STUDY MANUAL

ADVANCED MANAGEMENT ACCOUNTING (PEB 3)

ASSOCIATION OF NATIONAL ACCOUNTANTS OF NIGERIA (ANAN)

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MODULE 1

1.00 INTRODUCTION TO COST AND MANAGEMENT ACCOUNTING

1.01 Learning Outcomes

On successful completion of this Module, students should be able to:

i. Practically prepare various budgets component as well as the master Budgets;
ii. Prepare functional budgets;
iii. Evaluate and appreciate the behavioral aspect of budgeting.

1.02 Definitions

Management is essentially concerned with planning and control of the resources of a firm, with a view to the attainment of set objectives. Planning is concerned with a delineation of goals, and the formulation of a decision model for selecting means of achieving those goals. Control on the other hand, is the regulation of the activities within an organisation so that they are in accord with expectations established in policies, plans and targets. Crucial to the planning and control decisions of management, is information. Good decisions are based on information that is timely, relevant, properly presented, problem solving, and forward looking. This is where the cost and management accountant comes in. He must provide management with cost information for planning and control functions, volume and profit decisions, and for goal attainment of management.

Management also needs guidance in the interpretation of cost information, if wise decisions are to be made in such matters as costing of products and services, production policy and pricing of products. A cost accounting system is therefore necessary in planning each factor in the cost of products, the ascertainment and analysis of costs of products, and the interpretation and communication of cost data for management decision making.

Cost accounting is the systematic analysis and recording of financial transactions in respect of material, labour and expense, the collation and interpretation of these records to disclose costs of particular products or services, and the application of this financial information for purposes of efficient management of the business. Thus, cost accounting has three stress areas:

- First it involves the analysis and recording of financial transactions as they concern Materials, Labour and Expenses. These are the Elements of Cost. Cost is essentially the amount of resource given up in exchange for some good or services. It is expenditure, actual or notional, incurred on, attributable to a specified thing or activity;
- Second, it involves a collation and interpretation of the records to disclose costs of particular products, job, contracts, or services. This process of Cost Ascertainment is called Costing. The main object of Costing is analysis of financial records so as to apportion and allocate expenditure carefully to cost centres, and thence arrive at total costs for departments, processes, jobs, contracts and units;
- Third, it also involves the interpretation, presentation and application of cost information for the efficient management business.
  This process is called Cost Accountancy. It is 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. It also includes presentation of information derived therefrom for the purpose of managerial decision making. Indeed, this is also the domain of Management Accounting.

Management accounting is concerned with the application of accounting and statistical techniques to the specific purpose of providing and interpreting cost information designed to assist management in its function of promoting maximum efficiency. It focuses on the internal environment of the business and provides information for such decisions of the firm as Make-or-Buy, Replacement, Pricing and Cost Reduction Decisions. The techniques applied for the analysis are both statistical and accounting in nature, such as, Budgeting and Budgeting Control, Standard Costing and Variance Analysis, Direct Costing and Break-Even Analysis, and Project Cost Analysis.

Objectives of Cost & Management Accounting

As noted earlier, management accounting is an extension of cost accounting. The entire system of accounting for costs, assists internal management in decision making, and provides information to enable a business utilise available resources at an optimum level. Utility of accounting information lies in its ability to reduce uncertainty. Thus, information must be relevant, verifiable, quantifiable and free from bias. The different roles of Cost accounting include:

i. To analyse and classify all expenditures with reference to cost of products, operations and services;
ii. To arrive at cost of production of every unit, job, operation, process, department or service, and to develop cost standards where necessary;
iii. To identify to management inefficiencies, wastes, idleness in time or productive capacity, and every sub-optimal utilisation of materials, labour, machinery, and expense. It further executes analysis of unsatisfactory performance to indicate remedial measures;
iv. To provide data for periodic preparation of Financial Statements - not just for the entire organisation, but also for departments, units, products and services. It also explains in detail, the total picture revealed by the Financial Statement;
v. It reveals sources of economy in production with respect to methods, equipment, design, output and layout. Daily, weekly, monthly or quarterly information is put together to ensure prompt and constructive action;
vi. It provides actual cost figures for comparison with estimates, to serve as guide for future estimates and quotations to assist management in price-fixing policy;
vii. It provides perpetual inventory of stores and other materials, making possible the preparation of Interim Income Statements and Balance Sheet. It also provides basis for production planning, and for avoiding unnecessary wastage or losses of materials and stores;
viii. It provides information to enable management make short-term decisions of various types - price quotations, make-or-buy, or replacement decisions.

Cost accounting thoroughly aids management in various ways - channelling products to the right markets, determining efficiency in operations, surviving times of depression or stiff competition and general administration matters. At the national level, prosperous businesses, constitute a plus for the national economy. Efficiency in production, progress in industry matters, and elimination of wastes and inefficiencies, are all positive help to national growth and development.

Scope of Cost Accounting

The International Federation of Accountants (IFAC, 1998) identified four stages in which management accounting has evolved:

- Stage 1 - Prior to 1950, the focus was on cost determination and financial control, through the use of budgeting and cost accounting technologies;
- Stage 2 - By 1965, the focus had shifted to the provision of information for management planning and control, through the use of technologies such as decision analysis and responsibility accounting;
- Stage 3 - By 1985, attention was focussed on the reduction of waste in resources used in business processes, through the use of process analysis and cost management technologies;
- Stage 4 - By 1995, attention had shifted to the generation or creation of value through the effective use of resources, through the use of technologies, which examine the drivers of customer value, shareholder value and organisational innovation.

Consequently, the scope of cost and management accounting includes:

i) Cost Ascertainment - collection, analysis of expenses, measurement of production at different stages of manufacture;
ii) Control of Costs - involving planning and use of standards for each item;
iii) Proper matching of Costs with Revenue - monthly and quarterly statements to reflect cost and income streams identified with each product, over each period;
iv) Aids to management decision making.

A very recent trend in the development of the discipline is in the area of strategic management accounting.

Many businesses apply functional use of budgets, cost allocation methods, and cost-volume-profit or break even analysis, as an aid to internal functions of the business. Strategic management accounting (SMA) goes beyond these functions to focus on how external factors (for example, competitor analysis or political and monetary policy review) and non-financial information can improve a company's operations. Companies employ SMA to create sustainable cost advantage, to ensure that their products are the most competitively priced in the economic marketplace.

SMA is the merging of strategic business objectives with management accounting information to provide a forward looking model that assists management in making business decisions. SMA goes beyond internal accounting metrics to focus on external information regarding trends in costs, prices, market share and cash flow, and their impacts on resources, to determine the appropriate tactical response. Thus SMA requires enhanced intelligence about competitors, suppliers and technologies.

There are three primary attributes of SMA: technical, behavioural and cultural. Technical analysis enhances understanding and provides information on the event measured. The behavioural metric promotes actions to achieve the organisation's strategic objectives. And the cultural element establishes a shared set of beliefs within the organisation. These three elements comprise the elements of an effective SMA programme.

1.03 Budgetary Planning and Control

Budget, from an individual's perspective means a plan on how to utilize or spend an expected future income. People are involved in budgeting at one time or the other without knowing. Families make a list of how they are going to spend their income and try to keep their spending as much as possible within the pre-planned amount. They estimate the income being expected, plan how it will be spent and ensure they do not over spend their budget.

The wife of Mr. A asked him for some money to buy a dress when he got his salary and he quickly responded that he would not be able to part with that money at that particular time because it was not included in his budgeted expenses for the month. The meaning of this is that he did not plan for it; therefore, he would not accommodate the expenses he did not provide for in his estimate.

This simple illustration of individual's budget clearly enunciates the concept of Budgetary Planning and Control and underscores its relative importance to organizations as a tool for achieving its corporate goals and objectives. Corporate budgeting although similar in nature to individual's personal budget but is more elaborate in preparing.

Authors of books on management accounting have tried to define a budget in order to give a vivid description of the subject. Some of the definitions have been quoted here to give an insight into what a budget actually is.

In the entire above definitions one thing is very clear, that budget is a plan expressed in monetary or quantitative terms and projected into the figure of a corporate entity.

Budget may therefore be defined as plan of activities and programmes expressed in quantitative or monetary terms that relates to assets, liabilities, revenues and income of an organization and how it is managed. Budgetary planning is the development of short and long term strategic and tactical corporate objectives and preparation of various budgets to achieve the set goals. Budgetary control relates to the manner in which management ensures that set plans are attained and all areas of the organization functions in accordance with the policy of the entity. It serves as performance indicator when actual result is compared with the budget. An effective budgeting system must include both planning and control functions for it to achieve its aims.

1.04 Master Budget

This is the summary of a company's plans that sets specific targets for sales, production, distribution and financial activities. It generally culminates in cash flow budget, a budgeted profit & loss account and balance sheet. In short, it represents a comprehensive expression of management plan for the future and how these plans are to be accomplished (Will Seal et al, 2012).

The master budget is a summary of the individual functional budgets. Functional budgets are various operational budgets which includes, sales budget, production budget etc. It is the master budget which projects the corporate plan of an organization that is approved by the board of directors and passed to the management for implementation.

In every budget, there must be a principal factor that limits the activities of the organization thus, in

budgetary planning the principal budget factor must be determined as the parameter of other budget components depend on it, if for example as is usually the case, the sales forecast is fingered out as the principal budget factor, it will provide a basis for the preparation of all other functional budgets that make up the master budget. Master budget usually comprises budgeted cash flow statement, projected statement of comprehensive income and statement of financial position

1.05 Advantages of Budgeting

Organizations derive a lot of advantages by preparing budgets some of which are as stated below:

- It serves as a means of allocating resources of the organization for effective utilization
- It serves as a basis for monitoring and evaluation of subsequent performance in relation to the defined goals and objectives of the organization
- It provides a means of communicating management's plans throughout the organization
- It encourages managers to use their initiatives to think and plan for the future of the organization.
- It serves as a means of effective delegation of authority
- It helps to motivate managers to achieve the set goals.

1.06 Budget Limitations

In spite of the benefits and advantages derivable from budgeting system, there are still some limitations to its effectiveness.

- Budget cannot provide a meaningful result if not closely supervised
- It takes a great deal of management time
- It can encourage interdepartmental conflict
- It can restrict management initiative in decision making
- Persistent inflation in the economy can affect a budget
- Lack of realistic data in budget preparation
- Establishment of unattainable targets may affect the budget
- It ignores responsibility centres in performance evaluation
- Negative attitudinal trait of the operating managers against the budget can affect it

1.07 Budget Process

In establishing a sound budgeting system, an organization will have to take the following basic steps into consideration: -

- The long term corporate objective must be clearly defined
- The Establishment of achievable short term objective derived from the long term corporate objective
- Organisational structure must be defined with the line of authority established in order to identify the various responsibility centres.
- Obtain top management support in the process of introducing the budgetary statement.
- Request for budgetary estimates for the proposed period from the responsibility centres.
- Preparation of working budget from data obtained from the responsibility centres
- Prepare budget manual for the purpose of identifying the various budgetary objectives together with how the objectives will be achieved.
- Identify the principal budget factor among the various resources of the organization

- Appoint a budget committee or a budget officer for the purpose of coordinating the budgetary activities
- Review budget performance through periodic comparison of actual results obtained with the budget
- Investigate variances observed for the purpose of remedial or corrective actions.

1.08 Behavioral Aspect of Budgeting

Another aspect of budgeting which is very important and capable of impeding the realization of budgetary goals is the attitude and behaviour of manager's right from the planning, implementation and up to the control stage of budgeting. Some of these attitudes are stated below: -

- Where manager perceive budget as a pressure device without any motivating factor or incentive attached to it they tend to sabotage it by all means
- When they are not given the opportunity to participate in the budget process, they may not wish to take responsibility for its failure.
- In view of the usual competition that exists between individual departments and executive in budget performance, managers may be induced to do some unethical things that are against the interest of the organization in order to meet budget demand.
- Managers may just try to achieve the budget target when a favourable climate exist for higher productivity
- The absence of goal congruence between the manager's personal goal and expectations vis-à-vis the organizations goal which may lead him to do some things that may bring adverse consequences to the reputation of the organization.

In view of the above enumerated behavioral tendencies of managers handling budgets, the following suggestions to circumvent it have been recommended:

- Managers must be motivated through incentives which allows for goal congruency where the individual manager perceives that his or her own goals are achieved by his or her acting in a manner that allows the organization to achieve its goals.
- Managers operating the budget must be encouraged to participate actively in the formulation and implementation of the budgetary system.
- Controllable and uncontrollable cost variances in the budget must be classified separately as this is one of the performance evaluation indicators in budget appraisal.
- Targets set must be realistic and achievable.
- Budget duration should not be too lengthy in order to eliminate error in forecast

1.09 Incremental Budgeting System

Incremental budget is the traditional government budgeting system. The approach uses the current year estimates of income and expenditure as the starting point for determining the budget for the following year. In other words, next year's budget is determined by increasing the amount of current year's budgeted figures. Attention is focused on the marginal or incremental differences between this year and last year's budget rather than on the whole budget.

Some features of incremental budgetary systems are as follows:

- The system considers existing capital expenditure in the current budget without necessarily concerned with the priority of current challenges
- It does not give priority to expenditure estimates

- This method has no regard for effective and economical use of funds
- Most of the activities are either fundamental or mandatory and so it is repeated year after year.
- Unless major policy decisions are taken, yearly marginal challenges are the only aspect of the budget that is controlled
- The system is based mainly on funding and not on the output of the services, which are being funded
- The budget is usually for 12 months period

1.10 Performance Budgeting

Performance budgeting is concerned with the purpose for which funds are requested, the cost of the programme or project proposed and the measuring of the accomplished work. It emphasizes things which government does rather than the things which they buy. The essential factors of performance budget include the classification of budget as per function and activity. It measures output provided by each activity and also monitors actual against budgeted cost

1.11 Flexible Budget

This is a budget that is based on different levels of activities. It compares the actual cost incurred to the cost allowable for the activity level achieved.

It is dynamic in nature rather than static. By using the cost volume formula, a series of budgets can be developed easily for various levels of activities. Flexible budgeting distinguishes between fixed and variable costs, thus allowing for a budget that can be automatically adjusted through changes in variable cost totals to the particular level of activity actually attained. In this way, variances between actual cost and budgeted costs are adjusted for fluctuations before differences due to price and quantity factors are computed.

The primary use of flexible budget is for accurate measurement of performance by comparing actual costs for a given out-put with the budgeted costs for the same level of out-put.

1.12 Performance Reporting

The essence of control is feedback, therefore adequate and effective information system must be set up to ensure that budgeted figures are justified on a rational basis using reasonable criteria before being passed through approved stages. It follows therefore that actual performance must be carefully monitored and measured at every key result stage.

Deviations from plan and probable cause of such deviation should be investigated and reported to the responsibility Budget-holder for timely action. This means that the feedback information must be timely and relevant. It should be capable of motivating the manager to take action to ensure conformance with plan, whether it is physical or monetary deviations.

One very important aspect of control which is often over looked is that incentive could be built into it. The knowledge by a manager that his or her career progression may depend on his or her performance could motivate him or her to effectively control his budget.

1.13 Responsibility Budget

Responsibility budget set plans in terms of the responsibility centres. It is an excellent control device since it is a statement of the performance expected for each responsibility centre manager against which actual performance can later be compared.

Each manager is responsible for preparing those parts of the operating budget that correspond to his or her area of responsibility e.g. the manager that is in the position to control an item of cost should be responsible for its preparation and control.

It is important that a responsibility budget be broken down into its constituent cost elements such as: - material, labour and other management expenses. Such a break down is useful both as a guide to spending and as a basis of identifying the areas of inadequate performance if actual spending exceeds the budgeted amount.

If the total costs in a responsibility centre are expected to vary with changes in volume, the budget may be prepared in form of a "variable budget" or "flexible budget". This kind of budget would depict the planned behaviour of cost at various activity levels and is appropriately used in responsibility centres with a high proportion of engineered cost. The "variable budget" is usually expressed in terms of a cost volume equation i.e., a fixed amount for a specified time period, plus a variable amount per unit of activity (e.g. volume of output).

When there is a variable budget, the cost at one volume level should form part of the "master budget". The volume level will thus represent the planned level of operations for the budget period which is usually the same as the standard volume used for setting predetermined overhead rates.

1.14 Planning Programming Budgeting System (PPBS)

PPBS are a management control process recognized by most people as "Planning, programming and Budgeting System". Two principal types of planning activities are involved in this management control process.

1. Programming, this is the process of making decisions on major programmes to be undertaken. It involves formulating long-range plan.

2. Budgeting, this is a process which quantifies in financial or qualitative terms, the planning activities of the entire organization for a defined future period. This process involves "making decisions" (now) on the future allocation of scarce resources at the disposal of the organization and relating these decisions to a defined future period in definite terms.

1.15 Formal Programming Process

It begins with top management review of basic goals and strategies of the organization in pursuit of certain philosophies which when clarified become the organisation's objectives from which a "policy guideline" will be communicated to operating managers.

On the basis of these guidelines, operating managers will prepare tentative programmes of alternative projects capable of accomplishing the set objectives for discussions with top

management. The discussion will lead to the emergence of a set of approved programme which will form the basis of the budgeting process. Monitoring and control process will be established to ensure accomplishment of goals and target dates and ensuring that costs are as planned and resources are used with economy.

Control process involves reviewing of on-going programmes, consideration of proposal for new programmes and co-ordination of all the programmes by means of a formal programming procedure.

PPBS is not new, it is a system of budgeting that is applicable to both government and corporate entities. The approach is the same but the area of difference is the functions performed. Government budget is based on revenue allocation to recurrent and capital expenditures for payment of personal cost and provision of infrastructures whereas a business organization is profit oriented and articulates its budget towards profit maximization.

1.16 Zero Based Budgeting (ZBB)

Zero based budgeting is a process of analyzing on-going programmes whereby estimates of each item of cost is built up from the scratch rather than taking the current level of costs as the starting point as is customary with the practice in the preparation of annual budgeting process.
Zero-Base Budget Initiative

Citizens have a right to expect public officials to act responsibly, and a duty to hold public officials accountable. That's especially true when it comes to how their money is spent – which is why I plan to implement Zero-Base Budgeting for all state agencies and institutions, beginning with fiscal 2010. We'll start from scratch in reviewing and justifying each agency's budget on a six-year rotating schedule. That means the first set of agency budgets will get a zero-base review as we develop proposals for you to consider next year.
The first cycle will be complete in fiscal 2015. The idea is consistent with taxpayers' wishes. And it will enable us to assert greater fiscal discipline while making the most of every taxpayer dollar."

Zero-Base Budgeting Defined
ZBB in its purest form is an operating planning and budgeting process which requires the manager to justify the entire budget request in detail, and shifts the burden of proof to each manager to justify why any money should be spent. This procedure requires that all activities and operations be identified in decision packages which will be evaluated and ranked in order of importance by systematic analysis.

Direct Benefits of ZBB
ZBB provides the following:

1. Provides the organisation with the opportunity to tell its complete budget story;
2. It highlights what's in the base, thus lending credibility to your budget request;
3. Ranking and prioritizing of decision packages will focus your organisation to think in terms of performance and your strategic plan. It will reveal where resources might be reallocated to better meet the mission, goals and objectives of the agency.

Key Steps in the ZBB Process
The following are the key Process:

1. Comparison of statutory requirements, federal mandates, and rules to actual activities. This will help establish a basis for "where we should be".
2. Identification of cost centers;
3. Development of decision packages for each cost center;
4. Review and ranking of decision packages through cost/benefit analysis or subjective evaluation;
5. Allocation or reallocation of organizational resources;
6. Integration into the current Budget Development System, particularly where there are base reductions, base program transfers, or line-items related to the ZBB effort.

Updating on Where You've Been

1. Review ZBB literature;
2. Look at other peoples' efforts, as well as lessons you can learn from previous initiatives;
3. Solicit input from officers of other agencies;
4. Reduce the number of agencies to a more manageable level for piloting purposes;
5. Develop initial scope that emphasizes a modified approach to zero-base budgeting;
6. Develop procedure manual and forms;
7. Hold training for new participants.
8. Pilot different modified approaches to ZBB with say: Agriculture, Water Resources, State Police and smaller agencies:

    a. Agriculture – implement the purest approach to ZBB, particularly as it relates to Personnel;
    b. Water Resources – develop impact of 20% reduction/Increase scenarios for each bureau, then build from this exercise a list of opportunities for change in business practices;
    c. State Police – designate agency to model review of legal mandates in comparison with actual activities;
    d. Smaller agencies – implement a true modified approach to ZBB, wherein decision packages are developed at the base, 85% of base, and enhanced levels for ranking purposes.
    e. Work closely with agencies throughout the implementation process.

Update on Where You're Going:

1. you will need to modify approach based on first year's results for second year participants;
2. Expect the ZBB process to continue to establish a road map for integration within the current budget, planning, and performance processes.
3. Will encourage second year agencies to start now, since sufficient time is critical to success;
4. Will continue to work closely with agencies to make ZBB a worthwhile effort.

What will it take to implement ZBB? Implementing ZBB would entail:

1. Consensus on need to look at things from a different angle
2. Collaborative process
3. Flexibility to allow for creativity
4. Committed leadership and
5. Committed staff

The technique is also useful for major programmes as it is for individual expenses centres in which the portion of discretionary costs are relatively large.

This technique is particularly appropriate in government agencies and other non-profit-making organizations which tend to have high portion of discretionary costs. The technique naturally fits with the "PPBS".

Advantages of Zero Based Budgeting

- Manager performance can be closely monitored
- Limited resources are efficiently deployed
- It stimulated involvement of management team

Disadvantage of Zero Based Budgeting

- Wrong predictions may be made as current and past events are not considered in future projection
- Applicable mostly to discretionary cost items
- It supports the erroneous belief that budget is the ultimate for decision making and prevents management from introducing new ideas.

1.17 Rolling Budget (RB)

This system of budgeting is based on continuous updating of short budget by adding a new month after a month has passed so that the budget can show the current situation. Some of the advantages of this kind of budget are as follows: -

- Continuous reassessment of the budget is undertaken in consideration of inflationary trend.
- Budgetary process can be easily observed by management over twelve months' period at any given time
- Budget is made more realistic as planning and control is based on recent events.

The major disadvantage of this system is that managers become less enthusiastic and could be discouraged from participating in budgeting process.

1.18 Activity based Budgeting (ABB)

It is an approach to budgeting that involves quantitative expression of activities/business of organization which reflects forecast of workload (quantity of drivers) and other financial requirements to achieve strategic goals or planned changes to improve performance.

Activity based budgeting provides greater details, especially regarding overhead as it permits the identification of value added activities and their drivers.

It is useful for comparing actual cost rates and drivers' usage with the amounts budgeted.

1.19 Budgetary Slack

This is an intentional underestimation of revenues and or overestimation of expenses by some managers or budget holders in the process of budgeting. Deliberate misstatement of projections of costs and revenues is unethical, mischievous and capable of presenting unreliable data.

1.20 Budget Committee

The budget committee is usually headed by the Chief Executive Officer of the establishment who is the Managing Director. Other members include all the heads of departments who are responsible for cost control (e.g. sales, marketing, purchasing etc.).

The committee's responsibility covers related policy matters and resolving disputes relating to the budget implementation. Although the budget committee manages the budget but the final approval of the budget before implementation rests with the Board of Directors. The board of Directors is the highest level in the hierarchy of organizations organogram.

It is important at this point to emphasis that the success of a budget programme depends largely on the way it is being prepared.

Participative budgeting in which all managers charged with revenue and cost control responsibilities are given the opportunity to participate in its preparation is considered as the most effective instead of the budget being imposed on them by top management. This approach has many advantages which include: -

(i) Staffs at all levels are recognized by top management as members of the team whose suggestions and contributions are valuable.
(ii) Budget prepared by the person directly involved in an activity is likely to be more reliable and accurate.
(iii) An individual that participated in budget estimates will strive to meet the set target.

Participative or self-imposed budget as it is sometimes called is the ideal approach to budgetary process. This approach co-opts managers with responsibilities into the budget preparation process for their inputs. Individuals at all levels in the organization work together to produce the budget. Top management relies on their subordinates who are familiar with the day to day operations of the organization to provide them with information.

Where the budget is initiated by top management and requires a low level management cadre to prepare their own budgets based on the target set for them, they might consider the target too high and try to create budgetary slacks into it. Budget programme should not be very rigid; there must be room for adjustments when necessary.

The success of a self-imposed budget however depends largely on the agreement of the top management with the strategic plan of the organization.

It must always be borne in mind that in administering the budget, too much emphasis should not be placed on meeting the target by all means thereby making the whole process look hostile, uninteresting and demoralizing. The aim of budgeting is actually to serve as a means of establishing goals and evaluation of operating result for possible corrective actions where necessary.

1.21 Functional Budget

Functional Budget which is also referred to as operational budget relates to components of the master budget. They include Sales budget, Production budget, Cash budget etc. Sales budget is usually the principal factor in the budgetary process and forms the basis upon which all other

budgets take their bearing.

The basic functional budgets that are commonly prepared include:
- Sales budget
- Production Budget
- Purchasing Budget
- Direct Materials Budget
- Direct Labour Budget
- Ending finished goods stock Budget
- Selling and Administrative Expenses Budget
- Cash flow budget

1.22 Practical Work Through

Illustration of Budgetary Process

Nation Automobile Manufacturing Limited is a vehicle assembly plant in Nigeria. The company assembles Tricycle with the brand name Leo in their assembly plant for the past 3 years. The plant has an installed production capacity of 1000 Tricycle annually on a single shift and currently operates at 30% of its installed capacity. NAM Ltd. imports its raw material of semi-knock down (SKD) components for its production from China. Stocks usually arrive at the factory in 21 days after ordering and it takes 5 days to assemble 50 units.

The company's sales performance for 2012 was very poor as they made a sale of 150 units of Tricycle as against the budgeted target of 300 units.

The Managing Director of NAM Ltd. called the meeting of the budget committee which comprises all the departmental heads to discuss about 2013 annual budget preparation.
At the meeting he complained about the low sales recorded in 2012 and called for improvement in 2013, the General Manager (Sales and Marketing) responded that, the poor sales experienced could be reversed if more fund is allocated to Advertisement and Sales promotion.

The Managing Director however directed all the departmental heads to meet with their staffs and come up with their individual department budgets which should be submitted to the finance controller who will prepare the master budget to be presented at the next budget committee meeting.

Sales Budget
The sales budget is a very important component of the master budget. It is the principal budgetary factor upon which all other budgets depend except in exceptional cases when production budget or other budgets become the major factor. The GM (Sales & Marketing) of NAM Ltd. and his team made a sales forecast of 200 units for 2013 as depicted in figure I below:

Fig.1

Sales Budget (2013)

	Jan-Mar.	April-June	July-Sept.	Oct-Dec.	Total
Budgeted Sales (Unit)	40	50	50	60	200
Unit selling price (₦)	80,000	80,000	80,000	80,000	80,000
Total (₦)	**3,200,000**	**4,000,000**	**4,000,000**	**4,800,000**	**16,000,000**

Note: The sales policy of NAM Ltd is that goods are sold on cash and carry basis. Assuming that NAM Ltd. allows credit sales then a schedule of expected cash collection from debtors on quarterly basis will be prepared.

1.23 Production Budget

The GM (Production) and his team came up with the production budget. This budget shows the number of units to be produced including the ending stocks. It considers the projected sales forecast for each quarter of the year in order to be able to meet customers demand and avoid any stock out situation. Production requirement is arrived at by adding the desired quarterly closing stocks to each quarter's budgeted sales quantity and deducting the opening stock from the total. Figure 2 below depicts the production budget prepared by NAM Ltd. for 2013.

Fig.2

Production Budget (2013)

	Jan-Mar.	April-June	July-Sept.	Oct-Dec.	Total
Budgeted Sales in units (Fig.1)	**40**	**50**	**50**	**60**	**200**
Add forecast closing stocks of					
Assembled units	15	15	18	10	10
Total units required	55	65	68	70	210
Less Opening stock	(5)	(15)	(15)	(18)	(5)
Units to be produced	50	50	53	52	205

Direct Materials Budget

From the production budget, the direct materials budget is generated. This aspect deals with the calculation of the quantity and value of the raw materials required to meet the production target. In an automobile industry, the units of production are equal to the units of raw materials required for production. This is so because vehicles come in components known as CKD (completely knock down) or SKD (semi knock down) which when assembled together becomes a fully built unit. The various components that make up a unit of vehicle are normally reflected in the packing list that accompanies the shipping documents. Figure 3 shows the working.

Fig.3

Direct Materials Budget (2013)

	Jan-Mar.	April-June	July-Sept.	Oct-Dec.	Total
SKD required as per Budgeted Production units	50	50	53	52	205
Add estimated closing stocks of Raw Material (SKD)	10	10	10	10	10
Total units required	60	60	63	62	215
Less Opening stock of Raw Material (SKD)	(5)	(10)	(10)	(10)	(5)
Total SKD to be imported	55	50	53	52	210
Cost of SK (₦)	50,000	50,000	50,000	50,000	50,000
Total (₦)	**2,750,000**	**2,500,000**	**2,650,000**	**2,600,000**	**10,500,000**

Expected cash disbursement for importation.

	₦
1st Quarter SKD importation	2,750,000
2nd Quarter " "	2,500,000
3rd Quarter " "	2,650,000
4th Quarters " "	2,600,000
	10,500,000

Confirmed letters of credit are normally opened with company's bank for all SKD importation from China. These transactions are usually fully cash backed.

1.24 Direct Labour Budget

The policy of NAM Ltd on direct labour is to engage skilled workers for assembling of Tricycles when SKD components are received at the plant. They are paid ₦10,000 for each unit of Tricycle completely assembled. Their job is supervised by the production manager. See computation in figure 4 below:

Fig.4

Direct Labour Budget (2013)

	Jan-Mar.	April-June	July-Sept	Oct-Dec.	Total
Units of Tricycle to be produced	50	50	53	52	205
Direct labour cost Per unit (₦)	10,000	10,000	10,000	10,000	10,000
Total cost of Direct Labour (₦)	**500,000**	**500,000**	**530,000**	**520,000**	**2,050,000**

1.25 Manufacturing Overhead Budget

This budget considers other production costs other than direct material and direct labour. NAM Ltd, does not calculate its labour rate on hourly basis with respect to the level of production. The fixed manufacturing overhead with the exclusion of depreciation is calculated at N30,000 per quarter. See figure 5 below:

Fig.5

Manufacturing Overhead Budget (2013)

	Jan-Mar.	April-June	July-Sept.	Oct-Dec.	Total
	₦	₦	₦	₦	₦
Fixed Manufacturing Overhead	40,000	40,000	40,000	40,000	160,000
Less Depreciation	(10,000)	(10,000)	(10,000)	(10,000)	(40,000)
Total cash flow	30,000	30,000	30,000	30,000	120,000

Closing Inventory Budget

The closing stock of finished goods can be calculated as shown in figure 6 below. The amount arrived at will be reflected in the budgeted statement of financial position.

Fig.6

Closing Inventory Budget (2013)

Description		**Quantity**	**Cost**	**Total**
Production cost per unit		₦	₦	
Direct Material	1	50,000	50,000	
Direct Labour	1	10,000	10,000	
Manufacturing Overhead (160,000÷210)		760	760	
			60,760	

Budgeted closing finished goods stock (Fig.2)	5 units
Unit cost	60,760
Cost of closing stock of finished goods	₦303,800

1.26 Selling and Administrative Expenses Budget

This budget deals with all other expenses to be incurred for the smooth running of the company. The list will definitely be longer than what is shown here in a real situation. Figure 7 describes how this budget is calculated.

Fig.7

Selling and Admin. Expenses budget (2013)

	Jan-Mar.	April-June	July-Sept.	Oct-Dec.	Total
	₦	₦	₦	₦	₦
Description					
Staff salaries & wages	250,000	250,000	250,000	250,000	1,000,000
Office Maintenance Exp.	10,000	60,000	80,000	95,000	245,000

Advert & Publicity	20,000	100,000	200,000	200,000	520,000
Electricity & Water	10,000	40,000	45,000	72,000	167,000
Insurance	20,000	-	80,000	-	100,000
Rate & Taxes	5,000	20,000	20,000	30,000	75,000
Sales Commission	30,000	70,000	150,000	150,000	400,000
Depreciation	100,000	100,000	100,000	100,000	400,000
Total	445,000	640,000	925,000	897,000	2,907,000
Less Depreciation	(100,000)	100,000)	(100,000)	(100,000)	(400,000)
Cash disbursement	**345,000**	**540,000**	**825,000**	**797,000**	**2,507,000**

1.27 Cash Budget

Cash budget consider all sources of income and all disbursement to arrive at either a budget cash surplus or deficit for the year as the case may be. The information required for cash budget of NAM Ltd is drawn from the computation of sales, purchases, labour cost, selling and Administrative expenses etc. The working is shown in figure 8 below.

Fig.8

Cash Budget (2013)

	Jan-Mar.	April-June	July-Sept.	Oct-Dec.	Year
Income	₦	₦	₦	₦	₦
Opening cash balance	680,000				680,000
Brought forward balances		155,000	535,000	500,000	
Sales Income	3,200,000	4,000,000	4,000,000	4,800,000	16,000,000
Total cash available	3,880,000	4,155,000	4,535,000	5,300,000	16,680,000
Less: Expenditure					
Direct materials	2,750,000	2,500,000	2,650,000	2,600,000	10,500,000
Direct Labour	500,000	500,000	530,000	520,000	2,050,000
Manufacturing O/head	30,000	30,000	30,000	30,000	120,000
Payment to creditor	-	50,000	-	-	50,000
Selling & Admin. Exp.	445,000	540,000	825,000	797,000	3,612,000
Total Expenses	3,725,000	3,620,000	4,035,000	3,947,000	15,327,000
Carried forward balances	155,000	535,000	500,000	1,353,000	1,353,000
	3,880,000	**4,155,000**	**4,535,000**	**5,300,000**	**16,680,000**

1.28 Budgeted Statement of Comprehensive Income

Budgeted statement of comprehensive income (Profit & Loss Account) can be drawn from the data generated so far from other functional budgets of NAM Ltd. as is shown in figure 9 below:

Fig.9

Budgeted Statement of Comprehensive Income (2013)

Income Statement	₦
Operating:	
Sales – Wholesale	-
Sale-Retail	16,000,000

Total Revenue	**16,000,000**
Cost of Goods sold:	
Materials	(10,500,000)
Labour	(2,050,000)
Overhead-Depreciation	(10,000)
Overhead – Others	(30,000)
Change in inventory	(303,800)
Total cost of goods sold	**(12,893,800)**
Gross profit	**3,106,200**
Selling expenses:	
Advertisement and Publicity	(520,000)
Sales commission	(400,000)
Total selling expenses	**(920,000)**
General and Administrative Expenses:	
Staff salaries & wages	(1,000,000)
Depreciation	(400,000)
Office maintenance expenses	(245,000)
Electricity & Water	(167,000)
Insurance	(100,000)
Rate & Taxes	(75,000)
Total General & Administrative Expenses	**(1,987,000)**
NET PROFIT	199,200

Fig.10

Nation Automobile Manufacturing Ltd.
Statement of financial position as at
31 December, 2012

	₦
Assets	
Property, plant & equipment	800,000
Intangible assets	35,000
Long term financial assets	673,000
Total non-current assets	**1,508,000**
Trade and other receivables	200,000
Cash and cash equivalent	650,000
Assets classified as held for sale	80,000
Total current assets	**930,000**
Total Assets	**2,438,000**

Equity	
Share capital	2,000,000
Reserves	50,000
Retained income	320,000
Total shareholders' equity	2,370,000
Liabilities	
Trade and other payables	50,000
Provision	18,000
Total current liabilities	68,000
Total Equity and Liabilities	**2,438,000**

1.29 Budgeted Statement of Financial Position

In order to prepare the budgeted statement of financial position (Balance sheet) of NAM Ltd. for 2013, the current statement of financial position must be known, as it serve as the starting point. Some relevant data will be lifted from the operating budgets prepared for 2013 and will be adjusted to the 2012 statement of financial position to arrive at the budgeted statement of financial position as at 31 December 2013. (Fig.11) NAM Ltd 2012 statement of financial statement is presented in figure 10 above.

Fig.11
Nation Automobile Manufacturing Ltd.
Budgeted Statement of Financial Position as at 31 December 2013

	₦
Assets	
Properties, plant & equipments	400,000
Intangible assets	35,000
Long term financial assets	673,000
Total non-current assets	**1,108,000**
Current Assets:	
Trade and other receivables	200,000
Cash and cash equivalent	1,353,000
Inventory	303,800
Assets classified as held for sale	80,000
Total current assets	**1,936,800**
Total Assets	**3,044,800**
Equity	
Share capital	2,000,000
Reserves	50,000
Retained Income	519,200
Total shareholders' equity	**2,569,200**
Liabilities	
Trade and other payable	-
Provisions due in 12 months	475,600
Total current liabilities	**475,600**

Total Equity and Liabilities **3,044,800**

Notes to the budgeted statement of financial position.

1. Cash and cash equivalent amounting to ₦1,353,000 was taken from the cash budget computed in fig.8
2. Closing inventory of ₦303,800 was taken from the computed closing inventory budget in fig.6
3. Trade payable of ₦50,000 brought forward from 2012 account will be paid in the 2nd quarter of 2013, this has been eliminated from the 2013 budgeted financial position. This amount was included in the cash budget computed in fig.8.
4. Property, plant and equipment will be depreciated by ₦400,000 in 2013 to bring the net book value to ₦400,000. This has been taken from the budgeted Administrative expenses in fig.7.

WORKINGS

Illustration I

Ademola is the management Accountant of Onema Nig. Ltd. a company that produces plastic slippers. He was asked to prepare a flexible budget for the factory overheads, the output level per period is pegged at 10,000 hours. The following information was made available to him.

	₦
Direct labour cost per hour	3.00
Variable cost (in direct labour per direct labour hour)	2.00
Consumable supplies per direct labour hour	0.05
Power per direct labour	0.15
Rent and Rates per period	10,000
Depreciation per period	6,000
Administrative charge per period	3,000
Supervision per period	4,000

Semi variable costs are partly fixed and partly variable. The following represents the previous quarter costs.

Months	Direct labor (Hour)	Semi-variable cost (₦)
1	15,800	10,500
2	14,400	11,800
3	16,200	13,000

The flexible budget for the production department is to be prepared at 50%, 70%, 80% and 100% of the budgeted level of activities.

Solution 1

In preparing a flexible budget fixed and variable cost elements must be separated.

Where there is a mixture of both, effort should be made to separate them as it is known that variable cost responds to the level of activity while fixed cost remain constant at any level of activity.

In estimating the expected overheads at various levels of activities from the information given above, the mixed cost can be determined by using the high and low method.

	Activity	Cost (₦)
High	16,200	13,000
Low	14,400	10,500
Difference	1,800	2,500

Variable cost per hour = ₦2,500 ÷ 1800 hours = ₦1.38/hr

Total fixed cost = ₦13,000 – (₦1.38x16,200) = ₦9,356

1.30 Flexible Budget for Factory Overhead

At various activity level

Level of Activities	50%	70%	80%	100%
Number of hours	5,000	7,000	8,000	10,000
	====	====	====	====
Overhead costs:	N	N	N	N
Direct labour (3.0/hr)	15,000	21,000	24,000	30,000
Indirect labour (2.0/hr)	10,000	14,000	16,000	20,000
Consumable (0.05/hr)	250	350	400	500
Power (0.15/hr)	750	1,050	1,200	1,500
Rent & Rates	10,000	10,000	10,000	10,000
Depreciation	6,000	6,000	6,000	6,000
Administrative charge	3,000	3,000	3,000	3,000
Supervision	4,000	4,000	4,000	4,000
Other variable cost (1.38/hr)	69,00	9,660	11,040	13,800
Other fixed cost	9,356	9,356	9,356	9,356
	65,256	78,416	84,996	98,156

Illustration 2

Akala floated a new company where he intends to be producing shoe polish. He made a consultation with those companies who are already producing a similar product to obtain necessary information that would help him in his business plan. He also approached his bank manager for a short term loan to enhance his working capital and was told to submit a cash flow budget for six months period (Jan-June) for consideration.

The following information is made available in respect of the planned production of shoe polish.

1. 2000 units of the polish will be produced in the six months period

		₦	₦
2.	Selling price per unit		200
	Variable cost:		
	Direct materials per unit	40	
	Direct labour per unit	25	
		65	(65)
	Fixed Overhead:		
	Admin charges	15	
	Rent & Rate	10	
	Depreciation	5	
	`		(30)
	Mark up per unit	30	105

3. Monthly sales forecast was calculated as follows:

Jan	Feb	Mar	April	May	June
250	300	350	350	350	400

4. Sales will attract 30 days credit

5. Machinery will be purchased at a cost of ₦80,000

6. Suppliers will be paid 30 days after delivery of raw materials

7. Requires a short term bank loan of ₦60,000 at 20% p. annum interest rate.

Mr. Akala has ₦60,000 which he intends to invest as capital into the business.
As the company's accountant, prepare a cash budget that will be submitted to the bank manager.

Solution 2

Cash budget for 6 months (Jan-June, 2010)

	Jan	Feb	Mar	April	May	June	Total
	₦	₦	₦	₦	₦	₦	₦
Opening cash balance	60,000	14,415	27,580	47,495	75,410	103,325	328,255
Collection from Debtors	-	50,000	60,000	70,000	70,000	70,000	320,000
Short Term bank Loan	60,000	-	-	-	-	60,000	120,000
Total	**120,000**	**64,415**	**87,580**	**117,495**	**145,410**	**173,325**	**440,000**
Less Payments							
Raw Material	-	10,000	12,000	14,000	14,000	14,000	64,000
Direct labour	6,250	7,500	8,750	8,750	8,750	10,000	50,000
Admin charges	5,000	5,000	5,000	5,000	5,000	5,000	30,000
Rent & Rates	3,335	3,335	3,335	3,335	3,335	3,325	20,000
Purchase of Machinery	80,000	-	-	-	-	-	80,000
Loan Repayment	10,000	10,000	10,000	10,000	10,000	10,000	60,000
Loan Interest	1,000	1,000	1,000	1,000	1,000	1,000	6,000

Total	105,000	36,835	40,085	42,085	42,085	43,325	310,000
Closing balance	14,415	27,580	47,495	75,410	103,325	130,000	130,000
	120,000	**64,415**	**87,580**	**117,495**	**145,410**	**173,325**	**440,000**

Note

1. Collection from sales is after one month due to 30 days credit allowed
2. Payment for raw materials is after one month due to 30 days credit allowed by supplier
3. Intended loan request must be included in the budget
4. Loan repayment and interest to be paid must be included in the budget. This will prove to the banker that there will be adequate funds to pay back the principal amount plus interest.

Illustration 3

The following information relates to B. Johnson & Co. Ltd. that produces three different kinds of Toys (Lego, flute and Piano) for children.

	Lego	Flute	Piano
Sales (unit)	10,000	20,000	25,000
Unit selling price (₦)	30.00	50.00	80.00
Production cost per unit:			
Direct Material A (₦2 per kg)	5kg	15kg	25kg
Direct Material B (₦0.80 per kg)	2kg	2kg	6kg
Direct Labour:			
Moulding Dept. (₦4 per hour)	1hr	1½hr	1½hr
Finishing Dept. (₦3 per hour)	1hr	½hr	2hrs
Variable overhead	N3.00	N5.00	N4.00

From the above data, you are to calculate:

1. The contribution per product in unit and in total for the year.
2. The production cost budget for the year. Ignore fixed overhead charges
3. The material cost budget
4. The labour cost budget

The following additional information is provided in respect of stock levels.

(a) No opening stocks of Raw Material as at 1st of January, but it is intended to stock at least 20% of current production requirements of each material at the end of the year.

(b) Work-in-process – No stocks at the beginning and end of period

(c) Finished goods:

	Lego (Units)	Flute (Units)	Piano (Units)
As at 1st January	500	600	300
As at 31st December	2000	1500	1800

Solution 3

(i) Contribution per product:

Products:	Lego (₦)	Flute (₦)	Piano (₦)
Selling Price per unit	30.00	50.00	80.00
Less Variable cost:			
Direct Material A	(10.00)	(30.00)	(50.00)
Direct Material B	(1.60)	(1.60)	(4.80)
Direct labour-Moulding Dept.	(4.00)	(6.00)	(6.00)
Direct Labour-Finishing Dept	(3.00)	(1.50)	(6.00)
Variable Overhead	(3.00)	(5.00)	(4.00)
Contribution per unit (₦)	8.40	5.90	9.20
Sales unit	X10,000	X20,000	X25,000
Total contribution per product	84,000	118,000	230,000

(ii) **Production cost Budget**

Products:	Lego (₦)	Flute (₦)	Piano (₦)
Variable costs:			
Direct Material A	10.00	30.00	50.00
Direct Material B	1.60	1.60	4.80
Direct labour-Moulding Dept.	4.00	6.00	6.00
Direct Labour-Finishing Dept	3.00	1.50	6.00
Variable Overhead	3.00	5.00	4.00
Production cost per unit (₦)	21.60	44.60	70.80
Budgeted production unit	X11,500	X20,900	X26,500
Budgeted production costs	248,400	921,690	1,876,200

Total Budgeted cost of production for the year= ₦3,046,290 (248,400+921,690+1,876,200)

Budgeted Production unit calculation

Product:	Lego	Flute	Piano
Closing stock (unit)	2,000	1,500	1,800
Budgeted sales in units	10,000	20,000	25,000
Less opening stocks (units)	(500)	(600)	(300)
Production units	**11,500**	**20,000**	**26,500**

(iii) **Material cost Budget**

Products:	Lego	Flute	Piano
Production units	11,500	20,900	26,500
Material Usage:			

Material-A (kg)	57,500	313,500	662,500
Material-B (kg)	23,000	41,800	53,000
Total material	80,500	355,300	715,500
Add closing stock (20%)	16,100	71,060	143,100
Material purchases (kg)	**96,600**	**426,360**	**858,600**
Cost of Materials:			
Material-A (20% of closing stock)	69,000	376,200	795,000
Cost per kg (₦)	X 2.0	X2.0	X2.0
Material-B (20% of closing stock)	27,600	50,160	63,600
Cost per kg (₦)	X0.80	X0.80	X0.80
Cost of Material A	138,000	752,400	1,590,000
Cost of Material-B	22,080	40,080	50,880
Material cost Budget	160,080	792,528	1,640,880
Cumulative Total	₦2,593,488 = (160,080+792,528+1,640,880)		

(iv) **Labour Cost Budget**

Products:	Lego	Flute	Piano
Product Unit	11,500	20,000	26,500
Budgeted Labour hours			
Molding Dept.	11,500	31,350	53,000
Finishing Dept.	11,500	10,450	53,000
Budgeted Labour Costs:	₦	₦	₦
Molding Dept. @ ₦4	46,000	125,400	159,000
Finishing Dept. @₦3	34,500	31,350	159,000
Total Costs	80,500	156,750	318,000

Cumulative Total ₦555,250=(80,500+156,750+318,000)

1.31 Review Questions

1. "Imposed" budget can be less effective than participative budget (Discuss)
2. Define "Zero based" budget. How does it differ from "Incremental" budgeting system.
3. In spite of its benefit and advantages, budgeting system still have some limitations to its effectiveness. What are the limitations?
4. Discuss the importance of "principal budget factor" in the budgetary process.
5. List five functional budgets and write short notes on each of them.
6. Describe the features of flexible budget. What makes it different from other budgeting systems?

MODULE 2

2.00 MANAGEMENT ACCOUNTING IN DECISION SUPPORT

2.01 Learning Outcomes

On successful completion of this Module, students should be able to:

i. Explain the concept of standard costing;
ii. Identify the basic steps involved in standard costing techniques;
iii. Identify ideal, attainable, current and basic standards;
iv. Calculate material, labour, variable and fixed overhead variances;
v. Distinguished between standard variable costing and standard absorption costing;
vi. Identify the costs of material, labour, overhead variances.

2.02 Variance Calculation: Definition of Standard Costing

Standard cost defined. This can be formally defined as:

'A standard expressed in money. It is built up from an assessment of the value of cost elements. Its main uses are providing bases for performance measurement, control by exception reporting, valuing stock and establishing selling prices'. Terminology

A standard cost should be based on technical and engineering studies, specified production methods, work study and work measurement, clearly defined material specifications, and price and wage rate projections. The above represents the position under ideal circumstance and standards produced following such a thorough process are likely to be accepted as truly representative and realistic. However, standards produced less rigorously can also be of some value particularly in service areas and in industries where a detailed engineering basis is inappropriate.

It will be noted that a standard cost is not an average of past cost. These are likely to certain the results of past mistakes and inefficiencies. Furthermore, changes in method, technology and price make comparisons with the past of doubtful value for control purposes and assessing current efficiency.

2.03 Standard Costing Techniques

Standard costing is an important control technique which follows the feedback control cycle discussed previously. Standard costing establishes predetermined estimates of the cost of products or services, collects actual cost and output data and compares the actual result with the predetermined estimates. The predetermined costs are known as standard cost and the difference between standard and actual is known as a variance.

The process by which the total variance or difference between standard and actual cost is subdivided is known as variance analysis. In practice, standard costing is a detailed process requiring considerable accounting and technical development work before it can be used effectively. It can be used in a variety of costing situations, batch and mass production, process manufacture, transport, certain aspects of repetitive clerical work and even in jobbing manufacture where there is some standardization of components or parts. In principle there is no reason why standard costing should not be applied in service industries providing that a realistic cost unit can

be established. Undoubtedly, however, the greatest benefit is gained when the manufacturing or production process involves a substantial degree of repetition. The major applications in practice are in mass production and repetitive assembly work.

2.04 Types of Standard Costing Techniques

It is note-worthy that the efficacy or otherwise of a system of standard costing will depend largely on the established standard. In practice, it is possible to identify four different types of standard as follow:

i. IDEAL STANDARD

This may be described as an establishment standard specifically designed on the basis of the maximum productive capacity of the organization i.e. standard established without providing adequately for any negative factor that may inhibit the attainment of the standard. For example, labour standard established without provision for lateness, absenteeism, industrial action, annual leave, maternity leave etc. Also referred to as unattainable standard, ideal standards are specifically designed to demotivate workers because they are not achievable in nature.

ii. ATTAINABLE STANDARD

Also referred to as practical standard. This will represent an established standard specifically premised on what is considered practicable within the organization. Practical standard is established with adequate provision for negative factors that may affect the attainment of the established standard. For example, in establishing production standard, adequate provision is given to idle time or loss of production due to machine breakdown, loss of power, lack of raw materials, industrial dispute, repairs and maintenance etc.

iii. CURRENT STANDARD

This is described as an established standard specifically based on prevailing working condition within the organization or the industry at large. Current standards are however subject to frequent changes in order to reflect the current position within the organization.

vi. BASIC STANDARD

This will represent an old established standard designed principally to satisfy a given objective. Basis standard are not subject to frequent alteration, therefore outdated in nature.

2.05 Steps Involved in Standard Costing Technique

1. Identify the long term corporate objective of a business outfit.
2. Determine the short term achievable objective from the corporate objective.
3. Conduct a market research or market survey to identify the specific needs of consumers.
4. Design a particular product or service that will be used to satisfy the needs of the consumer.
5. Obtain top management support for the standard costing technique.

6. Identify the quantity as well as the quality of raw materials required in producing a unit of the product.
7. Estimate normal loss in the course of production.
8. Identify labour rate per hour together with the standard required in producing a unit.
9. Adopt a specific method of absorbing both the variable and fixed production overhead into product costing.
10. Prepare a standard cost card specially itemizing the standard cost of production unit.

2.06 Objectives of Standard Costing

1. To provide a basis for estimating.
2. To provide guidance on possible ways of improving performance.
3. To provide a formal basis for assessing performance and efficiency.
4. To assist in setting standards.
5. To control costs by establishing standards and analyzing variances.
6. To enable the principle of "management by exception" to be practiced at the detailed, operation level.
7. To motivate staff and management.
8. The standard cost can be used for stock and work-process valuation, profit planning and derisions making.
9. To assist assigning responsibility for adverse variance of (non-performance) in order to correct deficiencies or to maximize the benefits associated with favourable variance.

2.07 The Benefit of Standard Costing

i. Standard costing provides consistent platform whereby performance may be measured on the basis of what an item should cost or how much should have been produced, on the basis of the expected level of activity.

ii. It provides a method whereby labour and overheads can be consistently covered and charged into stock.

iii. It provides basis of control for buying, usage and efficient work levels.

iv. In setting up standards, management can reappraise activities to ascertain if they are being done in the most cost-effective and efficient way.

v. It increases an atmosphere of cost-consciousness amongst all levels, motivating staff and workers to see if there is a better way of performing a particular task.

vi. By creating a realistic target, it motivates staff and operative to achieve or better the standard lay down.

vii. It is a recognizable method of performance monitoring through variance analysis, motivating investigations into causes of shortfall and improving methods and procedures for the future.

viii. It provides a recognizable basis for budgeting, forecasting and planning.

ix. Where firms are in similar industries and are willing to compare, a meaningful basis for comparison might be established.

2.08 Limitations of Standard Costing Technique

1. Establishment of unattainable standard.
2. The problem of identifying the specific needs of consumers.
3. Persistent increase in the level of inflation.
4. Frequent changes in the level of technology.
5. Political instability.
6. Problem associated with the accurate estimation of normal loss in the course of production.
7. Labour rate per hour will vary among different organization depending on other economic variables.
8. Negative attitude of the operating manager against the established standards.

2.09 Variance Analysis

Variance is a statistical measure of how much a set of observations differ from each other.
In accounting and financial analysis, variance also refers to how much an actual expense or revenue deviates from the budgeted or forecast amount. Variance analysis is the quantitative investigation of the difference between actual and planned behaviour. This analysis is used to maintain control over a business

2.10 Purpose of Variance Analysis

The word variance will represent the difference between the standard cost of production and the actual cost of production or the difference between the budgeted revenue and the actual revenue. The process of classifying a given variance into its sub-variance is described as variance analysis. A given variance may be interpreted to represent adverse or favourable to the organization depending on the differences. For example, a given variance will represent adverse if the standard of production is lower than actual cost of production or budgeted revenue is considered to be higher than the actual revenue. On the other hand, a variance will be interpreted to mean favourable to the organization if the standard cost of production is higher than actual cost of production or the budgeted profit is lower than the actual profit.

2.11 Variance Chart

Operating Profit

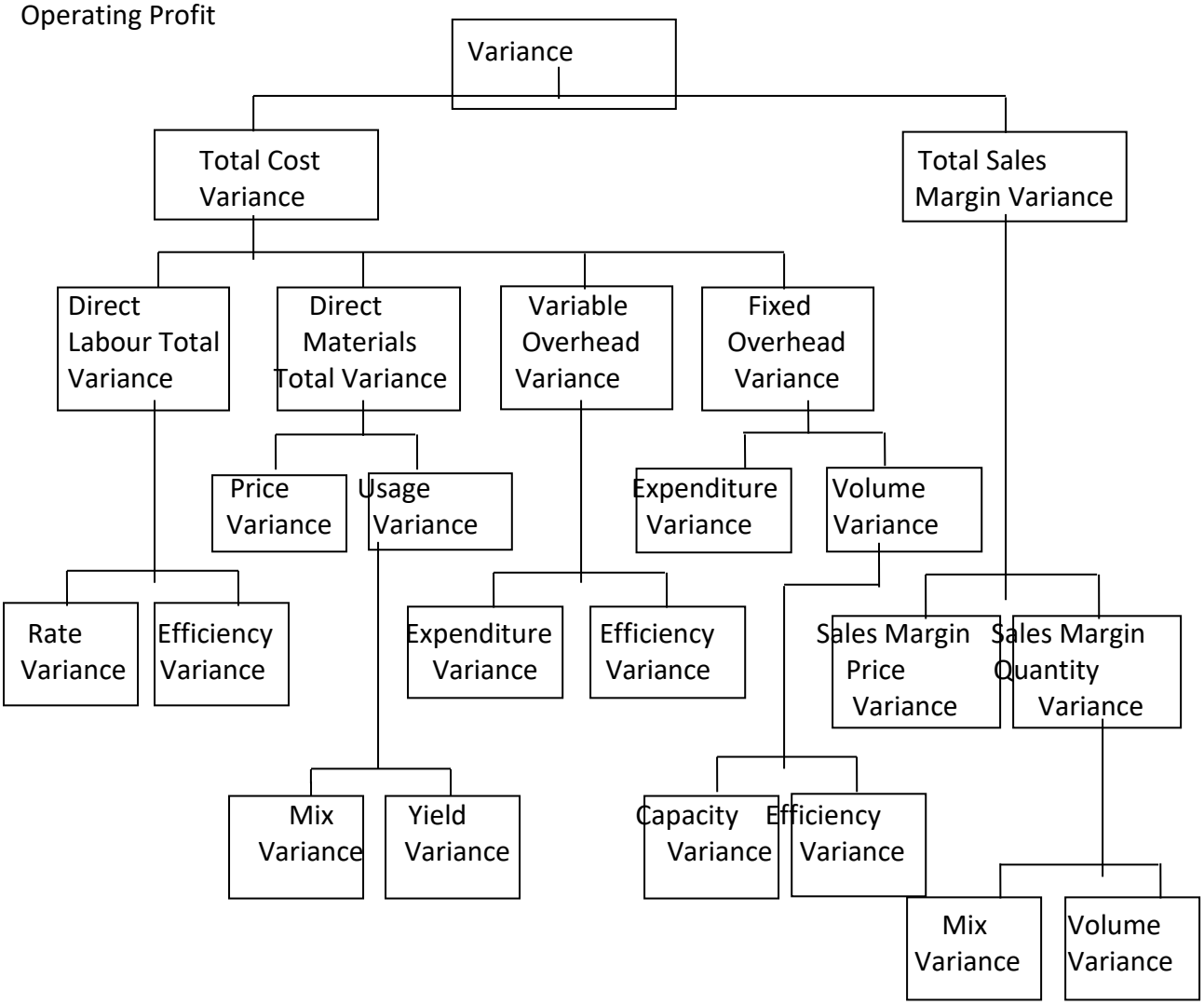


Chart of commonly encountered variances

2.12 Factors to Be Considered in Variance Analysis

The following factors must however be considered before the variance can be investigated.

i. The cost and benefit analysis of the investigation.
ii. The actual amount involved in the variance.
iii. The trend of the variance
iv. Materiality aspect of the variance of the organization
v. Size of the variance.
vi. Proportionate significant of the variance.

Operating Profit Variance

This will represent the difference between actual profit and budgeted profit. Operating profit variance may be analyzed diagrammatically as follows:

OPERATING PROFIT VARIANCE

Production Cost Variance	Selling & Dist. Cost Variance	Sales margin variance

DETAILED ANALYSIS OF PRODUCTION COST VARIANCES

2.13 Material Cost Variances

The cost of the materials which are used in a manufactured product are determined by two basic factors: the price paid for the materials, and the quantity of materials used in production, this gives, rise to the possibility that one actual cost will differ from the standard cost because the actual quantity of material used will be different from the standard and or that the actual price paid will be different from the standard price.

Direct material total variance

Direct material Price variance	direct material	usage variance

i. Direct-material total variance is defined as "the difference between the standard material costs of actual production volume and the actual cost of direct.

Direct material

OR

Actual cost of production	xx
Less standard cost of production (Based on actual output)	xx
	x

OR

Actual price x Actual quantity	xx
Less Standard Price x standard quantity Based on actual output xx	
	X

ii. Direct material variance is determined as "the difference between the standard price and actual purchase price for the actual quantity of material'' OR

Actual purchase quantity x Actual price	xx
Less: Actual purchase quantity x standard price	xx

xx

OR

(Standard price minus Actual price) x Actual quantity used

i.e. (SP-AP) A Q

Possible Causes of Material Price Variances

(a) Buying lower or higher than planned.

(b) Losing or gaining quantity discount by buying in smaller or larger quantities has planned.

(c) Making use of substitute material due to the unavailability of the intend material.

(d) Paying higher or lower prices than planned.

(e) Purchase of inferior material at lower prices

(f) Changes in market conditions resulting in general increases in material prices.

iii. Material usage variance is also defined as "the differences between the standard quantity specified for the actual production and the actual quantity used, at standard purchase price "OR

₦

Actual quantity used for actual Production x Standard quantity price	xx
Less: Standard quantity for actual production x Standard price	xx
	xx

Standard quantity based on actual production minus the actual quantity used multiplied by the standard price i.e. {SQ (BOAO-AQ} SQ

Possible Causes of Material Usage Variances

i. Careless handling of material by production personnel.
ii. Purchases of inferior quality materials.
iii. Pilferage of material items by production staff.
iv. Changes in quality control requirements.
v. Change in the method of production.
vi. Greater or lower yield from material than planned.
vii. Greater or lower rate of scrap than anticipated based on the earlier graphical illustration.

2.14 Labour Cost Variances

This cost of labour is determined by the price paid for labour and the quantity of labour used. Thus a "price" and "usage" variance will also arise for labour. Unlike materials labour cannot be stored, because the purchase and usage of labour normally takes place at the same time. Hence, the actual quantity of hours purchase will be equal to the actual quantity of hours used for each period. Based on the submission, labour rate variance and labour efficiency variance should equate the total labour cost variance.

Direct Labour total Cost Variance

Direct Labour Cost Variance | Direct Labour efficiency Variance

1. Direct labour total variance Is defined as "difference between the standard direct labour cost and the actual direct labour cost, incurred for the production achieved" OR the total labour variance is the difference between the standard cost for the actual production and the actual labour cost i.e.

SC – AC OR

	₦
Actual labour cost	xx
Less standard cost of labour (Based on actual output)	xx
	x

2. Direct labour rate variance is defined as "the difference between the standard and actual direct labour rate per hour for the total hours worked"

OR

The wage rate variance is equal to the difference between the standard wage rate per hour and the actual wage rate multiplied by the actual number of hours worked.

OR

	₦
Actual labour hours x Actual Rate	xx
Less: Actual Labour hours x standard Rate	xx
	x

OR

Standard rate minus Actual rate multiplied by the actual hours worked

i.e. (SR - AR) AH.

Possible Causes of Labour Rate Variance

(a) Payment of unplanned overtime or hours.

(b) Higher or lower grade of worker being used than planned.

(c) Higher rate being paid than planned due to government legislation.

(d) Negotiated increased in wage rates.

3. Direct – labour efficiency variance represents "the difference between the standard hours for the actual production achieved and the hours actually worked valued at the standard labour rate "OR labour efficiency variance is equal to the difference between the standard labour hours for actual production and the actual hours worked during the period multiplied by the standard wage rate per hour.

OR

	₦
Actual labour hours x standard Rate	xx
Less standard hours produced x standard Rate	xx
	X

OR

Standard hour worked on actual production minus hours worked multiplied by the standard labour Rate i.e. (SH - AH) SR.

Possible Causes of Labour Efficiency Variance

i. Use of inappropriate grade of labour.

ii. Machine breakdown.

iii. Lack of proper workshop supervisions.

iv. Use of inferior quality material

2.15 Variable Overhead Variances

A total overhead variance is calculated in the same way as the total direct labour and material variances. This is also sub-divided into two as follows:

Variable Overhead Variance

Variable Overhead Expected Variance

Variable Overhead efficiency Variance

1. Variable overheads variance is defined as "the difference between the actual variable overheads incurred and the variable overheads absorbed. "OR the total variable overhead variance is the difference between the standard variable overheads charge to production and the actual variable overheads incurred.

OR

	₦
Standard cost (based on actual output)	xx
Less: Actual variable overhead cost	xx
	X

OR

SC – AC

Where variable overheads vary with direct labour or machine hours of input. The total variable overhead variance will be due to one or both of the following:

(a) A "price" variance arising from the actual direct expenditure being different from budgeted expenditure.

(b) A "quality" variance arising from actual direct labour or machine hours of input being different from the hours of input, which should have been used. These reasons give rise to the two sub-variances explained below.

(ii) Variable overhead expenditure variance is defined as "the difference between the actual variable overheads incurred and the allowed variable overheads based on the actual hours worked"

OR

The variable overhead expenditure variance is equal to the difference between the budgeted flexed variable overheads (BFVO) for the actual direct labour hours of input and the actual variable overhead costs incurred (AVO)

OR

	₦
Actual variable overheads	xx
Less Actual labour x variable O/H, Absorption Rate	xx
	X
Actual variable overhead costs incurred	xx
Less standard cost allowed	
(Standard Vol. Rate x Actual hours worked)	xx
	X

OR

BFVO – AVO

(iii) Variable overhead efficiency variance is also defined as "the difference between the allowed variable overheads and the absorbed variable overhead OR the variable overhead efficiency variance is the difference between the standard hours of output and the actual hours of input for the period multiplied by the standard variable overhead rate.

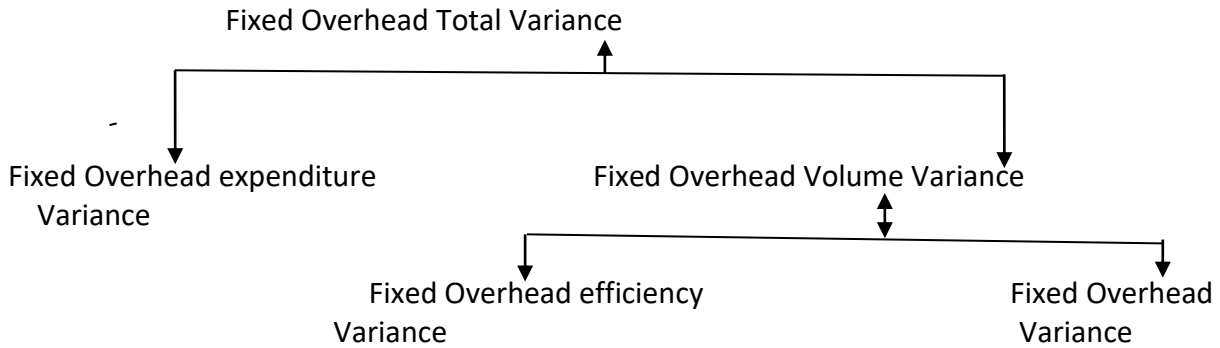
OR

	₦
Actual labour x Variable o/h absorption Rate	xx
Less standard hours x variable o/h Absorption Rate	xx

OR

(SH- AH) SR

Fixed Overhead Variance



a. Fixed Overhead Total Variance is defined as "the total differences between the fixed overhead absorbed by the actual productions and the actual fixed overheads for the period" OR

The total fixed overhead variance is the difference between the standard fixed overhead charged, to production and the actual fixed overhead incurred OR

	₦
Actual Fixed overhead incurred	xx
Less: Standard Cost (based on actual output)	xx
	x

Note: That the standard cost for the actual production can be calculated by measuring productions in standard hours of output.

The under or over recovery of fixed overheads (i.e. the fixed overhead variance) arises because of the fixed overhead rate is calculated by dividing budgeted fixed overheads by budgeted output. If actual output or fixed overhead expenditure differs from budget, an under or over of fixed overheads will arise. In order words, the under or over recovery may be due to the followings:

i. A fixed overhead expenditure variance arising from actual expenditure being different from budgeted expenditure.

ii. A fixed overhead volume arising from actual production differing from budgeted productions.

b. Fixed overhead expenditure variance is defined as "the differences between the actual fixed overheads and allowed budgeted fixed overheads for the period"

OR

	₦
Actual expenditure on fixed overheads	xx
Less: Budgeted fixed overheads	xx
	X

c. Fixed overhead volume Variance is defined as "the differences between fixed overhead absorbed by the actual productions and budgeted fixed overheads for the period" OR the volume variance is the difference between actual productions (AP) and budgeted productions(BP) for the period multiplied by the standard fixed overhead rate (SR)

OR

	₦
Actual Production ×Standard rate	xx
Less: Budgeted Production ×standard rate	xx
	x

OR

(AP-BP) SR

This variance seeks to identify the portion of the total fixed overhead variance that is the due to actual production being different from the budgeted production. The volume variance reflects the fact that fixed overheads do not fluctuate in relations to output in the short terms. Whenever

actual production is less than budgeted production, the fixed overhead charged to production will be less than the budgeted cost, and the volume variances will be adverse. Conversely, if the actual production is greater than the budgeted production. If the volume variance will be favourable. if required however, volume Variance can be sub-divided into, an efficiency variance and a capacity variance as follows.

(iv) Fixed overhead efficiency variance is described as "the difference between the standard hours of production achieved and the actual labour hours, valued at the fixed overhead absorption rate" OR

	₦
Actual Labour hours × F.O.A.R	xx
Less: Standard hours of production ×F.O.A.R	xx
	X

OR

(SH –AH) SR

(V) Fixed overhead capacity variance represent "the difference between the budgeted hours and actual hours, valued at the fixed overhead absorption rate" OR, the volume capacity is the difference between the actual hours of input (AH) and the budgeted hours of input (BH) for the period multiplied by the standard fixed overhead rate (SR)

OR

	₦
Budget fixed overheads	xx
Less: Actual labour hours x F.O.A.R	xx
	X

OR

(AH- BH) SR

ILLUSTRATION

The following data are available from the spraying Department of DABIRAB limited, a furniture manufacturer which has established standard cost of producing a cabinet styled: HABLAB

	₦
Labour	4.50
Material (15metres at ₦8)	120.00
Indirect costs:	
Variable charges (3 hrs. at ₦1)	3.00
Fixed charges (3 hrs. at ₦0.5)	1.50
	129.00

The actual costs of producing 400 of these cabins during October, 200X are stated below:

	₦
Material (7,500 meters at ₦9)	67,500
Material consumed (7,200) meters	

Direct labour (1,100 hrs. at ₦1,700)	1,870
Variable charges	950
Fixed charges	600

Fixed charges rate had been set by using 1,400 direct labour hours of operation as the monthly activities level. There was no operating stock of raw materials.

You are required to compute the following variance:

i. Material price variance
ii. Material usage variance
iii. Material cost variance
iv. Labour rate variance
v. Labour efficiency variance
vi. Labour cost variance
vii. Variable expenditure variance
viii. Variable efficiency variance
ix. Variable cost variance
x. Fixed expenditure variance
xi. Fixed volume variance
xii. Fixed efficiency variance
xiii. Fixed capacity variance
xiv. Fixed overhead total variance.

Solution

DABIRAB LTD.

1. MATERIAL PRICE VARIANCE

(Standard price – Actual price) Actual quantity used.
(SP – AP) AQ
(8 – 9) 7,200 = ₦ 7,200A

2. **MATERIAL USAGE VARIANCE**

(Standard quantity – Actual raw material) Standard price
Based on actual used for the production)
Production
(SQ – AQ) SP 15 x 400
6,000 – 7200 8 = ₦9,600A

3. **MATERIAL COST VARIANCE** ₦

Actual cost of production (N9 x 7,200)	64,800
Less standard cost of production (₦8 x 15 x 400)	48,800
	16,800A

MCV

₦16,800A

MPV
₦7,200A

MUV
₦9,600A

4. LABOUR RATE VARIANCE

(Standard Rate – Actual Rate) Actual hours worked.
(₦1.50 – ₦1.70) 1,100 = ₦220A

5. LABOUR EFFICIENCY VARIANCE

(Standard hours – Actual hours) Standard Labour rate
(3 x 400 – 1,100) ₦1.50
(1,200 – 1,100) ₦1.50 = ₦150F

6. LABOUR COST VARIANCE

	₦
Actual labour cost – (1.70 x 1,100)	1,870
Less: - Standard labour cost	
(₦1.50 x 400)	1,800
	70A

LCV
70A

LRV
220A

LEV
150F

7. VARIABLE EXPENDITURE VARIANCE

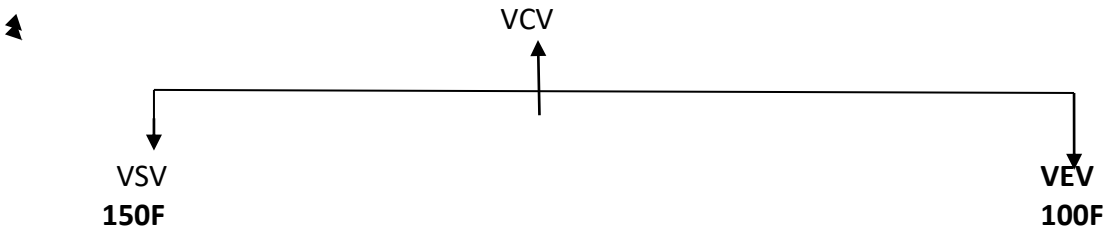
	₦
Actual variable overhead	950
Less Standard Cost Allowed	
(SR × Actual hours worked)	1,100
	150F

8. VARIABLE EFFICIENCY VARIANCE

(Standard hours – Actual hours) standard Rates/V.O.A.R;
Based on production
(3×400
(1,200-1,100) = ₦100F

9. VARIABLE COST VARIANCE

	₦
Actual variable overhead	950
Less Standard variable overhead (₦1×3×400)	1,200
	250F



10. FIXED OVERHEAD VARIANCE

	₦
Actual fixed overhead	600
Less budgeted fixed overhead (0.5×1,400)	700
	100F

11.FIXED OVERHEAD VOLUME VARIANCE

(Standard hours –budgeted hours) standard Rate or F.O.A.R.
Based on production
(3×400 – 1,400) ₦0.5
(1,200 -1,400) ₦0.5 = ₦100A

12. FIXED EFFICIENCY VARIANCE

(Standard hours – Actual hours)F.O.A.R
(Based on production
(3×400 – 1,100) 0.5
(1,200 – 1,100) 0.5 = ₦50F

13. FIXED CAPACITY VARIANCE

(Budgeted Hours – Actual Hours)F.O.A.R
(1,400 -1,000) ₦0.5 = ₦150A

14.FIXED OVERHEAD TOTAL VARIANCE

	₦
Actual fixed overhead	600
Less Standard cost based on production (₦0.5 × 400)	600
	-

Fixed O/H V

Expenditure Variance
100F

Volume variance
100A

Efficiency Variance
50 F

Capacity variance
150 A

ALTERNATIVE PRESENTATION TO THE SOLUTION

- A) MATERIAL VARIANCES

i) AA: Actual qty of RM @ Actual Price
ii) AS: Actual Qty of RM @ Standard Price
iii) SS: Standard Qty of RM @ Standard Price

Price Variance = (ii - i)
Usage Variance = (iii - ii)
Cost or Total Variance = (iii - i)

			₦
i)	AA: 7,200 x ₦9.00	=	64,800
ii)	AS: 7,200 x ₦8.00	=	57,600
iii)	SS: (15 x 400 BOAO) x ₦8.00	=	48,000

Price Variance = (ii - i) = 57,600 – 64,800 = ₦7,200 A
Usage Variance= (iii - ii) = 48,000 – 57,600 = ₦9,600 A
Cost Variance = (iii - i) = 48,000 - 64,800 = ₦16,800A

LABOUR VARIANCES

i)	AA: Actual hours @ Actual Rate =	1,100 x ₦1.70 =	1,870
ii)	AS: Actual hours @Standard Rate =	1,100 x ₦1.50 =	1,650
iii)	SS: Std hrs (BOAO) @ Std. Rate =	(3 x 400) x ₦1.5 =	1,800

Rate Variance = (ii – I) = 1,650 – 1,870 = 220A
Efficiency Variance = (iii - ii) = 1,800 - 1,650 = 150F
Cost Variance = (iii - i) = 1,800 – 1,870 = 70A

VARIABLE OVERHEAD VARIANCES

i)	AA: Actual hours @Actual Rate	(given) =	950
ii)	AS: Actual hours @Standard Rate =	(1,100 x ₦ 1) =	1,100
iii)	SS: Std hrs (boao 3x400) @Std Rate	(1,200 x ₦ 1)=	1,200

Expenditure Variance (ii – i) = 1,100 – 950 = 150F
Efficiency Variance (iii - ii)= 1,200 – 1,100 = 100F
Cost Variance (iii - i)= 1,200 - 950 = 250F

FIXED OVERHEAD VARIANCES

i)	S: Std. hours @ Std. FOH Rate	=	(3 x 400) x N.50 = 600
ii)	A: Actual hrs @ Std. FOH Rate	=	1,100 x N0.50 = 550
iii)	B: Budgeted hrs @ Std. FOH Rate	=	1,400 x N0.50 = 700
iv)	A: Actual FOH Cost (given)	=	= = = 600
P: Productivity or [Efficiency] Variance		=	(i - ii) = 600 – 550 = N50
C: Capacity Variance		=	(ii - iii) = 550 – 700 = (N150)
V: Volume Variance		=	(i - iii) = 600 – 700 = (100)
E: Expenditure Variance		=	(iii - iv) = 700 – 600 = 100
C: Cost or [Total] Variance		=	(i - iv) = 600 – 600 = 0

2.16 Modern Management Accounting Tools

Below are discussed some modern management accounting tools:

Activity Based Management

Over time the term activity based management and activity cost management (ABCM) has been used synonymously to describe the cost management application of Activity Based Costing (ABC). ABM aims to provide management with a simplified method of introducing and managing process and organization change. It can also be seen include activity analysis, cost driver analysis continuous improvement operational control and performance evaluation. ABM view the business as a set linked activities that ultimately add value to the customer, which focuses on managing business on the basis of the activities that make up the organization. In the implementation of ABM, there is exist three (3) stages to be followed

(a) Identify the major activates that exist in an organization

(b) Assign cost to cost centers (cost pools) for each activity

(c) Determine the associated cost driver for each of the major activity

Activity Based Management entails action based on activity driver analysis that aim to change the demand for activates asset utilization. Operation ABM Activity Based Management entails action based on activity driver analysis that increase efficiency lower cost and improve asset utilization. Strategic ABM Activity Based Management entail action based on activity driver analysis, that aim to change lower cost and improve so as to improve profitability.

Justification of ABM

i. It brings about improved quality of product and services provided
ii. Customers' satisfaction is increased and enhances.
iii. Aggregate cost of operation is lower and reduced to the barest minimum
iv. Profitability is increased overtime

Limitation of ABM

1. It requires extensive amount of work in the set-up of the system and in the process of data collection.

2. The exist some organization and behavioral consequences in which some activity cost pool may not correspond to the formal structure with the organization

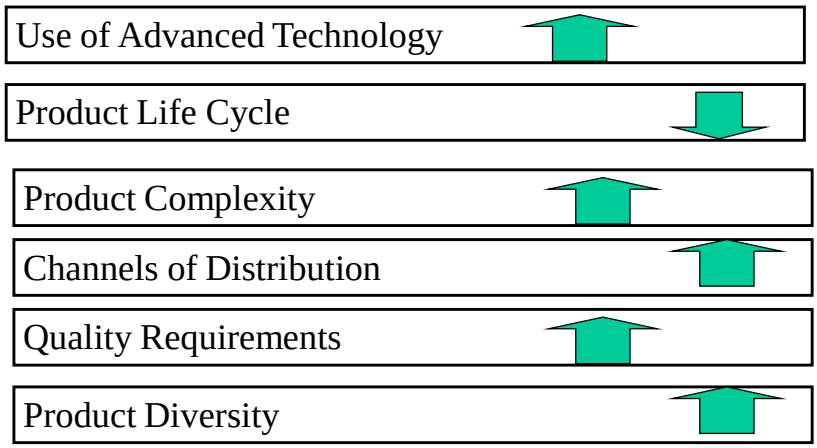
Activity Based Costing: What? Why? How?

Requirement of Cost Systems

Requirement of Cost Systems are as follows:

- Valuation of inventory and measurement of the cost of goods sold for financial reporting.
- Estimation of the costs of activities, products, services, and customers.
- Providing economic feedback to managers and operators about process efficiency.

Today's businesses are working in an increasingly complex environment.



Conventional Costing treats Expenses while **AB Costing deals with Economic Element, that is** Resources.

Composition of Costs are: Direct Materials Plus Direct Labour plus Overheads Conventional Costing:

- Total Cost = Material + Labour+ Overheads
- Overheads are allocated to the products on volume based measures e.g. labour hours, machine hours, units produced
- **Will this not distort the costing in the new environment**? ABC will clarify.
- ABC provides an Alternative.

  Basics of A B C

- Cost of a product is the sum of the costs of all activities required to manufacture and deliver the product.

- Products do not consume costs directly
- Money is spent on activities
- Activities are consumed by product/services
- ABC assigns Costs to Products by tracing expenses to "activities". Each Product is charged based on the extent to which it used an activity
- The primary objective of ABC is to assign costs that reflect/mirror the physical dynamics of the business
- Provides ways of assigning the costs of indirect support resources to activities, business processes, customers, products.
- It recognises that many organisational resources are required not for physical production of units of product but to provide a broad array of support activities.

An ABC system addresses the following Questions:

- What activities are being performed by the organisational resources?
- How much does it cost to perform activities?
- Why does the organisation need to perform those activities?
- How much of each activity is required for the organisation's products, services, and customers?
- <u>Basics of A B C : How?</u>

Steps:

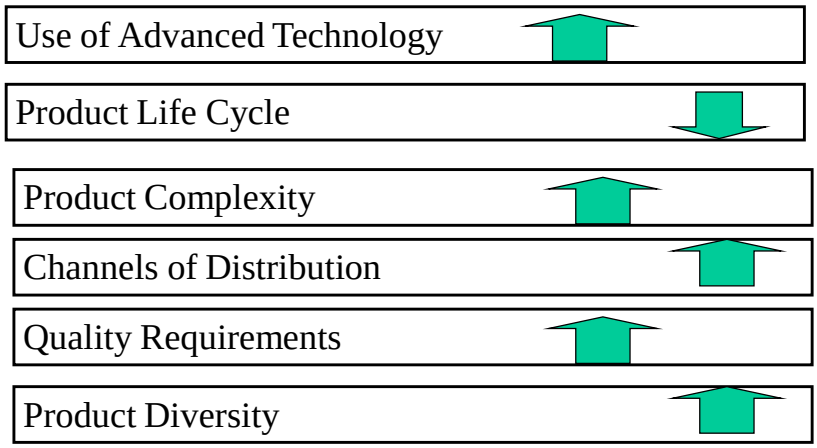
1. Form cost pools:
2. Identify activities
3. Map resource costs to activities
4. Define activity cost drivers
5. Calculate cost

These are called ABC Dictionary

1. **Map resource costs to activities**

- Financial accounting categorise expenses by spending code; salaries, fringe benefits, utilities, travel, communication, computing, depreciation etc.
- ABC collects expenses from this financial system and drives them to the activities performed.

Today's businesses are working in an increasingly complex environment.



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- <u>ABC provides an Alternative.</u>
- Conventional Costing **<u>AB Costing</u> Economic Element**
- Expenses Resources

<u>Basics of A B C</u>

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- Basics of A B C: How?

Steps:

The Steps are discussed as under:

1. ***Form cost pools:***
   Cost pools are groups or categories of individual expense items
2. **Identify Activities**:
   In developing an ABC system, the organization must identify the activities being performed, e.g.:

- Move material
- Schedule production
- Purchase material
- Inspect items
- Respond to customers
- Improve products
- Introduce new products
- Explore new markets
- *Form cost pools:*
- *Identify activities*

3. *Map resource costs to activities*
4. *Define activity cost drivers*

5. *Calculate cost*

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These are called ABC Dictionary

3. **Map resource costs to activities**

- Financial accounting categorizes expenses by spending code; salaries, fringe benefits, utilities, travel, communication, computing, depreciation etc.
- ABC collects expenses from this financial system and drive them to the activities performed.

Example of Mapping:

Accounting Records	
Salaries	313,000
Depreciation	155,000
Electricity	132,000
Supplies	25,000
Travel	100,000
Total	725,000

ABC Records						
Activities	Salaries	Depreciati	Electricity	Supplies	Travel	Total
Business Development	20,000	25000	5000		5000	55,000
Maintianing Present Business	80,000	60000	50000	5000	10000	205,000
Purhcasing Material	125,000	50000	20000	20000	60000	275,000
Set up Machines	25,000	10000	2000			37,000
Running Machines	50,000	10000	50000			110,000
Resolve Quality Problems	13,000		5000		25000	43,000
Total	313,000	155000	132000	25000	100000	725,000

As we can observe from the exhibit above, while accounting record will lump figures under an item, ABC will analyses the same item into the various activities that propelled incurrence of the cost. Notice for example the accounting record for Salaries is ₦313,000, this does not reveal what activities that brought about the total amount. But ABC record has shown what and what brought about the amount, and for the entire items one after the other.

Activities: Types

Activities Types are categorised as follows:

- Unit level: Performed each time a unit is produced
- Batch level: Performed each time a batch is produced
- Product level: Performed to support production of different type of product
- Customer Level: Performed to support servicing customers
- Facility level: Residuary head

2. Define activity drivers

- The linkage between activities and cost objects, such as products, customers, is accomplished by using activity drivers.
- An activity driver is a quantitative measure of the output of an activity.
- The selection of an activity driver reflects a subjective trade-off between accuracy and cost of measurement.

The chart below gives a guideline:

Activities	Drivers
Unit Level	
Acquire and Use material for containers	No. of Containers
Acquire and Use material for baby-care p	No. of products
Batch Level	
Set up manually controlled machines	No. of batches of con
Set up computer controlled machines	No. of batches of B. F
Product Level	
Design and manufacture moulds	No.of moulds required
Use manually controlled machines	Product type (contain
Use conputer controlled machines	Product type (B.Prod
Customer Level	
Consult customers	No. of consultations
Provide warehousing for customers	No. of cubit feet
Faciltiy Level	
Manage workers	Salaries

Activities	Drivers	Activity Cost	Activity Volum	Activity Ra
Unit Level				
Acquire and Use material for containers	No. of Containers	40,000	1,000,000	0.04
Acquire and Use material for baby-care products	No. of products	80,000	8,000	10
Batch Level				
Set up manually controlled machines	No. of batches of containers	3,000	10	300
Set up computer controlled machines	No. of batches of B. Produst	12,000	20	600
Product Level				
Design and manufacture moulds	No.of moulds required	5,000	5	1000
Use manually controlled machines	Product type (containers)	15,000	1	15000
Use conputer controlled machines	Product type (B.Products)	40,000	1	40000
Customer Level				
Consult customers	No. of consultations	4,000	40	100
Provide warehousing for customers	No. of cubit feet	2,000	10,000	0.2
Faciltiy Level				
Manage workers	Salaries	3,000	15,000	0.2
Use main building	Square feet	48,000	16,000	3

Ascertaining Cost

Activities	A. Rate	A.Volume	Containers	Baby Product
Unit Level				
Acquire and Use material for containers	0.04	1,200,000	48,000	
Acquire and Use material for baby-care products	10	7,000		70000
Batch Level				
Set up manually controlled machines	300	12	3,600	
Set up computer controlled machines	600	16		9600
Product Level				
Design and manufacture moulds	1000			
		1	1,000	
		4		4000
Use manually controlled machines	15000	1	15,000	
Use conputer controlled machines	40000	1		40000
Customer Level				
Consult customers	100			
Containers		2	200	
B.products		40		4000
Provide warehousing for customers	0.2			
Containers		8,000	1,600	
B.products		2,000		400
Faciltiy Level				
Manage workers	0.2			
Containers		4,000	800	
B.products		10,000		2000
Use main building	3			
Containers		5,000	15,000	
B.products		7,000		21000
Total Cost			85,200	151,000

Building an ABC Model

Identify Resources → **Identify Activities** → **Identify Cost Objects**

Define Activity Drivers → **Define Resource Drivers**

Enter Resource Costs → **Enter Resource Driver Qty.** → **Enter Activity Driver Qty.** → **Calculate Costs**

The two traditional costing methods are absorption costing and marginal costing, as we have seen. Absorption costing allocates and apportions all overheads to products. In order to do this, companies must allocate and apportion service overheads to the main production departments. Direct labour and/or machine-hour rates are then derived, which are used to calculate the overheads attribute to each product. The approach was developed in the early part of the 20th century and assumes that overheads directly relate to the level of production. This is not always the case under current production methods, as factors such as sales mix, complexity, range and production techniques all influence overhead costs. The method of apportionment can also seem arbitrary and the resulting product costs are sometimes difficult to interpret.

Marginal costing, on the other hand, makes no attempt to apportion overheads and a product's marginal cost only includes direct material, direct labour and directly attributable overheads. Sales less marginal cost establishes the company's contribution, which should be managed in such a way that it covers all fixed overheads and generates the required level of profit. Critics of this approach point to the danger of not apportioning all overheads to products and the possibility that these costs will not be recovered in selling prices. As a result, the company may drift into loss and eventually go out of business.

Absorption costing requires a lot of time and energy put into the basis of overhead allocation and apportionment but often the factors leading to the generation of these costs are obscured. Marginal costing tends to ignore these fixed overheads and relies on budgets to control cost levels. Activity-based costing provides an alternative approach to the treatment of fixed overheads. It focuses on the activities that generate overheads and the factors, of cost drivers, that cause costs to change. These cost drivers are the heart of ABC and are used to determine the basis of overheads attribute to each product. Attention is focused on each activity and the factors that cause cost levels to change. In consequence, the nature of each cost will be better understood and increased control and better decisions should result.

Terms Used in Activity-Based Costing

- Activity: Discrete services or related tasks which are carried out repeatedly.
- Cost Driver: The factor or event which causes a cost to occur.
- Cost Pool: All the costs incurred when an activity takes place.
- Professors Kaplan and Cooper of Harvard University created the idea of activity based costing. It was designed to deal with the problem of allocating costs to output where such costs are not related to volume of production.
- In the traditional methods overheads are apportioned to output using a basis such as machine hours.
- For every cost driver the cost per unit of activity is calculated and this is then used to divide costs into individual cost units.

Example of Activities	**& Cost Drivers Used**
No. of suppliers	- No. of invoices
- Accounting Department Costs	- No. of Accounting
- Set up costs	- No. of manufacturing set ups
- Engineering Dept. Cost	- No. of production Orders

Advantages of Activity-Based Costing (ABC)

- Better basis for cost apportionment
- Overheads are traced to the apportionment
- ABC brings attention to cost behavior and helps in the reduction of costs.

- ABC provides a useful means of getting financial and non-financial data.
- More realistic product.
- Forces managers to consider the drivers of cost in their business.

Disadvantages of Activity- Based Costing

- Difficult in picking cost drivers.
- Very time consuming.
- The problem of common costs
- A full ABC system having numerous cost pools and cost drivers is more complex and more expensive to operate.

The Stages Involved in ABC is:

a) Identify the activities that cause overheads to be incurred.
b) Change the accounting system so that costs are collected by activity rather than by cost center
c) Identify the factors that cause activity's costs to change. These factors are the cost drivers.
d) Establish the volume of each cost driver.
e) Calculate the cost driver rates by dividing the cost by the volume of its cost driver.
f) Establish the volume of each cost driver required by each product.
g) Calculate overheads attribute to each product by multiplying (f) by (e).

In the 1980's mainly in the USA and Japan, a new system, Activity-Based Costing (ABC), which is considered to produce a better distribution of expenses to product costs was researched and defined. As the name implies, ABC related costs are chargeable in the activity and each activity is itself necessary for the final product to be produced. Examples could be:

- Personnel department
- Material handling

Total Quality Management (TQM)

TQM is the integration of all functions and processes within an organization in order to achieve continuous improvement of the quality of goods and services. The goal is customer satisfaction

- **Deming:** the best known of the "early" pioneers, is credited with popularizing quality control in Japan in early 1950s.Today, he is regarded as a national hero in that country and is the father of the world famous Deming prize for quality.

- Juran, like Deming was invited to Japan in 1954 by the union of Japanese Scientists and engineers.
- Juran defines quality as fitness for use in terms of design, conformance, availability, safety and field use. He focuses on top-down management and technical methods rather than worker pride and satisfaction.

Philip Crosby: author of popular book Quality is Free. His absolutes of quality are:

- Quality is defined as conformance to requirements, not "goodness"
- The system for achieving quality is prevention, not appraisal.
- The performance standard is zero defects, not "that's close enough"
- The measurement of quality is the price of non-conformance, not indexes.

Commonality of Themes of Quality by the experts:

- Inspection is never the answer to quality improvement, nor is "policing".
- Involvement of leadership and top management is essential to the necessary culture of commitment to quality.
- A program for quality requires organization-wide efforts and long term commitment, accompanied by the necessary investment in training.
- Quality is first and schedules are second.

Definition of Quality

The concept and vocabulary of quality are elusive. Different people interpret quality differently. Few can define quality in measurable terms that can be proved operationalized. When asked what differentiates their product or service;

The banker will answer" service"
The healthcare worker will answer "quality health care"
The hotel employee will answer "customer satisfaction"
The manufacturer will simply answer "quality product"

Five Approaches of Defining Quality

- Harvard professor David Garvin, in his book *Managing Quality* summarized five principal approaches to define quality.
- Transcendent
- Product based
- User based
- Manufacturing based
- Value based

Transcendental view

- Those who hold the transcendental view would say "I can't define it, but I know it when I see it"

- Advertisers are fond of promoting products in these terms.

"Where shopping is a pleasure" (supermarket). "We love to fly and it shows" (airline). Television and print media are awash with such indefinable claims and therein lays the problem:

- Quality is difficult to define or to operationalize. It thus becomes elusive when using the approach as basis for competitive advantage. Moreover, the functions of design, production and service may find it difficult to use the definition as a basis for quality management.

PRODUCT BASED

- Quality is viewed as a quantifiable or measurable characteristic or attribute. For example, durability or reliability can be measured and the engineer can design to that benchmark.
- Quality is determined objectively.
- Although this approach has many benefits, it has limitation as well. Where quality is based on individual taste or preference, the benchmark for measurement may be misleading.

USER BASED

It is based on idea that quality is an individual matter and products that best satisfy their preferences are those with the highest quality. This is rational approach but leads to two problems; Consumer preferences vary widely and it is difficult to aggregate these preferences into products with wide appeal. This leads to the choice between a niche strategy and a market aggregation approach which tries to identify those product attributes that meet the needs of the largest number of consumers.

- Another problem concerns the answer to the question "Are quality and customer satisfaction the same?" the answer is probably not. One may admit that a Lincoln continental has much quality attribute, but satisfaction may be better achieved with an Escort.

MANUFACTURING BASED

- Manufacturing-based definitions are concerned primarily with engineering and manufacturing practices and use the universal definition of "conformance to requirements". Requirements or specifications are established by design and any deviation implies a reduction in quality. The concept applies to services as well as product. Excellence in quality is not necessarily in the eye of the beholder but rather in the standards set by the organization.
- This approach has the serious weakness. The consumer's perception of quality is equated with conformance and hence is internally focused.

Value Based: TQM is defined in term of costs and prices as well as number of other attributes. Thus, the consumer's purchased decision is based on quality at an acceptable price. This approach is reflected in the popular *Consumer Reports* magazine which ranks products and services based on two criteria: Quality and Value. The highest quality is not usually the best value. That designation is assigned to the "best- buy" product or service.

Characteristics of TQM Leader are:

- Visible, Committed and Knowledgeable
- A Missionary Zeal
- Aggressive Targets

- Strong Drivers
- Communication of Values
- Organization
- Customers Contact

Total Quality Organisation HRM

The Five Principles are:

- Quality Work the First Time
- Focus on the Customer
- Strategic Holistic Approach to Improvement
- CI as a Way of Life
- Mutual Respect and Teamwork

Customer Satisfaction: Three Part System

Human Resource Management
Customer Expectations
Company Operations (Processes)

These are all geared towards Customer Satisfaction

Indicators for Customer Satisfaction

- Frontline empowerment
- Excellent hiring, training, attitude and morale for front line employees
- Proactive customer service system
- Proactive management of relationship with customers
- Use of all listening posts
- Quality requirements of market segment
- Commitment to customers
- Understanding customer requirements
- Service standards meeting customers' requirements

Cost of Quality: Three Views of quality Costs

1. Higher quality means higher cost.
- Quality attributes such as performance and features cost more in terms of labor, material, design and other costly resources.
- The additional benefits from improved quality do not compensate for additional expense.
2. The cost of improving quality is less than the resulting savings.
- The saving result from less rework, scrap and other direct expenses related defects.
- This is said to account for the focus on continuous improvement of processes in Japanese firms.
3. Quality costs are those incurred in excess of those that would have been incurred if the product were built or the service performed exactly right the first time.

This view is held by adherents of TQM philosophy.

Costs include not only those that are direct, but also those resulting from lost customers, lost market share and the many hidden costs and foregone opportunities not identified by modern cost accounting systems.

Quality Costs

COST OF QUALITY IS said to be THE COST OF NON QUALITY

1: 10:100 Rules: "A stitch in time saves nine"

Types of Quality Costs

The cost of quality is generally classified into four categories

1. Cost of Prevention
2. Cost of Appraisal
3. Cost of Internal Failure
4. Cost of External

1. Cost of Prevention

- Prevention costs include those activities which remove and prevent defects from occurring in the production process.
- Included are such activities as quality planning, production reviews, training, and engineering analysis, which are incurred to ensure that poor quality is not produced.

2. Appraisal

- Those costs incurred to identify poor quality products after they occur but before shipment to customers. E.g. Inspection activity.

3. Internal Failure

- Those incurred during the production process.
- Include such items as machine downtime, poor quality materials, scrap, and rework.

4. External Failure

- Those incurred after the product is shipped.
- External failure costs include returns and allowances, warranty costs, and hidden costs of customer dissatisfaction and lost market share.

Benefits of TQM

- Greater customer loyalty
- Market share improvement
- Higher stock prices
- Reduced service calls
- Higher prices
- Greater productivity

Conclusion

We are advised by experts to Remember that the earth revolves around the CUSTOMER. Quality begets customers and customers beget quality. Let us all have action plans to support quality, this will make the world happy and earn us the blessing of God Almighty.

And also to remember that "Actions are direct reflection of one's intentions" (Al-Quran)

Target Costing

Target costing involves setting a target cost by subtracting desired profit margin from competitive market prices. It is a customer focused management tool used to determine the market price for new product, in which market research is adopted as a basis for measuring performances needs and setting target selling price.

Target costing involves the following stages

Stage 1: determine the target which customers will be prepared to pay for the product
Stages 2: Deduct the target profit margin from the cost, investigate the target cost.
Stages 3: Estimate the actual cost of the product.
Stages 4: If estimated actual costs exceed the target cost, investigation ways of driving down the actual cost to the target cost

Target costing is a customer-oriented technique that is widely used by Japanese companies and which has recently been adopted by companies in Europe and African companies.
Information that enables target costing operates successfully is needed from a wide range of support which includes:

(a) Sales pricing systems

(b) Target profit computation support system

(c) Research and Development support system.

(d) Value Engineering a variety Reduction

(e) Human Resources/Capital Management Systems.

The major feature of target costing is that a team approach is adopted to achieve the target cost. The team member in include designer, engineering purchasing, manufacturing marketing and management accounting personnel. Their aim is to achieve is to achieve the target cost specified for the product at the prescribed level of functionary and quality.
The major advantage of adopting target costing is that it is deployed during a product design and planning stage so that it can have a maximum impact in determining the level of the locked in costs. It is an iterative process with the design team, which ideally should result in the design team continuing with its product and process design attempt until it finds design that give an expected cost that is equal or less the target cost.

Limitation of target costing

(a) It results in employee de-motivation as pressure is mounted to meet target

(b) It consumes longer product development time because of many changes in designs and castings.

(c) There exist conflicts (organizational conflict) between designer who try to reduce cost and, marketing staff who give away promotional item costing even more.

Example:
PZ Manufacturing Plc. Employed you as management accountant to determine the target cost of product whose price will be set at ₦1,000. The company require minimum profit margin 10%

SOLUTION
Target Selling price = ₦1,000
Profit Margin = 10% x ₦1,000 = ₦100
Target cost = ₦1000 – ₦1,000 = ₦900
The target cost of the product is determined at ₦900

Balance Scorecard
A balance scorecard consists of an integrated set of performance measures that are derived from the company's strategy throughout the organization. A strategy is essential theory about how to achieve the organization's goals. For example, low –cost European carriers such as easy jet, Ryan air and Go have copied southwestern Airlines' strategy of offering passengers' low prices on short-haul jet service. The low prices result from the low price on short-haul jet services. The low price results from the absences of costly frill such as meals assigned seating and interline baggage checking.
Under the balanced scorecard approach, top management translates its strategy into performance measures that employees can understand and can do something about. For examples, the amount of the time passengers have to wait in line to have their baggage checked might be a performance measure for a supervisor in charge of the check – in counter at an airport. These performances measure easily understood by the supervisor can be improved by the supervisors' actions.

Common Characteristics of Balanced Scorecards
Performance measure used in the scorecard approach trend to fall into the four groups: financial, customer, internal business process and learning and growth, internal business processes are what the company does attempt to satisfy the customers. For example, in a manufacturing company, assembling a product of an internal business process. In airline, handling baggage is an internal business process. The idea that learning is necessary to improve internal business processes, improving business is necessary to improve customer satisfaction; and improving satisfaction is necessary to improve financial result.
Note that emphasis is on improvement - not on just attaining some specific objective such as profit. In the balances scorecard approach, continual improvement is encouraged. In many industries, this is a matter of survival. If my organization does not continually improve, it will eventually lose out competitors that do.

A financial performance measure appears in most companies to provide financial reward to owners. There are exceptions. Some companies – for examples, the body shop – may have loftier goals, such as providing environmentally friendly product to consumers. However, even non-profit organization must generate enough financial resources to stay in operation.
Ordinarily, top managers are responsible for the financial measures – not lower level of managers. The supervisor in charge of checking in passenger can be held responsible for how long passengers have to queue. However, this supervisor cannot reasonably be held responsible for the entire company's profit.

That is the responsibility of the airline's top managers, if any would use all of these performance measure and almost all companies would add other performances measures. Managers should

carefully select performances measures for their company's balanced scorecard, keeping the following point in mind. First and foremost, the performances measured should be consistent with, follow from, the company' strategy, people will find themselves working at cross purpose. Second, the scoreboard should not have too many performances measure. This can lead to a lack of performances and confusion.

2.17 Relevant Cost in Decision Making

(a) Historical Cost:

Every decision deal with the future, the function of the decision maker is to select course of action for the future and this decision by as nature be based on prediction. Historical costs are therefore irrelevant to decision though they may be the best basis of predicting future cost.

(b) Past Cost:

Cost incurred in the past i.e. sunk cost will always be irrelevant. The decision maker has no opportunity to alter what has already happened. Some specific examples of this are:

(i) Obsolete Stock: the stocks already healed and now prove to be obsolete, have no relevance to decision regarding its presale or other use.

(ii) Old equipment: the costs of new equipment and the disposal value of old equipment are relevant transactions. The book value of old equipment is irrelevant to any decision making techniques.

(c) Other terms that may also apply to historical or past cost are:

(i) General cost (ii) Indirect Cost (iii) Unavoidable cost
(ii) Allocated Cost (iv) Apportioned Cost (iv) Prorated cost
(vii) Uncontrollable cost

(d) Variable Cost:

This will represent those categories of cost that cannot be referred to as either labour or material yet varied with the activity level. As a result of this decision with the activity, variable costs constitute a relevant cost any decision.

Relevant cost in this context are only those expected future cost that will differ under alternative course of actions.

(e) Fixed cost:

Cost which has been classified as fixed by convention or on the basis of past experiences may in fact affect a particular decision. This may be for two reasons:

(i) The cost fixed in relation to the level of activity previously experienced, but a decision may extend the range of activity and thus cause certain fixed cost to be stepped up to new level:

(ii) The cost is fixed in relation to the normal time horizon for forecasting if the time span of an action exceeds the normal period, the fixed the cost may change.

Therefore, a fixed cost will be relevant to a particular, if that decision will influences the actual cost to increase as stated. But where will be no alteration in the position of a fixed cost, then such will not be relevant future decisions.

(f) Direct Cost:

This will represent total that will be directly incurred in the course of manufacturing a product or rendering services e.g. Material cost, labour cost and Direct expense.

(g) Material Cost: For the purpose of valuing raw material for decision making different value will require attention as follows:

- Replacement value: This will represent the current market price of the items. It will be required in valuing raw material, if it can be ascertained that the raw material is frequently used by the organization.
- Net Realizable Value: This will also represent the current disposable of an item or raw material presently held in store. This amount would be relevant in pricing decision it can be established that the purpose of acquiring the material initially is no longer achievable

- Historical Cost: This will represent the actual cost of obtaining the raw material as the time of purchase. In decision making, historical cost is sunk cost, therefore irrelevant in any present or future decision.
- Labour cost**:** this will represent the total remuneration payable to worker for their productive services to the organization. However, for the purpose of decision making, labour may be categorized into two:
- FULL- Time worker also referred to as salaried worker. There numeration of this cadre of labour represent a fixed cost to the organization since it is payable at the end of specified period. This labour cost will not be relevant in present or future decision except the increase in the present amount as result of that decision.
- Ad-hoc Worker: Under any circumstances, the remuneration of casual worker will represent a relevant cost to the organization. This is because such cost is directly attributable to the decision on whether or not particular order should be accepted or not.

(g) Sunk Costs

Past costs, which are not relevant to a decision, are called **sunk cost**. The CIMA official terminology describes sinks cost as that above have been irreversibly incurred or committed prior to a decision and which cannot therefore cost be termed **"irrecoverable costs"**

(h) **Committed cost:**

Not all future costs are relevant to a future decision some future cost will be arise as a result of decision that have already been taken. These are called committed costs. Typical committed costs are staff salaries and the rent for equipment and building where it relate to contractual obligation made in the past.

(i) **Future Cash Cost**

All future cash expenditure specifically identified with Decision is relevant to that decision

2.18 PRICING DECISION

Internal and External Pricing

A firm may be concerned with two types of pricing decisions. Those for sales external to the firm, i.e. to its customers and those relating to price used for internal transfers between parts of the same organization. This latter process is known as transfer pricing and is dealt with in this book in the section on Performance Appraisal. Pricing decision for external sales are dealt with in the rest of this chapter.

The Pricing Decision Problem

The pricing problem is a complex one with numerous, interacting factors and no simplistic solution. Typical of the factors which may need to be considered – explicitly – implicitly in a pricing decision are the following:

The firm's objective(s):

i. Is the firm a profit or revenue maximizer or is it pursuing satisfying objective?
ii. The market in which the firm operates.
iii. Perfect or imperfect competition or oligopolistic or monopolistic conditions?
iv. The demand for the firm's product.
v. Are the quantities known which are expected to be sold at various price?
vi. The elasticity of demand for the product.
vii. Is the demand elastic or inelastic?
viii. The cost structure of the firm and the product.
ix. What are the expected futures marginal cost fixed costs?
x. The competition. What is the extent and nature of the competition?
xi. The product. What is the stage in the product life cycle?
xii. The relative position of the firm. Is the firm dominant enough to be a price maker or is it a price taker?
xiii. Level of activity. Will the firm be working at full or below capacity? What is the position of competitors?
xiv. Government restrictions or legislation. Are there regulations or laws governing price?
xv. Inflation. Is inflation rising, falling, high, and low?
xvi. The availability of substitutes. Is the product clearly differentiated or are there close substitutes?

Naturally not all these points are explicitly considered in every pricing decision and it is quite possible for some factor not included above to be significant for a particular situation.

Price/Demand Relationship

An important consideration for a supplier is the reaction of consumers to alterations in price. The concept of price elasticity of demand has been developed to provide a measure of the degree to which demand responds to change in price.

The basic formula is:

$$\text{Price Elasticity of Demand} = \frac{\text{\% change in quantity demanded}}{\text{\% change in price}}$$

Note: it is important to remember that it is the percentage in quantity and price that are used and not absolute changes. Price elasticity is normally negative but by convention the minus sign is omitted. The measurement of elasticity can range from zero to infinity; from perfect inelasticity to

perfect to perfect elasticity but naturally the extremes of value have only theoretical interest. Three important ranges of value are discussed below.

Elasticity of demand greater than 0 but less than 1

A commodity with this value is said to have an INELASTIC demand. This means that a fall in price result in a less than proportionate extension of demand and thus total revenue falls.
Elasticity of demand = 1
Such a value is known as UNIT elasticity which means that a percentage fall in price is exactly matched by a percentage extension of demand so total revenue remains constant.

Elasticity of demand greater than 1 but less than infinity

In these circumstances the demand is said to be ELASTIC. The demand changes by a greater proportion than the change in price and accordingly the total revenue rises when price falls. The greater the elasticity the greater the effect on revenue from a reduction in price.
Although the concept of elasticity of demand is of considerable important there are obvious practical problem in obtaining meaningful values. Two particular difficulties which arise are the differing reactions to large and small price movements and to the fact that it is very unlikely for a demand curve to have constant elasticity along its entire length.

Whilst the price elasticity of demand is the most important measure of the sensitivity of demand, two other types of elasticity are associated with changes in the condition of demand, the formulae of which are given below:

$$\text{Cross elasticity of demand} = \frac{\text{\% change in quantity of X demanded}}{\text{\% change in price of Y}}$$

W9
This show the effect of a change in the price of one good on the demand for another good.

$$\text{Income elasticity of demand} = \frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$$

This shows the effect on demand of a change income.

Cost plus Pricing
Empirical studies have shown that firms frequently employ some form of formula based on costs to arrive at a selling price. In general, these systems are concerned with two elements – what is the relevant cost to include in the price? and – what is the 'profit' margin which must be added to the costs to arrive at the selling price?
Two cost plus systems are described below: full-cost pricing and rate of return pricing.

Full Cost Pricing
This system, sometimes known as absorption cost pricing, uses conventional cost accounting principles to establish the total cost for a product to which is added a mark-up, say 20%, to arrive at a selling price. The total cost includes all the variables costs, the measurement of which should

present few problems, plus apportioned fixed costs based on normal volumes and normal production mixes. It is this latter point which causes the major problems. The cost so established will only be appropriate when the actual volume/mix is the same as the estimated volume/mix even assuming there was some non-arbitrary way of assuming fixed costs to products which there is not. Alteration in selling prices affect the volume of sales which in turn affect the unit fixed costs which raise the possibility of further price changes thus causing a circular problem to be ever present when full-cost pricing is employed. A further problem with this method of pricing, which is common to all cost-plus systems, is the amount of the mark-up. There are numerous factors which govern the mark-up percentage. For example, the mark-up may be related to risk and rates of stock turnover (e.g. higher for jewelers than greengrocers), it may be influenced by general market conditions and the expected elasticity of demand for the product and it may be governed by what is normal for a given trade.

The most inflexible system would be where a fixed percentage is applied to the total cost of each product regardless of changes in conditions. This approach could cause a firm that is operating below capacity to turn away business which is available at less than normal price even though such business may be priced above marginal cost and would thus make a contribution to fixed cost. However, it must be realized that in the long run price must be sufficiently high to recover all cost, both fixed and variable, together with a reasonable rate of profit otherwise the survival firm will be in jeopardy.

Rate of Return Pricing

Where an organization uses the concept of rate of return on capital employed,

$$\text{i.e.} \quad \frac{\text{Profit}}{\text{Capital Employed}} \%$$

As a measure of performance, management may wish to know what selling price would be necessary to achieve a given rate of return on capital employed. This procedure involves deciding upon a target rate of return on capital employed, estimating the total costs for a 'normal production year' and the amount of capital employed. These figures can be used in the following formula:

$$\text{\% mark-up on cost} = \frac{\text{Capital Employed}}{\text{Total Annual Costs}} \times \text{Planned Rate of Return on Capital Employed}$$

For example, assume that the target rate of return on capital employed is 18%, the amount employed is ₦1.5m and the estimated annual total costs are ₦2.25m, what is the required mark-up on cost?

$$\text{Mark up \%} = \frac{1.5 \times 18\%}{2.25}$$

$$= 12\%$$

Notes:

a) The ratio Capital Employed: Total Annual Cost is known as the capital turnover ratio.

b) Return on capital employed (ROCE) is fully described later in the book.

This method of calculating a mark-up does have advantages of relating price to longer term financial objectives but it will be apparent that it is only a variant of full-cost pricing with the same potential inflexibility. The claim is sometimes made that the method removes the arbitrary element

from establishing what a 'fair' mark-up is, but the arbitrariness is simply transferred to the target rate of return. A further element of arbitrariness is that in order to make the calculation in a multi-product firm it would be necessary to apportion capital employed by product group which could only be done in an arbitrary manner. Both full-cost and rate of return pricing are essentially long term pricing strategies which, rigidly applied, lack the flexibility to deal with short- term pricing decisions.

Marginal Pricing

This method of pricing sometimes referred to as the variable cost or contribution method of pricing is simply the application of cost-volume-profit analysis to pricing decision. Using marginal pricing, the firm sets price so as to maximize contribution toward fixed cost and profit.

As in any decision the costs and revenues to be used for pricing are FUTURE costs and revenue. All past outlays are inescapable; they are sunk costs. For short term decisions marginal pricing can increase pricing flexibility and profits but needs to be used judiciously.

A typical example of its application in practice is where hotel chains cater for full price business during the week and offer the spare capacity at weekends at some price above marginal cost, but less than normal price, thus increasing profits. This process is known as price discrimination and enables the firm to sell at different price in different markets. A further example of marginal pricing is the familiar one where a firm is experiencing reduced demand and obtains the best possible price above marginal cost in order to provide some contribution to fixed costs.

Marginal pricing policies may also be relevant when dealing with the variables involved in managing marketing strategies. For example, a typical product moves through what is known as product life-cycle, i.e. introduction, growth, maturity, saturation and decline. At each stage management will require marginal cost and separable period cost data relevant to that stage in the cycle in order to make appropriate pricing decisions. Because volumes will vary at each stage the marginal approach will assist in choosing the most appropriate combination of price, advertising and, where necessary, price discrimination without the issue being clouded by the inclusion of unit fixed costs.

Marginal pricing makes explicit the consideration of demand and volume and thus more nearly approaches the theoretical framework of classical economics dealt with in the early part of the chapter. However, few if any firms are able to optimize prices by the MC=MR equation. Used with care, marginal pricing can assist in short run price setting but care must be taken that marginal pricing does not become the long run norm. It is worth restating that in the long run prices must cover all costs plus a reasonable margin of profit. Marginal pricing differs from the cost plus systems in that there is no automatic percentage mark up on cost to arrive at a selling price. When the marginal cost is known, the selling price is established in order to maximize contribution having regard to the expected demand, volume and other factors.

Other Pricing Strategies

(a) Marketing Penetration Pricing

This is a policy of low price when the product is first launched in order to obtain sufficient penetration into the market circumstances in which a penetration may be appropriate will include:

1. If the firm wish to discourage new entrants into the market.
2. If the firm wish to shorten the initial period of the product life cycles in order to enter the growth of maturity stages as quickly as possible.
3. If there are significant economies of scale to be achieved from a high volume of output, so that quick penetration into the market is desirable in order to gain unit cost reductions.

(b) Market Skimming Pricing

This involves charging high price when a product is first launched and spending heavily on advertising and sales promotion to obtain sales. The amount of market skimming is to gain high unit earl in the products life. High unit prices make it more likely that that competitor will enter the market in that it lower was to be charged.

Circumstances in which such a policy may be appreciated will include:

1. Where the product is new and different
2. Where the strength of demand and the sensitivity of demand price is known
3. Where high price in the early stages of a product life might generate high initial cash flow.
4. Where the firm can identify market segment for the product, each prepared to pay progressive lower prices.
5. Where product may have a short life cycle and so need to recover their development cost and make a profit relative quick

(c) Perceived value pricing

Under this method the seller, having defined the type of **Customers** he seeks to serve, will attempt to put himself into the customer position and to envisage what price that customers would be willing tom pay for the particular package on offer. It might consider for examples.

i. An average market price for the type of product
ii. Premium additions because this competitor is more reliable, durable and better designed.
iii. A premium because this particular supplier offers superior after sales services at a longer warranty period.

In other word the supplied put the value on the price variable in the market package to do this enquires good market research. Otherwise the supplier may over price under the price this product. Obviously, the price will be fixed must yield the reasonable profit over the product but this is a second stage calculation. The price is not demanded directly by references to cost.

(d) Demand differential pricing (also called price determination)

Under this approach is a product is sold in different price which do not reflect corresponding difference in cost. In its crudest form, demand deferential pricing occurs, when the seller is willing to barging with individual buyer. It is clearly most successful when the seller has committed himself to an investment in good or equipment and now seek to achieve to total income to recover is outlay and provide whatever profit can be obtained. It offered trade discount from the prices, these discounts will normally reflect real saving to the supplier. Here are some examples of price discrimination.

(1) The theatre or cinema manager charges different price for seats in different part of the auditorium

(2) Different fees may also be paid to watch a match in the stadium due to differentiation based on location

(3) In addition to standard fares, a transport operator may charge low fares to:

(a) Student to standard fares person i.e. differentiation by customer.

(b) Traveler at time where is low demand i.e. differentiation by times

Price discrimination can only be effective if a number of the following conditions are present: -

(a) The market must be segment able in price term, bad different sector

(b) Show different intestates of demand.

(c) There must be little or no chance of a black market developing

(d) There must be little or no chance that competitor can will undercut the firms price in the higher period market segment.

(e) The cost of segmenting and administering the arrangement should not exceed extra revenue derived from the price discrimination strategy.

(e) Going rate Pricing

This occurs when a firm tries to keep its price at the average level charged by the industry. The approach is typically found in condition where there are many sellers of an undifferentiated (homogenous) product i.e. in a perfectly competitive environment. There are two major reason for this:

i. in the absence of any scheme for inter firm comparison an individual firm may not be whether it is high or low operator compared with industry means
ii. There is probably insufficient evidence to indicate how customers and the competitors would react to attempt to charge above or below the going rate.

(f) Competitive bidding (sealed – bid pricing)

In this case competitor submit industrial bid offer for particular job the problem for each is the estimate its competitor will quote and then to fix own bid price at a figure sufficiently low to attract the customers always from the competitor but so low as to involve the firms in the risk of incurring the loss. It may be noted however, that a contract will always be awarded to the correct bidder a reputation for good quality work and reliable completion dates may also be taken into consideration. Where government contract is put out to competitive tender, the seller bid price will be established as already described. In many cases, however particularly with defenses contract there will be no competition. The government will place the work with a selected and willing supplier on the basis of a “price” to be agreed, the price must then be negotiated on some formula basis.

The price may be based on:

(a) An estimate of cost agreed in advance (either before work commences or during the course of the contract) this is known as a fixed price contract

(b) Actual cost after the completion of the work. Under each alternative profit element in the prices may be a fixed amount

- A percentage on cost (estimated or actual as the case may be)
- A variable amount dependent on saving against the estimated cost.
- An amount calculated to yield a target rate of return on capital employed.

(g) Target Costing:

It is an approach that is widely used by Japanese companies and has recently received considerable

amount of attention in the USA and European accounting literature. Target market price is determined by marketing management prior to designing and introducing a new product. The target price is set at a level that will permit the company to achieve a desired market share and sale volume.

A desired profit margin is then to determine the target maximum allowable product cost.

(h) Premium Pricing

This involves making a product appear "different" through product differentiation so as to justify a premium price; the product may be different in term of examples, quantity, reliability, and durability after sales services or extended warranties.

(i) Product bundling

This is variation on price discrimination which involves selling number of product or services as a package at a price lower than the aggregate of their individual prices. For examples a cosmetic manufacturer might offer a package that include the entire baby range of product (toilet, soap, sponge case baby oil, cream etc.) at a combined price that is lower than the total price of the individual components. This encourages customers to buy services that they might otherwise not have purchased.

(j) Psychological Pricing.

This is a strategy which includes pricing at ₦19.99 instead of ₦20 and withdrawing an unsuccessful product from the market and the re-launching it at a higher price, the customers having equated the lower price with lower quality.

2.19 Linear Programming Technique

This may be described as a mathematical modeling approach specifically to allocate the available limited resources of an organization among limited resources of an organization under a competing product line in order to achieve the economic objectives of the organization under a multiple constraint situation. Linear programming represents an extension of the optimal product mix decision especially where two or more resources of the organization are limited in supply. For examples, only one thousand kilograms (1,000kg) of raw material, 2,000 direct labour our and 1,500hrs of processing time are available on weekly basis.

Assumption of Linear Programming Techniques

1. **Linearity:** This implies that a linear relationship must exist between the objectives to be achieved and the factor of production. For example, if UNIT OF output will generate ₦10 contribution, then the 100 unit of the same product must generate a total contribution of ₦1,000.
2. **Certainty:** Information relating to the various factor of production is known with certainty and they are also capable of mathematical interpretation and expression.
3 **Divisibility:** This implies that it is impossible to manufacture fractional unit of particular product line i.e. it is possible to produces capable half unit of product (A).2/3 unit of product (B) or a ¼ of product (C).
4. **Non – Negativity:** This implies that is practically impossible for a negative unit of a particular line to be established but it is however possible to utilize all the available

resources in the process of manufacturing more profitable product line at the expenses of other product.

5. **Single Objectives:** It is also important to note linear programming objective must be economic and single in nature i.e. it is either to maximize contribution or to minimize costs.

Application of Linear Programming Techniques

APPLICATION	COMMENT
Budgetary Planning	Linear programming will help tom decide on the optimum product mix and on anticipated usage (and therefore cost) of resources such as labour and machine time, materials and so on. It can also show the amount of premium it is worthy paying to obtain extra unit of scare resources, in the event that other factor in the budget dictate that the level of activity should be different to that suggested by the solution to the linear programming problem.
Production Scheduling	LP model have helped demand requirement to be met at minimum cost, subject to constraint concerning production capacity, subcontracting and inventory holding.
Blending of Materials	Successful applications have been reports in such diverse setting at the mixing the paint, the mixing of meat to make sausage, the blending of chocolate product and blunt of petroleum product. Key cost is put include the cost of the individual material and the material and the processing cost for individual material and contribution of materials.
Transportation/distribution	The typical aim of this application is to meet demand for a product from different geographical market using several geographical dispersed plants, while minimizing transportation and distribution costs. A critical input is the cost of transporting product from each to each market area.
Personnel Planning	An example of an LP application in planning personnel is the assignment of nurses to hospital departments that undergo peaks and trough in demand. Key input in this application includes the cost of each type of nurse for normal and the cost overtime and supplementary staff.

Solution to Linear Programming Model

Traditionally, there are two different methods of providing solution to a linear programming model as follows:

(a) **Graphical Solution:** This approach will be considered necessary in a situation where there are only product lines without considering the number of constraint. However, under

graphical solution the following basic steps will be required

i. Identify the objective function i.e. to maximize contribution or to minimize cost.
ii. Identify the various constraints that may limit the attainment of the establishment target.
iii. Express each of these constraints in the form of inequalities.
iv. Establish the concept of non-negativity at both the end of the model formulation
v. Convert the inequalities into a linear or simple equation.
vi. Solve the linear equation and identify the associated linear values.
vii. Express the various constraints on a linear graph.
viii. Identify the feasible region among the various positions on the graph; a feasible region represents either the shaded or un-shaded portion of the graphs which satisfy all the available constraint and also establish various product mix among which is the optimal product mix.
ix. Prepare the solution table for the purpose of analyzing total contribution or total cost associated with each of the production mix within the feasible region.
x. Determine the optimal product mix from the solution table based on the highest contribution or lowest cost (see illustration)

Formulation of Linear Programming Model

The fundamental steps in linear programming model is to establish the objective function i.e. determine whether the objective is to maximize contribution or to maximize cost. In practice, if the examiner confirms that the objective is to maximize the profit, the word profit in that context will represent contribution. This is because linear programming represents an integral part of Marginal Costing and as such profit element will be irrelevant in this type of decision model.

Illustration

FORMULATION OF LINEAR PROGRAMMING MODE

The following information is in respect of three products A, B and C manufactured by a company.

	A	B	C
Per Unit	N	N	N
Selling Price	75	60	80
Cost:			
Direct Materials	24	27	36
Direct Labour	15	20	30
Fixed overheads 16% of Labour cost	24	32	48

All workers are paid at the rate of N2.50 per hour. All products use the same type of raw materials which cost ₦3.00 per kg. During this year, the company can procure a maximum of 12,000kgof raw materials only and has facilities to employ only 8,000 labour hours. The company wants to introduce linear programming technique to ensure judicious allocation of the limited resources.

Required

Make necessary calculation and formulate the linear programming objectives function and constraints the company's contribution margin.

Solution

Step1: Identify the contribution per unit

	A	B	C
Per unit	₦	₦	₦
Selling Price	75	60	80
Cost:			
Direct Materials	24	27	36
Direct Labour	15	20	30
Contribution (c)	36	13	14
Direct materials quantity at N3.kg	8kg	9kg	12kg
Direct labour hour at N2.50/hr	6hrs	8hrs	12hrs

Step2: Formulate the L.P Model

Objectives Function:

Maximize contribution = 36A + 13B + 14C

Subject to:

Materials 8A + 9B + 12C ≤ 12,000kg

Labour 6A + 8B + 12C ≤ 8,000hrs

Non – Negativity

A, B, C > 0

A = Quantity of product A in units

B = Quantity of product B in units

C = Quantity of product C in units

ILLUSTRATION 2

SIMPLE OPTIMAL PRODUCT DECISION

Express Nigeria Plc market two products which are produced in three successive departments. The contribution per unit of the two products and the production capacity of the three are as follows:

	A	B
Unit contribution in (N)	6	5
Machining Department (hours)	3	4
Foundry Department (hours)	2	1
Painting Department (hours)	4	5

A constraint on production is that each department has a limited of hours available for the forthcoming plan period as shown below:

Department	Available Hours
Machining	600
Foundry	250
Painting	720

Required

i. Formulate the linear programming problem for the above information

ii. Solve them graphically.

Solution

EXPRESS NIGERIA PLC

i. Formulation of linear Programming Model

Objectives Function:

Maximize contribution = 6A + 5B

Subject to:

Machining Department	3A	+	4B	≤ 600
Foundry Department	6A	+	B	≤ 250
Painting Department, A, B	≥	=	0	

ii. Graphical Solution

Step 1: Convert inequalities into simple equation

Machining Department

3A + 4B ≤ 600

If A = 0, B = 150 (600/4)

If B = 0, A = 200 (600/3)

Foundry Department

6A + B ≤ 250

If A = 0, B = 250

If B = 0, A = 125 (250/2)

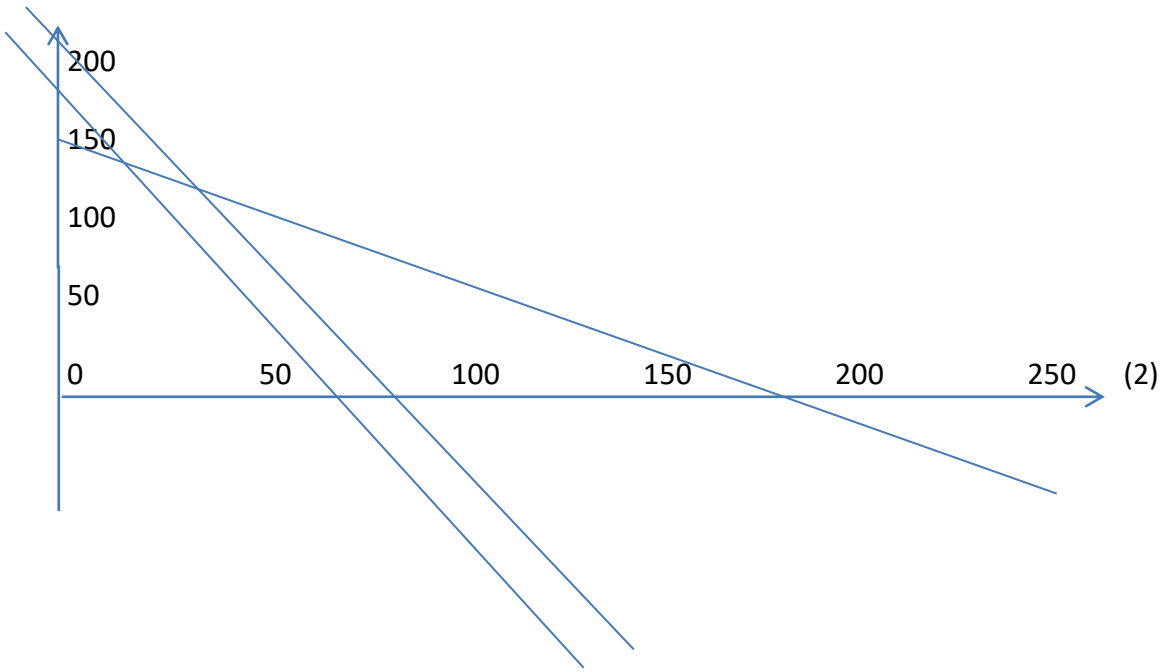
Painting Department

4A+5B = 720

If A = 0, B = 144 (720/5)

If B = 0, A = 180(720/4)

Step II: Graph



Step iii: Solution Table

	Points	6A	+5B	Total contribution ₦
	A	6(125)	+ 5(0)	750
	B	6(88.43)	+ 5 (73.33)	896.69
	C	6(0)	+ 5 (144)	720

<u>Workings</u>

<u>Point B (2X3)</u>

2A	+	B		= 250 x 2
4A	+	5B		= 720 x1
		+	2B	= 500
		+	3B	= 220
			B	= 220/3
			B	**= 73.33 units**

<u>Substitute for B in Equation1</u>

2A	+	B = 250
2A	+	73.33 = 250
2A	=	250 – 73.33
2A	=	176.67

A	=	176.67/2
A	=	176.67/2 = 88.34 units
A	=	**88.34 units**

Step IV: Optimal Product Mix

A	=	88.34 units
B	=	73.33 units

2.20 Computation of Shadow Pricing

A shadow price represents the extra contribution derivable from an addition unit of scare resource which has been fully utilized at the optimal level of activity. It is instructive to note that only a binding constraint will have a shadow value i.e. resources that must have been fully utilized level of activity.

Method of Computing Shadow Value

Two different approaches may be adopted in the process of identifying the shadow value of resources but it must be established that a binding constraint must be identified prior to the computation of the shadow value. The two methods of determining shadow values are:

i. Increase the number of constraint by one method

ii. The dual method

However, these two method relies extensively on the simultaneous equations as illustrated below. Meanwhile, it is possible to identify the binding constraint through any of the following two methods:

i. **Graphical Solution:** This implies that the two constraints that produced the optimal product mix within the feasible region are the binding constraint

ii. **Simple Arithmetic:** This will involve the comparison of resources available with the resources required to operate at the optimal product mix level. Binding constraint will therefore represent the constraint with zero balance.

ILLUSTRATION 3

Brass Limited produces two products Maaso and Russo Budget data relating to this product on a unit basis for August are as follows:

	Maaso	Russo
	₦	₦
Selling Price	150	100
Materials	80	30
Salesman's Commission	30	20

Each unit of production incurs cost on machining and assembly. The total capacity available in August 2011 budgeted to be 700 of machining 1000 of assembly. The cost of this capacity being fixed at N10,000 respectively for the month, whatever the level of usage made of it.

The number of our required in each of these departments to complete one unit of output is as follows:

	Maaso	Russo
	₦	₦
Machining	1.0	2.0
Assembly	2.5	2.0

Under the term of special control recently introduced by the Government in accordance's ECOMOG requirement, selling prices are fix and the maximum permitted output of either product in august is 400 units. At the controlled selling price, the demand for the product exceed this August this considerably.

You are required

a. To calculate brass Limited's optimal production for August, 2011 and profit earned.

b. To calculate the value of Brass Limited of a marginal increase in the available capacity for each machining and assembling assuming that the capacity of the other department is not altered and the output maximized on time apply.

Solution

a. **BRASS LIMITED**

Steps 2: Formulate LP Model

Objectives function maximizes contribution 40M + 50R (Wl)

Subject to

Machining	M	+	2R	≤	700
Assembly	2.5M	+	2R	≤	1,000
ECOMOG 1		M	≤	400	
ECOMOG 2		R	≤	400	
Non – Negativity		M, R		≥	0

Step 2: Convert inequalities into linear equation

Equation I: Machining

M + 2R ≤ 700

IF M = 0, R = 350 (700/2)

If R = 0, M = 700 (700/1)

Equation II: Assembly

M + 2R ≤ 1000

IF M = 0, R = 500 (1000/2)

If R = 0, M = 400 (1000/2.5)

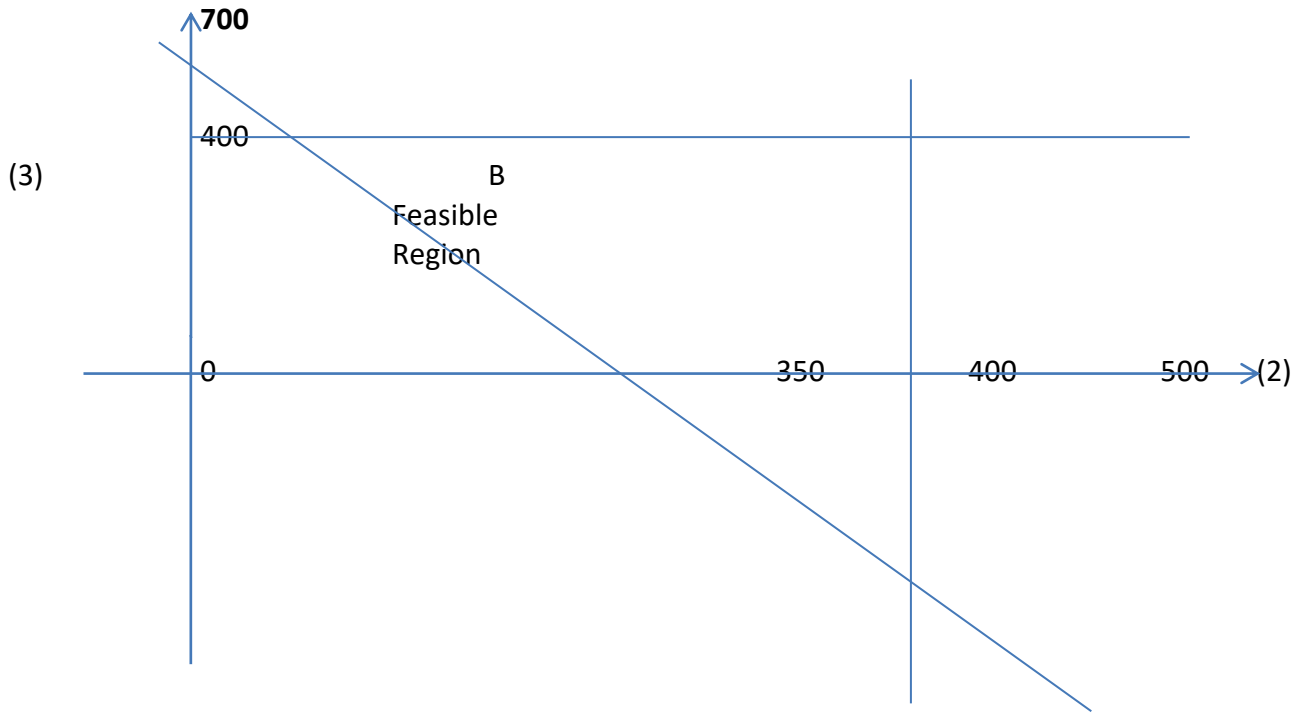
Equation III: ECOMOG 1

M = 400 R = 0

Equation IV: ECOMOG 2

M = 400 R = 0

Step III: Graph



Step IV: Solution Table

Points	40M	+	50R	Total contribution ₦	
A	40(400)	+	50(0)	16,000	
B	40(200)	+	5 (250)	20,500	Optimal Mix
C	40(0)	+	5 (350)	17,500	

Step 5: Optimal Product Mix

M = 200 units

R = 250 units

Steps 6: Profit Earned ₦

Total contribution	20,500
Less: TFC (N10,000 + N7,000)	17,000
	3,500

Workings

1. Contribution Per unit

		M		R
	₦	₦	₦	₦
Selling Price		150		100
Less				
Material	80		30	
Commission	30		20	
		110		50
		40		**50**

2. Point B (Equation 1 & 2)

2.5M + 2R = 1000

M + 2R = 700

1.5 + = 300

M + = 200

Substitute for in equation (2)

200 + 2R = 700

2R = 700 200

R = 500/2

R = 250

B Shadow Price

Step 1: Identify binding constraint

Using Arithmetic Approach

i.	**Machining**	Hrs
	Total Available	1,000
Less:	Required at optimal level	
	(1 x 200) + (2 x 50)	700
	Binding	
ii.	**Assembly**	Hrs
	Total Available	1,000
Less:	Required at optimal level	
	(2.5 x 200) + (2 x 50)	1,000
	Binding	

Alternatively

Graphical Analysis: The two question the produced the optimal mix at point B are binding constraint. Therefore, equation one ant two representing machining and assembly are binding constraints.

Step 2 ***Shadow Price using dual method***

Machining	m	+	2R	=	700	A
Assembly	2.5m		2R	=	1000	B
Objectives	40m		50R			
					100	

Let A represent machining
B represents assembly

Restate the equation through matrix

A	+	2.5B	=	40
B	+	2B	=	50

Substitute for B in equation 1

A	+	2.5 (10)	= 40
A	+	2.5	= 250
A	=	40 - 25	
X	=	N5	
A	=	2	
X	=	1	

Multiply equation 1 by 2 equation 2 by 1

A	+	2.5 B	= 40
2A	+	2B	= 50
2A	+	5B	= 80
		3B	= 30
		B	=N10

Shadow price using second method of increase constraint by one

Machining	m	+	2R	=	700
Assembly	2.5m		2R	=	1000

Increase machining by 1hr

M	+	2R	=	701

2.5m	+	2R	=	1,000
1.5m	+		=	299
m			=	299/1.5
			=	**199.33**

Substitution for m in equation 1

199.33 +	2R	= 701		
2R	=	701	-	199.33
R	=	501.55/2		
	=	**250.83**		

Shadow Price for Machining

		₦
New contribution (40 x 199.33) + (50 x 250.83)		20,515
Less:	Existing contribution (optimal)	20,500
		15

Increase Assembly by 1hr

M	+	2R	=	700
2.5m	+	2R	=	1,001
1.5m	+		=	301
m			=	301/1.5
m			=	**200,67**

Substitution for m in equation 1

200,67 +	2R	= 700		
2R	=	701	-	**200,67**
2R	=	499.33		
R	=	499.33/2		
R	=	249,66		

SHADOW Price of Assembly

New contribution (40 x 200.66) + (50 x 249.66)		20,510
Less:	Existing contribution (optimal)	20,500
		10

2.21 Product Pricing Decision

Adding New Product

Most new product decisions will involve capital expenditure on fixed assets, additional stock-holdings, launching cost and so on. The most things to do are to examine the incremental effect of the decision on revenue and operating costs.

ILLUSTRATION 3

A company is considering the manufacture of a sponge case known as product C. this product will be sold for one year. The estimated sales are 4,500 at a price of ₦2 each. You are given the following information in order to advice whether the venture should be added to the existing product range or not.

a) Raw Materials: This type of material (A & B) will be required. Material A is held in stock but is no longer required for its original purpose. It cost ₦500 six months ago. Replacement would be by special order only and would cost ₦600.

This substitute for a material costing ₦400. Material B is not in stock and the necessary supply could be purchased for ₦700.

b) Direct Labour: Total direct labour hours are estimate as 1000 hours. Product C will be manufactured in normal working hours but 400 hours additional overtime work will be necessary on the other products, because of the disruption of work schedules. Labour is paid N2 per hour, and the overtime rate is time and a half.

c) Supervision: Total supervisory time is estimated at 100 hours. Supervisors are salaried but their effective hourly rate is ₦1.25, no new supervisor will be employed.

d) Machines: Product C will be made on a machine which cost ₦2000 a year ago and has an estimated total life of five years. The machine would otherwise never be used and has no scrap value at date. The running cost of this machine is estimated at 75K per hour, presumably for the whole of the 1000 hours per hours which direct labour is charge.

e) Other Overheads: These are apportioned at 200% on direct labour cost.

Solution

Contribution margin statement for product C

		₦	₦
Estimated Revenue (N2 x 4500)			9,000
Less: Relevant cost			
Material:			
A	400		
B	700	1,100	
Labour			
Direct (2 x 1000)		2,000	
Overtime (2 x1 ½ x 400)		1,200	
Machine running cost (0.75 x 1000)		750	5,050
Surplus			3,950

Tutorials

In setting out the relevant cost of manufacturing the sponge case, it is essential to state any assumption made, and the reasons for the selected accounting treatment.

a) Raw material: Although the actual cost of material A to the organization as at the time of purchase was N500. The value of material A to the business is not more than ₦400 because the material was not used for the original purpose. The book value of ₦500 represents a sunk cost to the organization therefore irrelevant in a decision of this nature.

b) Direct Labour: It is assumed that the direct workers on product C are additional to those normally employed in the factory. The disruption of work schedule is probably due to the additional workers making use of common facilities and supervisory services.

There will thus be a loss of efficiency on other work which will have to be compensated by overtime working. The full cost of this overtime work is attributable to product C.

c) Supervision: as no additional supervisors are to be employed no cost will be incurred because of the introduction of product C.

d) Machine: Because the machine mentioned is presently standing idle, no other profitable use for it will be foregone by using it on product C i.e. the opportunity cost is nil. Any diminution in its second-hand value resulting from its use would be only cost incurred, therefore is the running cost of 75K per hour, presumably for the whole of the 1000 hours per hour which direct labour is charged.

e) Other Overheads: It appears that other overheads will continue regardless of the decision about product C since we are given no information to the contrary. They are therefore not relevant to the decision. It is instructive to note that, some time has been spent on this particular problem in order to illustrate two points.

   i) The need to set out as clearly as possible the reasons for decisions i.e. calculations,

   ii) The need to identify what costs are actually attributable to the decisions i.e. the relevant costs.

In many problems, these will include the opportunity cost of alternative uses. It should also be noted that most new product decisions will involve many other factors such as development cost, purchase and installation of machinery, investment in stock, new staff or retraining of existing staff and cost advertising the new product. In short, there would be a capital expenditure project to be evaluated.

Deleting a Segment

In a multi-product organization, it is possible that not all the entire product line is profitable. Therefore, it is possible for a management to be completing on whether a particular segment should either be added or eliminated from the existing product range. A segment consists of a product, type of customer, geographical regions, distribution channel or any other part of a firm that can be considered for expansion or reduction. Segmental profitability analysis is required for strategic decision such as abandonment or expansion of specific segment. Example of segmental profitability analysis and customer's profitability analysis. In a nutshell, decisions to be made in shutdown or discontinuances problem are:

- Whether or not close down a product line, department or other activity
- If the decision is shutdown, whether the closure should be permanent or temporary.
- If there is a choice about the timing of the closure, when should it take place?

However, decision scenario of this nature may be necessitated by the income statement prepared from the conventional accounting perspective where a segment is operating at a loss. It is therefore instructive to note that decision on whether or not eliminate a segment must not be based on absorption costing techniques, instead a marginal costing approach must be applied as follow:

(a) Economics Consideration: This will involve the process of examining the economic viability of the product to be eliminated by preparing the contribution margin statement or income statement of the contribution of each segment. Statement will be used identify to contribution of the segment to be eliminated toward the recovery of the company general fixed overhead and net of profit. The following format will however assist in achieving these objectives.

Contribution Margin Statement

	₦	₦
Sales		xx
Less: Relevant Cost		
Direct Material	x	
Direct Labour	x	
Direct expenses	x	
Variable production O/H	x	
Opportunity Cost	x	
Relevant differential fixed costs	x	(x)
Contribution		**X**

Interpretation of the statement

(a) If the statement shows a positive contribution, then management will be advised not to eliminate the segment. This is because the segment is actually contributing positively towards the recovery of the company. General fixed overheads and net profit.

(b) In the case of negative contribution management will be advised to delete the segment. This decision will then increase the total profit of the organization

(c) Under zero contribution i.e. total benefit equates the total relevant the final decision will depend on non-quantities factor.

(b) Qualitative factor: Specific issues to consider in this case will include:

(i) The impact of the closure decision on the company's goodwill.
(ii) The effect of the above closure decision on the turnover level of the entire organization especially where the product to be deleted is being jointly demanded with some of the other company's product.
(iii) The reaction of the company's shareholder to the decision to delete the segment.
(iv) The interpretation of the closure decision by the company's creditors.
(v) The effect of the closure decisions on workers' morale vis-à-vis the level of productivity.
(vi) Instead of outright elimination, is not possible to consider diversification of resources product line

ILLUSTRATION

An organization manufactures three band of ice cream, chocolate, Vanilla and strawberry.
The present net annual incomes from these are:

	Total` Chocolate	**Vanilla**	**Strawberry**	
	₦	₦	₦	₦
Sales	150,000	50,000	40,000	60,000
Variable Cost	90,000	30,000	25,000	35,000

Contribution	60,000	20,000	15,000	25,000
Fixed	55,000	17,000	18,000	20,000
Profit/Loss	**5,000**	**3,000**	**(3,000)**	**(5,000)**

The organization is concerned about its poor profit performances and is considering whether or not ceases selling vanilla. It is felt that selling cannot be raised or reduced without adversely effects net income. ₦5,000 of the fixed cost of vanilla are direct fixed which would be saved if production ceased. All other fixed cost would remain the same.

Required:

(a) Should the company drop the sales of vanilla?

(b) Suppose, however, it is possible to use resources realized by stopping production of vanilla and switch to producing a new ice cream Banana which would sell for N50,000 and incur variable cost of N30,000 and extra direct fixed cost N6,000.

(c) What are the non-qualifiable factors that the management of this organization should consider?

Solution

(a) The main objective is to ascertain whether or not Vanilla ice cream is contribution positively towards the company's profit.

Contribution Margin Statement for Vanilla

	₦	₦
Sales		40,000
Less: Relevant Cost		
Variable Fixed Cost	25,000	
Direct fixed Cost	5,000	30,000
Positive Contribution		10,000

Alternatively, by stopping production of Vanilla, the consequences would be fall in profit;

	₦
Loss of contribution	(15,000)
Saving in Fixed Cost	

Shut Down of Capacity

Apart from closing down a segment, a company may also be contemplating on whether a particular production capacity should be eliminated or reduced to a manageable level. It is convenient to start with a simple example of company engaged in food processing work. This company expanded rapidly, but now finds that market demand has fallen so that it can sell no more than 200,000 hours or work a year at an average price of ₦7 per hour. It has incurred a heavy loss in the most recent year and is under pressure from its bankers to restore some measure of profit.

By eliminating a bonus incentive scheme, it can reduce its variable cost to ₦6.25 per hour. Its fixed costs are currently ₦250,000 per annum, and it asks how far these have to be reduce to achieve a break even position. Making use of the break even formula, with A as the symbol of fixed cost, the sustainable level of fixed cost at the current level of output can be calculated as ₦150,000 thus

NA = ₦200,000
₦7 – 6.25
A = 0.75 (200,000)
A = 0.75 x 200,000
= ₦150,000

Therefore, fixed cost must be reduced by ₦100,000 per annum.

ILLUSTRATION 4

A paint manufacturing company manufacture 200,000 per annum medium-sized tins of "Spray lac Paint" when working at normal capacity. It incurs the following cost of manufacturing per unit:

	₦
Direct material	7.80
Direct labour	2.10
Variable overheads	2.50
Fixed overheads	4.00
Products cost (per unit)	16.40

Each unit (tin) of the product is sold for N21 with variable selling and administrative expenses of 60 kobo per tin.

During the next quarter, only 10,000 units can be produced and sold. Management plans to shut down the plant, estimating that the fixed manufacturing costs can be reduced to ₦74,000 for the quarter.

When the plant is operating, the fixed overheads are incurred at a uniform rate throughout the year. Additional costs of the plant shut-down for the quarter are estimated at ₦14,000.

You are required:

a) To express your opinion, along with the calculations, as to whether the plant should be shut down during the quarter, and

b) To calculate the shut-down point for quarter in units of products (i.e., in terms of number of tins).

Solution

a) Decision analysis (continue or shut-down plant)

Situations

Particular	*Operate plant*		*Shut-down*
	₦	₦	₦
Sales revenue		210,000	
Less variable cost			
Direct material		78,000	
Direct labour	21,000		
Variable production overheads	25,000		
Variable selling and administrative overheads	6,000	52,000	
Total contribution (10,000 x ₦8)		80,000	

Less fixed coats (₦4 x 200,000) x 3/12	200,000	74,000
Shut-down costs		14,000
Profit (loss)	120,000	(88,000)

The management is advised to shut down the plant as shut-down loss is lower than the loss caused by the operating the plant.

b) Shut-down point

$$= \frac{\text{total fixed cost when Plant is in operation} - \text{shut-down costs}}{\text{Contribution margin per unit}} = \frac{₦200{,}000 - ₦88{,}000}{₦8}$$

$$= \frac{14{,}000 \text{ units}}{₦74{,}000 + ₦14{,}000} = ₦88{,}000$$

Effect value of assets

The above example could have led to a decision to shut down the factory, for such decision, there is no question of using marginal cost approach or investment techniques, the question to be answered quite simply, whether the net proceeds of realizing the assets will be sufficient to discharge the liabilities of the company.

In making such calculations one would have to bear in mind many practical considerations which might include:

a) Redundancy payment to employees.

b) The open market value of specialized buildings in a particular location

c) The reliable value of specialized machine in a second-hand condition or storage cost spending commencement of a new venture.

d) Losses due to stock being obsolete or unsuitable for other purposes.

e) The cost of completing existing sales contract.

f) Liabilities for servicing goods and previously sold.

g) Cost of terminating outstanding purchase or hire commitments.

h) Making good any damage or deterioration to rented premises.

i) Terminal liabilities for taxation including any capital gains,

j) Temporary staff cost to replace employees who had already left.

It is also important to consider some qualitative factors, such as:

- Loss of goodwill.
- The reaction of the company's shareholders to the decision.
- The interpretation by the company's creditors.

- The attitude of the company's workers, in term of labour productivity or workers' morale.

Make or Buy Decision

In a manufacturing outfit, it is a common phenomenon for top management to be contemplating on whether a particular raw material, sub-assembly or a major component required in the production of the final product should rather be manufactured internally or purchased from an outside supplier.

In practice, this may be described as a critical decision especially in an industry where the level of competition is considered to be very high. This type of decision is also strategic as a result of the need to protect of secrecy considered to be adequate for the company's product or to guarantee uninterrupted supply of the component.

However; in applying the concept of marginal costing to this type of decision, it will be necessary to analyze the available facts from two different perspectives as follows:

Economic Consideration: Management will be interested in analyzing whether any of the two options will result into economic savings or deficit to the organization. To achieve this, Suppliers quotation will be compared with the relevant cost of producing the component using the following format.

Saving or deficit from making the component

	₦	₦
Suppliers' quotation (a)	××	
Less: Relevant cost of making (b)		
Direct labour Cost	×	
Direct Expenses	×	
Variable production overhead	×	
Opportunity Cost	×	
Incremental fixed cost	×	(×)
Saving or deficit		×

Decision Rule

1. a > b = make
2. a < b = buy
3. a = b = qualitative factors

NB: a = Supplier's quotation
B= Relevant cost of production

Qualitative Factors: Apart from the economic reasons stated above, it is also instructive to point out that there are other qualitative factors that must be taken into consideration as follows:

1. The degree of secrecy considered adequate for the company's product.
2. Do we have a reliable supplier who can supply to specification?
3. Is possible for the reliable supplier to satisfy our existing capacity level?
4. Do we have the manpower required to manufacture the component in addition to the actual final products?

5. Are we permitted by law to manufacture the component in addition to the final product?

ILLUSTRATION

A store uses three different components (materials) in manufacturing its primary product. Stoner manufacture two of the components and purchases one (designed as component 1) from outside suppliers. The company is currently developing the annual profit plan. Sales are highly seasonal, component 2 cannot be acquired from outsiders; however, component 3 can be purchased. The three components have special specification.

The annual profit plan provided data for the following computation:

	Component 3-unit cost (at 12,000)
	₦
Material (Direct)	1.40
Labour (Direct)	2.20
Fixed overheads (apportioned)	0.40
Machine for used only for component 3)	0.50
Variable factory overheads	1.00
Averages storage cost per year (fixed)	0.40
Total	5.90

The purchase manager investigated outside suppliers and found one that is willing to sign a one-year contract to deliver "12,000 top quality units as needed during the year at ₦5.20 per units" A serious consideration is being given to this alternative. Shall stoner make or buy component 3?

Solution

Saving /Deficit from making 12,000units of component '3'

	₦	₦
Supplier's quotation (₦5.20 × 12,000)		62,400
Less: **Relevant Cost of making**		
Direct material (₦1.40 × 12,000)	16,800	
Direct Labour (₦2.20 × 12,000)	26,400	
Machine Cost (₦0.50 x 12,000)	6,000	
Variable fact O/H (1.00 x 12,000)	12,000	61,200
Savings		1,200

Decision: Make the components

Note: Both fixed overheads (apportioned) and average storage cost per year (fixed) are period costs, they will not affect the decision. Therefore, period costs are not relevant in decision making.

ILLUSTRATION

MAT company, which manufactures part M-6 for use in its production cycle has the following costs per unit production of 25,000units.

Direct Materials	5
Direct Labour	20

Manufacturing Overhead	24
	49

It has been established that 2/3 of the overhead is fixed. Abubakar Company limited has offered to sell 25,000 unit of part M-6 Company for ₦45 per unit. If MAT Company accept Abubakar's offer, some of the facilities presently used to manufacture M-6 could be rented to a third party at an annual rent of ₦65,000. Additionally, N6 per Managing Director of MAT Company has called on you to advise on whether he should accept Abubakar company's offer or not.

Solution

a) Savings or deficit from making 25,000 units

	₦'000	₦'000
Supplier's quotation (45 x 25,000)		1,125
Less: Relevant cost of making		
Material (5 x 25,000)	125	
Labour (20 x 25,000)	500	
Variable O/H (1/3 x 24 x 25,000)	200	
Opportunity Cost	65	
Eliminable FC (6 x 25,000)	150	1,040
Saving		85

Decision = Make

ILLUSTRATION

Vernom limited produce and sells to wholesalers a highly successful line of summer lotion and insect repellants has decided to diversify in order to stabilize sales throughout the year. A natural area for the company to consider is the production of lotion and creams to prevent dry and shaped skin. After considerable research, a product has been developed. However, because of the conservative nature of the company management, vernom's management has to decide to introduce only one of the new products for this coming season. If the product is a success further expansion in future years will be initiated.

The product selected called chap-off is a lip balm that will be sold in a lipstick type tube. The product will be box. Because of the available capacity no additional fixed charges will be incurred to produce the product. However, some ₦100,000 fixed charges will be absorbed by the product to indicate fair share of the company's present fixed cost to the new product. Using the estimated sales and production of 100,000 boxes of chap-off as expected volume, the accounting department has developed the following costs per box:

	₦
Direct material	3.00
Direct Labour	2.00
Total Overhead	5.00

Vernom limited has approached a cosmetics manufacturer to discuss the possibility of purchasing the tubes for chap-off. The purchase price of the 24 empty tubes in a box from the cosmetics manufacturer is 90Kobo. With this purchase proposal, it is predicted that the direct labour and

variable overhead cost would be reduced by 10% and direct materials costs be reduced by 20%.

Required:

a. Should the vermon Limited make or buy the tubes? Show calculation to support your answer.

b. What would be the maximum purchase price applicable to the vermon Limited for the tubes? Show calculations to support your answer with an appropriate explanation.

c. Instead of sale of 100,000 boxes, revised estimate show sales volume of 125,000boxes. At any volume above 100,000 boxes, additional equipment at annual rental of ₦10,000 must be required. Under these circumstances, should the vernom Limited make or buy the tubes. Show calculations to support your answer.

d. The company has the option of making and buying at the same time. What would be your answer to requirement (c) if this alternative were considered? Show calculation to support your answer.

Solution

Savings or deficit from making the tube	₦	₦
Supplier's quotation		0.90
Less: Relevant cost of making		
Material (0.2×3.00)	0.60	
Labour (0.1×2.00)	0.20	
Variable O/H(0.1×0.50)	0.05	0.85
Saving		0.05

Decision =Make

(W1) Variable O/H		₦
Total O/H	=	1.50
Less Fu/u	(₦100,000)	
	(100,000)	1.00
		0.50

Analysis

	Product ₦		Box ₦		Total ₦
Material	2.40	+	0.60	=	3.00
Labour	1.80	+	0.20	=	2.00
Overhead	0.45	+	0.05	=	1.50
					6.50

(b) The maximum purchase price acceptable to the management of Vermont Ltd will be the relevant cost of manufacturing the tube internally i.e. 85k.

(C) Saving or Deficit from making 125,000 Units

	₦	₦
Supplier's quotation		
Less: Relevant Cost		
TVC(0.85×125,000)	106,250	
Relevant Fixed Cost	10,000	116,250
Deficit		(3,750)

Decision = Buy

(d) Option 1

Buy 125,000 @ 0.90k = ₦112,500

Option II

Make 125,000@at a total cost of ₦116,250

#

Option III	Make or Buy
Make (100,000 ×85k)	85,000
Buy (25,000 ×90k)	22,500
	107,000

2.22 Acceptance of Special Order/Extra Sales Order

In a manufacturing outfit, it is possible for the organization to be operating below the installed capacity by not being able to sell entire production in the market at the prevailing market rate.

Acceptance of a special order decision simply implies that the acceptance or rejection of an order which utilizes spare capacity but which only available at a lower than normal price is quoted. The procedure for analyzing this decision is considered from the perspective as follows:

(a) Economic perspective: By adopting an incremental analysis method illustrated below, management will like to examine whether the additional order will increase the total number of contribution of the organization which because the fixed costs are already covered, results in increased net profit.

Incremental analysis for acceptance of special order

	₦	₦
Increase in sales Revenue		××
Less: Incremental Costs of Executing sales order		
Direct Material	×	
Direct Labour	×	
Direct Expenses	×	
Variable production Overhead	×	
Incremental fixed Costs	×	
Freight cost (if to be incurred by seller)	×	
Production set-up costs	×	(×)
Incremental profit		×

It is noteworthy that if the acceptance of the sale order will generate extra profit then the order should be accepted but an incremental loss will indicate that the order should be rejected:

however, there are several factors which would need to be considered before a final decision is taken. These factors are referred to as qualitative factors as follows: -

Qualitative factors:

1. Is it absolute certain that fixed cost will remain static within the relevant range?
2. It is also provides to consider whether the acceptance of one order at a lower price will encourage other customer to demand lower prices as capacity?
3. What are the alternative ways of utilizing the available spare capacity or is this special order the most profitable way of using the spare capacity?
4. Is it possible for this special order to prevent the capacity from being utilized for future full price business?

ILLUSTRATION

Although MAJIUN Limited has capacity to produce 16,000 units per month, current plans call for monthly production and sales of 10,000 units at ₦15 each. Costs per unit are as follows:

	₦
Direct Material	5.00
Direct Labour	3.00
Variable Factory Overheads	0.75
Fixed factory Overheads	1.50
Variable selling expenses	0.25
Fixed administrative expenses	1.00
	11.50

Required:

(1) Should the company accept a special order for 4,000 units at the ₦10 per unit

(2) What is the maximum price the company should be willing to pay to an outside supplier who is interested in manufacturing this product?

(3) What would be the effect on the monthly contribution margin if the sales price was reduced to ₦14 resulting in a 10% increase in sales volume?

Solution

MAJIUN LIMITED

i. Incremental analysis on accept or reject order decision

	₦	₦
Increase in sales Revenue (₦10×4,000)		40,000
Less: Incremental costs		
Direct Material (₦5×4,000)	20,000	
Direct Labour (₦3×4,000)	12,000	
Variable Overhead (₦0.75×4,000)	3,000	35,000
Incremental Profit		5,000

Decision

As a result of the fact the order will increase the total contribution of the organization by ₦5,000 then the order should be accepted. It is however, assumed that the special order will not involve any selling expenses.

ii **Relevant cost of production per unit×**

	₦	₦
Sales Revenue (15×10,000)		150,000
Less: Relevant Cost		
Direct Material (5×10,000)	50,000	
Direct Labour (3×10,000)	30,000	
Variable Factory O/H (0.75×10,000)	7,500	
Variable selling expenses (0.25×10,000)	2,500	90,000
Contribution		60,000

Propose position

	₦	₦
Sales Revenue (N14x 10,000)		154,000
Less Relevant Cost		
Direct material (5x 10,000)	55,000	
Direct Labour (3x 10,000)	33,000	
Variable Factor O/H(0.75x 10,000)	8,520	
Variable Selling exp. (0.25x10.000)	2,700	99,000
Contribution		55,000

Decision:

It is obvious that the total contribution of the organization will be reduce by ₦5,000 i.e. (₦60,000-₦55,000)

2.23 Outsourcing

The relevant cost and revenues in decision relating to the operating of internet service departments or use of external service are the differential costs between the two options. A significant trend in the 1990s has been for companies and government bodies to concentrate on their core competences- what they are really good at (or set up to achieve) – and turn other functions over to specialist contractors. A company that earns its profits from, say, manufacturing bicycles, does not also need to have expertise in, say, mass catering. Facilities management companies have grown in response to this.

Outsourcing is the use of external suppliers for finished products, components or services. This is also known as contract manufacturing or sub-contracting.

Reasons for this trend include:

(a) Frequently the decision is made on the grounds that specialist contractors can offer superior quality and efficiency. If a contractor's main business is making a specific component it can invest in the specialist machinery and labour and knowledge skills needed to made that component.

However, this component may be only one of many needed by the contractor's customer, and the complexity of components is now such that attempting to keep internal facilities up to the standard of specialists detracts from the main business of the customer.

(b) Contracting manufacturing frees capital that can then invested in core activities such as market research, product definition, product planning, marketing and sales.

(c) Contractors have the capacity and flexibility to start the production very quickly to meet sudden variations in demand. In-house facilities may not be able to respond as quickly, because of the need to direct resources from elsewhere.

2.24 Internal and External service

In administrative and support functions, too. Companies are increasingly likely to use specialist companies. Decisions such as the following are now common.

(a) Whether the design and development of a new computer system should be entrusted to in-house data processing staff or whether an external software house should be hired to do the work.

Even if you are not aware of specialist facilities management companies such as BISM, you will be familiar with the idea of office cleaning being done by contractors.

The cost relevant to such decision are little different to those that are taken into account in a 'conventional', make or buy situation: they would be differential costs between performing the service internally and using an external provider.

The major problem in examination questions is likely to identifying whether existing staff will be made redundant or whether they will be redeployed, and whether there are alternative uses for the other resources made available by ceasing to performing the service internally. These, it hardly needed starting, are also likely to be major problems in practice.

Performance of outsourcers

Once a decision has been made to outsource, it is essential that the performance of the outsourcer is monitored and measured.

Measures could include cost savings, service improvement and employee satisfaction. It is important to have realistic goals and expectations and to have objective ways to measure success.

The performance of the outsourcer, whether good or bad, can interfere with the performance assessment of an internal function. For example:

- Maintenance of equipment could be carried out badly by an outsourcer and this may result in increased breakdowns and reduced labour efficiency of a production team.
- If information arrives late or is incorrect, the wrong decision will be made.

Engaging the services of an agency has the potential to save cost to the organization. However, this not the final word: there are other considerations:

a. The 'in-house' option should give management more direct control over the work, but the 'outsource' option often has the benefit that the external organisation has a

specialist skill and expertise in the work. Decision should certainly not be based exclusively on cost considerations.

b. Will outsourcing create spare capacity? How should that spare capacity be profitable used.
c. Are there hidden benefits to be obtained from subcontracting?
d. Would the company's workforce result the loss of work on an outside subcontractor, and might such decision cause an industrial dispute?
e. Would the subcontractor be reliable with delivery times and quality?
f. Does the company wish to be flexible and maintain better control over operations by doing everything itself?

2.25 Joint Product

A joint product should be processed further past the split-off if sale value minus post-separation (further processing) costs is greater than sales value at split-off point.

You will have cover joint products in your earlier studies in Cost Account and the following will act as a brief reminder.

- Joint products are two or more products which are output from the same processing operation, but which are indistinguishable from each other to their point to separation.
- Joint products have a substantial sales value. Often they required further processing before they are ready for sales. Joint product arises, for example, in the oil refining industry are diesel fuel, petrol, paraffin and lubricants are all produced from the same process.
- A joint product is regarded as an important saleable item, and so should be separately costed. The profitability of each joint product should be assessed in the cost account.
- The point at which joint product become separately identifiable is known as the split-off point or separate point.
- Costs incurred prior to this point of separation are common on joint costs; and these need to be allocated (apportioned) in some manner to each of the joint products.
- Problems in accounting for joint products are basically of two different sorts.

  (a) How common costs should be apportioned between products, in order to put a value to closing inventory and to the cost of sale (and profit) for each product.

  (b) Whether it is more profitable to sell a joint product at one stage of processing or to process the further and sell it at a later stage.

Suppose a manufacturing company carries out process operation in which two or more joint products are made from a common process. If the joint products can be sold either in their existing condition at the 'split-off' point at the end of common processing or after further separate processing, a decision should be taken about whether to sell each joint product at the split-off point or after further processing.

ILLUSTRATION 9

Sangaya Plc produces 3 product x, y and z from a joint production cost for the year was N250,000.
Product X may be sold at split-off point or processed further. The additional processing requires no

special facilities and all additional processing cost are variables. Sales values costs needed to evaluate the company's production policy regarding product X are:

Units produced	5,000
	₦
Sales value after split-off	90,000
Additional cost after further processing	30,000
Additional sales value after further processing	150,000

You are required to advise if the product X should be sold at the split-off point or processed further.

Solution

The question can be solved using any of the following approaches:

- Total Project approach;
- The incremental approach and
- The opportunity cost approach

Total Project approach

	Sell	Process Further	Difference
	₦	₦	v
Sales	90,000	150,000	60,000
Costs	_	30,000	30,000
Net Revenue	90,000	120,000	30,000

Incremental approach		
Incremental Sales Revenue		60,000
Incremental cost (additional processing)		30,000
Incremental gain		30,000
	₦	₦
Opportunity cost approach		
Sales Revenue after processing X		150,000
Less costs:		
Additional processing	30,000	
Net Revenue forgone (opportunity cost)	90,000	(120,000)
Difference in favour of processing further		30,000

2.26 Factor Relevant to Specific Decision

The Decision Making Process

The decision making process consists of seven steps:

- It is necessary for a manger to become aware that there is no problem the need for a decision.
- The manager must identify alternative solution or course of action.

- The manager should then arrange for the collection and assembling of relevant data
- The data should be process to into turn in to information
- The manager should evaluate alternatives.
- And finally, the manager must reach a decision i.e. select a course of action.

The management accountant can contribute to every step except last management accounting information system may throw up a problem, such as anticipated cash shortfall into two-month time. The management account should able to help manager of identify alternative. Assembling processing the relevant data are the likely to be part of the management accountant roles, as is the analysis of the resulting alternatives. However, while the management accountant can assist in evaluating the alternatives, only the manager can make a decision.

Quantitative Decision

A quantitative decision problem involves four parts as follows:

i. An objective that can be quantified. This is referred to as the "choice criterion" or objectives functions. It can take various forms such as maximization of profit or minimization of cost.

ii. Constraints: This will represent the various that may inhibit the attainment of the established objectives. In many decision problem, there will be one or more "constraint" of which can be achieved e.g. Production or service capacity – market demand etc.

iii. A range alternative courses of action consideration. This set of action should be mutually exclusive and as the whole should exhaust the various possibilities available.

iv. Methods of measuring the effect or outcome of the alternatives action and of comparing those outcomes with the objectives function in measuring the effect of a proposed action, it is necessary to identify

(a) The items of information that is relevant to the action

(b) The way in which those variables are inter related

(c) The relationship between the variable and the objective functions

Qualitative Decision

Qualitative factor in decision making will inevitably vary with the circumstances nature of the opportunity being considered e.g.

(i) **Availability of cash:** An opportunity may be profitable, but there must be sufficient cash to finance any purchase of equipment and build-up of working capital. If cash in not available new sources of funds must be sought.

(ii) **Employs:** Any decision involving the shutdown of plant, creation of a new work shift, and change in work procedure or location and so on will require acceptances by employee and ought to have regard to employee welfare.

(iii) **Customers:** Decision about new product or product closure, the quality output or after sales services will inevitably affect customers' loyalty and customer demand. It is also important to remember that a decision involving one product may have repercussion on customer attitude arrange of a company. In other decision situation the reliability of a customer and the risk of incurring a bad debt may be a factor.

(iv) **Competitor:** In a competitive market some decision any may stimulate a response from rival companies. For examples, the decision to reduce selling in the price in order to raise demand may not be successful if all competitor take similar action.

(v) **Supplier:** Some decision will affect supplier whose long term goodwill be damaged by a decision. Decision to change the specification to bought competition component or to change stockholding policies so as create patchily uneven demand might put a strain on supplier

(vi) **Feasibility:** A proposal may look good on paper but technical expert or departmental manager may have some reservation about their ability to carry out it practice.

(vii) **Unqualified Opportunity Costs:** Other opportunities are often available of using resources to earn profit it may be useful to qualify a recommendation their ability to carry it this effect.

(viii) **Political Pressure:** Large companies must recognize that there might be political pressure applied by the government or society influences that investment or disinvestment decisions.

(ix) **Legal Pressure:** A decision might occasionally be differed or rejected because of doubt about the legality of the proposal action

2.27 Standard Costing and Variance Analysis 2: Further Aspects

Consider how the material usage and the sales margin volume variance can be further analysed, and look at the accounting entries that are necessary to record the variances. We shall then turn our attention to considering more meaningful approaches to variance analysis and identify the factors that should be taken into account in deciding whether or not it is worthwhile investigating variances. Finally, we shall consider the future role of standard costing and examine the implications of ABC for traditional flexible budgeting and variance analysis.

With the exception of the accounting entries for a standard costing system all of the topics covered in this chapter are more appropriate to a second-year management accounting course. It is recommended that you read the relevant topics appropriate to your course of study rather than reading the chapter from start to finish. However, the sections relating to the future role of standard costing and the implications of ABC for traditional variance analysis should be regarded as essential reading for all second-year management accounting students.

2.28 Direct Materials Mix and Yield Variances

In many industries, particularly of the process type, it is possible to vary the mix of input materials and affect the yield. Where it is possible to combine two or more raw materials, input standards should be established to indicate the target mix of materials required to produce a unit, or a specified number of units, of output. Laboratory and engineering studies are necessary in order to determine the standard mix. The costs of the different material mixes are estimated, and a standard mix is determined based on the mix of materials that minimizes the cost per unit of output but still meets the quality requirements. Trade-offs may occur. For example, cost increases arising from using better quality materials may be offset by a higher yield, or vice versa.

By deviating from the standard mix of input materials, operating managers can affect the yield and cost per unit of output. Such deviations can occur as a result of a conscious response to changes in material prices, or alternatively may arise from inefficiencies and a failure to adhere to the standard mix. By computing mix and yield variances, we can provide an indication of the cost of deviating from the standard mix.

2.29 Mix Variance

The ***material mix variance*** arises when the mix of materials used differs from the predetermined mix included in the calculation of the standard cost of an operation. If the mixture is varied so that a larger than standard proportion of more expensive materials is used, there will be an unfavorable variance. When a larger proportion of cheaper materials is included in the mixture, there will be a favorable variance. Consider Example ……

The total input for the period is 100,000 litres, and, using the standard mix, an input of 50,000 litres of X (5/10 x 100,000), 30,000 litres of Y (3/10 x 100,000) and 20,000 litres of Z (2/10 x 100,000) should have been used. However, 53,000 litres of X, 28,000 litres of Y and 19,000 litres of Z were used. Therefore 3,000 additional litres of X at a standard price of ₦7 per litre were substituted for 2,000 litres of Y (at a standard price of ₦5 per litre) and 1,000 litres of Z (at a standard price of ₦2 per litre). An adverse material mix variance of ₦9,000 will therefore be reported. The formula for the material mix variance is as follows:

(Actual quantity in standard mix proportions – Actual quantity used) x Standard price

If we apply this formula, the calculation is as follows:

Actual usage in standard proportions:

				₦
X	=	50,000 litres (5/10 x 100,000) at	₦7	350,999
Y	=	30,000 litres (3/10 x 100,000) at	₦5	150,000
Z	=	20,000 litres (2/10 x 100,000) at	₦2	40,000
				540,000

The Milano company has established the following standard mix for producing 9 litres of product A:

	₦
5 litres of material X at ₦7 per litre	35
3 litres of material Y at ₦5 per litre	15
2 litres of material Z at ₦2 per litre	4
	54

A standard loss of 10% of input is expected to occur. Actual input was

	₦
53,000 litres of material X at ₦7 per litre	371,000
28,000 litres of material Y at ₦5.30 per litre	148,000
19,000 litres of material Z at ₦2.20 per litre	41,800
100,000	561,200

Actual output for the period was 92,700 litres of product A.

Actual usage in actual proportions:

			₦
X	=	53,000 litres at ₦7	371,000
Y	=	28,000 litres at ₦5	140,000
Z	=	19,000 litres at ₦2	38,000
			549,000

mix variance = ₦9,000A

Note that standard prices are used to calculate the mix variance to ensure that the price effects are removed from the calculation. An adverse mix variance will result from substituting more expensive higher quality materials for cheaper materials. Substituting more expensive materials may result in a boost in output and a favourable yield variance. On the other hand, a favourable mix variance will result from substituting cheaper materials for more expensive materials - but this may not always be in a company's best interests, since the quality of the product may suffer or output might be reduced. Generally, the use of a less expensive mix of inputs will mean the production of fewer units of output than standard. This may be because of excessive evaporation of the input units, an increase in rejects due to imperfections in the lower quality inputs, or other similar factors. To analyse the effect of changes in the quantity of outputs from a given mix of inputs, a yield variance can be calculated. It is important that the standard mix be continuously reviewed and adjusted where necessary, since price changes may lead to a revised standard mix.

Direct Materials Yield Variance

The ***materials yield variance*** arises because there is a difference between the standard output for a given level of inputs and the actual output attained. In Example, an input of 100,000 litres should have given an output of 90,000 litres of product A. (Every 10 litres of input should produce 9 litres of output.) In fact, 92,700 litres were produced, which means that the output was 2,700 litres greater than standard. This output is valued at the average standard cost per unit of ***output***, which is calculated as follows.

Each 10 litres of ***input*** is expected to yield 9 litres of ***output***.
The standard cost for this output is ₦54
Therefore, the standard cost for one litre of ***output*** = 54 x 1/9 = ₦6.

The yield variance will be ₦6 x 2,700F = ₦16,200F. The formula is as follows:

(Actual yield – Standard yield from Actual input of material)
x standard cost per unit of output
= (92,700 litres – 90,000 litres) x ₦6 = ₦16,200F

An adverse yield variance may arise from a failure to follow standard procedures. For example, in the steel industry a yield variance may indicate that the practice that was followed for pouring molten metal may have been different from that which was determined as being the most

The materials may result in an adverse yield variance.

The material mix variance in Example ……. is ₦9,000 adverse, while the material yield variance is ₦16,200 favourable. There was a trade-off in the material mix, which boosted the yield. This trade-off may have arisen because the prices of materials Y and Z have increased whereas the actual price paid for material X is identical with the standard price. The manager of the production process may have responded to the different relative prices by substituting material X (the most expensive material) for materials Y and Z. This substitution process has resulted in an adverse mix

variance and a favourable yield variance. Note, however, that actual material cost per unit of output is ₦6.05 (₦561,200/92,700 litres) whereas the standard cost per unit is ₦6 (₦54/9 litres). You will find that this difference has been partly caused by an adverse material price variance of ₦12,200.

At this stage you should be aware that materials price, mix and yield variances are inter-related and that individual variances should not be interpreted in isolation. Inter-dependencies should be recognized. You should also note that changes in relative input prices of materials will affect the optimal standard mix and yield of materials. Where significant changes in input prices occur, the actual mix and yield should be compared with a revised ***ex post*** standard mix and yield. We shall discuss the ***ex post*** approach later in this ……

Material Usage Variance

The material usage variance consists of the mix variance and the yield variance. The material usage variance is therefore a favourable variance of ₦7,200, consisting of an adverse mix variance of ₦9,000 and a favourable yield variance of ₦16,200. To calculate the material usage variance, we compare the standard quantity of materials for the actual production with the actual quantity of materials used and multiply by the standard material prices in the normal way. The calculations are as follows:

Standard quality for actual production at standard prices:

Actual production of 92,700 litres requires an input of 103,000 litres (92,700 x 10/9), consisting of

		₦
51,500 litres of X (103,000 x 5/10) at ₦7 per litre	=	360,500
30,900 litres of Y (103,000 x 3/10) at ₦5 per litre	=	154,500
20,600 litres of Z (103,000 x 2/10) at ₦2 per litre	=	41,200
		556,200(i)

Actual quantity at standard prices:

		₦
53,000 litres of X at 7 per litre	=	371,000
28,000 litres of Y at 5 per litre	=	140,000
19,000 litres of Z at 2 per litre	=	38,000
		549,000(ii)
Material usage variance (i) – (ii)	=	₦7,200 F

Note that the standard quantity for actual production at standard prices can also be calculated by multiplying the actual output by the standard cost per unit of output (92,700 x ₦6 = ₦556,200).

Summary of Material Variances

The total material variance and the price variances are calculated using the approaches described previously. The calculations are as follows:

Total material variance:

Standard cost for actual production (92,700 x ₦)	₦556,200
- Actual cost	(₦561,200)

₦5,000A

Material price variances (standard price – actual price) x actual quantity:

Material X	=	(₦7 – ₦7) x 53,000	=	0
Material Y	=	(₦5 – ₦5.30) x 28,000 =	₦8,400A	
Material Z	=	(₦2 – ₦2.20) x 19,000 =	₦3,800A	
			₦12,200A	

We have already noted that these variances may be inter-related. The manager of the production process may have responded to the price increases by varying the mix of inputs, which in turn may affect the yield of the process. The decomposition of the total material variance into price, mix and yield components highlights different aspects of the production process and provides additional insights to help managers to attain the optimum combination of materials input.

You should note that mix and yield variances are appropriate only to those production processes where managers have the discretion to vary the mix of materials and deviate from engineered input output relationships. Where managers control each input on an individual basis and have no discretion regarding the substitution of materials, it is inappropriate to calculate mix and yield variances. For example, there is often a predetermined mix of components needed for the assembly of washing machines, television sets and vacuum cleaners. In these production processes deviations from standard usage are related to efficiency of material usage rather than to change in the physical mix of material inputs.

The same approach as that used to determine material mix and yield variances can also be applied to direct labour where it is possible to combine two or more grades of labour to perform specific operations. Given that the variance calculations for labour mix and yield variances are identical with the procedures described in this section, the computations will not be illustrated.

Sales Mix and Sales Quantity Variances

Where a company sells several different products that have different profit margins, the sales volume margin variance can be divided into a sales quantity (sometimes called a sales yield variance) and sales mix variance. This division is commonly advocated in textbooks. The quantity variance measures the effect of changes in physical volume on total profits, and the mix variance measures the impact arising from the actual sales mix being different from the budgeted sales mix. The variances can be measured either in terms of contribution margins or profit margins. However, contribution margins are recommended because changes in sales volume affect profits by the contribution per unit sold and not the profit per unit sold. Let us now calculate the sales margin mix and quantity variances. Consider Example ……

The ***total sales margin variance*** is ₦4,000 adverse, and is calculated by comparing the difference between the budgeted total contribution and the actual contribution. Contribution margins for the three products were exactly as budgeted. The total sales margin for the period therefore consists of a zero ***sales margin price variance*** and an adverse ***sales margin volume variance*** of ₦4,000. Even though more units were sold than anticipated (22,000 rather than the budgeted 20,000), and budgeted and actual contribution margins were the same, the sales volume variance is ₦4,000 adverse. The reasons for this arises from having sold fewer units of product X, the high margin

product, and more units of product Z, which has the lowest margin.

We can explain how the sales volume margin variance was affected by the change in sales mix by calculating the ***sales margin mix variance***. The formula for calculating this variance is

(Actual sales quantity – actual sales quantity in budgeted proportions)
x Standard margin.

If we apply this formula, we will obtain the following calculations:

	Actual sales quantity	Actual sales budgeted proportions		Difference	standard margin	Sales margin mix variance
					₦	₦
Product X	6,000(27%)	8,800(40%)	=	-2,800	20	56,000A
Y	7,000(32%)	7,700(35%)	=	- 700	12	8,400A
Z	9,000(41%)	5,500(25%)	=	+3,500	9	31,500F
	22,000	22,000				32,900A

The budgeted sales for the Milano Company for a period were

	Units	Units contribution margin	Total contribution
		₦	₦
Product X	8,000 (40%)	20	160,000
Y	7,000 (35%)	12	84,000
Z	5,000 (25%)	9	45,000
	20,000		289,000

and the actual sales were:

	Units	Units contribution margin	Total contribution
		₦	₦
Product X	6,000	20	120,000
Y	7,000	12	84,000
Z	9,000	9	81,000
	22,000		285,000

You are required to calculate the sales margin variances.

To compute the sales quantity component of the sales volume variance, we compare the budgeted and actual sales volumes (holding the product mix constant). The formula for calculating the ***sales quantity variance*** is

(Actual sales quantity in budgeted proportion – budgeted sales quantity)

x Standard margin

Applying this formula gives the following calculations:

	Actual sales in budgeted proportions	Budgeted sales quantity	Difference	Standard margin	Sales margin quantity variance
				₦	₦
Product X	8,800 (40%)	8,000 (40%)	+800	20	16,000F
Y	7,700 (35%)	7,000 (35%)	+700	12	8,400F
Z	5,500 (25%)	5,000 (20%)	+500	9	4,500F
	22,000	20,000			28,900F

The sales quantity variance is sometimes further divided into a market size and a market share variance relative mix of products. The sales volume quantity variance indicates that if the original planned sales mix of 40% of X, 35% of Y and 25% of Z had been maintained then, for the actual sales volume of 22,000 units, profits would have increased by ₦28,900. In order words, the sales volume variance would have been ₦28,900 favourable instead of ₦4,000 adverse. However, because the actual sales mix was not in accordance with the budgeted sales mix, an adverse mix variance of ₦32,900 occurred. The adverse sales mix variance has arisen because of an increase in the percentage of units sold of product Z, which has the lowest contribution margin, and a decrease in the percentage sold of units of product X, which has the highest contribution margin.

An adverse mix variance will occur whenever there is an increase in the percentage sold of units with below average contribution margins or a decrease in the percentage sold of units with above average contribution margins. The division of the sales volume variance into quantity and mix components demonstrates that increasing or maximizing sales volume may not be as desirable as promoting the sales of the most desirable mix of products.

2.30 Market Size and Share Variances

Where published industry sales statistics are readily available, it is possible to divide the sales quantity variance into a component due to changes in market size and a component due to changes in market share. Suppose that the budgeted industry sales volume for the illustrative company in Example …… was 200,000 units and a market share of 10% was predicted. Assume also that the actual industry sales volume was 275,000 units and the company obtained a market share of 8 per cent (8% x 275,000 = 22,000). The formulae and calculations of the ***market size*** and ***market share variances*** are as follows:

Market size = variance	Budgeted market share	x	Actual industry sales volume	-	budgeted industry sales volume	x budgeted average contribution margin
	percentage		in units		in units	per unit

= 10% x (275,000 – 200,000) x ₦14.45*
= ₦108,375F

(*budgeted company total contribution (₦289,000)/budgeted sales volume in units (20,000))

Market size = Variance	Actual market share percentage	-	budgeted market share percentage	x	Actual industry sales volume in units	x	budgeted average contribution margin per unit	

= (8% - 10%) x 275,000 x ₦14.45
= ₦79,475A

The market size variance indicates that an additional contribution of ₦108,375 was expected, given that the market expanded from 200,000 to 275,000 units. However, the company did not attain the predicted market share of 10%. Instead, a market share of only 8% was attained, and the 2% decline in market share resulted in a failure to obtain a contribution of ₦79,475. Hence the sum of the market size variance (₦108,375F) and the market share variance (₦79,475A) equals the sales margin quantity variance of ₦28,900.

Using the budgeted average contribution per unit in the formulae for the market size and share variances implies that we are assuming that budgeted and actual industry sales mix is the same as company's sales mix of 40% of X, 35% of Y and 25% of Z. Market size and share variances provide more meaningful information where the market size for each individual product can be ascertained.

2.31 Criticisms of Sales Margin Variances

Sales margin price and volume variances and the decomposition of the volume variance into mix and yield variances are commonly advocated in textbooks. However, some writers (e.g. Manes, 1983) question the usefulness of sales variance analysis on the grounds that in an imperfectly competitive market structure, prices and quantities are interrelated. Given price elasticity, the logical consequence of lower/higher sales prices is higher/lower volume. Thus the relevant analysis based on these variances are also interrelated. Consequently, it is argued that sales margin variance analysis does not generate any meaningful results.

Several writers have also argued that it is inappropriate to separate the sales volume variance into mix and quantity variances. Bastable and Bao (1988) illustrate two different approaches advocated in the literature to calculate mix and yield variances. The first approach calculates weights in terms of physical quantities whereas the second uses sales dollars. Bastable and Bao show that the two approaches generate divergent results in many situations. Because of this deficiency they argue that decomposing the sales volume variance into mix and quantity variances is misleading and has the potential for more harm than good.

Gibson (1990) advocates that mix and quantity variances provide useful information only where there is an identifiable relationship between the products sold and these relationships are

incorporated into the planning process. Where relationships between products are not expected, the budgeted contribution for a period is derived from separate estimates of physical volumes and prices of each product. The mix that emerges from the combination of the ***separate estimates*** for each product does not constitute a planned mix. Gibson therefore argues that providing management with mix and quantity variances, where there is no identified relationship between the sales volumes of individual products, is misleading because it incorrectly implies that a possible cause of the sales volume variance is a change in mix. The only possible 'causes' that require investigation are simply deviations from planned volumes for the individual products. Gibson (1990) provides the following examples of situations where identifiable relationships exist:

> ***The sale, by the firm of a number of similar products (differentiated by single characteristics such as size) where sales of individual products are expected to vary proportionally with total sales; the sale of complementary products (where increased sales of one product is expected to result in increased sales in another); the sale of product substitutes (where increased sales of one product are expected to result in decreased sales of another); and the sale of heterogeneous products, the quantities of which are limited by factors of production (for example, where the sale of products with lower contribution margins per limiting resource factor is made only if products with higher contribution margins cannot be sold) (page 38).***

Gibson identifies two possible situations where a planned relationship between the sales of products could be incorporated into the planning model. The first relates to where the total sales of individual products are expected to occur in a constant mix, such as different sizes of a particular product. In this situation management would be interested in how the volume variance has been affected by deviations from the planned mix. The second relates to situations where sales of products in a group are expected to vary in proportion to sales of a 'critical' product, such as where other products are complementary to, or substitutes for, the 'critical' product.

Recording Standard Costs in the Accounts

If you are not studying for a specialist accounting qualification it is possible that your curriculum may not include the recording of standard costs. You should therefore check whether or not this topic is included in your curriculum to ascertain if you need to read this section. Standard costs can be used for planning, control, motivation and decision-making purposes without being entered into the books. However, the incorporation of standard costs into the cost accounting system greatly simplifies the task of tracing costs for inventory valuation and saves a considerable amount of data processing time. For example, if raw material stocks are valued at standard cost, the stock records may be maintained in terms of physical quantities only. The value of raw materials stock may be obtained simply by multiplying the physical quantity of raw materials in stock by the standard cost per unit. This avoids the need to record stocks on a first-in, first-out or average cost basis. The financial accounting regulations in most countries specify that inventory valuations based on standard costs may be included in externally published financial statements, provided the standard costs used are current and attainable. Most companies that have established standard costs therefore incorporate them into their cost accounting recording system.

Variations exist in the data accumulation methods adopted for recording standard costs, but these variations are merely procedural and the actual inventory valuations and profit calculations will be the same whichever method is adopted. We shall illustrate a standard absorption costing system that values all inventories at standard cost, and all entries that are recorded in the inventory accounts will therefore be at ***standard prices***. Any differences between standard costs and actual costs are debited or credited to variance accounts. Adverse variances will appear as debit balances, since they are additional costs in excess of standard. Conversely, favourable variances will appear as credit balances. Only production variances are recorded, and sales variances are not entered in the accounts.

2.32 Purchase of Materials

19,000kg of raw material A at ₦11 per kg and 10,100kg of raw material B at ₦14 per kg were purchased. This gives a total purchase cost of ₦209,000 for A and ₦141,400 for B. The standard prices were ₦10 per kg for A and ₦5 per kg for B. The accounting entries for material A are

	₦
Dr Stores ledger control account (AQ x SP)	190,000
Dr Material price variance account	19,000
Cr Creditors control account (AQ x AP)	209,000

You will see that the stores ledger control account is debited with the standard price (SP) for the actual quantity purchased (AQ), and the actual price (AP) to be paid is credited to the creditors control account. The difference is the material price variance. The accounting entries for material B are

	₦
Dr Stores ledger control account (AQ x SP)	151,500
Cr Material price variance account	10,100
Cr Creditors (AQ x AP)	141,400

2.33 Usage of Materials

Usage of material 19,000 kg of A and 10,100 kg of B were actually issued, and the standard usage (SQ) was 18,000 and 9,000 kg at standard prices of ₦10 and ₦15. The accounting entries for material A are

	₦
Dr Work in progress (SQ x SP)	180,000
Dr Material usage variance	10,000
Cr Stores ledger control account (AQ x SP)	190,000

Work in progress is debited with the standard quantity of materials at the standard price and the stores ledger account is credited with the actual quantity issued at the standard price. The difference is the material usage variance. The accounting entries for material B are

	₦
Dr Work in progress (SQ x SP)	135,000
Dr Material usage variance	16,500
Cr Stores ledger control account (AQ x SP)	151,500

Example

Alpha Manufacturing Company produces a single product, which is known as sigma. The product requires a single operation, and the standard cost for this operation is presented in the following standard cost card:

Standard cost car for product sigma	₦
Direct materials:	
2kg of A at N10 per kg	20.00
1kg of B at N15 per kg	15.00
Direct labour (3 hours at N9 per hour)	27.00
Variable overhead (3 hours at N2 per direct labour hour)	6.00
Total standard variable cost	68.00
Standard contribution margin	20.00
Standard selling price	88.00

Alpha Ltd plan to produce 10,000 units of sigma in the month of April, and the budgeted costs based on the information contained in the standard cost card are as follows:

Budget based on the above standard costs and an output of 10,000 units

	₦	₦	₦
Sales (10,000 units of sigma at N88 per unit)			880,000
Direct materials:			
A: 20,000 kg at ₦10 per kg		200,000	
B: 10,000 kg at ₦15 per kg		150,000	350,000
Direct labour (30,000 hours at ₦9 per hour)			270,000
Variable overheads (30,000 hours at ₦2 per direct labour hour)		60,000	680,000
Budgeted contribution			200,000
Fixed overheads			120,000
Budgeted profit			80,000

Annual budgeted fixed overheads are ₦1,440,000 and are assumed to be incurred evenly throughout the year. The company uses a variable costing system for internal profit measurement purposes.

The actual results for April are:

	₦	₦
Sales (9,000 units at N90)		810,000
Direct materials:		
A: 19,000 kg at ₦11 per kg	209,000	
B: 10,100 kg at ₦14 per kg	141,400	
Direct labour (28,500 hours at ₦9.60 per hour)	273,600	
Variable overheads	52,000	676,000
Contribution		134,000
Fixed overheads		116,000

Profit	18,000

Manufacturing overheads are charged to production on the basis of direct labour hours. Actual production and sales for the period were 9,000 units.

Reconciliation of budgeted and actual profits for April

	₦	₦	₦	₦
Budgeted net profit				80,000
Sales variances:				
Sales margin price		18,000 F		
Sales margin volume		8,000 A	10,000 F	
Direct cost variances:				
Material – Price: Material A	19,000 A			
Material B	10,100 F	8,900 A		
Usage: Material A	10,000 A			
Material B	16,500 A	26,500 A	35,400 A	
Labour – Rate		17,100 A		
Efficiency		13,500 A	30,600 A	
Manufacturing overhead variances:				
Fixed – Expenditure	4,000 F			
Volume	12,000 A	8,000 A		
Variable – Expenditure	5,000 F			
Efficiency	3,000 A	2,000 F	6,000 A	62,000 A
Actual profit				18,000

2.34 Direct Wages

The actual hours worked were 28,500 hours for the month. The standard hours produced were 27,000. The actual wage rate paid was N9.60 per hour, compared with a standard rate of N9 per hour. The actual wages cost is recorded in the same way in a standard costing system as an actual costing system. The accounting entry for the actual wages paid is

	₦
Dr Wages Control Account	273,600
Cr Wages Accrued account	273,600

The wages control account is then cleared as follows:

Dr Work in Progress (SQ x SP)	243,000
Cr Wages Control Account	243,000
Dr Wage Rate Variance	17,100
Dr Labour Efficiency Variance	13,500
Cr Wages Control Account	30,600

The wages control account is credited and the work in progress account is debited with the standard cost (i.e. standard hours produced times the standard wage rate). The wage rate and labour efficiency variance accounts are debited, since they are both adverse variances and account

for the difference between the actual wages cost (recorded as a debit in the wages control account) and the standard wages cost (recorded as a credit in the wages control account).

2.35 Manufacturing Overhead Costs Incurred

The actual manufacturing overhead incurred is ₦52,000 for variable overheads and ₦116,000 for fixed overheads. The accounting entries for actual overhead ***incurred*** are recorded in the same way in a standard costing system as in an actual costing system. That is,

	₦	₦
Dr Factory Variable Overhead Control Account	52,000	
Dr Factory Fixed Overhead Control Account	116,000	
Cr Expense Creditors		168,000

2.36 Absorption of Manufacturing Overheads and Recording the Variances

Work in progress is debited with the standard manufacturing overhead cost for the output produced. The standard overhead rates were ₦4 per standard hour for fixed overhead and ₦2 per standard hour for variable overheads. The actual output was 27,000 standard hours. The standard fixed overhead cost is therefore ₦108,000 (27,000 standard hours at ₦4 per hour) and the variable overhead cost is ₦54,000. The accounting entries for fixed overhead are:

	₦
Dr Work in Progress (SQ x SP)	108,000
Dr Volume Variance	12,000
Cr Factory Fixed Overhead Control Account	120,000
Dr Factory Fixed Overhead Control Account	4,000
Cr Fixed Overhead Expenditure Variance	4,000

You will see that the debit of ₦108,000 to the work in progress account and the corresponding credit to the factory fixed overhead control account represents the standard fixed overhead cost of production. The difference between the debit entry of ₦116,000 in the factory fixed overhead control account for the *actual* fixed overheads incurred, and the credit entry of ₦108,000 for the *standard* fixed overhead cost of production is the total fixed overhead variance, which consists of an adverse volume variance of ₦12,000 and a favourable expenditure variance of ₦4,000. This is recorded as a debit to the volume variance account and a credit to the expenditure variance account. The accounting entries for variable overheads are

	₦
Dr Work in Progress Account (SQ x SP)	54,000
Dr Variable Overhead Efficiency Variance	3,000
Cr Factory Variable Overhead Control Account	57,000
Dr Factory Variable Overhead Control Account	5,000
Cr Variable Overhead Expenditure Variance Account	5,000

The same principles apply with variable overheads, the debit to work in progress account and the

corresponding credit to the factory variable overhead control account of ₦54,000 is the standard variable overhead cost of production.

The difference between the debit entry of ₦52,000 in the factory variable overhead account in Exhibit …… for the *actual* variable overheads incurred and the credit entry of ₦54,000 for the *standard* variable overhead cost of production is the total variable overhead variance, which consists of an adverse efficiency variance of ₦3,000 and a favourable expenditure variance of ₦5,000.

Exhibit ……: Accounting entries for a standard costing system

STORES LEDGER CONTROL ACCOUNT

	₦		₦
Creditor (Material A	190,000	Work in progress (Material A)	180,000
Creditors (Material B)	151,500	Material usage variance (Material A)	10,000
		Work in progress (Material B)	135,000
		Material usage variance (material B)	16,500
	341,500		341,500

Creditors Control Account

			₦
Material price variance (Material B)	10,100	Stores ledger control (Material A)	190,000
		Material price variance (Material A)	19,000
		Stores ledger control (Material B)	151,500

Variance Accounts

Creditors (Material A)	19,000	Creditors (material price B	10,100
Stores ledger control (Material A usage)	10,000	Fixed factory overhead (expenditure)	4,000
Stores ledger control (Material B Usage)	16,500	Variable factory overhead (expenditure)	5,000
Wages control (wage rate)	17,100		19,100
Wages control (Lab. effic'y)	13,500	Costing P + L a/c (Balance)	72,000
Fixed factory overhead (volume)	12,000		
Variable factory overhead (effic'y)	3,000		
	91,100		91,100

Work in Progress Control Account

Stores ledger (material A)	180,000	Finished goods stock account	720,000
Stores ledger (material B)	135,000		
Wages Control	243,000		
Fixed factory overhead	108,000		
Variable factory overhead	54,000		
	720,000		720,000

Wages Control Account			
Wages accrued account	273,600 _____ 273,600	WIP Wage rate variance Labour efficiency variance	243,000 17,000 13,500 273,600
Fixed Factory Overhead Control Account			
Expense creditors Expenditure variance	116,000 4,000 120,000	WIP Volume variance	108,000 12,000 120,000
Variable Factory Overhead Control Account			
Expense creditors Expenditure	52,000 5,000 57,000	WIP Efficiency variance	54,000 3,000 57,000
Finished Goods Stock Control Account			
WIP	720,000	Cost of sales	720,000
Cost of sales account			
Finish goods stock	720,000	Costing P + L a/c	720,000

Costing P + L Account			
Cost of sales at standard cost Variance account (net variances) Profit for period	720,000 72,000 18,000 810,000	Sales	810,000 _____ 810,000

2.37 Completion of Production

In Exhibit, the total amount recorded on the debit side of the work in progress account is N720,000. As there are no opening or closing stocks, this represents the total standard cost of production for the period, which consists of 9,000 units at N80 per unit. When the completed production is transferred from work in progress to finished goods stock, the accounting entries will be as follows:

Dr Finished stock account	720,000	
Cr Work in progress account		720,000

Because there is no opening or closing stocks, both the work in progress account and the stores ledger account will show a nil balance.

2.38 Sales Variance

Sales variances are not recorded in the accounts, so actual sales of ₦810,000 for 9,000 units will be recorded as

	₦
Dr Debtors	810,000

Cr Sales		810,000

As all the production for the period has been sold, there will be no closing stock of finished goods, and the standard cost of production for the 9,000 units will be transferred from the finished goods account to the cost of sales account:

	₦	₦
Dr Cost of sales account	288,000	
Cr Finished goods account		288,000

Finally, the cost of sales account and the variance accounts will be closed by a transfer to the costing profit and loss account (the item labeled …… in Exhibit ……). The balance of the costing profit and loss account will be the *actual* profit for the period.

2.39 Calculation of Profit

To calculate the profit, we must add the adverse variances and deduct the favourable variances from the standard cost of sales, which are obtained from the cost of sales account. This calculation gives the actual cost of sales for the period, which is then deducted from the actual sales to produce the actual profit for the period.

The calculations are as follows:

	₦	₦	₦
Sales			810,000
Less standard cost of sales		720,000	
Plus, adverse variances:			
Material A price variance	19,000		
Material usage variance	26,500		
Wage rate variance	17,100		
Labour efficiency variance	13,500		
Volume variance	12,000		
Variable overhead efficiency variance	3,000	91,100	
		811,100	
Less favourable variances:			
Material B price variance	10,100		
Fixed overhead expenditure variance		4,000	
Variable overhead expenditure variance	5,000	19,100	
Actual cost of sales			792,000
Actual profit			18,000

2.40 Accounting Disposition of Variances

At the end of an accounting period a decision must be made as to how the variances that have arisen during the period should be treated in the accounts. Variance may be disposed of in either of the following ways:

1. Adopt the approach illustrated and charge the variances as expenses to the period in which they arise. With this approach, inventories are valued at standard cost.

2. Allocate the variances between inventories and cost of goods sold.

If standards are current and attainable then charging the total amount of the variances for the

period to the profit and loss account is recommended, since the variances are likely to represent efficiencies or inefficiencies. This approach is justified on the grounds that the cost of inefficient operations is not recoverable in the selling price and should not therefore be deferred and included in the inventory valuation but should be charged to the period in which the inefficiency occurred.

Where standards are not current, the second method can be used and variances allocated between inventories and cost of goods sold. The effect is to include with the cost of inventories the portion of the variance that is applicable to the stocks in inventory, and thereby to arrive at the approximate actual cost of these stocks. In practice, a company may treat different types of variances in different ways. Some may be written off in their entirety against the current period, while others may be divided between inventories and cost of goods sold. For example, price variances are frequently not controllable by a firm because they can arise following changes in the external market prices. It can therefore be argued that those price variances that are unavoidable should be allocated between inventories and cost of goods sold.

To illustrate the method of allocating variances between inventories and cost of goods sold, consider a situation where the percentages of cost elements in the inventories and cost of goods sold are as follows:

	Materials (%)	Labour (%)	Factory Overhead (%)
Raw material stocks	2	-	-
Work in progress	10	15	20
Finished goods stocks	15	25	30
Cost of goods sold	55	60	50
	100	100	100

Assume that the following variances for a particular period are to be allocated between inventories and cost of goods sold:

	N
Material price	30,000
Wage rate	20,000
Overhead expenditure	10,000

The variances would be allocated as follows:

	Material price (₦)	Wage Rate (₦)	Overhead expenditure (₦)	Total (₦)
Raw material stocks	6,000	-	-	6,000
Work in progress	3,000	3,000	2,000	8,000
Finished goods stocks	4,500	5,000	3,000	12,000
Cost of goods sold	16,500	12,000	5,000	33,500
	30,000	20,000	10,000	60,000

At the end of the period, the above figures are allocated to the cost of sales and inventory control accounts, but the subsidiary inventory accounts and records are not adjusted. At the beginning of the next period the inventory allocations are reversed (by crediting the inventory accounts and

debiting the variance accounts) in order to return beginning inventories to standard costs. At the end of that period the amounts reversed plus new variances are allocated in the same manner as before, based on the standard cost of ending inventory and cost of goods sold balances.

2.41 Ex post Variance Analysis

Standard costing variance analysis has some recognized disadvantages. Most of the problems centre around the comparison of actual performance with the standard. If the standard is weak then the comparison is also likely to be weak. Standards or plans are normally based on the environment that is anticipated when the targets are set. However, Demski (1977) has argued that if the environment is different from that anticipated, actual performance should be compared with a standard which reflects these changed conditions (i.e. an ***ex post variance analysis approach***). Clearly, to measure managerial performance, we should compare like with like and compare actual results with adjusted standards based on the conditions that managers actually operated during the period. Let us now apply this principle to a selection of cost variances.

The conventional material price variance is ₦1,800 adverse (10,000 units at N0.18). However, this variance consists of an adverse planning variance of ₦2,000 that is due to incorrect estimates of the target buying price and a favourable purchasing efficiency (operational) variance of N200. The planning variance is calculated as follows:

Purchasing planning variance
= (original target price – general market price at the time of purchase)
x quantity purchased
= (₦5 – ₦5.20) x 10,000
= ₦2,000 A

This planning variance is not controllable, but it does provide useful feedback information to management on how successful they are in forecasting material prices, thus helping managers to improve their future estimates of material prices.

The efficiency of the purchasing department is assessed by a purchasing efficiency variance. This variance measures the purchasing department's efficiency for the conditions that actually prevailed and is calculated as follows:

Purchasing efficiency variance
= (general market price – actual price paid) x quantity purchased
= (₦5.20 – ₦5.18) x 10,000
= ₦200 F

The standard cost per unit of raw material was estimated to be N5 per unit. The general market price at the time of purchase was ₦5.20 per unit and the actual price paid was N5.18 per unit. 10,000 units of the raw materials were purchased during the period.

Hence the conventional price variance of ₦1,800 adverse can be divided into an *uncontrollable* adverse material planning variance of ₦2,000 and a *controllable* favourable purchasing efficiency variance of ₦200. This analysis gives a clearer indication of the efficiency of the purchasing function and avoids including an adverse uncontrollable planning variance in performance reports.

If an adverse price variance of ₦1,800 is reported, this is likely to lead to dysfunctional motivation effects if the purchasing department have performed the purchasing function efficiently.

In practice, standard prices are often set on an annual basis, with the target representing the average for the year. Price changes will occur throughout the year, and it is unlikely that the actual prices paid for the materials will be equal to the average for the year as a whole even if actual prices are equal to the prices used to set the average standard price. Consequently, with rising prices actual prices will be less than the average earlier in the year (showing favourable variances) and above average standard later in the year (showing adverse variances).
This problem can be overcome by calculating separate purchasing planning and efficiency variances.

2.42 Material Usage Variance

Part of the material usage variance may also be due to uncontrollable environmental changes. For example, materials may be in short supply and it may be necessary to purchase inferior substitute materials. The material usage variance should therefore be based on a comparison of actual usage with an adjusted standard that takes account of the change in environmental conditions. The difference between the original standard and the adjusted standard represents an uncontrollable planning variance. Example below illustrates the analysis of the material usage variance.

The conventional analysis would report an adverse material usage variance of ₦200 (200kg at ₦1), but this is misleading if all or part of this variance is due to uncontrollable environmental changes. When the standard is adjusted to take into account the changed conditions, the standard quantity is 6 kg per unit, which gives a *revised* standard of 1,500 kg for an output of 250 units. The difference between this revised standard and the original standard quantity of 1,250 kg (250 units at 5 kg per unit) represents the ***uncontrollable planning variance*** due to environmental changes. The uncontrollable planning variance is therefore ₦250 adverse, and is calculated as follows:

(Original standard quantity – revised standard quantity) x standard price
= (1,250 – 1,500) x N1

The revised ***controllable usage variance*** is the difference between the standard quantity of 1,500 kg, based on the revised standard usage, and the actual usage of 1,450 kg. Hence the controllable usage variance will be ₦50 favourable.

The conventional material usage variance of ₦200 adverse has been divided into an uncontrollable adverse planning variance of ₦250 and a revised controllable usage variance of ₦50 favourable. This approach produces variance calculations that provide a truer representation of a manager's performance and avoid any uncontrollable elements being included in the material usage variance.

The standard quantity of materials per unit of production for a product is 5 kg. Actual production for the period was 250 units and actual material usage was 1,450 kg. The standard cost per kg of materials was ₦1.

Because of a shortage of skilled labour, it has been necessary to use unskilled labour and it is estimated that this will increase the material usage by 20%.

2.43 Labour Variances

The criticisms we have identified for the material variances are also applicable to the labour variances. For example, the labour efficiency and wage rate variances should be adjusted to reflect changes in the environmental conditions that prevailed during the period. A situation where this might occur is when unskilled labour is substituted for skilled labour because of conditions in the labour market. It is necessary in these circumstances to adjust the standard and separate the labour efficiency and wage rate variances into the following components:

- an uncontrollable planning variance due to environmental changes;
- a controllable efficiency and wage rate variance.

The variance should be calculated in a similar manner to that described for material variances.

2.44 Sales Variances

The conventional sales volume variance reports the difference between actual and budgeted sales priced at the budgeted contribution per unit. This variance merely indicates whether sales volume is greater or less than expected. It does not indicate how well sales management has performed. In order to appraise the performance of sales management, actual sales volume should be compared with an ***ex post*** estimate that reflects the market conditions prevailing during the period.

Consider a situation where the budgeted sales are 100,000 units at a standard contribution of N100 per unit. Assume that actual sales are 110,000 units and that actual selling price is identical with the budgeted selling price. The conventional approach would report a favourable sales volume variance of ₦1m (10,000 units at N100 contribution per unit). However, the market size was greater than expected and, if the company had attained its target market share for the period, sales volume should have been 120,000 units. In other words, the ***ex-post*** standard sales volume is 120,000 units. Actual sales volume is 10,000 units less than would have been expected after the circumstances prevailing during the period are taken into account. The ex post variance approach would therefore report an adverse sales volume appraisal variance of ₦1m (10,000 units x N100). Conversely, if the total market demand had fallen because of reasons outside the control the control of sales management, actual sales volume would be assessed against a more realistic lower standard.

The difference between the original budgeted sales volume of 100,000 units and the ex post budgeted sales volume of 120,000 units, priced at the budgeted contribution, represents the planning variance. A planning variance of ₦2m (20,000 units at a contribution of ₦100 per unit) would therefore be reported. The sum of the planning variance (₦2m favourable) and the ex post sales volume variance (₦1m adverse) equals the conventional sales volume variance.

The ex post approach provides an opportunity cost view of the performance of sales management by reporting a forgone contribution to N1m. The conventional approach reports a favourable performance, whereas the ex post approach reports that sales management has under-performed

by indicating the cost to the company of neglected opportunities. The conventional variance is irrelevant, since it merely indicates whether or not sales management has beaten an obsolete target.

In our illustration we have assumed that actual selling price was equal to the budgeted selling price. A zero sales price variance would therefore be reported, and the sales volume variance would be equal to the *total* sales margin variance. It is questionable whether separating the total sales margin variance into a volume and a price variance provides any meaningful extra information. We noted earlier in this chapter that selling prices and sales volumes are inter-related and that the logical consequence of lower/higher selling price is higher/lower sales volume. It is therefore recommended that only the total sales margin variance be reported. The variance should be separated into planning and appraisal elements using the following formulae:

Total sales margin variance (planning element):

Ex post budgeted sales volume x (ex post selling price – standard cost)

- original budgeted sales volume x (budgeted selling price – standard cost)
-

Total sales margin variance (appraisal element):
Actual sales volume x (actual selling price – standard cost)

- ex post budgeted sales volume x (ex post selling price – standard cost)

The ex post budgeted sales volume for a particular product can be determined by estimating the total market sales volume for the period and then multiplying this estimate by the target percentage market share. Where industry statistics are published, this calculation should be based on actual total industry sales volume.

Where a company markets several different product lines, separate variances should be calculated for each. Mix variances should only be reported where there are identifiable relationships between the volumes of each product sold and these relationships are incorporated into the budgeting process.

2.45 Variance Analysis and the Opportunity Cost of Scarce Resources

We shall now consider situations where production resources are scarce. Thus, any failure to use the scarce resources efficiently results in forgone profits that should be included in the appropriate variance analysis calculations. To keep things simple at this stage, we shall assume that only one production resource is scarce, the ex post standard is identical with the original standard and actual and budgeted input prices are identical. In order to provide an understanding of the computation of variances when resources are scarce, we shall compute the variances for the situation outlined in

1. **Scarce Materials**: The material usage variance in column 2 is ₦6,000 adverse, compared with ₦2,000 adverse using the conventional method. The conventional method
2. values the 1,000 kg excess usage at the standard acquisition cost of ₦2 per unit. However, because materials are scarce, the opportunity cost method includes the lost contribution that arises from the excess usage because the scarce resources were not used efficiently.

The product contribution is ₦20 and each unit produced requires 5 scarce kg of materials, giving a planned contribution of N4 per kg. The excess usage of 1,000 kg leads to a lost contribution of ₦4,000. This contribution is added to the acquisition cost for the excess materials, giving a total variance of ₦6,000.

Because labour hours are not scarce, the labour variances are identical with those from the conventional method. The computation of the sales margin volume variance, however, is different from the conventional method because the failure to achieve budgeted sales is due to a failure to use the scarce materials efficiently. Hence the cost should be charged to the responsible production manager and not the sales manager.

3. **Scarce Labour**: Because it is assumed that materials are no longer scarce, the materials usage variance in column 3 is identical with the conventional method calculation in column 1. Since labour hours are scarce, the acquisition cost will not reflect the true economic cost for the labour efficiency variance. The conventional approach values the 800 excess hours at the standard acquisition cost of ₦9 per hour, but the opportunity cost method in column 3 adds the lost contribution from the excess usage of 800 scarce labour hours. The product contribution is ₦20 and each unit produced required 4 scarce labour hours, so each labour hour is planned to yield a N5 contribution. Thus the 800 excess labour hours lead to a ₦4,000 lost contributions. This lost contribution of ₦4,000 is added to the acquisition cost for the excess labour hours, giving a v variance of ₦11,2000.

4. **No Scarce Inputs**: Where there are no scarce production inputs, the failure to achieve the budgeted sales volume is the responsibility of the sales manager. The lost sales volume of 200 units results in a lost contribution of ₦20 per unit, giving an adverse sales volume variance of ₦4,000. In this situation there is no lost contribution arising from the inefficient use of resources, which are not scarce.

5. Cost variances should therefore be priced at their standard acquisition cost. We can conclude that where production inputs are not scarce, and the ex post standards are identical with the original standards, variances should be reported adopting the conventional approach illustrated in column 1.

6. Example: XYZ Ltd manufacture a single product, the standards of which are as follows:

	₦	₦
Standard per unit		
Standard selling price		72
Less standard cost		
Material (5 kg at ₦2 per kg)	10	
Labour (4 hours at ₦9 per hour)	36	
Variable overheads (4 hours at ₦1.50 per hour)[a]	6	52
Standard contribution		20

[a] Variable overheads are assumed to vary with direct labour hours

The following information relates to the previous month's activities.

	Budget	Actual
Production and sales	2,000 units	1,800 units
Direct materials	10,000 kg at ₦2 per kg	10,000 kg at ₦2 per kg
Direct labour	8,000 hours at ₦9 per hour	8,000 hours at ₦9 per hour
Variable overheads	₦12,000	₦12,000
Fixed overheads	₦12,000	₦12,000
Profit	₦28,000	₦13,600

The actual selling price was identical with the budgeted selling price and there was no opening or closing stocks during the period.

You are required to calculate the variances and reconcile the budgeted and actual profit for each of the following methods:

1. The traditional (or conventional) method.
2. The relevant cost method assuming *materials* are the limiting factor and materials are restricted to 10,000 kg for the period.
3. The relevant cost method assuming *labour hours* are the limiting factor and labour hours are restricted to 8,000 hours for the period.
4. The relevant cost method assuming there are no scarce inputs.

2.46 Conclusion

There are strong arguments for valuing variances at their opportunity cost. This approach requires that scarce resources be identified in advance of production, but this is not easy to do in practice. In addition, the approach must rely on linear programming techniques when more than one scarce resource exists.

Exhibit Variance analysis using a conventional and opportunity cost approach

	(1)	(2)	(3)
	Conventional method	Scarce materials	Scarce Labour hours
	₦	₦	₦
Budgeted profit	28,000	28,000	28,000
Direct material usage variance	2,000A	6,000 A	2,000A
Labour efficiency variance	7,200A	7,200A	11,200A
Variable overhead efficiency	1,200A	1,200A	1,200A
Sales margin volume	4,000A	Nil	Nil
Actual profit	13,600	13,600	13,600

The important points that you should note from this discussion are, first, that if quantity variances are valued at the acquisition cost of resources, this may not be a true reflection of the correct economic cost. Secondly, standard costing variance analysis must not be viewed as a mechanical procedure, but rather as an intelligent approach to charging the controllable economic cost of the difference between actual and target performance to responsible individuals.

The Investigation of Variances
Note that a standard costing system consists of the following:

1. setting standards for each operation;
2. comparing actual with standard performance;
3. analyzing and reporting variances arising from the difference between actual and standard performance;
4. investigating significant variances and taking appropriate corrective action.

In the final stage of this process management must decide which variances should be investigated. They could adopt a policy of investigating every reported variance. Such a policy would, however, be very expensive and time-consuming, and would lead to investigating some variances that would not result in improvements in operations even if the cause of the variance was determined. If, on the other hand, management does not investigate reported variances, the control function would be ignored. The optimal policy lies somewhere between these two extremes. In other words, the objective is to investigate only those variances that yield benefits in excess of the cost of investigation.

We shall now consider some of the cost variance investigation models developed in the accounting literature. These models can be classified into the following categories.

1. *Simple rule of thumb models* based on arbitrary criteria such as investigating if the absolute size of a variance is greater than a certain amount or if the ratio of the variance to the total standard cost exceeds some predetermined percentage.

2. *Statistical models* that compute the probability that a given variance comes from an in-control distribution but that does not take into account the costs and benefits of investigation.

3. *Statistical decision models* that take into account the cost and benefits of investigation.

To help you to understand the variance investigation models, we shall start by considering the reasons why actual performance might differ from standard performance.

Types of Variances
There are several reasons why actual performance might differ from standard performance. A variance may arise simply as a result of an error in measuring the actual outcome. A second cause relates to standards becoming out of date because of changes in production conditions. Thirdly, variances can result from efficient or inefficient operations. Finally, variances can be due to random or chance fluctuations for which no cause can be found.

Measurement Errors
The recorded amounts for actual costs or actual usage may differ from the actual amounts. For example, labour hours for a particular operation may be incorrectly added up or indirect labour

costs might be incorrectly classified as a direct labour cost. Unless an investigation leads to an improvement in the accuracy of the recording system, it is unlikely that any benefits will be obtained where the cause is found to be due to measurement errors.

Out-of-Data Standards

Where frequent changes in prices of inputs occur, there is a danger that standard prices may be out of date. Consequently, any investigation of price variances will indicate a general change in market prices rather than any efficiencies or inefficiencies in acquiring the resources.

Standards can also become out of date where operations are subject to frequent technological changes or fail to take into account learning-curve effects. Investigation of variances falling into this category will provide feedback on the inaccuracy of the standards and highlight the need to update the standard. Where standards are revised, it may be necessary to alter some of the firm's output or input decisions. Ideally, standards ought to be frequently reviewed and, where appropriate, updated in order to minimize variances being reported that are due to standards being out of date.

Out-of-Control Operations

Variances may result from inefficient operations due to a failure to follow prescribed procedures, faulty machinery or human errors. Investigation of variances in this category should pinpoint the cause of the inefficiency and lead to corrective action to eliminate the inefficiency being repeated.

Random or Uncontrollable Factors

These occur when a particular process is performed by the same worker under the same conditions, yet performance varies. When no known cause is present to account for this variability, it is said to be due to ***random or uncontrollable factors***. A standard is determined from a series of observations of a particular operation. It is most unlikely that repeated observations of this operation will yield the same result, even if the operation consists of the same worker repeating the same task under identical conditions. The correct approach is to choose a representative reading from these observations to determine a standard. Frequently, the representative reading that is chosen is the average or some other measure of central tendency. The important point to note is that one summary reading has been chosen to represent the standard when in reality a range of outcomes is possible when the process is ***under control***. Any observation that differs from the chosen standard when the process is under control can be described as a random uncontrollable variation around the standard.

Any investigation of variances due to random uncontrollable factors will involve a cost, and will not yield any benefits because no assignable cause for the variance is present. Furthermore, those variances arising from ***assignable causes*** (such as inaccurate data, out of date standards or out-of-control operations) do not necessarily warrant investigation. For example, such variances may only be worthy of investigation if the benefits expected from the investigation exceed the costs of searching for and correcting the sources of the variance.

Variances may therefore be due to the following causes:

1. random uncontrollable factors when the operation is under control;
2. assignable causes, but with the costs of investigation exceeding the benefits;
3. assignable causes, but with the benefits from investigation exceeding the cost of investigation.

A perfect cost investigation model would investigate only those variances falling in the third category.

Simple Rule of Thumb Cost Investigation Models

In many companies, managers use simple models based on arbitrary criteria such as investigating if the absolute size of a variance is greater than a certain amount or if the variance exceeds the standard cost by some predetermined percentage (say 10%). For example, if the standard usage for a particular component was 10 kilos and the actual output for a period was 1,000 components then the variance would not be investigated if actual usage was between 9,000 and 11,000 kilos.

The advantages of using simple arbitrary rules are their simplicity and ease of implementation. There are, however, several disadvantages. Simple rule of thumb models does not adequately take into account the statistical significance of the reported variances or consider the costs and benefits of an investigation. For example, investigating all variances that exceed the standard cost by a fixed percentage can lead to investigating many variances of small amounts.

Some of these difficulties can be overcome by applying different percentages or amounts for different expense items as the basis for the investigation decision. For example, smaller percentages might be used as a signal to investigate key expense items, and a higher percentage applied to less important items of expense. Nevertheless, such approaches still do not adequately take into account the statistical significance of the reported variances, or balance the cost and benefits of investigation. Instead, they rely on managerial judgement and intuition in selecting the 'cut off' values.

Statistical Models Not Incorporating Costs and Benefits of Investigation

A number of cost variance investigation models have been proposed in the accounting literature that determines the statistical probability that a variance comes from an in-control distribution. An investigation is undertaken when the probability that an observation comes from an in-control distribution falls below some arbitrarily determined probability level. The statistical models that we shall consider assume that two mutually exclusive states are possible. One state assumes that the system is 'in control' and a variance is simply due to random fluctuations around the expected outcome. The second possible state is that the system is in some way 'out of control' and corrective action can be taken to remedy the situation. We shall also assume that the 'in-control' state can be expressed in the form of a known probability distribution such as a normal one.

Determining Probabilities

Consider a situation where the standard material usage for a particular operation has been derived from the average (i.e. the expected value) of a series of past observations made under 'close' supervision to ensure they reflected operations under normal efficiency. The average usage is 10 kg per unit of output. We shall assume that the actual observations were normally distributed with a standard deviation of 1 kg. Suppose that the actual material usage for a period was 12,000 kg and that output was 1,000 units. Thus average usage was 12 kg per unit of output. We can ascertain the probability of observing an average usage of 12 kg or more when the process is under control

by applying normal distribution theory. An observation of an average usage of 12 kg per unit of output is 2 standard deviations from the expected value, where, for a normal distribution,

$$Z = \frac{\text{actual usage (12 kg)} - \text{expected usage (10 kg)}}{\text{standard deviation (1 kg)}} = 2.0$$

A table of areas under the normal distribution (see Appendix C) indicates that there is a probability of 0.02275 that an observation from that distribution will occur at least 2 standard deviations above the mean. The shaded area indicates that 2.275% of the area under the curve falls to the right of 2 standard deviations from the mean. Thus, the probability of actual material usage per unit of output being 12 kg or more when the operation is under control is 2.275%. It is very unlikely that the observation comes from a distribution with a mean of 10 kg and a standard deviation of 1 kg. In other words, it is likely that this observation comes from another distribution and that the material usage for the period is out of control.

Where the standard is derived from a small number of observations, we only have an estimate of the standard deviation, rather than the true standard deviation, and the deviation from the mean follows a t-distribution rather than a normal distribution. The t-distribution has more dispersion than the normal distribution so as to allow for the additional uncertainty that exists where an estimate is used instead of the true standard deviation. However, as the number of observations increases, to about 30, the values of a t-distribution shown on a t-table approach the values on a table for a normal distribution. Assume that the mean and the standard deviation were derived from 10 observations when the process was under control. The probability that a random variable having a t-distribution with 9 degrees of freedom (n-1) will exceed 2 standard deviation from the mean is still small, equal to approximately 0.025 (or 1 chance in 40). Therefore, it is still likely that the observation comes from another distribution, and thus the material usage for the period is out of control.

Statistical Control Charts

Variances can be monitored by recording the number of standard deviations each observation is from the mean of the in-control distribution (10 kg in our illustration) on a statistical control chart. **Statistical quality control charts** are widely used as a quality control technique to test whether a batch of produced items is within pre-set tolerance limits. Usually samples from a particular production process are taken at hourly or daily intervals. The mean, and sometimes the range, of the sampled items are calculated and plotted on a quality control chart. A control chart is a graph of a series of past observations (which can be a single observation, a mean or a range of samples) in which each observation is plotted relative to pre-set points on the expected distribution. Only observations beyond specified pre-set control limits are regarded as worthy of investigation.

The control limits are set based on a series of past observations of a process when it is under control, and thus working efficiently. It is assumed that the past observations can be represented by a normal distribution.

The past observations are used to estimate the population mean and the population standard deviation. Assuming that the distribution of possible outcomes is normal, then, when the process is under control, we should expect

68.27% of the observations to fall within the range + 1……. from the mean;
95.45% of the observations to fall within the range + 2……. from the mean;
99.8% of the observations to fall within the range + 3 ….. from the mean.

Control limits are now set. For example, if control limits are set based on two standard deviations from the mean then this would indicate 4.55% (100% - 95.45%) of future observations would result from pure chance when the process is under control. Therefore, there is a high probability that an observation outside the 2 control limits is out of control.

Statistical quality control charts

Diagram

Figure ……. shows three control charts, with the outer horizontal lines representing a possible control limit of 2…., so that all observations outside this range are investigated. You will see that for operation A, the process is deemed to be in control because all observations fall within the control limits. For operation B the last two observations suggest that the operation is out of control. Therefore, both observations should be investigated. With operation C the observations would not prompt an investigation because all the observations are within the control limits. However, the last six observations show a steadily increasing usage in excess of the mean, and the process may be out of control. Statistical procedures (called casum procedures) that consider the trend in recent usage as well as daily usage can also be used.

Statistical quality control is used mainly for product or quality control purposes, but within a standard costing context, statistical control charts can be used to monitor accounting variances. For example, labour usage and material usage could be plotted on a control chart on an hourly or daily basis for each operation. This process would consist of sampling the output from an operation and plotting on the chart the mean usage of resources per unit for the sample output.

Decision Models with Costs and Benefits of Investigation

Statistical decision models have been extended to incorporate the costs and benefits of investigation. A simple decision theory single-period model for the investigation of variances was advocated by Bierman et al. (1977). The model assumes that two mutually exclusive states are possible. One state assumes that the system is in control and a variance is simply due to a random fluctuation around the expected outcome. The second possible state is that the system is in some way out of control and corrective action can be taken to remedy this situation.

In other words, it is assumed that if an investigation is undertaken when the process is out of control, the cause can be found and corrective action can always be taken to ensure that the process returns to its in-control state. This assumption is more appropriate for controlling the quality of output from a production process, but may not be appropriate when extended to the investigation of standard cost variances. For example, it does not capture situations where the investigation was signaled by measurement errors or the cause of the variance was due to out of date standards.

If the process is out of control, there is a benefit B associated with returning the process to its 'in-control' state. This benefit represents the cost saving that will arise through bringing the system back under control and thereby avoiding variances in future periods. However, if we do not investigate in this period, it is possible that an investigation may be undertaken in the next period.

Therefore, it is unlikely that the benefits will be equivalent to the savings for many periods in the future. Kaplan (1982) concludes that B should be defined as the expected one period benefit from operating in control rather than out of control, recognizing that this will underestimate the actual benefits.

A cost of C will be incurred when an investigation is undertaken. This cost includes the manager's time spent on investigation, the cost of interrupting the production process, and the cost of correcting the process. We shall assume that the costs to correct of an investigation that discovers that the process is 'out of control' are identical with the costs associated with finding that the process is 'in control'. However, the model can be easily modified to incorporate the incremental correction costs if the process is found to be out of control.
To illustrate a one-period model let us assume that the incremental cost of investigating the material usage variance in our earlier illustration (see page 804) is N100. Assume also that the estimated benefit B from investigating a variance and taking correction action is N400. We can therefore develop a simple decision rule: investigate if the expected benefit is greater than the expected cost. Denoting by P the probability that the process is **out** of control, the expected benefit can be expressed as

$$\begin{aligned} \text{Expected benefit} &= PB + (1-P)B \\ &= PB + (1-P)0 \\ &= PB \end{aligned}$$

The probability that the system is in control is 1 – P, and the benefit arising from investigating an 'in-control' situation is zero. Therefore, PB represents the expected benefit of investigating a variance. Assuming that the cost of investigation C is known with certainty, the decision rule I to investigate if

$$PB > C, \text{ or } P > C/B$$

In our example we should investigate if

$$P > 100/400 = 0.25$$

The model requires an estimate of P, the probability that the process is out of control. Bierman et al (1977) have suggested that the probabilities could be determined by computing the probability that a particular observation, such as a variance, comes from an 'in-control' distribution. They also assume that the 'in-control' state can be expressed in the form of a known probability distribution such as a normal distribution. Consider our earlier example shown on page ……, where the expected usage based on actual observation when the process in control was 10 kg per unit of output with a standard deviation of 1 kg. We noted that the recorded actual average usage of 12 kg for a particular period exceeded the mean of the distribution by 2 standard deviations. We referred to a normal probability table to ascertain that the probability of an observation of 12 kg (or larger) was 0.02275 (2.275%). The probability of the process being out of control is 1 minus the probability of being in control.

Thus P = 1 – 0.02275 = 0.97725. Recall that we ascertained that the variance should be investigated if the probability that the process is out of control is in excess of 0.25. The process should therefore be investigated. Instead of using the cost-benefit ratio C/B, we can ascertain whether

PB > C;
PB = 0.97725 x ₦400 = N391
C = N100

Therefore, the *expected value* of the benefits from investigation, PB, exceeds the cost of the investigation, C, and the variance should be investigated.

A major problem with decision theory models concerns the difficulty in determining the cost of investigation C and the benefits arising from the investigation B. Note that B is defined as the present value of the costs that will be incurred if an investigation is not made now. In situations where the inefficiency will be repeated there will be many opportunities in the future to correct the process, and the discounted future costs, assuming no future investigation, will be an overestimate of B. We have noted that Kaplan (1982) concludes that B should be defined as the expected on-period benefit from operating in control rather than out of control, but recognizing that this will be an underestimate of the actual benefits. It is also assumed that when an out-of-control situation is discovered, action can be taken so that the process will be in-control. In many situations the variance may have been caused by a permanent change in the process, such as a change in the production process or in raw material availability. In such instances the investigation will not exceed the expected benefit, since future operations will remain at the current cost level. The cost-benefit variance investigation model does not take such factors into account. Some benefits will be derived, however, since standards can be altered to reflect the permanent changes in the production process. This should lead to improvements in planning and control in future periods.

Problems also arise with determining the cost of investigating variances. The cost of an investigation will vary, depending upon the cause of the variance.

Some assignable causes will be detected before others, depending upon the ordering of the stages in the investigation procedure. If the variance is not due to an assignable cause, the cost of investigation will be higher because the investigation must eliminate all other causes before it can be established that the variance is not due to an assignable cause. Also, *additional* costs of carrying out the investigation may not be incurred, since they may be carried out by existing staff at no extra cost to the organization. However, some opportunity cost is likely to be involved because of alternative work forgone while the investigation is being undertaken.

Quantity Variances

Finally, it is important to note that the application of statistical techniques that incorporate random variations is only applicable to quantity variances – that is, labour efficiency and material usage variances. There is a fundamental difference between these variances and price variances. Efficiency cannot be predetermined in the same way as material prices and wage rates: first, because of the random variations inherent in the human element; and, secondly, because the resulting non-uniformity is more pronounced. One does not expect actual results to be equal to standard where the human element is involved, since some variances may be expected to occur

even when no assignable cause is present. For this reason, statistical techniques should be applied only to quantity variances.

Criticisms of Standard Costing

Standard costing systems were developed to meet the needs of a business environment drastically different from that which exists today. The usefulness of standard costing variance analysis in a modern business environment has been questioned and several writers have predicted its demise because of the following:

- ✓ the changing cost structure;
- ✓ inconsistency with modern management approaches;
- ✓ over-emphasizes the importance of direct labour;
- ✓ delay in feedback reporting.

Impact of the Changing Cost Structure

It is claimed that overhead costs have become the dominant factory costs, direct labour costs have diminished in importance and that most of a firm's costs have become fixed in the short-term. Given that standard costing is a mechanism that is most suited to the control of direct and variable costs, but not fixed or indirect costs, its usefulness has been questioned. However, recent surveys in many different countries have reported remarkably similar results in terms of cost structures. They all report that direct costs and overheads averaged approximately 75% and 25% respectively of total manufacturing costs with average direct labour costs varying from 10- 15% of total manufacturing cost.

Clearly the claim by some commentators that overheads are the dominant factory costs is not supported by the survey evidence. Direct materials are the dominant costs in most manufacturing organizations and account for, on average, approximately 60% of total manufacturing costs. Direct labour costs are now of much less importance and tend to be fixed in the short-term. Direct material and variable overheads (e.g. energy costs for running the machines) are now the only short-term variable costs. Thus, standard costing variance analysis for control purposes would appear to be only appropriate for direct materials and variable overheads, the latter being a small proportion of total manufacturing costs. However, the reporting of direct labour variances at periodic intervals is probably justified since efficiencies/inefficiencies in resource consumption are high-lighted and provide useful feedback information for re-deploying labour or ensuring that in the longer-term changes in resource consumption are translated into changes in spending on the supply of direct labour resources.

Inconsistency with Modern Management Approaches

In recent years many organizations have adopted new management approaches that focus on minimizing inventories, zero defective production, delivery of high quality products and services and a process of continuous improvement. Critics' claim that variance analysis does not support today's management philosophy. For example, if purchase price variances are used to evaluate

A USA survey by Lauderman and Schaeberle (1983) and two UK surveys (Puxty and Lyall, 1990; Drury et al., 1993) indicate that the statistical models outlined in this ……. are rarely used and also that some firms use more than one method to determine when variances should be

investigated.

	Lauderman and Schaeberle (1983) %	Puxty and Lyall (1990) %
Decision based on managerial judgement	72	81
Variances investigated beyond a certain monetary amount	54	36
variances investigated beyond a certain percentage	43	26
investigation based on statistical decision rules	4	-
variances investigated in all cases	-	9

(- no details reported)

Drury et al. (1993) survey	Extent to which method used				
	Never %	Rarely %	Sometimes %	Often %	Always %
Decision based on managerial judgment	8	5	12	53	22
Investigation where a variance exceeds a specific amount	12	17	31	34	6
investigation where a variance exceeds a given percentage of standard	15	18	31	29	7
Statistical basis using control charts or other statistical models	60	25	12	2	1

performance of the purchasing function, it is likely that purchasing management will be motivated to focus entirely on obtaining the materials at the lowest possible prices even if this results in:

- the use of many suppliers (all of them selected on the basis of price);
- larger quantity purchases, thus resulting in larger inventories;
- delivery of lower quality goods;
- indifference to attaining on-time delivery.

Today, companies wish to focus on performance measures which emphasize all the factors important to the purchasing function, such as quality and reliability of suppliers, and not just price. Nevertheless, material price variances still have an important role to play.

It is also claimed that using the volume variance to measure unutilized capacity motivates managers to expand output and thus increase inventories. This is inconsistent with a philosophy of minimizing inventories. Favourable volume variances are reported whenever actual production exceeds budgeted production and therefore profit centre managers can manipulate monthly profits by expanding output and increasing profits. Attention has already been drawn to the fact that volume variances are inappropriate for short-term cost control and performance measurement purposes. If volume variances are being used for these purposes then the problem arises because of the faulty application, rather than the inadequacies, of standard costing.

Volume variances are required to meet financial accounting requirements. Even if standard costing is abandoned the under – or over – recovery of overheads is necessary to meet conventional absorption costing profit measurement requirements. It is therefore inappropriate to single out standard costing variance analysis as being responsible for the excess production. The solution is to replace absorption costing with a standard variable costing system for monthly internal reporting.

To compete successfully in todays global competitive environment organizations are adopting a philosophy of continuous improvement, an ongoing process that involves a continuous search to reduce costs, eliminate inefficiencies and improve the quality and performance of activities that increase customer satisfaction. It is claimed that when standards are set, a climate is created whereby the standards represent targets to be achieved and maintained, rather than a philosophy of continuous improvement. Standard costing can be made more consistent with a continuous improvement philosophy if variances are used to monitor the trend in performance and giving more emphasis to the rate of change in performance. In addition, standards should also be regularly reviewed and tightened as improvements occur.

Over-Emphasis on Direct Labour

Some writers have criticized variance analysis on the grounds that it encourages too much attention to be focused on direct labour when direct labour has diminished in importance and is only a small proportion of total factory costs. Surveys, however, indicate that direct labour is the most widely used overhead allocation base. To reduce their allocated costs managers are motivated to reduce direct labour hours since this is the basis on which the overheads are allocated to cost centres. This process overstates the importance of direct labour and directs attention away from controlling escalating overhead costs. This over emphasis on direct labour arises, not from any inadequacies of standard costing, but from the faulty application of standard costing by focusing excessively on volume variances for short-term cost control and performance evaluation. Attention has already been drawn to the fact that volume variances should be used for meeting financial accounting requirements and not for cost control.

Delayed Feedback Reporting

A further criticism of variance reporting is that performance reports often arrive too late to be of value in controlling production operations. Performance reports are normally prepared weekly or monthly but such a lengthy time lag is not helpful for the daily control of operations. For operational control purposes labour and material quantity variances should be reported in physical terms in 'real time'. For example, most companies now use 'on line' computers to collect information at the point of manufacture so that variances can be reported and fed into the system instantaneously. Summary variance reports can still be prepared at appropriate periodic intervals if management wish to monitor deviations from standard and examine the trend in reported variances.

The Future Role of Standard Costing

Critics of standard costing question the relevance of traditional variance analysis for cost control and performance appraisal in today's manufacturing and competitive environment. Nevertheless, standard costing systems continue to be widely used. This is because standard costing systems provide cost information for many other purposes besides cost control and performance evaluation. Standard costs and variance analysis would still be required for other purposes; particularly inventory valuation, profit measurement and decision-making even if they were

abandoned for cost control and performance evaluation. For example, the detailed tracking of costs is unnecessary for decision-making purposes. Product costs for decision-making should be extracted from a data base of standard costs reviewed periodically (say once or twice a year). A periodic cost audit should be undertaken to provide a strategic review of the standard costs and profitability of a firm's products. The review provides attention – directing information for signaling the need for more detailed studies to make cost reduction, discontinuation, redesign or outsourcing decisions. Standard costs thus provide the basis for such decisions and can be derived from a database of either traditional or activity-based systems.

Many organizations have adapted their variance reporting system to report on those variables that are particularly important to them. These variables are company specific and cannot be found in textbooks. For example, some organizations that pursue a zero production defects policy have sought to measure the cost of quality by reporting quality variances. They define the quality variance as the standard cost of the output that does not meet specification. In traditional variance analysis this variance is buried in the efficiency variances of the various inputs. To illustrate the computation of the variances we shall simplify it by ignoring direct labour and overhead variances and concentrate on direct materials and assume that the standard usage for the production of a product is 5 kg and the standard price is N10 per kg. Actual usage for an output of 5,000 units (of which 400 were defective) was 24,800 kg. Traditional variance would report an adverse usage variance of ₦18,000, being the difference between the standard quantity of 23,000 kg for the good output of 4,600 units and the actual usage of 24,800 kg priced at N10 per kg. The variance analysis is modified to report an adverse quality variance of ₦20,000 (400 defective units x 5 kg x N10) and a favourable usage variance of ₦2,000 reflecting the fact that only 24,800 kg were used to produce 5,000 units with a standard usage of 25,000 kg. The fact that 400 units were defective is reflected in the quality variance.

In recent years there has been a shift from using variances generated from a standard costing system as the foundation for short-term cost control and performance measurement to treating them as one among a broader set of measures. Greater emphasis is now being placed on the frequent reporting of non-financial measures that provide feedback on the key variables required to compete successfully in today's competitive environment. These non-financial measures focus on such factors as quality, reliability, flexibility, after-sales service, and customer satisfaction and delivery performance. Recognition is also being given to the fact that periodic short-term reporting may be inappropriate for controlling those costs that are fixed in the short-run but variable in the long-term. Attention has already been drawn to the fact that variance reporting for long-term variable costs should be at less frequent intervals. However, standard costing on its own is insufficient for controlling these costs. Special cost reduction exercises (i.e. kaizen costing) for existing products, target costing for future products and activity-based cost management are now being increasingly used to manage future costs. In particular, an awareness that a significant proportion of a product's costs are determined by decisions made early in a product's life cycle has resulted in greater attention being given to feed-forward controls and managing the costs at the design stage rather than after production has commenced. The management of long-run variable costs using the above techniques will be examined later.

Most of the criticisms that have been leveled at standard costing relate to cost control and performance measurement. It remains to be seen whether standard costing will decline in importance as a cost control and a performance evaluation mechanism. The survey evidence, however, suggests that practitioners do consider that it is an important mechanism for controlling

costs. A UK survey by Drury et al. (1993) reported that 76% of the responding organizations operated a standard costing system. When asked how important standard costing was for cost control and performance evaluation, 72% of the respondents whose organizations operated a standard costing system stated that it was 'above average' or of 'vital importance'.

The Role of Standard Costing When ABC Has Been Implemented

For those organizations that have implemented activity-based systems standard costing still has an important role to play in controlling the costs of unit-level activities. Unit-level activities can be defined as those activities that are performed each time a unit of product or service is produced. These activities consume resources in proportion to the number of units produced. For example, if a firm produces 10% more units, it will consume 10% more labour cost, 10% more materials, 10% more machine hours and 10% more energy costs. Expenses in this category include direct labour, direct materials, energy costs and expenses that are consumed in proportion to machine processing times (such as machine maintenance). Therefore, traditional variance analysis can be applied for direct labour, direct materials and those variable overheads that vary with output, machine hours and direct labour hours.

Variance analysis is most suited to controlling the costs of unit-level activities but it can also provide meaningful information for managing those overhead costs that are fixed in the short-term but variable in the longer-term if traditional volume-based cost drivers are replaced with activity-based cost drivers that better reflect the causes of resource consumption. Variance analysis, however, cannot be used to manage all overhead costs. It is inappropriate for the control of facility-sustaining (infrastructure) costs because the costs of these resources do not fluctuate in the longer-term according to the demand for them.

Mak and Roush (1994) and Kaplan (1994b) have considered how variance analysis can be applied to incorporate activity costs and cost drivers for those overheads that are fixed in the short-term but variable in the long-term. The data presented earlier illustrates their ideas relating to ABC overhead variance analysis for a set-up activity. You will see from this example that budgeted fixed costs of N80,000 provide a practical capacity to perform 2,000 set-ups during the period. Assuming that the number of set-ups has been identified as the appropriate cost driver a cost of N40 per set-up (N80,000/2,000) will be charged to products.

Since budgeted capacity usage is 1,600 set-ups not all of the capacity provided (2,000 set-ups) will be used, and a budgeted cost of unused capacity of ₦16,000 (400 x N40), will be highlighted during the budget process. The actual number of set-ups performed was 1,500 compared with a budget of 1,600 and an unexpected capacity utilization variance of ₦4,000 (100 x ₦40) will be reported at the end of the period. The traditional spending (expenditure) variance is ₦10,000, being the difference between budgeted and actual fixed costs incurred. We can now reconcile the fixed set-up expenses charged to products with the actual expenses incurred that are recorded in the financial accounts:

	₦
Set up expenses charged to products (1,500 x ₦4)	60,000
Budgeted unused capacity variance (400 x ₦400	16,000A
Capacity utilization variance (100 x ₦40)	4,000A
Expenditure variance	10,000F
Total actual expenses	70,000

The above capacity variances highlight for management attention the ₦20,000 unused capacities (₦16,000 expected and ₦4,000 unexpected) and thus signals the opportunity for actions such as reducing the supply of resources or using the surplus resources to generate additional revenues.

In the Example it is assumed that the variable set-up costs, such as the cost of supplies used in the set-up activity varies with the number of set-ups. The variable cost driver rate of ₦25 per set-up has been calculated by dividing the budgeted variable cost of ₦40,000 by the budgeted number of set-ups of 1,600. Note that the budgeted variable cost per set-up will be ₦25 for all activity levels. Thus the estimated set-up costs at the practical capacity of 2,000 set-ups would be ₦50,000 (2,500 x ₦25) but the cost per set-up would remain at N25. To calculate the set-up variable cost variance, we must flex the budget. The actual number of set-ups performed were 1,500 and the flexible budget allowance is ₦37,500 (1,500 x ₦25). Actual expenditure is ₦39,000 and therefore an adverse variable cost variance of N1,500 will be reported. The reconciliation between the variable set-up expenses charged to products and the actual expenses incurred is as follows:

	₦
Variable set-up expenses charged to products (1,500 x N25)	37,500
Variable overhead variance	1,500A
Total actual expenses	39,000

In Example ……. we assumed that the number of set-ups was the cost driver. If set-ups take varying amounts of time they will not represent a homogeneous measure of output and thus may not provide a satisfactory measure of the cost of activity. To overcome this problem, it may be preferable to use the number of set-up hours as the cost driver. Let us now assume in Example ……. that the cost driver is set-up hours and that the quantity of set-up hours is the same throughout as the number of set-ups. Therefore, the variance analysis based on set-up hours will be identical to the variances that were computed when the number of set-ups was the cost driver.

Where cost drivers that capture the duration of the activity are used Mak and Roush (1994) advocate the reporting of separate efficiency variances for each activity. Assume in Example …… that the standard activity level for the actual number of set-ups performed during the period was 1,500 hours but the actual number of set-up hours required was 1,660. The standard activity level represents the number of set-up hours that should have been required for the actual number of set-ups. The difference between the standard and the actual set-up hours thus arises because of efficiencies/inefficiencies in performing the set-up activities. Assuming that variable

Example: Assume the following information for the set-up activity for a period:

Budget	Actual
Activity level: 1,600 set-ups	Total fixed costs: ₦70,000
Practical capacity supplied: 2,000 set-ups	Total variable costs: ₦39,000
Total fixed costs: ₦80,000	
Total variable costs: ₦40,000	Number of set-ups 1,500
Cost driver rates (variable): ₦25 per set-up	
(fixed): ₦40 per set-up	

costs vary with the number of set-up hours then inefficiency in performing set-up activities has resulted in an extra 160 set-up hours (1,660 – 1,500) being used thus causing additional spending of

₦4,000 (160 hours x ₦25). In addition, a favourable variable overhead expenditure variance of ₦2,500 will be reported. This figure is derived in a manner similar to the traditional analysis by deducting the actual variable overhead expenditure of ₦39,000 from the flexible budget based on actual set-up hours (1,660 x N25 = ₦41,500). Note that the sum of the efficiency variance (₦4,000A) and the expenditure variance (N2,500F) is the same as the variable overhead variance of ₦1,500 reported when the number of set-ups were used as the cost driver.

It is also possible to compute a capacity utilization and efficiency variance for fixed overheads. The efficiency variance is calculated by multiplying the 160 excess set-up hours by the fixed cost driver rate. Therefore, an adverse efficiency variance of ₦6,400 (160 x ₦40) and a favourable capacity utilization variance of ₦2,400 (60 x N40) will be reported. The capacity utilization variance reflects the fact that the actual set-up capacity utilized was 60 hours in excess of the budget (assumed to be 1,600 hours) but this was offset by the inefficiency in performing the activity which resulted in 160 hours in excess of requirements being utilized. The sum of the efficiency variance (₦6,400A) and the revised capacity utilization variance (₦2,400F) is identical to the capacity utilization variance reported when the number of set-ups was used as the cost driver.

The capacity utilization and efficiency variances relating to activity fixed costs are not particularly useful for short-term cost management. Mak and Roush conclude that they are more useful in a multi-period context whereby recurring adverse capacity variances (unused capacity) indicate the potential cost savings which can result from eliminating excess capacity.

Summary

The following items relate to the learning objectives listed at the beginning of the module.

- **Explain and calculate material mix and yield and sales mix and quantity variances**

  In some production processes it is possible to vary the mix of materials used to make the final product. Any deviations from the standard mix will lead to a materials mix variance. A favourable mix variance will occur when cheaper materials are substituted for more expensive ones. This may not always be in the company's best interest, since product quality may suffer or output may be reduced, leading to an adverse yield variance. The yield variance arises because there is a difference between the standard output for a given level of input and the actual output attained. Part of the sales margin volume variance may be accounted for because the actual sales mix differs from the budgeted sales mix. Calculating a sales margin mix variance can isolate this element. The remaining part of the sales margin volume variance represents the sales quantity variance. Thus, separating the sales margin volume variance into quantity and mix variances provides an explanation of how the sales volume margin variance is affected by a shift in the total volume of sales and a shift in the relative mix of products.

- **Explain the criticisms of sales margin variances**

  The decomposition of the sales margin variances into price and quantity variances has been criticized on the grounds that, in imperfectly competitive markets, prices and quantities are interrelated. The logical consequence of lower/higher sales prices is higher/lower volume. Thus, the relevant analyses based on these variances are also interrelated. Consequently, it is argued that the decomposition of the sales margin variances does not generate any meaningful results.

- **Prepare a set of accounts for a standard costing system**
  The method used in the ……. to illustrate the recording of standard costs valued all inventories at standard cost with all entries being recorded in the inventory accounts at standard prices. Any differences between standard costs and actual costs are debited or credited to variance accounts. Adverse variances appear as debit balances and favourable variances as credit balances.

  Explain and calculate planning and operating variances
  One of the criticisms of standard costing is that standards are normally based on the environment that was anticipated when the targets were set. To overcome this problem, whenever the actual environment is different from the anticipated environment, performance should be compared with a standard that reflects the changed conditions. One possible solution is to extract an uncontrollable planning or forecasting variance and report operating variances based on the changed conditions that applied during the period.

- **Explain and calculate variances using the opportunity cost approach to variance analysis**
  Traditionally, quantity variances are calculated using standard acquisition costs but where resources are scarce such costs do not represent the economic cost arising from a failure to use scarce resources efficiently. In such cases it is preferable to value the quantity variances at their opportunity cost (i.e. the forgone profit contribution) of scarce resource. The forgone profit is computed by multiplying any excess usage by the standard contribution per unit of the scarce resource. The calculation of variances using the opportunity cost approach was illustrated using Example …….
- **Explain the factors that influence the decision to investigate a variance and describe the different methods that can be used to determine whether an investigation is warranted.**
  The decision to investigate a variance should depend on whether the expected benefits are likely to exceed the costs of carrying out the investigation. Variances may be due to:
  (a) random uncontrollable variations when the variance is under control;
  (b) assignable causes but the costs of investigation exceed the benefits of investigation; and
  (c) assignable causes but the benefits from investigation exceed the costs of investigation.

  The aim should be only to investigate those variances that fall into the latter category. Methods of investigating variances include:

  (a) Simple rule of the thumb models;
  (b) Statistical models that focus on the probability of the variances being out of control; and
  (c) Statistical decision models that take into account the cost and benefits of investigation.

- **Comment on the future role of standard costing**
  Some writers have predicted the demise of standard costing on the following grounds:
  (a) the changing cost structure that has resulted in the growth of indirect costs (it is claimed that standard costing is not particularly suitable for controlling such costs);
  (b) the inconsistency of standard costing with modern management approaches;
  (c) the overemphasis of standard costing with direct labour, which is now a diminishing cost; and
  (d) the delay in feedback in variance reporting.

Most of the criticisms relate to standard costing as a control mechanism but standard costing provides information for many other purposes (e.g. inventory valuation and providing a database for which information can be extracted for decision-making purposes). Many organizations have also adapted standard costing to meet their own specific requirements and standard costing is also being adapted to be operated within an activity-based costing system.

- **Explain the role of standard costing within an ABC system**
  Within an ABC system variance analysis is most suited to controlling the costs of unit level activities. It can also provide meaningful information for managing those overhead costs that are fixed in the short-term but variable in the longer-term if traditional volume-based cost drivers are replaced with activity-based cost drivers that better reflect the causes of resource consumption. Variance analysis, however, cannot be used to manage all overhead costs. It is inappropriate for the control of facility-sustaining (infrastructure) costs because the cost of these resources does not fluctuate in the longer term according to the demand for them.

Notes

1. The standard quantity of materials for an actual production of 1,800 units is 9,000 kg. The actual usage of materials is 10,000 kg, which means an excess usage of 1,000 kg.
2. For an output of 1,800 units 7,200 labour hours should have been used, but the actual number of hours used was 8,000. Consequently, 800 excess labour hours were required.
3. The probability of 0.025 is derived from a t-distribution with 9 degrees of freedom.
4. It is assumed that the actual observations used to establish the standard performance can be represented by a normal distribution. There is no reason, however, why the analysis could not be modified to accommodate some other probability distribution.
5. We assume here that all favourable variances are in control or do not warrant an investigation. If favourable variances 2 standard deviations from the mean is deemed to be out of control, then the probability of observing a variance plus or minus 2 standard deviations from the mean is 0.0455 (0.02275 x 2).

6. Consequently, the probability that the process is out of control is 0.9545 (1 – 0.0455). The variance should still be investigated. Bierman et al. (1977) advocate a similar approach by stating that the probability of an event, given that another event (in this case an unfavourable variance) has already occurred, is based on considering only one-half of the probability distribution. Therefore, the probabilities derived from normal probability tables should be divided by 0.5. Thus 0.02275/0.5 = 0.0455.

Operational and Planning Variances

According to the traditional variances, the efficiency or otherwise of operating managers within the productive of the organization are determined according to difference between the established and the actual data. Ironically, it was fundamentally assumed that all established standard are error free i.e. specifically established on the premise of perfect information. Therefore, it will be natural to rely on tradit6ional variances as a basis for evaluating worker's efficiency

However, recent finding revealed that most of the established standard was specifically based on wrong information or imperfect information and a result of passage of time they become obsolete.

It is on this premise that traditional variances must be subject further analysis as follows:

(A) Planning Variances

This is specifically designed to measure the level of forecasting error inherent in a given variance. This will be determined by comparing the ex post standard price or the new standard price

Benefit of planning and operating variances

The segregation of traditional variances into those which are due to planning deficiencies and those which are due to controllable factors is probably not widely used but does have certain benefits.

a) It makes standard costing and variance analysis more realistic and meaningful in volatile and changing conditions.
b) Operational variances provide an up to date guide to current levels of operating efficiency as the standards have been recalculated using up to date information.
c) Having an update standard s and therefore more meaningful variances is likely to make the standard costing system more acceptable and have to a positive effect on motivation.
d) It emphasizes the importance of the planning function in the preparation of standards and helps to identify planning deficiencies.
e) The calculation of such variances provides a systematic method of reviewing standards and the assumption contained within them.

Problems of Operational and Planning Variances

As is to be expected there are problems in the using such variances.

a) There are elements of subjectivity in determining after event (i.e. ex post) what a realistic price is. This makes the allocation between planning and operational causes a subjective matter susceptible to political pressure.
b) There is undeniably more clerical and managerial time involved in continually establishing up to date standards and calculating additional variances.
c) Where the planning and operating functions are carried out in the same responsibility centre there is likely pressure to put as much as possible of the total variance down to outside, uncontrollable factors rather than internal, controllable actions. However, these pressures exist in the interpretation of any type of variance.

2.47 Review Questions

1. Under what circumstances will a (a) material mix and (b) material yield variances arise?
2. Distinguish between a sales margin mix and sales margin quantity variance.
3. Why do some writers criticize separating sales variances into their price and quantity elements?
4. Describe the two alternative ways of accounting for the variances at the end of an accounting period.
5. What are planning variances? Why are they separately identified?
6. Why is it advocated that opportunity costs should be incorporated into variance analysis?
7. Describe three approaches for determining when a variance should be investigated.
8. Explain why actual performance might differ from standard performance.
9. When should a standard cost variance be investigated?
10. What is a statistical control chart? How can it be applied to determining when a variance should be investigated?
11. Explain why the usefulness of standard costing in a modern business environment had been questioned.

12. Explain the future potential role of standard costing in a modern business environment.
13. How can standard costing be used when ABC has been implemented?
14. Why is standard costing more suitable for controlling the cost of unit-level activities?

MODULE 3

3.00 COST – VOLUME – PROFIT (CVP) ANALYSIS

3.01 Learning Outcomes

On successful completion of this Module, students should be able to:

i. Evaluate the cost-volume (CVP) analysis;
ii. Identify the underlying assumptions of (CVP);
iii. Analyse the basic CVP formulae;
iii. Prepare a simple income statement;
iv. Compute margin of safety and contribution margin ratio;
v. Prepare traditional, contribution and profit break-even chart;
vi. Evaluate multi-product CVP analysis;
vii. Elucidate the limitation of CVP.

3.02 Definitions

CVP analysis, sometimes termed Break-Even Analysis, is an application of marginal costing and seeks to study the relationship between costs, volume and profit at differing activity levels and can be a useful guide for short-term planning and decision making. It is more relevant where proposed changes in activity are relatively small so that established cost patterns and relationships are likely to hold good. With greater changes in activity and over longer term, existing cost structure e.g. the amount of the fixed costs and the marginal cost per unit, are likely to change so CVP analysis is unlikely to produce useful guidance. Typical short run decisions where C-V-P analysis may be useful include: choice of sales mix, pricing policies, multi shift working and special order acceptance.

3.03 Basic Assumption of CVP Analysis

Before any formulae are given or graph drawn, the major assumption behind CVP analysis must be stated. These are:

i. All cost can be resolved into fixed and variable elements
ii. Fixed costs will remain and variable costs vary proportionately with activity
iii. Over the activity range being considered costs and revenues behaves in linear fashion
iv. That the only factor affecting costs and revenue is volume
v. That technology, production method efficiency remains unchanged
vi. Particularly for graphical methods, that the analysis relates to one product only
vii. There are stock level changes or that stocks are valued at marginal cost only
viii. There is assumed to be no uncertainty.

3.04 Assumption Limitations

In a true life situation, the basic assumption of CVP analysis as discussed above, tend only to be over a limited range of activity. As a result of this reason, care must be exercised when using only break-even analysis as a basis for decision making or the presentation.
The basic assumptions of CVP have the following deficiencies:

a. It may be difficult to separate some costs into 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 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 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 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 consumers 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 regularly in all spheres of business endeavors.

3.05 Application of the Profit Volume Ratio

Management may request information towards solving a variety of problems which may requires calculations and solving profit- volume ratios, for example:

a. What is the company's break-even point?
b. What would be the profit on sales volume NX?
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, by 10%.

The use of PV ratio and graphs can provide answers to such problems, although it is again assumed this 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.

3.06 CVP Analysis by Analysis by formula

CVP analysis can be undertaken by graphical means or by simple formulae which are stated below and illustrated by examples

a) Break-even point (units) $= \frac{\text{Fixed costs}}{\text{Contribution/unit}}$

b) Breakeven point (sales) = Fixed cost x Sales price/unit

Contribution/unit $= \frac{\text{Fixed Cost} \times 1}{\text{C/S Ratio}}$

c) C/S Ratio $= \frac{\text{Contribution/unit} \times 100}{\text{Sales price/unit}}$

d) Level of sales to result in target profit (in units) $= \frac{\text{Fixed Cost + Target profit}}{\text{Contribution/unit}}$

e) Level of sales to result in target profit after tax (units)

$$= \frac{\text{Fixed Cost + Target Profit}}{\frac{1 - \text{Tax Rate}}{\text{Contribution/ Unit}}}$$

f) Level of sales to result in target profit (₦ sales)

= (fixed Cost + Target Profit) x Sales Price/ Unit

Contribution/ Unit

Note: the above formulae relate to a single product firm or one with an unvarying mix of sales. With a multi-product firm it is possible to calculate the break-even point as follows:

$$\text{Break-even point (£ sales)} = \frac{\text{Fixed Cost x Sales Value}}{\text{Contribution}}$$

Example

A company makes a single product with a sales price of #10 and a marginal cost of #6. Fixed costs are ₦60,000 p.a.

Calculate

a. Number of units to break-even
b. Sales at break-even point
c. C/S ratio
d. What number of units will need to be sold to achieve a profit of ₦20,000 p.a?
e. As (d) with a 40% tax rate.
f. What level of sales will achieve a profit of ₦20,000 p.a ?
g. Because of increasing costs the marginal cost is expected to rise to ₦6.50 per unit and fixed cost to ₦70,000 p.a. If the selling price cannot be increased what will be the number of units required to maintain a profit of ₦20,000 p.a?

Solution

Contribution = Selling Price - Marginal Cost

= ₦10 - ₦6 = ₦4

a) Break-even point (units)

$$\frac{₦60,000}{₦4} = ₦15,000$$

b) Break-even point (₦sales) = 15,000 × ₦4

= ₦150,000

c) C/S ratio = $\frac{₦4 \times 100}{₦10}$

= 40%

d) Number of unit for target profit = $\frac{₦60,000 + ₦20,000}{₦4}$ = ₦20,000

e) Number of units for target profit with 40% tax = $\frac{₦60,000 + ₦20,000}{1 - 0.4}$ = ₦23,333

f) Sales for target profit = ₦20,000 × ₦10 = ₦200,000

(Alternatively, this figure can be deduced by the following reasoning. After break-even points the contribution per unit, so that as 15,000units were required at break-even point, extra units would be required to make #200,000 profit.

∴ Total units = 15,000 + 5,000 = 20,000 × ₦10 = ₦200,000)

g) Note that the fixed costs, marginal cost and contribution have changed

No. of units for target profit = #70,000 + #20,000
#3.50
= 25,714 units

Note: The C/S ratio is sometimes known as the P/V ratio.

3.07 Graphical Analysis

The relationship existing cost, volume and profit at different activity level can also be presented in a form of graph or chart known as Break-even chart. A break even chart is a chart that indicates approximate profit or loss at different level of sales volumes within is a chart range. This approach may be preferred in the following instance:

(a) Where a simple overview is sufficient

(b) Where detailed numerical analysis is not especially if the users of the information have no accounting knowledge or background

Furthermore, Break-even chart are used to:

- Plan the production of company products
- Market a company's product
- Give a visual display of breakeven arithmetic

Basically, there are two different approaches to be applied in presenting the chart as follows:

Traditional Approach

After clearly distinguishing between the fixed cost and variable cost then apply the following step:

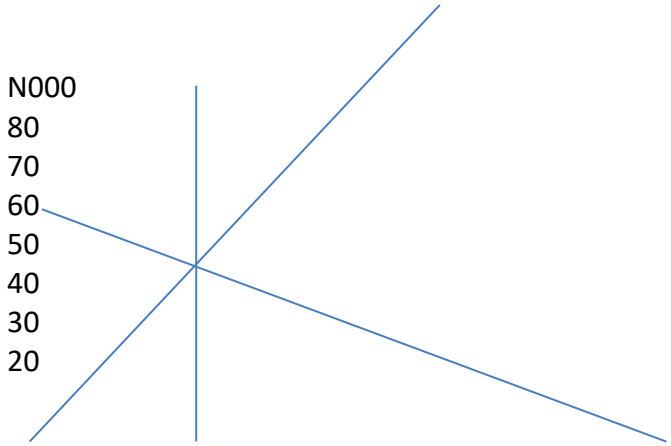
1. Draw two axes in a way that the horizontal axis will represent activity level, and the vertical axis will reveal the amount for both revenue and cost.
2. The fixed cost line will be drawn parallel to the horizontal axis.
3. The total cost line will start where the fixed cost line interested the vertical.
4. Draw a revenue line from the point of origin slopping upward with angle determined by the selling price.

ILLUSTRATION

A company makes a single product with a total capacity of 7000 units per annum. The following represent the cost and revenue data for the company.

Selling Price	=	N10
Variable cost per Unit	=	N5
Annual Fixed Cost	=	N30,000

Draw a traditional break-even chart to illustrate the stated and the break-even point in unit and sales values of the organization.



10
0

It will be seen from the break even chart above that the break-even point occurs at 6,000 units and this can be confirmed by calculation as follows:

BEP (U) = $\frac{TFC}{Cm/u} = \frac{₦30,000}{5}$ = 6,000 Units

BEP (N) = $\frac{TFC}{CMR} = \frac{₦30,000}{0.5}$ = ₦60,000

a. Contribution Margin Ratio

The angle by the intersection of the sales line and the total cost line is called the "angle of incidences" and show graphically the rate of contribution to selling price. Using any scale, the wider the angle the greater the ration of profit to selling price. In the illustration above, the contribution per unit is N5 while the selling price is ₦10, therefore, the contribution to selling price is 0.5 or 50%

b. Margin of Safety

The number per unit represented on the chart by the distance between the break-even point and the expected or budgeted sales in unit indicates the margin of safety i.e. the number of unit by which the anticipated sales can fall before the business loss. Using the example above, the chart reveals a margin of safety of 1,000 units i.e. (7,000 – 6,000) unit in other word, 14.9% of the expected sales.

c. Contribution Break-Even Chart

Sometimes, the break – even chart is prepared in different way in order to show the contribution at varying levels of activity. It is then prepared as follows:

(a) The sales line is drawn the same way under the traditional approach

(b) The variable cost will start at the origin

(c) The total cost line will also start at the amount representing the total fixed cost and is drawn parallel to the variable cost line, to the horizontal axis.

It is however, instructive to state that whichever method of break – even chart prepared, the break – even point will be the same. For example, using the same data provided earlier, a contribution break – even chart will look like this.

₦000
80
70
60
50
40
30
20
10

PROFIT – VOLUME GRAPH

This will represent a development of the break – even chart but is intended to show only.

(a) The fixed cost to be incurred and

(b) The profit at different level of sales

In consulting a profit volume graph, the profit line start at a point on the y axis below origin. That point representing the total cost. The line showing the profit at different level of sales slopes

upward to the right and will cut the x axis at a point which is the break – even point. Using the earlier examples provided for the traditional approach, the profit – volume graph would appear as follows:

40									
30									
20									
10		BEP							
0	10	20	30	40	50	60	70	80	90
10									
20									
30									
0									

3.08 Margin of Safety

This will represent the difference between breakeven point and the budgeted activity level. MOS indicates by how much sales may decrease before a company will suffer a loss. Margin of safety may be determined either in Unit or sales value as follows:

(a) MOS (Unit) = Budgeted Unit-BEP (Unit)

(b) MOS (Unit) = Budgeted Unit-BEP (Sales Value)

However, using the graphical approach, the number of unit represented on the chart by the distances between the break-even point and the expected or budgeted sales, in unit indicate the margin of safety, i.e. the number of unit by which the anticipated sales are fall before the business makes a loss

ILLUSTRATION

The following figure to a company manufacturing a varied Range of product

Year	Total Sales	Total Cost
	₦	₦
1	39,000	34,800
2	43,000	37,600

You are required to:

Assuming stability in prices with variable cost carefully controlled to reflect pre – determined relationship and an unvarying figure for fixed cost. The selling price per unit is ₦1.00.

Calculate:

(a) The fixed costs

(b) The profit/volume ratio

(c) The break – even point

(d) The margin of safety for year 1 and 2

<u>Solution</u>

(a) Fixed Cost = Total Cost – Total Variable Cost

= 37,600 – 0.7 (43,000)
= 37,600 - 30,100
= 7,500

Working:
Computation of variable cost per unit, using high and low method

Period	Sales	Cost
	₦	₦
Yr.2	43,000	37,600
Yr.1	39,000	34,800
Difference	4,000	2,800

Vic/u = $\frac{₦2,800}{₦\ 4,000}$ = Vc per N1 = 70K

(b) Profit/Volume ratio

P/V ratio (CMR) = $\frac{\text{Selling Price – Variable Cost}}{\text{Selling price}}$ = $\frac{1 - 0.7}{1}$ = 0.3

OR

P/V ratio = $\frac{\text{Total Sales – Total Variable Cost}}{\text{Total Sales}}$

Using Yr.1

= $\frac{39,000 - 0.7\ (39,000)}{39,000}$

= $\frac{39,000 - 27,300}{39,000}$ = $\frac{11,700}{39,000}$ = 0.3

Using Yr.2 OR

= $\frac{43,000 - 0.7\ (43,000)}{43,000}$

= $\frac{43,000 - 30,100}{43,000}$ = $\frac{12,900}{43,000}$ = 0.3

(c) BEP (Sales) = $\frac{\text{TFC}}{\text{CMR}}$ = $\frac{\text{Total Fixed Cost}}{\text{contribution Margin Ratio}}$

= $\frac{₦7,500\ (a)}{0.3\ \ (b)}$ = 25,000

(d) Margin of Safety:

	Year1	Year2
	₦	₦
Budgeted Sales	39,000	43,000
Less BEP (N)	25,000	25,000

	14,000	18,000

ILLUSTRATION 2

In a firm, a detailed budget of cost and sales and sales at various leveled prepared, but due to the computer operator's negligence, most of the information was destroyed.

The following are the data that could rescue:

Sales level (units)	6,000	8,000
	₦	₦
Material cost	18,000	24,000
Labour cost	15,000	19,000
Overhead cost	11,700	14,700

The selling price is ₦8.00 per unit at all level

You are required to compute:

(a) The fixed element, if any of each component cost.

(b) The break – even points in unit and value.

3.09 Multi – Product Break-Even Analysis

Organization typically produces and sells of variety of product and services. To perform breakeven analysis in a multi – product organization, however, a constant product sales mix must be assumed, or all products must have same c/s ratio.

Such as assumption allows us to calculate a weighted average contribution per mix, the weighting being on the basis of the quantities of each product in the constant mix. This means that the unit contribution of the

product that makes up the largest proportion of the mix has the greatest impact on the average contribution per mix. The only situation when the mix of product does not affect the analysis is when all the products have the same ratio of contribution to sales.

The breakeven point in a multi- product for a standard mix of product is calculated as fixed divided by contribution per mix. This can achieve the following basic steps: -

1. Calculate the contribution per unit for each product
2. Compute the contribution per mix
3. Calculate the breakeven point in term of the number of mixes
4. Compute the break-even point in term of the number of units of the product
5. Calculate the breakeven point in terms of revenue.

Illustration

Ekiti – Kete Industries Ltd manufactures two product- rice flour and beans flour.

The following data are projected for the coming year

	Rice flour		Beans Flour	
	Kg	₦	kg	₦
Sales	100,000	100,000	80,000	100,000
Fixed Cost		20,000		56,000
Variable Cost		60,000		30,000
Total cost		80,000		86,000
Net Profit		20,000		14,000

You are required to compute the

(i) Breakeven sales in kilogram for rice flour assuming that the facilities are not used jointly.

(ii) Breakeven sales in Naira for beans flour, assuming that the facilities are not used jointly

(iii) Composite quantity contribution margin, assuming that consumer purchase composite quantity of sixty kilogram of rice flour and forty kilogram of beans flour

(iv) Breakeven quantity of both product, assuming that consumers purchase composite sixty kilogram of rice flour and forty kilogram of bens flour

(v) Composite contribution margin ratio, assuming that a composite quantity is defined as one kilogram of rice flour and one kilogram of beans flour

(vi) Break – even sales in Naira, assuming that rice flour and beans flour become one kilogram complement and that there is no change in the company's cost.

Solution

(i) Break – even sales in Kg $\frac{₦20,000}{₦0.40}$ = 50,00 kgs

(ii) Break – even in Naira $\frac{₦56,000}{0.70}$ = ₦80,000

(iii)

	Rice flour	Beans flour	Total
Sales price	₦1.00	1.250	2.250
Variable Cost	₦0.60	0.375	0.975
Unit Contribution	₦0.40	0.875	1.275
Sales Mix	60%	40%	100%

Composite quantity contribution margin = (₦0.40) (0.60) + (₦0.875) (0.40)

= ₦0.59

(iv) Break – even point for both product $\frac{₦76,000}{0.59}$ = ₦128,814KGS

Individual Rice = 60% (128,814) = 71288kgs

Beans = 40% (128,814) = 51,526kgs

(v) Composite Contribution $\frac{₦1.275}{₦2.250}$ = 0.57

3.10 Non-Manufacturing Analysis

It is necessary to point out at this unction application of C-V-P analysis is not restricted to the manufacturing organization alone. The position is necessary all the previous illustration was based on manufacturing outfit. The knowledge of break – even can also be applied in a service oriented as illustrated below.

Illustration

The SAM FESTUS LTD. Budget for the year 2010 are stated below

No. of bed available ..... 80per day

In-patient days ..... 26,000 per annum

In-patient fees ..... ₦1,300,000

Cost	Variable	Fixed	Total
	₦	₦	₦
Direct Supplies	100,000	-	100,000
Direct Salaries	800,000	-	800,000
Patient Services O/H	58,000	102,000	160,000

Administration	108,000	150,000	258,000
	1,066,000	252,000	1,318,000

You are required to calculate:

a. The contribution margin ratio
b. The break-even point in both in-patient day and in-patient fees
c. The margin of safety ratio if the clinic operates at full capacity
d. The break-even point in patient day if direct salaries were increased to N826,000 making total variable cost to N1,092,000 all matters not specified remaining the same and the breakeven point in In-patient days if fixed patient services overhead were increased to N120,000 making total fixed cost to be N270,000 all other matter remaining the same.

Solution

SAM FESTUS LTD

(i) CMR = $\frac{\text{Total Fees - Total variable cost}}{\text{Total Fees}}$

$\frac{₦1,300,000 - ₦1,066,000}{₦1,300,000} = \frac{₦234,000}{₦1,300,000} =$ 0.18 or 185

(ii) BEP in In-patient days = $\frac{\text{TFT}}{\text{Cm/u}} = \frac{\text{Total Fixed Costs}}{\text{Contribution per Unit}}$

$= \frac{₦252.000}{₦9 \text{ (w1)}}$

= 28,000 days

(b) BEP in In-patient fees = $\frac{\text{TFC}}{\text{CMR}} = \frac{\text{Total Fixed Cost}}{\text{Contribution Ratio}}$

$= \frac{₦252,000}{0.18 \text{ (w1)}} = ₦1,400,000$

(w1) Cost per day = $\frac{\text{Total fees - Total Variable Cost}}{\text{In-patient days}}$

$= \frac{₦1,300,000 - ₦1,066,000}{26,000}$

= ₦9

(iii) Margin of safety at full capacity

$= \frac{\text{Full capacity In-patient days – BEP In patient days}}{\text{Full capacity In – patient days}} \times \frac{100}{1}$

$= \frac{29,200 \text{ (w2)} - 28,000}{29,200} \times \frac{100}{1}$

$= \frac{1200}{28,000} \times \frac{100}{1} = 4$

(w2) Full capacity = 80beds × 365 days = 29,200 In – patient days

(iv) BEP in In-patient days = $\frac{\text{TFC}}{\text{Cm/u}} = \frac{₦252,000}{\text{N8 (w3)}}$

= 31,500 days

(w3) Contribution per day = $\frac{₦1,300,000 – ₦1,092,000}{26,000}$

= ₦208,000

26,000

= ₦8

(v) Break – even point in In-patient days = $\frac{TFC}{Cm/u}$ = $\frac{₦270,000}{₦9}$

= 30,000 days

3.11 Limitations of Break – Even Analysis

(a) The result of the analysis can only be relied upon within the relevant range i.e. within the activity level that the associated cost can be accurately determined.

(b) The assumption that fixed cost will remain the same at all activity level may be stepped fixed line is probably the most accurate representative of Break – even analysis

(c) It is also improper to conclude that variable cost and sales will be linear. This is because the effect of extra discount, overtime payment, learning curve, special curve contact and other similar matter will make variable cost and revenue as a curve rather than a straight line.

(d) The cost volume profit analysis merely represents relationships which are essentially short term. However, where same scales are involves several years, and then the analysis will be inappropriate.

(e) The concept of C-V-P analysis relies heavily on the behavioral classification of cost i.e. only activity level determines the change in revenue and cost whereas in practice, there are numerous factors that will influence in cost and revenue in addition to the activity levels.

(f) It is also incorrect to assume that the firm is a price taker and that a perfect market exists.

(g) Even though, revenue and variable cost will vary the level of activity, the reaction of individual component such as material cost, labour cost etc. will not be same

(h) Break – even analysis also ignore risk and uncertainty therefore perfect knowledge of cost and revenue function is assumed. But it is obvious that in practices risk and uncertainty remain a crucial factor in all business decision.

(i) C.V.P analysis also assumed a single product or constant mix constant rate of mark – up on marginal cost. This will represent an over – simplification in most realistic situation.

3.12 The Theory of Constraint

a. Definition of Constraints:

A constraint is anything that prevents you from getting more of what you want. Every individual and every organization faces at least one constraint, so it is not difficult to find examples of constraints. You may not have enough time to study thoroughly for every subject and go with your friends on weekend, so time is your constraint. Since a constraint prevents you from getting more of what you want, the theory of constraints (TOC) maintains that effectively managing of the constraint is the key to success.

b. Theory of Constraint

TOC and continuous improvement

In TOC, analogy is often drawn a business process and chain. If you want to increase the strength of a chain, what is the most effective way to do this? Should you concentrate your efforts on strengthening the strongest link, the largest links, or the weakest link? Clearly, focusing effort on the weakest link will bring the biggest benefit.

Continuing with this analogy, the procedure to follow in strengthening the chain is straightforward. First, identify the weakest link, which is the constraint. Second, do not place a greater strain on the system than the weakest link can handle. Third, concentrate improvement efforts on strengthening

the weakest link. Forth, if the improvement efforts are successful, eventually the weakest link will improve to the point where it is no longer the weakest link. At this point, the new weakest link (i.e. the new constraint) must be identified, and improvement efforts must be shifted over to that link. This simple sequential process provides a powerful strategy for continuous improvement. The TOC approach is a perfect complement to TOM, BRP and lean production – it focuses improvement efforts where they are likely to be most effective.

An example of TOC

A simple will be used to illustrate the role of a constraint. In Exhibit 19.6, bottlenecks in the National Health Service contribute to the waiting lists that characterize the health care system. The key constraint is in surgery where the maximum number of patients that can be produced is 15 patients a day. Other parts of the systems such as general practitioners (100 patients per day) and outpatients (50 patients per day) could process higher numbers. The key to increasing the overall capacity of the system is to improve the capacity in surgery – improvements in other areas may simply lead to longer waiting lists.

General Practitioner Referral	Appointment made	Outpatient visit	Add to surgery waiting list	Surgery	Follow-up list	Discharge
100 patients Per day	100 patients Per day	50 patients Per day	150 patients Per day	15 patients Per day	60 patients Per day	140 patients Per day

Processing surgery patients at an NHS facility (simplified)
Source: this diagram originally appeared in the February 1999 issue of Health Management.

If efforts are focused on the first bottlenecks in surgery, subsequent improvements may lead to a situation when another part of the system takes over as the weakest link and hence a focus for management attention.

iii The impact of the theory

Conventional management accounting has two possible conflicts with TOC. If non-bottleneck machines have a production cut, then they begin to look inefficient. Labour efficiency variances may also worsen. Furthermore, a reduction in work in progress may lead to a fall in reported profit. The TOC solution is to change the usual measures by focusing on throughput expense.

The theory has its own special definitions:

Throughput	=	Sales – Material and purchase services
Inventory	=	Stock + Machines and buildings
Operating expense	=	Non-material conversion cost especially labour costs
Net profit	=	Throughput – Operational expense
ROI	=	Throughput – Operational expense Inventory

Note that direct labour is treated as a fixed cost. Traditional accounting such as standard costing focuses on controlling operational expenses ('cost world'), JIT focuses on cutting stock ('JIT world'). In contrast, 'Throughput world' focuses on throughput even if it means conflicting with JIT by

holding buffer stocks or with cost world by tolerating slack labour.

iv Managing constraints

Profit can be increases by effectively managing the organization's constraints. One aspect of managing constraints is to decide how to utilize them. If the constraint is a bottleneck in the production process, we have seen that the manager should select the product mix that maximizes the total contribution margin. In addition, the manager should take an active role in managing the constraint itself by increasing the efficiency of the bottleneck operation and by increasing its capacity. Such efforts directly increase the output of finished goods and will often pay off in an almost immediate increase in profits.

It is often possible for a manager to effectively increase the capacity of bottlenecks, which is called relaxing (or elevating) the constraint. In the case of Mountain Goat Cycles in Chapter 9, the stitching machine operator could be asked to work overtime. This would result in more available stitching time and hence more finished goods that can be sold. The benefits from relaxing the constraint in such a manner are often enormous and can be easily quantified. The manager should first ask, 'What would I do with additional capacity at the bottleneck if it were available?' In the example, if there are unfilled orders for both the touring and mountain panniers, the additional capacity would be used to process more touring panniers, since that would be a better use of the additional capacity. In that situation, the additional capacity would be worth ₦12 per minute or ₦720 per hour. This is because adding an hour of capacity would generate an additional ₦720 of contribution margin if it would be used solely to process more touring panniers. Since overtime pay for the operator is likely to be much less than ₦720 per hour, running the stitching machine on overtime would be an excellent way to increase the profit of the company while at the same time satisfying customers.

The implications are clear. Managers should focus much of their attention on managing bottlenecks. As we have discussed, managers should emphasize products that most profitably utilize the constrained resources. They should also make sure that products are processed smoothly through the bottlenecks, with minimal lost time due to breakdowns and set-ups. And they should try to find ways to increase the capacity at the bottlenecks.

The capacity of a bottleneck can be effectively increased in a number of ways, including:

- Working overtime on the bottleneck
- Subcontracting some of the processing that would be done at the bottleneck
- Investing in additional machine at the bottleneck
- Shifting workers from processes that are not bottleneck to the process that is a bottleneck
- Focusing business process improvement effort such as TOM and BPR on the bottleneck
- Reducing defective units. Each defective unit that is processed through the bottleneck and subsequently scrapped takes the place of a good unit that could be sold.

The last three methods of increasing the capacity of the bottleneck are particularly attractive, since they are essentially free and may even yield additional cost savings. The somewhat ad hoc examples have been generalized in the theory of constraints (TOC).

3.13 Activity -Based Analysis for Decision Making

i Designing an Activity Based Costing (ABC) System

Experts agree on several essential characteristics of any successful implementation of activity-

based costing.

First, the initiative to implement activity- based costing must be strongly supported by top management.

Second, the design and implementation of an ABC system should be the responsibility of a cross-functional team rather than of accounting department. The team should include representatives from each area that will use the data provided by ABC system. Ordinarily, this would include representatives from marketing, production, engineering and top management as well as technical trained accounting staff. Sometimes an outside consultant who specializes in in activity-based costing acts as an adviser to the team.

The reason for insisting on strong top management support and a multifunction team approach is rooted in the fact that it is difficult to implement changes in organizations unless those changes have the full support of those affected. Activity-based costing changes 'the rules of the game' since it changes some of the key measures that managers use for the decision-making and for evaluating individuals' performances. Unless the managers who are directly affected by the changes in the rules have a say, there will inevitably be resistance.

In addition, designing a good ABC system requires intimate knowledge of many parts of the organization's overall operations. This knowledge can only come from people who are familiar with those operations.

Top managers must support the initiative for two reasons. First, without leadership from top management, some manager may not see any reason to change. Second, if top managers do not support the ABC system and continue to play the game by the old rules, their subordinates will quickly get the message and abandon the ABC system. Time after time, when accountants have attempted to implement an ABC system on their own without top-management support and active co-operation from other managers, the results have been ignored.

ii Activities in ABC System

The first major step in implementing an ABC system is to identify the activities that will form the foundation for the system. This can be difficult, time consuming and involves a great deal of judgment.

A common procedure is for the individuals on the ABC implementation team to interview everyone-or at least all supervisors and managers-in overhead departments and ask them to describe their major activities. Ordinarily, this results in very long lists of activities. The length of such activities poses a problem. On the one hand, the greater the number of activities tracked in the ABC system, the more accurate the costs are likely to be. On the other hand, it is costly to design, implement, maintain and use a complex system involving large numbers of activities. Consequently, the original lengthy list of activities is usually reduced to a handful by combining similar activities. For example, several actions may be involved in handling and moving raw materials-from receiving raw materials on the loading dock to sorting them into the appropriate bins in the storeroom. All these activities might be combined into a single activity called material handling.

A useful way to think about activities and how to combine them is to organize them into five general levels: Unit level, batch level, product level, customer level, and organization-sustaining

activities.

These are as follows:

1. Unit level activities are performed each time a unit is produced. The costs of unit-level activities should proportional to the number of units produced. For example, providing power to run processing equipment would be a unit-level activity since power tends to consumed in proportion to the number of units produced.
2. Batch-level activities are performed each time a batch is handled or processed, regardless of how many units are in the batch. For example, tasks such as placing purchase orders, setting up equipment and arranging for shipments to customers are batch-level activities. They incurred each time there is a batch (or a customer order). Costs at the batch level depend on the number of batches processed rather on the number of unit produced, the number of units sold or other measures of volume. For example, the cost of setting up a machine for batch processing is the same regardless of whether the batch contains one or 5,000 items.
3. Product-level activities relates to specific customer and typically must be carried out regardless of many batches are run or units of produced or sold. For example, activities such as designing a product, advertising a product and maintaining a product manager and staff are all product-level activities.
4. Customer-level activities relate to specific customer and include activities such as sales calls, catalogue, mailing and general technical support that are not tied to any specific product.
5. Organization-sustaining activities are carried out regardless of which customers are served, includes activities such as cleaning executive offices, providing a computer network, arranging for loans, preparing annual reports to shareholders, and so on.

   When combining activities in an ABC system, activities should be grouped together at the appropriate level. Batch level activities should not be combined with batch level activities and so on. In general, it is best to combine only those activities that are highly correlated with each other within a level. Activities are correlated with each other if they tend to move in tandem. For example, the number of customer orders received is likely to be highly correlated with the number of completed customer orders shipped, so these two batch level activities (receiving and shipping orders) can usually be combined with little loss of accuracy.

iii ABC System and Traditional Product Cost

Activities consist of the aggregation of many different tasks and are described by verb associated with objects. Typical support activities includes: schedule production, set up machine, move material, purchase material, inspect material, process suppliers' records, expedite and process customer order. While the production process, activity cost centre product and assemble product. Within the production process, activity cost centre are often identical to the cost centre used by traditional cost system. Support activity cost centre are often to the cost used by traditional system, such as when purchasing department and activity are both treated as cost centre, Invariably, ABC system will normally have a greater number of cost centers.

The traditional costing system of absorption costing was developed in a time when most organization produced narrow of product in which similar operation process were undertaken and similar proportions of overhead were consumed.

Traditional costing system, which assume that all resources in proportion to their production volumes, tend to allocate too great a proportion of overhead to high volume product and too small a proportion of overhead to low volume product. Activity Based Costing (ABC) attempt to overcome this problem.

The major distinguishing features of ABC system are that they rely on a greater number of cost centre and second stage driver. By using greater number of cost centre and cost driver that cause activity resources consumption, and assigning cost to cost object on the basis of cost driver usage ABC system more accurately measure the resource consumed by cost object.

iv Benefit of ABC system

(a) In a more competitive business environment company's tent to product profitability reliability, in which ABC system facilitates good understanding of what actually drives overhead cost.

(b) With the increase in the complexity of manufacturing with wider product range, and shorter life cycles; ABC takes into consideration this complexity with their multiple cost driver.

(c) ABC system is concerned with all overhead which goes beyond its "traditional factory floor boundaries" as a result of the modern manufacturing system, in which overhead function include a lot of non-factory – floor activities, such as product design, production planning and quality control etc.

v Criticisms of ABC

(a) The implementation of ABC system is said to be often problematic

(b) The cost of implementing and maintain ABC system sometimes often exceed the benefit

(c) It still makes use of some measure of cost apportionment at the cost pooling stage for cost unit like rent, rate and building depreciation.

(d) Cost driver are only limited to activity is measurable quantitative term and which Can be related to production output

(e) There is exit constraint, in which a single cost driver cannot be said to explain the cost behavior of all items its association pools.

Illustration

A company manufactures two product, L and M using the same equipment and similar processes. An extract of the production data for these products in one period is shown below.

	L	M
Quantity produced (unit)	5,000	7,000
Direct labour hours per unit	1	2
Machine hour per unit	3	1
Set- up in the period	10	40
Order handed in the period	15	60

Overhead cost	₦
Relating to machine activity	220,000
Relating to production run set – ups	20,000
Relating to handling of order	45,000
	285,000

Required:

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

(a) A traditional costing approach using a direct hour to absorb overhead

(b) An activity based costing approach using suitable cost driver to trace overheads to product.

Solution

(a) Traditional Costing Approach

		Direct Labour hours
Product L =	5,000 unit × 1 hour	5,000
Product M =	7,000 unit × 2 hour	14,000
		19,000

Overhead absorption rate = ₦285,000 / 19,000 = ₦15 per hour

Overhead absorbed would be as follows:

Product L =	1 hour × ₦15	₦15 per unit
Product M =	2 hour × ₦15	₦30 per unit

(b) ABC Approach

		Machine hours
Product L =	5,000 unit × 3 hour	15,000
Product M =	7,000 unit ×1 hour	30,000
		22,000

Using ABC, the overhead cost is absorbed to the cost drivers

Machine hour driver cost	22,000 ÷ 22,000 m/c hours	=	₦10per m/c hour
Setup driven cost	22,000 ÷ 50Set up	=	₦400 per Set up
Order driven cost	45,000 ÷ 75 0rder	=	₦600 per order

Overhead cost would be as follows:

		Product L		Product M
		₦		₦
Machine hour driver cost	(15,000 hrs×N10)	150,000	(7,000 hrs×N10)	70,000
Set up driven cost	(10hrs×400)	4,000	(40 ×N400)	16,000
Order Handling Cost	(15hrs×600)	9,000	(60 ×N600)	36,000
		16,000		122,000
Unit produced		5,000		7,000
Overhead cost per unit		₦32.60		₦17.43

Those products M absorb an unrealistic amount of overhead using direct labour hour basis. Overhead absorption should be based on the activities which drive the cost in this case machine hour, the number of production run step – ups and the number of orders handled for each product.

3.14 Measuring and Managing Uncertainty

i Risk and Uncertainty

Risk

This is associated with those situations where we do not know what the future outcome of a project will be, but the probabilities of alternatives outcome can be estimated with some degree of confidence through a careful study of past result in similar field.

Uncertainty

Uncertainty occurs where the future outcome cannot be pretend with any degree of confidence from knowledge of past existing events, so that no probability estimates are available. As a result, the extent of deviation from forecast in unknown.

NB: For the purpose of this text, we intend to use both terms interchangeably since most investment project usually contain a mixture of risk and uncertainty

ii Risk Premium Rules

It can be agreed that in order to accept risk management require a premium over and above what would be required from a risk-free investment. Therefore, in this approach the discount rate is increased by X% to allow for the risk inherent in the investment.

The advantage of this method is:

i. It is simple and easily understood
ii. It has an intuitive appeal for risk adverse management.
iii. It explicitly incorporates a judgment on the uncertainty involved by the size of the premium required.

The disadvantages of this method are:

i It does not focus attention on assessing accurately the assumption used in the evaluation.
ii The choice of the amount of premium is often arbitrary depending on management view at particular moment.

iii The Maximum Rule

The maximum decision rule suggests a decision maker should select the alternative that often the least unattractive worst outcome. This would mean choosing the alternative that maximize the minimum.

Illustration -1

A businessman is trying to decide which of the three manually exclusive projects to undertake. Each of the projects could lead to verifying net cost which business man classifies as outcome I, II and III. He has constructed the following pay off table or matrix.

		Net profit N'000S if outcome turn out to be		
		I	II	III
		(Worst)	(Most likely)	(Best)
	A	50	85	130
Project	B	70	75	140
	C	90	100	110

Which project should he undertake? Use the maximum decision rule.

<u>Solution</u>

the maximum decision rule suggest that he should select the smallest worst result that could happen, this is the decision criterion that managers should play safe and either minimize their losses or cost, or else go for the decision which give the higher minimum profit. If he selects project A the worst result is a net profit of 50. Similarly, the worst result for B and C are 70 and 90 respectively. The best worst outcome is 90 and project C would therefore be selected (because this is a better worst possible than either A or B)

Criticisms of the Maximum Decision Rule
The maximum decision is subject to two major criticisms.

a. It is defensive conservative, being a safety first principle of avoiding the worst outcome without taking into opportunities for maximizing profit.
b. It ignores the probability of each different outcome taking place. In the previous example, we ignored the fact that outcome II was the most likely outcome of the three.

Maximum
The maximum criterion looks at the best possible result. Maximize the maximum profit. An alternative name that amount to the same thing is minimum (minimize the minimum cost or losses).

		Profit Action		
		A	B	C
	I	100	80	60
Circumstances	II	90	120	85
	III	(20)	10	85
Maximum profit		100	120	85

Action B would be chosen if the maximax rule is followed.
Criticisms of this approach would again say that it ignores probabilities and that it is over.

Illustration
A company is considering which of three alternative courses of action A, B and C to take. The profit or loss each choice depends on which one of four b economic circumstances, I, II, III or IV will apply. The possible profit and loss, in thousands of naira, are given in the following payoff table.

Losses are shown as negative figures.		A	B	C
	I	70	60	70
Circumstances	II	-10	20	-5
	III	80	0	50
	IV	60	100	115

Required:
States which action would be selected using of the maximum and maximum criteria.

<u>Solution</u>

i. The best possible outcome are as follows: -

A (circumstances III):	80
B (Circumstance IV):	100
C (Circumstances IV):	115

As 115 is the highest of theses figure, action C would be chosen using the maximum criterion.

ii. The worst possible outcome is as follow:

A (circumstances II):	-10
B (Circumstance III):	0
C (Circumstances II):	-5

The best of these figure is 0 (neither a profit nor a loss), so action B would be chosen using the maximum criterion.

3.15 Probabilities and Expected Values

Although the outcome of a decision may not be certain, there are some like hood that probabilities could assigned to the various possible outcome from analysis of previous experience.

Expected Values

Where probabilities are assigned to different outcome we can evaluate the worth of a decision as the expected value or will weighted average of this outcome. The principle is that, if a manager is faced with a number of alternative decisions, each range of possible outcome, the optimum decision will be the one which gives the highest expected value.

Example: Expected Value

Suppose a manager has to be choice between exclusive option A and B, and the probable outcome of each option are as follows:

OPTION A		OPTION B	
probability	Profit N	probability	Profit N
0.8	5,000	0.1	(2,000)
0.2	6,000	0.2	5,000
		0.6	7,000
		0.1	8,000

The expected value (EV) of profit of each option would be measure as follows:-

OPTION A				OPTION B				
probability	Profit ₦		EV of Profit ₦	Probability Profit ₦				EV of Profit ₦
0.8 ×	5,000	=	4,000	0.1	×	(2,000)	=	(200)
0.2	6,000			0.2	×	5,000	=	1,000
	EV			0.6	×	7,000	=	4,200
				0.1	×	8,000	=	800
						EV	=	5,800

In this example, since it offers a higher EV of expected profit, option B would be selected in preferences to A, unless further analysis is carried out.

Formula to Learn

The expected value of an opportunity is equal to the sum of the probabilities of outcome occurring multiplied by the return expected if it does occur.

EV = Epx

Where P is the probability of an outcome occurring

X is the value (profit or cost of the outcome)

Illustration

A manger has to choose between mutually option C and D and the probable outcome of each option are as follows: -

OPTION C		OPTION D	
Probability	Cost ₦	probability	Cost ₦
0.29	15,000	0.03	14,000
0.54	20,000	0.30	17,000
0.17	30,000	0.35	21,000

Both option will produce an income of ₦30,000, which should be chose?

Solution

Option C. Do the working yourself in the way illustrated above. Note that probabilities are for not profit.

Limitation of Expected Values

The preferences for B over A on the basis of expected value in the marred by the fact that A's worst possible outcome is a profit of ₦5,000, whereas B might incur a loss of ₦2,000 (Although there is a 70% chance that profit would be ₦7,000 or more, which would be more than the best profit from option A)

Since the decision must be once only between A and B the B expected value of profit (which is merely a weighted average of all possible outcome) has several limitations as a decision rule by which to judge preferences.

Expected value is more valuable as a guide to decision making where they refer to outcome which will occur many times over.

Examples would include the probability that so many customers per day will buy a loaf of bread, the probability that a customer's service assistant will receive so many phone calls per hours, and so on.

Cumulative Probability Tables

As we have seen, Expected value can be used to compare two or more mutually alternatives. The alternatives with the most favorable EV of profit or cost would normally be proffered. However, alternative can also be compared by looking at the spread of possible outcome and the probabilities that they will occur. The techniques of drawing up cumulative probability tables might be helpful, as the following examples shows.

The Disadvantages of Point Estimate Probabilities

A point estimate probability means an estimate of the probability of Particular outcomes occurring.

In the previous illustration, there were point estimate probabilities for variable cost (₦5.20 or ₦4.90 or ₦4.75) but in reality, the actual variable cost per unit might be any amount from below (₦4.75 to above ₦5.20. similarly, point estimate probabilities were given for period fixed cost (₦25,000 or ₦27,000 or ₦30,000) but in reality, actual fixed cost might be any amount between about ₦25,00 and ₦30,000.

The Advantages of Point Estimate Probabilities

In spite of their possible disadvantages, point estimate probabilities can be very helpful for decision maker

a. They provide some estimate of risk, which is probably better than nothing.
b. If there are enough point estimates they are likely to be a reasonably good approximation of a continuous probability distribution.
c. Alternatively, it can be assumed that point, probabilities represent a range of values, so that if we had the probabilities for variable cost per unit, of ₦5.20, ₦4,90, and ₦4.75 we could assume that those actually represent probabilities for the ranges, says, ₦5.05 to ₦5.30 and ₦4.82 to ₦4.70 to N4.81
d. The estimate is relatively easy to make, and so and failed, in simulation, a mathematical model is more practical than attempting continuous distribution estimates.

3.16 Simulation

Simulation can be defined as the process of experimentation used in order to describe and evaluate the basic characteristics of complex operating system.

Simulation is applicable to problem that can be involved by numerical or analytical method. However, frequent problem arise that analytical or numerical method cannot be used. In this situation, a simulation technique is employed because simulation is described as what to do when other method failed. In simulation, mathematical model is constructed with designation parameter to simulate what is happening in real world.

Application

i. Investment appraisal
ii. Inventory control
iii. Cash planning

Advantage of Simulation

i. It provides solution to problem that cannot be solve analytical
ii. The degree of assumption is not great in simulation
iii. Even when a computer is used simulation is not expensive.

Disadvantage of Simulation

i. It does not necessarily produce optimal solution.
ii. Simulation result are estimates and are subject to statically or sampling error;
iii. The financial model required to run the simulation is very complex.
iv. The model required accurate probability distribution

Steps in Simulation

i. Determine the number of simulation run to be made for both revenue and cost using the cash flow given:
ii. Based on I above, determine the boundary selection for revenue and cost necessary using

cash flow.

iii. Superlatively determine the cumulative of the cash flow under different state of nature for revenue and cost;

iv. Reduce the cumulative probability by 1 to arrive at the random number allocated i.e. range for probability.

v. Create a column for random selected and pick the various set of simulation run which is now fixed to appropriate random number range and trace it to corresponding cash flow for cost and revenue

vi. Ensure that all cash flow selected tally with the simulation run on revenue and cost

vii. Find the net cash flow for the simulation run i.e.

Computation of NCF

	Run 1	Run2	Run3
	₦	₦	₦
Revenue	x	x	x
Cost	(x)	(x)	(x)
NCF	x	x	x

viii. Use the Net cash flow in (viii) to compute for the set of simulation run

ix. Compute the average NPV of run by aggregating together and dividing by the total number of Run.

Illustration

The following probability estimates have been prepared for a proposed investment project.

	Year	Probabilities	₦
Initial outlay	0	1.00	(40.000)
Revenue per annum	1-5	0.15	40.000
		0.40	50.000
		0.30	55.000
		0.15	60.000
Running Cost per annum	1-5	0.10	25.000
		0.25	30.000
		0.35	35.000
		0.30	40.000

Required

a. Calculate the expected net present value of the project.

b. Analyze the risk inherent in this situation by stimulating the expected net present calculated. You should use the random number given at the end question to simulating 3 sets of cash flow, on the basis of your simulating results, what is the expected net value and what is the probability of the project yielding a negative present value.

c. Explain briefly why the ENPV calculated in (a) and the one calculated in (b) may not necessarily be the same.

Random Number (Set)	Revenue	Running Cost
1	30	71
2	20	00
3	79	94

Solution

(a) ENPV of the project

Expected Revenue per annum

(40,000 x .15) + (50,000 x .4) + (55,000 x .3) + (60,000 x.15)

6,000 + 20,000 + 16,500 +9,000

= ₦51,500

Expected Cost per annum

25,000 x .10 + 30,000 x .25 +.35 + 40,000 x .30

2.500 + 7,500 + 12,250 + 12,000

₦34,250

Expected Revenue per annum

= ₦51,000 – ₦34,500

= ₦17,250

ENPV = -40,000 + (17,250 x 3.60)

= ₦22,100

(b) ENPV based on simulation

Revenue

Possible

Cash flow Probability

Pr Cum

Probability R/NO

R/No -selected

S¬1 S¬2 S¬3

40,000

50,000

55,000

60,000 0.15

0.40

0.30

0.15 0.15

0.55

0.85

1.0 00-14

15-54

55-84

85-99

'30' '20'

79

Cost

Possible

Cash flow Probability

Pr Cum

Probability R/NO

R/No -selected

S¬1	S¬2	S¬3
25,000		
30,000		
35,000		
40,000	10	
.25		
.35		
.30	.10	
.35		
.70		
1.00	00-09	
10-34		
35-69		
70-99	'00'	

79

	N S¬1	NS¬2	N S¬3
Revenue	50,000	50,000	55,000
Cost	(40,000)	(25,000)	(40,000)
	10,000	25,000	15,000
CDF and 12%	3.60	3.60	3.60
	36,000	90,000	54,000
	(40,000)	(40,000)	(40,000)
	4,000	50,000	14,000

ENPV = -(4,000) + 50,000 + 14,000 = 12,000
3

The probability of the project yielding negative NPV is 331/2 i.e. one out of three occurrences.

(d) Simulation is basically Random sample and to that extent, it is liable sampling error. The error in this case ₦2,100 is relatively small but it can be reduced to any level consider satisfactory by management by simply increasing the number of simulation run. The above is true because of the law of large number which state the sampling error is inversely proportional to the square root of the number of simulation runs.

3.17 Sensitivity Analysis

This is the maximum tolerable unfavourable a change (as a percentage of the original estimated value) sometimes when using NPV and IRR approaches. What if questions are asked – to find out what the result will be if the variable were altered? The following kind of question can be asked.

i. What is the maximum limit in which selling price can be reduced for us to break-even?
ii. Where it is maximum tolerate margin in which variable cost can be increased for us to achieve positive NPV

Advantage

i. It is less complicated theory to understand
ii. It identifies areas that are critical to the success of the project.
iii. It identifies how critical some of the forecast are considered.

Disadvantages

i. It only considers the effect of a change in a single variable at a time, but in practice, more than on variable may be change simultaneously.

ii. It is not an optimizing technique.

Techniques or Formula In Solving Sensitivity Margin Problem

i. Sensitivity Margin of Sales (Selling Price)

$$\frac{NPV}{PV\ of\ sales} \times \frac{100}{1}$$

ii. Sensitivity Margin of Direct Material/Direct Labour/Variable Overhead

$$\frac{NPV}{PV\ of\ Contribution} \times \frac{100}{1}$$

ii. Sensitivity Margin of Direct Material/Direct Labour/Variable Overhead

$$\frac{NPV}{PV\ of\ Contribution} \times \frac{100}{1}$$

iii. Sensitivity Margin of initial outlay

$$\frac{NPV}{PV\ initially\ Outlay} \times \frac{100}{1}$$

iv. Sensitivity Margin of project life

$$\frac{Project\ life - breakeven\ project\ life}{Project\ life} \times \frac{100}{1}$$

iv. Sensitivity Margin of Cost of Capital (COC)

$$\frac{IRR\text{-}COC}{COC} \times \frac{100}{1}$$

Illustration

a. TIJANI is contemplating investing in a project and the following estimate been made

	₦
Cash outlay	100,000 (Year 0)
Sales price/unit	30
Unit cost	20
Discount rate	10% per annum
Life	3 years

Required

Calculate the maximum tolerable and in favourable change in each of the areas (as a percentage of the original estimated value) in:

i. Sales ii. Unit cost iii. Sales volume

iv. Initial outlay v. Project Life vi. Cost of capital

Comment on the result, could be sales volume be traded separately in the analysis? Now assume that the government anti – inflation policy below the sales price to rise by 10% per annum compound and unit cost are expected to rise at an annual rate at 20% compound. What initially cash subsidy would be necessary to retain viability of the project.

Solution

Computation of Net Present value

Year	Cash flow	Discount rate at	Value
	₦	10%	₦
0	(100,000)	1	(100,000)
1	40,000	0.909	36,360
2	60,000	0.826	49,560
3	30,000	0.751	22,530
			8,450

Cash flows are calculated viz:

Sales Volume x (Sales price – unit cost)

Year	DF at 10%	Sales	PV of Sales	Cost	PV of	PV of contribution
		₦	₦	₦	₦	₦
1	0.909	120,000	109,080	80,000	72,720	36,360
2	0.826	180,000	148,680	120,000	90,120	49,560
3	0.751`	67,590	67,590	60,000	45,060	22,530
			325,350		216,900	108,450

(i) Sensitivity to sales price

$$= \frac{\text{NPV}}{\text{Present value of Sales}} \times 100$$

$$= \frac{₦\,8,450}{₦\,325,350} \times 100 = 2.6\%$$

Sales price should not be reduced by more than 2.6% Less the project becomes unacceptable

(ii) Sensitivity to unit cost

$$= \frac{\text{NPV}}{\text{Present value of Sales}} \times 100$$

$$= \frac{₦8,450}{₦216,350} \times 100 = 3.9\%$$

The unit cost should not increase by more than 3.9% otherwise the project become unacceptable

(i) Sensitivity to Sales Volume

$$= \frac{\text{NPV}}{\text{Present value of contribution}} \times 100$$

PV of contribution = ₦325,350 – ₦216,900 = ₦108,450

$$= \frac{₦8,450}{₦108,450} \times 100 = 7.8\%$$

A fall in contribution beyond 7.8% lvel make the project unacceptable.

(iv) Sensitivity to sales outlay

$$= \frac{\text{NPV}}{\text{Present value of initial outlay}} \times 100$$

$$= \frac{₦8,450}{₦100,000} \times 100 = 8.4\%$$

The initial outlay should not increase beyond 8.4%

(v) Sensitivity to project life

Suppose we assume the project lasts 2 years

Year	Cash flow	DF at 10%	Value
	₦	10%	₦
0	(100,000)	1	(100,000)

1	40,000	0.909	36,360
2	60,000	0.826	49,560
			8,450

By interpretation:

2 yrs + $\frac{14,080}{14,080 + 8,450}$ x 3 – 2

= 2.63 years

Sensitivity to project life

= $\frac{3 – 2.63}{}$ x 100 = 12.3%

The maximum tolerate reduction in project life to retain its variability is 12.3%

(vi) Cost of Capital

We need to calculate the IRR of the project. Let us try discount of 15%

Year	NCF ₦	DCF 10%	PV ₦
0	(100,000)	1	(100,000)
1	40,000	0.87	34,800
2	60,000	0.77	46,200
3	30,000	0.66	19,800
			-800

IRR = $\frac{a + A}{A+B}$ (b-a)

= 10% + $\frac{8,450}{8,450+ 800}$ (15 - 10)

= 10% +0.9135 (5)%

= 10% +4.56%

= 14.56%

Sensitivity margin of Cost of Capital COC

$\frac{IRR – COC}{COC}$ x 100

$\frac{14.56 – 10}{10}$ x 100 = 45.6%

The cost of capital can therefore increase by 45.6% before the NPV becomes negative. The volume could be treated separately in the analysis. The sensitivity of sales volume could be calculated for each of the respective years.

Year 1 $\frac{NPV}{PV \text{ of contribution (Yr. 1)}}$ x 100

= $\frac{8,450}{36,360}$ x 100 = 23.2

Year 2 $\frac{NPV}{PV \text{ of contribution (Yr. 2)}}$ x 100

= $\frac{8,450}{49,560}$ x 100 = 17.1%

Year 3 $\frac{NPV}{PV \text{ of contribution (Yr. 3)}}$ x 100

= 8,450 x 100 = 37.5%
22,530

(b) Incorporation inflation effect

Year	Sales	Cost	Contribution
1	4,000 x 1.1 x 30 =132,000	4,000 x 1.2 x 20 = 96,000	36,000
2	6,000 x (1.2)2 x 30 =217,800	6,000 x (1.2)2 x 20 =96,000	45,000
2	3,000 x (1.1)3 x 30 =119,790	3,000 x (1.1)3 x 20 =103,680	16,110

Year	Cash flow N	DF at 10% 10%	Value ₦
0	1	(100,000)	(100,000)
1	0.909	36,000	32,360
2	0.826	45,000	37,560
3	0.751	16,110	12,099
			18,007

The initial subsidy needed to retain viability of the project is ₦18,007

3.18 Limitations

a. The approach requires that changes in each combination key variable are isolated but in practice, management is more interested in the combination of the effect of change in two or more key variables. Therefore, considering factor in isolation is unrealistic since they are often interdependent

b. Sensitivity analysis does not examine the probability that any variation in cost or revenue might occur.

3.19 Decision Tree

This may be describing as pictorial or diagrammatic representation of event or sequences associated with complex problem situation involving interrelated decision. It may also be described as way of graphically illustrating various alternative course of action associated with a particular secession. Decision tree represent an attempt of measuring the effect of risk and uncertainties inherent in capital budgeting decision or investment decisions in long term asset

1. Draw a decision tree and then distinguish between the following nodes:
   a. Decision Node: used to denote a situation where a decision maker is aware of various alternatives associated with particular decision or where a decision maker is able to ascertain in accurate term the actual financial implication of a particular decision.

   b. Chance Note: used to describe a situation where a decision marker is unable to ascertain the outcome of a particular point or the outcome of such a decision is based on probability.
2. Include all the relevant pay – offs associated with each of the decision points,
3. Identify the terminal values for each of the route the value of each node as follows:
   (a) Use the expected value criterion to identify the value of a chance node.
   (b) Use the highest pay off to determine the value of a decision node.
4. Determine the optimal course of ACTION BASED ON THE VALUE OF THE FIRST node

Illustration

A software company has just won contract worth ₦80,000 if it delivers a successful product on

time, but only ₦40,000 is late. It faces the problem now of whether to produce the work in house or to sub – contract it. To sub- contract is as fast and reliable as to make it certain that successful software is produced on time.

If the work is produced in house the cost would be only ₦20,000 but, based on past experience would have an only a 90% change of being successful. in the event of software not being successful, there would be insufficient time to write the whole package internally, but there would still be the option of either a late rejection of the contract (at a further cost of ₦10,000) or of late subcontracting the work on the same terms as before. With this late start his local sub – contractor is estimated to have 50/50 chance of producing the work on time or producing it late. In this case sub – con tractors to be paid ₦50,000 regardless of whether he meets the deadline or not.

You are required:

a) To draw a decision tree for the software company, using squire for decision point and circles for change including all relevant data on the diagram.

b) To calculate values as appropriates and to recommend a course of action to be software company.

<u>Solution</u>

Working

Chance Node (1)
(10,000 x 0.5 + (-30,000 x 0.5)
₦5,000 – 15,000
Decision node (2): Higher of (10,000)
And (30,000) = (10,000)
DECISION Node (3)
(₦60,000 X 0.5) + (-10,000 X 0.1)
₦54,000 – 1,000 = ₦53,000
Decision Node 4: Higher of
₦53,000 and ₦30,000 = ₦53,000

Terminal Values (₦):
(a) ₦80,000 – ₦20,000 = ₦60,000
(b) (₦20,000) + (₦10,000) = (₦30,000)
(c) ₦80,000 – ₦50,000 – ₦20,000 = ₦10,000
(d) ₦40,000 – ₦50,000 – ₦20,000 = (₦30,000)
(e) ₦80,000 – ₦50,000 = N30,000

Decision: The optimal decision is to produce the software in house because the incremental benefit of N53,000 from his alternative is higher than N30,000 from sub – contracting option.

3.20 Markov Analysis

Markov analysis is a technique specially designed to deal with the probabilities of future occurrences by analyzing persistently known probabilities. The techniques that all system start with initial state or condition. According to Trueman RG (1981) the "markov process is a stochastic process which has the probability of a transition from a given state to any future state depend only on the present state and not on the manner in which it was reached.

A stochastic process is a time dependent event. Guided or governed by some probability laws. The 'state' of such system change in some probabilistic fashion at fixed or random interval in times. Markov chain is one of such processes.

Application of Markov Analysis

The techniques can be used in:

(a) Business analysis
  (i) Market share analysis; and
  (ii) Bad debt prediction
(b) Operation Management
  (i) Personnel Management;
  (ii) Aggregate scheduling; and
  (iii) Management of finance
(c) Sales and Marketing Management
  (i) Number of outlet; and
  (ii) Brand switching behavior

I. Underlining Assumption of Markov Chain

(a) The probability of changing states and outcome remain constant over time
(b) Limited or finite number of states.
(c) Size and makeup of the system do not change during the analysis
(d) Future states (s) can be predicted for the previous states (s) and the Matrix of Transition probability. This implies that the probability if next depend on the outcome immediately preceding it.
(e) It is assumed that states are both collectively exhaustive (i.e. a system can be only one state at any point in time)

ii. **Types of Markov Chains**

(a) An Egordic Markov Chain. It describes the process in which it is possible to go from one state to another stat. this transition can be made in one or more step but there must be a link between them. In an Egordic Markov Chain. X is non Zero and less than one.
(b) A Regular Markov Chain. Is one in which the transition matrix P such that for some power of n, P" has none) element zero, impossible movement i.e. there is no movement from one step to another.
(c) Absorbing Markov Chain. A Markov is said to be absorbing if: it has at least one absorbing state and (ii) it is possible to go from every none absorbing state to at least in absorbing state in one more steps.

iii. Types Non Markov States

(a) Absorbing Markov state. This is a state that cannot be left once entered. That is there is 0 probability of leaving it (impossible to leave). Hence, the process either stop completely or it is restart all over again. Examples are; Retirement, Resignation, death etc.
(b) Transient State. A state in transient if the probability of its not returning back to that is 1. It is the same as non – recurrent state.
(c) Recurrent State. A state is recurrent if the probability that the process will eventually return back to that state after leaving it is 1.

3.21 Risk Analysis Approaching

WHICH METHOD OF ANALYZING RISK IS BEST?

Since there are several different ways of analyzing risk and uncertainty, which is best?

(a) The problem with adjusting the discount to make it higher for more risky project is to decide

what size of the adjustment ought to be, and unless there is rational and quantifiable basis for the size of adjustment this method of risk analysis und unreliable.

(b) Setting a time limit to the (discounted or undiscounted) payback period has the merit of compelling project to earn a satisfactory return before the end of their operational life and so of building in a satisfactory margin in case thing go wrong. However:
   (i) It should not be used on its own. The total expected NPV from a project over its entire life should take into consideration, not just payback period.
   (ii) It will discourage company from investing in project with every good long term prospect, just because they will offer small return in the short term. and so management should not concentrate on quick payback and 'short – termism'

(c) Sensitivity analysis is an important technique, and help manager to assess the effect on a project's NPV of higher cost or lower benefit than anticipated, or delayed benefit etc.
The main drawback to sensitivity analysis is that it ignores probabilities of various outcomes. For example, with sensitivity analysis is that 'what if question such as 'what if sales revenue are 5% or 10%, or 20% less than expected?' But what is the likelihood that sales will be 5% or 20% less than expected? What, realistically might happen?

(d) Analysis probabilities is a useful technique, with a project's NPV being calculated as an expected value and with risk being measured and quantifiable.

(e) Simulation modeling provides a more complex analysis of probabilities, which can be strength and a weakness. For example, where a complex analysis of probabilities risk may be helpful, because of the large number of uncertainties, simulation modeling may be needed to provide useful risk analysis.
But simulation modeling should not be used for project evaluation where the uncertainty is not so complex, and so a simpler method of risk analysis would be feasible, because this would be taking a sledgehammer to crack a nut.

3.22 Project Appraisal

i. Reasons for Capital Money

Capital Rationing

Definition and reasons for capital rationing

Capital rationing is the term used to describes the situation in which finance available for new investment is limited to an amount that prevents acceptances of all project with positives net profit values.

This situation might arise for the following reasons

(a) Raising money through the stock market may not be possible if share prices are at depressed level.

(b) There may be restriction on bank lending due to government controls;

(c) The cost associated with making small issues of capital may be too great

(d) Lending instruction rationing will occur under too risky to be given any more loan capital. Capital rationing will occur under these circumstances when;
   (i) A company's cost of additional borrowing has risen, because of risk; to a level it ceases to be worthwhile.
   (ii) No financial institution is prepared to provide extra funds, even at a very high rate interest.

(e) Management of a company may impose its own restriction on capital to limit the rate of its

growth to what it can handle.

ii. Assumption of Capital Rationing

1. Financial restriction is limited to a single period. i.e. fund will be freely available at subsequent period.
2. All projects are divisible i.e. it is possible to invest in a fraction part of a project.
3. There is a linear relationship between the NPV of a project, and the capital outlay i.e. by investing 20% in a particular project, the investor is also entitled to 20% of the NPV of the project
4. Funds are always available at a cost.
5. There is perfect information with regard to the acquisition of finance.
6. The risk attached to all project are the same.

iii. Capital Rationing Situation

A. HARD, REAL OR EXTERNAL RATIONING: This will be described as a situation the financial is externally imposed on the organization due to any of the following reasons:

i. High interest rate
ii. Stringent listing requirement of security and exchange commission,
iii. High gearing ratio i.e. the position of equity to debt
iv. Unwillingness on the part of the investor in the organization due to the fact that the investment is considered to be too risky.

B. SOFT, ARTIFICIAL OR INTERNAL RATIONING

This will be representing a Situation where the financial restriction is internally imposed on the organization through any of the following reasons:

i. Perpetual net operating losses
ii. Bad management
iii. Payment of dividend out of capital reserve.
iv. Unwillingness's on the part management to dilute shareholding position.

iv Single/Multi: - Period Capital Rationing

1. Identify the period of financial restriction with the actual amount available.
2. Compute the net present value of the entire project
3. Use the NPV to calculate the profitability index of all projects by relying on any of the following methods.
   a. Profitability $= \dfrac{\text{NPV}}{\text{capital require in year of financial restriction}}$
   b. P.I $= \dfrac{\text{Gross Present Value}}{\text{capital require in year of financial restriction}}$
4. Rank the result obtained in (3) above in a descending order.
5. Allocate the available finance based on the order or ranking established above.

Multi – Purpose Capital Rationing

Where the duration of financial restricted extend beyond a single period or beyond the year the available finance will any be disturbed among the various competing project but adopting the simple method under the linear programming techniques. This will however require the following

steps.

1. Identify the period of financial retraction together with their associate funds
2. Compute the NPV of each of the investment.
3. Formulate a linear programming model by relying on the various NPV's at the objective function
4. Express the period of financial restriction in form inequalities in order to represent the associated constraints
5. Established the doctrine of non-negativity at the end of the model formation.

v. Issues Associated with Capital Rationing

A. EXCLUSIVE PROJECT/Mutually exclusive investment: -Where two or more project are mutually exclusive, this will simply imply that the two project cannot be accepted together. However, under the ranking situation capital rationing decision, all the project are to be categorized along the line of the mutually exclusive project as such the group with the highest NPV will be selected.

B. MUTUALLY DEPENDENT PROJECT: - When two or more project are mutually dependent. This will simply mean that the dependent project will either be accepted together or jointly rejected. Meanwhile, in rationing decision, mutually dependent project will be merged together to represent a single project and as such, weighted profitability index will be computed and will be subject normal ranking.

C. NON DIVISBLE PROJECT: - Where a project is not divisible, this will mean that it will possible to have surplus funds under financial restriction but this will not be possible where project is divisible. Ti is therefore, the responsibility of the examiners to ascertain the treatment to be given the excess funds.

D PROJECT DELAY:-In capital rationing decision, it is a fundamental assumption that no project shall be delayed to another period.

3.23 Review Questions

1. Single period capital rationing

AYINLA Ltd is considering four projects. W, X, Y and Z, which have the following estimated cash flows and NPVs (at a cost of capital of 10%)

Project	Year 0	Year1	Year2	NPV
	₦	₦	₦	₦
W	(10,000)	6,000	7,000	+ 1,240
X	(20,000)	14,000	10,000	+ 991
Y	(30,000)	10,000	28,000	+ 2,230
Z	(40,000)	30,000	20,000	+ 3,801

Without capital rationing all project would be available, such that only N60,000 (say), is a year 0, the company will optimize its return by maximizing the NPV generated per N1 spent in year 0.

Project	NPV of Rationing	Outlay in year (Year)	NPV per N1 spent in year 0	priority of project
	₦	₦	₦	
W	1,240	10,000	0.124	1st
X	991	20,000	0.050	4th

Y	2.230	30,000	0.074	3rd
Z	3,801	40,000	0.095	2nd

The N60,000 available would be spent as follows

Project	Priority	Outlay	NPV
		₦	₦
W	1st	10,000	1,240
Y	2nd	40,000	3,801
Z	3rd	10,000	743(1/3 of 2,230)
		60,000	5,784

Projects are divisible. By spending the balance ₦10,000 on project Y, one third of the full investment would be made to earn one third of the NPV.
It is interesting; to note that the discounted rate of return (IRR) for each four project would be as follows:

Project	IRR (approx.)	Outlay
W	19%	1st
X	14%	2nd
Y	15%	3rd
Z	16%	2nd

It is no coincidence that the ranking of project in order of IRR gives the same priority listing as the ratio of NPV to outlay in year O. This coincidence arises only when there is single period rationing and at the same time no projects involve capital expenditure in any other year.

2. Multi – period capital rationing
SAMICO Ltd is setting it capital budget for 2011 and 2012 against a background which suggest the like hood of a storage of cash resources during the period. it is estimated that the cash available for investment will be N80,000 and N70,000 in 2012. The company's cost of capital is 10% and the project which are available in these years and which offer a positive NPV are as follows:

Project	2011	2012	2013	2014	2015 Year 0	NPV at 10% in (2011) value
	₦000	₦000	₦000	₦000	₦000	
A	(50)	(20)	40	30	20	+ 1,073
B	(30)	(40)	30	30	30	+ 1,016
C	(20)	(30)	10	23	23	+ 741
D	(31)	(15)	20	20	20	+ 577
E	0	(10)	4	5	2.32	+ 443

This NPV is expressed in terms of 2011 values, not 2012 values.
There are now two constraint preventing the acceptance of all worthwhile project
(a) Funds available in 2011
(b) Funds available in 2012

We have multi – period capital rationing, and linear programming techniques can be used to select an investment programme which will give maximum NPV within the capital rationing limitations.

Solution

You should be familiar with both basic procedures in formulating a linear programming problem, i.e.

(a) Identify the variable in the problem;

(b) Identify the objectives function (which will be to maximize the total NPV from all project)

(c) Specify the constraint

(a) Let a. be the proportion of Project A accepted;
b. be the proportion of Project B accepted;
c. be the proportion of Project C accepted;
d. be the proportion of Project D accepted;
e. be the proportion of Project E accepted.

(b) The objective function is to maximize the NPV from the total investment in 2011 and 2012.

Maximize 1,073a + 1,016b + 741c + 577d + 443e

Subject to the constraint:

50a + 30b + 20c + 31d	≤ 80	(Year 0 investment)
20a + 40b + 30c + 15d + 10e	≤ 70	(Year 0 investment)
A, b, c, d, e	≤ 1	(See note)
A, b, c, d, e	≤ 0	

Notes: It is assumed that project cannot be duplicates, so that the maximum proportion of any project which can be undertaken is 100%

The optimal solution

The simple method of linear programming would probably be used to derive a solution and although you will not be expected to produce a fully – worked solution by this method in your examination, some understanding of the optimal solution may be helpful.

The optimal solution to the problem could be calculated by the complex method, to show that the investment programme should be as follows:

Project	Proportion Accepted	Outlay year 0 ₦000	Outlay year 0 ₦'000	NPV ₦'000
A	100%	50	20	1,073
B	100%	20	30	741
C	100%	0	10	443
D	20.2555%	6.075	8.1	206
E	12.66%	3.925	1.9	73
		80.0	70.0	2,436

Some rounding occurs in the solution but all available funds 2011 and 2012 are utilized. Since these funds are effective constraint in our solution, they must have a dual price. These may also be calculated by the simplex method as follows:

Dual price of funds in 2011: an NPV of about N10 per ₦1,000 of outlay

Dual price of funds in 2012: an NPV of about N18 per ₦1,000 of outlay

In other words, if another ₦1,000 of funds could be made available in either 2011and2012 , the revised investment programme would yield an additional NPV of either ₦10 or ₦18, depending on the year in which extra fund were made available.

3. BOLADE Limited has ₦1,000,000 available for investment and the under listed which are not mutually exclusive have been identified.

Project	A	B	C	D	E
Initially/outlay	280,000	360,000	400,000	340,000	240,000
Residual Value	10,000	Nil	Nil	Nil	Nil

Net cash flow during 6 years life of the project

Project A. ₦80,000 annually.

B. ₦160,000 for each of the first 3 years and ₦120,000 for the next respectively

C. ₦120,000 for each of the 3 years and ₦160,000 for the remaining 3 years

D. ₦80,000 annually of the first 3years being been less than annual amount for the next 3 years.

E. First year nil and the remaining 5 years at ₦100,000 per annum.

The expected rate of return on capital is 15%. With supporting calculation advise management which of the project should be selected for investment.

Solution

Step 1 Evaluate the viability and PI of the entire project

Project A

YR	NCF	DFC	PV	PI	=	₦26,700
	₦		₦			₦280,000
0	(280,000)	1	(280,000)			
1-6	80,000 3.78		302,000			
6	10,000 0.43		4,300			0.095
		NPV	26,700			

Project B

YR	NCF	DFC	PV	PI	=	₦184,000
	₦		₦			₦360,000
0	(360,000)	1	(360,000)			
1-3	160,000	2.28	364,800			
4-6	120,000	1.50	180,000			0.513
		NPV	184,000			

Project C

YR	NCF	DFC	PV	PI	=	₦113,000
	₦		₦			₦400,000
0	(400,000)	1	(400,000)			
1-3	120,000	2.28	273,600			
4-6	160,000	7.15	240,000			0.284

		NPV	133,000			
Project D						
YR	NCF	DFC	PV	PI	=	(₦5,450)
	₦		₦			₦340,000
0	(340,000)	1	(340,000)			-0.016
1-3	80,000	2.28	182,800			
4-6	100,000	1.50	150,000			
-6	5,000	0.43	2,150			
		NPV	(5,450)			

Project D						
YR	NCF	DFC	PV	PI	=	₦51,000
	₦		₦			₦240,000
0	(240,000)	1	(240,000)			-0.016
2-6	100,000	2.91	291,000			
		NPV	51,000			

Step2: Rank the PI

Project	PI	Ranking
A	0.095	4
B	0.513	1
C	0.284	2
D	-0.01	5
C	0.2125	3

Step 3: Allocation of fund

	₦'000
Available funds	1,000
Less capital for B	360
Balance	640
Less capital for C	400
Balance	240
Less capital for E	240

Decision:

The management of BOLADE limited are hereby advise to select project B, C, and E order to maximize the company's net present value.

4. A company is considering the following independent project:

Project	Year 0	Year 1	Year 2
	₦'000	₦'000	₦'000
A	-100	-500	+25
B	-200	-90	+36
C	-150	-200	+44
D	-300	-100	+30
E	-50	+100	+10
F	-100	+80	-12

The maximum external finance available in Year 1 is ₦290,000. This figure can be however added to by any internally generated funds that arise form project in year 1.

Required: Advise the company what project to accept under the following independent condition

a. The company operates to accept under the following independent
b. The available capital in year 0 is limited to ₦450,000 and capital is freely available at the company's cost of capital in future years
c. in addition to (b) above A and C are mutually exclusive.
d. in addition (b) above projects A and E are mutually dependent.
e. Now assume that there is no capital rationing in year 0 but the maximum internal finance available in year 1 is ₦290,000. This figure can however be added to by any internally generated funds that arise from project in year 1.

Solution

A. In perfect capital market there is no capital rationing. Projects are therefore selected on the basic of NPV. We will therefore accept all projects with positive NPV. In this regard, accept project A,B,C,D and E.

B. Capital required to finance all projects with positive NPV = ₦800,000. Capital available = ₦450,000. Since the available capital is less than the capital required, we conclude that there is a single period capital rationing. Project must therefore be ranked on the basic of benefit cost ratio (Some authorities also call it profitability index)

Step1; Compute the NPV of each project (if not given). The NPV of each project is given in this guest ion and this step is not necessary.

Step2; Compute the benefit cost (B/C) ratio for each project and rank the project.

Project	YRO CF ₦ (a)	NPV ₦ (b)	B/C Ratio (b/a)	Ranking
A	100	25	0.25	2nd
B	200	36	0.18	4st
C	150	44	0.29	1st
D	300	30	0.10	5th
E	50	10	0.20	3rd

Step 3: Allocate the available in year 0 to the project in order of ranking

Project	YRO CF ₦ (a)	NPV ₦ (b)	B/C Ratio (b/a)	Ranking
C	150	150	300	44
A	100	250	200	25
E	50	300	150	27
B	150	450		106
Maximum possible NPV				

(150 x 36 =27)
200

Recommendation: Accept project C, A, E and 27% OF B.

(a) If A and C are mutually exclusive, the entire are grouped as follows:

Group 1 Project	(Exclude C) B/C Ratio	Ranking
A	0.28	1st
B	0.18	3rd
D	0.10	4th
E	0.20	2nd

Group 1 Project	(Exclude C) B/C Ratio	Ranking
B	0.18	3rd
C	0,29	1st
D	0.10	4th
E	0.20	2nd

Note: that the only difference between Group1 and 2 that Project A and C are in alterative group.

We now apply step 3 to each of the group in turn.

Allocation of Capital

Group 1

Project Outlay	Year 0 Outlay ₦	Cumulative of capital ₦	Balance ₦	NPV ₦
A	100	100	350	25
E	50	100	300	10
B	200	350	100	36
D	100	450	-	10
				81

(* 100 x 30 = 10)
300

Group2

Project Outlay	Year 0 Outlay ₦	Cumulative of capital ₦	Balance ₦	NPV ₦
C	150	150	300	44
E	50	200	250	10
B	200	400	50	26
D	50	450	-	5
				95

The NPV of Group2 than Group 1, therefore the company should accept C,E,B and 16.7% of D

(d) If project A and E are mutually dependent, then they must be accepted or rejected together. To ensure this we go through the following steps:

Step 1 – complete weighted B/C ratio for the dependent project

Project	Outlay	NPV
A	100	25
E	50	10
A	150	35

Weighted B/C ratio =35/150 = 0.23

Step 1 – complete weighted B/C ratio for the dependent project

Project	Outlay	NPV
A + E	0.23	2nd
B	0.18	3rd
C	0.25	1st
D	0.10	4th

Group2

Project	Year 0	Cumulative	Balance	NPV
	N	Outlay ₦	Cap ₦	₦
C	150	150	300	44
A + E	150	300	150	35
B	150	450	-	27

Maximum possible NPV 106

Recommendation: Accept project C.A.E and 75% of B

(e) Now capital rationing is in year 1 and not in year 0

Step 1: Recalculate the B/C ratio. Note that in doing this project F will be brought in because it generate positive in flow in Yr1 – the year capital rationing. It is necessary to test the desirability of F.

Project	Year1	NPV	B/C	Ranking
Capital				
	₦		₦	
	(a)	(b)	(b/a)	
A	500	25	0.05	5th
B	90	36	0.40	2nd
C	220	44	0.20	4th
D	100	30	0.30	3rd
F	-	10	+Infinity	1st
E	-	-12	+Infinity	?

Step 2: Allocate the available capital to the competing project, in order of ranking

Initially we will assume that project F is not accepted because the NPV is negative

Total capital available

		₦
-	Externally	290,000
-	Internally from project E	100,000
	Total available	390,000

Project	Year 1 ₦	Year1 Cumulative ₦	Balance Capital ₦	NPV ₦
E	0	0	390	10
B	90	90	300	36
D	100	190	200	30
D	200	390	-	40

Step 3: Should project F accepted? First compute the coast – benefit (C/B) ratio (not B/C ratio) for project F.

C/B = 12 / 80 = 0.15

Remember that project capital has not been funded. We still need ₦20,000

Should we take ₦20,000 from of year 1 cash flow of project F (despite its negative NPV) to fund project C? the answer is yes because B/C ratio of C (0.20) is greater than the C/B ratio of F (0.15) for every N1invested on C, the company make a net return of ₦0.20 – ₦0.15 =₦0.05

We are then left with ₦60,000 of year 1 cash flow of project F should we invest this on project A? The answer is no because for every ₦1 taken project from F and invested on project A, we again N0.05 on A and lose ₦0.15 on giving a net loss of ₦0.10.

The project to be accepted are E, B, D, C and 5% of F. the total NPV is

Project	₦'000
E	10
B	36
D	30
C	44

F20 x -12 (₦12,000)
80
= 2.3

(a) Historical Cost:

Every decision deal with the future. The function of the decision marker is to select course of action for the future and this decision by as nature be based on prediction. Historical costs are therefore irrelevant to decision though they any be the best basis of predicting future cost.

(b) Past Cost:

Cost incurred in the past i.e. sunk cost will always be irrelevant. The decision maker has no opportunity to alter whose has already happened. Some specific examples of this are:

(i) Obsolete Stock: the stock already healed and now proves to be obsolete, has no relevance to decision regarding its presale or other use.

(ii) Old equipment: The cost of new equipment at the disposal value of old equipment is relevant transaction. The book value of old equipment is irrelevant to any decision making techniques.

(c) Other terms that may also apply to historical or past are:

(i) General cost (ii) Indirect Cost (iii) Unavoidable cost
(ii) Allocated Cost (iv) Apportioned Cost (iv) Prorated cost
(vii) Uncontrollable cost

(d) Variable Cost:

This will represent those categories of cost that cannot be referred to as either labour or

material yet varied with the activity level. As a result of this decision with the activity, variable costs constitute a relevant cost any decision.

Relevant cost in this context are only those expected futures cost that will differ under alternative course of actions.

(e) Fixed cost:

Cost which has been classified as fixed by convention or on the basis of past experiences may in fact affect a particular decision. This may be for two reasons

(i) The cost fixed in relation to the level of activity previously experienced. But a decision may extend the range of activity and thus cause certain fixed cost to be stepped up to new level:

(ii) The cost are fixed in relation to the normal time horizon for forecasting if the time span of an action exceed the normal period, the fixed the cost may change.

Therefore, a fixed cost will be relevant to a particular, if that decision will influences the actual cost to increase as stated. But where will be no alteration in the position of a fixed cost, then such will not be relevant future decisions.

(f) Direct Cost:

This will represent total that will be directly incurred in the course of manufacturing a product or rendering services e.g. Material cost, labour cost and direct expense.

(g) Material Cost: For the purpose of valuing raw material for decision making different value will require attention as follows:

- Replacement value: This will represent the current market price of the items. It will be required in valuing raw material, if it can be ascertained that the raw material is frequently used by the organization.
- Net Realizable Value: This will also represent the current disposable of an item or raw material presently held in store. This amount would be relevant in pricing decision it can be established that the purpose of acquiring the material initially is no longer achievable
- Historical Cost: This will represent the actual cost of obtaining the raw material as the time of purchase. In decision making, historical cost is sunk cost, therefore irrelevant in any present or future decision.

■ Labour cost: this will represent the total remuneration payable to worker for their productive services to the organization. However, for the purpose of decision making, labour may be categorized into two:

- FULL- Time worker also referred to as salaried worker. There remuneration of this cadre of labour represent a fixed cost to the organization since it is payable at the end of specified period. This labour cost will not be relevant in present or future decision except the increase in the present amount as result of that decision.
- Ad-hoc Worker: Under any circumstances, the remuneration of casual worker will represent a relevant cost to the organization. This is because such cost is directly attributable to the decision on whether or not particular order should be accepted or not.

(g) Sunk Costs

Past costs, which are not relevant to a decision, are called sunk cost. The CIMA official terminology describes sinks cost as that above have been irreversibly incurred or committed prior to a decision and which cannot therefore cost be termed “irrecoverable costs”

(h) Committed cost:

Not all future costs are relevant to a future decision some future cost will be arise as a result of decision that have already been taken. These are called committed costs. Typical committed costs are staff salaries and the rent for equipment and building where relate to contractual obligation made in the past.

(i) Future Cash Cost

All future cash expenditure specifically identified with Decision is relevant to that decision

MODULE 4

4.00 PLANNING AND CONTROL

4.01 Learning Outcomes

On successful completion of this Module, students should be able to:

i. Evaluate organizations plan and the processes they use in budgetary control systems;
ii. Evaluate alternative approaches to budgeting;
iii. Prepare budgetary control of engineered, committed and discretionary costs;
iv. Prepare variance analysis;
v. Appraise standard costing and variance analysis in modern manufacturing environment;
vi. Evaluate both the advantages and disadvantages of forecasting techniques.

4.02 Introduction

In this module we focus our attention on those steps taken by business organizations to achieve their desired levels of profits a process that is generally called profit planning. We shall see that profit planning is accomplished through the preparation of a number of budgets which, when brought together, form an integrated business plan known as the master budget. The master budget is an essential management tool that communication management's plans throughout the organization, allocates resources and coordinates activities.

The most important factor in management accounting is the formulation of policy and its successful implementation. For the effective functioning of the management, it is essential that it should be appraised to the fact of how far the forecasts made by them in the past have been achieved and to what extent their policies have been implemented and on the basis of which future forecasts may be made. No planning could be made unless a policy in formulated. So policy comprises the various objects of the management and the principles followed in the attainment of those objects. As no budget can be prepared without a policy, it is the keynote of the budget. Hence the purpose of budgeting is to assess the extent of success of the management in their planning and the actions to be taken in case of variation, and to provide an insight into planning and practical guidance for understanding purpose of budgeting control system.

4.03 Budgetary System

According to CIMA, budgetary system represents an amalgamation of three component parts of budgetary planning, budget and budgetary control.

a. Budgetary Planning

This is defined as an establishment of a short term plan designed and incorporated from the long term corporate objective of the organization such that the established goals are based on budget.

b. Budget

Budget is a detailed plan for the acquisition and use of financial and other resources over a specified time period. It represents a plan for the future expressed in formal quantitative terms. The act of preparing a budget is called budgeting. The use of budgets to control a firm's activities is known as budgetary control. The master budget is a summary of a company's plans that sets specific targets for sales production, distribution and financial activities. It generally culminates in a cash budget, a budgeted profit and loss account, and a budgeted balance sheet. In short, it represents a comprehensive expression of management's plans for the future and how these plans

are to be accomplished.

4.04 Differences between Planning and Control

The terms planning and control are often confused, and occasionally these terms are used in such a way as to suggest that they mean the same thing. In actual sense, planning and control are two quite distinct concepts. Planning involves developing objectives and preparing various budgets to achieve these objectives. Control on the other hand, involves the steps taken by management to increase the likelihood that the objectives set down at the planning stage are attained, and to ensure that all parts of the organizational function in a manner consistent with organizational policies.

To be completely effective, a good budgeting system must provide for both planning and control. Good planning without effective control is time wasted. On the other hand, unless plans are laid down in advance, there are no objectives towards which control can be directed.

Budgeting systems often serve multiple purposes with two of the more important functions being planning and control. Management must decide which role is more appropriate. For example, large firms concerned with operational efficiency should focus on the control and co-ordination aspects of budgeting, while small, innovative companies should be more concerned with the planning aspects of budgeting.

a. Budgeting Control

This may also be described as an establishment of budget relating to the responsibilities of the executives, to the requirement of the budget or policy and the periodic review or comparison of the actual result with the budgeted performances either to secure approval for individual action or to serve as a remedial course of action.

Budgeting system involves the following steps/ stages:

i. Identification of the long-term corporate objective of the organization
ii. Establishment of short-term achievable objective from the long-term corporate objective
iii. Identification of the organizational structure together with the line of authority in order to identify the various responsibility centers within the organization
iv. Obtain top management support in the process of introducing the budgetary statement.
v. Request each of the responsibility centre to submit budgetary estimate for the proposed period.
vi. Use the data obtained to prepare the working budget.
vii. Prepare budget manual for the purpose of identifying the various budgetary objectives together with how the objective will be achieved.
viii. Identifying the budget key factor among the various resources of the organization.
ix. Appoint a budget committee or a budgetary officer for the purpose of coordinating the budgetary activities.
x. Embark on periodic comparison of the actual result obtained with the budgeted performances.
xi. Investigate the variances for the purpose of improvement.

4.05 Objectives of Budgetary Control

The main objectives of a budgetary control system are:

i. To provide a detailed plan of the works to be carried out by a business during a specific period.
ii. To provide a means of assessment of responsibilities for the derivations from the plan and to take the necessary action by the supply of information.
iii. To provide coordination of the activities of the business to enable the management to get the maximum benefit.
iv. It serves as a measure of performance.
v. It provides the management with a summarized picture of the results to be achieved from the plan of operations.
vi. It encourages effective delegation of authority.
vii. Attainment of budgetary goals may also serve as a motivating factor for increased productivity.
viii. It serves as a means of controlling future expenditure.

4.06 Purpose of Budgetary Control Systems

The following are the purposes of budgetary control system.

1. Coordination between the plans, policy and control is established.
2. As every person in the management is concerned with the preparation of the budget he can very well know the targets fixed could be reached.
3. Performances like production, expenditure and sales are subject to severe control and measurements.
4. As there is effective control over the cost, there is the possibility in their reduction as well as elimination of wastage in manpower and material.
5. Since there is an effective control over the production, resources can be put to the best use.
6. A budgetary control system indicates where the management policy goes wrong and why the forms the basis for a change or modification in policy.
7. As the personnel will try to achieve the target by coordinated effort there is bound to be the maximum profits.
8. Since every aspect of the business is thoroughly reviewed, the top management gets control of the various activities.
9. The liquid capital is put to better utilization and the surpluses, which are not invested can be avoided.
10. It serves as an effective control over stores and stocks.
11. The responsibilities of the executive and personnel for the achievement of policy are defined.
12. A well-organized budgetary control system is bound to give maximum utilization of resources, the maximum profits of the business can be got.
13. This enables constant comparison of the actual output and expenses with the budgeted figures

4.07 Limitations of Budgetary Control

1. Budget ignores responsibilities centres in performance evaluation.
2. It represents an ordinary tool which may not be effective without closer supervision.
3. The need for superior executive ability in preparation and presentation.
4. Budget may encourage inter-departmental conflicts among divisional heads.
5. Establishment of unattainable target or standard for workers.
6. Lack of realistic data in budget preparation.
7. Persistent increase in the level of inflation.
8. Frequent changes in the level of technology.
9. Political instability.
10. Negative attitudinal trait of the operating managers against the budget.

4.08 Steps in Budgetary Control

i. Establish a plan or target of performance, which coordinates all the activities of business.
ii. Record the actual performance.
iii. Compare the actual performance with the planned.
iv. Calculate the difference or variance and analyze the reason for them.
v. Act immediately to remedy the situation.

4.09 Organization for Budgetary Control

There should be an effective organization for successful budgetary control. Such organization requires.

i. The creation of budget centre.
ii. The introduction of adequate accounting records.
iii. The preparation of an organization chart.
iv. The general instruction in technique.
v. The establishment of budget committee.
vi. The preparation of budget manual.
vii. The fixation of budget period.
viii. The determination of key factor.
ix. The determination of the level of the activity.

4.10 Alternative Approaches to Budgeting

a. Incremental Budgeting

Increment budgeting is a method of budget setting in which the prior period budget is used as a base for the current budget to take account of any anticipated changes. For example, if activity levels are expected to be unchanged the budget for the coming year is simply based on the current year's budget, plus an increase or decrease to compensate for expected price changes. The method is crude and cannot be recommended as it does not stimulate managers to continually improve efficiency levels. Moreover, it encourages "spending up to the budget" to ensure a reasonable allocation in the next period. It leads to a "spend it or lose it" mentality.

Importance of Incremental Budgeting

i. The budget is stable and change is gradual.
ii. Managers can operate their departments on a consistent basis.
iii. The system is relatively simple to operate and easy to understand.
iv. Conflicts are avoided when departments appear to be treated similarly.
v. Coordination between budgets is easier to achieve.
vi. The impact of change can be seen quickly.

Limitations Of Incremental Budgeting

i. No incentive for developing new ideas.
ii. No incentive to reduce cost.
iii. It encourages spending up to the budget so that the budget is maintained next year/period.
iv. The budget may become out-of-date and no longer relate to the level of activity or type of work being carried out.
v. The priority for resources may have changed since the budgets were originally set.
vi. There may be budgetary slack built into the budget which is never reviewed. Managers might have overestimated their requirements in the past in order to obtain a budget which is easier to work within.

4.11 Zero-Based Budgeting (ZBB)

ZBB is a method of budgeting which requires each cost element to be specifically justified as though the activities to which the budget relates were being undertaken for the first time. Without approval, the budget allowance is zero. ZBB attempts to overcome the defects of incremental budgeting by requiring managers to obtain detailed approval for all projected expenditure. While the principle is sound the ZBB process can become over-bureaucratic, costly and time-consuming. For this reason, full ZBB systems are rare.

ZBB also known as “priority based budgeting” can equally be described as a budgeting technique which seeks to eliminate the draw backs of traditional incremental budgeting by taking the budgeting for service or overhead centres back to a minimal operating level and then requiring increments above this level to be quantified and justified.

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 sub-dividing the organization to discrete sub-units where operations can be meaningfully and individually identified and evaluated.

ii. **The Decision Packages**: Each decision unit manager submits not 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 Zero-Based Budgeting

i. Efficient allocation of resources, as it is based on needs and benefits.
ii. Drives managers to find cost effective ways to improve operations.
iii. Detects inflated budgets.
iv. Useful for service departments where the output is difficult to identify.
v. Increases staff motivation by providing greater initiative and responsibility in decision-making.
vi. Increases communication and coordination within the organization.
vii. Identities and eliminates wasteful and obsolete operations.
viii. Identifies opportunities for outsourcing.
ix. Forces cost centers to identify their mission and their relationship to overall goals.

Disadvantages of Zero-Based Budgeting

i. Difficult to define decision units and decision packages, as it is time-consuming and exhaustive.
ii. Forced to justify every detail related to expenditure. The Research and Development Department is threatened whereas the Production Department benefits.
iii. Necessary to train managers. ZBB must be clearly understood by managers at various levels to be successfully implemented. Difficult to administer and communicate the budgeting because more managers are involved in the process.
iv. In a large organization, the volume of forms may be so large that no one person could read it all. Compressing the information down to a usable size might remove critically important details.
v. Honesty of the managers must be reliable and uniform. Any manager that exaggerates skews the results.

4.12 Activity-Based Budgeting (ABB)

Activity based budgeting (ABB) which is also known as Activity Cost Management is defined as "a method of budgeting based on an activity framework and utilizing cost driver data in the budget-setting and variance feedback process".
In other words, it is a method of budgeting in which the activities that incur costs in every functional area of an organization are recorded and their relationships are defined and analyzed. Activities are then tied to strategic goal, after which the costs of the activities needed are used to create the budget.

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.
It could also be referred to as an approach to budgeting that involves quantitative expression of the activities/business processes of the reflecting forecasts of work load (quantity of drivers) and other financial requirements to achieve performance. Activity based budgeting provides greater detail, especially regarding overhead; because it permits the identification of value-adding activities

and their drivers. It is useful for comparing actual costing rates and driver usage with the amounts budgeted.

Features of Activity Based Budgeting

i. It recognizes 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.

ii. ABB differentiates and examines activities for their value adding potentials.

iii. The department activities are driven by demand and decisions which are beyond the control of the budget holder.

iv. It encourages immediate and relevant performance measures required that are found in conventional budgeting system.

Advantages of ABB

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

ii. It has ability to tackle cross organizational issues through a participating approach.

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

Limitations of ABB

i. Time consuming to set up- we have to understand the activities that drive the budget.

ii. Costly-buying, implementing and maintaining an activity based system, is very costly.

iii. Managers may be demotivated, rather than looking at the bigger picture.

iv. More effective methods such as Zero-based budgeting and continuous budgeting can be used instead of activity based budgeting

4.13 Rolling Budget/Continuous Budget

Rolling budget which is known as continuous 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 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 June to cover June to September in details and October of the following year in lesser details.
In other words, rolling budgets involve updating a twelve months budget every month or quarter. Where a rolling budget is regularly revised by discarding the segment relating to the one or three-month period that has just elapsed and adding on a new segment to the far end of the budget. The

new twelve-month budget will then be reviewed to reflect current expectations. Rolling budgets can be set at two levels of detail. For instance, a detailed budget may be prepared for the next three months, while less detailed "broad brush" figures are used for the subsequent nine months.
Preparing rolling budgets can become time-consuming and expensive if the process is badly managed or if it is difficult to obtain the necessary data. However, spreadsheet modeling combined with a financial/operational data base should minimize this problem.

4.14 Benefits of Rolling/Continuous Rolling Budgeting

Rolling budgeting are particularly beneficial where future costs and/or activities cannot be forecast accurately. Rolling budgets are useful for coping with inflation and are valuable for rapidly developing businesses and those firms that are committed to a policy of continuous improvement. Rolling budgets are perfectly compatible with flexible and activity-based budgeting.

i. The problem of being out of date before being applied is avoided since the budget is continuously updated.

ii. The budget is unlikely to become obsolete by the second or third month of the first quarter.

iii. Year end buying spree intended to mop up surplus budget funds will be avoided since the budget is continuously updated because the year-end will never be reached. Funds would be spent more wisely and only when necessary.

iv. Rolling budget reinforces the reality that most commercial activity is continuous process that does not have pauses in its activity.

v. Managers should become more adept at budgeting because they would be continually aware that the current budget would soon be due for an update.

vi. Manager's short-term planning horizon would not slip below eight or nine months.

vii. The control of working capital levels should be improved by monthly or quarterly updates, which will feed into the working capital control models.

viii. Rolling budgets are up to date and regularly revised, it thereby reduces the element of guess work and uncertainty that is inevitable in the budget setting process.

ix. The budgeting process is very likely to be more realistic and therefore a better means of motivating managers.

Disadvantages/Drawbacks of Rolling/Continuous Budgeting

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.

iii. Managers may feel that the "goal posts" are being motivated continually. This may discourage them from participating fully in the budgeting process.

iv. Some managers may regard the rolling budget as an opportunity to manipulate their figures, or to continually put off the achievement of operational goals.

Most of the problems identified above can be overcome by managing the budgeting process efficiently and sensitively. No organization should need to choose between flexible, activity-based and rolling budget. All three systems are compatible with each other. In fact, the ideal budgeting system for some organizations could be a combination of all three.

4.15 Beyond Budgeting

Some of the criticism and proposals for reform of budgeting have come from the beyond budgeting, it is important to propose viable alternative. They suggest a number of principles and practices. Arguing that in a globalized economy which increasingly rewards innovation and intellectual capital, the stifling effect of budgeting may damage shareholder interests. With respect to shareholder interests, the round table proposes that targets should be aimed at maximizing long-term value and that resources management should be over the lifetime of an investment and not on the basis of short-term budget allocations. The round table emphasizes the principle of delegation of responsibility with an approach to strategy development that involves the frontline as well as the head office. A beyond budgeting corporate culture aims to encourage radical thinking which analyses whether activities (and the costs that they incur) and value. Radical thinking helps the organization to break away from budgetary models of planning characterized by incrementalism. Overall, the emphasis is on an organizational culture that encourages workers to management empowerment.

When it is advocated that organizations abandon budgeting, it may mean that budgets are still used for cash management and other financial purposes but, crucially, not for performance education. The aim is to avoid the annual performance trap associated with budgeting by working with what have been called 'relative performance contracts with hindsight'. The significance of the term 'relative' is that performance is benchmarked against internal or external comparators rather than against historical standards such as last year's results. The term 'with hindsight' means that rather than against referring to fixed targets set at the beginning of the period, 'targets are adjusted by looking back and incorporating the actual operating and economic circumstances during the period.

Managerial and employees' rewards tend to be based on subjective and group criteria with an 'objective to engender a philosophy doing what is best for the firm in the light of current circumstance and to promote teamwork. These issues will be developed further below where it is argued that alternative control systems or reforms to budgeting are best studied as part of a more general review of possible approaches to organizational control.

Focus on practice

Beyond budgeting? Some survey evidence.

The critics of budgeting can sometimes present a rather simplified view of how budgets actually used. A recent survey suggested that the actual application of budgets is subtler than the critics allow and that the problems (such as short-termism and inflexibility) are dealt with via adaptation to the budgeting control system. In particular, companies use subjective evaluations and non-financial system based on human resource management. The budgets are revised frequently and are linked to long-term strategic plans. The budgets are supplemented by cultures of information sharing and managing for the long term.

4.16 Budgetary Control of Engineers

Mixed costs can be segregated into fixed and variable element by adopting Engineering method

amongst others. Engineering method can be described as a detailed analysis of cost behaviour based on an industrial engineer's evaluation of the inputs that are required to carry out a part of the prices of those inputs.

This approach is based on the use of engineering analysis of technological relationship between inputs and outputs e.g. methods study, work sampling and time motion studies. The procedure in such a study is to make an analysis based on direct observations of the underlying physical quantities required for an activity and then to convert the final results into cost estimates. Engineers, who are familiar with the technical requirements, estimate the quantities of material, labour and machine hours required for various operations, prices and rates are then applied to the physical measure to obtain the cost estimates. Engineering method is useful for estimating cost of repetitive processes where input-output relationships are clearly defined. The method is usually satisfactory for estimating cost that are usually associated with direct materials, labour and machine time, because these items can be directly observed and measured.

Time and motion studies can also be applied to well-structured administrative and selling activities such as typing, invoicing and purchasing. It is not generally appropriate, however, for estimating cost that are different to associate directly with individual unit of output such as many types of overhead costs, since these items cannot be easily be directly observed and measured.
The use of engineering method is most appropriate when direct cost from a large part of the total cost and when input output relationships are fairly stable overtime. One disadvantage of Engineering method is that methods study, work sampling and time and motion study technique can be expensive to apply in practice.

Types of Fixed Costs
Fixed costs are sometimes referred to as a capacity cost, since they result from outlays made for buildings, equipment, skilled professional employees and other items needed to provide the basic capacity for sustained operations. For planning purposes, fixed costs can be viewed as being either committed or discretionary.

4.17 Committed Fixed Costs
Committed fixed costs relate to the investment in facilities, equipment and the basic organizational structure of a firm. Examples of such costs include depreciation of buildings and equipment, taxes on real estate, insurance, and salaries of top management and operating personnel. The two key factors about committed fixed costs are that first, they are long term in nature, and second, they cannot be reduced to zero even for short periods of time without seriously impairing the profitability or long-run goals of the organization. Even if operations are interrupted or cut back, the committed fixed cost will still continue largely unchanged. During a recession, for example, a firm will not usually discharge key executives or sell off key facilities. The basic organizational structure and facilities ordinarily are kept intact. The costs of restoring them later are likely to be far greater than any short-run savings that might be realized.
Since it is difficult to change a committed fixed cost once the commitment has been made, management should approach these decisions with particular care. Decisions to acquire major equipment or to take on other committed fixed costs involve a long planning horizon. Management should make such commitments only after careful analysis of the available alternatives. Once a decision is made to build a certain size facility, a firm becomes locked into that decision for many years to come.

While not much can be done about committed fixed costs in the short run, management is generally very concerned about how these resources are utilized. The strategy of management must be to utilize the capacity of the organization as effectively as possible.

4.18 Discretionary Fixed Costs

Discretionary Fixed Costs (often referred to as managed fixed costs) usually arise from annual decisions by management to spend in certain fixed cost areas. Examples of discretionary fixed costs include advertising, research, public relations, management development programmes and internships for students. Two key differences exist between discretionary fixed costs and committed fixed costs. First, the planning horizons for discretionary fixed cost is fairly short term-usually a single year. By contrast, committed fixed costs have a planning horizon that encompasses many years. Second, discretionary fixed costs can be reduced for short periods of time with minimal damage to the long-run goals of the organization. For example, a firm that has been spending N50,000 annually on management development programmes may be forced, because of poor economic conditions, to reduce its spending in that area during a given year. Although some unfavourable consequences may result from the cutback, it is doubtful that these consequences would be as great as those that would result if the company decided to economize during the year by laying off key personnel.

Whether a particular cost is regarded as committed or discretionary may depend on management's strategy. For example, during recessions when the level of home building is down, many construction companies retain large numbers of employees on the payroll, even though the workers have little or no work to do. While these latter companies may be faced with short-term cash flow problems, it will be easier for them to respond quickly when economic conditions improve. And the higher morale and loyalty of their employees may give these companies a significant competitive advantage.

The most important characteristic of discretionary fixed costs is that management is not locked into a decision regarding such costs. They can be adjusted from year to year or even perhaps during the course of a year if circumstances demand such a modification.

4.19 Control and Performance Measurement/The Budgeting Process

i. The Budgeting Process

Management accounting can assist managers in making decisions. The actions that follow managerial decisions normally involve several aspects of the business, such as the marketing, production, purchasing and finance functions, and it is important that management should coordinate these various interrelated aspects of decision-making. If they fail to do this, there is a danger that managers may each make decisions that they believe are in the best interests of the organization when, in fact, taken together they are not; for example, the marketing department may introduce a promotional campaign that is designed to increase sales demand to a level beyond that which the production department can handle. The various activities within a company should be coordinated by the preparation of plans of actions for future periods. These detailed plans are usually referred to as ***budgets***.

Our objective in this module is to focus on the planning process within a business organization and

to consider the role of budgeting within this process. What do we mean by planning? Planning is the design of a desired future and of effective ways of bringing it about (Ackoff, 1981). A distinction is normally made between short-term planning (budgeting) and ***long-range planning***, alternatively known as ***strategic*** or ***corporate planning***. How is long-range planning distinguished from other forms of planning?

Sizer (1989) defines long-range planning as a systematic and formalized process for purposely directing and controlling future operations towards desired objectives for periods extending beyond one year. Short-term planning or budgeting, on the other hand, must accept the environment of today, and the physical, human and financial resources at present available to the firm. These are to a considerable extent determined by the quality of the firm's long-range planning efforts.

ii. Stages in the Planning Process

To help you understand the budgetary process we shall begin by looking at how it fits into an overall general framework of planning, decision-making and control. The framework outline in this model will be used to illustrate the role of long-term and short-term planning within the overall planning and control process (Figure .1). The first stage involves establishing the objectives of the organization.

Stage 1: Establishing Objectives

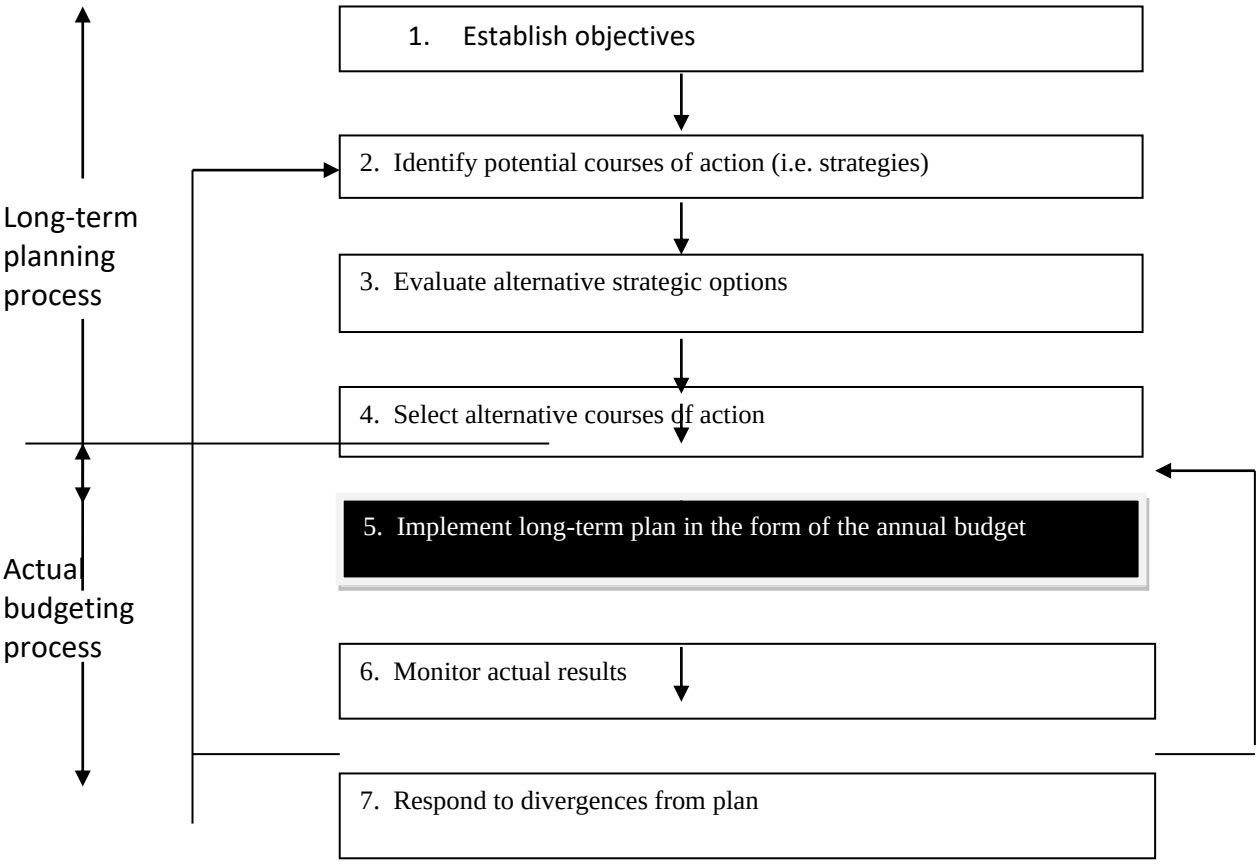
Establishing ***objectives*** is an essential pre-requisite of the planning process. In all organizations employees must have a good understanding of what the organization is trying to achieve. Strategic or long-range planning therefore begins with the specification of the objectives towards which future operations should be directed. The attainment of objectives should be measurable in some way and ideally people should be motivated by them. Johnson and Scholes (2002) distinguish between three different objectives, which form a hierarchy: the 'mission' of an organization, corporate objectives and unit objectives.

The ***mission*** of an organization describes in very general terms the broad purpose and reason of an organization's existence, the nature of the business (es) it is in and the customers it seeks to serve and satisfy. It is a visionary projection of the central and over-riding concepts on which the organization is based. Objectives tend to be more specific and represent desired states or results to be achieved.

iii. ***Corporate objectives*** relate to the organization as a whole. They are normally measurable and are expressed in financial terms such as desired profits or sales levels, return on capital employed, rates of growth or market share. Corporate objectives are normally formulated by members of the board of directors and handed down to senior managers. It is important that senior managers in an organization understand clearly where their company is going and why and how their own role contributes to the attainment of corporate objectives. Once the overall objectives of the organization have been established they must be broken down into subsidiary objectives relating to areas such as product range, market segmentation, and customer service and so on. Objectives must also be developed for the different parts of an organization. ***Unite objectives*** relate to the specific objectives of individual units within the organization, such as a division or one company within a holding company. Corporate objectives are normally set for the organization as a whole and are then translated into unit objectives, which become the targets for the individual units. You should note that the expression ***aims*** is sometimes used as an alternative

to mission and the term ***goals*** is synonymous with objectives.

Figure.1 **The Role of Long-and Short-Term Planning Within the Planning, Decision-Making and Control Process**



Stage 2: Identify Potential Strategies

The next stage shown in Figure 1 is to identify a range of possible courses of action (or ***strategies***) that might enable the company's objectives to be achieved. The corporate strategy literature advocates that, prior to developing strategies, it is necessary to undertake ***a strategic analysis*** to become better informed about the organization's present strategic situation. This involves understanding the company's present position, its strengths and weaknesses and its opportunities and risks.

Having undertaken a strategic analysis, the next stage is to identify alternative strategies. The identification of strategies should take into account the following:

1. The generic strategy to be pursued (i.e. the basis on which the organization will compete or sustain excellence).

2. The alternative directions in which the organization may wish to develop.

An organization should determine the basis on which it will compete and/or sustain a superior level of performance (i.e. the generic strategy that it will follow). The purpose is to ensure that deliberate choices are made regarding the type of competitive advantage it wishes to attain. Porter (1985) has identified three ***generic strategies*** that an organization can follow:

1. *cost leadership*, whereby the organization aims to be the lowest cost producer within the industry;

2. *differentiation*, through which the organization seeks some unique dimension in its product/service that is valued by consumers, and which can command a premium price;

3. *focus*, whereby the organization determines the way in which the strategy is focused at particular parts of the market. For example, a product or service may be aimed at a particular buyer group, segment of the product line or smaller geographical area.

An organization that adopts a focused strategy aimed at narrow segments of the market to the exclusion of others also needs to determine whether within the segment it will compete through cost leadership or differentiation. Small companies often follow much focused or *niche* strategies by becoming so specialized in meeting the needs of a very small part of the market that they are secure against competition from large organizations.
Porter's view is that any organization seeking a sustainable competitive advantage must select an appropriate generic strategy rather than attempting to be '*all things to all people'*.

Having identified the basis on which it will compete, an organization should determine the directions it wishes to take. The company should consider one or more of the following:

1. doing nothing;
2. withdrawing from some markets;
3. selling existing products more effectively in existing markets (market penetration);
4. selling existing products in new markets (market development);
5. developing new products for sale in existing markets (product development);
6. developing new products for sale in new markets(diversification).

Stage 3: Evaluation of Strategic Options

The alternative strategies should be examined based on the following criteria:

1. *Suitability*, which seeks to ascertain the extent to which the proposed strategies fit the situation identified in the strategic analysis. For example, does the strategy exploit the company strengths and environmental opportunities, avoid the weaknesses and counter the environmental threats?

2. *Feasibility,* which focuses on whether the strategy can be implemented in resource terms. For example, can the strategy be funded? Can the necessary market position be achieved? Can the company cope with the competitive reactions?

3. *Acceptability*, which is concerned with whether a particular strategy is acceptable. For example, will it be sufficiently profitable? Is the level of risk acceptable?

The above criteria represent a broad framework of general criteria against which strategic options can be judged. The criteria narrow down the options to be considered for a detailed evaluation. Management should select those strategic options that have the greatest potential for achieving the company's objectives. There could be just one strategy chosen or several.

Stage 4: Select Course of Action

When management has selected those strategic options that have the greatest potential for achieving the company's objectives, long-term plans should be created to implement the strategies. A ***long-term plan*** is a statement for the preliminary targets and activities required by an organization to achieve its strategic plans together with a broad estimate for each year of the resources required.

Because long-term planning involves '*looking into the future*' for several years ahead the plans tend to be uncertain, general in nature, imprecise and subject to change.

Stage 5: Implementation of the Long-Term Plans

Budgeting is concerned with the implementation of the long-term plan for the year ahead. Because of the shorter planning horizon budgets are more precise and detailed. Budgets are clear indications of what is expected to be achieved during the budget period whereas long-term plans represent the broad directions that top management intend to follow.

The budget is not something that originates '*from nothing*' each year – it is developed within the context of ongoing business and is ruled by previous decisions that have been taken within the long-term planning process. When the activities are initially approved for inclusion in the long-term plan, they are based on uncertain estimates that are projected for several years. These proposals must be reviewed and revised in the light of more recent information. This review and revision process frequently takes place as part of the annual budgeting process, and it may result in important decisions being taken on possible activity adjustments within the current budget period. The budgeting process cannot therefore be viewed as being purely concerned with the current year – it must be considered as an integrated part of the long-term planning process.

Stages 6 And 7: Monitor Actual Outcomes and Respond to Divergences from Planned Outcomes

The final stages in the decision-making, planning and control process outline in Figure 15.1 are to compare the actual and the planned outcomes, and to respond to any divergences from the plan. These stages represent the control process of budgeting, but a detailed discussion of this process will be deferred until **later.** Let us now consider the short-term budgeting process in more detail.

The Multiple Functions of Budgets

Budgets serve a number of useful purposes. They include:

1. *planning* annual operations;
2. *coordinating* the activities of the various parts of the organization and ensuring that the parts are in harmony with each other;
3. *communicating* plans to the various responsibility centre managers;
4. *motivating* managers to strive to achieve the organizational goals;
5. *controlling* activities;
6. *evaluating* the performance of managers.

Let us now examine each of these six factors.

v. Planning

The major planning decisions will already have been made as part of the long-term planning process. However, the annual budgeting process leads to the refinement of those plans, since managers must produce detailed plans for the implementation of the long-range plan. Without the annual budgeting process, the pressures of day-to-day operating problems may tempt managers not to plan for future operations. The budgeting process ensures that managers do plan for future operations, and that they consider how conditions in the next year might change and what steps they should take now to respond to these changed conditions. This process encourages managers to anticipate problems before they arise, and hasty decisions that are made on the spur of the moment, based on expediency rather than reasoned judgment, will be minimized.

vi. Coordination

The budget serves as a vehicle through which the actions of the different parts of an organization can be brought together and reconciled into a common plan. Without any guidance, managers may each make their own decisions, believing that they are working in the best interests of the organization. For example, the purchasing manager may prefer to place large orders so as to obtain large discounts; the production manager will be concerned with avoiding high stock levels; and the accountant will be concerned with the impact of the decision on the cash resources of the business. It is the aim of budgeting to reconcile the differences for the good of the organization as a whole, rather than for the benefit of any individual area. Budgeting therefore compels managers to examine the relationship between their own operations and those of other departments, and, in the process, to identify and resolve conflicts.

vi. Communication

If an organization is to function effectively, there must be definite lines of communication so that all the parts will be kept fully informed of the plans and the policies, and constraints, to which the organization is expected to conform. Everyone in the organization should have a clear understanding of the part they are expected to play in achieving the annual budget. This process will ensure that the appropriate individuals are made accountable for implementing the budget. Through the budget, top management communicates its expectations to lower level management, so that all members of the organization may understand these expectations and can coordinate their activities to attain them. It is not just the budget itself that facilitates communication – much vital information is communicated in the actual act of preparing it.

vii. Motivation

The budget can be a useful device for influencing managerial behavior and motivating managers to perform in line with the organizational objectives. A budget provides a standard that under certain circumstances, a manager may be motivated to strive to achieve. However, budgets can also encourage inefficiency and conflict between managers. If individuals have actively participated in preparing the budget, and it is used as a tool to assist managers in managing their departments, it can act as a strong motivational device by providing a challenge. Alternatively, if the budget is dictated from above, and imposes a threat rather than a challenge, it may be resisted and do more harm than good.

vii. Control

A budget assists managers in managing and controlling the activities for which they are responsible. By comparing the actual results with the budgeted amounts for different categories of expenses, managers can ascertain which costs do not conform to the original plan and thus require their attention. This process enables management to operate a system of ***management by exception*** which means that a manager's attention and effort can be concentrated on significant deviations from the expected results. By investigating the reasons for the deviations, managers may be able to identify inefficiencies such as the purchase of inferior quality materials. When the reasons for the inefficiencies have been found, appropriate control action should be taken to remedy the situation.

x. Performance Evaluation

A manager's performance is oft en evaluated by measuring his or her success in meeting the budgets. In some companies, bonuses are awarded on the basis of an employee's ability to achieve the targets specified in the periodic budgets, or promotion may be partly dependent upon a manager's budget record. In addition, the manager may wish to evaluate his or her own performance. The budget thus provides a useful means of informing managers of how well they are performing in meeting targets that they have previously helped to set. The use of budgets as a method of performance evaluation also influences human behavior, and for this reason we shall consider the behavioural aspects of performance evaluation later.

x. Conflicting Roles of Budgets

Because a single budget system is normally used to serve several purposes there is a danger that they may conflict with each other. For instance, the planning and motivation roles may be in conflict with each other. Demanding budgets that may not be achieved may be appropriate to motivate maximum performance, but they are unsuitable for planning purposes. For these a budget should be set based on easier targets that are expected to be met.

There is also a conflict between the planning and performance evaluation roles. For planning purposes budgets are set in advance of the budget period based on an anticipated set of circumstances or environment. Performance evaluation should be based on a comparison of actual performance with an adjusted budget to reflect the circumstances under which managers actually operated. In practice, many firms compare actual performance with the original budget (adjusted to the actual level of activity, i.e. a flexible budget), but if the circumstances envisaged when the original budget was set have changed then there will be a planning and evaluation conflict.

xi. The Budget Period

The conventional approach is that once per year the manager of each budget centre prepares a detailed budget for one year. The budget is divided into either twelve monthly or thirteen four-

weekly periods for control purposes. The preparation of budgets on an annual basis has been strongly criticized on the grounds that it is too rigid and ties a company to a twelve-month commitment, which can be risky because the budget is based on uncertain forecasts.

An alternative approach is for the annual budget to be broken down by months for the first three months, and by quarters for the remaining nine months. The quarterly budgets are then developed on a monthly basis as the year proceeds. For example, during the first quarter, the monthly budgets for the second quarter will be prepared; and during the second quarter, the monthly budgets for the third quarter will be prepared. The quarterly budgets may also be reviewed as the year unfolds. For example, during the first quarter, the budget for the next three quarters may be changed as new information becomes available. A new budget for a fifth quarter will also be prepared. This process is known as ***continuous*** or ***rolling budgeting***, and ensures that a twelve-month budget is always available by adding a quarter in the future as the quarter just ended is dropped. Contrast this with a budget prepared once per year. As the year goes by, the period for which a budget is available will shorten until the budget for next year is prepared. Rolling budgets also ensure that planning is not something that takes place once a year when the budget is being formulated. Instead, budgeting is a continuous process, and managers are encouraged to constantly look ahead and review future plans. Furthermore, it is likely that actual performance will be compared with a more realistic target, because budgets are being constantly reviewed and updated. The main disadvantage of a rolling budget is that it can create uncertainty for managers because the budget is constantly being changed.

Irrespective of whether the budget is prepared on an annual or a continuous basis, it is important that monthly or four-weekly budgets be used for *control* purposes.

Xii. Administration of the Budgeting Process

It is important that suitable administration procedures be introduced to ensure that the budget process works effectively. In practice, the procedures should be tailor-made to the requirements of the organization, but as a general rule a firm should ensure that procedures are established for approving the budgets and that the appropriate staff support is available for assisting managers in preparing their budgets.

xiii. The Budget Committee

The budget committee should consist of high-level executives who represent the major segments of the business. Its major task is to ensure that budgets are realistically established and that they are coordinated satisfactorily. The normal procedure is for the functional heads to present their budget to the committee for approval. If the budget does not reflect a reasonable level of performance, it will not be approved and the functional head will be required to adjust the budget and re-submit it for approval. It is important that the person whose performance is being measured should agree that the revised budget can be achieved; otherwise, if it is considered to be impossible to achieve, it will not act as a motivational device. If budget revisions are made, the budgetees should at least feel that they were given a fair hearing by the committee. We shall discuss budget negotiation in more detail later in this module.

The budget committee should appoint a budget officer, who will normally be the accountant. The role of the budget officer is to coordinate the individual budgets into a budget for the whole organization, so that the budget committee and the budgetee can see the impact of an individual

budget on the organization as a whole.

xiv. Accounting Staff

The accounting staff will normally assist managers in the preparation of their budgets; they will, for example, circulate and advise on the instructions about budget preparation, provide past information that may be useful for preparing the present budget, and ensure that managers submit their budgets on time. The accounting staff does not determine the content of the various budgets, but they do provide a valuable advisory and clerical service for the line managers.

xv. Budget Manual

A budget manual should be prepared by the accountant. It will describe the objectives and procedures involved in the budgeting process and will provide a useful reference source for managers responsible for budget preparation. In addition, the manual may include a timetable specifying the order in which the budgets should be prepared and the dates when they should be presented to the budget committee. The manual should be circulated to all individuals who are responsible for preparing budgets.

xvi. Stages in the Budgeting Process

The important stages are as follows:

1. communicating details of budget policy and guidelines to those people responsible for the preparation of budgets;
2. determining the factor that restricts output;
3. preparation of the seals budget;
4. initial preparation of various budgets;
5. negotiation of budgets with superiors;
6. coordination and review of budgets;
7. final acceptance of budgets;
8. ongoing review of budgets.

Let us now consider each of these stages in more detail.

xvii. Communicating Details of the Budget Policy

Many decisions affecting the budget year will have been taken previously as part of the long-term planning process. The long-range plan is therefore the starting point for the preparation of the annual budget. Thus, top management must communicate the policy effects of the long-term plan to those responsible for preparing the current year's budgets. Policy effects might include planned changes in sales mix, or the expansion or contraction of certain activities. In addition, other important guidelines that are to govern the preparation of the budget should be specified – for example the allowances that are to be made for price and wage increases, and the expected changes in productivity. Also, any expected changes in industry demand and output should be communicated by top management to the managers responsible for budget preparation. It is essential that all managers be made aware of the policy of top management for implementing the long-term plan in the current year's budget so that common guidelines can be established. The process also indicates to the managers responsible for preparing the budgets how they should respond to any expected environmental changes.

xviii. Determining the Factor that Restricts Performance

In every organization there is some factor that restricts performance for a given period. In the majority of organizations this factor is sales demand. However, it is possible for production capacity to restrict performance when sales demand is in excess of available capacity. Prior to the preparation of the budgets, it is necessary for top management to determine the factor that restricts performance, since this factor determines the point at which the annual budgeting process should begin.

xix. Preparation of the Sales Budget

The volume of sales and the sales mix determine the level of a company's operations, when sales demand is the factor that restricts output. For this reason, the sales budget is the most important plan in the annual budgeting process. This budget is also the most difficult plan to produce, because total sales revenue depends on the actions of customers. In addition, sales demand may be influenced by the state of the economy or the actions of competitors.

xx. Initial Preparation of Budgets

The managers who are responsible for meeting the budgeted performance should prepare the budget for those areas for which they are responsible. The preparation of the budget should be a 'bottom-up' process.

This means that the budget should originate at the lowest levels of management and be refined and coordinated at higher levels. The justification for this approach is that it enables managers to participate in the preparation of their budgets and increases the probability that they will accept the budget and strive to achieve the budget targets.

There is no single way in which the appropriate quantity for a particular budget item is determined. Past data may be used as the starting point for producing the budgets, but this does not mean that budgeting is based on the assumption that what has happened in the past will occur in the future. Changes in future conditions must be taken into account, but past information may provide useful guidance for the future. In addition, managers may look to the guidelines provided by top management for determining the content of their budgets. For example, the guidelines may provide specific instructions as to the content of their budgets and the permitted changes that can be made in the prices of purchases of materials and services. For production activities standard costs may be used as the basis for costing activity volumes which are planned in the budget.

xxi. Negotiation of Budgets

To implement a participative approach to budgeting, the budget should be originated at the lowest level of management. The managers at this level should submit their budget to their superiors for approval. The superior should then incorporate this budget with other budgets for which he or she is responsible and then submit this budget for approval to his or her superior. The manager who is the superior then becomes the budgetee at the next higher level. The process is illustrated in Figure 15.2 Sizer (1989) describes this approach as a two-way process of a top-down statement of objectives and strategies, bottom-up budget preparation and top-down approval by senior management.

The lower-level managers are represented by boxes 1 – 8. Managers 1 and 2 will prepare their budgets in accordance with the budget policy and the guidelines laid down by top management. The managers will submit their budget to their supervisor, who is in charge of the whole

department (department A). Once these budgets have been agreed by the manager of department A, they will be combined by the departmental manager, who will then present this budget to his or her superior (manager of plan 1) for approval. The manager of plant 1 is also responsible for department B and will combine the agreed budgets for departments A and B before presenting the combined budget to his or her supervisor (the production manager). The production manager will merge the budget for plants 1 and 2, and this final budget will represent the production budget that will be presented to the budget committee for approval.

At each of these stages the budgets will be negotiated between the budgetees and their superiors, and eventually they will be agreed by both parties. Hence the figures that are included in the budget are the result of a bargaining process between a manager and his or her superior. It is important that the budgetees should participate in arriving at the final budget and that the superior does not revise the budget without giving full consideration to the subordinates' arguments for including any of the budgeted items.

Otherwise, real participation will not be taking place, and it is unlikely that the subordinate will be motivated to achieve a budget that he or she did not accept.

It is also necessary to be watchful that budgetees do not deliberately attempt to obtain approval for easily attainable budgets, or attempt to deliberately understate budgets in the hope that the budget that is finally agreed will represent an easily attainable target. It is equally unsatisfactory for a superior to impose difficult targets in the hope that an authoritarian approach will produce the desired results. The desired results may be achieved in the short-term, but only at the cost of a loss of morale and increased labour turnover in the future.

The negotiation process is of vital importance in the budgeting process, and can determine whether the budget becomes a really effective management tool or just a clerical device. If managers are successful in establishing a position of trust and confidence with their subordinates, the negotiation process will produce a meaningful improve in the budgetary process and outcomes for the period.

Xxii. Coordination and Review of Budgets

As the individual budgets move up the organizational hierarchy in the negotiation process, they must be examined in relation to each other. This examination may indicate that some budgets are out of balance with other budgets and need modifying so that they will be compatible with other conditions, constraints and plans that are beyond a manager's knowledge or control. For example, a plant manager may include equipment replacement in his or her budget when funds are simply not available. The accountant must identify such inconsistencies and bring them to the attention of the appropriate manager. Any changes in the budgets should be made by the responsible managers, and this may require that the budgets be recycled from the bottom to the top for a second or even a third time until all the budgets are coordinated and are acceptable to all the parties involved. During the coordination process, a budgeted profit and loss account, a balance sheet and a cash flow statement should be prepared to ensure that all the parts combine to produce an acceptable whole. Otherwise, further adjustments and budget recycling will be necessary until the budgeted profit and loss account, the balance sheet and the cash flow statement prove to be acceptable.

xxiii. Final Acceptance of the Budgets

When all the budgets are in harmony with each other, they are summarized into a ***master budget*** consisting of a budgeted profit and loss account, a balance sheet and a cash flow statement. After the master budget has been approved, the budgets are then passed down through the organization to the appropriate responsibility centres. The approval of the master budget is the authority for the manager of each responsibility centre to carry out the plans contained in each budget.

xxiv. Budget Review

The budget process should not stop when the budgets have been agreed. Periodically, the actual results should be compared with the budgeted results. These comparisons should normally be made on a monthly basis and a report sent to the appropriate budgetees in the first week of the following month, so that it has the maximum motivational impact. This will enable management to identify the items that are not proceeding according to plan and to investigate the reasons for the differences. If these differences are within the control of management, corrective action can be taken to avoid similar inefficiencies occurring again in the future. However, the differences may be due to the fact that the budget was unrealistic to begin with, or that the actual conditions during the budget year were different from those anticipated; the budget for the remainder of the year would then be invalid.

During the budget year, the budget committee should periodically evaluate the actual performance and reappraise the company's future plans. If there are any changes in the actual conditions from those originally expected, this will normally mean that the budget plans should be adjusted. This revised budget then represents a revised statement of formal operating plans for the remaining portion of the budget period. The important point to note is that the budgetary process does not end for the current year once the budget has begun: budgeting should be seen as a continuous and dynamic process.

xxv. A Detailed Illustration

Example 1: Illustration of the procedure for constructing budgets in a manufacturing company

Note that the level of detail included here is much less than that which would be presented in practice. A truly realistic illustration would fill many pages, with detailed budgets being analyzed in various ways. We shall consider an annual budget, whereas a realistic illustration would analyze the annual budget into twelve monthly periods. Monthly analysis would considerably increase the size of the illustration, but would not give any further insight into the basic concepts or procedures. In addition, The Enterprise Company manufactures two products, known as Ama and Bama. Ama is produced in department 1 and Bama in department 2. The following information is available for 201X.

Standard material and labour costs:

	₦
Material X	7.20 per unit
Material Y	16.00 per unit
Direct labour	12.00 per hour

Overhead is recovered on a direct labour hour basis.

The standard material and labour usage for each product is as follows:

	Model Ama	Model Bama

Material X	10 units	8 units
Material Y	5 units	9 units
Direct labour	10 hours	15 hours

The balance sheet for the previous year end 201X was as follows:

	₦	₦	₦
Fixed Assets:			
Land		170,000	
Building and equipment	1,292,000		
Less depreciation	255,000	1,037,000	1,207,000
Current assets:			
Stocks, Finished goods	99,076		
Raw materials	189,200		
Debtors	289,000		
Cash	34,000		
	611,276		
Less current liabilities			
Creditors	248,800		362,476
Net assets			1,569,476
Represented by shareholder's interest:			
1,200,000 ordinary shares of N1 each		1,200,000	
Reserves		369,476	
			1,569,476

Other relevant data is as follows for the year 201X:

	Finished Product	
	Model Ama	Model Bama
Forecast sales (units)	8,500	1,600
Selling price per unit	₦400	₦560
Ending inventory required (units)	1,870	90
Beginning inventory (units)	170	85

	Direct material	
	Material X	Material Y
Beginning inventory (units)	8,500	8,000
Ending inventory required (units)	10,200	1,700

	Department 1	Department 2
	₦	₦
Budgeted variable overhead rates (per direct labour hour):		
Indirect materials	1.20	0.80
Indirect labour	1.20	1.20
Power (variable portion)	0.60	0.40
Maintenance (variable portion)	0.20	0.40
Budgeted fixed overheads		
Depreciation	100,000	80,000

Supervision	100,000	40,000
Power (fixed portion)	40,000	2,000
Maintenance (fixed portion)	45,600	3,196

	₦
Estimated non-manufacturing overheads:	
Stationery etc (Administration)	4,000
Salaries	
Sales	74,000
Office	28,000
Commissions	60,000
Car expenses (Sales)	22,000
Advertising	80,000
Miscellaneous (Office)	8,000
	276,000

Budgeted cash flows are as follows:

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
	₦	₦	₦	₦
Receipts from customers	1,000,000	1,200,000	1,120,000	985,000
Payments:				
Materials	400,000	480,000	440,000	547,984
Payments for wages	400,000	440,000	480,000	646,188
Other costs and expenses	120,000	100,000	72,016	13,642

You are required to prepare a master budget for the year 201X and the following budgets:

1. sales budget;
2. production budget;
3. direct materials usage budget;
4. direct materials purchase budget;
5. direct labour budget units;
6. factory overhead budget;
7. selling and administration budget;
8. cash budget.

We shall assume in this example that the budgets are prepared for only two responsibility centres (namely departments 1 and 2). In practice, many responsibility centres are likely to exist.

xxvi. Sales Budget

The sales budget shows the quantities of each product that the company plans to sell and the intended selling price. It provides the predictions of total revenue from which cash receipts from customers will be estimated, and it also supplies the basic data for constructing budgets for production costs, and for selling, distribution and administrative expenses.

The sales budget is therefore the foundation of all other budgets, since all expenditure is ultimately dependent on the volume of sales. If the sales budget is not accurate, the other budget estimates will be unreliable. We will assume that the Enterprise Company has completed a marketing analysis and that the following annual sales budget is based on the result:

Schedule 1 - Sales Budget for Year Ending 201X

Product	Units sold	Selling price	Total revenue
		₦	₦
Ama	8,500	400	3,400,000
Bama	1,600	560	896,000
			4,296,000

Schedule 1 represents the *total* sales budget for the year. In practice, the *total* sales budget will be supported by detailed *subsidiary* sales budgets where sales are analyzed by areas of responsibility, such as sales territories, and into monthly periods analyzed by products. The detailed *subsidiary* sales budget could be set out as shown earlier.

Note that with the detailed subsidiary monthly budgets the total budgeted sales of ₦4,296,000 is analyzed by each sales territory for each month of the budget period. The detailed analysis assumes that sales are divided among the four sales territories as follows:

	Ama	Bama
North	3,000 units	500 units
South	2,500 units	600 units
East	1,000 units	200 units
West	2,000 units	300 units
	8,500 units	1,600 units

Detailed Monthly Budgets for North, South, East and West Sales Territories

		North		South		East		West		Total	
		Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
			₦		₦		₦		₦		₦
Month 1	Ama										
	Bama		____		____		_____		_____		_____
	Total		____		____		_____		_____		_____
Month 2											
Month 3											
Month 4											
Month 5											
Month 6											
Month 7											
Month 8											
Month 9											
Month 10											

Month 11								
Month 12								
Total months								
1 – 12 Ama	3000	1200000	2500	1000000	1000	400000	2000	800000
8500	3400000							
Bama	500	280,000	600	336000	200	112000	300	168000
1600	896000							
		1480000		1336000		512000		968000
	4296000							

xxvii Production Budget and Budgeted Stock Levels

When the sales budget has been completed, next is to prepare the production budget. This budget is expressed in *quantities* only and is the responsibility of the production manager. The objective is to ensure that production is sufficient to meet sales demand and that economic stock levels are maintained. The production budget (schedule 2) for the year will be as follows:

Schedule 2 - Annual production budget

	Department 1 Ama	Department 2 Bama
Units to be sold	8,500	1,600
Planned closing stock	1,870	90
Total units required for sales and stocks	10,370	1,690
Less planned opening stocks	170	85
Units to be produced	10,200	1,605

The total production for each department should also be analyzed on a monthly basis.

xxviii Direct Materials Usage Budget

The supervisors of departments 1 and 2 will prepare estimates of the materials which are required to meet the production budget. The materials usage budget for the year will be as follows:

Schedule 3 - Annual Direct Material Usage Budget

	Department 1			**Department 2**					
	Units	Unit price ₦	Total ₦	Unit	Unit price ₦	Total ₦	Total units	Total Unit price ₦	Total ₦
Material X	102,000	7.20	734,400	12,840	7.20	92,448	114,840	7.20	826,848
Material Y	51,000	16.00	816,000	14,445	16.00	231,120	65,445	16.00	1,047,120
			1,550,400			323,568			1,873,968

a) 10,200 units production at 10 units per unit of production.
b) 10,200 units production at 5 units per unit of production.
c) 1,605 units production at 8 units per unit of production.
d) 1,605 units production at 9 units per unit of production.

xxiv. Direct Materials Purchase Budget

The direct materials purchase budget is the responsibility of the purchasing manager, since it will be he/she who is responsible for obtaining the planned quantities of raw materials to meet the production requirements. The objective is to purchase these materials at the right time at the planned purchase price. It is necessary also to take into account the planned raw material stock levels. The annual materials purchase budget for the year will be as follows:

Schedule 4 - Direct Materials Purchase Budget

	Material X (units)	Material Y (units)
Quantity necessary to meet production requirements as per material usage budget	114,840	65,445
Planned closing stock	10,200	1,700
Total need	125,040	67,145
Less planned opening stock	8,500	8,000
Total units to be purchased	116,540	59,145
Planned unit purchase price	₦7.20	₦16
Total purchases	₦839,088	₦946,320

Note that this budget is a summary budget for the year, but for detailed planning and control it will be necessary to analyze the annual budget on a monthly basis.

xxx. Direct Labour Budget

The direct labour budget is the responsibility of the respective managers of departments 1 and 2. They will prepare estimates of the departments' labour hours required to meet the planned production. Where different grades of labour exist, these should be specified separately in the budget. The budget rate per hour should be determined by the industrial relations department. The direct labour budget will be as follows:

Schedule 5 - Annual Direct Labour Budget

	Department 1	Department 2	Total
Budgeted production (units/quantity)	10,200	1,605	
Hours per unit	x 10	x 15	
Total budgeted hours	102,000	24,075	126,075
Budgeted wage rate per hour	x N12	xN12	
Total wages	₦1,224,000	₦288,900	₦1,512,900

xxxi. Factory Overhead Budget

The factory overhead budget is also the responsibility of the respective production department managers. The total of the overhead budget will depend on the behaviour of the costs of the individual overhead items in relation to the anticipated level of production. The overheads must also be analyzed according to whether they are controllable or non-controllable for the purpose of cost control. The factory overhead budget will be as follows:

Schedule 6 - Annual Factory Overhead Budget

Anticipated activity - 102,000 direct labour hours (department 1)
24,075 direct labour hours (department 2)

	Variable overhead rate per direct labour hour		Overheads		
	Department 1	**Department 2**	**Department 1**	**Department 2**	**Total**
	₦	₦	₦	₦	₦
Variable/Controllable overheads:					
Indirect material	1.20	0.80	122,400	19,260	
Indirect labour	1.20	1.20	122,400	28,890	
Power (variable portion)	0.60	0.40	61,200	9,630	
Maintenance (variable portion)	0.20	0.40	20,400	9,630	
Total variable/controllable overhead			326,400	67,410	393,810
Non-controllable/fixed overheads:					
Depreciation			100,000	80,000	
Supervision			100,000	40,000	
Power (fixed portion)			40,000	2,000	
Maintenance (fixed portion)			45,600	3,196	
Total non-controllable/fixed overheads			285,600	125,196	410,796
Total overheads			612,000	192,606	804,606
Budgeted departmental overhead rate			₦6.00	₦8.00	

a) ₦612,000 total overheads divided by 102,000 direct labour hours.
b) ₦192,606 total overheads divided by 24,075 direct labour hours.

The budgeted expenditure for the variable overhead items is determined by multiplying the budgeted direct labour hours for each department by the budgeted variable overhead rate per hour. It is assumed that all variable overheads vary in relation to direct labour hours.

xxxii. Selling and Administration Budget

The selling and administration budgets have been combined here to simplify the presentation. In practice, separate budgets should be prepared: the sales manager will be responsible for the selling budget, the distribution manager will be responsible for the distribution expenses and the chief administrative officer will be responsible for the administration budget.

Schedule 7 - Annual Selling and Administration Budget

	₦	₦
Selling:		
Salaries	74,000	
Commission	60,000	
Car expenses	22,000	
Advertising	80,000	236,000
Administration:		

Stationery	4,000	
Salaries	28,000	
Miscellaneous	8,000	40,000
		276,000

xxxiii **Departmental Budgets**

For cost control the direct labour budget, materials usage budget and factory overhead budget are combined into separate departmental budgets. These budgets are normally broken down into twelve separate monthly budgets, and the actual monthly expenditure is compared with the budgeted amounts for each of the items concerned. This comparison is used for judging how effective managers are in controlling the expenditure for which they are responsible. The departmental budget for department 1 will be as follows:

Department 1 - Annual Departmental Operating Budget

	Budget	Actual
	₦	₦
Direct labour (from schedule 5):		
102,000 hours at ₦12		1,224,000
Direct materials (from schedule 3):		
102,000 units of Material X at ₦7.20 per unit	734,400	
51,000 units of Material Y at ₦16 per unit	816,000	1,550,400
Controllable/variable overheads (from schedule 6):		
Indirect materials	122,400	
Indirect labour	122,400	
Power (variable portion)	61,200	
Maintenance (variable portion)	20,400	326,400
Uncontrollable/fixed overheads (from schedule 6):		
Depreciation	100,000	
Supervision	100,000	
Power (fixed portion)	40,000	
Maintenance (fixed portion)	45,600	285,600
		3,386,400

xxxiv. Master Budget

When all the budgets have been prepared, the budgeted profit and loss account and balance sheet provide the overall picture of the planned performance for the budget period.

Budgeted Profit and Loss Account for the Year Ending 201X

	₦	₦
Sales (Schedule 1)		4,296,000
Opening stock of raw materials (from opening balance sheet)	189,200	
Purchases (schedule 4)	1,785,408	
	1,974,608	
Less closing stock of raw materials (schedule 4)	100,640	
Cost of raw materials consumed	1,873,968	
Direct labour (schedule 5)	1,512,900	

Factory overheads (schedule 6)		804,606	
Total manufacturing cost		4,191,474	
Add opening stock of finished goods			
(from opening balance sheet)	99,076		
Less closing stock of finished goods	665,984		
		(566,908)	
Cost of sales			3,624,566
Gross profit			671,434
Selling and administration expenses (schedule 7)			276,000
Budgeted operating profit for the year			395,434

(a) ₦839,088 (X) + ₦946,320 (Y) from schedule 4.
(b) 10,200 units at ₦7.20 plus 1,700 units at ₦16 from schedule 4.
(c) 1,870 units of Ama valued at ₦332 per unit, 90 units of Bama valued at ₦501.60 per unit. The product unit costs, i.e. cost per unit are calculated as follows:

	Ama		Bama	
	Units	₦	Units	₦
Direct materials				
X	10	72.00	8	57.60
Y	5	80.00	9	144.00
Direct labour	10	120.00	15	180.00
Factory overheads:				
Department 1	10	60.00	-	-
Department 2	-	-	15	120.00
		332.00		501.60

Budgeted Balance Sheet as at 31 December

	₦	₦
Fixed assets:		
Land		170,000
Building and equipment	1,292,000	
Less depreciation	435,000	857,000
		1,027,000
Current assets:		
Raw material stock	100,640	
Finished goods stock	665,984	
Debtors	280,000	
Cash	199,170	
	1,245,794	
Current liabilities:		
Creditors	307,884	937,910
		1,964,910
Represented by shareholders' interest:		
1,200,000 ordinary shares of ₦1 each	1,200,000	
Reserves	369,476	

Profit and loss account	395,434	1,964,910

a) ₦255,000 + ₦180,000 (schedule 6) = ₦435,000
b) ₦289,000 opening balance + ₦4,296,000 sales – ₦4,305,000 cash
c) Closing balance as per cash budget.
d) ₦248,800 opening balance + ₦1,785,408 purchases + ₦141,660 indirect materials – ₦1,876,984 cash.

xxxv. Cash Budgets

The purpose of the cash budget is to ensure that sufficient cash is available at all times to meet the level of operations that are outlined in the various budgets. The cash budget for Example is presented below and is analyzed by quarters, but in practice monthly or weekly budgets will be necessary. Because cash budgeting is subject to uncertainty, it is necessary to provide for more than the minimum amount required, to allow for some margin of error in planning. Cash budgets can help a firm to avoid cash balances that are surplus to its requirements by enabling management to take steps in advance to invest the surplus cash in short-term investments. Alternatively, cash deficiencies can be identified in advance, and steps can be taken to ensure that bank loans will be available to meet any temporary cash deficiencies. For example, by looking at the cash budget for the Enterprise Company, management may consider that the cash balances are higher than necessary in the second and third quarters of the year, and they may invest part of the cash balance in short-term investments.

The overall aim should be to manage the cash of the firm to attain maximum cash availability and maximum interest income on any idle funds.

Cash Budget for Year Ending 201X

	Quarter	Quarter	Quarter	Quarter	Total
	₦	₦	₦	₦	₦
Opening balance	34,000	114,000	294,000	421,984	34,000
Receipts from debtors	1,000,000	1,200,000	1,120,000	985,000	4,305,000
	1,034,000	1,314,000	1,414,000	1,406,984	4,339,000
Payments:					
Purchase of materials	400,000	480,000	440,000	547,984	1,867,984
Payment of wages	400,000	440,000	480,000	646,188	1,966,188
Other costs and expenses	120,000	100,000	72,016	13,642	305,658
	920,000	1,020,000	992,016	1,207,814	4,139,830
Closing balance	114,000	294,000	421,984	199,170	199,170

xxxvi. Final Review

The budgeted profit and loss account, the balance sheet and the cash budget will be submitted by the accountant to the budget committee, together with a number of budgeted financial ratios such as the return on capital employed, working capital, liquidity and gearing ratios. If these ratios prove to be acceptable, the budgets will be approved. In Example 15.1 the return on capital employed is approximately 20%, but the working capital ratio is over 4:1, so management should consider alternative ways of reducing investment in working capital before finally approving the budgets.

xxxvii. Computerized Budgeting

In the past, budgeting was a task dreaded by many management accountants. You will have noted from Example 15.1 that many numerical manipulations are necessary to prepare the budget. In the real world the process is far more complex, and, as the budget is being formulated, it is altered many times since some budgets are found to be out of balance with each other or the master budget proves to be unacceptable.

In today's world, the budgeting process is computerized instead of being primarily concerned with numerical manipulations, the accounting staff can now become more involved in the real planning process. Computer-based financial models normally consist of mathematical statements of input and outputs. By simply altering the mathematical statements budgets can be quickly revised with little effort. However, the major advantage of computerized budgeting is that management can evaluate many different options before the budget is finally agreed. Establishing a model enables 'What-if?' analysis to be employed. For example, answers to the following questions can be displayed in the form of a master budget: What if sales increase or decrease by 10%? What if unit costs increase or decrease by 5%? What if the credit terms for sales were reduced from 30 to 20 days?

In addition, computerized models can incorporate actual results, period by period, and carry out the necessary calculations to produce budgetary *control* reports.

It is also possible to adjust the budgets for the remainder of the year when it is clear that the circumstances on which the budget was originally set have changed.

xxxviii. Web Technology for the Budget Process

An e-budgeting solution completely automates the development of an organization's budget and forecast. From anywhere in the world, at all times, participants in the process can log through the Internet to access their budget and any pertinent related information so they can work on their plans. Web-based enterprise budgeting systems offer a centrally administered system that provides easy-to-use flexible tools for the end users who are responsible for budgeting. The Web functionality of these applications allows constant monitoring, updates and modeling.

E-budgeting provides the flexibility demanded by modern organizations. For example, the finance department can request across-the-board reallocations of expenditures and model the result immediately. No longer do management accountants have to go back and forth with other managers re-inputting data and retallying results. E-budgeting can eliminate the cumbersome accounting tasks of pulling numbers from disparate files, cutting and pasting, entering and uploading, and constantly performing reconciliation. Also, a Web-based budgeting application lets managers' access data from office or home – wherever they happen to be working. It broadens the system's availability to the user community.

When executives at Toronto-Dominion Bank were searching for a new solution capable of handling the bank's enterprise budgeting and planning function, they turned to the Internet. The company selected Clarus Corporation's Web-deployed, enterprise Clarus™ Budget solution. Its accountant stated 'in the past, we have compiled our business plan using hundreds of spreadsheets, and our analysts have spent a disproportional amount of their time compiling and verifying data from

multiple sources. Implementing a Web-based, enterprise-wide budgeting solution will help us to develop our business plans and allow our analysts to be proactive in monitoring quarterly results'.

xxxix. Activity-Based Budgeting

The conventional approach to budgeting works fine for unit level activity costs where the consumption of resources varies proportionately with the volume of the final output of products or services. However, for those indirect costs and support activities where there are no clearly defined input-output relationships, and the consumption of resources does not vary with the final output of products or services, conventional budgets merely serve as authorization levels for certain levels of spending for each budgeted item of expense. Budgets that are not based on well-understood relationships between activities and costs are poor indicators of performance and performance reporting normally implies little more than checking whether the budget has been exceeded. Conventional budgets therefore provide little relevant information for managing the costs of support activities.

With conventional budgeting indirect costs and support activities are prepared on an incremental basis. This means that existing operations and the current budgeted allowance for existing activities are taken as the starting point for preparing the next annual budget.

The base is then adjusted for changes (such as changes in product mix, volumes and prices) which are expected to occur during the new budget period. This approach is called incremental budgeting, since the budget process is concerned mainly with the increment in operations or expenditure that will occur during the forthcoming budget period. For example, the allowance for budgeted expenses may be based on the previous budgeted allowance plus an increase to cover higher prices caused by inflation. The major disadvantage of the incremental approach is that the majority of expenditure, which is associated with the 'base level' of activity, remains unchanged. Thus, the cost of non-unit level activities becomes fixed and past inefficiencies and waste inherent in the current way of doing things is perpetuated.

To manage costs more effectively organizations that have implemented activity-based costing (ABC) have also adopted ***activity-based budgeting*** (ABB). The aim of ABB is to authorize the supply of only those resources that are needed to perform activities required to meet the budgeted production and sales volume. Whereas ABC assigns resource expenses to activities and then uses activity cost drivers to assign activity costs to cost objects (such as products, services or customers), ABB is the reverse of this process. Cost objects are the starting point. Their budgeted output determines the necessary activities which are then used to estimate the resources that are required for the budget period. ABB involves the following stages:

1. estimate the production and sales volume by individual products and customers;
2. estimate the demand for organizational activities;
3. determine the resources that are required to perform organizational activities;
4. estimate for each resource the quantity that must be supplied to meet the demand;
5. take action to adjust the capacity of resources to match the projected supply.

The first stage is identical to conventional budgeting. Details of budgeted production and sales volumes for individual products and customer types will be contained in the sales and production budgets. Next, ABC extends conventional budgeting to support activities such as ordering,

receiving, scheduling production and processing customers' orders. To implement ABB knowledge of the activities that are necessary to produce and sell the products and services and service customers is essential. Estimates of the quantity of activity cost drivers must be derived for each activity. For example, the number of purchase orders, the number of receipts, the number of set-ups and the number of customer orders processed are estimated using the same approach as that used by conventional budgeting to determine the quantity of direct labour and materials that are incorporated into the direct labour and materials purchase budgets. Standard cost data incorporating a bill of activities is maintained for each product indicating the different activities, and the quantity of activity drivers that are required, to produce a specified number of products. Such documentation provides the basic information for building up the activity-based budgets.

The third stage is to estimate the resources that are required for performing the quantity of activity drivers demanded. In particular, estimates are required of each type of resource, and their quantities required, meeting the demanded quantity of activities. For example, if the number of customer orders to be processed is estimated to be 5000 and each order takes 30 minutes processing time then 2500 labour hours of the customer processing activity must be supplied.

Next, the resources demanded (derived from the third stage) are converted into an estimate of the total resources that must be supplied for each type of resource used by an activity. The quantity of resources supplied depends on the cost behavior of the resource. For flexible resources where the supply can be matched exactly to meet demand, such as direct materials and energy costs, the quantity of resources supplied will be identical to the quantity demanded. For example, if customer processing were a flexible resource exactly 2500 hours would be purchased. However, a more likely assumption is that customer processing labour will be a step cost function in relation to the volume of the activity (see Chapter 2 for a description of step cost functions).

Assuming that each person employed is contracted to work 1500 hours per year, 1.67 persons (2500/1500) represents the quantity of resources required, but because resources must be acquired in uneven amounts, two persons must be employed. For other resources, such as equipment, resources will tend to be fixed and committed over a very wide range of volume for the activity. As long as demand is less than the capacity supplied by the committed resource no additional spending will be required.

The final stage is to compare the estimates of the quantity of resources to be supplied for each resource with the quantity of resources that are currently committed. If the estimated supply of a resource exceeds the current capacity additional spending must be authorized within the budgeting process to acquire additional resources. Alternatively, if the demand for resources is less than the projected supply, the budgeting process should result in management taking action to either redeploy or reduce those resources that are no longer required.

Exhibit 15.1 illustrates an activity-based budget for an order receiving process or department. You will see that the budget is presented in a matrix format with the major activities being shown for each of the columns and the resource inputs are listed by rows. The cost driver activity levels are also highlighted. A major feature of ABB is the enhanced visibility arising from showing the outcomes, in terms of cost drivers, from the budgeted expenditure. This information is particularly useful for planning and estimating future expenditure.

ABB can be applied using the information presented in Exhibit 1. Assume that ABB stages one and

two as outlined above result in an estimated annual demand of 2800 orders for the processing of the receipt of the standard customers' order activity (column 6 in Exhibit 1). For the staff salaries row (that is, the processing of customers' orders labour resource) assume that each member of staff can process on average 50 orders per month, or 600 per year. Therefore 4.67 (2800 orders/600 orders) persons are required for the supply of this resource (that is, stage three as outlined above). The fourth stage converts the 4.67 staff resources into the amount that must be supplied, that is 5 members of staff. Let us assume that the current capacity or supply of resources committed to the activity is 6 members of staff at ₦25,000 per annum, giving a total annual cost of ₦150,000.

Management is therefore made aware that staff resources can be reduced by ₦25,000 per annum by transferring one member of staff to other activities where staff resources need to be expanded or, more drastically, making them redundant.

Some of the other resource expenses (such as office supplies and telephone expenses) listed in Exhibit 15.1 for the processing of customer's order activity represent flexible resources which are likely to vary in the short-term with the number of orders processed. Assuming that the budget for the forthcoming period represents 80% of the number of orders processed during the previous budget period then the budget for those resource expenses that vary in the short-term with the number of orders processed should be reduced by 20%.

With conventional budgeting the budgeted expenses for the forthcoming budget for support activities are normally based on the previous year's budget plus an adjustment for inflation. Support costs are therefore considered to be fixed in relation to activity volume. In contrast, ABB provides a framework for understanding the amount of resources that are required to achieve the budgeted level of activity. By comparing the amount of resources that are required with the amount of resources that are in place, upwards or downwards adjustments can be made during the budget setting phase.

Periodically actual results should be compared with a budget adjusted (flexed) to the actual output for the activities (in terms of cost drivers) to highlight both in financial and non-financial terms those activities with major discrepancies from budget. Assume that practical capacity for salaries for the processing of customers' standard orders activity was set at 3000 orders (5 staff at 600 orders per member of staff), even though budgeted activity was only 2800 orders, and the actual number of orders processed during the period was 2500 orders. Also assume that the actual resources committed to the activity in respect of salaries was ₦125,000 (all fixed in the short-term).

Exhibit X1
Activity-Based Budget for an Order Receiving Processing

Activities	Handle receiving goods	Execute orders	Special import rush	Distribution express	Order Deliveries (standard products)	Order cost (non-standard products)	Order administration	Execute receiving	Total

Resource expense accounts:							
Office supplies							
Telephone expenses							
Salaries							
Travel							
Training							
Total Cost							
Activity cost driver measures	Number of rush documents	Number of customs bills	Number of customer of credit	Number of consignment letters	Number of notes orders	Number of standard orders	Number non-standard orders

The following information should be presented in the performance report:

	₦
Flexed budget based on the number of orders processed (2500 orders at ₦41.67)	104,175
Budgeted unused capacity (3000 – 2800 x ₦41.67)	8,334
Actual unplanned unused capacity (2800 – 2500) x ₦41.67	12,491
	125,000

The cost driver rate of ₦41.67 per order processed is calculated by dividing the ₦125,000 budgeted cost of supplying the resources by the capacity supplied (3000 orders). The above activity performance information highlights for management attention the potential reduction in the supply of resources of ₦20,825 (₦8,334 expected and ₦12,491 unexpected) or, alternatively, the additional business that can be accommodated with the existing supply of resources.

XL. Planning, Programming Budgeting Systems

Non-profit organizations have found line item budgets to be unsatisfactory mainly because they fail to provide information on planned and actual accomplishments. In addition, such budgets do not provide information on the efficiency with which the organization's activities have been performed, or its effectiveness in achieving its objectives. A further deficiency with line item budgets is that they fail to provide a sound basis for deciding how the available resources should be allocated. ***Planning, programming budgeting systems*** (PPBS) are intended to overcome these deficiencies.

The aim of PPBS is to enable the management of a non-profit organization to make more informed

decisions about the allocation of resources to meet the overall objectives of the organization. First, overall objectives are established. Secondly, the programmes that might achieve these objectives are identified. Programmes normally relate to the major activities undertaken by municipal or government organizations.

Finally, the costs and benefits of each programme are determined so that budget allocations can be made on the basis of the cost-benefits of the different programmes. PPBS is the counterpart of the long-term planning process operated in profit-oriented organizations. We can relate PPBS to the long-term planning process outlined in Figure 15.1 for profit-oriented companies. The first stage in the process of PPBS is to review the organizational objectives for the activities which it performs (i.e. stage 1 in Figure 15.1). Stage 2 involves identifying programmes that can be undertaken to achieve the organization's objectives. Examples of programmes include extending childcare facilities, improvement of health care for senior citizens and the extension of nursery facilities (see Exhibit 15.3 for an illustration of a childcare programme). The third stage involves identifying and evaluating alternative methods of achieving the objectives for each specific programme. Such a comparison and evaluation will show the costs of each alternative course of action and the benefits which result. The final stage (stage 4) is to select the appropriate programme on the basis of cost-benefit principles. At this stage it would be useful if the programmes could be ranked, but this is extremely difficult. It is therefore necessary for a subjective judgment to be made by the top management of the organization on the amount of resources to be allocated to the various programmes.

PPBS involve the preparation of a *long-term* corporate plan that clearly establishes the objectives that the organization aims to achieve. These objectives do not necessarily follow the existing organizational structure. For example, one objective of a local authority may be the care of the elderly.

Exhibit 15.3: Illustration of a childcare programme

- ✓ The construction of three new kindergartens.
- ✓ The repair and extension of five existing kindergartens.
- ✓ The employment of ten new nursery school teachers.
- ✓ The establishment of a child-minding scheme that is based in the homes of mothers with young children of their own.
- ✓ The setting up of an occasional childcare centre.
- ✓ The introduction of an hourly baby-sitting service.

Source: Wilson and Chua (1993)

The following services may contribute to this objective:

1. provision of sheltered accommodation;
2. erection of aged-persons' dwellings;
3. provision of domestic health services;
4. provision of home nursing services;
5. provision of social and recreational facilities.

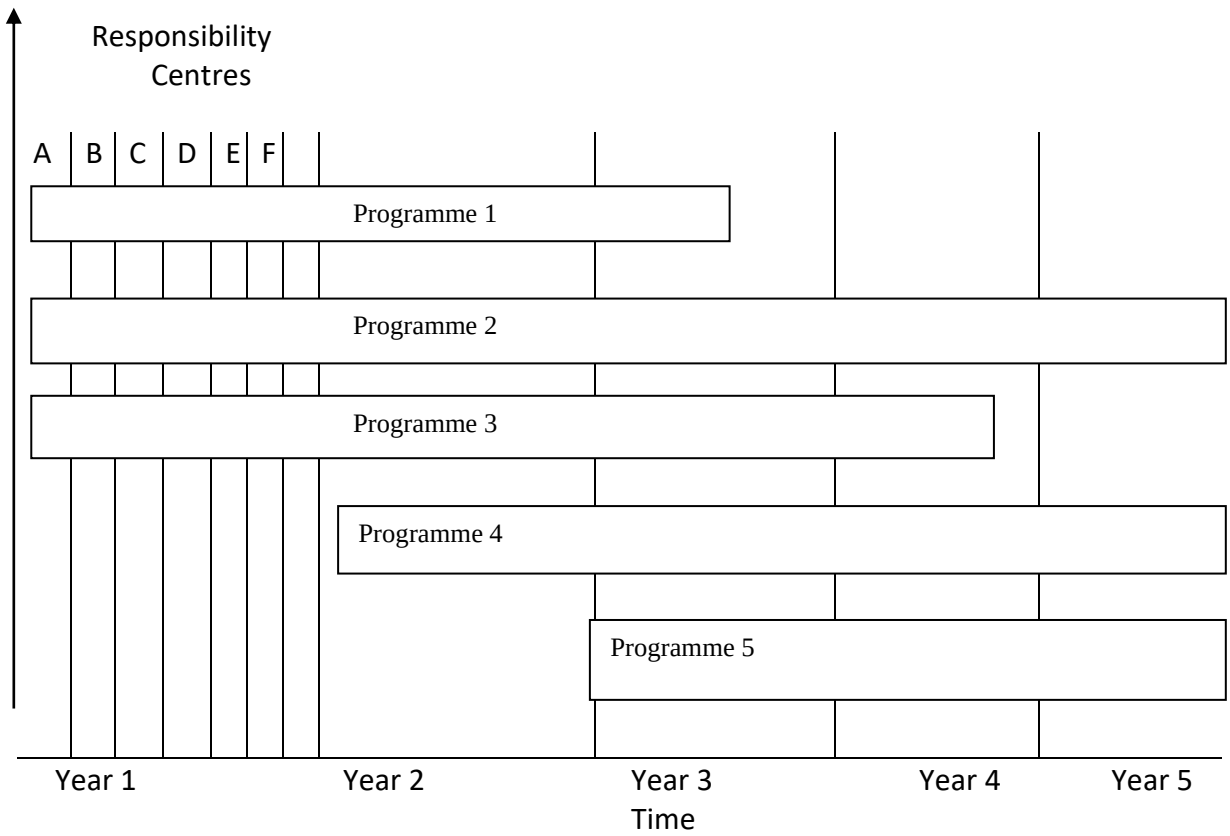
The provision of these activities may be undertaken by separate departments, such as housing, health and social services. However, PPBS relates the estimates of total costs to the care of the elderly programme, rather than relating costs to the various departments.

A programme budget cuts across departmental barriers by providing estimates of the programme for the provision of the elderly rather than these estimates being included within the three budgets for each of the housing, health and social welfare departments.

PPBS forces management to identify the activities, functions or programmes to be provided, thereby establishes a basis for evaluating their worthiness. In addition, PPBS provides information that will enable management to assess the effectiveness of its plans; for example, is the provision of the services for the elderly as well developed as it should be for an expenditure of X thousand pounds? The programme structure should correspond to the principal objectives of the organization and enable management to focus on the organization's output (the objectives to be achieved) rather than just the inputs (the resources available to be used). Hence a more effective allocation of scarce resources can be achieved. Within the overall programme budget, apart from the main objectives of the programme, there will be a series of sub-objectives reaching down to the lower levels of management.

Because the programme structure is unlikely to match the organization's structure, a particular individual must be made responsible for controlling and supervising the programme. Anthony and Young (1988) suggest that one possibility is to adopt a matrix type of organizational structure, with a matrix consisting of programme managers in one dimension and functionally organized responsibility centres in the other. This process is illustrated in Figure 15.3. The programmes are represented by horizontal bars and the budgets by vertical dashed lines. The budget for year 1 has been analysed by six responsibility centres (A to F). Such an organizational structure requires that the budgeted and the actual accomplishments be compared by *programmes*. In addition, information must be accumulated by department or responsibility centre (i.e. responsibility centres A to F in Figure 15.3) and line item budgets must be used for controlling expenditure. Note that the budgeting process in this illustration focuses on a single year, whereas PPBS focuses on activities extending over a period of several years. A budget is, in effect, one slice of the organization's programmes where costs are related to departments or responsibility centres, rather than programmes.

Figure 15.3: A Matrix Organizational Structure



In the 1960s and early 1970s efforts were made to implement PPBS into US government budgeting, but by the mid-1970s the attempt had been abandoned. Pendlebury (1996) concludes that efforts to implement PPBS failed because much of the data that were required on outputs were unobtainable. He states:

> *Although the philosophy behind PPBS was good, practical difficulties and organizational realities led to its demise. One influence that it did have, however, and that still remains, is to have reinforced the advantages of a programme structure. In other words, even though programme impacts might not be measurable and the establishment of cost/benefit relationships not possible, the budget might at least show the proposed spending on different activities or programmes (page 287).*

Xli. Zero-Based Budgeting

Zero-based budgeting (also known as priority-based budgeting) emerged in the late 1960s as an attempt to overcome the limitations of incremental budgets. This approach requires that all activities are justified and prioritized before decisions are taken relating to the amount of resources allocated to each activity. Besides adopting a 'zero-based' approach zero-base budgeting (ZBB) also focuses on programmes or activities instead of functional departments based on line-items which is a feature of traditional budgeting.

ZBB works from the premise that projected expenditure for existing programmes should start from base zero, which each year's budgets being compiled as if the programmes were being launched for the first time. The budgetees should present their requirements for appropriations in such a fashion that all funds can be allocated on the basis of cost-benefit or some similar kind of evaluative analysis. The implementation of a zero base budgeting approach in a UK local authority.

The social services department of a local authority decided in 1990 to implement a system of devolved budgeting. Prior to these initiatives, budget preparation had been largely centralized with input from the social services department coming primarily from the director and the assistant directors. In social services departments, the major divisions of service are: juvenile justice and services for adolescents; children and families; elderly; elderly mental infirm; learning difficulties, mental health; and physical disability. In the authority under review, each of these divisions of service was under the control of an assistant director and in addition there was an assistant director responsible for finance and administration. As a result of the devolved budgeting initiative, the number of budget holders increased to over 70, and over 300 cost centres were established.

A zero based approach to budget preparation was introduced for the financial year 1992/93. Prior to the introduction of zero base budgeting (ZBB) the budget allocations available to each cost centre and budget holder were based on an incremental budgeting system which meant that past histories of spending patterns determined current resource allocations. It was anticipated that the increased budget involvement would make it difficult on occasions to justify historically based allocations and the move to zero base budgeting (ZBB) was seen as a means of providing the opportunity for the base to be challenged and redistributions brought about. In its pure form, ZBB requires each budget request to be built up from zero. For large complex organizations this would clearly be close to impossible. The social services department's attempt at ZBB for the financial year 1992/93 adopted the philosophy of starting from some point within the base, rather than from zero, and followed loosely a decision package approach. The process was bottom-up with budgets being built up from cost centres to arrive at a budget holder's budget. The aggregate of each budget holder's budget gave the budget for the division of service, and the aggregate of each division of service budget gave the total social services department budget. (For 1992/93, the gross revenue budget was over ₦50 million).

Each budget holder was required to compile three incremental decision packages for the group of cost centres they were responsible for. These were:

current provision,
statutory provision,
90 per cent provision.

The purpose of the 90 per cent package was to release a notional amount from each budget holder which would be available for redistribution on a prioritized basis. The 90 per cent target was not required for each cost centre but for the group of cost centres under the budget holder's control, thus providing scope to move money around. ZBB does, of course, require not only the inputs for each decision package to be determined but also the outputs. A careful analysis of the needs of the community for personal social services was required in order to establish the demand for services and the level of service that could be provided at each level of funding.

ZBB is best suited to discretionary costs and support activities. With ***discretionary costs*** management has some discretion as to the amount it will budget for the particular activity in question. Examples of discretionary costs include advertising, research and development and training costs. There is no optimum relationship between inputs (as measured by the costs) and outputs (measured by revenues or some other objective function) for these costs. Furthermore, they are not predetermined by some previous commitment. In effect, management can determine what quantity of service it wishes to purchase and there is no established method for determining the appropriate amount to be spent in particular periods. ZBB has mostly been applied in local and government organizations where the predominant costs are of a discretionary nature. In contrast, direct production and service costs, where input-output relationships exist, are more suited to traditional budgeting using standard costs.

ZBB involves the following three stages:

- a description of each organizational activity in a decision package;
- the evaluation and ranking of decision packages in order of priority;
- allocation of resources based on order of priority up to the spending cut-off level.

Xlii. Decision packages are identified for each decision unit. Decision units represent separate programmes or groups of activities that an organization undertakes. A decision package represents the operation of a particular programme with incremental packages reflecting different levels of effort that may be expended on a specific function. One package is usually prepared at the 'base' level for each programme. This package represents the minimum level of service or support consistent with the organization's objectives. Service or support higher than the base level is described in one or more incremental packages. For example, managers might be asked to specify the base package in terms of level of service that can be provided at 70% of the current cost level and incremental packages identify higher activity or cost levels.

Once the decision packages have been completed, management is ready to start to review the process. To determine how much to spend and where to spend it, management will rank all packages in order of decreasing benefits to the organization. Theoretically, once management has set the budgeted level of spending, the packages should be accepted down to the spending level based on cost-benefit principles.

The benefits of ZBB over traditional methods of budgeting are claimed to be as follows:

1. Traditional budgeting tends to extrapolate the past by adding a percentage increase to the current year. ZBB avoids the deficiencies of incremental budgeting and represents a move towards the allocation of resources by need or benefit. Thus, unlike traditional budgeting the level of funding is not taken for granted.

2. ZBB creates a questioning attitude rather than one that assumes that current practice represents value for money.

3. ZBB focuses attention on outputs in relation to value for money.

ZBB was first applied in Texas Instruments in 1969. It quickly became one of the fashionable management tools of the 1970s and, according to Phyrr (1976), there were 100 users in the USA in the early 1970s, including the State of Georgia whose governor was ex-present Jimmy Carter. When he became the US President, he directed that all federal agencies adopt ZBB.

During the 1970s many articles on ZBB were published but they declined rapidly towards the end of the decade, and by the 1980s they had become a rarity. ZBB has never achieved the widespread adoption that its proponents envisaged. The major reason for its lack of success would appear to be that it is too costly and time-consuming. The process of identifying decision packages and determining their purpose, cost and benefits is extremely time-consuming. Furthermore, there are often too many decision packages to evaluate and there is frequently insufficient information to enable them to be ranked.

Research suggests that many organizations tend to approximate the principles of ZBB rather than applying the full-scale approach outlined in the literature. For example, it does not have to be applied throughout the organization. It can be applied selectively to those areas about which management is most concerned and used as a one-off cost reduction programme. Some of the benefits of ZBB can be captured by using ***priority-based incremental budgets***. Priority incremental budgets require managers to specify what incremental activities or changes would occur if their budgets were increased or decreased by a specified percentage (say 10%). Budget allocations are made by comparing the change in costs with the change in benefits. Priority incremental budgets thus represent an economical compromise between ZBB and incremental budgeting.

Xliii. Summary

The following items relate to the learning objectives listed at the beginning of the module.

- **Explain How Budgeting Fits into the Overall Planning and Control Framework.**
  The annual budget should be set within the context of longer-term plans, which are likely to exist even if they have not been made explicit. A long-term plan is a statement of the preliminary targets and activities required by an organization to achieve its strategic plans together with a broad estimate for each year of the resources required. Because long-term planning involves 'looking into the future' for several years, the plans tend to be uncertain, general in nature, imprecise and subject to change. Annual budgeting is concerned with the detailed implementation of the long-term plan for the year ahead. As the year progresses the control process involves comparing planned and actual outcomes and responding to any deviations by taking appropriate remedial action to ensure that future results will conform to the annual budget. Alternatively, the annual budget may have to be changed if remedial action cannot be taken. Budgeting is therefore a continuous and dynamic process, and should not end once the annual budget has been prepared.

- **Identify and Describe the Six Different Purposes of Budgeting.**
  Budgets are used for the following purposes:
  (a) planning annual operations;
  (b) coordinating the activities of the various parts of the organization and ensuring that the parts are in harmony with each other;
  (c) communicating the plans to the managers of the various responsibility centres;
  (d) motivating managers to strive to achieve organizational goals;
  (e) controlling activities; and
  (f) evaluating the performance of managers.

- **Identify and Describe the Various Stages in the Budget Process.**
  The important stages are as follows:

(a) communicating details of the budget policy and guidelines to those people responsible for the preparation of the budgets;
(b) determining the factor that restricts output (normally sales volume);
(c) preparation of the sales budget (assuming that sales demand is the factor that restricts output);
(d) initial preparation of the various budgets;
(e) negotiation of budgets with superiors;
(f) coordination and review of budgets;
(g) final acceptance of budgets; and
(h) ongoing review of budgets.

Each of the above stages is described in the chapter.

- **Prepare Functional and Master Budgets.**
  When all of the budgets have been prepared they are summarized into a master budget consisting in a budgeted profit and loss account, a balance sheet and a cash budget statement. The preparation of functional and master budgets was illustrated using Example 15.1.

- **Describe the Use of Computer-Based Financial Models for Budgeting.**
  Computer-based financial models are mathematical statements of the inputs and output relationships that affect the budget. These models allow management to conduct sensitivity analysis to ascertain the effects on the master budget of changes in the original predicted data or changes in the assumptions that were used to prepare the budgets.

- **Describe the Limitations of Incremental Budgeting.**
  With incremental budgeting indirect costs and support activities are prepared on an incremental basis. This means that existing operations and the current budgeted allowance for existing activities are taken as the starting point for preparing the next annual budget. The base is then adjusted for changes (such as changes in product mix, volumes and prices) which are expected to occur during the new budget period. When this approach is adopted the concern is mainly with the increment in operations or expenditure that will occur during the forthcoming budget period. The major disadvantage of the incremental approach is that the majority of expenditure, which is associated with the 'base level' of activity, remains unchanged. Thus, past inefficiencies and waste inherent in the current way of doing things are perpetuated.

- **Describe Activity-Based Budgeting.**
  With conventional budgeting the budgeted expenses for the forthcoming budget for support activities are normally based on the previous year's budget plus an adjustment for inflation. Support costs are therefore considered to be fixed in relation to activity volume. Activity-based budgeting (ABB) aims to manage costs more effectively by authorizing the supply of only those resources that are needed to perform activities required to meet the budgeted production and sales volume. Whereas ABC assigns resource expenses to activities and then uses activity cost drivers to assign activity costs to cost objects (such as products, services or customers) ABB is the reverse of this process. Cost objects are the starting point. Their budgeted output determines the necessary activities which are then

used to estimate the resources that are required for the budget period. ABB involves the following stages:

(a) estimate the production and sales volume by individual products and customers;
(b) estimate the demand for organization activities;
(c) determine the resources that are required to perform organizational activities;
(d) estimate for each resource the quantity that must be supplied to meet the demand; and
(e) take action to adjust the capacity of resources to match the projected supply.

- **Describe Budgeting and Planning, Programming and Budgeting Systems (PPBS) In Non-Profit Organizations.**

  In non-profit organizations the annual budgeting process compares budgeted and actual inputs but does not provide information on the efficiency with which activities have been performed, or the effectiveness in achieving objectives. The aim of PPBS is to enable the management of a non-profit organization to make more informed decisions about the allocation of resources to meet the objectives of the organization. PPBS involve the following stages:

  (a) establishing the overall objectives;
  (b) identifying the programmes to achieve these objectives; and
  (c) determining the costs and benefits of the programmes so that budget allocations can be made on the basis of cost-benefits of the different programmes. PPBS is the counterpart of the long-term planning process in profit-oriented companies.

- **Describe Zero-Base Budgeting (ZBB).**

ZBB is a method of budgeting that is mainly used in non-profit organizations but it can also be applied to discretionary costs and support activities in profit organizations. It seeks to overcome the deficiencies of incremental budgeting. ZBB works from the premise that projected expenditure for existing programmes should start from base zero, with each year's budgets being compiled as if the programmes were being launched for the first time. The budgetees should present their requirements for appropriations in such a fashion that all funds can be allocated on the basis of cost-benefit or some similar kind of evaluative analysis. The cost-benefit approach is an attempt to ensure 'value for money'; it questions long-standing assumptions and serves as a tool for systematically examining and perhaps abandoning any unproductive projects.

4.20 STANDARD COSTING

The word standard cost represents an estimated or a pre-determined total cost of production per unit for an organization. The process of estimating the total cost of production per unit is described as standard costing technique. If the estimated total cost of products for a big organization is based on the total unit produced then, the procedure is described as budgeting system.

Standard costing technique therefore represents an integral part of management accounting control technique which will also include budgeting system and responsibility accounting statement. Standard costing technique may either be viewed from the perspective of marginal costing technique or absorption costing technique. By relating standard costing technique with marginal costing technique, variance analysis will be determined on the total relevant cost of

products excluding fixed overhead. But if it is viewed in the context of Absorption costing then variance analysis will involve the total cost of products to the organizations.

4.21 Basic Step Involved in Standard Costing Technique

1. Identify the long term corporate objective of a business outfit.
2. Determine the short term achievable objective from the corporate objective
3. Conduct a market research or a market survey to identify the specific needs of the consumers.
4. Design a particular product or service that will be used to satisfy the need of the consumer.
5. Obtain top management support for the standard costing technique.
6. Identify the quantity as well as the quality of raw materials required in producing a unit of the product.
7. Estimate normal loss in the course of production.
8. Identify labor rate per hour together with the standard hour required in producing a unit
9. Adopt a specific method of absorbing both the variable and fixed production overhead into product costing
10. Prepare a standard cost card specifically itemizing the standard cost of production per unit.

4.22 Objective of Standard Costing Living

1. To provide a basis for estimating.
2. To provide guidance on possible ways of improving performance
3. To provide a formal basis for assessing performance and efficiency.
4. To assist in setting standards.
5. To control costs by establishing standards and analyzing variance.
6. To enable the principle of “management by exception” to be practiced at the detailed operational level.
7. To motivate staff and management.
8. The standard costs can be used for stock and work-in-progress valuation, profit planning and decision making.
9. To assist assigning responsibility for adverse variance of (non-performance) in order to correct deficiencies or to maximize the benefits associated with favorable variance.

4.23 Benefits of Standard Costing

(i) Standard costing provides a consistent platform whereby performance may be measured on the basis of what an item should cost or how much should have been produced, on the basis of the expected levels of activity.

(ii) It provides a method whereby labor and overheads can be consistently recovered and charged into stock.

(iii) It provides basis of control for buying, usage and efficient work levels.

(iv) In setting up standards, management can reappraise activities to ascertain if they are being done in the most cost-effective and efficient way.

(v) It creates an atmosphere of cost-consciousness amongst all levels, motivating staff and workers to see if there is a better way of performing a particular task,

(vi) By creating a realistic target, it motivates staff and operatives to achieve or better the standard laid down.

(vii) It is a recognizable method of performance monitoring through variance analysis, motivating investigations into causes of shortfall and improving methods and procedures for the future

(viii) It provides a recognizable basis for budgeting, forecasting and planning.

(ix) Where firms are in similar industries and are willing to compare, a meaningful basis for comparison might be established.

4.24 Limitations of Standard Costing Technique

1. Establishment of unattainable standard.
2. The problem of identifying the specific needs of consumers.
3. Persistent increase in the level of inflation.
4. Frequent changes in the level of technology.
5. Political instability.
6. Problem associated with accurate estimation of normal loss in the course of production
7. Labor rate per hour will vary among different organizations depending on other economic variables.
8. Negative attitude of the operating manger against the established standards.

4.25 Types of Standard Costing

It is note-worthy that the efficacy otherwise of a system of standard costing will depend on the established standard. In practice, it is possible to identify four different type of standards as follows:

1. **Ideal Standard:** This may be described as an established standard specifically designed on the basis of the maximum productive capacity of the organization i.e. standard established without providing adequately for any negative factor that may inhibit the attainment of the standard. For example, labor standard established without provision for lateness, absenteeism, industrial action, annual leave, maternity leave etc. Also referred to as unattainable standards, ideal standards are specifically designed to demotivate workers because they are not achievable in nature.

2. **Attainable Standard:** Also referred to as practical standard. This will represent an established standard specifically premised on what is considered practicable within the organization. Practical standard is established with adequate provision for negative factors that may affect the attainment of the established standard. For example, in establishing production standard, adequate provision is given to idle time or loss of production due to machine breakdown, loss of power, lack of raw materials, industrial dispute, repairs and maintenance etc.

3. **Current Standard:** This will be described as an established standard specifically based on the prevailing working condition within the organization the industry at large. Current, standards are however subject to frequent changes in order to reflect the current position within the organization

4. **Basic Standard:** This will represent an old established standard designed principally to satisfy a given objective. Basic standards are not subject to frequent alteration, therefore outdated in nature.

4.26 Variance Analysis

The word variance will represent the differences between the standard cost of production and the actual cost of production or the difference between the budgeted revenue and the actual revenue. The process of classifying a given variance into its sub-variance is described as variance analysis. A given variance may be interpreted to represent adverse or favorable to the organization depending on the differences. For example, a given variance will represent adverse if the standard cost of production is lower than the actual cost of production or budgeted revenue is considered to be higher than the actual revenue. On the other hand, a variance will be interpreted to mean favorable to the organization if the standard cost of production is higher than the actual cost of production or the budgeted profit is lower than the actual profit.

i. Factors to be considered in Variance Analysis

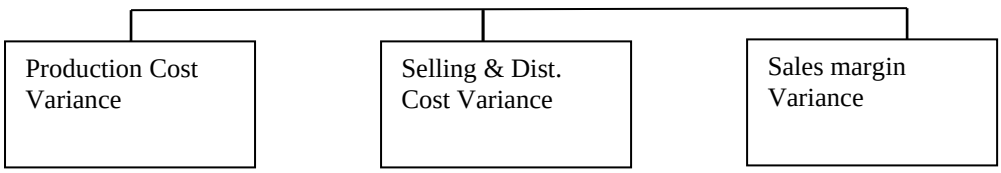
The following factors must however be considered before a variance can be investigated.

1. The cost and benefit analysis of the investigation.
2. The actual amount involved in the variance.
3. The trend of the variance.
4. Materiality aspect of the variance to the organization.
5. Size of the variance
6. Proportionate significance of the variance.

ii. Operating Profit Variance

This will represent the difference between actual profit and budgeted profit. Operating profit variance may be analyzed diagrammatically as follow:

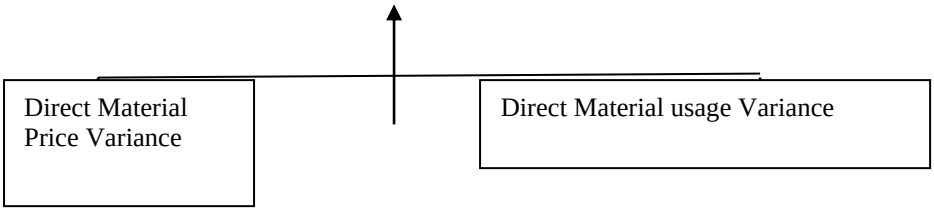
Operating Profit Variance



iii. Detailed Analysis of Production Cost Variances

(a) **Material Cost Variances:** The cost of the materials which are used in a manufactured product are determined by two basic factors: the price paid for the materials, and the quantity of materials used in production, this gives rise to the possibility that one actual cost will differ from the standard cost because the actual quantity of material used will be difference from the standard and or that the price paid will be different from the standard price.

iv. Direct-Material Total Variance



(i) Direct-material total variance is defined as "the difference between the standard material cost of the actual production volume and the actual cost of direct material

OR

Actual cost of production	xx
Less standard cost of production (based on actual output)	xx
	X

OR

Actual Price x Actual quantity	xx
Less std. Price x standard quantity Based on actual output	xx
	X

(ii) Direct material price variance is determined as "difference between the standard price and actual purchase price for the actual quantity of material" OR

Actual purchase quantity x Actual Price	x
Less actual purchase Quantity x standard price	x
	X

OR

(Standard price minus Actual price) x Actual quantity used i.e. (SP-AP) AQ

- **x Possible Causes of Material Price Variances**

(a) Buying lower or higher quantity than planned

(b) Losing or gaining quantity discounts by buying in smaller or larger quantities than planned.

(c) Marking use of substitute material due to the unavailability of the intended material.

(d) Paying higher or lower prices than planned.

(e) Purchase of inferior material at lower prices

(f) Changes in market conditions resulting in general increase in material prices.

Note opinions exist with regards to the type of quantity to be used in material price variance either the actual quantity PURCHASED or the actual quantity CONSUMED. The basis of argument with material purchases is that the time of purchase and the time of usage may not be the same. For example, materials may be purchased in one year and consumed in another year. Therefore, materials price variance under consumption may vary with the material price variance based on actual quantity purchased. If the variance is to be determined after purchase in order to evaluate the efficiency level of the purchasing department then the actual quantity purchased will be appropriate. If the variance is to be reported at the end of the period in order to evaluate the efficiency level of the entire organization then, the actual quantity consumed will be appropriate. However, the first method is recommended because the price variance can be reported in the period in which it is incurred, and reporting of the total variance is not delayed until months later when the materials are used. For the sake of simplicity, we shall assume in the entire chapter that

illustrated data are presented at the end of the period, therefore, actual purchases are identical with the actual usage.

(iii) Direct material usage variance is also defined as "the difference between the standard quantity specified for the actual production and the actual quantity used, at standard purchase price"

OR

Actual quantity used for actual production	₦
X standard price	xx
Less standard quantity for actual production x Standard price	xx
	X
	=========

OR

Standard quantity based on actual output minus the actual quantity used multiplied by the standard price i.e. (SQ (BOAO) – AQ) SP

v. Possible Causes of Material Usage Variance

a) Careless handling of material by production personnel.

b) Purchases of inferior quality materials.

c) Pilferage of material items by production staff.

d) Changes in quality control requirements.

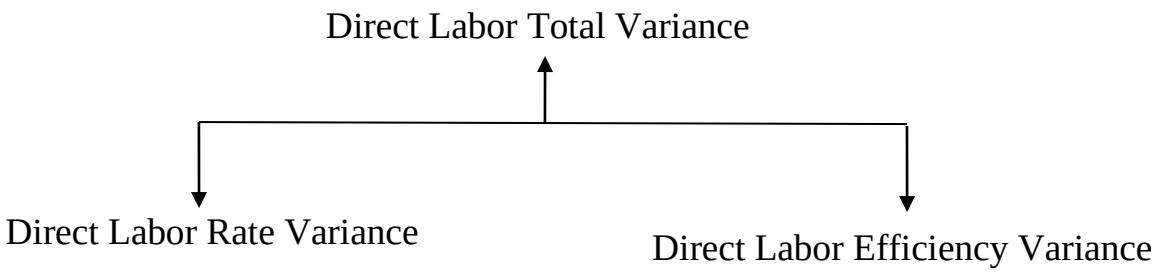
e) Changes in the method of production.

f) Greater or lower yield from material than planned.

g) Greater or lower rate of scrap than anticipated based on the earlier graphical illustration.

Material usage variance can be further sub-divided into two parts – material mixture variance and material yield variance.

(b) **LABOR COST VARIANCES:** The cost of labor is determined by the price paid for labor and the quantity of labor used. Thus a "price" and "usage" variance will also arise for labor. Unlike materials, labor cannot be stored, because the purchase and usage of labor normally takes place at the same time. Hence, the actual quantity of hours purchased will be equal to the actual quantity of hours used for each period. Based on this submission, labor rate variance and labor efficiency variance should equate the total labor cost variance.



1) Direct labour total variance is defined as "difference between the standard direct labour cost and the actual direct labor cost, incurred for the production achieved" OR the total labor variance is the difference between the standard labour cost for the actual production and the actual labour cost i.e.

SC – AC OR

	₦
Actual Labor Cost	xx
Less Standard Cost of Labor (based on actual output)	xx
	X

2) Direct labor rate variance is defined as the "the difference between the standard and actual direct labor rate per hour for the total hours worked"

OR
The wage rate variance is equal to the differences between the standard wage rate per hour and the actual wage rate multiplied by the actual number of worked.
OR

	₦
Actual Labor Hours x Actual Rate	xx
Less: Actual labor hours x Standard Rate	xx
	X

OR
Standard Rate minus Actual Rate Multiplied by the Actual Hours Worked
i.e. (SR – AR) AH

vi. Possible Causes of Labour Rate Variance

a) Payment of unplanned overtime or bonus.

b) Higher or lower grade of worker being used than planned.

c) Higher rates being paid than planned due to government legislation.

d) Negotiated increase in wages rates.

3) Direct – labor efficiency variance represents "the difference between the standard hours for the actual production achieved and the hours actually worked valued at the standard labour rate "OR Labour efficiency variance is equal to the difference between the standard labour hours for actual production and the actual hours worked during the period multiplied by the standard wage rate per hour.

OR

	N
Actual Labor Hours x Actual Rate	xx
Less: Standard hours produced x Standard Rate	xx
	X
	=========

OR

Standard hours worked on actual production minus the actual hours worked multiplied by the standard labour Rate i.e. (SH –AH) SR.

Illustration 1

Veronica Manufacturing has developed the following standards for one of its products.

vii. Standard Cost Card

One Unit of Product

	₦
Materials: 10yards x ₦6 per yard	60.00
Direct Labor: 4 hours x ₦8 per hour	32.00
Variable manufacturing overhead: 4 hours x ₦5 per hour	20.00
	112.000

The company records materials price variances at the time of purchase.

The following activity occurred during the month of April:

Materials purchased:	10,400 yards costing ₦59,800
Materials used:	9,500 yards
Units produced:	1,000 units
Direct labor:	4,200 hours costing ₦35,700

Required:

a) Calculate the direct materials price variance.

b) Calculate the direct materials usage variance.

c) Calculate the direct labor rate variance.

d) Calculate the direct labour efficiency variance.

Solution

a) **Direct Materials Price Variance**

	₦
Actual Purchase Qty x Actual Price	59,800
Less: Actual Purchase Qty x Standard Price	
(10,400 yards x N6)	62,400
	2,600 Fav

(Standard Price – Actual Price) Actual Qty Purchased.
(SP – AP) AQP
(N6-N5.75*) 10,400 yards = ₦2,600 FAV.
*Actual Price = N59,800/10,400 = ₦5.75

b) **Direct Material Usage Variance**

	₦
Actual Purchase Qty used for Actual production x Standard (9,500 yards x N6) Price	57,000
Less: Standard quantity for actual production x Standard Price (9,500 yards x N6)	60,000
	3,000 Fav

OR
(Standard Quantity – Actual Quantity) Standard Price based on output)
(SQ – AQ) SP
(10,000 – 9,500) ₦6 = ₦3,000 Fav.
*Standard quantity = 10 yards x 10,000 units = 10, yards.

Note: Material price variance is computed on actual quantity purchased and not on consumption. This is due to the fact that the company records materials price variances at the end of purchase.

c) **Direct Labor Rate Variance**

	₦
Actual labor hours x Actual Rate	35,700
Less: Actual Labor hours x Standard Rate (4,200 hours x N8)	33,600
	2,100 Adv.

OR
(Standard Rate – Actual Rate) Actual hours paid
(SR – AR) AHP
(N8 – N8.50*) 4,200 hours = ₦2,100 Adv.
* Actual labor Rate = ₦35,700/4,200 = ₦8.50

d) **Direct Labor Efficiency Variance**

Actual labor Hours x Standard Rate	₦
(4,200 x N8)	33,600
Less: Standard hours produced x Standard Rate	
(4 hours x 10,000 units x ₦8)	32,000
	1,600 Adv.

OR
(Standard Hours – Actual Hour) Stand Rate

(4,000* - 42,000) N8 = 1,600 Adv.
*Standard hours produced = 4 hours x 1,000 units = 4,000 hours

viii. POSSIBLE CAUSES OF LABOR EFFICIENCY VARIANCE

(a) Use of inappropriate grade of labor

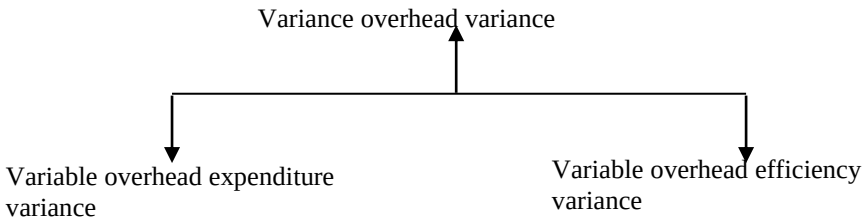
(b) Machine breakdown

(c) Lack of proper workshop supervisions

(d) Use of inferior quality material

ix. VARIABLE OVERHEAD VARIANCES

A total variance overhead variance is calculated in the same way as the total direct labour and material variances. This is also sub-divided into two as follows:



i) Variance overhead variance is defined as the difference between the actual variance overheads incurred and the variance overheads absorbed. Or the total variable overhead variance is the difference between the standard variable overheads charge to production and the actual variable overheads incurred.

Or

	₦
Standard cost (based on actual output)	xx
Less: actual variable overhead cost	xx
	X

Or
SC-AC
Where variable overheads vary with direct labour or machine hours of input. The total variable overhead variance will be due to one or both of the followings:

a) A price variance arising from actual expenditure being different from budgeted expenditure.

A quality variance arising from actual direct labour or machine hours of input being different from the hours of input, which should have been used. These reasons give rise to the two sub-variance explained below.

ii) Variable overhead expenditure variance is defined as the difference between the actual variable overheads incurred and the allowed variable overheads based on the actual hours worked.

Or
The variable overhead expenditure variance is equal to the difference between the budgeted flexed variable overheads (BFVO) for the actual direct labour hours of input and the actual variable overhead cost incurred (AVO).
Or

	₦
Actual variable overheads	xx
Less Actual labour x variable O/H absorption rate	xx
	X

Actual variable overhead cost incurred	xx
Less standard cost allowed	
(Standard Vo Rate x actual hours worked	xx
	X

Or
BFVO- AVO

iii) Variable overhead efficiency variance is also defined as the difference between the allowed variable overheads and the absorbed variable overhead OR the variable overhead efficiency variance is the difference between the standard hours of output and the actual hours of input for the period multiplied by the standard variable overhead rate.

Or

	N
Actual labour x variable o/h absorption rate	xx
Less standard hours x variable o/h absorption rate	xx
	X

Or
(SH-AH) SR

Illustration 3
The Mafoluku manufacturing company has developed the following standards for one of their products.
x. STANDARD VARIABLE COST CARD
One unit of product

	₦
Materials: 15 square feet x ₦5 per square foot	75.00
Direct labour: 8 hours x ₦7 per hour	56.00
Variable manufacturing overhead: 8 hours x ₦5 per hour	40.00
Total standard variable cost per unit	171.00

The company records materials price variances at the time of purchase.
The following activity occurred during the month of April:

Materials purchased:	40,000 square feet at ₦5.30 per square foot
Units produced:	37,000 square feet
Direct labour:	2,500 units
Actual variable	
Manufacturing overhead	₦114,000

Required

a. Calculate the direct materials price variance
b. Calculate the direct materials usage variance
c. Calculate the direct labour rate variance
d. Calculate the direct labour efficiency variance
e. Calculate he variance overhead spending variance
f. Calculate the variable overhead efficiency variance.

Solution

a. Direct materials price variance

	₦
Standard price x actual Qty purchased	
(5x 40,000 sq. Feet)	200,000
Less: actual price x actual Qty purchased	
(5.30 x 40,000 sq feet)	212,000
	12,000 adv
Or	
(Standard price- Actual price) Actual Qty purchased	
(N5- N5.30) 40,000	₦12,000adv

b. **Direct material usage variance** ₦

Standard quantity x standard price	
(15ft x 2,500) x ₦5)	187,500
Less: actual quantity x standard price	
(37, 000ft x ₦5)	185,000
	2,500 Fav
Or	
(Standard quantity – actual quantity) standard price	
(37,5000 – 37,000) ₦5	2,500 fav

Direct labour rate variance

Actual labour hours x actual rate	
(21,000 hours x N 6.70)	140.700
Less: actual labour hours x standard rate	
(21,000 x N7,000	147,000
	6,300 fav

Or
(Standard rate – actual rate) actual hours paid
(N 7- N6.70) 21,000 ₦6,300 fav

c. **Direct labour efficiency variance** ₦

Actual labour hours x standard rate
(21,000 x N7.00) 147,000
Less: standard hours produced x standard rate
(8 hours x 2,500 units x N 7,000) 140, 000
7,000 adv

Or
(Standard hours produced – actual hours) standard rate
(SH- AH) SR
(20,000 – 21, 000) N 7 ₦7,000 adv

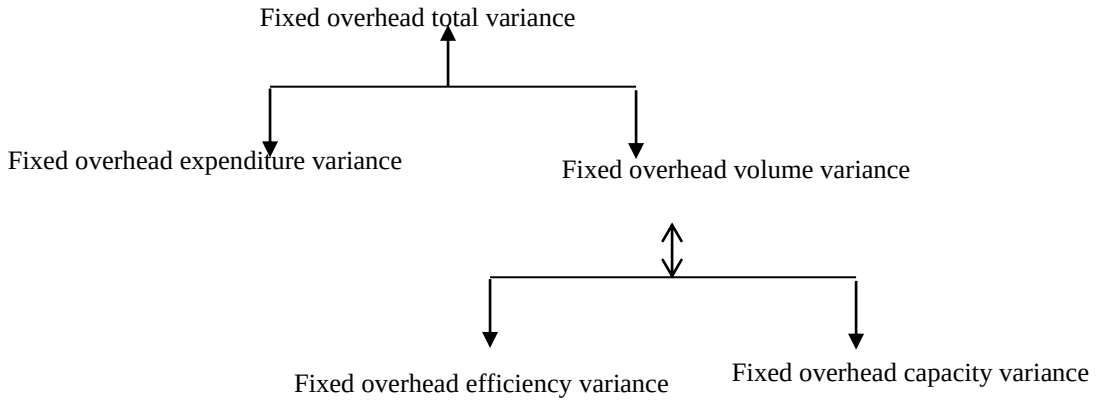
(e) Variable overhead spending variance ₦
Actual variable overhead cost incurred 114, 000
Less: standard variable rate x actual hours worked
(N5x 21,000 hours) 105,000
9,000 adv

(f) Variable overhead efficiency variance ₦
Actual labour hours x variable overhead absorption rate
(21,000 x ₦5) 105,000
Less: standard hour x variable overhead absorption rate
(8 hours x 2,500 units x ₦5) 100,000
5,000 adv

Or
(Standard hours produced – actual hours worked) standard variable overhead rate
(20,000-21,000) x N 5 = ₦5,000 adv
Standard hours produced = 8 hours x 2,500 units = 20,00hour

It is instructive to posit, that if marginal standard costing technique is in operation, variance analysis on production cost will only include material cost, labour cost and variable production overhead as earlier explained. However, accounting standards requires that, for the purpose of external financial reporting, companies should value stocks at full absorption manufacturing cost. The effect of this is that fixed overhead should be allocated to products and included in the closing stock valuations. With the variable costing systems, fixed overheads are not allocated to products. Instead, the total fixed costs are charged as an expense in the period in which they are incurred. Fixed overhead variances may be illustrated as follows:

4.27 Fixed Overhead Variance



a. Fixed overhead total variance is defined as the total difference between the fixed overhead absorbed by the actual productions and the actual overheads for the period or

The total fixed overhead variance is the difference between the standard fixed overhead charged, to production and the actual fixed overhead incurred or

	N
Actual fixed overhead incurred	xx
Less standard cost (based on actual output)	xx
	X

Note: That the standard cost for the actual production can be calculated by measuring productions in standard hours of output or units of output.
The under or over recovery of fixed overheads (i.e. the fixed overhead variance) arises because the fixed overhead rate is calculated by dividing budgeted fixed overheads by budgeted output. If actual output or fixed overheads will arise expenditure differs from budget, an under or over recovery of fixed overheads will arise. In other words, the under or over recovery may be due to the following:

1. A fixed overhead expenditure variance arising from actual expenditure being different from budgeted expenditure.
2. A fixed overhead volume variance arising from actual production differing from budgeted productions.

(ii). Fixed overhead expenditure variance as the difference between actual fixed overheads and allowed budgeted fixed overheads for the period.

Or

	₦
Actual expenditure on fixed overheads	xx
Less budgeted fixed overheads	xx
	X

(iii)Fixed overhead volume variance is defined as the difference between fixed overhead absorbed by the actual productions and budgeted fixed overheads for the period or the volume variance is the difference between actual production (AP) and budgeted production (BP) for a period multiplied by the standard fixed overhead rate (SR).

Or

	₦
Actual production x standard rate	xx
Less budgeted production x standard rate	xx
	X

Or

(AP-BP) SR

This variance seeks to identify the portion of the total fixed overhead variance that is due to actual production being different from budgeted production. The volume variance reflects the fact that fixed overheads do not fluctuate in relations to output in the short terms. Whenever actual

production is less than budgeted production, the fixed overhead charged to production will be less than the budgeted cost and the volume variance will be adverse.
Conversely, if the actual production is greater than the budgeted production, the volume variance will be favourable. If required however, volume variance can be subdivided into an efficiency variance and a capacity variance as follows:

iv) fixed overhead efficiency variance is described as the difference between the standard hours of production achieved and the actual labour hours, valued at the fixed overhead absorption rate

Or

	₦
Actual labour hours x F.O.AR	xx
Less standard hours of production x F.O.AR	xx
	X

Or

(SH-AH)SR

(v)Fixed overhead capacity variance represent "the difference between the budgeted hours and actual hours, valued at the fixed overhead absorption rate or, the volume capacity is the difference between the actual hours of input (AH) and the budgeted hours of input (BH) for the period multiplied by the standard fixed overhead rate (SR)

Or

	₦
Budgeted fixed overheads	xx
Less actual labour hour x F.O.A.R	xx
	X

Or

(AH-BH) SR

Illustration 4

The following standard cost were developed for one the products of Chisco industries:

i. STANDARD COST CARD PER UNITS

		₦
Material:	2 feet x ₦7 per foot	14.00
Direct labour	4 hours x ₦5.00 per hour	20.00
Variable overhead	4 hours x ₦4 per hour	16.00
Fixed overhead	4 hours x ₦6 per hour	24.00
Total standard cost per unit		74.00

The following information is available regarding the company's operations for the period:

Units produced:	11,000
Materials purchased	26, 000 feet @ ₦6.85 per foot
Material used:	20,000 feet
Direct labour	42,000 hours costing ₦210,000
Manufacturing overhead incurred:	
Variable:	₦189,000
Fixed	₦250,000

Budgeted fixed manufacturing overhead for the period is ₦240,000 and the standard fixed overhead rate is based on expected capacity of 40, 000 direct labour hours.

Required

a. Calculate the direct materials price variance

b. Calculate the direct materials usage variance

c. Calculate the direct labour rate variance

d. Calculate the direct labour efficiency variance

e. Calculate the variance manufacturing overhead spending variance

f. Calculate the variance manufacturing overhead efficiency variance

g. Calculate the fixed manufacturing overhead budget variance

h. Calculate the fixed manufacturing overhead volume variance.

Solution

a. Materials price variance

(std. Price- act. Price) actual purchases
(N7-N6.85) 26,000 ₦3,900 fav

b. Material usage variance

(standard usage – actual usage) standard price
(2x 11, 000 – 20, 000) N7 ₦14,000 fav

c. Labour rate variance

(standard rate – actual rate) actual hours paid
(5 – N 210, 000/42,000) ₦5 ₦0 F

d. Labour efficiency variance

(standard hours produced – actual hours paid
(4 x 11,000 – 42,000) ₦5 ₦10,000 F

e. Variable manufacturing overhead spending variance

(budgeted variable rate – actual variable rate) actual hours
(N4- N189,000/42,000) ₦42,000 ₦21,000 A

f. Variable manufacturing overhead efficiency variance

(standard hours produced – actual hours) budgeted variable rate
(4x 11, 000 – 42,000) N4 ₦8,000 F

g. Fixed manufacturing overhead budget variance ₦

Actual expenditure on fixed overheads	250,000
Less: budgeted fixed overheads	240, 000
	10,000 A

h. Fixed manufacturing overhead volume variance N

Actual production x standard rate

(11,000 x ₦24)	264,000
Less: budgeted production x standard rate	240, 000
	24,000 fav

Or

(Standard hours – budgeted hours) standard rate

(4x 11000 – 40,000) ₦6 = ₦24,000 F

Illustration 5

Unity pharmaceutical limited manufactures one product 'Unidol' and operates a standard costing system. Analysis of variances is made monthly. The standard cost card for "unidol" is as follows:

Direct material = 0.5kg at ₦4.00 per kg.
Direct wages = 2hours at ₦2.00 per hours
Variable overheads = 2 hours at ₦0.50 per hour
Fixed overheads = 2 hours at ₦4.00 per hour.

Budgeted output for the month of January 200 x was 5,000 units of "Unidol". Actual results for the period were as follows:

i. Production for the month – 4,850 units
ii. material consumed in production was 2,300kg at a total cost of ₦9,,800
iii. labour hours paid for amounted to 8,500 hours at a cost of ₦16,800

Other details for the month are:

a. Actual operating hours 8,000hrs
b. Variable overheads ₦3,000
c. Fixed overheads ₦42, 800

You are required to calculate:

a. Material price variance]
b. Material usage variance
c. Labour rate variance
d. Labour efficiency
e. Variance overhead variance
f. Variable overhead efficiency variance
g. Fixed overhead expenditure variance

<u>Solution</u>

UNITY PHARMACEUTICAL LIMITED

VARIANCE ANALYSIS FOR THE MONTH OF JANUARY, 200X

a. Material price variance

Material consumed at actual price – standard consumption at standard price
= ₦9,800-(2,300-4)
= ₦600 adverse

b. Material usage variance

Units produced	4850 units		
Standard materials to be used	4850x 0.50	=	2425kg
Actual consumption			2300kg
			125kg
Material usage variance (125kg x ₦4)		=	₦500F

c. Labour rate variance ₦

Actual hrs. At standard price (8500hrs x N2)	17,000
Actual hrs. At actual rate	16,800
	200 F

d. Labour efficiency variance ₦

Budgeted hrs. For actual output (4850 x 2)	9,700
Actual hrs.	8,000
	1,700F

Labour efficiency variance = (1700 hrs x N2) = ₦3,400F

Where there is a difference between the actual operating hours and the actual hours paid. Labour rate variance will be computed using actual hours paid while the efficiency variance will be used on the actual hours worked.

e. Variable overhead variance ₦

Standard VPO (8000hrs x ₦0.50)	4,000
Actual cost	3,000
Variable overhead expenditure variance	1,000 F

f. Variable overhead efficiency variance

(Standard hrs. At standard rate) – (actual hr. At standard rate)
= (9,700 x 0.50) – (8,000 x 0.50)
= 4850 – 4000 = N850 F

g. Fixed overhead expenditure variance ₦

Budgeted fixed overhead = 5000 units x N8	40,000
Actual fixed overhead	42, 800
Fixed overhead expenditure variance	2,800 A

ii. Possible Causes of Overhead Variances

a. Changes in production volume
b. Major shifts in demand for products
c. Labour disputes
d. Material shortages
e. Poor production scheduling
f. Machine breakdowns

g. Labour efficiency
h. Poor production quality etc.

ILLUSTRATION 6

The following data are available from the spraying Department of SNOWBALL Limited, a furniture manufacturer which has established standard cost of producing a cabinet styled:

CONCORD	₦
Labour	4.50
Materials (15 metres at ₦8)	120.00
Indirect costs:	
Variable charges (3 hrs at ₦1)	3.00
Fixed charges (3 hrs at ₦0.5)	1.50
	129.00

The actual costs of producing 400 of these cabins during October, 200x are stated below:

	₦
Materials (7,500 meters at ₦9)	67,500
Material consumed (7,200) meters	
Direct labour (1,100 hrs. At ₦1.70)	1,870
Variable charges	950
Fixed charges	600

Fixed charges rate had been set by using 1,400 direct labour hours of operations as the monthly activities level. There was no opening stock of raw materials.

You are required to compute the following variances

1. Material price variance
2. Material usage variance
3. Material cost variance
4. Labour rate variance
5. Labour efficiency variance
6. Labour cost variance
7. Variable expenditure variance
8. Variable efficiency variance
9. Variable cost variance
10. Fixed expenditure variance
11. Fixed volume variance
12. Fixed efficiency variance
13. Fixed capacity variance
14. Fixed overhead total variance

Solution

SNOWBALL LTD.

1. Material price variance

(Standard price –actual price) actual quantity used.
(SP-AP) AQ
(8-9) 7200 = N7,200 A

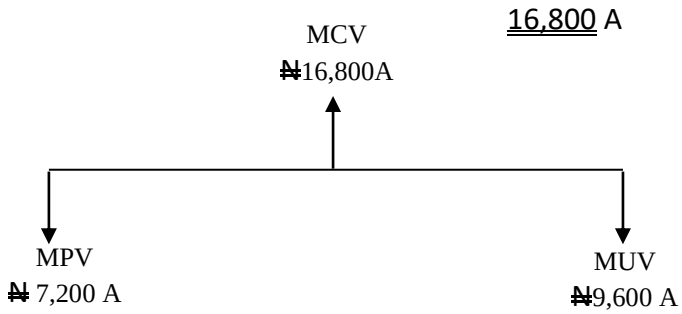
2. Material usage variance

(Standard quantity – actual raw material) standard price
Based on actual used for the production)

Production
(SQ-AQ)SP 15x400
6,000-7200 8 = N 9,600 A

3. Material cost variance

	₦
Actual cost of production (N 9 x 7200)	64,800
Less standard cost of production (N8x15x400)	48,000
	16,800 A



4. **Labour rate variance**

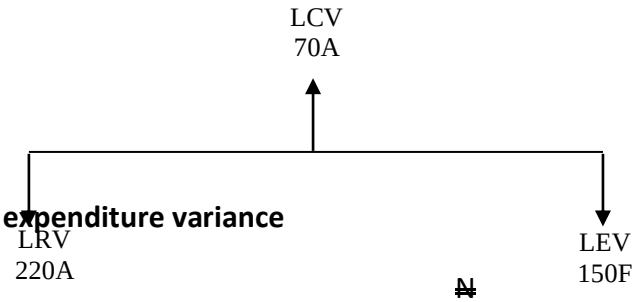
(Standard rate- Actual rate) actual hours worked
(1.50-1.70) 1,100 = ₦220A

4 **Labour efficiency variance**

(Standard hours – actual hours) standard labour rate
(3x400 – 1,100) 1.50
(1,200 – 1,100) 1.50 = ₦150 F

5. **Labour cost variance**

	₦
Actual labour cost – (1.70 x 1,100)	1,870
Less: standard labour cost (N1.50 x 3x 400)	1,800
	70 A



6. Variance expenditure variance

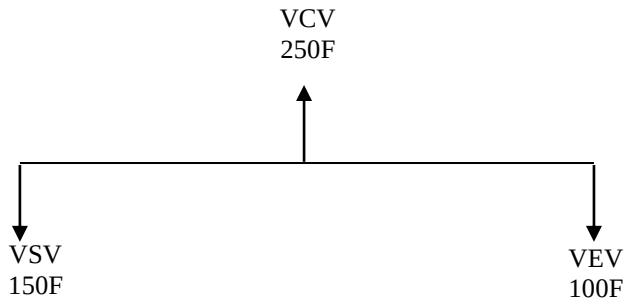
	₦
Actual variable overhead	950
Less standard cost allowed	
(SR x actual hours worked) (N10x1100)	1,100
	150F

7. Variable efficiency variance

(Standard hours- actual hours) standard rates/ V.O.A.R:
(based on actual production
(3x400
(1,200 x1,100) 1 = N 100 F

8. Variable cost variance

	₦
Actual variable overhead	950
Less standard variable overhead	
(N1x 3x 400)	1,200
	250 F



9. Fixed expenditure variance

	₦
Actual fixed overhead	600
Less: budgeted fixed overhead	
(0.5 x 1,400)	700
	100F

10. Fixed volume variance

(standard hours – budgeted hours) standard rate or F.O.A.R
Base on production
(3x400
(1,200 – 1,400) 0.5 = 100A

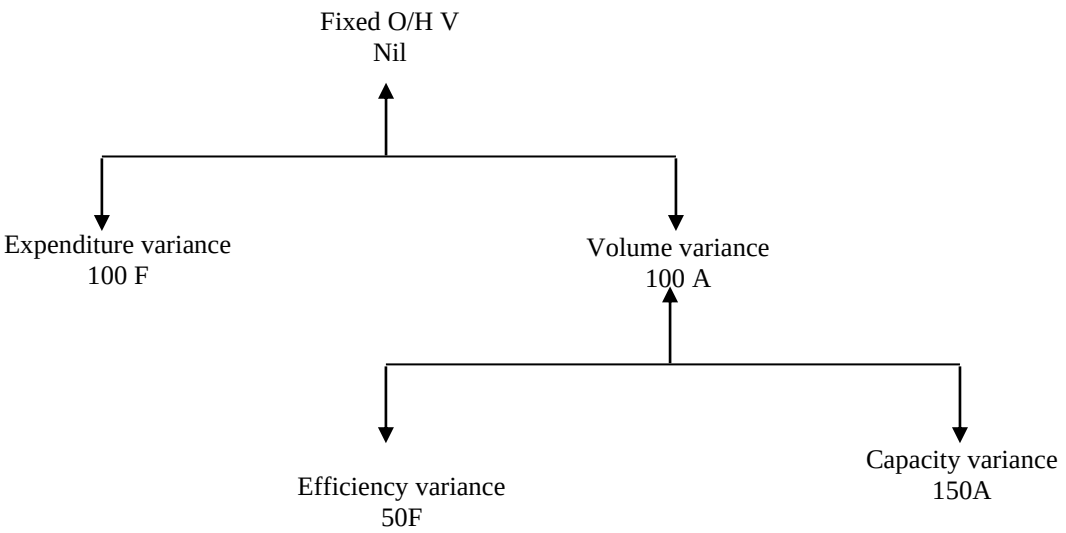
11. Fixed efficiency variance

(standard hours- actual hours) F.O.A.R
(based on production
(3x400
1,200 – 1,100 0.5 = N50F

12. Fixed capacity variance
(budgeted hours – actual hours) F..O.A.R
(1,400 – 1,100) 0.5 = 150 A

13. Fixed overhead total variance

	₦
Actual fixed overhead	600
Less standard cost based on production	
(0.5 x 3x 400)	600



4.28 Advanced Variance Analysis
i The Concept of Sales Mix
DEFINITION OF SALES MIX

The term sales mix means the relative proportions in which a company's products are sold. Managers try to achieve the combination, or mix that will yield the greatest amount of profits. Most companies have several products, and often these products are not equally profitable. Where this is true, profits will depend to some extent on the company's sales mix. Profits will be greater if high-margin rather than low-margin items make up a relatively large proportion of total sales.

Changes in the sales mix can cause interesting (and sometimes confusing) variations in a company's profits. A shift in the sales mix from high-margin items to low-margin items can cause total profits to decrease even though total sales may increase. Conversely, a shift in the sales mix from low-margin items to high-margin items can cause the reverse effect-total profits may increase even

though total sales decrease. It is one thing to achieve a particular sales volume; it is quite a different thing to sell the most profitable mix of product.

ii. Sales Mix and Quantity Variances

The sales volume variance can be subdivided into a mix variance if the proportions of products sold are controllable.

iii. Sales Mix Variance

This variance indicates the effects on profit of changing the mix of actual sales from the standard mix.

It can be calculated in one of two ways

1. The difference between the actual total quantity sold in the standard mix and actual quantities sold, valued at the standard margin per unit.
2. The difference between actual sales and budgeted sales, valued at (standard profit per unit- budgeted weighted average profit per unit).

iv. Sales quantity variance

This variance indicates the effect on profit of selling a different total quantity from the budgeted total quantity.

It can be calculated in one of two ways

1. The difference between actual sales volume in the standard mix and budgeted sales valued at the standard margin per unit.
2. The difference between actual sales volume and budgeted sales valued at the budget weighted average profit per unit.

v. Sales mix and sales quantity (yield) variances)

Where a company sells several different products that have different profit margins, the sales volume margin variance can be divided into a sales quantity (sometimes called a sales yield variance) and sales mix variance. The quantity variance measures the effect of changes in physical volume on total profits, and the mix variance measures the impact arising from the actual sales mix being different from the budgeted sales mix. The variances can be measured either in terms of contribution margins or profit margins. However, contribution margins are recommended because changes in sales volume affect profits by the contribution per unit sold and not the profit per unit sold.

Illustration:

The budgeted sales for a company for period were

	Units	**Unit contribution Margin (₦)**	**Total Contribution (₦)**
Product X	8,000 (40%)	20	160,000
Y	7,000 (35%)	12	84,000
Z	5,000 (25%)	9	45,000
Total	**20,000**		**289,000**

And the actual sales were

	Units	**Unit contribution Margin (₦)**	**Total Contribution (₦)**

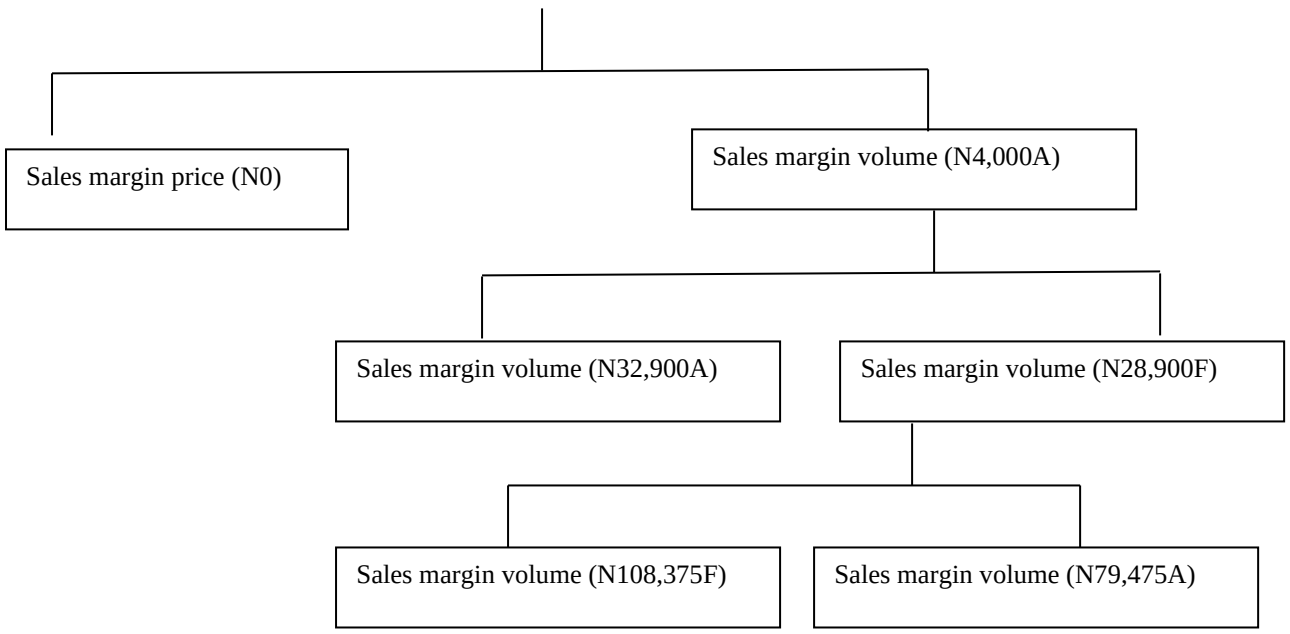
Product X	6,000 (40%)	20	120,000
Y	7,000 (35%)	12	84,000
Z	9,000 (25%)	9	81,000
Total	**22,000**		**285,000**

The total sales margin variance is 4000 adverse, and is calculated by comparing the difference between the budgeted total contribution and the actual contribution. Contribution margins for the three products were exactly as budgeted. The total sales margin for the period therefore consists of a zero sales margin price variance and an adverse sales margin volume variance of 4000. Even though more units were sold than anticipated 22,000 units rather than the budgeted 20,000 units and budgeted and actual contribution margins were the same, the sales volume variance is 4000 adverse. The reasons for this arise from having sold fewer units of product, the high margin product, and more units of product Z, which has the lowest margin.

We can explain how the sales volume margin variance was affected by the change in sales mix by calculating the sales margin mix variance. The formula for calculating this variance is: (actual sales quantity-actual sales quantity in budgeted proportions) x standard margin).

	Actual Sales Quantity	**Actual sales in budgeted proportion**	**Difference**	**Standard margin**	**Sale**
Product X	6,000 (27%)	8,800 (40%) =	-2,800	20	56,000A
Y	7,000 (32%)	7,700 (35%) =	-700	12	8,400A
Z	9,000 (41%)	5,500 (25%) =	+3,500	9	31,500F
Total	**22,000**	**22,000**	**285,000**		**32,900A**

Total Sales Margin Variance (N4,000



vi. Summary of Sales Variances

To compute the sales quantity component of the sales volume variance, we compare the budgeted

and actual sales volume (holding the product mix constant). The formula for calculating the sales quantity variance is: (actual sales quantity in budgeted proportion actual sales quantity) x standard margin.

Applying this formula gives the following calculations:

	Actual Sales in budgeted proportions	**Budgeted sales quantity**	**Difference**	**Standard margin**	**Sale margin quantity variance**
Product X	8,800	8,000	+800	20	16,000F
Y	7,700	7,000	+700	12	8,400F
Z	9,000 (41%)	5,000	+500	9	4,500F
Total	**22,000**	**20,000**			**28,900F**

The sales quantity variance is sometimes further divided into market size and a market share variance. Before considering the market size and market share variances, we shall discuss the sales variances we have calculated so far in respect of example above by separating the sales volume variance into quantity and mix variance, we shall explain the how the sales volume variance is affected by a shift in the total physical volume of sales and shift in the relative mix of products.

The sales volume quantity variance indicates that if the original planned sales mix of 40% of X, 35% of Y and 25% of Z had been maintained, then, for the actual sales volume 22,000 units, profits would have increased by 28,900. In other words, the sales volume variance would have been N28,900 favorable instead of 4,000 adverse. However, because the actual sales mix was not in accordance with the budgeted sales mix an adverse mix variance of N32,900 occurred. The adverse sales mix variance has risen because of an increase in the percentage of units sold of product Z, which has the lowest contribution margin, and a decrease in the percentage sold of units of product X, which has the highest contribution margin.

An adverse mix variance will occur whenever there is an increase in percentage sold of units with below average contribution margins. The division of the sales volume variance into quantity and mix components demonstrates that increasing or maximizing sales volume may not be as desirable as promoting the sales of the most desirable mix of products.

vii. Interdependence Between Variances

The cause of one (adverse) variance may be wholly or partly explained by the cause of another (favorable) variance.

1. Material price or material usage and labor efficiency
2. Labour rate and material usage
3. Sales price and sale volume

The Significance of Variance

The decision as to whether or not a variance is so significant that it should be investigated should take a number of factors into account

1. The type of standard being used
2. Interdependence between variances
3. Controllability
4. Materiality

viii. Materials Mix and Yield Variance

The materials usage variance can be subdivided into a materials mix variance and a materials yield variance if the proportion of material in a mix is changeable and controllable.

The mix variance indicates the effect on cost of changing the mix of material inputs.

The yield variance indicates the effect on costs of material inputs yielding more or less than expected.

Standard input to produce 1 unit of product X:

ix. Direct Materials Mix and Yield Variances

In many industries, particularly of the process, it is possible to vary the mix of input materials and affect the yield. Where it is possible to combine two or more raw materials, input standards should be established to indicate the target mix of materials required to produce a unit, or a specified number of units, of output. Laboratory and engineering studies are necessary in order to determine the standard mix. The costs of the different material mixes are estimated and a standard mix is determined based on the mix of materials that minimizes the cost per unit of output but still meets the quality requirements. Trade-offs may occur. For example, costs increases arising from using better quality materials may be offset by a higher yield, or vice versa.

By deviating from the standard mix of input materials, operating managers can affect the yield and cost per unit of output. Such deviations can occur as a result of a conscious response to changes in material prices, or alternatively may arise from yield variances; we can provide an indication of the cost of deviating from the standard mix.

x. Material Mix Variance

The material mix variance arises when the mix of materials used differs from the predetermined mix included in the calculation of the standard cost of an operation. If the mixture is varied so that a larger than standard proportion of more expensive materials is used, there will be an unfavorable variance. When a larger proportion of cheaper materials is included in the mixture, there will be a favorable variance.

Illustration

A company has established the following standard mix for producing 9 gallons of product A

	N
5 gallon of material X at N7 per gallon	35
3 gallon of material Y at N5 per gallon	15
2 gallon of material Z at N2 per gallon	4

A standard loss of 10% of input is expected to occur.

Actual input was 53,000 gallons of material X at N7 per gallon	371,000
28 gallons of material Y at N5.30 per gallon	148,400
19 gallons of material Z at N2.20 per gallon	41,800
100,000	**N561,200**

The total output for the period is 100,000 gallons and using the standard mix, an input of 50,000 gallon of X (5/10x100,000), 30,000 gallons of Y (3/10x100,000) and 20,000 gallons of Z (2/10x100,000) should have been used. However, 53,000 gallons of X , 28,000 gallons of Y and 19,000 gallons of Z were used. Therefore 3000 additional gallons of X at a standard price of N7 per gallon were substituted for 2,000 gallons of Y (at a standard price of N5 per gallon) and 1,000 gallons of Z (at a standard price of N2 per gallon). A material mix variance of N9,000 will therefore be reported. The formula for the material mix variance is as follows:

(Actual quantity in standard mix proportions-actual quantity used) x standard price
If we apply this formula, the calculation is as follows:

Actual usage in standard proportions:		N	
X = 50,000 gallons (5/10x 100,000) at	N7	350,000	
X = 30,000 gallons (3/x 100,000) at	N5	150,000	
Z = 20,000 gallons (2/10 x 100,000) at	N2	40,000	
			540,000
Actual usage in actual proportions		N	
X = 53,000 gallons at N7		371,000	
Y = 28,000 gallons at N5		140,000	
Z = 19,000 gallons at N2		38,000	
		549,000	
Mix variance =			**N9,000 A**

Note that standard prices are used to calculate the mix variance to ensure that the price effects are removed from the calculation. An adverse mix variance will result from substituting more expensive higher quality materials for cheaper materials. Substituting more expensive materials may result in a boost in output and a favorable yield variance.

On the other hand, a favorable mix variance will result from substituting cheaper material for more expensive materials- but this may not always be in a company's best interests, since the quality of the product may suffer or output might be reduced. Generally, the use of a less expensive mix of inputs will mean the production of fewer units of output than standard. This may be because of excessive evaporation of the input units, an increase in rejects due to imperfections in the lower quality inputs, or other similar factors. To analyze the effect of changes in the quantity of outputs from a given mix of inputs, a yield variance can be calculated. It is important that the standard mix be continuously reviewed and adjusted where necessary, since price changes may lead to a revised standard mix.

xi. Direct material yield variance

The yield variances arise because there is difference between the standard output for a given level of inputs and the actual output attained. In the illustration above, an input of 100,000 gallons should have given an output of 90,000 gallons of product A. (Every 10 gallons of input should produce 9 gallons of output). In fact, 92700 gallons were produced, which means that the output

was 2700 gallons greater than standard. This output is value the average standard cost per unit of output, which is calculated as follows. Each 10 gallons of input is expected to yield 9 gallons of output. The standard cost for this output is 54. Therefore, the standard cost for one gallon of output = N54x1/9 = 6
The yield variance will be 6 x 2,700 = 16,200 F.

The formula is as follows: (actual yield-standard yield from actual input of material) x standard cost per unit of output = (92,700 gallons – 90,000 gallons) x 6.

Adverse yield variances may arise from a failure to follow standard procedures. For example, in the steel industry a yield variance may indicate that the practice that was followed for pouring molten metal may have been different from that which was determined as being the most efficient when the standard yield was calculated. Alternatively, the use of inferior quality materials may result in an adverse yield variance.

The material mix variance in the example above is N9,000 adverse, while the material yield variance is N16,200 favorable. There was a trade off in the material mix, which boosted the yield. This trade off may have arisen because the prices of materials Y and Z have increased whereas the actual price paid for material X is identical with the standard price. The manager of the production process may have responded to the different relative prices by substituting material X (the most expensive material) for materials Y and Z. This substitution process has resulted in an adverse mix variance and a favorable yield variance. Note, however, that actual material cost per unit of output is N6.05 (561,200/92,700 gallons), whereas the standard cost per unit is N6 (N54/9 gallons). You will find that this difference has been partly caused by an adverse material price variance of 12, 200.
At this stage you should be aware that materials price, mix and yield variances are interrelated and that should be recognized. You should also note that changes in relative input prices of material will affect the optimal standard mix and yield of materials. Where significant changes in input prices occur, the actual mix and yield of materials where significant changes in input prices occur, the actual mix and yield should be compared with a revised ex-post standard mix and yield.

xii. Material Usage Variance

The material usage variance consists of the mix variance and the yield variance. The material usage variance is therefore a favorable variance of N7,200 consisting of an adverse mix variance of N 9,000 and a favorable yield variance of N16,200. To calculate the material usage variance, we compare the standard quantity of materials for the actual production with the actual quantity of materials used and multiply by the standard material prices in the normal way. The calculations are as follows.
Actual production of 92700 gallons requires an input of 103000 gallons (92700x10/9), consisting of

	N
51500 gallons of X (10300 x 5 / 10) at N7 per gallon =	360,500
30900 gallons of Y (103000 x 3 / 10) at N5 per gallon =	154,500
20600 gallons of Z (103000 x 2 / 10) at N2 per gallon =	41,200
	5 56,200 (i)

Actual quantity at standard prices	N
53000 gallons of X at N7 per gallon	= 371,000
28000 gallons of Y at N5 per gallon	= 140,000

19000 gallons of Z at N2 per gallon	= 38,000	
	549,000	(ii)
Material usage variance I, - ii	**= 7,200 F**	

Note that the standard quantity for actual production at standard prices can also be calculated by multiplying the actual output by the standard cost per unit of output (92700x N 6 = N556200)

Summary of material variances

The total material variance and the price variances are calculated using the approaches described above. The calculations are as follows:

	N
Standard cost for actual production (92,700 x N6)	556,200
Actual Cost	561,200
	5,000A

Material price variances, (standard price-actual price) x actual quantity

	N	
Material X = (7-7) x 53,000	0	
Material Y = (5-5.30) x 28,000)	8,400A	
Material Z= (2-2.20) x 19,000	3,800A	
		12,200A

We have already noted that this variance may be inter-related. The manager of the production process may have responded to the price increases by varying the mix of inputs, which in turn may affect the yield of the process. The decomposition of the total materials variance into price, mix and yield components different aspects of the production process and provides additional insights to help managers to attain the optimum combination of materials inputs.

You should note that mix and yield variances are appropriate only to those production processes where managers have the discretion to vary the mix of materials and deviate from engineered input-output relationships. Where managers control each input on an individual basis and have no discretion regarding the substitution of materials, it is inappropriate to calculate mix and yield variances. For example, there is often a predetermined mix of components needed for the assembly of washing machines, television sets and vacuum cleaners. In these production processes deviations from standard usage are related to efficiency of material usage rather than to changes in the physical mix of material inputs.

The same approach as that used to determine material mix and yield variances can also be applied to direct labor where it is possible to combine two or more grades of labor to perform specific operations. Given that the variances calculations for labor mix and yield variances are identical with the procedures described in this section, the computations need not be illustrated.

XIII. MARKET SIZE AND SHARE VARIANCES

Where published industry sales statistics are readily available, it is possible to divide the sales quantity variance into a component due to changes in market size and components due to changes in market share. Suppose that the budgeted industry sales volume for the illustrative company. In the example above was 200,000 units and a market share of 10% was predicted. Assume also that the actual industry sales volume was 275,000 units and the company obtained a market share of 8 percent (8% x 275,000=22,000 units). The formulae and calculations of the market size and market

share variances are as follows:

Market size Variance =	Budgeted market share percentage X	Actual budgeted industry industry Sales Volume in units - Sales Volume in units X	Budgeted average contribution margin per unit

= 10% x (275,000 -200,000) x 14.45
= N108,375F
(budgeted company total contribution (289,000/budgeted sales volume in units (20,000)

Market size variance	Actual Market Share Percentage - Budgeted Market Share Percentage	Actual Industry Sales Volume In units X budgeted average contribution margin per unit

(8%-10%) x 275,000 x 14.45 = N79,475A
The market size variance indicates that an additional contribution of N108,375 was expected given that the market expanded from 200,000 to 275,000 units. However, the company did not attain the predicted market share of 10%. Instead, a market share of only 8% was attained and the 2% decline in market share resulted in a failure to obtain a contribution of N79,475. Hence, the sum of the market size variance (N108,375F) and the market share variance (N79,475A) equals the sales margin quantity variance of N28,900.

Using the budgeted average contributions per units in the formulae for the market size and share variances implies that we are assuming that budgeted and actual industry sales mix is the same as company sales mix of 40% of X, 35% of Y and 25% of Z, market size for each individual product can be ascertained.

xiv. Criticism of Sales Margin Variances

Sales margin price and volume variances and the decomposition of the volume variance into mix and yield are commonly advocated in textbooks. However, some writers (e.g. Manes, 1983) question the usefulness of sales variance analysis on the grounds that in an imperfectly competitive market structure, prices and quantities are interrelated. Given price elasticity, the logical consequence of lower/higher sales price is higher/lower volume. Thus, the relevant variances and analysis based on these variances are also interrelated. Consequently, it is argued that sales margin variance analysis does not generate any meaningful results.

Several writers have also argued that it is inappropriate to separate the sales volume variance into mix and quantity variances. Bestable and Bao (1988) illustrate two different approaches advocated in the literature to calculate mix and yield variances. The first approach calculates weights in terms of physical quantities whereas the second uses sales dollars. Bastable and Bao show that the two approaches generate divergent results in many situations. Because of this deficiency, they argue that decomposing the sales volume variance into mix and quantity variances is misleading and has the potential for more harm than good.

Gibson (1991) advocates that mix and quantity variances provide useful information only where

there is an identifiable relationship between the products sold and these relationships are incorporated into the planning process. Where relationships between products are not expected, the budgeted contribution for a period is derived from separated estimates of physical volumes and prices of each product. The mix that emerges from the combination of the separate estimates for each product does not constitute a planned mix. Gibson therefore argues that providing management with mix and quantity variances, where there is no identified relationship between the sales volumes of individual products, is misleading because it incorrectly implies that a possible cause of the sales volume variance is a change in mix. The only possible causes that require investigation are simply deviations from planned volumes for the individual products. Gibson provides the following examples of situations where identifiable relationships exist: the sale by the firm of a number of similar products (differentiated by single characteristics such as size) where sales of individual products are expected to vary proportionally with total sales; the sales of complementary products (where increased sale of one product are expected to result in increased sales in another); the sale of heterogeneous products, the quantities of which are limited by factors of production (for example, where the sale of products with lower contribution margins per limiting resource factor is made only if products with higher contribution margins cannot be sold.)

Gibson identifies two possible situations where a planned relationship between the sales of products could be incorporated into the planning model. The first relates to where the total sales of individual products are expected to occur in a constant mix, such as different sizes of a particular product. In this situation management would be interested in how the volume variance has been affected by deviations from the planned mix. The second relates to situations where sales of products in a group are expected to vary in proportion to sales of a critical product, such as where other products are complementary to, or substitutes for, the critical product.

4.29 Planning and Operational Variances

The standard costing technique as a matter of tradition/convention involves the comparison of actual cost with pre-determined cost which could have been estimated several months back. Any computed or taken will only be beneficial if the standards are still realistic, otherwise, it would be of no value at best and at worst, it could be misleading.

Operational and planning approach therefore, is an attempt at arriving at a more realistic standard by updating the standards at the end of the control period in order to:

1. Identify those variances that are due to forecasting problems, i.e, planning variances.

2. Identify those variances that are due to the level of performance of the operating margins i.e., operational variances.

Planning and operational variances recognize the difference between changes occasioned by errors at the planning stage and those attributable to efficient or inefficient operation.

4.30 Operational Variances

These are variances which compare actual results with those that are considered achievable by a reasonably efficient management during the previous period. The work “efficient” will most probably be different from the original standard and it will therefore take account of actual conditions which are now perceived with the benefit of hindsight. They are often termed ex-posed budget.

i. Advantages of Planning & Operational Variances

1. It makes standard costing and variance analysis more realistic and meaning in changing conditions.
2. Operational variances provide an up-date guide to current levels of operating efficiency as the standards have been recalculated using up to date information.
3. Standard costing becomes more acceptable and thus has positive effect on motivation.
4. It provides a systematic method of reviewing standards as well as the assumptions upon which they are made.

ii. PROBLEMS OF OPERATIONAL AND PLANNING VARIANCES

1. There is an element of subjectivity in determining the ex-post standard
2. More electrical and managerial time are involved in continually establishing an up to date standard and calculating additional variances.

Illustration 3
Standard Cost Card
200 Tons Product Rubber (Pack)

Standard Quantity	Standard Price	Standard Cost		
Material X		24 tons	N20	N480

The actual result for a certain week, when 1000 tons of rubber were produced, are materials purchased and used are 1,500 tons at N28. It is now realized that the standard price per ton of material X should have been set at N26 and the stand quantity to produce 200 tons of rubber should have been 28 tons.

Required:
Calculate the traditional variances due to planning and operational errors.

<u>Solution</u>

(a.) Traditional Variance Analysis

Material X	Actual cost	Actual quantity @ standard price	standard cost specified
	(1)	(2)	(3)
1,500 tons @N28	1,500 tons@ N20	200 x 24 = 4800@N20	
N42,000	N30,000	N96,000	

Analysis

Cost Variance	Price Variance	Usage Variance
(3 - 1)	(2 - 1)	(3 - 2)
N54,000	(N12,000)	N66,000
Favorable	Adverse	Favorable

(b.) **Traditional Material Price Variance N12,000 Adverse**

(i.) Material price variance due to bad planning:

	₦
New standard price per ton (Ex-post)	26
Old standard price per ton (Ex-ante)	20
Planning Variance	6 Adverse

Total price variance due to bad planning
= N6 x 1,500 = N9,000 Adverse

(ii) Material price variance due to operating errors

	₦
New standard price per ton (Ex-post)	26
Old standard price per ton (Ex-ante)	28
Operational variance per ton	2 Adverse

Total price variance due to bad planning
= N2 x 1,500 = N3,000 Adverse

(c.) Traditional Material Usage Variance N66,000 Favorable.

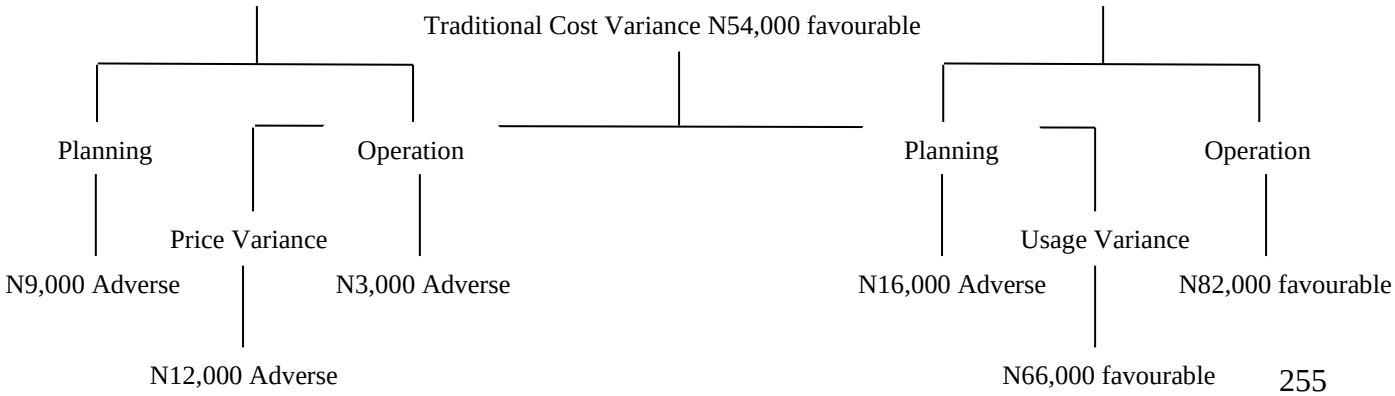
(i.) Material usage variance due to bad planning:

Tons	
New standard quantity specified at	
N28 per 200 tons of rubber (28 x 200)	5,600
Old standard quantity specified (24 x 200)	4,800
Planning Variance	800 Adverse
OR	
800 tones x N200	N16,000 Adverse

(ii) Material usage variance due to operating errors:

	Tons
New standard quantity specified	5600
Actual quantity used	1500
Operating Variance	4100 favourable
OR	
4,100 tons x N20	N82,000 favourable

We now have:



Thus, all in all, the planning and operational variance approach complements and supplements the traditional variance analysis.

Illustration

The management team of OOU Ltd, feels that standard costing and variance analysis have little to offer in the reporting and some of the activities of their firm. Although we produce a range of fairly standardized products states the accountant of OOU Ltd, "prices of many of our raw materials are apt to change suddenly and comparison of actual prices with a pre-determined, and often unrealistic, standard price is of little use. For some of our products we can utilize one of several equally suitable raw materials and we always plan to utilize the raw material which will in our opinion, lead to the cheapest total product cost".

"However, we are frequently caught out by price changes and expensive than the alternative which was originally rejected. For example, consider the experience over the last accounting period of two of our products. Alpha and Beta. To produce a unit of Alpha we can use either 5kg of gamma or 5 kg of delta. We planned to use gamma as it appeared it would be the cheaper of the two, and our plans were based on the cost of gamma 10.800kg, due to market movement the actual prices changed and if we had purchased efficiently the cost would have been:

Export	gamma	N4.50 per kg
	Delta	N4.00 per kg

Production of Alpha was 2,000 units and usage of gamma amounted to 10.800kg at a total cost of N51,840. Production of Beta use only one raw material epsilon, but again the price of this can change rapidly. It was thought that epsilon would cost N30 per tonne but in fact we only paid N25 per tonne and if we had purchased correctly the cost would have been less as it was freely available at only N23 per tonne. It usually takes 1.5 tonne of epsilon to produce 1 tonne of Beta but our production of 500 tonnes of Beta used only 700 tonnes of epsilon".
"So you can see that with our particular circumstances, the traditional approach variance analysis is of little use and we don't use it for material although we do use it for reporting on labor and variable overhead costs".

You are required to:

Analyze the material variance for both Alpha and Beta Utilizing.

i. Traditional variance analysis and

ii. An approach which distinguishes between planning and operational variances

Solution: **OOU LTD**

(a) **ALPHA PLANNING AND OPERATIONAL VARIANCES**

(A) Planning Variance = (Original Std. Price – Related Std. price) Std. Usage

(3-4.5) 5 X 2000

15,000 Adverse

Avoidable Planning Variance

Std. Usage (Revised Std. Price – Revised STD Price of Alternative)

10,000 (4.50 – 4.00)

N5,000 Adverse

Unavoidable Planning Variance

(Original Std Price – Revised STD Price of Alternative

(3.00 – 4.00) 1000

10,000 Adverse

(b) **Operational Variances**

Dm Cost = Revised Std Cost – Actual Cost

Based on Standard output

(4.50 x 10,000 – 51,840)

N6,840 Adverse

Dm Price Variance = (revised Std. Price – Actual Price) Actual Qty

(4.5 – 4.8) x 10,800 = 3240 Adverse

Dm usage variance = (Revised Std. usage – Actual Usage) Revised Std price

= (10,000 – 10,800) 4.5

= (800) 4.5

= N3,600 Adverse

(i) **Traditional Variance**

Dm Cost Variance = (Std Cost Based on Std Output-Actual Cost)

(3 x 10,000 – 51,840)

21,840 Adverse

Dm Price Variance = (Std Price – Actual Price) Actual Qty.

(3 – 4.80) x 10,800

= N19440 Adverse

Dm Usage Variance = (Std usage – actual usage) Std Price

(10,000 – 10,800) 3

N2,400 Adverse

ii. Beta planning and operational variances

(a) Planning variance

Planning variance = (Original Std Price – Revised Std Price) x Std. usage

(30 – 23)

N5,250 favourable

The breakdown to avoidable and unavoidable planning variance was not possible here because of the absence of the revised standard price of Alternative material.

b. Operational variances

Dm Cost = Revised Std Cost – Actual

Based on Std output Cost

(23 x 750) – (25 x 700)

17,350 – 17,500

N250 Adverse

Dm Price Variance = (revised Std price-actual price) actual qty
= (23 – 25) 700
= N1,400 Adverse

Dm usage variances = (Std usage – Actual usage) revised Std price
= (750 -700) 23
= N1,150 favourable

Traditional Variances

Dm Cost Variance = (Std cost based on Std output – Actual cost)
= (30 x 750) – 17500)
= 22,500 – 17,500
= N5,000 favourable

Dm price variance = (Std price – Actual Price) Actual Qty
= (30 – 25) 700
= N3,500 favourable

Dm usage Variance: (Std usage –Actual Usage) Std price
= (750 – 700) x 30
= N1,500 favourable

Illustration

Nwafa Nig. Ltd took record of the following data for the year ended 31st December, 2008.

	Actual (N)	**Standard (N)**
Sales	800,000.00	700,000.00
Material cost	200,000.00	180,000.00
Labor cost	300,000.00	270,000.00
Variable production overhead	100,000.00	110,000.00
Fixed production overhead	80,000.00	60,000.00
Total cost	680,000.00	620,000.00
Units Production	100,000.00	80,000 units

Normal capacity is 120,000 units. 80,000kg of raw materials were estimated but 100,000kg we actually consumed. The company estimated to pay labour at N50 per hour but actually consumed 7,000 hours. All overhead costs are absorbed on hourly basis.

You are required to calculate all the relevant variances and prepare the profit reconciliation statement.

NWANFA NIG. LTD

PROFIT RECONCILIATION STATEMENTS FOR THE YEAR ENDED 31ST DECEMBER, 2008

	N	**N**	**N**	**N**
Profit Variance				
Standard profit			80,000.00	
Actual profit			120,000.00	40,000F
Caused by				
SMPV			75,000A	
SMVV			20,000F	
SMV				55,000A

MPV		25,000F		
MUV		O		
MCV			25,000F	
LRV		50,000F		
LEV		12,500A		
LCV			37,500F	
VPOSV		42593F		
VPOEV		5,093A		
VPOCV			37,500F	
FPOBV		10,000F		
FPOCV	12,222			
FPOEV	2,7778A			
FPOVV		15,000A		
FPOCV			5,000A	95,000F
				40,000F

Profit Variance

Actual profit =	120,000
Standard profit =	80,000
	40,000F

Sales Margin Variance:

(Budget output) X budget profit/unit - Actual Quantity (Actual Selling Price – Cost - Standard Price)

80,000 x 1) – (100,000 (8-7.75)
80,000 – 25,000
= 55,000A

SMPV (Sales Margin Price Variance)
(Standard Price – Actual Price) x Actual Quantity
= (8.75 – 8) x 100,000
= **75,000A**
SMVV (Sales Margin Volume Variance
(Budgeted Qty – Actual Qty) Std – Profit per unit
(80,000 – 100,000) 1
= **20,000F**

75,000A
20,000F
55.000A

Total Cost Variance:

Actual Total Cost	680,000
Expected Total cost (100,000 x 7.75)	775,000
	95,000F

Material Cost Variance

Actual Material Cost	200,000
Expected Material cost (2.25 x 100,000)	225,000
	25,000F

Material Price Variance

(Standard Price – Actual Price) x Actual Quantity

(2.25 – 2) 100,000 = 25,000F

Material Usage Variance

(Expected Usage – Actual Usage) Standard Price 25,000F

(100,000 – 100,000 x 2.25 = 0 0

25,000F

Labour rate Variance

Actual labour cost	300,000
Expected labour cost (3.375 x 100,000	337,500
	37,500F

Labour rate variance

(Standard - Actual) x Actual

Rate rate hours

(50-42.8571) x 7,000 = **50,000F**

Labour efficiency Variance

(Expected - Actual) x Standard

Hour Hour Rate

((0.0675)

X 100,000 - 7,000) x 50 = 12,500A

= (50,000F)

12,500A

37,500F

Variable Production Overhead (VPO) Cost Variance

Actual VPO Cost	100,000
Expected VPOl cost (1.375 x 100,000)	137,500
	37,500F

VPO Spending Variance

(Standard Rate - Actual Rate) x Actual Hour

(20.3703037 – 14.2857) x 7,00 0 = **42,593F**

VPO Efficiency Variance

42,593F

5,093A

37,500F

(Expected Hour – Actual Hour) x Standard Absorption Rate

(6,750 – 7,000) x 20.37037

= **5,093A**

Fixed Production of Variance

Actual FPV	80,000
Expected FPO cost (100,000 x 0.75)	75,000
	5,000F

FPO Budget Variance

Actual FPO	80,000
FPO BONC (120,000 x 0.75)	90,000
	10,000F

FPO Volume Variance

FPO hr FPO hr x std

BONC - Boao Absorption Rate

0.0675 11.1111

0.0675 x 100,000 - x 120,000

(6750-8,100)11.1111 = 15,000A.

10,000F
15,000A
5,000A

FPO

Capacity Variance

Actual – std hour std FPO Abc rate

Hour boinc

(7,000-8,100).11111

= **12222A**

FPO efficiency variance

(Std hour actual) std FPO

(Bonc Hour) A. R

(6,750 – 7,000) 11.11111 = **2,778A**

12,222A
2,778A
15,000A

Workings:

Profit per unit (standard) = N80,000 / 80,000 unit = N1/unit

Standard S.P/unit = 700,000 / 80,000 = N8.75

Actual S.P = 800,000 / 100.000 = 8.00

Standard cost/unit 620,000 / 80,000 = 7.75

Standard materials cost/unit = 180,000 / 80,000 = 2.25

Standard labour cost/unit = 270,000 / 80,000 = 3.375

Standard V. P. O absorption rate/unit = 110,000 = 1.375

Standard FPO absorption rate/unit = $\frac{80,000}{60,0000}$ = 0.75 $\frac{80,000}{}$

Actual labour rate = $\frac{300,000}{7,000}$ = 42.8571

Standard labour hour = $\frac{270,000}{5.0}$ = 5.400hrs

Material price standard = $\frac{180,000}{80,000}$ = 2.25

Material price actual= $\frac{200,000}{100,000}$ = 2.00

FPO absorption rate (std) = $\frac{110,000}{5,400}$ = 20.3707

VPO absorption rate (std)= $\frac{60,000}{5,400}$ = 11.1111

VPO absorption rate (actual)= $\frac{100,000}{7,000}$ = 14.2857

FPO absorption rate (actual) =$\frac{80,000}{7,000}$ = 11.42857

Material/unit = $\frac{80,000 \text{ kg}}{80,000 \text{ unit}}$ = 1kg/unit

Actual usage = $\frac{100,000 \text{ kg}}{100,000 \text{ unit}}$ = 1kg/unit

Standard labour hour/unit = $\frac{5400}{80,000}$ = 0.0675

4.31 Performance Monitoring Techniques

i. Non-financial performance indicators-overview; The typical objectives of a modern manufacturer include:

1. A zero defect rate, which is to be actualized though total quality, management (TQM) and a continuous improvement ethos (although zero defects is unlikely to be achieved in practice).
2. On time delivery, through better planning and a service-oriented attitude.
3. Minimal inventory, using JIT purchasing and manufacturing.
4. Produce to price, i.e. identify a realistic price for a new product then set about designing and producing at a cost level which will generate a satisfactory profit.

These are the types of goals a company will need if it is to compete and survive as a world class producer. CIMA official terminology defines world class manufacturing as a position culture based on factors such as continuous improvement, problem prevention, zero defect tolerance, customer-

driven JIT-based production and total quality management.

Conventional cost and management accounting techniques and procedure may be inadequate in the environment for instance:

1. Accounting number may not be relevant for example, data on scrap rates are more useful a quality monitor than are figures for rectification cots.
2. Control figures may take longer to produce if they have money values attached, which means that managers may take longer to react to problem.
3. Inflation may distort and mask trends.
4. Cross-border comparison in money may be difficult because of exchange rate fluctuations.
5. Standard costing will often only enable the obvious costs of below standard quality and efficiency to be identified. Knock-on effects, customer complaints, do not normally appear in accounting statements.
6. An emphasis on reducing reported manufacturing, selling and distribution overhead costs may cause adverse effect to customer's service, product quality and sales delivery performance, which far outweigh any apparent savings. These consequent cost are hard to identify and do not appear in any formal accounting system. Nonetheless, they are real.

Three broad areas lend themselves to non-financial measurement:

1. Supplier performance: using measures such as delivery times, quality, and ability to respond.
2. Plant manufacturing performance (or departmental service provision): measured by defect rates, equipment/system downtime, cycle times, output quantities, yields, resource productivity etc.
3. Customer performance: using measures such as complaints (a passive measures), warranty claims (also passive), satisfaction surveys (a proactive measurement) and market share.

All the above non-financial performance measures (or non-financial performance indicators (NFPIs) may be reported as indices or ratios so as to emphasis trends.
CIMA official terminology describes non-financial performance measures as measure of performance based on non-financial information which may originate in, and be used by operating departments to monitor and control their activities without any accounting input. Non-financial performance measures may give a more timely indication of the levels of performance achieved than do financial ratios, and may be less susceptible to distortion by factors such as uncontrollable variations in the market forces on operation.

ii. Non-financial indicators in manufacturing

As manufacturing industry has such a variety of process, methods and products there are a vast number of possible efficiency measures. This section covers some of the more usual ones and indicates their value of management. Non-financial indicators are classified under the headings of material, labour and equipment. As all these are interrelated there will be some, heritable, repetition in the types of measures used.

iii. Materials control ratios

Almost all manufacturing process involves some loss of materials, either because materials are deliberately removed through machining because of the nature of the process itself (due to causes such as evaporation, purification or the impossibility of removing all of a product from a vat or container). Obviously, production managers need to keep the loss to minimum to reduce cost. Two measures of process loss can be used.

1. Process yield i.e. (quantity of output from the process + Quantity of material input) x 100; or

2. Loss, i.e. (quantity of materials input – quantity of output from the process)

It may be possible to specify a normal loss for a process. This can be used as a yardstick against which to compare actual losses. "Normal loss is an expected loss, allowed for in the budget, and normally calculated as percentage of the good output from a process during a period of time." CIMA official terminology. Therefore, actual losses can also be expressed as a percentage of good output for comprises purpose.

Process loss=(quantity of material input – quantity of output) ÷ quantity of output) x 100

iv. LABOUR CONTROL RATIOS

Four types of labour measurements are of particular interest for the monitoring and control of labour. These are measures of labour:

- Availability
- Utilization
- Efficiency
- Productivity

Similarly measures to these will be referred to again below in the context of capacity ratios

1. Labour capacity ratio = (Actual hours worked ÷ budgeted hours worked) x 100. The labour capacity ratio measures the actual as opposed to the planned availability of labour.

   It is important for explaining why actual outputs are due to fewer hours being worked than budget.

2. Idle time ratio = (Actual hours paid actual hours worked) ÷ actual hours paid x 100

   The idle time ratio is a utilization ratio. It will highlight time lost due to:

   i. Waiting for work (because of a shortage of materials or tooling or because of machine downtime).

   ii. Travelling to the work station or job.

   iii. Training and attendance at courses.

   iv. Unavailability or work, as opposed to waiting for work

It is not all the hours that a worker is present at his or her place of employment that will be spent in useful activity (that is work); it is expected and normal to have some non-productive time. An idle time ratio that is more than normal indicates that there is room for expansion in output (or a cut back in staffing) if the causes of idle time can be identified and dealt with.

3. Labour efficiency = (standard hours produced ÷ Actual hours worked) x 100.

The labour efficiency ratio measures how effective the direct labour is when it is actually engaged in production. Theoretically, the efficiency ratio should be 100% if labour is working to standard level of efficiency and its standard time have been correctly set. Therefore, the budgeted labour efficiency ratio is assumed to be 100% unless otherwise stated.

4. Labour productivity ratio = (standard hours produced / actual hours part) X 100.

An alternative productivity measure is output per employees, for example, a car factory may measure its overall productivity as cars produced per employee per year. Productivity will be increased if idle time is reduced and labour efficiency is improved. Standard productivity ratio can be used in converting budgeted hours paid into budgeted output (expressed in standard hours).

v. Equipment and process control measurement

The measures which production management can use to monitor equipment are similar to those used for monitoring labour, i.e. availability, utilization, efficiency and productivity. However, they are usually expressed as time and rates rather than ratios. You will already have encountered some of the following definitions.

1. **Throughput**: The rate production of a defined process over a stated period of time. Rates may be expressed in terms of units of production batches produced turnover or other meaningful measurements: CIMA official terminology, production management will seek to increase average unit costs.

2. **Cycle time**: The period required to complete an operation on one unit of a batch, improved cycle times will usually lead to improved through put rates.

3. **Downtime**: "The period for which a workstation is not available for production due to a functional failure." This is the time between a machine breaking down and it being repaid and make ready for production again. Clearly, managers will seek to minimize equipment or process downtime as it is non productive.

4. **Idle time:** "The period for which a workstation is available for production but is not used due to e.g. shortage of tooling, material or operators" BS 5191 = British Standard 5191. This definition is similar to that for direct labour waiting time, again as idle time is non-productive, it should be minimized.

5. **Lead time:** "The time expected to elapse between the start of a process or activity and its completion," CIMA official terminology. Lead times will be reduced if the set-up times and cycles are improved and down time idle time is minimized.

6. **Set-up time**: The period required to purpose a workstation from a standard conditional of redness to commence a specified operation" (BS5191). If it takes a long time to set up machine or process, there is pressure on production management to maximize batch sizes so that the set-up time per unit is minimized. Minimal batch sizes are required for time- is zero, so that the ideal batch size of one unit of output can be achieved.

7. **Transit (or Transfer) time**: "The period between the completion of an operation and the availability of the material at the succeeding workstation." Transfer times can be reduced by improved materials handling system and by redesigning the factory layout to optimize workflow.

8. **Changeover time**: "The period required to change a workstation from a state of readiness for one another" (BS5191).

CIMA official terminology also contains definitions for breaking down time, operation time, process time and queuing time. However, these can be ignored, as they are less important than the measures detailed above.

vi. Capacity Ratios

The capacity of a manufacturing business is the maximum outputs it can achieve in a period. Capacity relates to a process, a machine, the labour force, or, more usually a department or factory. Although the following capacity measure appear to be entirely production oriented. They can be adapted and applied in service sector industries. Services industries that can benefit from capacity monitoring include: Transport, hotels, hospitals and education.

CIMA official terminology identifies four capacity levels, these levels are:

1. **Full capacity**: Output (expressed in standard hour) that could be achieved if sales orders, suppliers and workforce were available for all installed work place. Full capacity is a theoretical rather than a practical measure, as it is virtually impossible to achieve.

2. **Practical Capacity**: "Full capacity less an allowance for known unavailable volume losses." Practical capacity is a realistic measure, however, managers should be seeking to minimize the gap between practical and full capacity.

3. **Budget capacity:** Standard hours planned for the period, taking to account budgeted sales, supplies, work force availability and efficiency expected.

4. **Normal Capacity**: "A measure if the long-run average level of capacity that may be expected." This is often used for setting the budgeted fixed overhead absorption rate. This capacity measure is of little interest in the context of non-financial performance monitory.
   Capacity performance measure refers to the availability and utilization of resources. They apply to direct labour, machines or process. The following four apply to manufacturing, but they can be modified to suit particular service industry applications.

1. **Idle capacity ratio=** (practical capacity –budget capacity) ÷ practical capacity) x 100.

   A positive idle capacity ratio indicates that budget capacity is below practical capacity, therefore, there is room for expansion. A negative idle capacity ratio indicates that the budget is impractical.

2. **Production volume ratio** = (standard hours produced ÷ budget capacity) x 100.

   The production volume ratio shows the actual output achieved as a proportion or the budget output. The standard hours produced could be either machine hours or labour hours, depending upon which output unit the firm uses. The production volume ratio is the same as output unit the firm uses. The production volume ratio is the same as the flexing factor used to create a flexible budget (assuming finished stock X wip are minimal).

   The production volume ratio is the product of the capacity ratio and the efficiency ratio. In order words, the capacity ratio and the efficiency ratio are the sub-ratios that explain the production volume ratio indicates that actual output is below budget. The shortfall could be

caused by an adverse capacity ratio and/or an adverse efficiency ratio.

3. **Capacity ratio**: (actual hours worked ÷ budget capacity) x 100. An adverse capacity ratio will occur if fewer hours are worked than were budget.

4. **Efficiency ratio**= (standard hours produced ÷ actual hours work) x 100. An adverse efficiency ratio will occur if standard hours produced fall below actual hours worked.

vii. Responsibility Accounting Statement (RAS)

This is described as performance evaluation report designed to evaluate the level of efficiency or otherwise of worker within the organization according to the various responsibility productivity accounting reports. It represents a fusion of flexible budgeting techniques with the basic variance analysis. This is due to the fact that RAS represents an integral part of the management accounting control technique. This report also emphasis the need to properly classify control report according to controllable variables and uncontrollable variances.

The basic involved in RAS

1. Identify the long-term corporate objective of the organization.

2. Classify the long term corporate objective into a short term achievable objective.

3. Identify the various responsibility centres within the organization for the purpose of recognizing expenditure and revenue.

4. Obtain top management support before the introduction of RAS within the organization.

5. Provide adequate training to all the operations' managers on the effective use of RAS among workers.

6. Introduce the system of RAS among the operating managers.

7. Embark on periodic review of the result of RAS in order to ensure compliance with current position of the organization.

Benefits of RAS

1. It regulates the quality of performance evaluation.

2. It facilitates effective delegation of authority together with the commensurate level of responsibility

3. It guaranteed the doctrine of management by objective.

4. It facilitates the application of management by exception as a result of adopting a peculiar method of evaluating efficiency.

5. Control report through RAS is considered to be more meaningful to the users.

Limitations of RAS

1. It is too complex to operate in practice.

2. It will encourage a general increase in overhead cost for the organization.

3. Establishment of unattainable standard.

4. Lack of realistic data during the budget preparation.

4.32 Illustrations

1. Akintoye Ltd. Manufactures a single product whose standard materials costs is as follows:

Direct material	Standard quantity	Standard price	Standard cost
	10 tons	N5	N50

The product can be manufactured either from material A or B as the price of material B was slightly higher during the planning stage, it was decided to use material A. the budgeted output was 20,000 products per month.

Actual result for a month:
Output 20,000 units, materials purchased and used 190,000 tons of materials A at N10 per ton.
As the cost of material A was abnormally high, an investigation was made. It revealed that the efficient procurement prices of the two of raw materials could have been used during the month concerned were: Material A N7 and material B N6. There are difficulties in altering product specification from one material to another, although they are substitutes. It is therefore, company policy not to permit production managers to reverse the initial decision to use raw material A on a day basis if the relative price of material B changes.

You are required to calculate the
I. Traditional variances of price and usage and
ii. Operational and planning variances of price and usage.

1. A photocopier can produce 900 copies per hour. What is the cycle time?

Answer:
The throughput rate is 900 copies per hour = 60 x 60 seconds = 36,000 seconds
Cycle = 3,600 seconds ÷ 900 = 4 seconds per copy.

A company organized in three departments. Part making, assembly and finishing gave the following information concerning its activities in a cost accounting period.

Part making		**Assembly**	**Finishing**
Budgeted output (units)	10,000	18,000	20,000
Output per hour (budget)	2	3	5
Actual output (units)	12,000	17,400	21,000
Total hours worked during the budget period were 15,500 hours			

Required:
Compute for the company as a whole
i. The activity ratio

ii. The efficiency ratio

3. Omoze Ltd manufacturing winter clothing. The company's products are produced using automated process. The following data relates to the month of October.

Capacity Measure

Full capacity	315,000 Standard machine hours
Practical capacity	300,000 Standard machine hours
Budget capacity	240,000 Standard machine hours
Actual output	270,000 Standard machine hours
Actual machine hours worked	20,000

Required:

Calculate the following capacity ratios for October

1. Idle capacity ratio
2. Production volume ratio
3. Capacity ratio
4. Efficiency ratio

<u>Solution</u>

Note that the full capacity statistic is not relevant

1. Idle capacity ratio = (Practical – Budgeted) ÷ practical) x100

Capacity Capacity Capacity
= (300,000 -240,000) ÷300,000) x 100 = 20%

2. Production volume capacity = (Standard ÷ Budgeted) x 100

Hours produced Capacity
(270,000 ÷ 240,000) x $\frac{100}{1}$ = 112.5%

3. Capacity ratio = (Actual hours ÷ Budgeted) x $\frac{100}{1}$

Worked capacity
= (200,000 ÷ 240,000) x $\frac{100}{1}$ = 83.3%

4. Efficiency ratio

(Standard hours/Actual hours) x 100
Produced ÷ Worked
= 270,000 ÷ 240,000 x $\frac{100}{1}$ = 135%

Checked:

Efficiency ratio of 135% x capacity ratio of 83.3%= production volume ratio of 112.5%

4. Onyia Plc. specializes in providing security guards for supermarkets "The following data relates to last week.
   1. Direct staff on the payroll, 520

2. Maximum working week, 60 hours. This is also the standard working week.
3. Normal hours lost through staff being on holiday or sick, 12.5 percent
4. Budget staff available for the week, 442.
5. Actual hours charged to clients, 24,000
6. Actual hours worked by direct staff in the week, 25,000

Required:

a. Complete the following table

Capacity measures	Calculations	Hours
Full capacity		
Practical capacity		
Budget capacity		
Actual output		
Actual hours worked		

b. Calculate the following capacity ratio for October

Idle capacity ratio
Production volume ratio
Capacity ratio
Efficiency ratio

Solution:

Capacity measures	Calculation	Hours
Full capacity	520 staff x 60 hour per week	31,200
Practical capacity	Full capacity less 12.5 percent =31x 0.875	27,300
Budget capacity	442 staff x 60 hours	26,520
Actual output	Actual charged to clients (given)	24,000
Actual output worked	Given	25,000

b. Idle capacity ratio = practical capacity – budget capacity) ÷ practical capacity) x 100
= (27,300 -26,520) ÷ 27,300) x 100 = 2.9%

2. Production volume ratio = (standard hours produced – budget capacity) x 100 =
(24,000 ÷ 26,520) x 100 = 90.5%

3. Capacity ratio = (actual hours worked ÷ budget capacity) x 100 =
(25,000 ÷ 26,529) x 100 = 94.3%

4. Efficiency ratio = (Standard hours products ÷ actual hours worked) x 100 =
(24,000 ÷ 25,000) x 100 = 96%

Check: Efficiency ratio 96% X capacity ratio 94.3% = production volume ratio of 90.5%

5. Bola engineering Ltd.'s budget for February 20xx was 36,000 standard hours of output. The budgeted idle time ratio is 20%. Actual hours worked were 42,000 and standard hours produced were 30,000.00.

Required

Calculate the company's actual labour capacity ratio, idle time ratio, labour efficiency ratio and labour productivity ratio in February, 20xx.

1. Labour capacity ratio (actual hours worked ÷ budgeted hours worked) x 100 (42,000) x 100 =117%

We can assume that the budget efficiency ratio is 100 percent, therefore, the budgeted hours worked = the budgeted output in standard hours.

2. Idle time ratio = (actual hours paid – actual hours worked) ÷ actual hours paid) x 100 = (48,000 -42,000)/48000 x 100 = 12.5%

3. Labour efficiency = (standard hours produced ÷ actual hours worked) x 100 = (30,000 ÷ 42,000) x 100 = 71%.

4. Labour productivity = (standard hours produced ÷ actual hours paid) x 100 = (30,000 ÷ 48,000) x 100 = 62.5%

6. David Ltd produces adhesives from a mixture of solvents and reigns for use on manufacturing. Toughie, is one type of adhesive produced by the company.

- During the month of May, 2010 the output of Toughie was 2,000 kg
- 2,500kg of solvents and resins were used to produce the Toughie
- Normal losses due to the evaporation of solvents and the residues left in the mixing process are 15 percent of output.

Required:
Calculate the Toughie process yield and the actual process loss. Compare the actual process loss in kilograms with the normal loss.

Solution:
Process yield i.e. (quantity of output from the process ÷ quantity of materials input) x 100 = (Quantity of material input – input-quantity of output) ÷ quantity of output x 100 =) 2,500 -2,000) ÷2000) x 100 = 25%.
Normal loss in kg = quantity of output x normal percent = 2,000 x 15 percent =300kg
Actual process loss = 2,500 – 2,000 = 500kg. This is 200kg in excess of normal levels.

7. Oyo Ltd dry and package peat for sale to garden centres. During the month of August 2010, the company produced 9,000 tonnes of dried peat from an input of 12,000 tonnes. Normal losses, due almost entirely to evaporation are 40 percent of output.

Required:
Calculate the yield and the actual process loss, compare the actual weight lost with the normal loss and comment on the different.

Answer
Process yield i.e. (quantity of output from the process ÷ quantity of materials input) x 100 = (9000 ÷ 12,000) x 100 = 75 percent.
Process loss = (quantity of material input-quantity of output) x 100
= (12,000-9000) ÷ 100 = 33%

Normal loss in tones= quantity of output x normal loss percent = 9,000 x 40 percent = 3,600 tonnes. Actual process loss = 12,000 – 9,000 = 3000 tonnes. This is 600 tonnes less than normal levels. This could indicate a process problem in that the peat is not being dried enough; alternatively, the peat that was input was drier than normal.

8. SOBAZ Can Company manufactures recyclable soft drink cans. A unit of production is a case of 12 dozen cans. The following standards have been set by the production engineering staff and the controller:

Direct Material: 4kg @ N0.80 per kg
Direct Labor: 0.25 hours at N16 per hour

Actual material purchased amounted to 240,000 kg at 0.81 per kg. Actual costs incurred in the production of 50,000 units were follows:

Direct Material: N170,000 for 210,000kg
Direct Labor: N210,600 for 13,000 hours

You are required to compute and analyse relevant variance

Solution

The relevant variances are material and labor related variances.

i. **Material Price Variance:** Actual Cost – Standard Cost

= (240,000 x 0.81) – (240,000 x 0.80)
= 194,400 – 192,000
= N2,400 Adverse

The adverse variance of N2,400 is due to high cost of purchasing the direct material.
That is N0.01 x 240,000 = N2,400

ii. **Material Usage Variance**: Std Cost of material used – Std Cost of Production

= (0.8 x 210,000) – (4 x 0.80 x 50,00)
= (168,000 -160,000)
= N8,000 Adverse

The adverse variance of N8,000 is due to the usage of 10,000kg above the standard to produce 50,000 units. Hence more materials (10,000kg) were used to produce the given output.

iii. Direct Labor Rate Variable

= Actual Cost – Standard Cost
= (210,600 – 208,000)
= N2,600 Adverse

This is due to higher rate of direct labor paid for the production

Actual Rate = $\frac{210,600}{13,000}$ = 16.20

Standard Rate N16.00

The adverse variance is due to 0.20 x 13,000 = N2,600A

iv. Direct Labor Efficiency Variance

= Standard Cost of Direct Labor - Standard Labor Cost
Hours used in production of Actual production

= (16.00 x 13,000) – (0.25 x 50,000 x 16.00)
= (208, 000 – 200,000)= N8,000A

The adverse variance is due to more hours used in producing the units

Actual hours used = 13,000 hours
Expected hours = 12,500 hours
500 hours

Variance = 500 x N16
= N8,000 Adverse

9. If standard price per ton of raw material A is N20 and the actual price paid is N28. The traditional price variance per ton of raw material A is N8 adverse. But if the standard price was incorrectly set and, with benefit of hindsight, it is now realized that the price should have been set at a standard of N26 per ton; you are required to analyze further the traditional variance into planning errors and operating errors.

Solution

	N
(a.) Variance due to Bad Planning:	
New standard (Ex-Post standard)	26
Old standard (Ex-Ante standard)	20
Planning Variance	6 Adverse

	N
(b.) Operational Variance:	
New standard (Ex-Post standard)	26
Actual Price Paid	28
Operational variance	2 Adverse

Accurate appraisal of a responsible manager's operating performance requires analysis of variance which excludes elements from planning errors.

10. Adeniji standards for the manufacture of 20 tons of product rubber calls for 24 tons of material X at N20 per ton.

20 tons of Product Rubber:

Standard Quantity	Standard Price	Standard Cost
24 tons	N20	N480

Actual production during day one - 20 tons of rubber
Actual quantity used - 30 tons at N20

Required:
Calculate the traditional price and material usage variances

Solution

(a.) **Traditional Usage Variance:**

Standard specified (standard cost of actual output)

			=N=
Material – X	24 tons@	N20	480
Actual cost	30 tons@	N20	600
			120 Adverse

Note: The material price variance is NIL

(b.) **Planning and Operational Variances:** if the standard quantity was incorrectly set at the planning stage and with the benefit of insight, it is now realized that the standard quantity of 20 tons is incorrectly set, the ex-post or new standard is 28 tons. In addition to the information in example above, calculate the planning and operational variances.

(i.) **Variance due to bad planning**

Tons

New standard (ex-post standard)	28
Old standard (ex-ante standard)	24
	4 tons Adverse
Or	
4 tons x N20	N80 Adverse

(ii.) Operational Variance tons

New Standards	28
Actual quantity used	30
	2 tons Adverse

Or

2 tons x N20

4. 33 Review Questions

1. Define standard cost
2. What are the basic steps involved in standard costing techniques?
3. Itemise the objectives of establishing standard costing
4. Enumerate the benefits of standard costing techniques
5. Define variance analysis
6. List the limitations of standard costing technique
7. Clearly distinguish between ideal and attainable standards
8. What is current standard?

MODULE 5

5.00 PERFORMANCE EVALUATION

5.01 Learning Outcomes

On successful completion of this Module, students should be able to:

i. Calculate ROI (Return on Investment) or RI (Residual Income);
ii. Evaluate performance and calculate transfer prices;
iii. Explain what is meant by responsibility centres and value based management.

5.02 Introduction

The size and complexity of any organization depends largely on the kind of products or services it produces or offers to the public. Some organizations have grown so large in size and complexity that their business activities can no longer be controlled effectively and efficiently under a centralized management. Decision making, performance evaluation etc. then becomes a very difficult task for the management.

Organisations are classified under two distinct structure namely, Centralized and Decentralized structures.

5.03 Centralised Structures

This is an organizational structure in which decision making process is confined to some few managers at the top level.

5.04 Decentralized Structures

Decision making under this structure is hierarchical in nature and is usually in three levels in which the top management will take strategic corporate decisions, the middle level managers take tactics decisions while the lower level managers take operational decisions.

Decentralization leads to segmentation of the activities of an organization into cost centres and even divisions. The major cost centres are: -

1. **Revenue centre**
2. **Cost centre**
3. **Profit centre**
4. **Investment centre**

Advantages of Decentralisation

The benefits of decentralization include:

(i) Lower level managers are given additional responsibilities and decision making authority, thereby resulting in efficiency and job satisfaction

(ii) Managers performance evaluation is enhanced

(iii) Top managers can concentrate more on higher level of strategic decision making delegating some responsibilities to their subordinates.

(iv) It serves as a career enhancement for junior managers to assume higher level of decision making in future.

Disadvantages of Decentralization

(i) Managers at the lower level may make non-optimal decision based on communication lapses between them and the top level managers regarding the overall corporate plan of the organization.

(ii) There may be lack of co-ordination among various responsibility centre managers

(iii) Problem of transfer pricing treatment, motivation and performance evaluation of divisional managers

5.05 Revenue Centre

This is a segment of a decentralized organization which is headed by a manager who has control over the revenue generation only.

5.06 Cost Centre

A business segment where the manager has control over cost and not over revenue and investment funds example of this is the production department in an organization. Other departments like Finance, Administration, Human resources etc are also considered as cost centres.

The Manager of a cost centre is expected to minimize cost in all possible ways.

5.07 Profit Centre

A profit centre is a business segment headed by a manager who has effective control over both revenue and cost but not over investment decision. The performance of a manager heading a profit centre may be measured in terms of the actual profit recorded against the expected or budgeted profit.

5.08 Investment Centre

An investment centre is a segment of an entity whose manager has control over revenue, cost and investments in operating assets. In large multinational organizations this segment is usually a division headed by a Divisional manager or Managing Director who takes responsibility for the overall profitability of the division.

He initiates investment proposals for approval by the board of Directors and ensures that the investment when executed brings in good returns to the division.

5.09 Distinction between economic and Managerial Performance Evaluation

The need to distinguish between divisional managerial performance and economic performance leads to three different profit measures vis: -

(i) Division controllable profit
(ii) Divisional contribution to corporate sustaining costs and profits
(iii) Divisional net profit

Divisional controllable profit is preferred for evaluating divisional managerial performance because it includes only revenues and expenses that are controllable or influenced by divisional managers.

Divisional contribution to corporate sustaining costs and profit is derived by deducting those non-controllable expenses that are estimated to be available in the event of divisional divestment from controllable profit. Example of such expense is the allocation of those corporate joint reserves shared by divisions that fluctuate according to the demand for them. The divisional contribution to corporate sustaining costs and profit is appropriate for measuring divisional economic performance. It aims at providing an approximation of a division's contribution to corporate profit.

Divisional net income is an alternative measure for evaluating divisional economic performance. It includes the allocation of all cost. Companies may decide to use divisional net profit when comparing the performance of a division or other performance evaluation methods.

5.10 Divisional Performance Evaluation Methods

Divisional performance evaluation relates to how segments or divisions in an organization are appraised through the contribution of the division to the overall profitability of the organization in terms of economic and managerial competences which includes the deployment of operating assets optimally for generation of reasonable returns on investment.

In order to be able to evaluate the performance of a division, a segmented profit and loss account different from the normal financial accounting format will be prepared. This type of segmented profit & loss accounts is useful in analyzing the profitability of segments and in measuring the performance of segment or divisional managers.

Divisional or investment centre managers' performance can also be evaluated by using "Returns on Investment (ROI), "Residual Income" (RI) or Economic Value Added (EVA) methods.

5.11 Returns on Investment (ROI) Method

One of the methods of evaluating the performance of divisional or investment centre is by measuring the rate of returns generated by the operating assets invested by the manager in his division. The rate of return can be calculated through the use of Return on Investment Method. Return on Investment is calculated by dividing net operating profit by average operating assets.

$$ROI = \frac{\text{Net operating profit}}{\text{Average operating assets}}$$

In the above formula, Net operating profit refers to profit before interest and taxes also known as EBIT (Earnings before interest and taxes) and not the Net profit. In the same vein, operating assets in the formula refers to assets such as cash, inventory debtors, plant & machinery and so on which are employed for the operations of the organization but excluding non-operating assets.

In deciding which value of the plant and machinery should be included in the operating assets, whether the net book value or the cost. Both approaches are commonly used even though they present different results, however the net book value approach is more preferable because of its consistency and is being used by many organization.

The above formula for ROI can be modified by including sales in it to as follows:

$$ROI = \frac{\text{Net operating profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Average operating assets}}$$

The first side of the equation is called margin.

$$\text{Margin} = \frac{\text{Net operating profit}}{\text{Sales}}$$

Margin measures the ability of managers to control operating expenses in relation to sales.

The second side of the equation is called Turnover.

$$\text{Turnover} = \frac{\text{Sales}}{\text{Average operating assets}}$$

Turnover measures the sales that are generated for each naira invested in operating assets.

The alternative formula for ROI derived from the above equation is ROI = Margin X Turnover.

The new formula and the first one can be used in calculating ROI as they will virtually produce the same result. The beauty in using the Margin X Turnover formula is that it provides additional insight as some managers look at margin alone as performance indicator and fails to look at the aspect of Turnover as well.

Du pont who introduced this new ROI concept felt it is important to look at both margin and turnover in assessing the performance of a manager.

One of the advantages of ROI as a measure of performance is that it focuses the manager's attention to the control of investment in operating assets and control of expenses and margin as well. Return on investment (ROI) can be increased in three ways. It can be done by increasing sales, reducing expenses and reducing operating assets.

This can be illustrated as follows:

The manager of hardware division of Oloyede Industries Ltd. is being evaluated monthly on the basis of ROI. His result for the month of June is as follows:

Net operating profit	N50,000
Sales	N250,000
Average operating assets	N100,000

The rate of return on investment for the Hardware division is calculated as follows:

$$\textbf{ROI} = \frac{\text{N50,000}}{\text{N250,000}} \times \frac{\text{N250,000}}{\text{N100,000}}$$

$$= 20\% \times 2.5 = 50\%$$

The above stated rate of return can be enhanced by the hardware division manager if he increases sales say to N300,000 resulting in increase of N10,000 on the Net operating profit. The rate of return will be affected in this way.

$$\textbf{ROI} = \frac{N60,000}{N300,000} \times \frac{N300,000}{N100,000}$$

= 24% X 3 = 72% as against 50%
=== ===

If the divisional manager of Oloyede Industries Ltd reduces the operating assets by reducing the amount owed by debtors, say by N20,000, the rate of returns will be affected thus: -

$$\textbf{ROI} = \frac{N60,000}{N300,000} \times \frac{300,000}{80,000}$$

= 24% X 3.75 = 90% as against 72%
===

Suppose the manager was able to reduce expenses by N15,000 which resulted in the increase of Net operating profit. The rate of return will be as shown below

$$\textbf{ROI} = \frac{N75,000}{N300,000} \times \frac{300,000}{80,000}$$

= 24% X 3.75 = 93.75% as against 90%.

It can be seen from all the above illustrations how managers can improve their ROI rate through conscious efforts by reducing costs, increasing sales and reasonable investment in operating assets. Although the popularity of ROI as a means of evaluating performance of managers cannot be denied yet approach has been criticized by many. Some of the criticisms are that

1. Managers who wish to increase their ROI may go about it in a way that is inconsistent with the corporate strategy of the organization or increase the ROI in such a way that will result into an adverse result for the entity in the long run.

2. A manager who is evaluated on the basis of ROI may reject profitable investment opportunity even if it will enhance the performance of the whole entity so far as it is going to reduce the performance of his own division from the previous level attained.

5.12 Residual Income

Residual Income is the net operating profit that agvvn investment centre earns above the minimum required return on its operating assets. It is calculated as follows:

Residual Income = Net operating Income – (Average operating assets X minimum required rate of return).

5.13 Economic Value Added (EVA)

Economic value added is a performance measurement method that has similarity with concept of Residual Income but with some minor differences. Research and Development expenses for example are treated as investment under the concept of EVA instead of being treated as expenses.

ECONOMIC VALUE ADDED

1. Economic Value-added analysis EVA is Measurement Alternative for Shareholder value.

A Little Bit of History

While Residual income measures have been around for over 100 years in academic literature, Stern Stewart & Co. introduced the formal concept of EVA about 28 years ago. Fortune Magazine put EVA on the map in a September 1993 article. A whole slew of offspring has followed: SVA from Andersen Consulting. Other variations of Economic Value Added

2. EVA TESTIMONIALS

"Only EVA gives a real picture of value creation. Accounting benchmarks just don't do the job" Robert Boldt, Cakoers. EVA correlates better with stock performance than EPS. (Fortune Magazine study).

3. EVA BENEFITS

The benefits of Economic Value Added include:

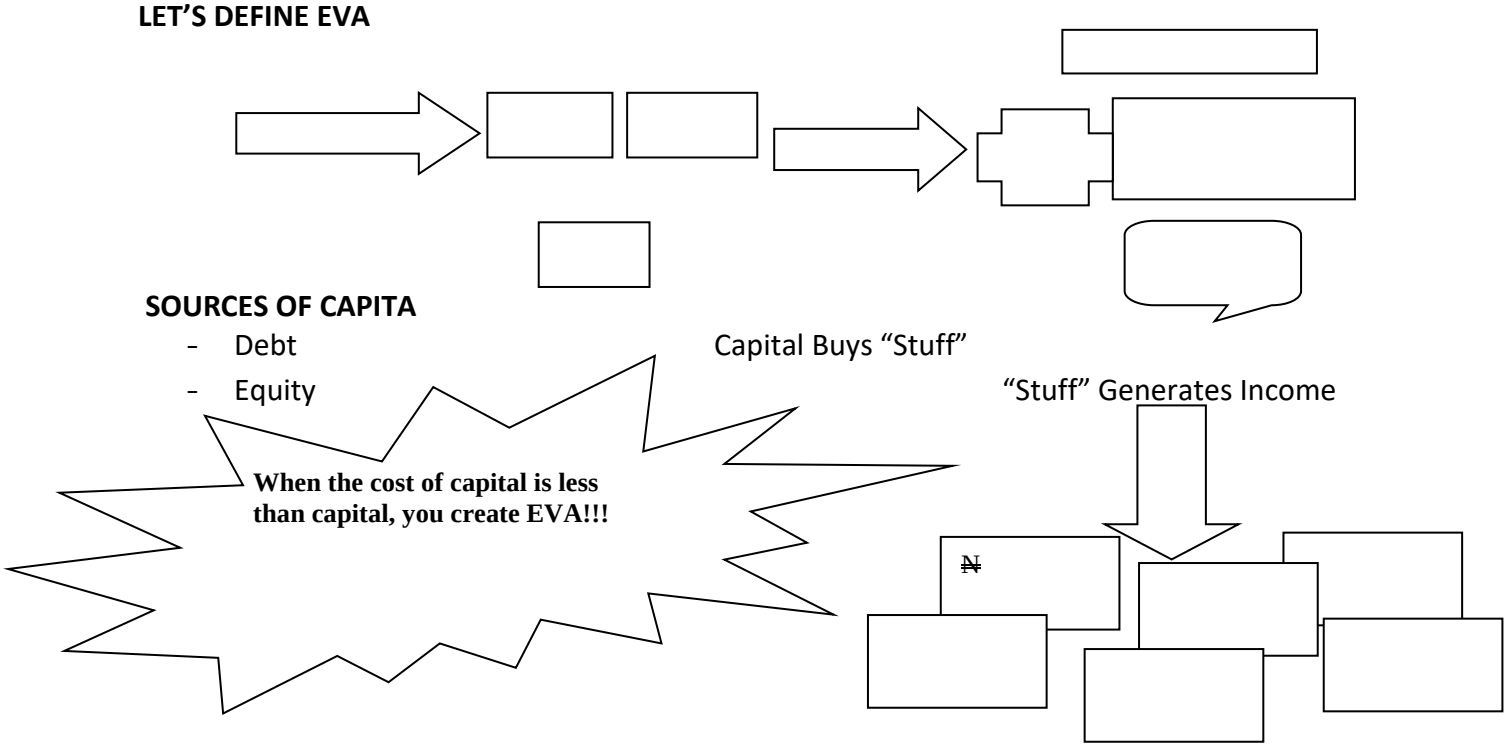
a. Objective evaluation
b. Easy tool for strategic decision support
c. Consistent measurement tool
d. Improves on-going operating decisions
e. Provides basis for common incentive-pay

EVA RISKS

EVA is associated with the following risks

a. May be subjective in implementation.
b. Singular reliance on EVA may be misleading

LET'S DEFINE EVA



4. EVA ELEMENTS

The under listed are the elements of EVA

a. Cost of Equity Financing
b. Components of Capital
c. Adjusted Net Operating Income

5. COST OF DEBT FINANCING

The Costs of debt financing include:

a. Interest Expense
b. After-tax impact
c. Consider all Debt, Excluding A/P

6. **COST OF EQUITY FINANCING**

Cost of equity financing considers

a. Shareholder Hurdle Rate
b. Price Appreciation
c. Dividend Rate
d. "Six Percentage Point" Rule

7. **COMPONENTS OF CAPITAL**

The components of Capital under EVA are:

a. Net Working Capital

b. Net Long-Lived Tangible Assets
c. R & D Spending
d. Employee Development Spending

8. **ADJUSTED NET OPERATING INCOME**
    a. Substitute R&D and Employee
    b. Development Cost with Annual Amortisation
    c. Use Net Income from Continuing Operations
    d. Adjusted Net Operating Income Minus Cost of Financing Equal
    e. Economic Value Added.

9. **EVA USES**
    a. Planning Tool
    b. Business Unit Evaluation
    c. Incentive Compensation Base
    d. Marge and acquisition Analysis
    e. Capital Asset Analysis.

10. **CORPORATE EXAMPLES include:** CSX and Quaker Oats
11. **WAYS TO RAISE EVA include:**
    a. Increase Profits
    b. Reduce Capital Spending
    c. Reduce Investment in Working Capital
    d. Increase High-margin Capital Investments
12. **EVA IMPLEMENTATION**

    To implement EA, it is necessary to ensure:
    a. top management buy-in
    b. make it a way of life
    c. implement Gradually
    d. keep it Simple
    e. train the users
13. **MARKET VALUE ADDED - - MVA, ANOTHER MEASURE OF WEALTH**

    This is Stern Stewart's Second Concept with the following qualities:
    a. Compares Borrowed, Invested ***and*** Earned Capital Versus
    b. Current Market Value of Debt and Equity
    c. A Prospective Stream of Future EVA
14. **EVA IMPLEMENTATION**
    - Top management buy-in
    - Make it a way of life
    - Implement gradually
    - Keep it Simple

- Train the users

5.14 Economic Value Added: The Real Key to Creating Shareholder Wealth

STERN STEWART & CO.

- A global consulting firm established in 1982 by Joel M. Stern and Bennett Stewart
- Pioneered the EVA concept in 1989
- A financial performance measure that captures the true economic profit of an enterprise is needed
- EVA is used by over 300 successful companies

EVA DEFINED

- EVA is a financial measurement tool that determines if a business is earning more than its true cost of capital.
- EVA is the net operating profit minus an appropriate charge for the opportunity cost of all capital invested in an enterprise or project, or net income minus dollar cost of equity capital.

AVE is:

- An estimate of true economic profit.
- A tool that focused on maximizing shareholder wealth.
- A fundamental measure of Return on Capital.

EVA ID TRUE ECONOMIC PROFIT

- "Until a business returns profit that is greater than its cost of capital, it operates at a loss."

ACCOUNTING PROFIT VS ECONOMIC PROFIT

- Just because you have an accounting profit does not mean that you have an economic profit

HISTORY OF EVA

- EVA is not a new concept: Alfred Marshal mentioned the concept of Residual Income in 1890
- Adam Smith "Maximize wealth of owners"
- Modigliani & Miller "Net Present Value" (long term tool)

WHY USE EVA? THE FOUR M'S

- Management System
- Motivation
- Mindset
- Measurement

MANAGEMENT STSTEM

- Simply measuring EVA can give mangers a better focus on performance.

- Provides a foundation for a comprehensive financial management system

MOTIVATION

- Incentive plans to make managers think like owners because they are paid like owners.
- EVA Bonus Plan

MINDSET

- **Changes corporate** culture
- EVA System provides a common language for employees across all corporate functions.
- Facilitates decentralized decision making

MEASUREMENT

- Most accurate measure of corporate performance over any given period.
- Translates accounting profits into economic reality.

PRIME DIRECTIVE: MAXIMIZE SHAREHOLDER WEALTH

- Primary Goal: maximize Shareholder wealth
- Maximizing Shareholder Wealth = Maximizing Market Value, or Total Value

MAIXIZING SHAREHOLDER WEALTH AND MARKET VALUE ADDED

- Maximize shareholder wealth only if the company's managers are able to add value to the Total Equity Capital
- This added value is what we call, Market Value Added, or MVA

MARKET VALUE ADDED

- MVA is the difference between a company's Total Value and its Total Equity Capital.
- MVA = Total Value – Total Equity Capital
- MVA component: Total Valued Tot al Equity Capital

IMPORTANCE BETWEEN MARKET VALUE AND MVA: GM EXAMPLE

- 1988, General Motors:

Market value = $25 billion

Total Equity Capital = $ 45 billion
MVA GM= $25 billion - $45 billion

IMPORTANCE BETWEEN MARKET VALUE AND MVA: MERCK EXAMPLE

- In 1988 Merck,

Market value = $25 billion

Total Equity Capital = $5 billion
MVA MERCK = $25 billion - $5 billion
= + $20 billion

MVA: GM AND MERCK

- Same Market Values at the end of 1988.

- However, Merck created $20 billion while GM destroyed roughly the same amount.

  MVA GM= - $20 billion

  MVA MERCK= +

SHAREHOLDER WEALTH AND MVA

- Maximize not only Total Market value
- But the Difference of total Market Value and total Equity Capital
- In short,
  Maximize Shareholder Wealth= Maximizing MVA

HOW **DOES MVA RELAT E TO EVA**

- To increase MVA => increase Economic Value Added, or EVA
- MVA is a premium based on market expectations of future e EVAs
- Shareholders' Wealth = MVA = PV of Future EVAs

5.15 Calculating EVA

- Estimate based on revised reported earnings:
  EVA = Sales – Operating Expenses-
  Depreciation – Interest Expenses
  (including Taxes) – Equity Financing
  Expenses (or, Cost of Equity X Total Equity Capital
  = Net Income – K_{eq} x Total equity Capital
  = Net Income - $ Cost of Equity Capital

THE COCA-COLA COMPANY

Example

- EVA = Net Income - K_{eq} x Total Equity Capital

  = $3,533 million – 12% x $7,700 Million
  = $3,533 million - #924 million
  = $2,609 million
- The $2.6 billion is an estimate of the company's true economic profit for 1998.

5.16 Why Should You Implement EVA?

- A consistent way of improving firm
- Allows Managers to make better decisions
- Aligns interests of Managers and investors
- Improves communication
- Used to Evaluate Corporate Management
- Best measurement of shareholder wealth

EVA IS CONSISTENT

- Financial Management System or "Framework"
- Goal is continuous improvement of EVA to increase stock price
- Ends confusion of multiple goals

MANAGERS BEHAVE LIKE OWNERS

- Incentive package offers rewards based on EVA improvement
- Cash bonuses have no limit
- Plan is Long-term

IMPROVES COMMUNICATION

- Decentralizes authority
- Motivates management and workers to cooperate
- Investors understand goals

EVALUATING MANAGERS

- Measures true profitability
- Higher correlation with stock price
- Keq gives investors opportunity cost
- Evaluate divisions of company

BEST MEASUREMENT OF SHAREHOLDER WEALTH

- Accounts for all capital ckosts (K_{debt} and K_{eq})
- shows wealth created or destroyed

CALCULATING MVA

Mva1 = TV – BV of Equity Capital
= PV of future EVA's

GIVEN

- assumptions: No debt
  No retained earnings

  BV Equity Capital = Assets = Invested= $ 1000
  Capital

  WACC = K_{eq} =12%
  Expected Return = RIC_1 – 15%

CALCULATING MVA USING

TV-Book value of Equity Cap.

Net Income = (Invested Capital*Exp. Return)

= 1000* 15%

= $150

Retention Rate = 0

Net Income = Divs. = $150

CONTINUED

Total Value of the Company – PV of the Div

= $150/.12 = $1250

MVA 1 = TV-Book Value of Equity Capital

= $1250-$1000 = $250

MVA1 = PV of future EVA's

= $30/.12 = $250

DOES A POSITIVE EVA MEAN THAT MVA INCREASES?

Book Value of Equity = $ 1000

WACC = 12%

Expected Return = RIC2=13%

Net Income = ($100*.13) = $130

EVA2 = NI- (Book Value of Equity* Keq)

=$130- ($1000*.12)

MVA LOWERED

MVA2 = PV of the expected future EVA'S

= $10/.12 = $ 83.33

- Even though EVA was positive, MVA was lowered

WHY SHOULD YOU IMPLEMENT EVA?

- Best measurement of shareholder wealth
- A consistent way of improving wealth
- Allows Managers to make better decisions
- Aligns interests of Managers and investors

FIVE STEP PROCESSS

1. Introduce EVA to management and the board of directors
2. Establish EVA centers, define EVA, and provide EVA Training
3. Develop the EVA financial management and reporting system
4. Refocus and strengthen incentives

5. Train line managers

5.17 Critical Success Factors of Implementing EVA

- Education
- Commitment from Top Management
- System support
- Compensation Integration

5.18 Common Mistakes

- Failure to fully integrate EVA
- Implementing EVA too fast
- Top management lacks
- Insufficient training

5.19 Summary

- EVA is a financial measurement tool that determines if a business is earning more than its true cost of capital.
- Most accurate in measuring true profitability: motivates mangers to think like owners; and provides a common language within the corporate culture.
- Shareholder Wealth = MVA = PV of future EVA

The purpose of measuring performance on the basis of Residual Income or Economic value added is to maximize the total R.I or EVA and not to maximize the ROI.

5.20 Transfer Pricing

Transfer price is the price charged for goods or services provided by one department or division to the other within an organization. It can also extend to goods or services provided by an organization to its subsidiaries in the same country or across the border (international).

The setting of transfer price is very important to managers as wrong pricing can have adverse effect on both the supplying and receiving division, this is the reason managers are keenly interested in knowing how the price is set.

Four approaches are recognized for setting transfer price, they are:-

1. Negotiated transfer pricing
2. Cost based transfer pricing
3. Market based transfer pricing
4. Arbitrary transfer pricing
5. Dual-Rate Method

5.21 Negotiated transfer pricing

This price is arrived at when managers of the supplying and receiving divisions meet to agree at a price after negotiation. In order to agree at the appropriate price to charge, both managers will consider the price that will not affect the profitability of their divisions. As a matter of fact, the supplying division will aim at getting a price higher than his cost while the receiving division's manager will also strive to have a good bargain that will increase his profitability considerably. An acceptable transfer price can however be struck at a range between the lowest price that the supplying division can allow and the highest price that the receiving division can afford. The reason behind this is not far-fetched, this is so because, organizations with divisions usually evaluate the performance of the divisions on the basis of the profit generated.

5.22 Cost Based Transfer Pricing

Companies usually set the selling price of their goods by simply adding a certain percentage called mark-up to the cost of goods. Mark-up is the difference between the selling price and the cost price.
The mark-up stands for the required profit margin. This approach is called cost-plus method.
However, when goods are transferred between divisions within the organization the pricing will be different.

Cost based transfer pricing approach is one of the methods used in setting price of goods or service transferred between segments or divisions in an organization. The price is calculated by either considering only the viable cost or the full (absorption) cost of production as the base price of the selling division.

Assuming that the viable cost of a product is N20 and the price at which the buying division can purchase a similar product in the market is N30. The transfer price after a lot of bickering between the selling division and the buying division will be between N20 and N30. To the selling division the price will definitely be ≥N20 and to the buying division the transfer price will definitely be ≤ N30. In the same vein if the selling division has a fixed cost of N5 and decides to apply the full cost, the cost will be expressed as variable cost + Fixed cost = product cost N20 + N5 = N25

In this regard, the base price of the selling division will move to N25. The transfer price will then be ≥N25. The transfer price will be agreed at a price between N25 and N30 because the selling division must sell at a price that will enable it to post a profit and the buying division will only buy at N30 or less to enable him post a profit as well. This is very important where the division manager's performance is evaluated on the basis of Net profit generated for the company.

Illustration 1

Sanders Feeds Ltd produces chicken feeds and concentrates. The products are produced under two divisions in the company. The concentrate division sells its product to its customers as well as the Chicken feeds division who uses it as its raw materials.
Assuming that the concentrate division has no capacity utilization problem and could produce enough to satisfy all its customers including the Chicken fed Division. Let's assume also that both divisions were able to agree on transfer price of N27 per bag of concentrate from our earlier pricing of between N25 and N30.

Concentrate Division produced and sold 200 bags to its customers at the market price of N30 and 1000 bags to Chicken Feeds Division at the transfer price of N27. The profitability of the Concentrate Division can be calculated as follows:

	Concentrate Division N
Sales to customers (2000 bags X N30)	60,000
Sales to Chicken Feed Division (100 X N27)	27,000
	87,000
Less cost of sales (3000 bags X N25)	75,000
Net profit	12,000

If the market price at which the Chicken feed division can purchase the concentrate in the open market is N30 for its production, then it will make additional profit of N3,000 (N30 – N27) X 1000 to the profit it will declare.

Advantages of Cost Based T.P

(i) It is easy to calculate
(ii) It is not prone to market fluctuation
(iii) It aids planning
(iv) Proper cost records are maintained

Disadvantages of Cost Based T.P

(i) Transfer price can be too high especially when full cost is applied
(ii) Selling division makes more profit at the expense of the buying division especially when cost-plus approach is employed
(iii) The divisions are treated as cost centres only
(iv) The approaches save time

5.23 Market Based Transfer Pricing

Market based transfer price is the price charged for a particular commodity or service in the open market. Open market price is the price negotiated at "arm's length" between a willing seller and a willing buyer who are unconnected or unrelated. This method of pricing is very good and is accepted by tax authority both locally and internationally as the most credible transfer pricing method. Some of the advantages of this method are:

(i) The autonomy of the divisions are maintained
(ii) Market forces are there to determine the price
(iii). It encourages initiatives as managers are not constrained to take the price that will affect their profitability

The disadvantages are:

(i) Complication of the prices of stocks valuation when it is necessary to eliminate unrealized profit on stocks.
(ii) Exact replica of the product may not be available in the market
(iii) It may affect the level of profit expected by a division when compared with other methods of pricing.

Arbitrary transfer pricing

This method is applied by top management to fix the transfer price for goods transferred among divisions within the organization.

The advantage of this method is that a uniform transfer price is maintained for all divisions.

The major disadvantage envisaged is that the autonomy of the divisions will be impeded and performance evaluation of the managers on the basis of profitability may not be appropriate.

5.24 Dual-Rate Transfer Pricing Method

In applying this method, two different prices will be charged. The selling division may sell at market price to the buying division, but the buying division records the purchase at variable cost. The difference between the transfer prices will be treated as subsidiary to the selling division by the organization.

5.25 INTERNATIONAL DIMENSION OF (T.P)

Transfer pricing became very prominent among multinational entities when globalization, occasioned by advancement in technology, communications, transportation and information broke the barrier of distance in international trade. Transfer of goods services etc. within the multinational Enterprises group which is referred to as "Intra-group transactions" started growing rapidly. As a result of this, goods and services produced by entities of a group in one country can be transferred to entities of the same group in another country.

For economic reasons, business entities now operate on the principle of comparative advantage in which they set up facilities in other countries of the world that offer them optimum yield on their investment.

Transactions between "associated companies" or entities are usually determined by market and group driven forces which may not conform with "open market" conditions as between independent entities; in other words, quite a large number of international transactions are no longer governed totally by market forces, but by forces which are driven by the common interest of the entities of a group.

In international transfer pricing, especially with multinational companies, their primary objective is basically focused on how to cut down on taxes, duties and to minimize the risk of foreign exchange. To gain a better competitive position in the international market and to have a good relationship with government of their host countries unlike domestic objectives that focuses on managerial motivation and divisional autonomy, international pricing is aimed at reducing taxes and maximizing profit.

Transfer pricing has been variously used by the multinationals to shift profits from their subsidiaries in high tax jurisdictions to low tax jurisdiction and increasing the profitability of their subsidiaries in low tax jurisdiction in order to maximize the profit of the group and reduce its tax liability.

5.26 Tax Implication of Transfer Pricing

As earlier mentioned, transfer pricing can be manipulated to avoid tax deliberately by applying a wrong transfer price which is referred to by tax authorities as "transfer mis-pricing".

In order to minimize the incident of tax avoidance on both domestic and cross border transactions, the organization for Economic Cooperation and Development (OECD) and the United Nations (UN)

have recommended five transfer pricing methods to determine the "arm's length" price which is accepted for tax purpose. They are: -

- Comparative uncontrolled price method (CUPM)
- Cost plus method (CPM)
- Resale Price Method (RPM)
- Transactional Net Margin Method (TNMM)
- Profit Split Method (PSM)

"Arms length principle" provides that transactions within a group are compared to transactions between unrelated entities to determined acceptable transfer prices.

5.27 Transfer Pricing Regulation in Nigeria

For many years Nigeria government has lost colossal sums of money to tax avoidance being perpetrated by the multinational companies both in domestic and cross border transactions through "transfer mispricing".

The Federal Inland Revenue Services (FIRS) having considered the huge amount of revenue they have lost over the years decided to introduce transfer pricing regulation into the Nigeria tax system. The Income tax (transfer pricing) regulation No.1 therefore became effective in 2012 with commencement date of 2nd of August, 2012.

From that date all goods and services transferred between related entities and subsidiaries both locally and internationally became subjected to the transfer pricing regulations in Nigeria. The regulation is meant to ensure that intra/inter-company transferred are correctly charged based on "arms length principle"

5.28 Value Based Management

What is Value Based Management (VBM)?

A definition of the subject is very important for a good understanding of what value based management method is all about.

The Chartered Institute of Management Accountants (CIMA) defined value based management as "a managerial process which effectively links strategy, measurement and operational processes to the end of creating shareholders value". Copeland defines value based management as "an approach to management whereby the company's overall aspirations analytical techniques and management processes are all aligned to help the company maximize its value by following management decision-making on the key drivers of value" (Copeland et al, 2000)

Mc Taggart opined that VBM is "a formal systematic approach to managing companies to achieve the objective of maximizing value creation and shareholders value over time (Mc Taggart et al, 1994). The above definitions have clearly portrayed value based management in all its ramifications as a strategic managerial process aimed at maximizing value creation and shareholders value. It entails good governance of an enterprise.

Information systems Audit Control Foundation defines enterprises governance as "the set of responsibilities and practices exercised by the board and effective management with the goal of

providing strategic directions, ensuring that objectives are achieved, ascertaining the risks are managed appropriately and verifying that the organization's resources are used responsibly (Information System Audit and Control, 2001). In the light of the above definitions, it could be seen that value based management is focused on two basic strategic areas of value creation namely "shareholders value creation and measurement" and "managing for shareholder value".

One thing that should be borne in mind when thinking of managing for shareholder's value is that real economic profit is not earned yet until the cost of capital has been repaid. Accountants don't usually consider this in arriving at the net profit declared, they always think that equity capital is a cheap or even free funds that cost nothing to the shareholders who provided it.

CIMA official defines cost of capital as "the minimum acceptable return on an investment generally computed as a hurdle rate for use in investment appraisal exercises. The computation of optimal cost of capital can be complex and many ways of determining this opportunity cost have been suggested".

Some of the metrics that are employed to measure value creation in an organization are:
- Shareholders Value Analysis (SVA)
- Economic profit (EP) and economic value added (EVA)
- Cashflow return on Investment (CFROI)
- Total business return (TBR)

These metrics can be used for numerous purposes including valuation, strategy, evaluation and monitoring of performance. Although there are significant differences between the different values of the Metric, but they all attempt to measure value creation for shareholders

Advantages of Value Based Management

(i) Provides a common language-usable internally and externally
(ii) Powerful comparative tools- in terms of bench marking competitive performance
(iii) Useful for resource allocation-better discrimination between value-creating, value destroying and value investment
(iv) Powerful strategic tool
(v) Regarded as very useful tool to help management focus upon value drivers
(vi) Helps create more shareholders value by getting more accountability for discrete business units.

Disadvantages of Value Based Management

(i) Different form of VBM and methods complicate task
(ii) Relatively disappointing at the subordinate business level because of the difficulty of forecasting value.
(iii) Managerial costs of implementation
(iv) The degree of complexity in the calculation is a limitation
(v) Difficulty to translate the financial measures into operating customer measures
(vi) Technical measurement difficulties-such as the cost of capital.

5.29 Shareholder Value Analysis (SVA)

This approach can be used to estimate the value of the shareholders stake in a company or business unit. It can also be used as a basis for formulating and evaluating strategic decisions. The value of

the operations of a business is determined by discounting expected future operating "free cash flow" as an appropriate cost of capital. In funding shareholders value, the value of marketable securities and other investments must be added to and the value of debt must be subtracted from, the business valuation.

Free cash flow is the cash flow from operations of a business for a period without considering any financing related cash flows such as shares or debt issues, dividend and interest payment etc. Figure 1 below shows how to determine the free cash flow.

Fig.1	N
Sales	300
Less: Operating cost	(100)
Operating profit	200
Add Depreciation	50
Less: Cash tax on profit	(20)
Operating profit after tax	230
Less: Investment in working capital	(50)
Free cash flow from operations	80

Ideally free cash flow for all the future years must be estimated. However, a short cut approach can be applied where the future cash flows are divided into two periods as follows:

Value of operation =
Present value (PV) of free cash flows
During planning horizon +
Present value (PV) of free cash flows
After planning period (continuing value)

5.30 The PV of Free Cash Flows during the Planning Horizon

Value of operations during the planning horizon which is the number of years into future sales growth forecast can be estimated using the "seven value drivers" which are:

- the percentage annual sales growth
- operating profit margin (before non-operating items such as interest payable and tax)
- cash income tax rate (including deferred tax)
- incremental fixed capital investment rate
- investment in working capital rate
- planning horizon
- cost of capital

The first five value drivers can be used to calculate "free cash flow". These will be discounted at the company's cost of capital using weighted average cost of capital (WACC) which weights the returns of equity and debt investors according to the relative proportions of equity and debt invested in the company.

5.31 PV of Free Cash Flows beyond the Planning Horizon

This is the second component of the shortcut method. It is referred to as the "continuing" or "terminal value". It is normally assumed that on the average, the business will earn its cost of capital therefore the effect of new investment beyond the planning horizon can be ignored. It is believed that with shareholder value analysis (SVA) the cash flow after the final year of the planning

period will continue to rise into infinity.

Advantages of SVA

(i) It can be used to value a business
(ii) It is a tool for evaluating alternative strategic decision
(iii) The simplified approach can be used to perform sensitivity analysis of a business

Disadvantage of SVA

(i) It is difficult to predict the variables required for analysis

5.32 Economic Profit (EP)

Shareholders value can also be determined using this approach. Economic profit has been severally applied using the name "Residual Income" as a means of measuring division performance. Economic profit (EP) is the difference between the return on capital and the cost of capital and may be calculated in two ways as shown below.

(i) EP = Invested capital X (return on capital – WACC)
(ii) EP = Operating profits after tax less capital charge

Economic profit approach has a direct link with long term value based on the "free cash flow" method even though it is a short term single period measure.
The returns generated on capital invested by a business depends on the combination of margin and ability of the business to generate turn over.

Advantages of EP

(i) It can be used for business valuation
(ii) It is used for performance evaluation to fulfill a more strategic role
(iii) It is relatively straight forward and easy to calculate
(iv) Can be used to set performance target to the company

Disadvantage of EP

(i) Distorting effects of inflation and depreciation could undermine the validity of the calculations

5.33 ECONOMIC VALUE ADDED (EVA)

EVA was developed by a US consultant called Stern Stewart. It is a refined model of the EP or Residual Income approach earlier discussed. The formulae for EVA is as stated below:

(i) EVA – Adjusted Invested Capital X (adjusted return on capital – WACC)
(ii) EVA = Adjusted operating profits after tax less capital charge
(iii) EVA = Adjusted operating profits after tax less (Adjusted invested capital X WACC)

5.34 Cash Flow Return on Investment (CFROI)

CFROI is a "real" rate of return measure which identifies the relationship between cash generated by a business in relation to the cash invested in it.

This approach is believed to provide an accurate measure of economic performance of a business free from accounting distortions. It is assumed that this approach provides also, a "superior"

measure of current performance, the performance measure which best predicts future cash generation.

CFROI is more sophisticated, it shares the same principle with IRR (Internal Rate of Return) which appraises capital investment opportunities.

CFROI "discounts" the future annual cash flow that are expected to rise over the average life of a company's assets back to current cash value. CFROI measures the cash profitability of a business for a specific year and represents the average projected rate of return from all the existing projects at a particular point in time. It is also a measure of performance like SVA and EP.

Advantages of CFROI

(i) It is a superior measure of performance that provides the basis for more accurate business valuation.

(ii) Of each of the metrics available, it most accurately reflects the way in which the stock market judges a company's performance.

(iii) As a measure of performance unlike EP/EVA it is neither distorted by the effect of inflation nor depreciation

Disadvantage of CFROI

(i) It is too sophisticate and difficult to calculate

5.35 Total Business Return (TBR)

Total business return is defined as "the internal equivalent of the external total shareholders returns measure, which considers capital gains and dividends received by shareholders".

TBR combines the cash flow performance of a business with change in value that occurred during the period, as it incorporates the long term effect on the value of the business of decisions and actions taken in a particular period. This gave it an edge over the weakness inherent in short time performance measures such as Cash flow, EP/EVA and CFROI.

Total business returns measure internal rate of return that equates the beginning value of a business with net free cash flow arising in the period.

Advantages of TBR

(i) It incorporates the effect of the changes in value and "delivered" performance in a period.

(ii) It is the closest measure of the true economic performance of a business.

Disadvantages of TBR

(i) It is difficult to have an accurate measurement of opening and closing business valuations for a particular period.

5.36 Managing for Shareholder Value

Managing for shareholder value is a governance issue that deals with the problem of separation of ownership and management in which management of day to day activities of the company is delegated to hired managers by the owners or shareholders, which often leads to lack of alignment of interest between the two groups.

The managers who should be at the fore front of value creation may just be pursuing self-interest and may not always take the best decision with the interest of the shareholders at heart.

In order to ensure alignment of interest between the owners and managers, there should be open and honest communication and active interest in governance by shareholders.

Employees' motivation and remuneration is also a key factor in value based management practice, this is so because the real assets of a company lie in the knowledge and creativity of people working there. One of the best way of reconciling the interest of shareholders with that of the employee is to allow employees to share in the benefit they help to create by way of reward that is linked with long term growth value. This can be in form of share participation that will make employees feel like owners and part of the company.

Mintzberg has this to say "shareholders value drives a wedge between those who create the economic performance and those who harvest its benefit. Those who create the benefits are disengaged from ownership of their efforts and treated as dispensable, while those who own the enterprise treat that ownership as dispensable and so disengage themselves from its activities" (Mintzberg, 2002). Value creation is achieved through a major strategic and operational decisions made throughout the company.

Decision made no matter how little it may look must lend itself to the principle of VBM and for it to be sustained, value based management must be embedded into company's culture so that it becomes more or less the second nature of the company.

Culture encompasses all the implicit norms and ways of behaviour that direct employees' action. The implementation of value based management in any organization should be deep in scope and usually very extensive to the extent that comprehensive restructuring might be inevitable. If clarity of decision making is to be ensured, an organization must know precisely where in the organization value is created and where value is destroyed.

5.37 Revision Questions

1. The following information was given in respect of Minna Division of Larmonde Ltd that produces intermediate Ceramic products for the market and also supply other divisions of the company. Minna Division had projected a residual income of N280,000 in their budget for next year.

Capital employed	N1,500,000
Production Capacity	110,000 units
Sales to other customers at (N18 per unit)	75,000 units
Minna Division fixed cost	N55,000
Variable cost per unit	N12
Cost of capital	12%

Kaduna divisional manager has asked Minna Division to submit a quotation for the transfer price at which it would supply him with 35,000 units.

You are required to:

(i) Calculate the transfer price to be offered by Minna Division to enable it achieve the required

N280,000 residual Income projected.

(ii) Explain why the transfer price offered may result in suboptimal decision making from the group's perspective.

(iii) Assuming Kaduna division later decided to increase its requirement to 40,000 units and asked for quotation from another two companies A & B who could supply the same identical intermediate products at N15 and N16 per unit respectively. Company A will not take order less than 40,000 units while company B can supply any quantity required. State the source or sources from which Kaduna division should purchase the products to enable it maximize its net profit in each of the cases below and explain why the particular source or sources have been chosen. Assuming that Minna Division is willing to supply the product to Kaduna Division at: -

(a) An average price per unit for the quantity required such that the budgeted residual Income of Minna Division will still be achieved.

(b) An average price per unit which reflects the opportunity cost of the goods transferred.

(c) Price per unit which reflects the opportunity cost of each unit of the product.

(iv) Which of the basis for transfer price in (iii) above would lead to group profit maximization and also calculate the reduction in group profit that would arise from the operation of each of the other transfer prices for the goods.

2. Performance of Divisions or Segments of an organization can be evaluated using ROI or RI methods. Briefly describe how these methods are used for performance evaluation.

3. How does Return on Investment (ROI) method differ from Residual Income (RI) method of evaluation with regards to decentralized organization.

4. Write short notes on the following:
   (a) Revenue centre
   (b) Cost centre
   (c) Profit centre
   (d) Investment centre

5. Mention two transfer pricing methods and explain how each of them is being calculated.

6. Define value based management (VBM) in your own words and state three of its advantages and disadvantages.

7. The divisional manager of Samayo Ltd (Motor Division) gave the following information for performance evaluation purpose.

Average operating assets	N150,000
Net operating profit	N 50,000
Minimum required rate of return	10%

Evaluate the performance of the division using an alternative method of ROI and the Residual Income method.

<u>Solution</u> ROI Returned

		Income
Average operating assets	N150,000	N150,000
Net operating profit	N 50,000	N 50,000
ROI	33%	
Minimum required return (20%)		(30,000)
Residual Income		N20,000

Reason why some managers want their performances evaluated on the basis on either ROI or Residual Income is their perception of investment. Residual Income basis encourages investments which will be profitable to the entire organization so managers who are already being evaluated on ROI would reject it.

Let us assume that equipment for vehicle alignment is to be purchased for the division at the cost of N45,000 and is expected to generate a Net operating profit of N20,000 per annum.

Evaluate the performance of the division in the light of the new investment using both ROI and Residual Income methods.

(i) Performance Evaluation
Using Residual Income

	Present	New Project Total	Cumulative
Average Operating assets	N150,000	N45,000	N195,000
Net Operating Profit	N 50,000	N20,000	N 70,000
Minimum Require Return (20%)	N (30,000)	N(9,000)	N (39,000)
Residual Income	N 20,000	N11,000	N 31,000

The new project will be acceptable to the Divisional manager since it has a residual income and the cumulative residual income is more than the present amount. If the cumulative RI falls below the present level, the Divisional manager will reject the new project even if the new project alone has contributed a higher amount to the cumulative RI which makes it a profitable investment.

(ii) Performance Evaluation
Using ROI

	Present	New Project	cumulative Total
Average Operating assets	N150,000	N45,000	N195,000
Net Operating Profit	N 50,000	N20,000	N 70,000
Return on Investment (ROI)	33.3%	44.4%	35.89%

The Divisional manager will accept the new project because it has a high return and will also increased the divisions cumulative return on investment (ROI) from the present 33.3% to 35.89%.

8. Omotuyole Industry has three divisions in the organization; they are Sea foods, Poultry and Cattle Ranch. Each of the divisions is headed by a divisional manager. The company's policy is to evaluate its divisional mangers performance on the basis of ROI although the management Accountant is of the opinion that they should be evaluated on the basis of Residual Income.

The following data in respect of the operations of the company is presented as follows:

	Sea foods Division	Poultry Division	Cattle Ranch Division
Average Operating assets	600,000	400,000	800,000
Net Operating Profit	150,000	200,000	250,000
Minimum Required Return (18%)			

You are required to:

(1) Compute the rate of Returns on Investment (ROI) of each division.

(2) Compute the Residual Income of each of the divisions

(3) Include in your computation a proposed new division for production of animal feeds. It is expected that the investment will be N350,000 and will generate a Net operating profit of N100,000. The Minimum Required return for all divisions is the same.

(4) Comment on the two evaluation approaches used

(5) Advice the management if the new division should be created or not.

Solution

(i) Performance Evaluation using ROI

	Sea foods Division N	Poultry Division N	Cattle Ranch Division N
Average Operating Assets	600,000	400,000	800,000
Net Operating Profit	150,000	200,000	250,000
ROI	25%	50%	31.25%

The Poultry division has the highest Return on Investment and the lowest investment which made it a high performance division in the organization.

(ii) Performance Evaluation using Residual Income.

	Sea foods Division N	Poultry Division N	Cattle Ranch Division N
Average Operating Assets	600,000	400,000	800,000
Net Operating Profit	150,000	200,000	250,000
Minimum Required Return (18%)	(108,000)	(72,000)	(144,000)
Residual Income	42,000	128,000	106,000

Using Residual Income to evaluate the performances of the divisions, the poultry division still shows the highest residual income. It has the lowest level of investment with the highest returns. All the divisions however have some good residual income except the sea foods division that has low residual income.

(iii) Performance Evaluation with
Inclusion of New division
Using Residual Income and ROI

	Sea foods Division N	Poultry Division N	Cattle Ranch Division N	Animal Feeds N
Average Operating Assets	600,000	400,000	800,000	350,000
Net Operating Profit	150,000	200,000	100,000	100,000
Minimum Required Return (18%)	(108,000)	(72,000)	(144,000)	(63,000)
Residual Income	42,000	128,000	106,000	37,000
Return on Investment (ROI)	25%	50%	31.25%	28,57%

Poultry division stands out in terms of performance evaluation on the basis of Residual Income and Return on Investment. Investment in the new division is worth while having shown a positive residual income over the minimum required return. The organization should go ahead with the investment in animal feeds division.

9. Dan Maliki Plc has two divisions in their organization namely Furniture and Electronics Divisions. The following data have been extracted from their records.

	Furniture Division N	Electronics Division N
Sales	50,000	70,000
Variable operating cost:		
Labour	12,000	18,000
Over head	5,000	9,000
Fixed operating cost:		
Controllable by division	8,000	10,000
Centrally Controlled	5,000	6,000
Divisional Manager's salary	10,000	7,000
Central Admin. Expenses	20,000	35,000
Equipments purchased	30,000	20,000

Depreciation is to be calculated at the rate of 10% on straight line method.

You are required to prepare segmented profit statement for both division and comment on the result.

Solution

Dan Maliki Plc

Segmented Profit statement

	Furniture Division	Electronics Division
	N	N
Sales	50,000	70,000
Less Variable cost:		
Material	(10,000)	(15,000)
Labour	(12,000)	(18,000)
Overhead	(5,000)	(9,000)
Expense controllable by Division	(8,000)	(10,000)
Divisional Manager's salary	(10,000)	(7,000)
Depreciation	(3,000)	(2,000)
Divisions Net profit	2,000	9,000

A comparison of the result of the two divisions indicates that Electronic division earned more profit than the furniture division. The furniture division can increase its sales to improve its net profit. The divisional manager must also see how to cut down on its controllable expenses.

10. Oluyole Industries Ltd is a manufacturer of shoes. It has two divisions, the leather sole and Shoe making. The leather sole division sells leather sole to the shoe making division as intermediate product and also to its customers as well.

The following information about the leather sole division is made available.

Capacity in units	10000
Selling price per unit to customers	N35
Variable cost per unit	N14
Fixed cost per unit	N5

The shoe division buys 5000 units of the leather sole at the rate of N20 per unit from outside sources for its normal production.

Calculate the required transfer price range agreeable to the two divisions if: -

(i) The leather sole division has idle capacity to meet all the requirement of the shoe division and its customers.
(ii) The leather sole division sells all what it produces to the outside customer
(iii) Transfer price to be charged on the basis of full cost at idle capacity

Solution

(i) The leather sole division has the capacity to sell to its customers and still supply the quantity required by the shoe division, therefore there is no opportunity cost for any lost sales. Transfer price is calculated as:

$$\text{Transfer price} \geq \text{Variable cost per unit} + \frac{\text{Total contribution margin on lost sales}}{\text{number of units transferred}}$$

$$\text{Transfer price} \geq N14 + \frac{0}{5000} = N14$$

If the Variable cost is applied the transfer price range will be between N14 – N20. the leather Sole division manager will not sell below N14 and the shoe division manager will not buy above N20 which is the price he buys from outside source.

(ii) The leather sole division usually sells all it produces to customers. If it must accommodate the requirement of the shoe division, it must lose some of its sales to customers, this is an opportunity cost to the leather sole division.

$$\text{Transfer price} \geq \text{Variable cost per units} + \frac{\text{total contr. margin on lost sales}}{\text{number of units transferred}}$$

$$\text{Transfer price} \geq N14 + \frac{(35-14) \times 5000}{5000} = N14+21 = N35$$

The price is the same with what is obtainable in the market, therefore the buying division can either buy from the leather Sole division or buy from outside source. However, since the price range of the selling division is between N14 and N35, shoe division can still negotiate for a reduction.

(iii) If full cost is applied by the selling division under the first scenario the transfer price will be as stated under.

$$\text{Transfer price} \geq \text{Total cost per unit} + \frac{\text{Total contribution margin on lost sales}}{\text{Number of units transferred.}}$$

$$\text{Transfer price} \geq N19 + \frac{0}{5000} = N19$$

The transfer price will be ≥ N19 for the selling division and ≤ N35 for the buying division.

MODULE 6

6.00 PERFORMANCE MEASUREMENT SYSTEMS

6.01 Learning Outcomes

On successful completion of this Module, the Students should be able to:

i. Design mission statements, objectives, strategies and goal for an organization;
ii. Evaluate the various performance measurements in modern manufacturing environments;
iii. Examine alternative competitive strategies;
iv. Evaluate how a balanced scorecard fits together and how it supports a company's strategy;
v. Describe monitoring of the external environment and strategies employ by organizations;
vi. Examine the impact of incentive schemes on organizations.

6.02 Introduction

In this module, we focus on the performance measurement systems in modern manufacturing environments having realized that budgets cannot just be based on a few percentage changes from previous years- a company's whole strategic position may need reassessment. Performance measurement systems provide tools, concepts Zand practices that can help managers choose and implement new strategies appropriately.

6.03 Mission in Meaning and Definition

About two decades ago. Peter F. Drucker raised important philosophical question relation to business; what is business? What will it be? And what should it be? These three questions, though simply worded, are in reality the most fundamental question that each organization strives to answer in the emerging world of strategic management.

A mission can be described as a statement which defines the role an organization plays or tends to play in future in the society while purpose is the reason(s) for organizational existence. Mission strictly is the particular need(s) of the society. Purpose relates to what the organization strives to actualize in order to fulfill its mission to the society. Higgins and Vincz (1989) defined a mission statement as the purpose and the reason for the existence of an organization. The strategic objectives of an organization are the definite and specific statement of the factors that constitute goal accomplishment.

A mission statement is therefore a declaration of an organization's reason for existence. It is an enduring statement of purpose that distinguishes an organization from other similar enterprises. It is very important in establishing objectives and formulating strategy effectively. It is sometimes referred to as creed statement, statement of purpose, philosophy, belief and business principles.

A mission statement reveals the long-term vision of an organization in terms of what it wants to be and whom it wants to serve. It describes the organizational purpose, customers, products or services, markets, philosophy and basic technology. It also answers such questions as: what is our business?

A good mission statement indicates the relative attention that an organization will denote to meeting the claims of various stakeholders like shareholders, customers, board of directors etc. It reflects the anticipation of customers; identification of customer's needs and thus provides a product or service to fulfill the identified needs.

In writing and evaluating a mission statement, it is important to ensure that the mission statement includes all of the essential components and also communicate the feeling that will guide and motive stakeholders to action. The components of an effective mission statement include customers, products/services, markets, technology, concerns for survival, growth and profitability, philosophy, self-concept which involves an organization's major strengths and competitive advantage, reconciliatory effectiveness and quality inspiration of a mission statement to motivate and stimulate its reader to action.

A good judgment is required in evaluating and writing mission statements for there is no one best mission statement for a particular organization. A mission statement has to be precise and not necessarily lengthy before it can be effective. The development of a mission statement is affected by social responsibilities. This involves the responsibilities of the firms to customers, environmentalists, communities and other groups. Social policy should be integrated into all strategic management activities of an organization, which must have economic benefits and gains to the organization.

An organization without a clear mission statement tends to have its short term actions counter-productive to its long run purpose. It should be carefully prepared and should always be subject to revision so that it can meet major environmental changes to enable it stand the test of time.

6.04 Formation of Mission Statements

Mission statements could be defined formally or informally by all of the following:

- Usually entrepreneurs lay corporate philosophy
- Major strategies, chief executives, consultants planning
  Mission statement once formulated, should serve that organization for many years but they can be redefined or refined.

A good example of redefinition and refinement is the Nigerian Breweries Plc. Mission statement.

NEW

Our Corporate Mission (Nigerian Breweries Plc)

> **"To remain the beverage company in Nigeria, producing high quality brands, to meet the needs of identified viable sectors in the market."**

OLD

> **"To remain the leading brewery company in Nigeria, producing high quality brands, to meet the needs of identified viable sectors in the market."**

The Need for an Explicit Mission

What then is a company mission designed to accomplish? There are certain justifications for mission statement in an organization. King & Clelland (1978) provides seven of such reasons

namely:

1. To ensure unanimity of purpose within the organization
2. To provide a basis, for motivating the use of the organization resources
3. To develop a basis, or standard, for allocating organizational resources
4. To establish a general tone or organizational climate, e.g. to suggest business like options
5. To serve as a focal point for those who can identify the organization's purpose and direction and to deter those who cannot from further participating in the organization's activities.
6. To facilitate the translation of objectives and goals into a work structure involving the assignment of tasks to responsible elements with the organization.
7. To specify organizational purposes and the translation of these purposes into goals in such a way that cost, time and performance parameters can be assessed and controlled.

6.05 Mission Statement Characteristics

For a mission statement to be effective, it is necessary for it to have the following characteristics:

1. It should be feasible
2. It should be precise
3. It should be clear. An example is ANAN College of Accountancy for training Accountants.
4. It should be motivating
5. It should be distinctive e.g. the Automobile, Elantra Hyundai
6. It should be a major component of strategy
7. It should be indicative of how objectives are to be accomplished

6.06 Objectives and Goals

Objectives are open-ended attributes that denote the future states or outcomes. Goals are close-ended attributes, which are precise and expressed in specific terms.
Objectives are therefore long-term, while goals are short-term.

6.07 Roles of Objectives

Objectives play an important role in strategic management. The followings are some of such roles:

1. Objectives define the organization's relationship with its environment
2. Objectives help an organization pursue its mission and purpose
3. Objectives provide the basis for strategic decision-making
4. Objectives provide the standards for performance appraisal

The essence of the roles of objectives in strategic management may be aptly summed up in the truism that "if one does not know where he has to go, any path will take him there"

6.08 Characteristics of Objectives

In order for objectives to be effective as measures of organizational behaviour and performance, certain characteristics must be present. The characteristics are:

1. Objectives should be understandable: Objectives play important roles in strategic management and are used in a variety of ways. Therefore, they should be understood by those who have to achieve them.
2. Objectives should be concrete and specific: Concrete and specific: Concrete and specific objectives are more likely to lead and motivate managers.
3. Objectives should be related to a time frame: The duration of achieving objectives should be made known to managers who are to achieve them.

4. Objectives should be measurable and controllable: objectives should be measureable and controllable in comparison with companies with the same industry and in general.
5. Objectives should be challenging: Challenging objectives are motivating, but they should not be unrealistic.
6. Correlations of different objectives: Correlations of different objectives leads to synergistic advantages and mutual support.
7. Objectives should be set within constraints: Several constraints (internal as well as external) are involved in objective-setting.

Objectives-setting involves some complex processes. In order to understand the complexities of objectives setting, certain related issues must be discussed.

6.09 Objective Setting Issues

There are many issues, which influence different aspects of objectives setting. Six of such issues are presented here:

1. **Specificity**: Many organizations have corporate, general, specific, functional and operational objectives. Note that specificity is related to the organizational levels for which a set of objectives has been defined or stated.
2. **Periodicity:** Objectives are formulated periodically. Whether they are long-term, medium-term and short-term objectives they must be integrated.
3. **Verifiability:** Each objective has to be tested on the basis of its verifiability. In order words, it should be possible for a manager to state the basis on which to decide whether an objective can be meaningfully used in strategic management.
4. **Reality:** It is a common observation that organizations tend to have two sets of objectives: official and operative. Official objectives are those which the organizations profess to attain while operative objectives are those which they seek to attain in reality.
5. **Quality:** Objectives may be good as well as bad. The quality of an objective can be judged on the basis of its capability to provide a specific direction and a tangible basis for evaluating performance.

6.10 Objectives Setting

Peter Drucker posits that objectives need to be set in eight vital areas of market standing, innovation, productivity, physical and financial resources, profitability, manager performance and development, worker performance and attitude, and public responsibility. Objectives have to be set in these performance areas because they are of strategic importance to every organization.

6.11 Objective Formulation Process

It is important to answer the question:" How are objectives formulated?" William Glueck identified four sets of factors that should be considered in objectives formulation. The four factors are:

i. **Environment Forces**: These forces consider all the interests within the organization. Different stakeholders' interests in an organization are sometimes conflicting. Every shareholder's group usually advances a set of claims or expectations that are to be considered in setting objectives.
ii. **Really of enterprises' resources and internal power relationships**: This implies that objectives are functions of the resources capability of an organization and the relative decisional power that different groups of strategists exercise or wield in sharing those resources amongst the various interest groups.
iii. **Top executives value system**: The value system of the top executive influences on the corporate philosophy adopted by the organizations in terms of strategic management in

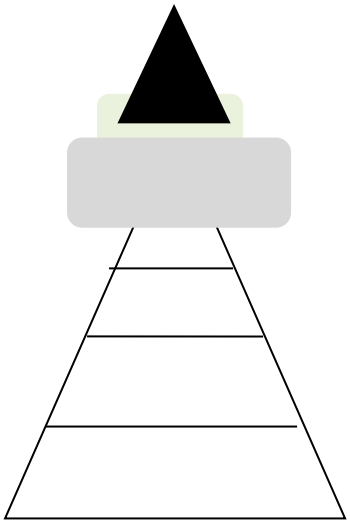
general and objectives in particular. Understandably, values are enduring set of beliefs, which shape perceptions of what is good or bad, and what is desirable or undesirable in terms of the choice of objectives.

iv. **Managerial Awareness:** Awareness of the past objectives and development of the firm by management leads to the knowledge of choice and objectives that were emphasized in the past and which were necessitated by different reasons.

From the foregoing, it is evident that objective-setting is a complex task which is based on consensus among all concerned and has no precise beginning or end. Mission and purpose provide a common thread which link or bind together the different aspects of the objective-setting process by providing a specific direction along which the organization can move or grow.

Hierarchy of Objectives

The hierarchy of objectives starts with mission and purpose of an organization. Next to that is the business definition operating at the corporate level and others at different business levels. Each business level set of objectives is followed by divisional, departmental, functional and operational objectives. In essence, a hierarchy of objectives spans the entire spectrum of functions and operations as show in figure 6.1 below.



6.12 Goals Setting, Establishing Policies, and Resources Allocation

Strategy implementation is of great importance in strategic management because the success of strategy depends on how well it is implemented. Reasons have been advanced for the low rate of success of strategy implementation:

1. Individual resistance to change.
2. Lack of effective organizational structure.
3. Failure to segment market appropriately
4. Paying too much attention to new acquisitions. Therefore, strategy implementation bas little chance of success of goal-setting, policy-making and resource-allocation activities are not adequately performed.

Goal setting is essential for successful strategy implementation for it represents the basis for allocating resources. Establishment of goals in organizations is based on decentralization.

The active participation of managers in goal setting activities can lead to acceptance and

commitment towards the attainment of the overall goals.

Functions of Goals

Goals perform the following functions in every organization

1. Goals serve as guideline for action
2. Goals direct efforts and activities of organizational members
3. Goals channel efforts and activities of organizational members
4. Goals serve as standards for evaluating performance which are very important for employees' innovation and identification.
5. Goals provide basis for organizational design and give incentives for employees to perform.

Organizational goals and structure interaction lead to actions necessary for goals accomplishment. Also, they may impose unavoidable restrictions on employee activities and resources utilization patterns necessitating the implementation of a variety of organization design elements.

Goals usually vary with the size of the firm. Large firms concentrate on profit and socially oriented goals while small firms concentrate on profit-oriented goals. Lever Brothers Plc, UAC Plc, Nigerian Breweries Plc, are some examples of large firms.

The goals structure of organizations varies depending upon the time, the strategic issues facing a given industry, the economic situation, environmental uncertainty, values of top management and the size of the firm. Critical to success in all types and sizes of firms are goals clarity and goals communication. Goals should be measurable, consistent, reasonable, challenging, clearly communicated throughout the organization and characterized by appropriate time dimension. Commensurate rewards and sanctions must be established for goal-actualization.

Goals should state quantity, quality, and cost, time, verifiable and must not be vague. For example, "To minimize profit", goals are not clear specific and measurable, goals are expected to be reasonable, challenging and require some efforts for realistic achievement. Unrealistic goals can be demoralizing to both managers and employees.

Policies which are referred to as specific guidelines, methods, procedures, rules, forms and administrative practices are established to support and encourage strategy implementation. Policies are also used to facilitate and solve recurring problems. Policies set boundaries, constraints and limits on the kind of administrative actions that can be taken to reward and sanction behaviour. In addition, it clarifies what can and cannot be done in pursuit of an organization's goals and objectives.

There are three types of policies adopted in every organization. These are strategic policy, control policy and policies that aid implementation. It is the strategic policies that guide the formation of objectives at the highest level of an organization. The components of a strategic policy are the return on investment, scope of strategy and the organization's role in the entire society.

The allocation of resources after the establishment of goals in accordance with the priorities established by approved goals is necessary. Financial, physical, human and technological resources are necessary for the attainment of organizational goals. The formulation of strategies makes top managers to develop strategy programmed to show what, when and where new resources are needed to achieve the desire results.

The importance of strategy formulation lies in the ability of organization to motivate workers towards strategy implementation. Furthermore, it is not sufficient to successfully set goals, establish policies and allocate resources because the strategy must be evaluated and controlled for meaningful results to be achieved.

Critical Success Factors

Critical success factors (CSFs) sometimes referred to as strategic factors or key factors for success are those which are crucial or vital for organizational success. When strategists consciously look for such factors and take them into consideration for strategic management, they are likely to be more successful, putting in relatively less efforts. Rockart has applied the CSFs approach to several organizations through a three-step procedure for determining CSFs. The generation of the success factors and refining CSFs into objectives, lead to the identification performance measures.

The relevant CSFs are useful in objective-setting and the exercise of a strategic choice in all organization. The vital implications of explicit structuring of the hierarchy of objectives on strategic management are four according Kazmi:

1. It serves as a charter of aims the organization plans to achieve.
2. It is helpful in laying down the aims of different sub-systems within the organization
3. It is a powerful means of communicating the organizational purpose down the line i.e. hierarchy of management.
4. It ensures the creation of a result-oriented organizational system designed to achieve the purpose and actualize the organization's mission.

6.13 What Is Strategy?

The world "Strategy" emerged from the Greek word "Strategos". Strategos means a general in the army while the Greek word "Strategia" means the art or approaches of the general. The word 'strategy' was first introduced to the business parlance in the early fifties (1950's) after the Second World War. In order to understand the concept of strategy very well, we must understand the art of the general. A general in the army leads his country military personnel to war.

Although, both business and military organizations try to use their own strengths to exploit competitor's weakness through both continuous attentions to changing external and internal conditions and the formulation and implementation of comprehensive adaptations to those conditions, there is a fundamental difference between military strategy and business strategy. Business strategy is formulated, implemented, and evaluated with an assumption of *competition,* whereas military strategy is based on an assumption of *conflict*. Aside from this, both business and military organization must adapt to change and constantly improve to be successful. In addition, military conflict and business completion are so similar that many strategic-management techniques apply equally to both.

Glueck, a distinguished professor of management at the University of Georgia defined strategy as "a unified, comprehensive and integrated plan designed to assure that the basic objectives of the enterprise are achieved". The use of the adjectives – unified, comprehensive, and integrated make this definition adequate as it covers the basic nature, activities, and the desired end these activities are aimed. Steiner and Miner in their book: Management Policy and Strategy, define strategy as "the forging of the company's missions, setting objectives for the organization in the light of external and internal forces, formulating specific policies and assuring their proper implementation,

so that the basic purposes and objectives of the organization will be achieved"

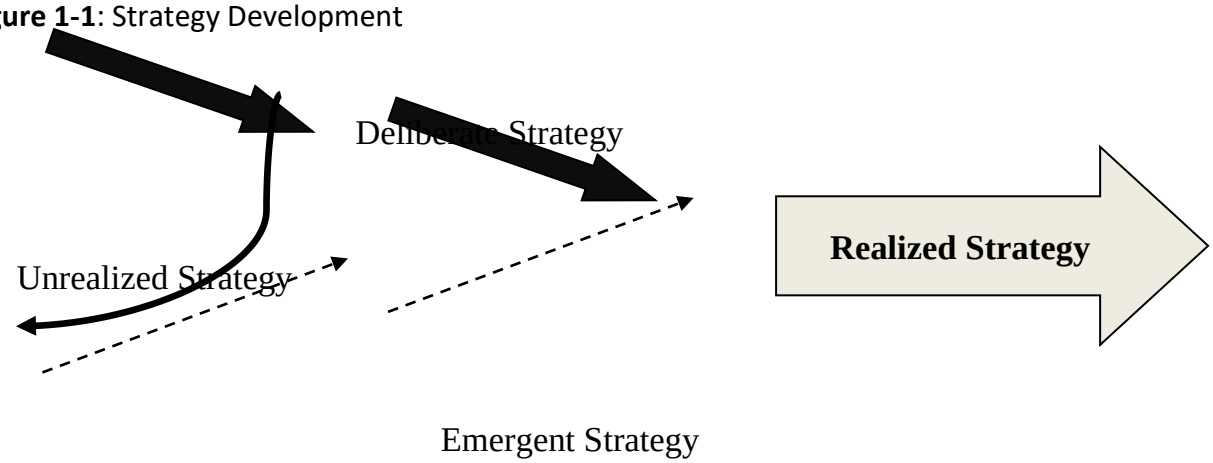
Although, as a discipline strategy and strategic management is in the process of evolution and a uniform terminology is still evolving. Several points are clear after careful consideration of these and other definition by different authors. It is noted from these definitions that strategy is:

- A plan, that is, a selected course of action based on consideration of relevant factors.
- The pattern or common thread related to the company's activities which are derived from its policies, objectives and goals.
- Basically, aimed at moving an organization from its current position to a desired future state.
- Concerned with acquisition and allocation of organizational resources for carrying out a plan or following a course of action.
- Selected based on the realities of internal and external environment of the company and concerned with trade-offs between different activities and creating a fit among organizational activities.

It can be concluded that strategy is a very complex concept. Therefore, any attempt to give it an adequate definition using a sentence or two will certainly miss out some key elements. A careful consideration of many definitions in the literature can be found in a number of words and phrases that are all connected in some ways with the concept of strategy. These elements may include purpose or mission, objectives or goals, strengths and weaknesses, opportunities and threats, implementation, policies, key decisions, key success factors, capabilities or competences, planning and sustainable competitive advantage.

Hence the strategies that company adopts may be planned and deliberate, but equally may reflect the organization's learning in the face of environmental change. In most cases, effective strategies are likely to be a mixture of deliberate and emergent, reflecting not least the need to react to unexpected events and organizational learning.

Figure 1-1: Strategy Development



The distinction between deliberate and emergent strategies reflects both the nature of a company's' organizational dynamics and the constant change and uncertainty of the business environment. Consequently, the development of a company's strategy is a much more uncertain and evolutionary process than the highly rational models of strategic analysis have suggested in the past.

Johnson and Scholes (1993) categorized a number of different approaches to strategy. These views are:

1. **A Natural Selection View:** companies are under great environmental pressure and have constantly to adapt to changes in their environment.
2. **A planning View**: that strategy comes about through highly systematized forms of planning, that is, a rational approach to strategy.
3. **A logical incremental View**: this means an evolutionally step-by-step approach (adaptive) to strategy.
4. **A Political View**: that is, where strategy emerges after a variety of internal battles, in which managers, individuals and other groups bargain and trade their interests and information.
5. **A Cultural View:** taking strategy based on the experience, assumptions and beliefs of management over time and which may eventually permeate the whole organization.
6. **A Visionary View:** where the strategy is dominated by one individual, or sometimes a small group, who have a particular vision of where the company can and should be (this is majorly intuitive approach).

6.14 Classification of Strategies

Strategies have been viewed from different dimensions. Some authors classified strategies using levels of strategy: corporate, business and functional strategies. Other writers classified strategies as 'pure' that is grand strategies and 'mixed' strategies. Many more writers classified strategies based on several factors. These factors include market dominance (leader, challenger, follower, and niche), rate of innovation (pioneers, close followers, and late followers), growth (at integration, diversification, and cooperation), aggressiveness (building, holding, and harvesting), competitive strategies (cost leadership, product differentiation, and market segmentation), and warfare based strategies (offensive and defensive). Other dimensions proposed include internal/external, related/unrelated, horizontal/vertical, and active/passive dimensions.

6.15 Growth Strategies

Growth strategies include intensification, integration, diversification, and internationalization strategies.

a) **Intensification Strategies:** Intensification strategies involve investment of resources in one or more of an organisation's business(es) or products, either singly or jointly, in terms of identified market with the help of proven tech
b) nology to achieve competitive advantage. Such competitive advantage facilitates expansion. Intensification means relying on doing what organizations know they are best at doing. Intensification strategies include market penetration, market development, product development, and innovation,
   i) *Market Penetration* involves seeking increased market share for present products or services in present markets though better marketing efforts.
   ii) *Market Development* consists of marketing present products, often with possible cosmetic modification and range increases, to customers in related market areas, by adding channels of modifications and range increases, to customers in related market areas by adding channels of distribution or by changing the content of promotion.
   iii) *Product Development* involves the improvement or modification of existing products or the additions of related products in order to secure increased sales for existing products in the current markets through established channels.
   iv) *Innovation Strategy* is the creation of an entirely new product or a great improvement in a product for the replacement of an existing product. This new product, unlike a modified

product, starts a life cycle of its own in the existing or/and new market thereby rendering similar existing products obsolete.

c) **Integration and Outsourcing Strategies:** Integration basically means adding or combining activities related to the present activity of the organization. Integration can be vertical or horizontal.
   i) *Vertical Integration* can be forward or backward. Forward integration is gaining ownership or increased control over distributors or retailers. Backward integration is seeking ownership or increased control of any company's suppliers.
   ii) *Horizontal Integration* is seeking ownership or increased control over competitors. Integration strategy in addition to vertical and horizontal dimension can be internal or external. An organization can combine related activities through internal start-up or through external growth involving the purchase of, or an arrangement with companies that are behind or ahead of a business in the added value channel.
   iii) *Outsourcing Strategy* is having another company usually a vendor, a third party provider, or a consultant provides a value creating activity for an organisation.

d) **Diversification Strategies:** Diversification strategy is any strategic move that is used to add a new business to an organization present business(es) that either produce related or unrelated products, or its involvement in related or unrelated markets and activities.
   i) *Concentric (related) diversification* is when an organization adds a business that produces related products or that is involved in related markets or activities.
   ii) *Conglomerate (Unrelated) Diversification* is when an organization adds a business that produces unrelated products or is involved in unrelated markets and activities.
   iii) *Combination Diversification* is when an organization adds businesses that produce some related products or are involved in related markets or activities while others produce unrelated products or are involved in unrelated markets or activities.

e) **Internationalization Strategies:** An international strategy is a strategy through which the organisation enters and sells it goods or services outside its domestic market. Therefore, international strategy includes entry and competitive strategies. There are five different strategies that a company can use to enter foreign market. These include exporting, licensing, franchising, joint ventures, and wholly owned subsidiaries. To successfully compete in international or foreign markets, a company has for basic options: international, multi-domestic, global, and transnational strategies.

f) **Strategy Methods:** Strategy methods are means of achieving a strategy. At the corporate level, the two basic means of achieving organizational growth are organic development (or internal start-up), and cooperation. Strategy methods relate to the question; if we want to grow and expand nationally and/or globally, should we do so through organic development or corporate cooperation, such as acquisitions, mergers, or strategic alliances.
   i) *Organic Development* involves the establishment of a new business from the scratch internally. This strategy takes longer time than cooperative strategies, such as acquisition, and it is associated with some entrepreneurship programmes.
   ii) *Cooperative Strategies* are strategies in which two or more organizations work together to achieve a shared objective. Interestingly, cooperative strategies are formed by organizations competing against one another. The popular corporate – level cooperative strategies are merger, acquisition, and strategic alliances. Merger is any transaction involving two or more organizations of about equal size in which stock is exchanged to form one organization, the combinations of these organizations are usually friendly. Therefore, these organizations lose their identities and a new entity emerges. An acquisition is the purchase of a company that is completely absorbed as an

operating subsidiary or division of the acquiring organization. The acquiring organization is usually a larger one while the acquired company is a small organization.

iii) *Strategic Alliance* is a partnership of two or more companies or business units for the achievement of strategically significant objectives that are mutually beneficial. Strategic alliances include joint ventures, equity strategic alliance.

2) **Stability Strategies**

A stability strategy, sometimes viewed as a lack of strategy can be appropriate for a successful company operating in a reasonably predictable environment. Organizations that are happy with their success and the size of their business or businesses often choose stability over growth. Stability involves continuing in a company's current activities without significant change in direction. Stability strategies can be very dangerous too if followed for too long. The three basic stability strategies are no-change, profit, and pause/proceed – with – caution strategies.

i) A *no-change Strategy* is a decision to do nothing but to continue current operations with existing strategy and policies for the foreseeable future.

ii) *A Profit Strategy* is a decision to do nothing in a worsening situation but instead to act as though the organisation's problems are only temporary.

iii) *Pause/Proceed with-Caution Strategy* is just a time out; an opportunity to rest before continuing a growth or defensive strategy.

3) **Consolidation and Recovery Strategies**

Consolidation and recovery strategies are moves to solve fundamental problems confronting an organization. The profitability and survival of an organization can be threatened and hampered through unfavourable external developments. The moment top managers begin to observe any or some symptoms of failure, an appropriate strategic move must be made to protect their organization from imminent failure. The five common strategic alternatives that can be adopted to defend an organisation's profitability and survival are retrenchment/turnaround, captive company, sellout/divestment, liquidation and bankruptcy.

6.16 Business Level Strategies

In a multi-business company, business strategy-making is carried out by business-level general managers while business strategy-making in a single-business company is usually done by executive-level managers. Business strategy or business-level strategy is the managerial game plan for a single business that is formulated by management to produce successful performance in one specific line of business.

Business-level strategy is concerned majorly with;

1) Developing responses in the form of adjustments to changes that are emerging in the segments of the general environment,
2) Generating, selecting and implementing competitive moves and market approaches that can ensure long-term competitive advantage,
3) Building distinctive valuable competences and capabilities that can enhance superior performance,
4) Uniting the strategic moves of the various functional departments, and
5) Developing action plan for addressing any special strategy-related issues unique to a company's competitive situation.

The three major facets of business-level strategy are:

1) Decision about product or service-related attributes that can offer the best chance to win a competitive edge,
2) Development of expertise, resource strengths, and competitive capabilities that are capable of distinguishing a company from rivals,
3) Insulation of the business as much as possible from the actions of rivals and their threatening competitive developments.

Business – level or competitive strategies include Porter's generic competitive strategies and cooperative strategies. Porter's competitive strategies include cost leadership, differentiation, cost focus, and differentiation focus strategies.

6.17 Functional Level Strategies

Functional-level strategy is the managerial game plan for a particular activity, business strategic advantages of a firm to the challenges of the environment. Tactics constitute an operational maneuver intended to win a given (competitive) battle. Tactics include the various short-term plans, actions, decision, programme and procedures geared towards winning a given battle while strategy is reasoned that tactics include the specific which deliver and implement the strategies in order to achieve objectives and pursue the mission while strategies draw the purpose and objectives of the company, the paths to follow, and the decision it takes in order to reach certain desirable points and levels of success. However, the distinction between tactic and strategy should be interpreted with care because one company's strategy is another company's tactic. The distinction between strategy and tactics can be seen from the following perspectives:

Differentiating between strategy and tactics for, theoretical purpose does not mean that the two are competitive but they are complementary. There is interdependence between the two forms of plans. Tactics are formulated within the framework of strategy. They are short-term plans necessary to support the pursuit of strategic objectives

6.18 Benefits of Strategic Approach to Managing Business

Business managers, to succeed in the face of the increasing complexity of modern business organizations and the general environment, require good strategic thinking and effective strategic management. The increasing complexity of modern business organizations has been due to a number of factors such as;

- The rapid advancement in micro-electronic technology that has revolutionized business processes.
- The improvement in world-wide communication systems, leasing to better and more timely information which greatly enhance effective decision-making by buyers, sellers and marketing intermediaries
- Greater emphasis on consumer rights and protection
- Increasing concern among most nations for the protection of the natural environment, leading to the development of alternative materials, components, energy sources etc.
- The increased ability of firms to compete with each other due to the benefits of new technology and a sufficiency of trained labor
- The greater inter-connectedness of the world's people in their trading, economic, and political activities e.g. European Union (EU) Oil Producing and Exporting Countries (OPEC), World Trade Organization (WTO) and the shrinking of the world such as Globalization.

On the basis of these and many more factors, modern-day managers have to think strategically about their company's position and about the impact of changing conditions. In addition, they have to monitor the external conditions carefully to know when and how to institute strategic changes. It can safely be concluded that the fundamentals of strategic management need to drive the whole approach to managing organization. Any factor that stimulates change in strategy is called a triggering event. Some possible triggering events are:

- **New Executive Leadership:** Change in strategic leadership is usually associated with change in strategic direction. A new CEO in his/her effort to cut through the veil of complacency or breaks the ceiling of mediocrity must ask a series of serious question. He or she must force people to question the reason for the company's existence.
- **Performance Gap:** An organization gap exists when performance does not meet expectations. Declining sales and/or profits or even stagnant sales or profit may require a change of strategy.

Changes in Industry and Competition: changes in industry have a direct bearing on the profitability of a company. Increase in competitive intensity or the decision of buyers to become competitors (by in integrating backward) or suppliers to become competitors (by integrating forward) requires a change in strategy. In the same way, actions of competitors often trigger change in a company's strategy.

- **Emergence of New Opportunities and Threats:** New opportunities in any segment of the general environment such as ban on importation of foreign substitute products or sharp reduction on banks' lending rate can encourage a company to abandon stability strategy for concentration or diversification strategy to take advantage of such favourable conditions. The appearance of threat from any segment of the general environment also pushes companies to develop strategies to avoid or attack such threatening factors.
- **Strategic Inflection Point:** this concept was developed by Andy Grove, past CEO of Intel Corporation. Strategic inflection point occurs when a company is faced with a major change due to the introduction of new technologies, a different regulatory environment, a change in customers' values, or a change in what customers prefer.
- **Change of Ownership:** A company that is confronted with threat of a change in ownership may block such attempt through development of strategies that can discourage buyers. Change in corporate ownership can be due to corporate combination. The new owners usually develop new strategies to steer the organization into a new direction or to reverse negative trends.

Summary

- Strategies are means to ends. They are the means through which organizational purpose-vision, mission, and objectives are accomplished. Strategy cannot be given one single definition but as a concept, it comprises of some key elements, such as purpose, mission, objectives or goals, strengths and weaknesses, opportunities and threats, implementation, policies, capabilities, competences, competitive advantage, and key success factors.
- Strategies can be viewed from different perspectives, such as plan, ploys pattern, position and perspective.
- Strategies that business organizations adopt are usually classified in various ways but the most useful way is by levels-corporate, business, and functional levels.

- Corporate strategies are adopted by multi-business companies to manage the various businesses in their portfolio.
- Business-level strategies, also known as competitive strategies are adopted by businesses or strategic business units to achieve success in the market place.
- Functional strategies include all strategies that functional managers follow to support the implementation of business-level strategies.
- Strategic plans are unified, comprehensive and integrated plans that cover a long-term period, and are developed in the light of the realities of the business environment. Strategic plans are influenced by the values and expectations of stakeholders. Therefore, they are very complex in nature. Although, there is distinction between strategy and tactics, this distinction should be interpreted with care because one company's strategy is another company's tactics.
- Strategies do not just happen, but because they involve change, they are usually triggered by some factors, such as new executive leadership, performance gap, changes in the industry and competition, appearance of new opportunities and threats, and change of ownership.

6.19 JIT CONCEPT

Under ideal conditions, a company operating a JIT system would purchase only enough materials each day to meet that day's needs. Moreover, the company would have no goods still in progress at the end of the day, and all goods completed during the day would have been shipped immediately to customers. As this sequence suggests, just-in-time means that raw materials are received just in time to go into production, manufactured parts are completed just in time to be assembled into products, and products are completed just in time to be shipped to customers. Although few companies have been able to reach this ideal, many companies have been able to reduce stock to only a fraction of their previous levels. The result has been a substantial reduction in ordering and warehousing costs, and much more effective operations.

How does a company avoid a build-up of parts and materials at various workstations and still ensure a smooth flow of goods when JIT is in use? In a JIT environment, the flow of goods is controlled by a pull approach. The pull approach can be explained as follows: at the final assembly stage, a signal is sent to the preceding workstation as to the exact amount of parts and materials that will be needed over the next few hours to assemble products to fill customer orders, and only that amount of parts and materials is provided. The same signal is sent back through each preceding workstation so that a smooth flow of parts and materials is maintained with no appreciable stock building-up at any point. Thus, all workstations respond to the pull. As one worker explained, 'under a JIT system you don't produce anything, anywhere, for anybody unless they ask for it somewhere downstream. Stocks are an evil that we're taught to avoid. The pull approach is illustrated in exhibit.

The pull approach described above can be contrasted to the push approach used in conventional manufacturing systems. In conventional systems, when a workstation completes its work, the partially completed goods are 'pushed' forward to the next workstation regardless of whether that workstation is ready to receive them. The result is an unintentional stockpiling of partially completed goods that may not be completed for days or even weeks. This ties up funds and also results in operating inefficiencies. For one thing, it becomes very difficult to keep track of where everything is when so much is scattered all over the factory floor. Another characteristic of conventional manufacturing systems is an emphasis on keeping everyone busy as an end itself. This

inevitably leads to excess stock-particularly work in progress stock-for reasons that will be done more fully explored in a later section on the theory of constraints.

In JIT, the traditional emphasis on keeping everyone busy is abandoned in favour of producing only what customers actually want-even if that means some workers are idle.

JIT purchasing

Any organization with stock-retail, wholesale, distribution, service or manufacturing- can use JIT purchasing. Under JIT purchasing:

1. A company relies on a few ultra-reliable supplies. IBM, for example, eliminated 95% of the suppliers form one of its plants, reducing the number from 640 to only 32. Rather than soliciting bids from suppliers each year and going with the low bidder, the dependable suppliers are rewarded with long-term contracts.
2. Suppliers make frequent delivers in small lots just before the goods are needed. Rather than deliver a week's (or a month's) supply of an item at one time, suppliers must be willing to make deliveries as often as several times a day, and in the exact quantities specified by the buyer. Undependable suppliers who do not meet delivery schedules are weeded out. Dependability is essential, since a JIT system is highly vulnerable to any interruption in supply. If a single part is unavailable, the entire assembly operation may have to be shutdown. Or, in the case of merchandising company, if the supplier allows stock to get down to zero, customers may be turned away unsatisfied.
3. Suppliers must deliver defect-free-goods. Because of the vulnerability of a JIT system to disruptions, defects cannot be tolerated. Indeed, suppliers must become so reliable that incoming goods do not have to be inspected.

Companies that adopt JIT purchasing often realize substantial savings from streamlined operations. Note that a company does not have to eliminate all stock to use the JIT approach. Indeed, retail organizations must maintain some stock or they could not operate. But the amount of time a product spends on a shelf or in a warehouse can be greatly reduced.

Key elements in a JIT system

In addition to JIT purchasing, four key elements usually required for the successful operation of a JIT manufacturing system. These elements include improving the plant layout, reducing the set-up time needed for production runs, striving for zero defects, and developing a flexible workforce.

Improving plant layout

Properly to implement JIT, a company typically must improve the manufacturing flow lines in its plant. A flow line is the physical path taken by a product as it moves through the manufacturing process as it is transformed from raw materials to completed goods.

Traditionally, companies have designed their plant floors so that similar machines are grouped in one location. This approach to plant layout creates an individual 'mini' factory for each separate product, frequently referred to as focused factory or as a factory within a factory. The flow line for a product can be straight, or it can be a U-shaped configuration. The key point is that all machines in a product flow line are tightly grouped together so that partially completed units are not shifted from place to place all over the factory. Manufacturing cells are also often part of a JIT product flow line. In a cell, a single worker operates several machines.

The focused factory approach allows workers to focus all their efforts on a product from start to

finish and minimizes handing and moving. After one large manufacturing company rearranged its plant layout and organized its products into individual flow lines, the company determined that the distance travelled by one product had been decreased from 3 miles to just 100 metres. Apart from reductions in handling, this more compact layout makes it much easier to keep track of where a particular job is the production process.

An improved plant layout can dramatically increase throughput, which is the total volume of production through a facility during a period, and it can dramatically reduce throughput time (also known as cycle time) which is the time required to make a product.

Reduced set-up time

Set-ups involve activities-such as moving materials, changing machine setting, setting up equipment and running tests, - that must be performed whenever production is switched over from making one type of item to another. For example, it may not be a simple matter to switch over from making 1.25 cm brass screws to making 2 cm brass screws on a manually controlled milling machine. Many preparatory steps must be performed, and these steps can take hours. Because of the time and expense involved in such set-ups, many managers believe set-ups should be avoided and therefore items should be produced in large batches. For example, one batch of 400 units requires only one set-up, whereas four batches of 100 units each would require four set-ups. The problem with big batches is that they create large amounts of stock that must wait for days, weeks, or even months before further processing at the next workstation or before they are sold.

One advantage of a dedicated flow line is that it requires fewer set-ups. If equipment is dedicated to a single product, set-ups are largely eliminated and the product can be produced in any batch size desired. Even when dedicated flow lines are not used, it is often possible to slash set-up time by using techniques such as single minute exchange of dies. A die is a device use for cutting out, forming or stamping material. For example, a die is used to produce the stamped metal door panels on a car. A die must be changed when it wears out or when production is switched to a different product. This changeover can be time consuming. The goal with single-minute exchange of dies is to reduce the amount of time required to change a die to a minute or less. This can be done by simple techniques such as doing as much of the changeover work in advance as possible rather than waiting until production is shutdown. When such techniques are followed, batch sizes can be very small. Smaller batches reduce the level of stock, make it easier to respond quickly to the market, reduce cycle times, and generally make it much easier to spot manufacturing problems before they result in a large number of defective units.

Zero defects and JIT

Defective units create big problems in a JIT environment. If a completed order contains a defective unit, the company must ship less than the promised quantity or it must restart the whole production process to make just one unit. At minimum, this creates a delay in shipping the order and may generate a ripple effect that delays orders. For this and other reasons, defects cannot be tolerated in a JIT system. Companies that are deeply involved in JIT tend to become zealously committed to a goal of zero defects. Even though it may be next to impossible to attain the zero defect goal, companies have found that they can come very close. For example, Motorola, Allied Signal, and many other companies now measure defects in terms of the number of defects per million units of product. In a traditional company, parts and materials are inspected for defects when they are received from suppliers and quality inspectors inspect units as they progress along the production line. In a JIT system, the company's suppliers are responsible for the quality of incoming parts and materials. And instead of using quality inspectors, the company's production

workers are directly responsible for spotting defective units.

A worker who discovers a defect is supposed to punch an alarm button that stops the production flow line and sets off flashing lights. Supervisors and other workers then descend on the workstation to determine the cause of the defect and correct it before any further defective units are produced. This procedure ensures that problems are quickly identified and corrected, but it does require that defects are rare-otherwise there would be constant disruptions to the production process.

Flexible workforce

Workers on a JIT line must be multi-skilled and flexible. Workers are often expected to operate all of the equipments on a JIT product flow line. Moreover, workers are expected to perform minor repairs and do maintenance work when they would otherwise be idle. In contrast, on a conventional assembly line a worker performs a single task all the time everyday and all maintenance work is done by a specialized maintenance crew.

Benefits of a JIT system

The main benefits of JIT are the followings:

a. Working capital is bolstered by the recovery of funds that were tied up in stock.
b. Areas previously used to store stock are made available for other, more productive uses.
c. Throughput time is reduced, resulting in greater potential output and quicker response to customers.
d. Defect rates are reduced, resulting in less waste and greater customer satisfaction.

As a result of benefits such as those cited above, more companies are embracing JIT each year. Most companies find, however, that simply reducing stock is not enough. To remain competitive in an ever changing and ever more competitive business environment, companies must strive for continuous improvement.

6.20 Total Quality Management (TQM)

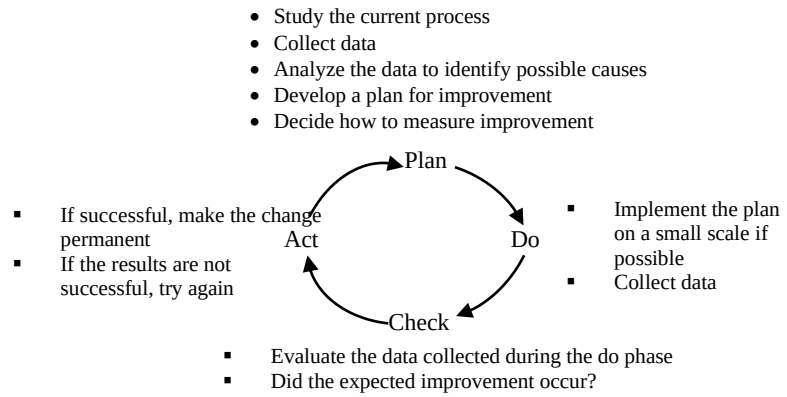
The most popular approach to continuous improvement is known as Total Quality Management (TQM). There are two major characteristics of TQM: (1) a focus on serving customers and (2) systematic problem solving using teams made up of frontline workers. A variety of specific tools are available to aid teams in their problem solving. One of these tools, benchmarking, involves studying organizations that are among the best in the world at performing a particular task. For example, when Xerox wanted to improve its procedures for filling customer orders, it studies how the mail-order company L.L Bean processes its customer orders.

The plan-do-check-act-cycle

Perhaps the most important and pervasive TQM problem-solving tool is the plan-do-check-act (PDCA) cycle, which is also referred to as the Deming Wheel. The plan-do-check-act-cycle (PDCA) cycle are illustrated in exhibit 6.2. The PDCA cycle applies the scientific method problem to problem solving. In the plan phase, the problem solving team analyses data to identify possible causes for the problem and then proposes a solution. In the Do phase, an experiment is conducted. In the check phase, the results of the experiment are analyzed. And in the act phase, if the results of the experiment are favourable, the plan is implemented. If the results of the experiment are not favourable, the team goes back to the original data and starts all over again. An important element of TQM is its focus on the customer. The accounting and consulting firm KPMG peat Marwick periodically surveys its customers' satisfaction with its services.

The firm's managing directors' points out that it costs four times as much to gain a new customer as it does not keep an old customer, and the most satisfied customers are generally the most profitable customers for the firm. For each complaint that you hear, there are fifty you don't. If you don't monitor client's satisfaction, you may find out about their dissatisfaction as they walk out the door.

Exhibit 6.2



The plan-do-check-act-cycle

In sum, TQM provides tools and techniques for continuous improvement based on facts and analysis; and it properly implemented, it avoids counterproductive organizational infighting.

Some criticism of TQM

There have been a number of criticisms of TQM. They may not always be justified but managers should be aware of possible pitfalls. TQM has been accused of draining innovation from organizations by standardizing internal processes. It is also accused of making organizations more efficient at what they are doing irrespective of whether they should be doing it. The specter is that TQM results in a finely honed organization that is a world class producer of wagon or manual typewriters. Like other management change initiatives, TQM suffers from the flavor of the month syndrome. Typically, organizational members have been bombarded with so many fads that they may merely go through the motions of implementation of TQM hoping that senior managers will soon embrace a new three better acronyms.

6.21 SCENARIO PLANNING "WHAT—IF" ANALYSIS

Terminal or salvage value has often been ignored in investment decisions. The usual reason offered is the difficulty of estimating it. Because of this uncertainly, the effect of salvage value has often been ignored or heavily discounted. This approach may be unwise, however, because salvage value could make the differences between investing and not investing. Given the highly competitive environment, companies cannot afford to make incorrect decisions.

A much better approach to deal with uncertainty is to use sensitivity analysis. Sensitivity analysis changes the assumptions on which the capital investment analysis relies and assesses the effect on

the cash-flow pattern. Sensitivity analysis is often referred to as what-if-analysis. For example, this approach is used to address such questions as what is the effect on the decision to invest in a project the cash receipts are 5 percent less than projected, 5 percent more. Although sensitivity analysis is computationally demanding if done manually, it can be done rapidly and easily using computer and spreadsheet software packages such as Lotus, Excel, and Quattro. In fact, these packages can also be used to carry out the NPV and IRR computations that have been illustrated manually throughout the chapter. They have built-in- NPV and IRR functions that greatly facilitate the computational requirements.

To illustrate the potential effect of terminal value, assume that the after-tax annual operating cash flows of the project shown in exhibit are N3.1 million instead of N4 million. The net present value without salvage value is as follows:

	N
Present value (N3,100,000 x 5.65)	17,515,000
Investment	18,000,000
Net present value	N (485,000)

Without the terminal value, the project would be rejected. The net present value with salvage value of N2 million, however is a positive result. Meaning that the investment should be made

Present value (Present value (N3,100,000 x 5.65)	N17,515,000
Present value (N2,000,000 x 0.322)	644,000
Investment	(18,000,000)
Net present value	N 159,000

But what if the salvage value is less than expected? Suppose that the worst possible outcome is a salvage value of N1,600,000? What is the effect on the decision? The NPV can be recomputed under the new scenario

Present value (Present value (N3,100,000 x 5.65)	N17,515,000
Present value (N1,600,000 x 0.322)	515,000
Investment	(18,000,000)
Net present value	N30,200

Thus, under a pessimistic scenario the NPV is still positive. This illustrates how sensitivity analysis can be used to deal with the uncertainty surrounding salvage value. It can also be used for other cash-flow variables.

6.22 Alternative Competitive Strategies

In developing a sustainable competitive position, each firm purposefully or as a result of market forces arrives at one of the two competitive strategies: cost leadership or differentiation.

6.23 Cost leadership

Cost leadership is a strategy in which a firm outperforms competitors in producing products or services at the lowest cost. The cost leader makes sustainable profits at lower prices, thereby limiting the growth of competition in the industry through its success at price wars and undermining the profitability of competitors, which must meet the firm's low price. The cost leader normally has a relatively large market share and tends to avoid niche or segment markets by using the price advantage to attract a large portion of the broad market. While most firms make strong efforts to reduce costs, the cost leader may focus almost exclusively on cost reduction, thereby

ensuring a significant cost and price advantage in the market.

Cost advantage usually result from productivity in the manufacturing process, in distribution or in overall administration. For example, technological innovation in the manufacturing process and labour savings from overseas production are common routes to competitive productivity. Firms known to be successful at cost leadership are typically very large manufacturers and retailers, such as Wal-Mart, Texas instruments, and Compaq. A potential weakness of the cost leadership strategy is the tendency to cut costs in a way that undermines demand for the product or service, for example, by deleting key features. The cost leader remains competitive only so long as the consumer sees that the product or service is (at least nearly) equivalent to competing products that cost somewhat more.

6.24 Differentiation

The differentiation strategy is implemented by creating a perception among customers that the product or service is unique in some important way, usually by being of higher quality. This perception allows the firm to charge higher prices and outperform the competition in profits without reducing costs significantly. Most industries, including automobile, consumer electronics and industrial equipment, have differentiated firms. The appeal of differentiation is especially strong for product lines for which the perception of quality and image is important, as in cosmetics, jeweler, and automobiles. Tiffany, Bently, Rolex, Maytag, and Mercedes Benz are good examples of firms that stress differentiation.

A weakness of the differentiation strategy is the firm's tendency to only undermine its strength by attempting to lower costs or by ignoring the necessity to have a continual and aggressive marketing plan to reinforce the perceived difference. If the consumer begins to believe that the perceived difference is not significant, lower-cost rival products will appear more attractive.

Strength and weakness are most easily identified by looking inside the firm at its specific resources.

- Product lines: are the firm's products innovative? Are the products offering too wide or too narrow? Are there important and distinctive technological advances?
- Management: what is the level of experience and competence?
- Research and development: is the firm ahead of or behind competitions? What is the outlook for important new products and services?
- Manufacturing: how competitive, flexible, productive, and technological advanced are the current manufacturing processes? What plans are there for improvements in facilities and processes?
- Marketing: how effective is the overall marketing approach, including promotion, selling and advertising.
- Strategy: how clearly defined, communicated, and effectively implemented is corporate strategy?

Opportunities and threats are identified by looking outside the firm. Opportunities are important favourable situations in the firm's environment.

Demographic trends, changes in regulatory matters, and technological changes in the industry might provide significant advantages or disadvantages for the firm. For example, the gradual aging of the U.S population represents an advantage for firms that specialize in products and services for the elderly. In contrast, threats are major unfavourable situations in the firm's environment. These might include the entrance of new competitors or competing products, unfavourable changes in government regulations, and technological change that is

unfavourable to the firm. Opportunities and threats can be identified most easily by analyzing the industry and the firm's competitions:

- Barriers to entry: do certain factors, such as capital requirements, economics of scale, product differentiation, and access to selected distribution channels, protect the firm from new comers? Do other factors, including the cost buyer switching, government regulations and policies that favour the firm, and educational and licensing restrictions, restrict competition? To what degree is the firm protected from competition from new entrants to the industry?
- Intensify of rivalry among competitors: intense rivalry can be the result of high entry barriers, specialized assets (and therefore limited flexibility for a firm in the industry), rapid product innovation, slow growth in total market demand, or significant over capacity in the industry. How intense is the overall industry rivalry facing the firm?
- Pressure from substitute products: will the presence of readily substitutable products increase the intensify level of the firm's competition?
- Bargaining power of customer: the greater the bargaining powers of the firm's customers, the greater the level of competition facing the firm. Bargaining power of customers is likely higher if switching cost is relatively low and if the products are not differentiated.
- Bargaining power of suppliers: the greater the bargaining powers of a firm's suppliers, the greater the overall level of competition facing the firm. The bargaining power of suppliers is higher when a few large firms dominate the group of suppliers and when these suppliers have other good outlets for their products.

SWOT analysis guides the strategic analysis by focusing attention on the strength, weakness, opportunities and threats critical to the company success. By carefully identifying the critical success factors in this way, executives and managers can discover differences in viewpoints. For example, what some managers might view as strength, others might view as weakness. SWOT analysis therefore also serves as a means of obtaining greater understanding and perhaps consensus among managers regarding the factors that are crucial to the firm's success. In addition, careful consideration of its CSFs will lead to the identification of the firm's appropriate overall strategy. The ultimate objectives of the SWOT analysis then are to identify the overall strategy and the CSFs of the firm and to begin to develop a consensus among executives and managers regarding them.
Cost, quality and time: many firms find that a consideration of critical success factors yields a renewed focus on the three key factors: cost, quality, and speed of product development and product delivery. Increasingly, firms find that they must compete effectively on each of these three factors. Consumer expectations are very high for quality, cost and speed. Retail business such as Wal –Mart and Home Depot succeed.
By providing high-quality goods at low prices in a timely manner. Suppliers to these firms expect to meet very high standards of quality (including inspections by retailer at the manufacturer's plant) and to meet increasingly demanding delivery terms, in many cases delivering product directly to the retail location, bypassing any warehousing operation.

Measures for critical success factors

Developing measures for the CSFs involves a careful study of the firm's business process. Product development, manufacturing, marketing, management, and financial functions are

investigated to determine in which specific ways these functions contribute to the firm's success. The objective at this step is to determine the specific measures that will allow the firm to monitor this step is to determine the specific measures that will allow the firm to monitor its progress toward achieving its strategic goals.

6.25 The Competitive Strategy

A firm succeeds by finding a sustainable, long-term strategy, that is, a set of policies, procedures, and approaches to business that produce long-term success. Finding a strategy begins with determining the purpose and long-range direction, and therefore the mission, of the company. Exhibit 6-4 list excerpts from the mission statements of several companies. The mission is developed into specific performance objectives, which are then implemented by specific corporate strategies, that is, specific actions to achieve the objectives that will fulfill the mission. See the Sara Lee corporate strategy in exhibit 6-5. note that Sara Lee's broad mission statement is explained in terms of more specific objectives, which are in turn operationalized through specific corporate strategies.

EXHIBIT 6-4 MISSION STATEMENTS OF SELECTED COMPANIES

Ford motor company (www.ford.com)

To be a low cost producer of the highest-quality products and services the best customer value.

General electric (www.ge.com)

To become the most competitive in the world by being number one or number two in market share in every business the company is in.

IBM (www.ibm.com)

To be the most successful information-technology company in the world

Motorola (www.motorola.com)

To complete the picture at home-integrating broadband with wireless services.

Johnson & Johnson **(www.jnj.com)**

To alleviate pain and disease

United parcel service (www.ups.com)

To move at the speed of business

Walt Disney (Disney.com)

To make people happy

Merck (www.merck.com)

To preserve and improve human life

Sara lee (www.saralee.com)

To build leadership brands in three highly focused global businesses: food and beverage, intimates and underwear, and household products. Our primary purpose is to create long-term shareholder value.

Exhibit 6-5 Sara Lee corporate strategy

Management philosophy

Sara Lee corporation is committed to the principle of decentralized management.

The company is organized into a large number of discrete profit centers, each led by an operating executive with a high degree of authority and accountability for the performance of that business.

Operating executives are selected and developed based on their ability to succeed in this entrepreneurial environment. Success at Sara Lee corporation is measured by performance, and the company makes use of numerous reward systems to motivate management to achieve an outstanding level of performance. This management philosophy is a defining and enduring attribute

of Sara Lee corporation

Lines of business

Sara Lee is a global consumer packaged goods company with more than $20 billion in annual revenue and divided into three highly focused global businesses: food and beverage, initiates and underwear, and household products.

Progress

Sara Lee Corporation has a 20 years' history of delivering record sales and profits. One reason is that we set aggressive goals for ourselves and empower management to achieve them.

Financial goals

We believe that the key drivers of increased shareholder value are Sara lee's ability to grow profits, general high returns on capital employed in our business and maintain a strong financial position. These value drivers-earnings growth, profitability and financial strength are the basis for the goals that guide our financial management.

- Earning growth: real growth in earnings per share of 8% to 10% per year.
- Profitability: return on invested capital above 20%
- Financial strength: cash flow to total debt greater than 40%

Exhibit 6-6 cost management focus in prior and contemporary business environment

	Prior business environment	**Contemporary business environment**
Cost management focus	Financial reporting and cost analysis; common emphasis on standardization and standard cost, the accountant as functional expert and financial storekeeper	Cost management as a tool for the development and implementation of business strategy, the accountant as business partner.

Firms have responded to the changes in business in many ways, including reengineering operational processes, downsizing the workforce, outsourcing service functions and developing smaller, more efficient and more socially responsible organizational policies and structures.

They have attempted to become more adaptable as the pace of change increases. Firms also are beginning to use cost management to support their strategic goals. Cost management has shifted away from a focus on the stewardship role: product costing and financial reporting. The new focus is on a management facilitating role: developing cost and other information to support the management of the firm and the achievement of its strategic goals. Before the changes in business processes, a focus on detailed method for product costing and control at the departmental level was appropriate for the high volume, standardized, infrequently changing manufacturing processes of that time. Now a firm's cost accounting system must be more dynamic to deal with the more rapidly changing environment and the increasing diversity of products and manufacturing processes. The cost management system must be able to assist management in this dynamic environment by facilitating strategic management. The contemporary business environment

focuses on critical success factors, including both financial and non-financial factors. (exhibit 6-6)

Strategic measures of success

The strategic cost management system develops strategic information, including both financial and nonfinancial information. In the past, firms tended to focus primarily on financial performance measures, such as growth in sales and earnings, cash flow, and stock price. In contrast, firms in the contemporary business environment use strategic management to focus primarily on strategic measures of success, many of which are nonfinancial measure of operations, such as market share, product quality customer satisfaction and growth opportunities (see exhibit 6-7). The financial measures show the impact of the firm's policies and procedures on the firm's current financial position and therefore, its current return to the shareholders. In contrast, the nonfinancial factors show the firm's current and potential competitive position as measured from at least three additional perspectives: (1) the customer (2) internal business processes, and (3) innovation and learning (i.e. human resources). Additional perspective includes community and social impact, governmental relations, and ethical or professional management behaviour. Strategic financial and nonfinancial measures of success are also commonly called critical success factors (CSFs).

Without strategic information, the firm is likely to stray from its competitive course, to make strategically wrong manufacturing and marketing decisions: to choose the wrong products or the wrong customers. Some of the consequences of a lack of strategic information are shown exhibit 6-8.

Exhibit 6-7 Financial and Nonfinancial measures of success critical success factors

Financial measures of success	Nonfinancial measures of success
Sales growth Earnings growth Dividend growth Bond and credit ratings Cash flow Increase in stock price	**Customer measures** Market share and growth in market share Customer service On-time delivery Customer satisfaction Brand recognition Positions in favourable markets **Internal business processes** High product quality
	Manufacturing innovation High manufacturing productivity Cycle time Yield and reduction in waste **Learning and innovation (human resources** Competence and integrity of managers Morale and firm wide culture Education and training Innovation in new products and manufacturing methods

Exhibit 6-8 consequences of lack of strategic information

Decision making based on guesses and intuition only

Lack of clarity about direction and goals

Lack of a clear and favourable perception of the firm by customers and suppliers

Incorrect investment decisions, choosing products, markets, or manufacturing processes inconsistent with strategic goals

Inability to effectively benchmark competitors, resulting in lack of knowledge about more effective competitive strategies

6.26 Monitoring of the External Environment

In most industries, firms compete actively with one another to achieve strategic competitiveness and earn above average returns. The intensity of competitive rivalry among firms is a function of several factors.

These factors include:

i. **Seller Concentration:** Seller concentration refers to the number of competitors in an industry and their relative sizes. Industries populated by many participants tend to be characterized by intense rivalry. In addition, when rivals are more equal in size and capability, they can usually compete on a fairly even footing making it harder for one or two firms to "win" the competitive battle and dominate the market.

ii. **Diversify of Competitors:** The propensity of firms to engage in aggressive price competition also depends on their characteristics. The more similar firms are in their goals, strategies and cost structures, the more likely their interest are to converge, and the probability of peaceful co-existence increases. However, with greater firm diversity in their strategies, personalities, resources, corporate priorities, it is difficult to identify an industry's competitive rules.

iii. **Product Differentiation:** In a market where buyers view products as commodities, that is, in a commodity business, products are undifferentiated and customs' purchasing decisions are based primarily on price and service. In such circumstances price is the only competitive weapon, and price competition seriously damages margin. However, where products are highly differentiated as in the case of books, perfumes and medical services,
price is only one variable influencing customer choice. In these instances, competition is likely to occur primarily based on quality, product designs, advertising and promotion. Such competition may be intense but it may permit profit margins to remain at healthy levels.

iv. **High Exist Barriers:** Sometimes companies continue to compete in an industry even though the returns on their invested capital are low or even negative. Such choice by firms has been enforced by exit barriers. Exist barriers can be economic, strategic, and emotional factors. Common sources of exit barriers are:

- Specialized assets (assets with values linked to a particular business or location;)
- Fixed costs of exist (e.g. labor agreements)
- Strategic interrelationship e.g. shared facilities and access to financial markets
- Emotional barriers (e.g. fear for a firm's career, loyalty of employers or customers.)
- Government and social restrictions (e.g. concern for job losses and regional economic effects).

The rational here is that it is better to remain in a business when it costs more to get out of a business than to stay in and compete.

v. **Switching Costs:** Rivalry is stronger when customers' costs to switch brands are low. The lower the costs of switching, the easier it is for rival sellers to raid one another's customers. Such raid can be done through pricing and service offerings. On the other hand, high switching costs partially insulate firms from rivals' efforts to attract their customers.

vi. **Slow Industry Growth:** Rivalry is equally stronger when demand for the product is growing slowly because firms are challenge to use resources effectively to serve an expanding customer base and mostly to protect their market shares. In a rapidly expanding markets, there tends to be enough business for everybody to grow but when growth slows or when market demand drops unexpectedly, expansion-minded firms and/or firms with excess capacity often ignite a battle from market share through price-cutting or other sales-increasing tactics. This battle for market share protection often results in market instability, reduction in profitability and shake-out of the weak and less efficient firms.

vii. **High Fixed or Storage Costs:** When fixed costs account for a large fraction of total costs, firms are challenged to operate near or at full capacity so that the costs can be spread across a larger volume of output. This, however, can lead to excess supply. To reduce inventories, firms typically offer price concessions, special discounts, rebates and other sales-increasing tactics thus heightening competition. This phenomenon is observed in industries with high storage costs or producing perishable or seasonal products. A firm or firms is/are pressured to dump excess supplies on the market or use pricing strategies to sell quickly whenever inventories grow beyond an acceptable level.

Industry Life Cycle Analysis

Changes that take place in an industry inevitably determine the strength of the competitive forces in the industry. An important tool for analyzing the effects of industry evolution on competitive forces is the industry life cycle model. The industry life cycle identifies five sequential stages in the evolution of an industry. The stages are embryonic, growth, shakeout, mature and decline. The task of strategy managers is to anticipate how the strength of competitive forces will change as the industry environment evolves and to choose strategies that take advantage of opportunities as they appear and develop strategies that counter emerging threats.

Competitors and Markets

A detailed understanding of competition may be difficult through industry analysis because of its too high level. The five forces can have different impact on different kinds of players. Therefore, it is better to disaggregate because many industries contain a range of companies, each of which has different capabilities and competes on different bases. These competitor differences are better understood through the concept of strategic groups. In the same way that competitors differ, customers too can differ significantly. The differences in customers can be understood by distinguishing between strategic customers and ultimate consumers and between different market segments. The understanding of strategic groups and market segments assist in identification of what customers' value and critical success factors. These various concepts are discussed below:

Strategic Groups

Strategic groups are organization within an industry with similar strategic characteristic, following similar strategies and therefore compete more directly with one another than with other organizations in the industry. These organizations are not formally identified groups or part of an industry association. They are usually identified on the basis of a set of strategic dimensions, such

as, technological leadership, the degree of product quality, pricing policies, the choice of distribution channels, and the degree and type of customer service. Such strategic dimensions define an organization's business strategy in the industry. Once competitor in an industry can be grouped according to similarities of strategy and bases of competition, then they constitute a distinct strategic group. The characteristics of one strategic group are different from those in other strategic groups in the same industry. There are many different characteristics that distinguish between strategic groups in the same industry. But these can be grouped into two basic categories; the scope of an organization's activities (such as product range, geographical coverage and range of distribution channels used), and the resources commitment (such as brands, marketing spend and extent of vertical integration).

Strategy managers need to understand those characteristics that are especially relevant in their industry as they relate to the history and development of that industry and the forces at work in the environment. The strategic group analysis is useful in three ways:

- Understanding competition: Strategic group analysis assist manager to focus on their direct competitors within their particular strategic groups, rather than the whole industry. They can therefore develop the dimensions that distinguish them most from other competitors or groups. Such dimensions can then become the focus of their action.
- Analysis of strategic opportunities: The use of strategic group maps can facilitate the identification of relatively under-occupied or unexploited (white spaces) and they can be market opportunities that are impossible to exploit (black holes) which can likely damage any entrant. Therefore, strategic spaces need to be tested carefully.
- Analysis of mobility barriers: The movement of an organization from one strategic group to another requires difficult decisions and rare resource. These barriers are similar to those in five forces analysis. Most successful strategic groups have erected strong mobility barriers to impede imitation.

Market Segments

Strategic group analysis assists with understanding the similarities and differences in the characteristics of producers (that is organizations that are actual or potential competitors) while market segment analysis is concerned with customers. A market segment is a group of customers who have similar needs that are different from customer needs in other part of the market. The understanding of what customers' value is and how an organization or its competitors are aligned to meet these needs is vital to understanding strategic capability.

6.27 Performance Appraisal

It will be necessary to firstly identify the basic objectives that an ideal performance technique should achieve prior to the examination of the various financial and non-financial performance appraisal techniques.

As with any form of information systems, the performance appraisal system should assist management to plan and control activities and to make decisions which include the objectives of the organization as a whole to be met. Therefore, a performance evaluation method ideally should:

a. promote goal congruence
b. encourage long run views rather than short-term expedients
c. provide relevant and regular feedback to central government
d. encourage initiative and motivation.

6.28 Financial Measurement of Divisional Performance

There are many financial indices of measuring divisional performance but the entire method can be grouped into three as follows:

a. absolute profit
b. returns on capital employed
c. residual income

- **Absolute Profit**

This may be described as the profit that arises from divisional operation. The profit achieved would be compared against a budget or target and variances in volume, price and rate of expenditure would be brought under review.

It is likely since a division is not a completely independent business that some costs will be charged to the division in respect of goods or services provided by other segments of the enterprise. Some of these will be requisitioned as required by the divisional manager and will be charged at "arm's length" prices. Others, however, will be apportionment's cost over which the divisional manager may have no control in the short-term. For the purpose of judging the manager's personal achievement, it is necessary to examine the specific type of profit to use because numerous types of profit exist below.

a. **Controllable profit:** This is defined as the difference between divisional revenue and costs controllable at the divisional level. The underlying logic for this approach is that ideal measurement should only include those costs and revenue which divisional management has absolute control over rather than apportioned cost from the central management. The specific cost and revenue to include or reject will depend on the degree of tactical responsibility that has been delegated. But in practice items to be included are:

i. variable revenue and costs which are dependent on divisional management decision e.g. sales income, labour costs, material costs, operating expenses etc.

ii. divisional fixed and variable overheads, so far these costs are specifically incurred by the divisions.

While the following terms will be excluded from identifying the controllable profit.

i. depreciation, are fixed assets cost incurred by the management.

ii. apportioned cost from central management through central administration or cost or facilities used jointly by division.

The main problem in using controllable profit is that it will encourage divisional managers to adopt a short-run view of objective which the group may find inconsistent with the level of investment.

Divisional managers may treat fixed assets as "free" goods and concentrate on maximizing the short run returns at the expense of the longer-term efficiency of the assets. This, could have implication for expenditure on repairs and maintenance; the largest technical problem would be the isolation of controllable overheads.

b. **Net profit**: This will represent the difference between revenue and controllable divisional costs together with apportioned central administration costs. This method allows divisional management to be aware of all the costs of the division and its net effects on group position. Although this approach is frequently applied in practice, it is not recommended for divisional appraisal due to the arbitrary method of apportioning cost outside the control of divisional managers.
c. **Divisional profit**: This is the profit that arises from division operations which can be calculated without arbitrarily apportioning central management costs. It is also referred to as traceable or direct profit. It represents the equivalent of controllable profit less depreciation on divisional assets and other non-controllable divisional overheads. The problem with this profit it that a number of costs which re identifiable with the division are not controllable by the division.

- **Residual income or profit**

This is sales revenue less controllable divisional costs and interest imputed on the divisional investment. Divisional residual income is divisional profit less an imputed interest charge on the net costs employed by the divisions. The rate of "interest" will normally be the required pre-tax rate of returns of the enterprise as a whole. so that any residual income will indicate earnings in excess of the normal returns. The imputed interest charge on the firm's cost of capital, cost of borrowing or its weighted average cost of capital. Using residual profit as a performance measure assumes that the level of divisional investment is a responsibility of divisional management. This should be contrasted with the view taken when absolute profit is used as a performance measure that the investment level is a central strategies responsibility.

Advantages of RI

1. Residual profit concept takes a long run review of divisional performance.
2. Residual income will behave consistently with maximization objective of the organization therefore it promotes goal congruence.
3. Residual income performance measures are reconcilable to planning decision using techniques such as NPV and IRR.
4. Maximization of residual profit could have a strong motivating influence and would ensure that growth opportunities is not jeopardized provided they earn a rate of returns above the cost of capital.

Disadvantages

1. Top management may not be favorably disposed to the issue of complete autonomy granted divisional management through residual income approach.
2. The practical difficulties of eliminating the effect past decisions on current operation resulting in the current residual income.
3. The problems of estimating the firm's cost of capital especially where there is more than one source of finance to the firm.
4. Residual income approach is not so popular with managers and professional accountant in practice.
5. Being an absolute measure of performance (it is expressed in Naira) it is affected by the size of the divisions and therefore will not provide a basis for inter-divisional comparison. This probably is the main reason why central management continued to prefer ROI, which is a measure and facilities inter-divisional comparison.

6. Not all projects will start off with positive or sufficiently large positive profits in the early years of a project to produce a positive increment to residual income. In this case long-term objective will be sacrificed by pursuing short-term objectives.

Illustration 1

PEDABO incorporated has just formed a new division and the following four investment opportunities are available to the division. The firm requires a minimum return of 20 percent.

Investment opportunity	Income	Investment
	N	N
1	171,000	950,000
2	168,000	700,000
3	151,200	540,000
4	149,600	680,000

Required:

a. Calculate the ROI for each project
   Project 1 ROI

   Project 2 ROI

   Project 3 ROI

   Project 4 ROI

b. (i) If you were the division manager and you were evaluated based on ROI, which investment opportunities would you accept?
   (ii) ROI for the division would be…

c. (i) If you were evaluated based on RI, which investments would you accept?
   (ii) Residual income for the division would be…

d. (i) If you were president of PEDABO incorporated, which project would you want the division to accept?
   (ii) Which performance measure would you use to encourage this action?

<u>Solution</u>

			ROI
(a)	Project 1 =	N171,000/N950,000 x 100 =	18%
	Project 2 =	N 168,000/N700,000 x 100 =	24%
	Project 3=	151,200/N540, 000 x 100 =	28%
	Project 4 =	149, 600/N680, 000 x 100 =	22%

(b) (i) project 3

(ii) ROI for the division would be 28%

(c) (i) residual income

Investment opportunity	Income N	Workings	Imputed cost N	Residual income N	Decision
1	171,000	(20% x 950,000)	190,000	(19,000)	Reject
	168,000	(20% x 700,000)	140,000	28,000	Accept
	151,200	(20% x540, 000)	108,000	43,000	Accept
	149,600	(20% x680, 000)	136,000	13,600	Accept

(ii) residual income for the three divisions would be N 28,000 + N 43, 200 + N13,600 = N 84,800

d. (i) project 2,3 and 4
(ii) residual income

Illustration 2

A company has three branches at Ibadan, Benin and Kaduna, each operating as an independent unit. The following data are in respect of them.

	Ibadan	Benin	Kaduna
Total assets (N)	1,420,000	1,210,000	1,840,000
Return on investment expected	25%	18%	20%
Last year's profit (N)	520,000	309,000	384,000

The company has a project which any of the branches can undertake and on which a returns of 23% is expected to be earned on the funds invested.

You are required

(a) Calculate actual return on investment for last year for each branch.
(b) Calculate the residual income for last year for each branch.
(c) State with reasons, which of the branches will be willing to undertake the new project if:
(i) performance of branches is evaluated on the basis of actual return on investment and
(ii) Performance of branches is evaluated on the basis of residual income.

Solution

ROCE:	Ibadan N	Benin N	Kaduna N
Return on capital employed	520,000 x 100 1,420,000 36.6%	309,000 x 100 1,210,000 25.5%	384,000 x 100 1,840,000 20.9%

(b) residual income	N	N	N
Profit	520,000	309,000	384,000
Less: imputed cost (wl)	355,000	217,800	368,000
	165,000	91,200	16,000

(wl) imputed cost:

Ibadan 25% x N 1,420,000 = N 355,000

Benin 18% x N 1,210,000 = N 217,800

Kaduna 20% x N 1, 840,000 = N 368,000

(c) (i) Only Kaduna Branch will be eager to accept the new project if performance evaluation is based on actual return on investment. The rationale behind this decision is premised on the following reasons.

(a) Kaduna branch is having the least return on investment as at the moment 20.9%. if the project is accepted by the branch the overall return on the investment of the branch will improve to 21.95% i.e. the average of 20.9% and 23%.

(b) Ibadan and Benin will not be eager to accept the new project because of their present ROCE of 36.6% and 25.5% respectively are both higher than 23%.

(ii) Ibadan Branch is presently having the highest imputed cost of capital which is 25% and if the new project is accepted, the imputed cost of capital of the branch will reduce to 24% i.e. the average of 25% and 23% respectively.

(a) Benin and Kaduna will not be eager to accept the new project because their existing imputed cost of capital are both lower than 23% and if this new project is accepted their overall imputed cost of capital will increase.
(b) It is instructive to note however, that the higher the imputed cost of capital the lower the residual income and vice-versa.

Illustration 3

DAID company limited is a large integrated conglomerate with shipping, metals and mining operations throughout the country. The general manager of the metals division has been directed by the board to submit his proposed capital budget for 20XX for inclusion in the company wide

budget. The division manager is considering the following projects, all of which require an outlay of capital and have equal risk.

Project	Investment required N 000	Return N 000
1	12,000	2,760
2	4,800	1,536
3	3,500	490
4	2,400	432
5	1,600	320
6	700	196

The division manager must decide which of the projects to take. The company has a cost of capital of 15%. An amount of N 30 million is available to the division for investment purposes.

Required:

(i) compute the total investment, total returns, return on capital invested and residual income on each of the following assumptions, stating selected projects.

(a) The company has a rule that all projects promising at least 20% or more should be accepted

(b) The division manager is evaluated on his ability to maximize his returns on capital invested.

(c) The division manager is evaluated to maximize residual income as computed by using the 15% cost of capital.

(ii) which of the three approaches will result in the most effective investment policy for the company as a whole?

<u>Solution</u>

DAID LIMITED

a. <u>assume 20% or more determine the ROI for all the projects</u>

project	inv.	Return	ROI%
	N 000	N 000	workings
1	12,000	2,760	23
2	4,800	1,536	32
3	3,500	490	14
4	2,400	432	18
5	1,600	320	20
6	700	196	28

N.B: select projects 1,2,5 & 6.

(i) Total investment N 000 (ii) total returns N 000

Project		project	
1	12, 000	1	2,700
2	4, 800	2	1,536
5	1,600	5	320
6	700	6	196
	19,100		4,812

(iii) ROI = $\frac{\text{return x 100}}{\text{Investment}} = \frac{4{,}812}{19{,}100} \times 100$

= 25%

(iv) residual income: N'000

Total return 4,812

Less imputed cost (15% x 19,100) 2,865

1,947

(b) If the objective is to maximize return on investment then only project 2 should be selected based on the following reasons:

i. Project 2 is having the highest ROI which currently stands at 32%.

ii. ROI is a relative value method unlike the other method that represents absolute value method.

iii. any attempt to dilute the existing return of 32% from project 2 will result in the overall minimisation of the total return for the organization, e.g. the acceptance of project (2) and project (6) will generate and average ROI of 30%, a value lower than 32% being promised by project (2) alone. It is therefore appropriate to choose project 2 alone as follows:

i. Total investment = N 4.8m

ii. Total return = N 1.536m

iii. ROI = 32%

iv. Residual income: N'000

Total return 1,536

Less imputed cost (15% x N 4.8m) 720

816

(c) If the divisional performance is evaluated on residual income, then only projects whose ROI are higher than the cost of capital will be selected because such project would have a positive residual income. Based on this submission, projects 1,2,4,5& 6 will be selected as follows:

(I & II) Total investment & returns

Project	investment	returns	(IV)	Residual income
				N 000
	N 000	N000	total return	5,244
1	12,000	2,760	less imputed cost	
2	4,800	1,536	(0.15x21,21500)	3,225
3	2,400	432		2,019
4	1,600	320		
5	700	196		
	21,500	5,244		

(III) ROI = $\frac{\text{returns}}{\text{Investment}} \times \frac{100}{1} = \frac{5,244}{21,500} \times \frac{100}{}$

= 24.39

Based on all the analysis above, option "c" will result in the most effective investment policy for the company as a whole. This because the option is having the highest residual income of N 2,019,000 as against N 1, 947,000 and N 816, 000 for options (a) and (b) respectively.

6.29 Non-financial Performance Measures

Most writing on the subject of non-financial performance measures or non-financial indicators contains long lists of such measures depending on areas of interest of the writer. Few of such measures are produced below:

Quality	Time	Quantity	People
Defects	Second	Range of product	Employees
Equipment failures	Minute	Parts/components	Employee skills
Warranty claims	Hour	Units produced	Customers
Returns	Cycle	Services performed	Supplier
Stock outs	Day	Kg/litres/metres	
Lateness/waiting time	Month	M2m3	
Misinformation	Year	Documents	
Miscalculation		Deliveries	
Absenteeism		Inquiries	

The beauty of non-financial indicator is that anything can be compared if it is meaningful to do so. However, there is a danger that too many such measures could be reported overloading managers with information that is not truly useful or that sends conflicting signals. There is clearly a need for the information provider to work more closely with the managers who will be using the information to make sure that their needs are properly understood. Arguably, non financial measures are less likely to be manipulated than traditional profit-related measures and they should therefore, offer a

means of contracting short-term objectives, since short term profit at any (non-monetary) expense is rarely an advisable goal. A combination of financial indicators is likely to be most successful.

But a good combination of performance indicator needs to be applied flexibly so that manager's fell they will be rewarded for looking beyond the specific areas targeted. A rigid or punitive application is likely to lead to poor morale.

6.30 The Balanced Scorecard

The balanced scorecard is a performance measurement which consists of a variety of indicators both financial and non-financial.

The balanced scorecard approach is an approach to the provision of information to management to assist strategic policy formulation and achievement; It emphasis the need to provide the user with a set of information which addresses all relevant areas of performance in an objective and unbiased fashion. The information provided may include both financial and non-financial elements, and cover areas such as profitability, customer satisfaction, internal efficiently and innovation (CIMA official terminology)

The balanced scorecard focused on four different perspectives, as follows:

Perspective	Question	Explanation
Customer	What do existing and new customers value from us?	Gives rise to targets that matter to customers: cost, quality, delivery, inspection, handling and so on.
Internal	What processes must we excel at to achieve our financial and customer objectives	Considers the business's capacity to maintain its competitive position through the acquisition of new skills and the development of new products.
Financial	How do we create value for our shareholders?	Covers traditional measures such as growth, profitability and shareholder value but set through talking to the shareholder or shareholders direct.

Performance targets are set once the key success factors have been identified and the balanced scorecard is the main monthly report.

The scorecard is 'balanced' in the sense that managers are required to think in terms of all for perspectives, to prevent improvements being made in one area at the expense of another.

The important features of this approach are as follows:

- It looks at both internal and external matters concerning the organisation.

- It is related to the key elements of a company's strategy.
- Financial and non-financial measures are linked together.

The balanced scorecard approach may be particularly useful for performance measurement in organizations which are unable to use simple profit as a performance measure. For example, the public sector has long been forced to use a wide range of performance indicators, which can be formalized with a balanced scorecard approach.

Problems

As with all techniques, problems can arise when it is applied.

Problems	Explanation
Conflicting measures	Some measures in the scorecard such as research funding and cost reduction may naturally conflict. It is often difficult to determine the balance which will achieve the best results.
Selecting measures	Not only do appropriate measures have to be devised but the number of measures use must be agreed. Care must be taken that the impact of the results is not lost in a sea of information.
Expertise	Measure is only useful if it initiates appropriate action Non-financial managers may have difficulty with the usual profit measures. With more measures to consider this problem will be completed.
Interpretation	Even a financially-trained manager may have difficulty in putting the figures into and overall perspective.

6.31 Performance Measurement Models: The Balanced Scorecard

So far in this session, our focus on financial metrics of various sorts is arguably inappropriate for strategic decision making. We will now consider a very influential model, the balanced scorecard, which may be used by organization to develop, implement and control strategy through a balanced use of financial and non-financial indicators. Rather than focus on an individual strategy investment, the balanced scorecard is concerned with the maintenance of an outward and forward-looking stance on a continuous and routine basis through a systematic process of monitoring and reporting on a variety of different performance dimensions.

A balanced scorecard (BSC) consists of an integrated set of performance measures that are derived from the company's strategy and that support the company's strategy throughout the organization. A strategy is essentially a theory about how to achieve the organization's goals. For example, low-cost European carriers such as EasyJet, Ryanair and Go have copied Southwestern Airlines' strategy of offering passengers low prices on short-haul jet service. The low prices result from the absence of costly frills such as meals, assigned seating and interline baggage checking.

Under the balanced scorecard approach, top management translates its strategy into performance measures that employees can understand and can do something about. For example, the amount

of time passengers has to wait in line to have their baggage checked might be a performance measure for a supervisor in charge of the check-in counter at an airport. This performance measure is easily understood by the supervisor, and can be improved by the supervisor's actions.

6.32 Divisional Performance Measures and The Balanced Scorecard

We have considered various financial measures of divisional performance such as ROI and RI. The great advantage of the balanced scorecard is that it can provide managers with guidance on how to improve these metrics. Generally speaking, ROI can be increased by increasing sales, decreasing costs, and/or decreasing investments in operating assets. However, it may not be obvious to managers how they are supposed to increase sales, decrease costs and decrease investments in a way that is consistent with the company's strategy. For example, a manager who is given inadequate guidance may cut back on investments that are critical to implementing the company's strategy.

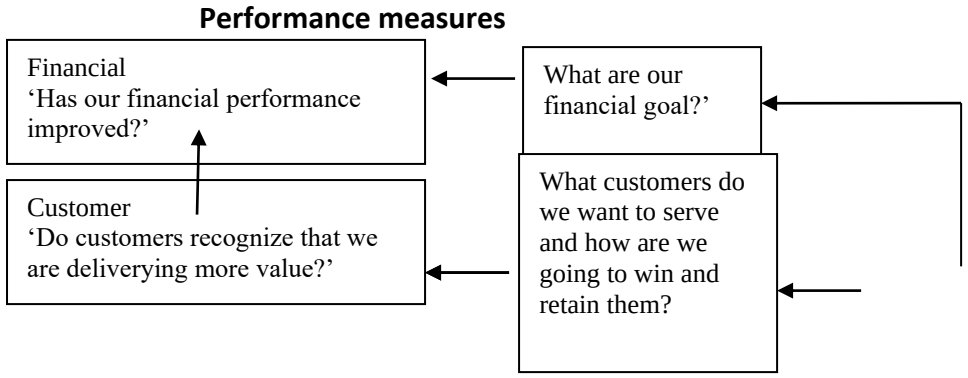
For that reason, when managers are evaluated based on ROI, a balanced scorecard approach is advised, and indeed, ROI, or residual income, it typically included as one of the financial performance measures on a company's balanced scorecard. The balanced scorecard provides a way of communicating a company's strategy to managers throughout the organization. The scorecard indicates how the company intends to improve its financial performance. A well-constructed balanced scorecard should answer questions such as; 'what internal business processes should be improved?' and 'which customer should be targeted and how will they be attracted and retained at a profit?' In short, a well-constructed balanced scorecard can provide managers with a road map that indicates how the company intends to increase its ROI. In the absent composed to do to increase ROI and they may work at cross-purposes rather than in harmony with the overall strategy of the company. Other critics of EVA are also concerned that a single top-down metric will not be enough to guide the generation of corporate wealth.

6.33 Common Characteristics of Balanced Scorecards

Performance measures used in the balanced scorecard approach tend to fall into the four groups: financial, customer, internal business processes, and learning and growth. Internal business processes are what the company does in an attempt to satisfy customers. For example, in a manufacturing company, assembling a product is an internal business process. The basic idea is that learning is necessary to improve internal business processes; improving business processes is necessary to improve customer satisfaction; and improving customer satisfaction is necessary to improve financial results. Note that the emphasis is on improvement-not on just attaining some specific objectives such as profit. In the balanced scorecard approach, continual improvement is encouraged. In many industries, this is a matter of survival. If an organization does not continually improve, it will eventually lose out to competitors that do.

Ultimately, most companies exist to provide financial rewards to owners. There are exceptions. Some companies-for example, The Body Shop-may

Exhibit 6.7



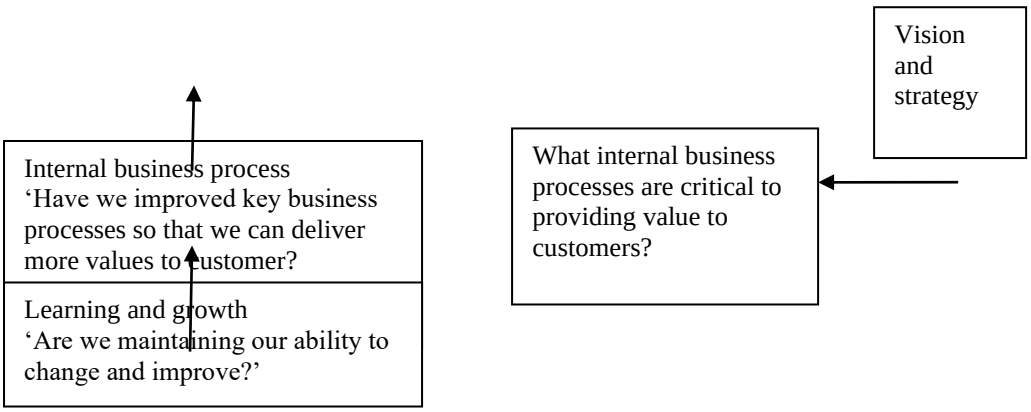


Exhibit 6.7 From strategy to performance measures: the balanced scorecard have loftier goals, such as providing environmentally friendly products to consumers. However, even non-profit organizations must generate enough financial resources to stay in operation. Ordinarily, top managers are responsible for the financial performance measures- not lower level managers. The supervisors in charge of checking in passengers can be held responsible for how long passengers have to queue. However, this supervisor cannot reasonably be held responsible for the entire company's profit. That is the responsibility of the airline's top managers.

However, some companies, if any, would use all of these performance measures, and almost all companies would add other performance measures. Managers should carefully select the performance measures for their company's balanced scorecard, keeping the following points in mind. First and foremost, the performance measures should be consistent with, and follow from, the company's strategy. If the performance measures are not consistent with the company's strategy, people will find themselves working at cross-purposes. Second, the scorecard should not have too many performance measures. This can lead to a lack of focus and confusion.

While the entire organization will have an overall balanced scorecard, each responsible individual will have his or her own personal scorecard as well. This scorecard should consist of items the individual can personally influence that relate directly to the performance measures on the overall balanced scorecard. The performance measures on this personal scorecard should not be overly influenced by actions taken by others in the company or by events that are outside of the individual's control.
With those broad principles in mind, we now take a look at how a company's strategy affects its balanced scorecard.

6.34 A Company's Strategy and the Balanced Scorecard

Returning to the performance measures in Exhibit 6.7, each company must decide which customers to target and what internal business processes are crucial to attracting and retaining those customers. Different companies, having different strategies, will target different customers with different kinds of products and services. Take the car industry as an example BMW stresses engineering and handling; Volvo, safety; Jaguar, luxury detailing; and Toyota, reliability. Because of these differences in emphases, a one-size-fits-all approach to performance measurement will not work even within this one industry. Performance measures must be tailored to the specific strategy of each company.

Suppose, for example, that Jaguar's strategy is to offer distinctive, richly finished luxury

automobiles to wealthy individuals who prize handcrafted, individualized products. Part of Jaguar's strategy might be to create such a large number of options for details, such as leather seats, interior and exterior colour combinations, and wooden dashboards, that each car becomes virtually one of a kind. For example, instead of just offering tan or blue leather seats in standard cowhide, the company may offer customers the choice of an almost infinite palate of colours in any of a number of different exotic leathers. For such a system to work efficiently, Jaguar would have to be able to deliver a completely customized car within a reasonable amount of time-and without incurring more cost for this customization than the customer is willing to pay. Exhibit 6.7 suggests how Jaguar might reflect this strategy in its balanced scorecard.

If the balanced scorecard is correctly constructed, the performance measures should be linked together on a cause-and-effect basis. Each link can then be read as a hypothesis in the form 'if we improve this performance measure, then this other performance measure should also improve. Starting from the bottom of Exhibit 6.7, we can read the links between performance measures as follows. If employees acquire the skills to install new options more efficiently, then the company can offer more options and the options can be installed in less time. If more options are available and they are installed in less time, then customer surveys should show greater satisfaction with the range of options available. If customer satisfaction improves, the company should be able to maintain or increase its selling prices, and if the time to install option decreases, the costs of installing the options should decrease. Together, this should result in an increase in the contribution margin per car. If the contribution margin per car increases and more cars are sold, the result should be an increase in profits.

In essence, the balanced scorecard articulated a theory of how the company can attain its desired outcomes (financial, in this case) by taking concrete actions. While the strategy laid out in Exhibit 6.7 seems plausible actions, it should be regarded as only a theory that should be discarded if it proves to be invalid. For example, if the company succeeds in increasing the number of options available and in decreasing the time required to install options and yet there is no increase in customer satisfaction, the number of cars sold, the contribution margin per car, or profits, the strategy would have to be reconsidered. One of the advantages of the balanced scorecard is that it continually tests the theories underlying management's strategy. If a strategy is not working, it should become evident when some of the predicted effects (i.e. more car sales) do not occur. Without this feedback, management may drift on indefinitely with an ineffective strategy based on faulty assumptions.

6.35 Advantages of Timely Feedback

Whatever performance measures are used, they should be reported on a frequent and timely basis. For example, data about defects should be reported to the responsible managers at least once a day so that action can quickly be taken if an unusual number of defects occur. In the most advanced companies, any defect is reported immediately, and its cause is tracked down before any more defects can occur. Another common characteristic of the performance measure under the balanced scorecard approach is that managers focus on meeting any specific standard.

6.36 Risk and the Balance Scorecard

One of the authors was recently involved in a research project looking at the implementation of the balanced scorecard in a major European bank. The bank had 'customized' the scorecard by including 'Risk' as a major objective. Relative to some of its competitors, this bank did seem to better prepare to the credit crunch with a much less risky approach to lending. Another interesting

feature of the bank was the way that each employee had a personal scorecard which was aligned to the local business unit through to corporate objectives. The scorecard implementation had a board level corporate champion and was 'owned' by both human resource and finance functions

FOCUS ON PRACTICE
A Health Service Scorecard

Many business and services used a balanced scorecard type system to report on key operating statistics and performance indicators. The Health Service Executive (HSE) is the state agency responsible for the running of the public health service in Ireland. It has over 100,000 employees and an annual budget of approximately £15 billion. The HSE uses a reporting system called HealthStat to monitor its performance in delivering health and care services.

HealthStat is described by the HSE as 'a comprehensive databank of performance information for Irish public health service. To provide a comprehensive view of how services are delivered, HealthStat group's performance indicators under three headings: (1) Access-measuring waiting time for services; (2) integration-checks that patients receive the correct services, in the right location and are informed about their treatment; and (3) Resources-whether a hospital or care facility is making best use of its financial and human resources. In total, 18 performance metrics across these three headings are reported on a monthly basis. Each metric is compared to a national target-these targets have been set against best international practice and are regularly reviewed. Each month, a traffic-light type dash-board (green=better than target, amber=below target, but improving, red=well below target) is compiled and reported to clinical managers, hospitals and the HSE's board. The data is also released to the public via the HSE's website. According to the HSE, HealthStat, being the first unified reporting systems used by the HSE, provides all staff and managers with a platform to monitor and improve service delivery.

Exercise: Looking at the example given, do you think these performance metrics take into account factors like quality of care received, willingness of medical professional to communicate to patients, and so on? Should such things be included in performance measurements?
Source http//www.nse.le/eng/staff/HealthStat/about/

6.37 Some Criticisms of the Balanced Scorecard

Although the balanced scorecard has many merits, there have been some criticisms, particularly from academics. Some researchers have questioned whether the alleged cause-and-effect relationship between non-financial and financial indicators can be supported. In particular, customer satisfaction does not necessarily yield good financial result. Furthermore, the score card does not have an explicit way of monitoring competitor actions and does not propose a specific remuneration system (as with EVA, for example).

The widespread adoption of the balanced scorecard may, in the part, be explained by the effective rhetoric deployed by its advocates. Whatever its limitations, the balanced scorecard can fit in with a more sophisticated view of management that sees strategy as an emergent process and which takes a less 'top-down' 'keep-on-track' approach to organizational control. The balanced scorecard can facilitate this learning process as can other techniques such as **benchmarking** through a consciously interactive relationship between performance indicators and management action.

6.38 Incentive Schemes

General features of incentive schemes

Under this scheme, payments are related to output in some way or another. There are lots of variations. Some schemes apply to individuals while other apply to groups of workers. Some have a direct and immediate relationship to output whilst others are indirect. In an organized and well planned system, both the firm and the employees can benefit. The employee from the extra income arising from increased production, and the firm from the reduced overheads per unit of the increased production. Regrettably, not all schemes achieve this objective. The following factors should be considered.

a. Workers efforts should be taken into consideration and payment should be made without delay.
b. Employees should be able to calculate their own bonus; hence, simple scheme should be introduced.
c. Performance levels should be demonstrably fair, that is, they should be in reach of the average worker, working reasonably hard.
d. There should be no artificial limit on earnings and earnings should be safeguard when problems arise outside the employee's control.
e. The scheme should not be introduced until there has been full consultation and agreement with employees and unions.
f. Performance levels, rate, etc must be considered, so that it will be on for a reasonable length of life. Rapid changes especially artificial one curtail earnings and therefore, destroy trust and cause problems.
g. Employees should be consulted and agreement reached before the implementation.

Advantages and disadvantages of incentive schemes

Advantages

a. It increases production, thereby increasing wages but also reducing overheads per unit, particularly where there are substantial fixed overheads.
b. It enables a firm to remain competitive in inflationary periods.
c. It improves morale by ensuring that extra effort is rewarded.
d. It attracts efficient workers towards the opportunity of earning higher wages.

Disadvantages

a. There are problems in establishing performance levels and rates with frequent and continuing disputes.
b. Some incentive schemes are expensive to administer and complex.

c. Some group of workers, although relatively unskilled, may earn high wages through incentive schemes whilst other engaged on skilled work may become resentful when differentials are eroded.

Types of incentive scheme

a. Individual incentive schemes

Incentive schemes which relate to an individual worker seem to be the more usual and successful, probably because of the immediate and direct relationship between effort and reward.

b. Straight piecework

The worker would be paid an agreed rate per unit for the number of units produced. On occasions, the number of operations would be the basis of payment, or where various types of articles are produced, a piecework time allowance per article would be set and the worker paid for the piecework hours produced.

Illustrations 3-6

Week No. 52

Employee No. 16068

Clock hours 40

Output

600 units of A piecework time allowance 1.0 mins/units

300 units of B piecework time allowance 1.8 mins/units

200 units of C piece work time allowance 2.25 mins/units.

You are to assume a rate of 20k per unit produced.

Suggested solution 3-6

Piecework rate

20k per minute produced

Total production

= (600x1.0)+ (300x1.8) + (200x2.5) piecework minutes

= 1640 piecework minutes

Gross wages

= 1640x N 0.20 = N 328

c. differential piecework

One objection to straight piecework systems is that, because a flat rate per unit is paid, the incentive effect at higher production levels, declines. Differential piecework seeks to overcome this by increasing the rate progressively at various higher production levels.

For example, up to 100 units per day 10k/unit

101 -150 units per day 12k/units

151- 200 units per day 15k/unit

Differential piecework would of course normally be accompanied by the usual safeguards of guaranteed day rates or in-lieu-bonuses.

d. Group incentive schemes

It has been observed that individual based incentive schemes are common and successful but using group scheme will be much ideal in some type of business. Such businesses are:

i. Road surfacing or local mining
ii Cars or domestic appliances

Any of the incentive methods (piecework, differential piecework, premium bonus systems, etc) can be used, with appropriate adoption, for group scheme. In addition, because of the wider scope of a group scheme, incentives based on cost savings, delivery dates, quality norms are used.

Merit and Demerits of group schemes

Merits

a. It engenders closer co-operation in the group and a team spirit.
b. It is simple to administer, especially with recording of labour times, production rates, etc.
c. Support-workers, not directly associated with production, can easily be included in the scheme.
d. It reduces the number of rates to be negotiated.
e. It encourages more flexible working arrangement within the group.

Demerits

a. It is less direct than individual schemes. Provision of some incentive is difficult.
b. It causes friction as it rewards both efficient and less hardworking members of a group with same bonus.
c. It is difficult to obtain agreement on proportions of the bonus which group members will receive.

Trends in labour costing

Labour costs were a major proportion of total cost in the past. This means that it was worthwhile carrying out a thorough analysis of labour costs and making the necessary detailed accounting entries. The position today is very different. Factories are highly automated and labour is a small (and reducing) proportion to total cost. In these circumstances simpler costing systems are being used for labour with some companies eliminating direct labour accounting completing and treating

labour as part of overhead.

It is important to note that:

a. Incentive scheme may increase the labour cost per unit but as long as the reduction in overhead cost per unit is sufficient, the scheme should be worthwhile.
b. Incentive schemes are not only applicable to manufacturing, the federal government is attempting to introduce 'Performance Related Pay' across the public sector and civil servants, local government officials, teachers and others are being targeted.
c. It is a common costing practice to charge overtime wages above basic rate to overheads rather than direct wages. For example, if the basic rate is N 4 per hour and overtime is paid at 'time and a quarter', then N 4 per hour would be charged to direct wages and N 1 per hour charged to overheads.
An incentive scheme is any method of remuneration based on labour performance. Such incentive schemes may relate to individuals or groups.

a. profit sharing
b. co-partnership
c. benefits-in-kind

Illustration

Under a premium bonus system, assume that an employee is paid a time rate of N 1.50 per hour. In week 36, he works 40 normal hours and 2 hours overtime for which he is paid 'time and a half'. During the 42 hours worked, he produces 64 measures or standard hours of work. A premium bonus scheme is in operation under which he is paid 50% of time saved at the basic time rate. Calculate the employee's pay for the week 36.

Suggested solution

Calculation of employee's pay for the week 36

a. pay base on attendance time	N
40 + (2x1 1/2) = 43 hours at N 1.50	64.50
b. bonus	
time save = 22 hours (64-42)	16.50
bonus thereof = 50% x 22 at N 1.50	
Total pay	N 81.00

Illustration

A worker is paid by differential piecework. The scheme is as follows:

Up to 150 units per day	50k per unit
151 – 170 units per day	60k per unit
171- 180 units per day	65k per unit
181- 200 units per day	70k per unit

His daily output for a five-day week were 168 units, 183 units, 159 units 194 units and 147 units. Compute his gross pay for the week?

Suggested solution

Calculation of gross pay for the week

Day 1	168 units	N
	N(150x50k) + (18x60k)	85.80
Day 2	183 units	
	N(150x50k) + (20x60k) +(10x65k) + (3x70k)	95.60
Day 3	159 units	
	N(150x50k) + (9x60k)	80.40
Day 4	194 units	
	N(150x50k) + (20x60k) + (10x65k)+ (14x70k)	103.30
Day 5	147 units	
	N(147x50k)	73.50
Gross pay		438.60

6.39 Some Measures of Internal Business Process Performance

Other measures are delivery cycle time, throughout time and manufacturing cycle efficiency (MCE). These three important performance measures are discussed as follows:

DELIVERY CYCLE TIME

The amount of time between when an order is received from a customer to when the completed order is shipped is called delivery cycle time. This time is clearly a key concern to many customers, who would like the delivery cycle time to be as short as possible. Cutting the delivery cycle time may give a company a key competitive advantage-and may be necessary for survival and therefore many companies would include this performance measure on their balanced scorecard.

THROUGHPUT (MANUFACTURING CYCLE) TIME

The amount of time required to turn raw materials into completed products is called throughout time. The relationship between the delivery cycle time and the throughout (manufacturing cycle) time is that the throughout time, or manufacturing cycle time, is made up of process time, inspection time, move time and queue time. Process time is the amount of time in which work is actually done on the product. Inspection time is the amount of time spent ensuring that the product is not defective. Move time is the time required to move materials or partially completed products from workstation to workstation. Queue time is the amount of time a product spends waiting to be worked on, to be moved, to be inspected, or in storage waiting to be shipped.

6.40 Performance Monitoring Techniques

Non-financial performance indicators-overview; the typical objectives of a modern manufacturer include:

1. A zero defect rate, which is to be actualized though total quality, management (TQM) and a continuous improvement ethos (although zero defects is unlikely to be achieved in practice).
2. On time delivery, through better planning and a service-oriented attitude.
3. Minimal inventory, using JIT purchasing and manufacturing.
4. Produce to price, i.e. identify a realistic price for a new product then set about designing and producing at a cost level which will generate a satisfactory profit.

These are the types of goals a company will need if it is to compete and survive as a world class producer. CIMA official terminology defines world class manufacturing as a position culture based on factors such as continuous improvement, problem prevention, zero defect tolerance, customer-driven JIT-based production and total quality management.

Conventional cost and management accounting techniques and procedure may be inadequate in the environment for instance:

1. Accounting number may not be relevant for example, data on scrap rates are more useful a quality monitor than are figures for rectification cots.
2. Control figures may take longer to produce if they have money values attached, which means that managers may take longer to react to problem.
3. Inflation may distort and mask trends.
4. Cross-border comparison in money may be difficult because of exchange rate fluctuations.
5. Standard costing will often only enable the obvious costs of below standard quality and efficiency to be identified. Knock-on effects, customer complaints, do not normally appear in accounting statements.
6. An emphasis on reducing reported manufacturing, selling and distribution overhead costs may cause adverse effect to customer's service, product quality and sales delivery performance, which far outweigh any apparent savings. These consequent costs are hard to identify and do not appear in any formal accounting system. Nonetheless, they are real.

Three broad areas lend themselves to non-financial measurement:

1. Supplier performance: using measures such as delivery times, quality, and ability to respond.
2. Plant manufacturing performance (or departmental service provision): measured by defect rates, equipment/system downtime, cycle times, output quantities, yields, resource productivity etc.
3. Customer performance: using measures such as complaints (a passive measures), warranty claims (also passive), satisfaction surveys (a proactive measurement) and market share.

   All the above non-financial performance measures (or non-financial performance indicators (NFPIs) may be reported as indices or ratios so as to emphasis trends.

CIMA official terminology describes non-financial performance measures as measure of performance based on non-financial information which may originate in, and be used by operating departments to monitor and control their activities without any accounting input. Non-financial performance measures may give a more timely indication of the levels of performance achieved than do financial ratios, and may be less susceptible to distortion by factors such as uncontrollable

variations in the market forces on operation.

Non-financial indicators in manufacturing

As manufacturing industry has such a variety of process, methods and products there are a vast number of possible efficiency measures. This section covers some of the more usual ones and indicates their value of management. Non-financial indicators are classified under the headings of material, labour and equipment. As all these are interrelated there will be some, heritable, repetition in the types of measures used.

Materials control ratios

Almost all manufacturing process involves some loss of materials, either because materials are deliberately removed through machining because of the nature of the process itself (due to causes such as evaporation, purification or the impossibility of removing all of a product from a vat or container). Obviously, production managers need to keep the loss to minimum to reduce cost. Two measures of process loss can be used.

1. Process yield i.e. (quantity of output from the process + Quantity of material input) x 100; or
2. Loss, i.e. (quantity of materials input – quantity of output from the process)

   It may be possible to specify a normal loss for a process. This can be used as a yardstick against which to compare actual losses. "Normal loss is an expected loss, allowed for in the budget, and normally calculated as percentage of the good output from a process during a period of time" CIMA official terminology. Therefore, actual losses can also be expressed as a percentage of good output for comprises purpose.

   Process loss = (quantity of material input – quantity of output) ÷ quantity of output) x 100

Illustration

David Ltd produces adhesives from a mixture of solvents and reigns for use on manufacturing. Toughie, is one type of adhesive produced by the company.

- During the month of May, 2010 the output of Toughie was 2,000 kg
- 2,500kg of solvents and resins were used to produce the Toughie
- Normal losses due to the evaporation of solvents and the residues left in the mixing process are 15 percent of output.

Required:

Calculate the Toughie process yield and the actual process loss. Compare the actual process loss in kilograms with the normal loss.

Solution:

Process yield i.e. (quantity of output from the process ÷ quantity of materials input) x 100 = (Quantity of material input – input-quantity of output) ÷ quantity of output x 100 =) 2,500 -2,000) ÷2000) x 100 = 25%.

Normal loss in kg = quantity of output x normal percent = 2,000 x 15 percent =30kg

Actual process loss = 2,500 – 2,000 = 500kg. This is 200kg in excess of normal levels.

Illustration

Process yield i.e. (quantity of output from the process ÷ quantity of materials input) x 100 = (9000 ÷ 12,000) x 100 = 75 percent.

Normal loss in tones= quantity of output x normal loss percent = 9,000 x 40 percent = 3,600 tonnes

Actual process levels: This could indicate a process problem in that the peat is not being dried

enough, alternatively, the peat that was input was drier than normal.

6.41 Labour Control Ratios

Four types of labour measurements are of particular interest for the monitoring and control of labour. These are measures of labour.

- Availability
- Utilization
- Efficiency
- Productivity

Similarly measures to these will be referred to again below in the context of capacity ratios

1. Labour capacity ratio = (Actual hours worked ÷ budgeted hours worked) x 100. The labour capacity ratio measures that actual as opposed to the planned availability of labour. It is important for explaining why actual outputs are due to fewer hours being worked than budget.
2. Idle time ratio = (Actual hours paid actual hours worked) ÷ actual hours paid x 100
   The idle time ratio is a utilization ratio. It will highlight time lost due to:
   i. Waiting for work (because of a shortage of materials or tooling or because of machine downtime).
   ii. Travelling to the work station or job.
   iii. Training and attendance at courses.
   iv. Unavailability or work, as opposed to waiting for work

   It is not all the hours that a worker is present at his or her place of employment that will be spent in useful activity (that is work); it is expected and normal to have some non-productive time. An idle time ratio that is more than normal indicates that there is room for expansion in output (or a cut back in staffing) if the causes of idle time can be identified and dealt with.
3. Labour efficiency = (standard hours produced ÷ Actual hours worked) x 100.
   The labour efficiency ratio measures how effective the direct labour is when it is actually engaged in production. Theoretically, the efficiency ratio should be 100% if labour is working to standard level of efficiency and it standard time have been correctly set. Therefore, the budgeted labour efficiency and if standard times have been correctly set. Therefore, the budgeted labour efficiency ratio is assumed to be 100% unless otherwise stated.
4. Labour productivity measure is output per employees, for example, a car factory may measure its overall productivity as cars produced per employee per year. Productivity will be increased if idle time is reduced and labour efficiency is improved. Standard productivity ratio can be used in converting budgeted hours paid into budgeted output (expressed in standard hours).

Illustration

Bola engineering Ltd.'s budget for February 20xx was 36,000 standard hours of output. The budgeted idle time ratio is 20%. Actual hours worked were 42,000 and standard hours produced were 30,000.00.

Required

Calculate the company's actual labour capacity ratio, idle time ratio, labour efficiency ratio and

labour productivity ratio in February, 20xx.

1. Labour capacity ratio (actual hours worked ÷ budgeted hours worked) x 100 (42,000) x 100 =117%

   We can assume that the budget efficiency ratio is 100 percent, therefore, the budgeted hours worked = the budgeted output in standard hours.

2. Idle time ratio = (actual hours paid – actual hours worked) ÷ actual hours paid) x 100 = (48,000 -42,000) x 100 = 12.5%

3. Labour efficiency = (standard hours produced ÷ actual hours worked) x 100 = (30,000 ÷ 42,000) x 100 = 71%.

4. Labour productivity = (standard hours produced ÷ actual hours paid) x 100 = (30,000 ÷ 48,000) x 100 = 62.5%

Equipment and process control measurement

The measures which production management can use to monitor equipment are similar to those used for monitoring labour, i.e. availability, utilization, efficiency and productivity. However, they are usually expressed as time and rates rather ratios. You will already have encountered some of the following definitions.

1. Throughput: The rate production of a defined process over a stated period of time. Rates may be expressed in terms of units of production batches produced turnover or other meaningful measurements: CIMA official terminology, production management will seek to increase average unit costs.

2. Cycle time: The period required to complete an operation on one unit of a batch, improved cycle times will usually lead to improve through put rates.

3. Downtime: "The period for which a workstation is not available for production due to a functional failure." This is the time between a machine breaking down and it being repaid and make ready for production again. Clearly, managers will seek to minimize equipment or process downtime as it is non-productive.

4. Idle time: "The period for which a workstation is available for production but is not used due to e.g. shortage of tooling, material or operators" BS 5191 = British Standard 5191. This definition is similar to that for direct labour waiting time, again as idle time is non-productive, and it should be minimized.

5. Lead time: "The time expected to elapse between the start of a process or activity and its completion," CIMA official terminology. Lead times will be reduced if the set-up times and cycles are improved and down time idle time is minimized.

6. Set-up time: The period required to purpose a workstation from a standard conditional of redness to commence a specified operation" (BS5191). If it takes a long time to set up machine or process there is pressure on production management to maximize batch sizes are required for time- is zero, so that the ideal batch size of one unit of output can be achieved.

7. Transit (or Transfer) time: "The period between the completion of an operation and the availability of the material at the succeeding workstation." Transfer times can be reduced by improved materials handling system and by redesigning the factory layout to optimize workflow.

8. Changeover time: "The period required to change a workstation from a state of readiness for one another" (BS5191).

CIMA official terminology also contains definitions for breaking down time, operation time, process time and queuing time. However, these can be ignored, as they are less important than the measures detailed above.

Illustration
A photocopier can produce 900 copies per hour. What is the cycle time?

Answer:
The throughput rate is 900 copies per hour = 60 x 60 seconds = 36,000 seconds
Cycle = 3,600 seconds ÷ 900 = 4 seconds per copy.

CAPACITY RATIOS

The capacity of a manufacturing business is the maximum outputs it can achieve in a period. Capacity relates to a process, a machine, the labour force, or, more usually a department or factory. Although the following capacity measure appear to be entirely production oriented. They can be adapted and applied in service sector industries. Services industries that can benefit from capacity monitoring include: Transport, hotels, hospitals and education.
CIMA official terminology identifies four capacity levels, these levels are:

1. **Full capacity**: Output (expressed in standard home) that could be achieved if sales orders, suppliers and workforce were available for all installed work place. Full capacity is a theoretical rather than a practical measure, as it is virtually impossible to achieve.

2. **Practical Capacity**: "Full capacity less an allowance for known unavailable volume losses." Practical capacity is a realistic measure, however, managers should be seeking to minimize the gap between practical and full capacity.
3. **Budget Capacity**: "A measure if the long-run average level of capacity that may be expected." This is often used for setting the budgeted fixed overhead absorption rate. This capacity measure is of little interest in the context of non-financial performance monitory. Capacity performance measure refers to the availability and utilization of resources. They apply to direct labour, machines or process. The following four apply to manufacturing, but they can be modified to suit particular service industry applications.
4. **Idle capacity ratio=** (practical capacity –budget capacity) ÷ practical capacity) x 100. A positive idle capacity ratio indicates that budget capacity is below practical capacity, therefore, there is room for expansion. A negative idle capacity ratio indicates that the budget is impractical.
5. **Production volume ratio** = (standard hours produced ÷ budget capacity) x 100.

The production volume ratio shows the actual output achieved as a proportion or the budget output. The standard hours produced could be either machine hours or labour hours, depending upon which output unit the firm uses. The production volume ratio is the same as output unit the firm uses. The production volume ratio is the same as the flexing factor used to create a flexible budget (assuming finished stock X wip are minimal).
The production volume ratio is the product of the capacity ratio and the efficiency ratio. In order words, the capacity ratio and the efficiency ratio are the sub-ratios that explain the production volume ratio indicates that actual output is below budget.
The shortfall could be caused by an adverse capacity ratio and/or an adverse efficiency ratio.

6. Capacity ratio: (actual hours worked ÷ budget capacity) x 100. An adverse capacity ratio will occur if fewer hours are worked than were budget.

7. Efficiency ratio= (standard hours produced ÷ actual hours work) x 100. An adverse efficiency ratio will occur if standard hours produced fall below actual hours worked.

RESPONSIBILITY ACCOUNTING STATEMENT (RAS)

This is described as performance evaluation report designed to evaluate the level of efficiency or otherwise of worker within the organization according to the various responsibility productivity accounting reports. It represents a fusion of flexible budgeting techniques with the basic variance analysis this is due to the fact that RAS represents an integral part of the management accounting control technique this report also emphasis the need to properly classify control report according to contribute variables and uncontrollable variances.

The basic involved in RAS

1. Identify the long-term corporate objective of the organization
2. Classify the long term corporate objective into a short term achievable objective
3. Identify the various responsibility Centre's within the organization for the purpose of recognizing expenditure and revenue.
4. Obtain top management support before the introduction of RAS within the organization **5.** Provide adequate training to all the operators' managers on the effective use of RAS among workers.
5. Introduce the system of RAS among the operating managers.
6. Embark on periodic review of the result of RAS in order to ensure compliance with current position of the organization.

Benefits of RAS

1. It regulates the quality of performance evaluation.
2. It facilitates effective delegation of authority together with the commensurate level of responsibility
3. It guaranteed the doctrine of management by objective.
4. It facilitates the application of management by exception as a result of adopting a peculiar method of evaluating efficiency
5. Control report through RAS is considered to be more meaningful to the users.

Limitations of RAS

1. It is too complex to operate in practice
2. It will encourage a general increase in overhead cost for the organization
3. Establishment of unattainable standard
4. Lack of realistic data during the budget preparation

6.42 Illustrations

1. Omoze Ltd manufacturing winter clothing. The company's products are produced using automated process. The following data relates to the month of October.

Capacity Measure

Full capacity	315,000 Standard machine hours
Practical capacity	300,000 Standard machine hours
Budget capacity	240,000 Standard machine hours
Actual output	270,000 Standard machine hours
Actual machine hours worked	20,000

Required:

Calculate the following capacity ratios for October

1. Idle capacity ratio
2. Production volume ratio
3. Capacity ratio
4. Efficiency ratio

Solution

Note that the full capacity statistic is not relevant

1. Idle capacity ratio = (Practical – Budgeted) ÷ practical) x100
   = (300,000 -240,000) ÷300,000) x 100 = 20%
2. Production volume capacity = (Standard Hours produced ÷ Budgeted Capacity) x 100
   (270,000 ÷ 240,000) x $\frac{100}{1}$ = 112.5%
3. Capacity ratio = (Actual hours Worked ÷ Budgeted capacity) x $\frac{100}{1}$
   = (200,000 ÷ 240,000) x $\frac{100}{1}$ = 135%
4. Efficiency ratio
   (Standard hours Produced ÷ Actual hours Worked) x 100
   = 270,000 ÷ 240,000 x $\frac{100}{1}$ = 135%

Checked:

Efficiency ratio of 135% x capacity ratio of 83.3%= production volume ratio of 112.5%

2. Onyia Plc. specializes in providing security guards for supermarkets "The following data relates to last week.
   i. Direct staff on the payroll, 520
   ii. Maximum working week, 60 hours. This is also the standard working week.
   iii. Normal hours lost through staff being on holiday or sick, 12.5 percent
   iv. Budget staff available for the week, 442.
   v. Actual hours changed to clients, 24,000
   vi. Actual hours worked by direct staff in the week, 25,000

Required:

a. Complete the following table

Capacity measures	Calculations	Hours
Full capacity		
Practical capacity		
Budget capacity		
Actual output		
Actual hours worked		

b. Calculate the following capacity ratio for October

Idle capacity ratio
Production volume ratio
Capacity ratio
Efficiency ratio

Solution

Capacity measures	Calculation	Hours
Full capacity	520 staff x 60 hour per week	31,200
Practical capacity	Full capacity less 12.5 percent =31x 0.875	27,300
Budget capacity	442 staff x 60 hours	26,520
Actual output	Actual charged to clients (given)	24,000
Actual output worked	Given	25,000

1. Idle capacity ratio = practical capacity – budget capacity) ÷ practical capacity) x 100 = (27,300 -26,520) ÷ 27,300) x 100 = 2.9%
2. Production volume ratio = (standard hours produced – budget capacity) x 100 = (24,000 ÷ 26,520) x 100 = 90.5%
3. Capacity ratio = (actual hours worked ÷ budget capacity) x 100 = (25,000 ÷ 26,529) x 100 = 94.3%
4. Efficiency ratio = (Standard hours products ÷ actual hours worked) x 100 = (24,000 ÷ 25,000) x 100 = 96%

Check: Efficiency ratio 96% X capacity ratio 94.3% = production volume ratio of 90.5%

6.43 Review Questions

1. What exactly is a strategy? What have you learnt about the different views and levels of strategy?
2. What have you learnt about corporate strategy in terms of direction and methods?
3. What are the basic differences between strategy and tactics?
4. Based on what you have learnt, interview a manager from a local business organization on the reasons for the adoption of strategies in their organization and benefits from such strategies.
5. What are the factors that can trigger in strategic options by business organization?

6. A company organized in three departments. Part making assembly and finishing gave the following information concerning its activities in a cost accounting period.

Part making		**Assembly**	**Finishing**
Budgeted output (units)	10,000	18,000	20,000
Output per hour (budget)	2	3	5
Actual output (units)	12,000	17,400	21,000
Total hours worked during the budget period were 15,500 hours			

Required:
Compared for the company as a whole

ii. The activity ratio
iii. The efficiency ratio

MODULE 7

7.00 CURRENT DEVELOPMENT IN STRATEGIES PERFORMANCE MANAGEMENT

7.01 Learning Outcomes

On successful completion of this Module, the Students should be able to:

i. That, conventional management accounting does not meet the needs of today's manufacturing and competitive environment.
ii. That, traditional product costing system provides misleading information for decision-making purposes.
iii. that, management accounting pratices follow, and have become subservient to financial accounting requirements.
iv. That, management accounting focuses almost, entirely or internal activities and relatively little attention is given to the external environment in which the business operates.

7.02 Introduction

In this module, we look at the current development in strategies performance management having considered the principal criticisms of current management accounting practices as forwarded by Johnson and Kaplan (1987), and, summarized as follows:

i) That, conventional management accounting does not meet the needs of today's manufacturing and competitive environment.
ii) That, traditional product costing system provides misleading information for decision-making purposes.
iii) That, management accounting practices follow, and have become subservient to financial accounting requirement.
iv) That, management accounting focuses almost entirely on internal activities and relatively little attention is given to the external environment in which the business operates.

7.03 Benchmarking

Benchmarking is 'the establishment, through data gathering, of targets and comparators, through whose use relative levels of performance (and particularly areas of underperformance) can be identified. By the adoption of identified best practices it is hoped that performance will improve.

There are four types of benchmarking:

a. Internal benchmarking: a method of comparing one operating unit or function with another within the same industry.
b. Functional benchmarking: in which internal functions are compared with those of the best external practitioners of those functions, regardless of the industry they are in (also known as operational or generic benchmarking).
c. Competitive benchmarking: in which information is gathered about direct competitors, through techniques such as reverse engineering.
d. Strategic benchmarking: a type of competitive benchmarking aimed at strategic action and organizational change.

Benefits of Benchmarking

Benefits of benchmarking include the following:

a. Its flexibility means that it can be used in both the public and private sector and by people at different levels of responsibility.
b. Cross comparisons (as opposed to comparisons with similar organizations) are more likely to expose radically different ways of doing things.
c. It is and effective method of implementing change, people being involved in identifying and seeking out different ways of doing things in their own areas.
d. It identifies the process of improve.
e. It helps with cost reduction.
f. It improves the effectiveness of operations.
g. It delivers services to a defined standard.
h. It provides a focus on planning.

Benchmarking has other advantages. It can provide early warning of competitive disadvantage and should lead a greater incidence of team working and cross-functional learning.

Limitation of benchmarking exercises

i. Difficulties in deciding which activities to benchmarking
ii. Identifying the 'best in class' for each activity
iii. Persuading other organization to share information
iv. Successful practices in one organization may not transfer successfully to another
v. The danger of drawing incorrect conclusions from inappropriate comparisons.

Behavioural implications of performance measures

Providing targets and measuring performance is often intended to motivate staff to achieve those targets, but this will only achieve through involvement and the development of goal congruence. Staff may well use the measurement of performance as a policing device particularly if it is used to assess their personal performance rather than that of the unit they manage.

If the manager feels that the target profit or target output level is too tough then they will be demotivated. If the required standard is too easy they may relax down to the level set as a target.
Budget pressure. One way to reduce the budget pressure is by the use of several performance measures. In order to achieve cost savings there are a limited number of things that a manager can do easily. One of these is to cut back on discretionary costs such as entertaining, advertising, training, maintenance. All these cuts will produce a short-term profit improvement; the problem comes with long-term profitability. Cut advertising and future sales may fall, cut training and staff may leave or become less efficient, cut maintenance and plant and machinery will become less productive. Measures are needed to ensure adequate levels of training and maintenance.
Inter-divisional competitiveness. When performance measures are used there needs to be some incentive to achieve given targets. This may be bonuses, it may be promotion. However, this can have 'dysfunctional' results (sub-optimal results, counter-productive outcomes). Managers may make decisions that make life difficult for other managers. This may simply be a purchasing department buying cheap material making life difficult for a production department. It may involve

coercing staff to leave one department and work for another. Managers and staff need to be aware of the overall goal of the company.

Controllability and Responsibility

It is clearly desirable that manager's performance should only be assessed by reference to costs or others factors that are under their control. It is worth pointing out two issues here. First, that fewer costs are controllable in the short run than in the longer term. For instance, if an insurance premium is too high, a remedy could be to change insurance companies, but this would involve a penalty if the change took place mid-year. The second issue is that of joint responsibility for costs. The classic example being total material cost, responsibility being shared between the purchasing and production managers.

Goal Congruence

Any performance measure should attempt to achieve goal congruence. An example of an inappropriately-thought-out measure would be a sales manager whose performance is assessed purely on the basis of the sales revenue achieved or, worse still, on the number of items sold.

On the face of it, this would seem an excellent performance measure for a sales manager until it was found that the manager was making sales at drastically reduced prices resulting in items being sold at a loss. There must be 'strings' attached-only sell at standard prices. Even so there are potential problems for example, if it were then discovered that the customers for the sales refused to pay, being far from credit worthy organizations. More strings required-no bonus till the cash is received from debtors.

7.04 E-Commerce: New Challenges for Management Accounting

A lot of hype has been generated by the internet. Yet many of the breakthroughs in inter-personal and inter-organizational communication rely on older technologies such as electronic data interchange (EDI) and telephones. The power of the telephone has been massively increased because the tele-worker can be linked to the company's database via a personal computer. Thus the huge reduction in paper, floor space, queuing and so on, in an operation such as telephone banking or a ticket less airline, does not necessarily require internet technology. But for these operations, the internet is cheaper than telephone and EDI as well as opening up the possibility of real-time screen communication for both consumers and smaller companies.

Focus on practice

Performance measurement of internet sites.

In the early days, few internet companies could measure their sites performance or weather their sites were becoming more effective over time. Internet companies attracted visitors to their sites but were less successful at making sales or retaining customers. If anything, the more visitors the sites drew, the more money they lost. As in any business, long term profitability is based on lifetime customer value the revenue customers generate over their lives, less the cost of acquiring converting and retaining them. New site performance indicators are being developed that measure attraction conversion and retention plus other factors such as the rate of which the number of customer increases and customer gross margins. Paradoxically, it would be wrong to think that internet companies are the most likely candidate for stock elimination for example, part of the success of one of the more established dot com companies, amazon.com is that its stocks of books, CDs, video are far larger than local retailers.

More direct relations between customers and producer (disintermediation) means that huge chains

of dedicated high street branches are assets of doubtful value. But as companies become more virtual there are new challenges for management accounting. In a virtual company assets are not only tangible but also include intangible assets such as brand value, intellectual property, human capital (people), virtual integration, information management, quality of service and customer relations, they need to be factored into performance measurement exercises. Otherwise a company may end up with a distorted picture of its overall economic value, market position and future potential.

7.05 Business Process Re-Engineering (BPR)

Process-re-engineering is a more radical approach to improvement than either TQM or benchmarking. Instead of tweaking the existing system in a series of incremental improvements, a business process is diagrammed in detailed, questioned, and then completely redesigned in order to eliminate unnecessary steps, to reduce opportunities for errors, and to reduce costs. A business process is any series of steps that is followed in order to carry out some tasks in a business. For example, the steps followed to make a large seafood pizza at Pizza Hut are a business process. The steps followed by your bank when you deposit a cheque are a business process. While process re-engineering is similar in some respects to TQM, its proponents view it as a more sweeping approach to change. One difference is that while TQM emphasizes a team approach involving people who work directly in the processes, processes re-engineering is more likely to be imposed from above and more likely to use outside consultants.

Process re-engineering focuses on simplification and elimination of wasted effort. A central idea of process re-engineering is that all activities do not add value to a product or service should be eliminated.

What does a re-engineered process look like?

The first step in re-engineering is to look at the underlying process and not at the administrative structure set up to perform it. The aim will be to combine several jobs one-known as horizontal compression. If a process is too much for one person then a case-team will be formed. The aim should be that the workers make decisions. Jobs are vertically compressed through the elimination of hierarchy and checking.

Much re-engineering is enabled through new technology, especially the linkage between a telephone-based customer focused personnel with central databases. Shared databases mean that information can appear simultaneously in as many places as it is needed. Expert systems mean that the generalist can do the work of the expert. Telecommunications and portable computers mean at field personnel can send and receive information wherever they are. Paradoxically, organization are both centralized and decentralized by the new technology. Jobs change from simple tasks to multidimensional work which reduces the work that was created by fragmentation such as checking, reconciling, waiting, monitoring and tracking.

The implications of BPR for management accounting are that management accountants have to be more flexible and work in teams with non-accountants. Accounting work is dispersed and may be done by non-accountants. Non-financial performance measures are more important. The emphasis is on eliminating overhead rather than measuring/allocating it. Organizational structures/departments/budgets are less important than processes.

Some Criticisms of Re-Engineering

In common with other management panaceas, BPR has suffered from over-hyping and from the evangelical language often associated with the management guru. Action that may be easy to write or talk about may be harder to implement in practice. For example, how easy is it for organizations to distinguish between value adding and non-value adding activity? Mistakes have been made where firms took out non-value adding personnel but then subsequently had to re-hire them as they turned out to have created unanticipated value! BPR is likely to face resistance from managers who have been promoted to manage existing structures not take them out!

A recurrent problem in process re-engineering is employee resistance. The cause of much of this resistance is the fear that people may lose their jobs. Workers reason that if process re-engineering succeeds in eliminating non-value-added activities, there will be less work to do and management may be tempted to reduce the payroll. Process re-engineering, if carried out insensitively and without regard to such fears, can undermine morale and will ultimately fail to improve the bottom line (i.e. profits). As with other improvement projects, employees must be convinced that the end result of the improvement will be more secure, rather than less secure jobs. Real improvement can have this effect if management uses the improvement to generate more business rather than to cut the workforce. If by improving processes the company is able to produce a better product at lower cost, the company will have the competitive strength to prosper. And a prosperous company is a much more secure employer than a company that is in trouble.

7.06 Corporate Governance: A Financial Perspective

It is important to understand the different aspects of accounting for reporting and accounting for decision making and control. On a practical level, these distinctions may be maintained by using different costs for different purposes.' In this chapter, we point out that even though they should make distinctions between costs for external reporting and costs for decision making, management accountants generally also have a responsibility to ensure the integrity of financial data for reporting purposes. In this respect, we are moving on to a more complex view on the role of management accounting. The distinction between management accounting and financial accounting was justified in the historical context of the latter part of the 20th century when prominent commentators such as Johnson and Kaplan were concerned about the potentially damaging effect of financial reporting practices on the internal decision making. However, the most recent evidence from the US, UK and elsewhere, is that wealth has been destroyed, not by a lack of creativity or entrepreneurship but by reckless, greedy and sometimes fraudulent behaviour by executives at the highest level of giant corporations.

These instances, the boundary between internal and external decision making becomes more blurred as does our earlier distinction between the roles of management and financial accounting. Just as strategies need to be embedded in an organization's control systems and may involve tensions between expansive belief systems and a more constraining boundary system, there can be tensions between the free- wheeling spirit associated with entrepreneurship and the more constraining values associated with financial probity and integrity. In corporate disasters that have stemmed from mismanagement rather than obvious fraud, the scandal here is that too often the senior executives who were responsible for the poor decisions were able to walk away from the mess of wrecked livelihoods and pensions with their own wealth and financial security unharmed.

The 'reward for failure syndrome' means that the supposed morally tale of capitalism that business failure leads to financial penalty seems to have broken down for the very people who bear the greatest decision making responsibility. The fashionable term for analyzing these issues is **corporate**

governance.

FOCUS ON PRACTICE

7.07 Corporate Remuneration and the 'Reward for Failure' Syndrome

The reward for failure syndrome may easily be observed in high-prolific companies such as the retail giant, Sainbury's. Over his four years at the top of Sainbury's the ousted chairman, Sir Peter Davis, received about £11 million. Over the same period, the company fell behind main rivals, Tesco and Asda, and profits fell to a 15-year low. Even without corporate disasters, chief executives have been awarded remuneration packages that pay bonuses even if performance goes down. In the past decade, the average remuneration package or FTSE100 directors rose in flat and falling stock market returns. Cohen argues that 'free market economics can't explain the runaway growth in income. Try as hard as they might, conventional economics can't find a link between executive pay and performance.

Another indicator of executive excess is the ratio of CEO pay to average worker pay. In the UK the multiplicand of CEO pays to full-time manual worker pay has increased from 10 times in 1980 to 80 times in 2002. In the US, the multiplicand reached 516 in 1999. A large number of examples of corporate malfeasance involving tax evasion, false accounting money laundering and other dubious practices may be found on the www.visancsustan.edu/aaba/home.htm.

Exercise: Review how the proposed bonus bank system in EVA can, at least in principle address one of the weaknesses of executive remuneration whereby bonuses are too often linked to short-run performance.

Corporate governance has several implications for the study and practice of management accounting. In particular, one assumption generally implicit in management accounting is that decision makers are profit maximizers because this is the goal that serves the owners of the firm. The assumption of profit maximization has been questioned on both theoretical and empirical grounds. Empirically, the evident suspicion of directors and senior managers in the City pages of even the most conservative of newspapers suggests that the notion that managers may pursue their own rather than shareholders' interests is accepted as a stylized fact of mainstream corporate life.

A special theory called agency theory addresses the difficulties of monitoring and linking managerial behaviour to the interests of shareholders. With respect to theory, the adherence to the profit maximization assumption seems to ignore a financial accounting literature that deals with activities such as earnings management and the various managerialist models of the firm that have been derived from standard neoclassical economics. Managerialist theories of the firm may themselves be related to a finance view of corporate governance where the key questions are:

> *How do the suppliers of finance get managers to return some of the profits to them? How do they make sure that managers do not steal the capital they supply or invest in bad projects? How do suppliers of finance control managers?*

Although corporate governance issues have long been the subject matter of related subjects such as financial reporting and auditing, the question that has been addressed less thoroughly is the contribution of organizational/internal accounting to corporate governance. Certainly, if internal accounting does play a role assuring outside suppliers of capital then the criterion of relevance becomes a much more complex issue. From an agency perspective the apparent domination of

financial reporting conventions over 'correct' decision making rules may not be a mistake but rather a rational response to the increasing separation of ownership and control. We will now explore this issue further by looking at some examples of the links between financial and management accounting.

7.08 Management Accounting and Regulatory Approaches to Corporate Governance

The integrity of corporate reporting has been made the subject of intense regulatory and legal scrutiny. In the US, the emphasis has been on increased judicial enforcement of financial standards in the Sarbanes-Oxley Act (2002). These regulatory innovations seem to suggest that the suppliers of capital no longer trust their most immediate agents, the senior executive of large corporations. In the UK with the publication of the Higgs Report (2003), one of the ways that management accounting can contribute to improving corporate governance is to advocate new performance measures that are designed to enhance the ability of non-executive directors to monitor their fellow executive directors.

But how can Non-Executives Directors make difference if they do not know what is going on in the company? From this perspective, it is a short step to see a potential role for management accounting to provide non-executives with information with which to assess risk, check on strategy and monitor the behaviour of executive board members. Indeed, many of the criticisms of conventional reporting and the proposed remedies will be unsurprising to academic management accountants. If conventional transaction-based financial accounting data is too late and too backward looking, then many of the key trends and key performance drivers will be driven by approaches such as the balanced scorecard and strategic management accounting. The response from the management accounting profession to the corporate governance debate has been articulated in a CIMA technical report, which outlines the sort of board reporting practices that are deemed necessary for good market performance and sound corporate governance.

Drawing on previous reports on governance such as the Cadbury Report, Starovic builds on the Combined Code on Corporate Governance. Along with the usual admonitions that good quality information should be relevant, focused, forward looking and so on, Starovic also argues for integrated information systems and processes. The role of management accountants in the financial perspective on corporate governance is summarized in Fig. 7.4.

Yet such an ambitious proposal begs some obvious questions. Why should non-executives at Marconi claimed that they were only doing what everyone else is doing (focusing and internationalizing in the telecom industry). So how can they be blamed if the result is corporate meltdown? Yet strategic management accounting techniques should enable managers to develop a unique company strategy based on an appraisal of how actual and potential competitors will react. Adopting a unique strategy is probably the only way that a company obtains a competitive advantage and thus a higher return. If a company just does what all its competitors are doing, then at best the company will just match the industry return.

At worst, as in the Marconi case described above, if all companies try to expand in one industry, then a huge surplus of capacity and low returns are very likely. In short, institutional theory suggests that strategic management accounting is unlikely to be adopted by managers driven by mimetic behaviour. Another way of looking at the corporate governance crisis at the turn of the century is to see it as a problem of risk management.

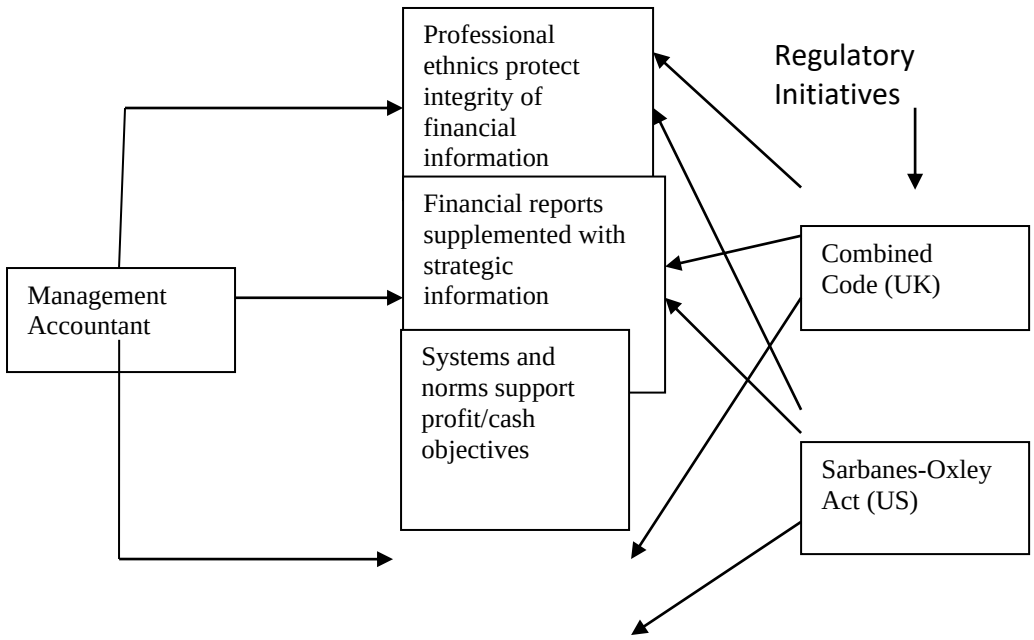


FIG. 7.4

7.09 Review Questions

i. What is divisionalisation?
ii. Itemize the benefits associated with divisionalisation
iii. Define responsibility accounting.
iv. Clearly distinguish between cost, profit and investment centres
v. Identify the financial measurement of divisional performance
vi. What are the merits and demerits of residual income approach?
vii. Itemize the users of financial statements and their specific needs.
viii. Enumerate the specific limitations of ratio analysis.
ix. Identify the specific classification of ratio.
x. Lists other non-financial performance measures that can assist in evaluating divisions.
xi. What is called performance in the context of public sector?
xii. What is value for money?
xiii. Define balanced scorecard?
xiv. List four types of benchmarking.

Recommended Further Readings

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