - These refer to unforeseen decisions of a non-recurring nature, so that revenue and costs are obtained within a relatively short time.

(c) Investment or disinvestments decisions - These refer to decision of long-term consequences. It allows for the concept of time value of money and the appreciation of discounted cash flow techniques.

(d) Long-range decisions - These relate to an infrequently reviewed decisions. They are decisions made once, meant to provide a continuing solution to a recurring problem, for example, deciding, or reviewing the channel of distribution of the company's products.

(e) Control decisions - That is, these are cautious decisions with a view to evaluate the benefits expected such that they exceed the costs of investigation. It is more like "think before you act" circumstances.

3.4.3 Relevant cost

Any cost that is useful for decision making is often referred to as a relevant cost. A cost is said to be relevant provided there is a future cash flow arising from a direct consequence of a decision.

(a) Relevant costs are future costs:

(i) A decision is about the future; it cannot alter what has been done already

In a famous passage, the economist Jevons(1871) wrote 'the fact that labour once spent has no influence on the future of any article; It is gone and lost forever. In commerce, bygones are forever bygones, and we are always starting clear at each moment judging the values of things with a

view to future utility

(ii) The concept that bygones are bygones refers not only to labour, but also to all historic costs of materials, machinery and other items.

(iii) Costs that have been incurred include:

- cost that have already been paid; and
- costs that are the subject of legally binding contracts, even if payments due under the contract have not yet been made.

It is necessary to advise the readers that past costs are only useful as long as they provide information for forecasting.

(b) Relevant costs are cash flows:

(i) Decisions are most often taken which will maximize the 'satisfaction' of a company's shareholders. Readers will realise that the time value of money affects the worth of cash flows from project over a longer period, and all short - run decisions are assumed to improve the shareholders' satisfaction if they increase net cash inflows. '*The decision rule will be to accept opportunities that increase the value of future cash resources and to reject those that decrease it.' (Arnold 1963)*

(ii) Only cash flow information is required. In essence, any cost or charge that fails to reflect additional cash spending should be excluded. These include:

- Depreciation as a fixed overhead incurred.
- Notional rent or interest, as fixed overhead incurred.
- All overheads absorbed. Fixed overhead absorption is always

irrelevant, since it is overheads to be incurred which affect decisions. (Confusingly variable overhead costs are usually relevant, because they should be incurred at the same rate that they are absorbed).

(c) A relevant cost is one which arises as a direct consequence of a decision. Thus, only costs which will differ under some or all of the available opportunities should be considered; relevant costs are, therefore, sometimes referred to as incremental costs or differential costs.

Thus, if an employee is expected to have no other work to do during the next week, but will be paid a basic wage (of ₦100 per week) for attending work and doing nothing, his manager might decide to give him a job which earns only ₦40. The net gain is ₦40, and the ₦100 is irrelevant to the decision, because although it is a future cash flow, it will be incurred anyway whether the employee is given work or not. Relevant costs were slow to be accepted by the accounting profession, and did not properly feature in accounting textbooks until the early 1960's. Economists have been aware of them for a much longer time; and they are simply the application of common sense and economic wisdom. Parker (1963) in his book titled *Management Accounting* wrote that *intelligent business men at an early date were aware intuitively of the notions of a voidable cost and opportunity cost, and of irrelevance of cost which are the same under all alternatives,*

3.4.3 Differential Costing

This is a term used in the preparation of adhoc information when all the cost and

income differences between the various options being considered are highlighted so that clear comparisons can be made of all the financial consequences. In one sense, differential costing is a wider concept than marginal costing because all cost changes are considered, both fixed and variable, whereas the presumption when marginal cost is used is that only variable cost changes.

3.4.4 Differential and Incremental Costs

A differential cost is the difference in the cost of alternative choices. If option A will cost an extra N300 and option B will cost an extra N360, the differential cost is N60, with option B being more expensive. A differential cost is the difference between the incremental costs of each option.

3.4.6 Historical Cost Information

Although historical costs (also called past cost, sunk costs, irrevocable cost and including committed costs) are irrelevant for decision making. Historical cost data can be useful for decision making. *["Historical costs are themselves irrelevant to the decision, although they may be the best available basis for predicting future costs." (Horngren, 2004).]*

3.4.7 Opportunity Costs

Relevant cost may also be expressed as opportunity costs. An opportunity cost is the benefit of the next best alternative that is forgone:

(a) If the choice is between choosing option A or doing nothing, the opportunity cost of A is the extra cash expenditure incurred, for choosing option A, Arnold(1963), calls this an *external opportunity cost* but it is, quite simply, incremental cost.

(b) If the choice is between choosing option B or C, the opportunity cost of A would be described as the benefit forgone from the more profitable of the two other choices, B or C. Arnold calls this an *internal opportunity cost*, which arises whenever there are mutually exclusive options, or limiting factors/scare resources for production. It is this type of opportunity cost which is more widely known by the general term; opportunity cost, for example. see quotation in the above paragraph incremental or differential costs.

3.4.8 Acceptance or rejection of a special order

By this, it meant the acceptance or rejection of an order which utilizes spare capacity but which is only available if a lower than normal price is quoted. The procedure is illustrated by the following example.

ILLUSTRATION

Babariga Company which manufactures rubber soles for use in its production cycle, has the following unit cost for production of 40,000 units.

	₦
Director labour	30
Direct material	8
Manufacturing overheads	36
	74

75% of the manufacturing overhead is fixed. Buba Ltd has offered to sell 40,000 units of the rubber soles to Babariga Ltd for ₦55 per unit. If Babariga accepts the offer, part of the facilities presently used to manufacture the rubber shoes could be rented to Kaftan Ltd at a rent of ₦72,000. Also, per unit of the fixed overhead costs applied to the rubber shoes would be avoided.

The Managing Director, Mallam Danbaba has called you to advise him on whether or not to accept the offer. You are also required to state other matters that should be noted before taking the decision.

SUGGESTED SOLUTION

EVALUATION OF BUBA LTD'S OFFER

	₦	₦
Buba Ltd's Quotation (₦55 x 40,000)		2,200,000
Less incremental outlay		
Direct Materials (₦8 x 40,000)	320,000	
Direct Labour (₦30 x 40,000)	1,200,000	
Valuable manufacturing overhead (25% of N36 x 40,000)	360,000	
	1,880,000	
Applicable fixed overhead (₦10 x 40,000)	400,000	
	2,280,000	
Opportunity cost - rent to Kaftan Ltd.	72,000	2,352,000
		(152,000)

Decision: Since Buba Ltd's quotation of ₦2,200,000 is fess the cost of producing within (₦2,352,000), it is hereby recommended that the offer should be accepted from Buba Ltd. Subject to other qualitative factors. However, there are several other factors which would need to be considered before a final decision is taken. These include:

(a) Will the acceptance of one order at a lowered price lead other customers to demand lower prices as well?

(b) Is this special order the most profitable way of using the spare capacity?

(c) Will the special order lock up capacity which could be used for future full price business?

(d) Is it absolutely certain that fixed costs will not alter?

3.4.9 Discontinuance of a Product Line

If a company has a range of products, one of which is deemed to be unprofitable, it may consider discontinuing with the item from its range.

ILLUSTRATION

Aseye Ltd. Igbogbo produces three products for which the following operating statement has been produced:

	Product A	Product B	Product C	Total
	₦	₦	₦	₦
Sales	128,000	200,000	180,000	508,000
Total Costs	144,000	152,000	136,000	432,000
Profit/(Loss)	(16,000)	48,000	44,000	76,000

The total cost comprises 2/3 variable and 1/3 fixed.

The directors consider that as product A shows a loss it should be discontinued.

Based on the above cost data, should Product A be dropped? What other factors should be considered?

SUGGESTED SOLUTION

ASEYE LTD, IGBOGBO

Product A

	₦
Sales	128,000
Less Total Variable Cost (2/3 x ₦144,000)	96,000
Total Contribution	32,000

Decision: Product A is showing a positive total contribution of ₦32,000, hence it should not be dropped. If product A is mistakenly dropped, the total profit of the business (₦76,000) will go down by the positive contribution of A (₦32,000) to

₦44,000.

Other factors that should be considered are:

(i) Is product A jointly demanded with any of the other products? If so, then sales of other products will be affected. This will also lead to loss of profit.

(ii) Loss of goodwill will result if customers of product A cannot see the product in the market.

(iii) What will be the fate of workers that manufacture product A? Are they going to be re-trained or retrenched?

(iv) What would happen to the plant and equipment used in manufacturing Product A, particularly if it is of a specialized nature and not readily marketable.

3.4.10 Key Budget Factor / Limiting Factor

Key budget factor sometimes known as a limiting factor or principal budget factor is a factor which is a binding constraint upon the organization, that is, the factor which restricts indefinite expansion or unlimited profits. It may be sales, availability of finance, skilled labour, supplies of material or lack of space. Where a single binding constraint can be identified, then the general objective of maximizing contribution can be achieved by selecting the alternative which maximizes the contribution per unit of key factor. It will be apparent that from time to time, the key factor in an organization will change. For example, *a* firm may have a shortage of orders. It overcomes this by appointing salesmen and then finds that there is a shortage of machinery capacity. The expansion of the productive capacity may introduce a problem of lack of space and so on.

The 'maximizing contribution per unit of the limiting factor' rule can be of value, but can only be used where there is a single binding constraint and where the constraint is continuously divisible, that is, it can be altered one unit at a time. Where several constraints apply simultaneously, the simple maximizing rule given above cannot be applied because of the interaction between constraints. In such circumstances mathematical techniques can be used to establish the optimal position. One of the most important mathematical techniques that can be used for such problems is known as Linear Programming (LP). Rules governing the limiting factor(s):

(a) When there is no key limiting factor, use contribution margin

(b) If there's only one key limiting factor, use contribution per key limiting factor.

(c) If there is more than one limiting factor, use linear programming.

3.4.11 Make or Buy Decisions

Frequently, management is faced with the decision on whether to make a component part within or to buy from outside supplier. A decision is relevant particularly in a situation whereby the company has the capacity to produce/make such component.

In general, the relevant cost comparison is between the marginal cost of manufacture and the buying-in price. However, when manufacturing the component displaces existing production, the lost contribution must be added to the marginal cost of production of the component before comparison with the buying-in price. The two situations are illustrated below.

3.5 COST-VOLUME-PROFIT (CVP) ANALYSIS

Cost-Volume-Profit Analysis otherwise known as Break-Even Analysis refers to a

technique that assists in decision making by employing the marginal costing concept and is used to measure the effect on profit as a result of changes in volume of activities, cost and prices. It also facilitates planning in the sense that CVP analysis could assist to predict future cost levels and sales as related to a range of level of activity. It demonstrates how the profit will be affected as a result of changes in any of the variables that make up the profit function. Its use requires the separation of the total cost function into their, variable and fixed portion, as required in the application of marginal costing principles.

The profit-volume ratio is a very useful figure which indicates the relationship of contribution to turnover. The formula used to calculate it is:

$$\frac{\text{Contribution}}{\text{Sales}} \times \frac{100}{1}$$

It is common practice to express this measurement in percentage form, so the usual version is:

$$\frac{S - V}{S} \times 100$$

The profit-volume ratio may be used to measure the relative contribution of a product or a company for various periods. It is popularly called P/V Ratio.

3.5.1 Application of the *P*/Vratio

Management may request information towards solving a variety of problems which require calculations and involving profit-volume ratios, for example:

(a) What is the company's break-even point?

(b) What would be the profit on sales volume ₦X?

(c) What volume of sales would be required to achieve a planned level of profit?

(d) What volume of sales would be required to maintain the present level of output if selling price were reduced, lets say, by 10%

The use of P/V ratio and graphs can provide answers to such problems although it is again assumed that these answers are guides only and may not be accurate. However, they do at least provide a measuring tool which can form the basis of decision making.

3.5.2 Basic Assumptions of CVP-Analysis

The basic assumptions associated with CV P technique are:

(a) All costs could be categorized as either variable cost or fixed cost.

(b) Semi-Variable cost can be segregated into both the variable and its fixed component.

(c) Selling price per unit is constant.

(d) Variable cost per unit is constant.

(e) Total fixed cost remains unchanged regardless of output.

(f) Parity of production and sales. That is, there is no closing stock of goods since production equals sales.

(g) Only one product is involved and in case of a multi-product organization, there is a constant sales mix.

(h) Level of technology and efficiency remains the same.

(i) Volume is the only independent variable that affects cost.

(j) Risk and uncertainty are non-existent.

(k) There is a relevant range.

3.5.3 Limitations of the basic assumptions

In a true life situation, the basic assumptions of C-V-P analysis as discussed above tend only to be valid over a limited range of activity. As a result of this reason, care must be exercised when using break even analysis as a basis for decision making or the presentation of information. The basic assumptions of C-V-P have the following deficiencies:

(a) It might be difficult to separate some costs into their fixed and variable cost portions.

(b) The selling price per unit is assumed to be constant. This is not realistic because of possibility of discounts.

(c) The variable cost per unit is assumed to be constant. This is not realistic because quantity discount could result in decrease in material cost and labour cost per unit could fall whenever the learning curve theory becomes applicable.

(d) Fixed cost is assumed to remain unchanged. This is not true because in reality, fixed cost moves in a step-like manner. Also in the long run all costs are variable.

(e) It is assumed that production is equal to sale, hence no closing stock. This assumption looks unrealistic because a business is a going concern and invariably stocks are carried from one period to the other.

(f) The assumption of one product or constant mix of product is not realistic because most organizations produce variety of products and invariably actual mix turn out to be radically different from the expected level of activity. This

may be due to a host of factors such as the tastes of the customers and the economic realities of the day,

(g) The assumption that there is no change in level of technology and efficiency is untenable since innovations are taking place every day in all spheres of business endeavours.

3.5.4 Applications of the CVP Model

(a) To determine the breakeven point in units

$$= \frac{\text{Total Fixed Cost (TFC)}}{\text{Contribution per unit or Contribution Margin (CM)}}$$

$$= \frac{\text{TFC}}{\text{CM(Units)}}$$

(b) Break even point in sales value (₦)

$$= \frac{\text{Total fixed cost}}{\text{Contribution margin ratio}}$$

(c) Number of units to sell to make a targeted profit (₦)

$$= \frac{\text{TFC + Targeted profit}}{\text{CM(Units)}}$$

(d) The sales value in N required to achieve a targeted profit

$$= \frac{\text{TFC +Targeted profit}}{\text{CMR}}$$

Note: Targeted profit is assumed to be profit before tax (PBT). However, if the targeted profit is profit after tax, there is need to gross-up the profit after tax to profit before tax, using the formula below:

$$\text{Profit before tax} = \frac{\text{Profit after tax}}{1 - \text{tax rate}}$$

That is, if tax rate is 30%, PBT = $\frac{\text{Profit tax}}{1 - 0.30} = \frac{\text{PAT}}{0.7}$

ILLUSTRATION

Yinka Limited is considering a reduction in the price of its product by 10% because it is felt that such a step may lead to a greater volume of sales. It is thought that there is no prospect of a change in fixed costs or variable cost per unit. The director wishes to maintain profit at the present level, so the loss which will be incurred by reducing the selling price must be offset by a gain due to increased volume of sales. You are given the following information:

Sales (10,000 units)	₦200,000
Variable costs	₦15 per unit
Fixed costs	₦40,000

State the volume of sales required to maintain the existing profit.

SUGGESTED SOLUTION

The present level of profit = N200,000 – (150,000 + 40,000)
= N10,000

and the P/V Ratio is = $\frac{S - V}{S} = \frac{50,000}{200,000} = 25\%$

If the selling price were reduced with no corresponding increase in sales volume, the profit-volume ratio would be:

Sales	=	180,000
VC	=	150,000
Total Contribution	=	30,000

CMR = $\frac{S - V}{S} = \frac{30,000 \times 100}{180,000 \times 1} = 16.67\%$

It is not expected that fixed costs will change. The Director wishes profit to remain at its present level. So, the volume of sale required is

$$= \frac{\text{TFC + Profit}}{\text{P/V or CM Ratio}} = \frac{\text{N40,000 + 10,000}}{16^{2}/_{3}\%}$$

$$= ₦300,000$$

The P/V Graph

The profit volume graph - This graph is a development of the break - even chart and portrays the relationship of profit to volume. It requires the same basic data as the Break - Even Chart (BEC) and suffers from the same limitations with BEP chart. But if these limitations are borne in mind, they provide a valuable aid to management in making decisions concerning volumes of output. Construction of profit - volume chart will involve the following processes:

(a) Draw a vertical line and select a point in between it to represent point 0, that is, the point at which neither profit nor loss is made.

(b) From point 0, draw the horizontal line to the right and scale appropriately for sales.

(c) Also scale the upper vertical line for profit and the lower line for losses.

(d) On the vertical axis, the area below the sales line represents fixed cost and that above it represents profit.

(e) Profits are plotted for the required fixed costs and for profit and a line is drawn to connect the two points.

The P/V graph, or profit/volume graph is similar to the break - even chart, and records the profit or loss at each level of sales. It is a straight line graph, drawn most simply by

recording:

(i) The loss at zero sales, which is full amount of fixed cost and

(ii) The profit (loss) at the budgeted level of sales; and joining up the two points.

4.0 CONCLUSIONS

Marginal costing is a decision making technique used to determine the effect on profit due to cost changes and volume changes from time to time in a multi-product firm especially in the short run. Emphasis is on the variable cost of a product and the fixed cost is written off in full against the contribution and treated as period cost. The various areas where the marginal costing technique is applicable are in: make or buy, accept or reject situations, deleting a segment, special pricing decisions etc. Cost-Volume-Profit analysis, also known as Break-even analysis, is used to measure the effect on profit as a result of changes in both revenue and cost parameters,

5.0 SUMMARY

This unit treated in a greater depth the concept of marginal costing and its contribution towards the provision of information for managerial decision making.

6.0 TUTOR MARKED ASSIGNMENT

1. What is differential cost?

2. What are the formulae for: break-even point (units); break-even point (sales value)?

3. Explain the term “Opportunity Cost”

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UNIT 8: SOURCES OF FINANCE

CONTENTS

1.0 INTRODUCTION

The financial needs of a business varies from firm to firm, and it is influenced by a firm's size, ownership structure, type of technology being used within the firm, the relationship between capital and labour, the length of credit periods (taken and allowed), and the age of the firm's assets among others. For example, processing businesses are usually capital intensive, requiring large amounts of capital while retail businesses usually require less capital. Every business needs finance to start and hump it up to profitability. There are several sources to consider when looking for start-up financing. The main questions managers have to answer are:

i. How much finance is needed?

ii. Whether the finance can be obtained internally

iii. Whether the finance should be borrowed temporarily, with a view to paying back, or obtained as permanent (e.g. share) capital

iv. If the finance is borrowed, whether the loan is for short (up to one year), medium (1–5 years) or long term.

2.0 OBJECTIVES

The aim of this unit is to enable students understand the major sources of finance available to a business and how businesses get money to finance growth, also to overcome problems such as working capital and cash flow issues. Other objectives are;

i. To understand the various sources of finance for a business; and

ii. To understand how firms acquire funds in order to acquire assets for their businesses.

3.0 MAIN CONTENT

Sources of funds available to business organizations could be classified into two main categories:

1. Short-term sources; and
2. Long-term sources

These categories have different types of sources, that is a firm can generate funds internally or externally to finance its activities. External sources could also be short-term or long-term. This unit will focus on how firms acquire funds in order to acquire assets to grow their businesses.

3.1 Short Term Sources of Finance

Short-term fund means financing for a period of less than 1 year. They represent short-term obligations. Since they are supposed to be settled by cash, they represent cash

payments which must be settled as at when due. The need for short-term finance arises to finance the current assets of a business like an inventory of raw material and finished goods, debtors, minimum cash and bank balance etc. Short term financing is also named as working capital financing. Short term finances are available in the form of:

1. Owner's Equity: The owner contributes as owner/shareholder who bears the risk of the business.

2. Bank Overdraft: The source of overdraft is commercial banks, and they grant this to creditworthy firms. Funds could be advanced to such firms within a period ranging between one day and one year. These loans are supposed to be repaid on self-liquidating basis.

3. Account Payable: This is trade credit. A firm can buy something on credit. Supplies could be made on credit, and they give rise to trade credits.

4. Bill Finance: This bill is a promissory note. But there are different types of bills and complexity exists in their meanings. In our case, a bill is a trade bill of exchange which could be domestic or foreign.

5. Deferred Tax Payment: Tax payment could be looked at from two perspectives: Self-imposed (a firm will not pay when it is supposed to pay and that becomes a source) and Late assessment.

6. Factoring: Debt could be factored. This is another source of short-term funds. Factoring involves handing over of account receivable or any other debt to factors for collection with or without recourse.

7. Hire Purchase Finance Arrangement: This is a form of installment credit. Hire purchase is similar to leasing, with the exception that ownership of the goods passes to the hire purchase customer on payment of the final credit installment, whereas a lessee never becomes the owner of the goods. Hire purchase agreements usually involve a finance house.

i) The supplier sells the goods to the finance house.

ii) The supplier delivers the goods to the customer who will eventually purchase them.

iii) The hire purchase arrangement exists between the finance house and the customer.

The finance house will always insist that the hirer should pay a deposit towards the purchase price. The size of the deposit will depend on the finance company's policy and its assessment of the hirer. This is in contrast to a finance lease, where the lessee might not be required to make any large initial payment.

8. Stock Finance: Stocks could be used to raise short-term funds in a number of ways. They could be used as collaterals for secured loans from commercial or merchant banks. Raw materials could be financed en route by means of trade bills and/or warehouse receipt. This represents another type of secured loans on the value of stock of raw materials. The bill could become negotiable if endorsed by a reputable commercial house or bank, and could thereafter be sold outright or used as collateral for a loan.

SELF-ASSESSMENT EXERCISE

1. List and explain six short-term sources of finance for a firm or business.

3.2 Long Term Sources of Finance

A long-term source of finance means capital requirements for a period of more than 5 years to 10, 15, 20 years or maybe more depending on other factors. Capital expenditures in fixed assets like plant and machinery, land and building etc of a business are funded using long-term sources of finance. Part of working capital which permanently stays with the business is also financed with long-term sources of finance. Two major external sources of long-term funds are: Financial institutions (Including lease finance companies), and capital market. Capital market is classified into: Organized and Unorganized. The organized capital market will be our focus because it is the capital market that will assess the performance of the firm. Firms raise money from the capital market by: Issuing common stock (C/S); And issuing instruments of debt (long-term liabilities). Note that a firm cannot issue debt instruments if it has no common stock. Long term financing sources can be in form of any of the following:

1. **Common Stock:** Equity shares, common stock and ordinary shares, all mean the same thing, but a stock is a group of shares, that is, a stock is made up of shares. Ordinary shares could be issued by firms which have been quoted on the stock exchange. Ordinary shares constitute the equity base of a firm, and represent ownership of the firm on pro-rata basis. This implies that an individual investment is a small proportion of total investment. Each equity shareholder is entitled to a proportionate part of the firm's residual profit and asset. The capital contributed by the shareholders is, therefore, known as risk capital. But they have some compensation like voting rights.

2. Preference Shares: The next class of shares which ranks above equity shares are the preference shares. They are also known as preference stocks. Preference shares occupy an intermediate position between common stock and debenture stocks. Preference shareholders are entitled to fixed dividend payment as different from equity shareholders which are entitled to variable dividend payments. They are imperfect creditors because tax is paid before fixed dividend is paid to them; they are not creditors and they are not the owners of the firm. They do not normally have voting rights unless otherwise stipulated in the terms of the issue.

There are various types of preference shares:

(i) Cumulative preference shares

(ii) Participating Non-Cumulative shares

(iii) Participating Cumulative shares

(iv) Redeemable and irredeemable Preference shares

(v) Convertible Preference shares

i. Cumulative Preference Shares

Preference shares could be cumulative or non-cumulative. Cumulative preference shares allow for dividend payment to be deferred if a firm does not make adequate profit to pay such dividend. Therefore, such firms are normally required to pay such dividends in arrears before dividend could be paid to common shareholders. Non-cumulative preference shares do not allow for any form of deferment of dividend payment.

ii. Participating Non-Cumulative Preference Shares

This class of shareholders is entitled to a non-cumulative dividend at a fixed rate but without a right to participate in the residual profit of a firm after the equity shareholders has been paid.

iii. Participating Cumulative Preference Shares

This class of shareholders is entitled to participate in the residual profit of a firm in addition to the cumulative fixed dividend rate (i.e. they combine the features of cumulative and participating).

iv. Redeemable and Non-Redeemable/Irredeemable Preference Shares

Preference shares could be redeemable or irredeemable. Redeemable preference shares are normally redeemed after a fixed period of time. We can say that this class of preference shares has a definite maturity period while irredeemable preference shares do not have definite maturity period (but it could be sold at the security market – an artificial maturity

v. Convertible Preference Shares

Convertible preference shares convey upon the holders the right to convert these shares into equity shares in accordance with the terms of issues. This is an issue with speculative features. These shares are corporate fixed-income securities that the investor can choose to turn into a certain number of shares of the company's ordinary shares after a predetermined time span or on a specific date. The fixed income component offers a steady income stream and some protection of the investors' capital. However, the option to convert these securities into stock gives the investor

the opportunity to gain from a rise in share price. It can be summarized that convertible preference shares give the assurance of a fixed rate of return plus the opportunity for capital appreciation.

Some of the advantages of preference shares are:

i. Dividends do not have to be paid in a year in which profits are poor, while this is not the case with interest payments on long term debt (loans or debentures).

ii. Since they do not carry voting rights, preference shares avoid diluting the control of existing shareholders while an issue of equity shares would not.

iii. Unless they are redeemable, issuing preference shares will lower the company's gearing. Redeemable preference shares are normally treated as debt when gearing is calculated.

iv. The issue of preference shares does not restrict the company's borrowing power, at least in the sense that preference share capital is not secured against assets in the business.

v. The non-payment of dividend does not give the preference shareholders the right to appoint a receiver, a right which is normally given to debenture holders.

However, dividend payments on preference shares are not tax deductible in the way that interest payments on debt are. Furthermore, for preference shares to be attractive to investors, the level of payment needs to be higher than for interest on debt to compensate for the additional risks. Preference shares are less attractive than loan stock because:

i. They cannot be secured on the company's assets

ii. The dividend yield traditionally offered on preference dividends has been much too low to provide an attractive investment compared with the interest yields on loan stock in view of the additional risk involved.

3. Loan Stocks: Loan stock is long-term debt capital raised by a company for which interest is paid, usually half yearly and at a fixed rate. Holders of loan stock are therefore long-term creditors of the company. Loan stocks has a nominal value, which is the debt owed by the company, and interest is paid at a stated "coupon yield" on this amount. For example, if a company issues 10% loan stock, the coupon yield will be 10% of the nominal value of the stock, so that N100 of stock will receive N10 interest each year. The rate quoted is the gross rate, before tax. Debentures are a form of loan stock, legally defined as the written acknowledgement of a debt incurred by a company, normally containing provisions about the payment of interest and the eventual repayment of capital. Loan stocks and debentures are usually redeemable. They are issued for a term of ten years or more, and perhaps 25 to 30 years. At the end of this period, they will "mature" and become redeemable (at par or possibly at a value above par). Loan stock and debentures will often be secured. Security may take the form of either a fixed charge or a floating charge.

a) **Fixed charge;** Security would be related to a specific asset or group of assets, typically land and buildings. The company would be unable to dispose of the asset without providing a substitute asset for security, or without the lender's consent.

b) **Floating charge;** With a floating charge on certain assets of the company (for example, stocks and debtors), the lender's security in the event of a default payment is whatever assets of the appropriate class the company then owns (provided that another

lender does not have a prior charge on the assets). The company would be able, however, to dispose of its assets as it chose until a default took place. In the event of a default, the lender would probably appoint a receiver to run the company rather than lay claim to a particular asset.

4. Lease Financing: This is an important source of long-term funds. It is an agreement between two parties, the "lessor" and the "lessee". The lessor owns a capital asset, but allows the lessee to use it. The lessee makes payments under the terms of the lease to the lessor, for a specified period of time. It may be used as a source of financing company expansion or for modernization of the productive apparatus of the firm. Thus, through leasing, a company may make use of equipment without actually owning it. The main objective of leasing is to put at the disposal of a firm a plant or any fixed asset which serve the productive need of such a firm. The firm, in making use of that equipment, is obliged to pay to the lessor adequate sum of money which constitutes cost on the part of the firm. There are two basic forms of lease: "operating leases" and "finance leases".

1. Operating Lease: Operating lease is a rental agreement between the lessor and the lessee whereby:

a) The lessor supplies the equipment to the lessee

b) The lessor is responsible for servicing and maintaining the leased equipment

c) The period of the lease is fairly short, less than the economic life of the asset, so that at the end of the lease agreement, the lessor can either

i) Lease the equipment to someone else, and obtain a good rent for it, or

ii) Sell the equipment second hand.

2. Finance lease: A finance lease is a lease agreement between the user of the leased asset (the lessee) and a provider of finance (the lessor) for most, or all, of the asset's expected useful life. Other important characteristics of a finance lease are:

a) The lessee is responsible for the upkeep, servicing and maintenance of the asset. The lessor is not involved in this at all.

b) The lease has a primary period, which covers all or most of the economic life of the asset. At the end of the lease, the lessor would not be able to lease the asset to someone else, as the asset would be worn out. The lessor must, therefore, ensure that the lease payments during the primary period pay for the full cost of the asset as well as providing the lessor with a suitable return on his investment.

c) It is usual at the end of the primary lease period to allow the lessee to continue to lease the asset for an indefinite secondary period, in return for a very low nominal rent. Alternatively, the lessee might be allowed to sell the asset on the lessor's behalf (since the lessor is the owner) and to keep most of the sale proceeds, paying only a small percentage (perhaps 10%) to the lessor.

5. Bonds: Bonds may be used to raise financing for a specific activity. They are a special type of debt financing because the debt instrument is issued by the company. Bonds are different from other debt financing instruments because the company specifies the interest rate and when the company will pay back the principal (maturity date). Also, the company does not have to make any payments on the principal (and may not make any interest payments) until the specified maturity date. The price paid for the bond at the time it is issued is called its face value.

When a company issues a bond it guarantees to pay back the principal (face value) plus interest. From a financing perspective, issuing a bond offers the company the opportunity to access financing without having to pay it back until it has successfully applied the funds. The risk for the investor is that the company will default or go bankrupt before the maturity date. However, because bonds are a debt instrument, they are ahead of equity holders for company assets.

SELF-ASSESSMENT EXERCISE

1. Discuss the various types of Preference shares.
2. What is Lease financing? Discuss the types of Lease financing

4.0 CONCLUSION

A firm can source for funds to finance its activities. These sources could be short-term or long-term, and the funds so acquired are used in turn to acquire assets. Both short and long term sources of funds have their own advantages and disadvantages and degrees of risk attached.

5.0 SUMMARY

In this unit, we have been able to classify the sources of finance for a firm and enumerate and discuss the various short-term and long-term sources of finance;

6.0 TUTOR-MARKED ASSIGNMENT

1. List three long-term sources of finance for a firm.

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UNIT 9 PAYBACK PERIOD (on- Discounting Technique)

CONTENTS

1.0 INTRODUCTION

Capital investment decisions include decisions on expansion, acquisition, modernization or replacement of producing fixed assts. Capital budgeting is the appraisal of capital projects (Long-term assets) so as to enable management take decision on what asset to invest on most efficiently in anticipation of future earnings. Capital budgeting techniques adopted in ranking investment proposals can be broadly categorized in two groups.

- The conventional, traditional or the Non-discounted cash flow technique. Under this method we have the Payback Period (PBP) and Accounting rate of return (ARR)
- The modern, time adjusted or the discounted cash flow technique which include the Net Present Value (NPV), Internal Rate of Return (IRR) and Profitability Index (PI) otherwise known as the Cost/Benefit Ratio. We shall take the methods one after the other.

2.0 OBJECTIVES

- To understand what Payback period is all about and the formula involved in calculating it.
- To know how to make decisions after calculations especially when there are mutually exclusive projects.
- To understand the advantages and disadvantages of the technique.

3.0THE MAIN CONTENT

3.1 Meaning of Payback period

Appraising capital investment on the basis of time that would be taken to get back your initial investment is called as payback period. Payback period is one of the easiest methods of capital investment appraisal techniques. Projects with a shorter payback period are usually preferred for investment when compared to one with longer payback period. However, there is the discounted Payback Period – Capital Investment Appraisal using discounted payback period which is similar to payback period but here, the time value of money or discounted value of cash flow is considered for calculation of payback period.

3.2 Workings on Payback Period

The formula to calculate payback period of a project depends on whether the cash flow per period from the project is even or uneven. In case they are even, the formula to calculate payback period is:

Payback Period = $\frac{Initial\ Investment}{Cash\ flow\ per\ Period}$

N/B: When cash inflows are uneven, we need to calculate the cumulative net cash flow for each period and then use the following formula for PBP –

Payback period = A + $\frac{B}{C}$

Where:

A = the last period with a negative cumulative cash flow

B = the absolute value of cumulative cash flow at the end of the period A.

C = is the total cash flow during the period after A.

N/B: Payback period uses only cash flows not profit.

Example 1

Onyinye Company Ltd is planning to undertake a project requiring initial investment of N200,000,000. The project is expected to generate N45, 000,000 per year for 6 years, calculate the payback period of the project.

SUGGESTED SOLUTION

Payback Period = $\frac{Initial\ Investment}{Annual\ Cash\ flow}$

Payback Period = $\frac{200,000,000}{45,000,000}$ = 4.44 years

Example 2

Lagos Limited is to undertake a project requiring N1, 000,000 outlay.

The project generates N200,000 annually.

Required: what is the payback period?

SUGGESTED SOLUTION:

Payback Period = $\frac{Initial\ Investment}{Cash\ flow}$ i.e $\frac{1{,}000{,}000}{200{,}000 Cash\ flow}$

= 5years

3.3 Decision Rules

A. **Independent project**

1. Accept if the project has a PBP that equal to or less than that set by the management.
2. Reject if the project has a PB that is greater than the time set by the management.

B. M**utually Exclusive Project**

1. Select the project with the least PBP.
2. Ensure that the project selected has a PBP that is equal to or less than that set by the management.

3.4 Advantages of Payback period

1. It is simple to calculate.
2. It can be a measure of risk inherent in a project since cash flows that occurs later in a projects life are considered more uncertain, payback period provides an indication of how certain the project cash inflow are.

3. For companies facing liquidity problems it provides a good ranking of projects that would return money early.
4. Unlike ARR, it uses cash flows instead of accounting profit, cash profit or inflow is superior to accounting profit.
5. It serves as a first screening process i.e. as a simple initial screening process for new projects.

3.5 Disadvantages of PBP

1. It Does not consider the time value of money.
2. It does not take into account the cash flows that occur after the payback period.
3. It may lead to excessive investment in short term projects.
4. It is unable to distinguish between projects with the same payback period.

4.0 CONCLUSION

Payback period as one of the budgeting techniques is one of the best traditional methods of assessing project and it has been going a long way in selecting a good project among bad ones.

5.0 SUMMARY

Payback period always serve as the first screening process for new project. Based on the decision rule, one can easily determine which projects to choose after calculation and it has a lot of advantages that makes it outstanding among other budgeting techniques.

6.0 TUTOR MARKED ASSIGNMENT

Flourish Plc is to undertake a project requiring an investment of N200,000 on necessary plant and machinery. The project is to last for 5 years at the end of which

the plant and machinery will have net book value or scrap value of N40,000 – profit after depreciation are as follows.

Yrs	Cashflows
1	50,000
2	45,000
3	40,000
4	30,000
5	20,000

You are required to calculate the payback period and state whether Flourish Plc. Is to accept or reject the project based on the estimated payback period.

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UNIT 10 ACCOUNTING RATE OF RETURN (ARR) (Non- Discounting Technique)

CONTENTS

1.0 INTRODUCTION

This Capital Investment Appraisal technique compares the profit that can be earned by the concerned project to the amount of initial investment capital that would be required for the project. Projects that can earn a higher rate of return are naturally preferred over ones with low rate of return. ARR is a non-discount capital investment appraisal technique in that it does not take into consideration the time value of money involved.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

1. Define and calculate the ARR technique.
2. Make decision regarding the answers and observation especially when there are mutually exclusive projects.
3. Understand the advantages and disadvantages of ARR

1.0 THE MAIN CONTENT

3.1 Meaning of ARR

Accounting Rate of Returns (ARR) measures the average annual net earnings throughout the estimated life of the project. It is an investment's average net income divided by its book value.

3.2 Workings on Accounting Rate of Returns

Accounting Rate of Return is calculated using the following formulas:

$$\text{ARR} = \frac{\textit{Average Accounting Profit}}{\textit{Average Investment}} \times \frac{100}{1}$$

OR

$$\text{ARR} = \frac{\textit{Average Accounting Profit}}{\textit{Investment}} \times \frac{100}{1}$$

N/B: The formula can be used depending on the question but if asked to get the ARR without specifying the one to use, it is advisable to use the first formula. ARR uses profit not cash flow. Thus you have to convert it to profit by subtracting the depreciation value.

3.3 General Decision Rule

Accept the project only if it's ARR is equal or greater than the required Accounting rate of return. In case of mutually exclusive project, accept the one with highest ARR.

Example 1:

An initial investment of N130,000 is expected to generate annual cash flow of N32,000 for 6 years. Depreciation is allowed on the straight line basis. It is estimated that the project will generate scrap value of N10,500 at the end of 6 years. Calculate its accounting rate of return assuming that there are no other expenses on the project.

SUGGESTED SOLUTION:

Annual Depreciation $= \frac{Initial\ Investment - Scrap\ Value}{Useful\ Life}$

$= \frac{130{,}000 - 10{,}500}{6} =$ N19,917

Accounting Income = ₦32,000 - 19,917 = ₦12,083

N/B: We were given cashflow instead of profit so we subtracted depreciation to get profit.

Then Average Investment

$= \frac{130{,}000 + 10{,}500}{2} =$ N70, 250

ARR $= \frac{12{,}083}{70{,}250} \times \frac{100}{1} =$ 17.2%.

Example 2:

EdoDelta Plc is to undertake a project requiring an investment of N100, 000 on necessary plant and machinery. The project is to last for 5 years at the rate of which the plant and machinery will have net book value of N20, 000. Profit before depreciation are as follows:

Yrs	Cashflows
1	40,000
2	44,000
3	48,000
4	52,000
5	58,000

You are required to calculate the ARR of the project.

SUGGESTED SOLUTION

Annual Depreciation $= \frac{Initial\ Outlay - Scrap\ V.}{useful\ Life\ in\ Year}$

$\frac{100{,}000 - 20{,}000}{5} = N16,000$

Average Investment $= \frac{Initial\ Outlay + Useful\ Life}{2}$

$\frac{100{,}000 + 20{,}000}{2} = \frac{120{,}000}{2}$

$= 60{,}000$

Average Profit

Yr	**Profit**	**Depreciation**	**Net Profit**
1	40,000	16,000	240,000
2	44,000	16,000	28,000
3	48,000	16,000	32,000
4	52,000	16,000	36,000

5	58,000	16,000	42,000
			162,000

Average Profit = $\frac{162,000}{5}$ = 32,400

ARR = $\frac{32,400\ x\ 100}{60,000}$ = 54%

Example 3

If **Nwata Ventures** has a project with the Initial Outlay ₦20, 000, annual profit of N5, 000 for 6 years what is the ARR

SUGGESTED SOLUTION

Average Investment = $\frac{20,000 + 0}{2}$ = **10,000**

Average Profit = 5,000

ARR = $\frac{5,000}{10,000}$ x $\frac{100}{1}$ = **5%.**

Example 4

A project has a cost of N53, 500 and its expected cash inflows are N11, 500 per annum for 6 years. If the cost of capital is 5%, what is the ARR?

Average Investment = $\frac{N55,500 + 0}{2}$ = **26,750**

Average Profit = N11,500

ARR = $\frac{11,500}{26,750}$ x $\frac{100}{1}$ = **43%**

Example 5

Consider the following two projects

	Project A	**Project B**
Cost	150,000	150,000
Residual value	0	0
Estimated Profit after Depreciation.		
Yr 1	35,000	100,000

Yr 2	50,000	80,000
Yr 3	60,000	60,000
Yr 4	70,000	40,000
Yr 5	80,000	30,000

What project is ARR?

SUGGESTED SOLUTION

Since we were given direct profit.

Average profit for Project A = $\frac{295,000}{5}$ = **59,000**

Average profit for Project B = $\frac{310,000}{5}$ = **62,000**

Average Investment for Project A = $\frac{150,000 + 0}{2}$ = **75,000**

Average Investment for Project B = $\frac{150,000 + 0}{2}$ = **75,000**

There ARR for profit A = $\frac{59,000}{75,000} \times \frac{100}{1}$ = **78.67%**

The ARR for Profit B = $\frac{62,000}{75,000} \times \frac{100}{1}$ = **82.67%**

Decision

Chose Project B because it has higher rates of return using ARR

3.4 Advantages of ARR

- Like Payback Period, this method of investment appraisal is easy to calculate.
- It recognizes the profitability factor of investment.
- Unlike the Payback Period, it considered the profit over the entire life of the project.
- It uses readily available accounting data.
- It could be used to compare performance for many companies.

3.5 Disadvantages of ARR

- It ignores the time value of money.

- It can be calculated in different ways. Thus there is problem of consistency.
- It uses accounting income instead of cash flow information.
- It ignores risk and management attitude towards risk
- There are no rules for setting the minimum acceptable ARR by the management.

4.0 CONCLUSION

Having seen the way ARR works based on the calculation and decisions using the answers and observations, one can categorically say that the objective of this unit has been achieved.

5.0 SUMMARY

Accounting Rate of Return as one of the basic method of budget appraisal is very necessary because it gives a straight forward answer and it makes use of the entire profit throughout the project life and the decision using the technique is very easy to make.

6.0 TUTOR MARKED ASSIGNMENT

From the example 5 given in the contest above, assume that the scrap value is N10,000 for project A and N15,000 for project B and the profit given was before depreciation.

Recalculate the ARR and choose between the two projects.

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UNIT 11 THE NET PRESENT VALUE (NPV) (Discounting Technique)

CONTENTS

1.0 INTRODUCTION

Discounted Cash Flow (DCF 1)

Against the backdrop that the traditional techniques ignore the timing of cash flow, a new approach known as the discounted cash flow has been developed. This approach uses cash flows rather than accounting profits. According to Lucey, (1988), accounting profits are invariably calculated for stewardship purposes and are period-oriented (usually monthly, quarterly or annually) thus necessitating accrual accounting with its attendant conventions and assumptions. Therefore, for investment appraisal

purposes, a project-oriented approach using cash flow is to be preferred since it disallows depreciation as an expense and also recognises the timing of cash flows.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define Net Present Value (NPV)
- apply the formula for simple NPV
- describe the investment criteria under NPV.

3.0 MAIN CONTENT

3.1 Assumptions Underlying the Basic Discounted Cash Flow Appraisal

According to Lucey (1988), certain assumptions are made initially so that the underlying principles can be more easily understood.

These are as follows:

- uncertainty does not exist
- inflation does not exist
- the appropriate discount rate to use is known
- a perfect capital market exists, that is unlimited funds can be raised at the market rate of interest.

Later, each of the above assumptions will be isolated and handled accordingly.

3.2 Advantages of NPV

- Net present value account for time value of money which makes it a sounder approach than other investment appraisal techniques which do not discount future cash flows such as Payback Period and Accounting Rate of Return.

- Net Present Value is even better than some other discounted cash flow techniques such as IRR, in situations where IRR and NPV gives conflicting decision, NPV decision should be preferred.
- It gives a clear accept/reject recommendation.
- It makes use of all the cash flow over the project life span unlike Payback Period.
- NPV gives absolute measures of profit ability which immediately reflects in the shareholder's wealth.
- NPV of projects is additive, it can be summed up.

3.3 Disadvantages of NPV

- It may be difficult to calculate.
- Net present Value does not take into account the size of the project.
- Unlike the IRR, non-accounting managers may not be conversant with the decision rule of NPV, particularly in large decentralised organisations.
- Like all the other methods, it-does not take risk into account.
- It does not consider inflation.

N/B: NPV uses cash flows in the calculation i.e. profit before depreciation so if the net profit is given i.e profit after depreciation, we must add back depreciation to make it cash flows.

3.2 Net Present Value (NPV)

Net Present Value (NPV) is defined as the difference between the present value of cash inflows and those of the cash outflows all discounted at the cost of capital. According to Okafor (1983), the net present worth of a project is the present value of

the discounted net proceeds anticipated throughout the economic life of the project. The cash outflows and inflows are discounted using the same rate of discount. The algebraic sum of the discounted stream of cash flows is the Net Present Value (NPV).

That is

$$NPV = \sum_{t=0}^{n} \frac{FC_t}{(1+K)^t}$$

where

NPV = net present value

CF_t = net cash flow at time t

K = discount rate

For most conventional investments, the net cash outflow would occur at the initial period, that is, at t = 0. In such cases, the equation becomes:

$$\sum_{i=0}^{n} \frac{CF_i}{(1+K)^i} CF_0$$

NPV

t = 0

The present value of one ratio today, is of course ₦1. Therefore, CF_0, would be equal to the initial cost of the project.

Decision Rule

The general criteria under the NPV appraisal techniques are the followings.

- INVEST: if NPV > 0. That is, invest if the NPV is positive.
- DON'T INVEST: if NPV < 0. That is, do not invest if the NPV is negative.

- Remain indifferent: if NPV = 0. That is, you may or may not invest if the NPV = 0.

According to Okafor (1983), choosing among alternatives and mutually exclusive projects, the decision rule is to rank them according to their relative net present worth. The project with the highest NPV is presumed to be the most preferable.

ILLUSTRATION 1

NOUN Fresh LTD. is trying to decide which type of machine tool to buy, of the two types available. Type A costs ₦10, 000,000 and the net annual income from the first three years of its life will be ₦3,000,000, ₦4,000,000 and ₦5,000,000 respectively. At the end of this period, it will be worthless except for scrap value of ₦1,000,000. To buy a type A tool, the company would need to borrow from a Finance Group at 9%. Type B will last for three years too, but will give a constant net annual cash flow of ₦3,000,000. It costs ₦6,000,000 but credit can be obtained from its manufacturer at 6% interest. It has no ultimate scrap value. Which investment would be the more profitable? Give reason for your answer.

SUGGESTED SOLUTION

NOUN Fresh LTD

Type A Year	Cash flow ₦'000	Discount Factor (9%) ₦'000	Net Present Value ₦'000
0	(10,000)	1.000	(10,000)
1	3,000	0.917	2,751
2	4,000	0.842	3,368
3	6,000	0.772	4,632
	NPV		₦751

N.B: 6,000 = 5,000 cash flow + 1,000 scrap value.

Type B	**Cash flow**	**Discount Factor (6%)**	**Net Present Value**

Year	₦'000	₦'000	₦'000
0	(6,000)	1.000	(6,000)
1	3,000	0.943	2,829
2	3,000	0.890	2,670
3	3,000	0.840	2,520
	NPV		₦2,019

Alternatively, for project B, since the cash inflows form an annuity, we then use annuity factor. For n = 3, r = 6%, the annuity factor is:

$$\frac{1-(1.06)^{-3}}{0.06} = 2.673$$

The NPV = 3000 x 2.673 – 6000 = 2019.

Thus, we can see that type B has a far higher NPV and this will be the better investment.

ILLUSTRATION 2

Wisdom Plc is proposing to purchase a new machine for ₦20, 000,000 which will have a life span of 6 years. The cash inflows estimated to be generated by the machine are as follows: Year 1 = ₦12,400,000; Year 2 = ₦6,000,000; Year 3 = ₦7,100,000; Year 4 = ₦2,203,000 and Year 5 = ₦2,774,000 and removed in year 6 an estimated net cash outflow of ₦1,477,000.

The company's cost of capital is 15%. Should investment be proceeded with?

SUGGESTED SOLUTION

Wisdom Plc

Year	**Cash flow ₦'000**	**15% Discount ₦'000**	**Net PV at 15% ₦'000**
0	(20,000)	1.000	(20,000)
1	12,400	0.870	10,788
2	6,000	0.756	4,536
3	7,100	0.658	4,672
4	2,203	0.572	1,260
5	2,774	0.497	1,379
6	-1,477	0.432	-638

Net Profit Value (NPV)	=	+ 1,997

The NPV is positive, hence ‘go’ for the project.

3.3 Illustration of Net Present Value (Annuity)

Obumneme Group of Companies leases land and erects building on it, financing the construction from term loans. The buildings are rented out by the company which can borrow and invest money at 15 percent per annum.

As the company's financial controller, you have been approached to advise it on how best to use a site it leased 25 years ago for 80 years, from Obumnenye Local Government for an initial premium of ₦50, 000,000 and annual ground rent of ₦6, 000,000. When the lease expires, the building will revert to the local government. The following options are available to the company on the use of the site in question.

a. The site could be out-leased for the remaining years at an annual rent of ₦40, 000,000.

b. A house could be constructed quickly on the site with the following estimated costs and income.

Building and other capital expenditure	₦500, 000,000
Annual management and maintenance fee	₦150, 000,000
Annual rental income (till the lease expires)	₦250, 000,000

c. Blocks of flats could be constructed on the site. However, this would entail a long development period and rents would not be collected till after 5 years. The estimated costs and income for this option are given as follows.

Building and other capital expenses = ₦250, 000,000 per year (amounting to N1, 250,000.00) Annual management and maintenance costs of N200,

000,000.00 and annual rental income of N550, 000,000.00 (for the 50 years after completion)

SUGGESTED SOLUTION

This is an interesting question that brings out some cost/management concepts clearly. The concepts are the followings.

a. The initial premium of ₦50, 000.00. This cost is already incurred hence it is both sunk and irrelevant. Accordingly, we shall disregard it in our analysis.

b. The annual ground rent of ₦6, 000.00. This cost is yet to be incurred. Hence, it is a relevant cost. However, since it must necessarily be incurred regardless of the option embarked upon, it becomes a common cost. Accordingly, including or excluding it in our analysis shall not affect our decision. We shall exclude it.

c. The net cash inflows in each case form an annuity. Hence, we shall use annuity table (present value) instead of ordinary present value table.

d. Relevant period.

The land was rented 25 years ago for 80 years. The relevant period therefore is from today (the 25^{th} year) to the 80^{th} year. That is, 55 years.

Therefore, the annuity factor at 15 percent for 55 years is calculated thus.

The formula is = $\frac{1-(I+r)^{-n}}{r}$

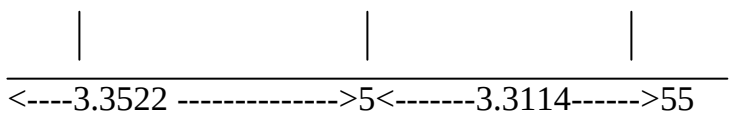
where n = the number of periods

r = the interest rate

Substituting

$$\frac{1-(1.15)^{-55}}{0.15} = \underline{6.6636}$$

Option C however takes the form of a deferred annuity since the building would take 5 years to complete and cash inflows can only take place as from the 6th year. This we can represent on a number line thus:



- a5 0.15 = 3.3522 and
- a55 0.15 = 6.6636
- difference = 3.3114

Therefore, the annuity factor for the deferred annuity is 3.3114. Anchored on foregoing comments, we then proffer our solution thus:

Option A: Out- lease the site for remaining years

Since the yearly income is ₦40, 000,000 for 55 years, the present value is ₦40, 000,000 x 6.6636 = ₦266, 544,000.00.

Option B: Quick construction of a house at the site. This is purely theoretical, as house cannot be so quickly built.

Assuming that it is possible to quickly construct a house, then the cost of the house ₦500, 000,000 took place in year zero. Also, since the annual management and maintenance fee is ₦150,000,000 and the annual rental income is ₦250,000,000, the net annual cash inflow is ₦100,000,000 (i.e. ₦250,000,000 – ₦150,000,000). Therefore, the NPV is ₦100, 000,000 x 6.6636 – ₦500, 000,000 = ₦166, 360,000.

Option C: Construction of a block of flats.

Since the construction would last for 5 years @ ₦250, 000,000 per annum, the present value of the cost of the block of flats is:

₦250, 000,000 x 3.3522 = ₦838,050,000

Also, given that annual management and maintenance costs ₦200,000,000 and annual rental income of ₦550,000,000 shall commence after 5 years, the annual net cash inflows of ₦350,000,000 (₦550,000,000 – ₦200,000,000) form a deferred annuity whose present value is

₦350, 000,000 x 3.3114 = ₦1,158,990,000

This leaves us with an NPV of ₦320, 940,000 (That is ₦1, 158,990,000 – ₦838, 050,000).

Summary

Option A: NPV = ₦266, 544,000

Option B: NPV = ₦166, 360,000

Option C: NPV = ₦320, 940,000

Therefore, since option C has the highest NPV, that option is the most preferable and hence recommended.

N.B: We most logically assumed the 25th year as our focal date.

4.0 CONCLUSION

In this unit, you have learnt about the most fundamental methods for appraisal capital projects – the Net Present Value (NPV). This approach must be understood and applied most religiously.

5.0 SUMMARY

In this unit, you are acquainted with the Net Present Value (NPV) method of capital investment approach. You are now familiar with the basic definition, its advantages and disadvantages as well as the formula. You have also learnt about the computational technique and the investment criteria.

6.0 TUTOR-MARKED ASSIGNMENT

Flourish Plc is to start up a project worth N8m and having the following cash flows:

Yrs	Cashflows (₦)
1	5,000,000
2	6,000,000
3	8,000,000

If the discount rate is 25% calculate the NPV if the scrap value at the end of 3 years is ₦100,000.

Peculiar Nig. Ltd. invested ₦10m in a project that gives it ₦1m per annum for 40 years. If the cost of capital is 10 per cent per annum, compute the Net Present Value.

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UNIT 12 THE INTERNAL RATE OF RETURN (Discounting Technique)

CONTENTS

1.0 INTRODUCTION

In the previous units of this module, you are conversant with the various investments appraisal techniques. While the payback period tried to answer the question of how long it would take for the cost of the investment to be recovered, the Net Present Value (NPV) on the other hand centred on wealth maximization. Yet, there is another method that sets a hurdle rate, internally, before investment can take place. This is called the Internal Rate of Return (IRR). This is the focus of this unit.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define Internal Rate of Return (IRR)
- state IRR formula and how to derive unknown values within a range
- outline the investment criteria under the IRR
- state the merits and the demerits of IRR.

3.0 MAIN CONTENT

3.1 Internal Rate of Return (IRR)

According to Okafor (1983), the IRR criterion follows the basic principles of the NPV method. Unlike the NPV method, the IRR does not use an exogenously determined (exogenously to the project being considered) discount rate. Rather, the principle is to find a rate of discount that will match the discounted value of cash inflows and outflows. The rate of discount, which achieves that equality, is the internal rate of return. Put differently, the internal rate of return is the rate at which NPV is zero; the rate, at which the present value of the cash inflows is equal to those of the outflows, and the hurdle rate or the break-even rate.

According to Lucey (1988), alternative names for the IRR include DCF yield, marginal efficiency of capital, trial and error method, discounted yield and the actuarial rate of return. According to Okafor (1983) and VanHorn (1986), the IRR is derived mathematically by solving the following equation for:

$$\sum_{t=0}^{n} \frac{CF_t}{(I = r)^t} = 0$$

For conventional projects, the equation becomes:

$$\sum_{t=0}^{n} \frac{CF_t}{(I = r)^t} = CF_0$$

3.2 Investment Criteria under the IRR Approach

Under the IRR, the investment criteria are as follows.

- Invest if IRR > cost of capital. That is invest if the internal rate of return is more than the cost of capital.
- Do not invest if the IRR < cost of capital. That is, do not invest if the internal rate of return is less than the cost of capital.
- Remain indifferent if IRR = cost of capital.

3.3 Advantages of IRR

1. It shows the return on the original money invested.
2. IRR rates are presented in form of familiar figures that can easily be interpreted by the user of the data.
3. IRR though peculiar to a given project avoids disputes that characterize the choice of the appropriate cost of capital to use when appraising project.

3.4 Disadvantages of IRR

1. It is difficult to compute and interpret.
2. It most times bring conflicting answers with NPV of which NPV will be used for decision making therefore making IRR more irrelevant
3. It can lead to a situation of sub-optimal decision.

4. Where mutually exclusive projects are being considered, the IRR may produce a decision that will conflict with the NPV decision in that the IRR, being a rate of return, does not recognise the size or scale of project.
5. A project may produce more than one IRR. This also occurs when a project has unconventional cashflows.

ILLUSTRATION 1

Refer to illustration 2 under Module 2 unit 6. Compute the Internal Rate of Return (IRR).

SUGGESTED SOLUTION

Trial and Error: Let us try 20% since 15% gives NPV of ₦1, 997,000

Year	**Cash flow ₦'000**	**20% Discount ₦'000**	**Net Present ₦'000**
0	-20,000	1,000	-20,000
1	12,400	0.833	10,329
2	6,000	0.694	4.164
3	7,100	0.579	4,111
4	2,203	0.402	1,061
5	2,774	0.402	1,061
6	-1,477	.0335	-495
			285

Let us try 22%

Year	**Cash flow ₦'000**	**20% Discount ₦'000**	**Net Present ₦'000**
0	-20,000	1,000	-20,000
1	12,400	0.820	10,168
2	6,000	0.672	4.032
3	7,100	0.551	3,912
4	2,203	0.451	994
5	2,774	0.370	1,026
6	-1,477	0.303	-447
			-315

Since IRR lies between positive and negative numbers, it should lie between + 286 and –315. Hence, using the formula to calculate the IRR, we have:

$$IRR = x + \left|\frac{a}{a+b}\right|(y - x)$$

where x = the lower rate of interest used

- Y = the higher rate of interest used
- a = the absolute NPV at X%
- b = the absolute NPV at Y%
- II = modulus i.e. assume every figure to be positive.
- IRR = Internal Rate of Return

Using the above formula, we have:

20% + [285/ (285 + 315)] x (22 – 20)

= 20 + (285 x 2)/600

= 20 + 0.95

∴ IRR = 20.95%

This is the highest cost of capital, which could be used on the project. As a check, calculate the NPV with 20.95% as your cost of capital.

Proof: **Femi Nig. Ltd.**

Year	Cash flows ₦	DF @ 20.95%	PV ₦
0	(20,000)	1.000	(20,000)
1	12,400	0.827	10,255
2	6,000	0.684	4,104
3	7,100	0.565	4,012
4	2,203	0.467	1,029
5	2,774	0.386	1,071
6	(1,477)	0.319	(471)
			0

ILLUSTRATION 2

Haruna Nigeria Ltd.

An investment is being considered for which the net cash flows have been estimated as follows:

Year 0	Year 1	Year 2	Year 3	Year 4
₦ -9,500	₦ 3,000	₦ 4,700	₦ 4,800	₦ 3,200

What is the NPV if the discount rate is 20%? Is the project acceptable? Calculate the IRR.

SUGGESTED SOLUTION

From the table, at r = 20%

The discount factors are 0.833, 0.694, 0.579 and 0.482

∴ NPV = -9500 + (0.833 x 3000) + (0.694 x 4700) + (0.597 x 4800) + (0.482 x 3,200) = + ₦582.

Since, the NPV is positive, the project is acceptable. To calculate the IRR, we try higher rate say 25%. The NPV if r = 25% is calculated thus:

Year	**Cashflow ₦'000**	**20% Discount ₦'000**	**Net Present ₦'000**
0	-9500	1,000	-9,500
1	3,000	0.8000	2,400
2	4,700	0.6400	3,008
3	4,800	0.5120	2,458
4	3,200	0.4096	1,311

That gives NPV = -323.

The IRR can be calculated as follows:

$$IRR = 20\% + 5\% \left(\frac{582}{905}\right) = \underline{23.22\%}$$

a b c d

where:

- is a discount rate, which gives a positive NPV? In this example, 20% gives ₦-582.
- is the difference between (a) and the rate, which gives a negative NPV? In this example, 25% - 20% = 5%.
- is the positive NPV at the discount rate chosen in (a)? In this example, it is 582?
- is the total range of NPV at the rates chosen? In this example, + 582 to – 323 = 905?

ILLUSTRATION 3

Justice Chukwuyem has been looking for a suitable investment which will give a target internal rate of return of 17 to 20%. An investment adviser has offered the company a project, the details of which are given below.

Pineapple Squash Bottling Project

Initial investment involves purchase of machinery for ₦1, 800,000 and installation expenses of ₦310, 000. The plant can produce ₦100,000 cartons of pineapple squash per annum, during the first two years, rising to125,000 cartons per annum, for the next three years. Cost of production of each carton, excluding depreciation costs is ₦21 and the selling price will be ₦27. The plant will be scrapped at the end of the 5^{th} year and is expected to have negligible scrap value.

You are required to calculate the actual internal rate of return of the above project. You may ignore the effect of taxation.

SUGGESTED SOLUTION

Present Value factor = $(1 + r)^n$

where r is the rate; and

n is the number of year.

i. Pineapple Squash Bottling Project

Year	**Cash flow ₦**	**PV Factor 17%**	**Present Value**	**PV Factor 20%**	**Present Value**
0	(211,000)	1.000	(211,000)	1.000	(211,000)
1	60,000	0.855	51,300	0.833	49,980
2	60,000	0.731	43,860	0.694	41,640
3	75,000	0.624	46,800	0.579	36,150
4	75,000	0.534	40,050	0.482	36,150
5	75,000	0.456	34,200	0.402	30,150
Net present value			5,210		(9,655)

Cash flow – years 1 and 2 (₦27 – 21) x ₦10, 000 = ₦60, 000

Cash flow – years 3, 4, and 5 (₦27 – 21) x ₦12, 5000 = ₦75,000

N/B: This is a neat way of determining the cash inflows.

Actual Rate of Return = $a + \frac{c}{c+d}$ (b – a)

Where a = the low discount rate

b = the high discount rate

c = the low rate of present value

d = the high rate of net present value

$17 + \frac{5210}{5210+9655}$ (20 – 17)

= $17 + \frac{5210 \times 3}{14865}$

= 17 + 1.05 = 18%

3.5 Short cut to IRR computation

You learnt that the computation of IRR involved a lot of trial and error except when you are using computers. Therefore, any discussion that could considerably reduce the quantum of trial and error shall be a welcome development. Accordingly, we shall be concern with developing short cuts to trial and error approach.

Since the calculation of IRR is based on trial and error, any technique to minimize the extent of the trial and error would be highly appreciated. The following steps would be helpful.

Step 1: Sum up the cash inflows

Step 2: Find the average of the cash inflows. Let this be x

Step 3: Given that the cash outflow occurred in year zero and taking year zero as the focal date, we then establish an equation of values,

Thus x and i = CFO

Where x = the average of cash inflows

And i = annuity factor for a given value of n and i

CFO = cash outflow in year 0.

Step 4: From the annuity table (present value) read up the nearest (most approximate) rate in which annuity factor at the given value of n is very close to the quotient

Step 5: The rate obtained in Step 4 above becomes the base rate.

Step 6: Compute the NPV using the rate as the discount rate.

Step 7: If the NPV derived from above is positive, a higher rate of discount is tried and if negative, a lower rate is tried.

Step 8: Upon arriving at two rates, one having a positive NPV and the other a negative NPV, resort to interpolation viz:

$$IRR = x + \left|\frac{a}{a+b}\right|(y-x)$$

where IRR = internal rate of return

x = the lower rate

a = NPV at x

y = the higher rate

b = NPV at y

II = modulus sign (meaning assume every figure to be positive).

ILLUSTRATION

Anulika Nig. Ltd. is considering investing in a project which cash flows were as follows:

Year 0 ₦'000	**Year 1** ₦'000	**Year 2** ₦'000	**Year 3** ₦'000	**Year 4** ₦'000	**Year 5** ₦'000
-144	+15	+25	+35	+45	+ 60

Given that the cost of capital is at 10% per annum, should Anulika Nig. Ltd. invest in it or not – using the IRR approach?

SUGGESTED SOLUTION

To minimize the extent of the trial and error, the above eight steps are then sequentially followed in the following way.

Step 1: Sum up the cash inflows ₦ (15,000 + 25,000 + 3,500 + 45,000 + 60,000) = ₦180, 000

Step 2: Find the average of the cash inflows: the average is ₦180, 000 ÷ 5 = ₦36, 000

Step 3: Given that the outflow occurred in year zero and taking year zero as the focal date, we then establish an equation of values, thus:

X an i = CFO

Substituting

36,000 as 5 i = 144,000

∴ a 5 i = 4.00

Step 4: From the annuity table (present value) read up the nearest (most approximate) rate which annuity factor at the given value of n is very close to the quotient, CFO: X

Substituting

144,000: 36,000 = 4.00

From the annuity table (present value) given that n = 5 and a5 i = 4.00

The nearest values of i are 7% (4.100) and 8% (3.993).

Step 5: The rate obtained in Step 4 above becomes the base rate. In this case 8%

Step 6: Compute the NPV using the base rate at the discount rate.

Year	**Cash flow ₦'000**	**DCF @ 8% ₦'000**	**Present Value ₦'000**
0	-144	1,000	-144.00
1	15	0.926	13.89
2	25	0.857	21.43
3	35	0.794	27.79
4	45	0.735	33.08

5	60	0.681 NPV =	40.86 -6.95

Step 7: If the NPV derived in Step 6 above is positive, a higher rate of discount is tried and if negative, a lower rate is tried.

Accordingly, let's try lower rate say 6%

Year	**Cash flow ₦'000**	**DCF @ 8% ₦'000**	**Present Value ₦'000**
0	-144	1,000	-144.00
1	15	0.943	14.15
2	25	0.890	22.25
3	35	0.839	29.37
4	45	0.792	35.64
5	60	0.747	44.82
		NPV =	-2.23

Step 8: Upon arriving at the two rates, one having a positive NPV and the other a negative NPV, resort to interpolation viz:

$$IRR = x + \left|\frac{a}{a+b}\right|(y-x)$$

where IRR = internal rate of return

x = the lower rate

a = NPV at x

y = the higher rate

b = NPV at y

II = modulus

Substituting:

$$IRR = 6 + \frac{2.23}{2.23 + 6.95}(8-6)$$

$$= 6 + \frac{2.23 \times 2}{9.18}$$

$$= 6 + 0.4858$$

= 6.486

As a check, let's now compute the NPV given that the discount rate = 6.486%.

Year	Cash flow ₦'000	DCF @ 6.486% ₦'000	Present Value ₦'000
0	-144	1,000	-144.00
1	15	0.9391	14.0865
2	25	0.8819	22.0475
3	35	0.8282	28.987
4	45	0.7777	34.999
5	60	0.7304	43.824
		NPV =	-0.056*

- For all practical purposes, the NPV at IRR should be zero. However, occasionally, one could record a negligible negative or positive NPV (-0.056 in this case) due to rounding up of error.

4.0 CONCLUSION

This method called Internal Rate of Return is also very important. Even with the possibility of multiple rates, it is still very important.

5.0 SUMMARY

In this unit, you have learnt the various definitions of Internal Rate of Return (IRR). You are now aware of computational techniques and the investment criteria. You have also learnt the short cut approach to solving IRR Problems.

6.0 TUTOR-MARKED ASSIGNMENT

1. Calculate the projects IRR if the initial outlay is N80,000 and the cash flow are as follows:

Yrs	CF (₦)
Yr1	10,000
Yr2	12,000
Yr3	40,000
Yr4	25,000
Yr5	15,000

If the expected scrap value is 5,000 at the end of five years and the discount factor is 15%.

7.0 REFERENCES/FURTHER READING

Horngren, C.T., Datar, S. & Foster (1997). *Cost accounting: A managerial emphasis*. New Delhi: Prentice Hall.

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UNIT 13 THE PROFITABILITY INDEX (Discounting Technique)

CONTENTS

1.0 INTRODUCTION

As scientific as the Net Present Value (NPV) approach to investment appraisal may appear to be, it has one major limitation– it fails to consider the quantum of capital that generated the NPV. This is a major weakness since ordinarily; a higher capital base will generate a higher NPV. Logically, therefore, a relative NPV or better still, an NPV per unit of capital base would give a better evaluation results. This is where the Profitability Index (PI) becomes an indispensable investment appraisal technique for projects evaluation.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain the meaning of profitability index (PI)
- state the formulae for PI

- apply the formulae for PI
- outline the merits and the demerits of PI
- compare the IRR method with the NPV method.

3.0 MAIN CONTENT

3.1 Profitability Index or Excess Present Value Index (EPV I)

There are two possible formulae to calculate this index.

a. According to Okafor (1983), the profitability index (PI) of a project is the ratio of the sum of the present values of all its cash inflows to the sum of the present values of its cash outflows, i.e.

$$PIi = \frac{Pvi}{Ci}$$

Where

PIi = profitability index of project I

Pvi = sum of present value of cash inflows from project I

Ci = sum of present value of cash outflows of project I.

b. According to Lucey (1988), the EPVI is merely a variant of the basic NPV method and is the ratio of the NPV of a project to the initial investment.

$$\text{i.e. EPVI} = \frac{\text{NPV}}{\text{Initial Investment}}$$

Thus, the index is a measure of relative and not absolute profitability. Because of this, it suffers from the same general criticisms when used for ranking purposes as the IRR.

Decision rule

The decision rules for the profitability index are as follows.

- Accept only projects that have profitability index of more than 1 (one)

- Reject projects that have profitability index of less than one
- Remain indifferent if the index is zero.

For the excess present value index, the decision rules are as follows.

- Accept only projects which EPVI is positive
- Reject projects which EPVI is negative
- Remain indifferent if the EPVI is zero.

ILLUSTRATION 1

Nwagod Company Ltd is considering five different investment opportunities. The company's cost of capital is 12 percent. Data on these opportunities under consideration are given below.

Project	**Investment ₦'000**	**PV at 12% ₦'000**	**NPV ₦'000**	**IRR ₦'000**	**Profitability Index ₦'000**
a.	35,000	39,325	4,325	16	1.12
b.	20,000	22,930	2930	15	1.15
c.	25,000	27,453	2,453	14	1.10
d.	10,000	10,854	854	18	1.09
e.	9,000	8,749	(251)	11	0.97

i. Rank the five projects in descending order of preference, according to:

- NPV (Net Present Value)
- IRR (Internal Rate of Return)
- Profitability Index.

Which ranking would you prefer?

Based on your answer in part 2, which projects would you select if ₦55, 000,000 is the limit to be spent?

SUGGESTED SOLUTION

i. **Nwagod Company Ltd**

Order of Preference	NPV	IRR	Profitability Index
a.	1	2	2
b.	2	3	1
c.	3	4	3
d.	4	1	4
e.	5	5	5

ii. The profitability index approach is generally considered the most dependable method of ranking projects competing for limited funds. It is an index of relative attractiveness, measured in terms of how much you get out for each naira invested.

i. Based on the answer in part 2, projects (a) should be selected, where combine NPV would be ₦7, 255 (₦2,930 + ₦4,325) with the limited budget of ₦55,000,000.

4.0 CONCLUSION

In this unit, you have learnt that Net Present Value (NPV) has one major weakness when one is faced with two or more projects – it fails to take into consideration the quantum of capital outlay that generated the NPV. This is a weakness because huge capital outlays are likely to have huge NPV relative to small capital outlay. This is where the Profitability Index (PI) comes in hence; PI is defined as NPV per unit of capital.

5.0 SUMMARY

In this unit, you have looked at the basic definition of profitability index. You also looked at the computational techniques and the investment criteria.

6.0 TUTOR-MARKED ASSIGNMENT

United Development Corporation has ₦2.5million naira available for investment in projects. The following projects are under consideration.

Project No	Initial ₦	Annual ₦	Life
1.	800,000	230,000	6 years
2.	600,000	190,000	6 years
3.	700,000	210,000	6 years
4.	900,000	240,000	6 years
5.	300,000	92,000	6 years
6.	950,000	300,000	6 years

The corporation expects a minimum rate of return of 18%. Projects Nos. 2 and 5 are complementary to each other. They have to be accepted together or rejected together. Projects Nos. 2 and 5 are mutually exclusive due to their nature.

You are required to:

i. calculate profitability of all the six projects (6 marks)

ii. advise the corporation on selection of projects to maximise profitability, bearing in mind that only ₦2.5 million capital is available (6 marks)

Note: Present value of annuity of ₦1 for the next 6 years at 18% is ₦3.497 (ICAN, Nov. 1999, Q3).

7.0 REFERENCES/FURTHER READING

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UNIT 14 PERFORMANCE MEASUREMENT 1

CONTENTS

1.0 INTRODUCTION

Every companies have their goals and objectives whether small, medium-size or large. These objectives are usually communicated to the lowest level of management in the form of budget and targets and are somewhat expressed in figures. But, in reality there could be deviations from these targets which may reduce the probability of companies meeting their objectives. This implies that performance evaluation is fundamental in order to measure whether such organization has achieved its goals and objectives. Thus, performance measurement or evaluation is necessary for the following reasons:

- to measure the extent to which the targets set are being met;
- to identify the risky areas of the business and report appropriately to the managers;
- to ascertain areas that are performing poorly and thereafter make reports to the managers for corrective steps;
- for appropriate and adequate reward of good performances.

The purpose of performance measures is to set direction and to motivate managers. Measurements provide incentives, so it is important that performance measures be tied to valuable organizational goals. For example, a hotel could have the following goals and related performance measures:

Organizational Goals	**Performance Measures**
Exceed guests expectations	Satisfaction index, number of repeated stays
Maximize revenue yield	Occupancy rate, room rate, income before fixed costs
Focus on innovation	New products/services implemented per year, number of employee suggestions

The performance measurement is further classified into financial and non-financial performance measurement. The financial performance measures tries to evaluate how externalities look to shareholders. This they do by gauging their cash flows, market shares, sales growth, operating incomes, return on equity, assets and so on while non-financial measures evaluate performance from customer's perspective (e.g. ordering,

invoicing, sales and paying for materials), internal perspective (e.g. cycle time, quality, employee skills and productivity), and innovation and learning perspective (e.g. time to develop next generation, process time to maturity, new product introduction and competition).

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Highlight the attributes of a good performance measures;
- Differentiate between financial and nonfinancial measures in an organization;
- Explain the term bench marking;
- Describe the various types of benchmarking;
- Give the formulas for the various key performance indicators; and
- Identify the limitations of the use of ratios in measuring performance

3.0 MAIN CONTENT

3.1 Developing Performance Measures

Business managers are increasingly recognizing the importance of effective performance measures. A typical attitude of managers is “you simply cannot manage anything you cannot measure”. Because most units/departments within an organization have multiple goals and actions, only some of these goals and actions are expressed in financial terms, such as operations budgets, profit targets, or required rate of return on investment, depending on the financial classification of the centre. Other goals and actions, which are to be achieved concurrently, are nonfinancial in nature. For example, many companies list environmental stewardship, social responsibility and organizational learning as key goals. The well designed management control system

develops and reports both financial and nonfinancial measures of performance. Good performance measures will

- relate to the goals of the organization;
- balance long-term and short-term concerns;
- reflect the management of key actions and activities;
- be affected by actions of managers and employees;
- be readily understood by employees;
- be used to evaluate and reward managers and employees;
- be reasonably objective and easy to measure; and
- Be used consistently and regularly

Both financial and nonfinancial performance measures are important. Sometimes, accountants and managers focus too much on financial measures, such as profit or cost variances, because they are readily available from the accounting system. Managers, however, can improve operational control by also considering nonfinancial measures of performance. Such measures may be more timely and more closely affected by employees at lower level of organizations, where the product is made or the services rendered.

Nonfinancial measures are often easier to quantify and understand. Hence employees can be easily motivated toward achieving performance goals. Often the effects of poor nonfinancial performance (for example, lack of organizational learning and process improvement and low customer satisfaction) do not show up in the financial measures

until considerable ground has been lost. Financial measurement often are lagging indicators that arrive too late to help prevent problems and ensure organization's health. What is needed are leading indicators. As a result, many companies now stress management of the activities that drive revenues and costs rather than waiting to explain the revenues or costs themselves after the activities have occurred. Superior financial performance usually follows from superior nonfinancial performance.

SELF ASSESSMENT EXERCISE

1. What are the attributes of a good performance measure?
2. Differentiate between financial and nonfinancial performance measures.

3.2 Benchmarking

This is the process of comparing a company's performance with that of other companies in the industry or against best practice. With benchmarking, we try to evaluate the company's current position when matched against other companies in the industry or other industries. After the analysis of the company's own performance, a comparison of the company's with others will be done. The difference between the company's performance and those of other companies is known as a **performance gap**. Corrective actions will be taken in order to close the performance gap. The following are the **types of benchmarking**:

3.2.1 Strategic Benchmarking: This is the benchmarking made when a company wants to improve its overall position in relation to other companies. This has to do with comparing high level factors like values, distinctive capabilities, core competences, product development, etc. however, since these are high level, it could take some years for it to fully be implemented.

3.2.2 Performance /competitive Benchmarking: This is the benchmarking that involves comparing the company's performance in key areas, products or services with that of other companies in the industry.

3.2.3 Process Benchmarking: This is the benchmarking that seeks to improve existing key processes by comparing it with that of other companies. The benefits derived from this type are mostly short-term.

3.2.4 Functional Benchmarking: This type of benchmarking seeks to improve individual activities, areas or functions within the organization by comparing them with benchmarks from companies drawn from different businesses within and outside the industry of the company. It's geared towards gaining expertise or specialization in areas like finance, distribution, customer services, etc.

3.2.5 Internal Benchmarking: This type of benchmarking involves the comparison of the performance of one division, unit or department within an organization with the others also within the organization. So the management of the company might have the intention of spreading the good performance of one unit throughout the organization. There is virtually no much hindrances encountered in the process as there will be easier access to sensitive information than the others.

3.2.6 External Benchmarking: This type of benchmarking involves the comparison of the performance of the company as a whole to the best practice found in other companies. This can be the direct opposite of the internal benchmarking as there could be limited access to sensitive information for adequate comparison.

SELF ASSESSMENT EXERCISE

Explain the term benchmarking and describe the various types of benchmarking in organizations.

3.3 Financial Performance Measurement

This entails the collecting and reporting of information that will show how well the company uses its assets to generate the needed revenue that supports the overall company objectives. This shows the financial health of the company and could be used to make comparisons between the company and other companies in the industry. Financial performance measurement indicator frequently used is a ratio. A ratio relates two pieces of financial data to each other.

Key Financial Performance Indicators

3.3.1 Profitability Ratios: indicates the firm's efficiency of operation. These ratios are of two types: those showing profitability in relation to investment and those showing profitability in relation to sales.

Net Profit Margin = $\frac{\text{Profit Before Interest and Tax (PBIT)}}{\text{Revenue}}$

Gross Profit Margin = $\frac{\text{Gross Profit}}{\text{Revenue}}$

Asset Turnover = $\frac{\text{Revenue}}{\text{Total Capital Employed}}$

The total capital employed = Non-current Assets + Current Assets – Current Liabilities

Return On Capital Employed (ROCE) = Asset turnover x Net Profit Margin

= $\frac{\text{Profit Before Interest and Tax}}{\text{Total Capital Employed}}$

3.3.2 Liquidity Ratio: are used to judge a firm's ability to meet short-term obligations. Essentially, this ratio is used to compare short-term obligations with short-term resources available to meet these obligations.

Current Ratio

This is the ratio that indicates the number of times the current assets can be used to settle the current (short–term) obligations. A normal ratio is considered to be 1:1

$$\text{Current Ratio} = \frac{\text{Current Asset}}{\text{Current liabilities}}$$

Being that there are certain portions of the current asset that are not easily converted into cash (i.e. illiquid) another ratio which excludes the inventory is calculated. A normal rate is considered to be 1.

$$\textbf{Quick or Acid Test Ratio} = \frac{\text{Current Assets – Inventory}}{\text{Current Liabilities}}$$

3.3.3 Efficiency Ratios:

Inventory Period

This could be measured in days, week or months. This shows the amount of time the company has to hold on to inventory before it can be converted to cash. So, a high ratio is not healthy for the organization and could imply that much capital is being tied down. This ratio can thus, be improved by:

- introducing a Just-In-Time System;
- review of the production process;
- review of the inventory system in order to eliminate obsolete inventories;
- automation of some processes; and

- re-design of factory to allow easy flow of inventory

Inventory Period = $\frac{\text{inventory x 365}}{\text{Cost of sales}}$ for days

Receivables Period

This could be measured in days, week or months. It shows the amount of time it takes the company to receive its revenue arising from sales. This is because some sales made were on credit. With a high ratio, the company faces the risk of running out of cash for operations. To improve this ratio, the company should:

- review the company's credit term; and
- grant more discounts that can induce early settlement of credit by customers

Receivable Period = $\frac{\text{Receivables x 365}}{\text{Credit Sales}}$ for days

Payables Period

This can also be measured in days, weeks or months. It shows the amount of time it takes the company to settle its short-term obligations. A high ratio will indicate that the company takes so much time to settle its payables and thus will be at risk of losing further credit facility from its customers.

Payables Period = $\frac{\text{Payables x 365}}{\text{Credit Purchases}}$ for days

3.3.4 Gearing Ratios

Financial Gearing Ratio

This ratio measures the financial risk of the company. The financial risk of the company happens to be the risk that a company faces as a result of the composition of its capital structure (i.e. debt and equity).

Gearing ratio (financial risk) = $\frac{\text{Debt}}{\text{Debt + Equity (shareholders' funds)}}$

Operational Gearing Ratio

This measures the business risk of the company. The business risk is the deviations that could occur to the expected revenue as a result of the operations, products, services, etc. that the company is into.

Operational gearing ratio (business risk) = $\frac{\text{Contribution}}{\text{Profit before Interest and}}$

So where this ratio is high, it could be an indication of high fixed cost proportion of the total cost, reduced sales or reduced profit margin. Although the ratios are easy to calculate and understand, there are few limitations

3.4 Limitations of Ratios

- The ratios are not useful until they are compared with the ratios of other companies
- The ratios are historical which may not be accurate for predicting the future
- The basis of computing those ratios can differ from firm to firm thereby making comparison difficult.
- There are other areas of business that are not being captured by the financial analysis such as quality, customer service, etc.
- The variables that make up the ratio analysis can be manipulated by managers.

4.0 CONCLUSION

Performance measurement is a tool for achieving the goals and objectives in the hands of a business manager. Organizations should strive towards developing well-designed management control system and report both financial and nonfinancial measures of

performance. To evaluate the financial condition and performance of a company, the financial analyst needs certain yardsticks which includes ratio that relates two pieces of financial data to each other. The analysis and interpretation of various ratios should show the financial condition and performance of the firm than they would obtain from analysis of the financial data alone.

5.0 SUMMARY

In this unit, we have been able to discuss the attributes of a good performance measure, differentiate between financial and nonfinancial performance measures, explain the term benchmarking and describe the various types of benchmarking. We were also able to consider financial performance with respect to ratio analysis as a key financial performance indicator.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain extensively the financial performance measurement.
2. Describe the importance of performance measurement

7.0 REFERENCES/FURTHER READING

Horngren, C.T., Sundem, G.L. & Stratton, W.O. (2004) Introduction to *management accounting.* New Delhi: Prentice-Hall.

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UNIT 15 PERFORMANCE MEAUREMENT II

CONTENTS

1.0 INTRODUCTION

There are aspects of performance that cannot really be measured by the use of financial performance ratios. Some areas may include quality, customer satisfaction, customer service and retention, etc. there are certain models that will be used in this aspect of performance measurement. They include:

- Kaplan and Norton's Balanced Scorecard;
- Lynch and Cross' Performance Pyramid; and
- Flitzgerald and Moon's Building Blocks

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Describe the Kaplan and Norton's Balanced Scorecard
- Explain the Lynch and Cross' Performance pyramid
- Highlight the characteristics of Flitzgerald and Moon's Building blocks

3.0 MAIN CONTENT

3.1 The Balanced Scorecard

The balanced scorecard is a performance measurement and reporting system that strikes a balance between financial and operating measures, links performance to rewards, and gives explicit recognition to the diversity of organizational goals. Balance scorecard is a set of measurement that gives top managers a fast but comprehensive view of the business. The balance scorecard includes both financial and operational measures that tell us how an organization has performed. Companies use the balanced scorecard to focus management's attention on items subject to action periodically.

In using the balanced scorecard, the managers will have to view performance from four different perspectives.

- Financial Perspective – how does the company look to the shareholders?
- Customer Perspective – how is the company seen by customers?
- Internal Perspective – how well does the company manage its internal processes?
- Innovative and learning Perspective – how can the company continue improving and creating value?

3.1.1 Financial Perspective

This shows how the company creates value for its owners. The owners being the shareholders will be concerned with several aspects of financial performance which include:

- Market share
- cash flow
- Revenue growth
- share price
- Profit ratio
- profit growth
- Return on investment
- Economic value added
- Return on capital employed
- and many others

3.1.2 Customer Perspective

This looks at what customers value the most. Thus, the company can focus its performance targets on satisfying the customers more effectively. In order to meet the financial perspective targets, the customers should be satisfied so as to drive more sales. This aspect will look at things like:

- Customers service
- Responsiveness
- New products

- Customer Loyalty
- New markets
- Reliability
- Customer retention
- Image
- Customer satisfaction
- Efficiency

So in analyzing the customer perspective, the following could be key performance indicators:

- Customer satisfaction index
- Average time taken to process orders
- Repeat purchases
- Returned orders
- Market share
- Response time
- On time deliveries
- New customer acquisitions
- Number of complaints

3.1.3 Internal Perspective

In order to achieve it's financial and customers objectives, what processes must the company perform with excellence? So the company should focus on activities that are essential to satisfying the shareholders and customers.

So the company will be focusing on things like:

- Improve core competence
- Quality performance
- Improvement in technology
- Inventory management
- Streamline processes
- Motivated workforce
- Manufacturing

The **key performance indicators** that can be used to measure this internal performance may include:

- Efficiency improvements
- increased productivity
- Reduction in unit costs
- % defective output
- Reduced wastes
- amount of recycled waste
- Increase in capacity utilization
- amount of reworking

3.1.4 Innovation and Learning Perspective

This is concerned on how the company can continue to improve and create value. The company will be focusing on how to improve the value already created while satisfying the shareholders and customers (financial and customers objectives). This will thus, help to sustain the customers too.

So the company will be focusing on things like:

- New product development
- Continuous improvement
- Technological leadership
- HR development
- Product diversification

The **key performance indicators** that can be used to measure the innovative and learning performance may include:

- Number of new products
- Value of new products in sales
- % sales from new products
- R&D as a % of sales
- Amount of training
- Number of employee suggestions
- Number of strategic skills learned
- Extent of employee empowerment

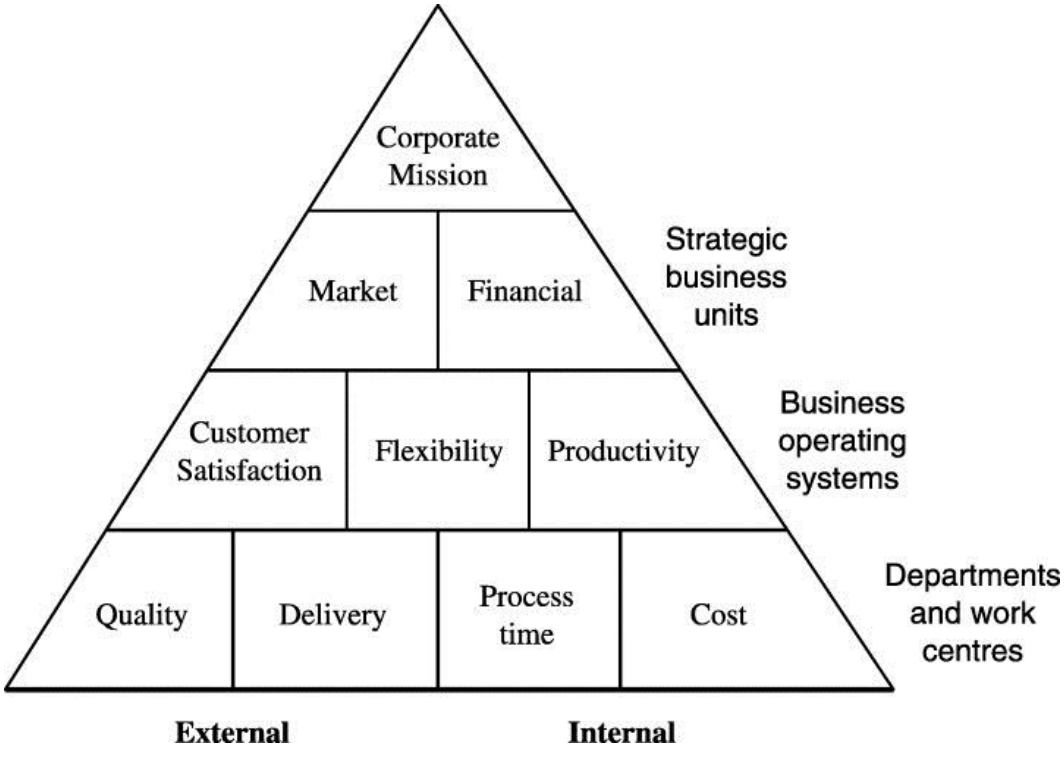
SELF-ASSESSMENT EXERCISE

Explain the Balanced Scorecard and describe the four perspectives

3.2 THE SMART PERFORMANCE PYRAMID

The Strategic Measurement and Reporting Technique (SMART) performance pyramid builds on four levels that show the link between corporate strategy, strategic business units and operation. The first level defines the overall corporate vision which is

translated into individual business unit objectives. Second level shows the short-term targets of cash flow and profitability and long term goals of growth and market position. The third level is business operating systems which consist of customer satisfaction, flexibility and productivity. The last level, which is the fourth level is the business unit and consists of four key performance measures (quality, delivery, cycle time and waste). The SMART performance pyramid is a balanced model which measures stakeholder satisfaction such as customer satisfaction, quality and delivery. It also measures the operation activity for example, productivity and lead time. The main strength of the SMART performance pyramid is that it provides a link between corporate objectives with operational performance indicators.



Objectives are being set by the top level of management and passed down to the lowest level of management in forms of target. So in essence, for the overall corporate

objectives of the organization as a whole to be met, business strategies with market and financial focus have to be used.

In order to achieve the market and financial business strategies, the targets for the business operating system also have to be met. These business operating system targets will include customer satisfaction, flexibility and productivity. To achieve targets of business operating system, the operational targets of quality, delivery, cycle time and waste have to be met. Now, with the exception of the flexibility, performance measures within the pyramid and below the corporate objective can be divided into market measures and financial measures. Thus; Market measures could mean measures of external effectiveness, and financial measures representing measures of internal efficiency.

For example: A company might have a goal of becoming the leading producer of Electronics in the industry (corporate vision). It comes up with a strategy of New Product Development (business strategy). The success of this new product as a business strategy for meeting the corporate objective depends on the company's ability to meet the customer's taste, being flexible enough to the changing market factors and enhancing productivity. Meeting customers' needs will entail producing quality products and delivering them on time to the customers. Improving productivity will entail reducing the cycle time (from order to delivery) and reducing wastes during production.

3.3 BUILDING BLOCKS

This model is mostly suitable for service industries. The building blocks are grouped into three:

- Dimensions
- Standard
- Reward

Dimensions

These are areas of the business that have to be monitored and controlled if business goals are to be achieved.

These dimensions can be further subdivided into two:

- Determinants
- Results

Determinants: Areas that affect the results. They include:

Quality - Number of complaints

Customer satisfaction as shown by customer opinion and surveys

Whether the rate of complaints are increasing or decreasing

Number of errors discovered

Flexibility - Speed in responding to customer requests.

Ability to cope with sudden increase in demand

The mix of different types of work done by employees

Innovation - Number of new services offered

% of total revenue that come from new services

Resources Utilization – labour efficiency, material wastage rate. Whether the assets are used to maximum capacity

Results - this reflects the success or failure of the determinants identified above.

Financial Performance - Profitability

Growth in profits

Profit margin

Competitiveness - growth in sales

Customer retention rates

Success rate in converting enquiries into sales

Market share

STANDARDS

What properties are good standards or targets to possess?

Equity - The standards should be fair for all managers. Performance measures should be equally challenging for all part of the business otherwise relaxation being given to one part will lead to feelings of unfair treatment by the others.

Ownership - here, the employees should accept the standards as their own. Where they feel the standards have been imposed on them by senior management, then the standard is not meeting this requirement.

Achievable - so standards should also be realistic

REWARDS

What properties should the reward schemes possess?

Motivation - the reward scheme should be set in a manner that will motivate the manager to achieve more.

Clear - those reward schemes should be clear. What kind of performance will be rewarded and how their performance will be measured should be communicated.

Controllability employees and managers alike should be held responsible for the results which they have control or influence over.

4.0 CONCLUSION

There are aspects of performance that cannot really be measured by the use of financial performance ratios. These areas include quality, customer satisfaction, customer service and retention. Thus, there are certain models that can be used in measuring this aspect of performance measurement. This was covered by this unit.

5.0 SUMMARY

In this unit, we have been able to critically explored three fundamental measures of performance namely the Balanced Score Card, SMART Performance Pyramid and Building Blocks.

6.0 TUTOR-MARKED ASSIGNMENT

1. Briefly explain the following:
    i. The Balanced Score Card
    ii. SMART Performance Pyramid
    iii. Building Blocks

7.0 REFERENCE/FURTHER READING

Horngren, C.T., Sundem, G.L. & Stratton, W.O. (2004) Introduction to *management accounting.* New Delhi: Prentice-Hall.

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