CHAPTER 1

INTRODUCTION TO MANAGERIAL ACCOUNTING-OVERVIEW OF COST ACCOUNTING

Definition of Management Accounting:

The Managerial Accounting is another name of Management Accounting so we have been using Management Accounting in our discussion throughout.

Management Accounting may be defined as the **"Process of identification, measurement, accumulation, analysis, preparation, interpretation and communication of information (both financial & operating) used by the management to plan, evaluate and control within an organization and to assure use of and accountability for its resources**."

(**IMAP** *by* **FMAC** *pg: 37)*

Management accounting, therefore, is an integral part of organization process. It provides information essential for:

- Controlling the current activities of an organization
- Planning its future strategies, tactics and operations
- Optimizing the use of its resources
- Measuring and evaluating performance
- Reducing subjectivity in the decision making process and
- Improving internal and external communication

The Concept:

Accountability:

Management accounting presents information measuring the achievement of the objectives of an organization and appraising the conduct of its internal affairs in that process. In order that further action necessary can be taken, based on this information, it is necessary at all times to identify the responsibilities and key result areas of the individuals within the organization.

Controllability:

Management accounting identifies the elements of activities which management can or cannot influence, and seeks to assess the risk and sensitivity factors. This facilitates the proper monitoring, analysis, comparison and interpretation of information which can be used constructively in the control, evaluation and corrective functions of management.

Reliability:

Management accounting information must be of such quality that confidence can be placed in it. Its reliability to the user is dependent on its source, integrity and comprehensiveness.

Interdependency:

Management accounting, in recognition of the increasing complexity of business, must access both external and internal information sources from interactive functions such as marketing, production, personnel, procurement, finance, etc. This assists in ensuring that the information is adequately balanced

Relevancy:

Management accounting must ensure that flexibility is maintained in assembling and interpreting information. This facilitates the exploration and presentation, in a clear, understandable and timely manner, of as many alternatives as are necessary for impartial and confident decisions to be taken. The process is essentially forward looking and dynamic. Therefore, the information must satisfy the criteria of being applicable and appropriate.

(**IMAP** *by* **FMAC** *pg: 37)*

Evolution of Management Accounting:

The field of organizational activity encompassed by management accounting has developed through four recognizable stages.

- **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 have been shifted to the provision of information for management planning and control, through the use of such technologies as decision analysis and responsibility accounting:
- **Stage 3** – By 1985, attention was focused on the reduction of waste in resources used in business processes, through the use process analysis and cost management technologies.
- **Stage 4 –** By 1995, attention had shifted to the generation or creation of value, through the use of technologies which examine the drivers of customer value, shareholder value, and organizational innovation.

While these four stages are recognizable, the process of change from one to another has been evolutionary.

- Cost determination and financial control
- Information for management Planning and control
- Reduction of waste of resources in business processes
- Creation of value through effective resource use

(**IMAP** *by* **FMAC** *pg: 29)*

Comparison of Financial Accounting with Managerial Accounting:-

	Financial Accounting	**Management Accounting**
1- Origin	Since 1497- Double Entry book keeping System.	From 19th century.
2. Purpose	The main purpose of Financial Accounting is to prepare profit and loss account and balance sheet.	The main purpose of management accounting is to provide detailed information.
3. Target Group	Reporting to owner and outside agencies	Mainly to management
4. Statutory Requirements	These accounts have to be prepared according to the legal requirements of Companies Acts.	Maintenance of these accounts is voluntary.
5. Analysis of Cost and Profit	Financial account reveal the profit or loss of the business as a whole during a particular period. It does not show the figure of cost and profit for individual products, departments and processes.	Managerial accounts show the detailed cost and profit data for each product line,department, process etc.
6. Period of reporting	Financial Statements are prepared periodically, usually on an annual basis.	Management Reporting is a continuous process that may be daily, monthly, as required by management.
7. Control Aspect	It lays emphasis on the recording of financial transactions and does not attach any importance to control aspect.	It provides for a detailed system of controls with the help of certain special techniques like standard costing and budgetary control.
8. Nature	It is concenrned almost exclusively with historical records. The historical nature of financial accounting can be easily understood in the context of the purposes for which it was designed.	It is concenrned not only with historical costs but also with predetermined costs. This is because management accounting does not end with what has happened in the past.
9-Audit	There is an audit requirement of financial statements.	There is no such audit requirements.Cost audit concept is getting importance in some countries.
10. International Standards	There are international accounting standards to be followed.	There are few guidelines issued by MAC(Management Accounting Committee).

Role of a Management Accountant:-

Traditional Role:

In a traditional role, the Management Accountant is primarily concerned with the application of accounting techniques and to the provision of information designed to assist all levels of management in planning, reporting and controlling the activities of the organization.

Dynamic Role:

In today's business environment, role of a Management Accountant is much more dynamic than his traditional role. This is to create and enhance value of the organization through stakeholders. This concept of value creation gives Management Accountant a more dominant position in the organization. It includes:

- Suggesting ways and means to add more value
- Involvement in facilitating change processes in the organization
- Being a business advisor and not just a "corporate policeman". Complete understanding of organizational strategy, helping to solve problems and functioning as an effective member of cross-functional teams.
- Being pro-active by following Feedforward control (i.e. forecasting of differences between actual and planned outcomes, and the implementation of action, before the event, to avoid such differences.
- Being able to address not only real concerns but also the perceived concerns, described to include timeliness and trustworthiness.
- Fully participating in members of the Management team, playing pivotal role in achievement of business objectives by expertise and diversified knowledge.
- Playing effective role in Project Management
- Preparing cashflow on the basis of realistic assumptions to determine debt-servicing capability.
- Monitoring of growth initiatives and planning
- Conducting SWOT Analysis
- Strengthening the role as Cost auditor
- Assisting the government in developing audit process for income tax and sales tax.

(**Management Accountant** *Executive Summary by* Ali Imran Siddiqui Pg: 34*)*

Management Audit in a dynamic business environment:

A systematic assessment of methods and policies of an organization's management in the administration and the use of resources, tactical and strategic planning, and employee and organizational improvement

The objectives of a management audit are to

1. Establish the current level of effectiveness
2. Suggest improvements
3. Lay down standards for future performance

Management auditors (employees of the company or independent consultants) do not appraise individual performance, but may crtitically evaluate the senior executives as a management team.

CHAPTER 2

COST CLASSIFICATION IN MANAGEMENT ACCOUNTING PERSPECTIVE

1. **Classification according to function:**
   - Manufacturing cost
   - Administration cost
   - Selling and distribution costs
   - Financial costs
   - Research and development costs
2. **Classification according to variability**
   - Fixed Cost
   - Variable Cost
   - Semi-variable or semi-fixed costs
3. **Classification according to identifiability with cost units:**
   - Direct costs
   - Indirect costs
4. **Classification according to controllability**
   - Controllable costs
   - Uncontrollable Costs
5. **Classification on the basis of time.**
   - Historical costs
   - Predetermined Costs
6. **By department**
7. **Budgeted Cost and Standard Costs**
8. **For Analytical Process**

1. **Functional Classification:-**

This is a traditional classification. A business has to perform a number of functions like manufacturing, administration, selling, distribution and research. Cost may have to be ascertained for each of these functions. On this basis, costs are classified into the following groups:

a) **Manufacturing Cost:** Also named **"Production Cost"** or **"factory cost"**. This is the cost of the sequence of operations which begins with supplying materials, labour and services and ends with completion of production.

b) **Administration Cost:** This is general administrative cost and includes all expenditure incurred in formulating the policy, directing the organization and controlling the operations of an undertaking, which is not directly related to production, selling and distributions, research and development activity of function.

c) **Selling & distribution costs:** Selling cost is the cost of seeking to create and stimulating demand and securing orders.

Distribution cost is the cost of sequence of operations which begins with making the packed product available for despatch and ends with making the re-conditioned returned empty package for re-use.

d) **Financial Cost:** It includes Interest/mark-up, bank charges and various fees paid to lenders for borrowing funds.

e) **Research and development cost:** Research cost is the cost of searching new or improved products or methods. It includes the cost incurred at Pre-production stage which is the core focus of Life Cycle Costing.

2. Behavioural Classification:-

Costs sometimes have a definite relationship to volume of production. They behave differently when volume of production rises or falls. As such they are described as fixed, variable and semi-variable or semi-fixed.

a) **Fixed Cost:** These cost remain fixed in 'total amount' and do not increase or decrease when the volume of production changes. But the fixed cost per unit decreases when volume of production increases and vice versa.

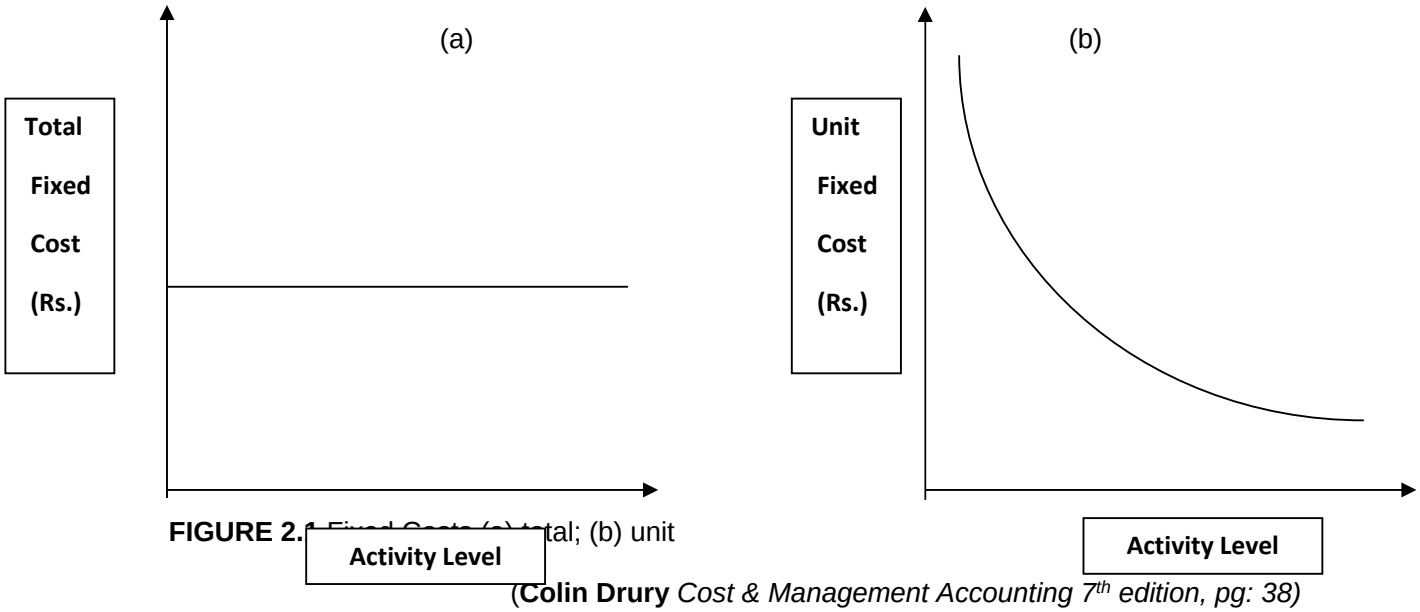

FIGURE 2.1 Fixed Costs (a) total; (b) unit

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 38)*

The characteristics of fixed cost are:

1. Fixed in total amount within a relevant output range
2. Increase or decrease in per unit fixed cost when quantity of production changes
3. Apportioned to departments on some arbitrary basis
4. Controllable by top management
5. Over a long period of time fixed cost is also variable.

b) Variable Cost: These costs tend to vary in direct proportion to the volume of output. In other words, when the volume of output increases, the total variable cost will increase and when volume of output decreases, total variable cost also decreases. But the variable cost per unit remains fixed.

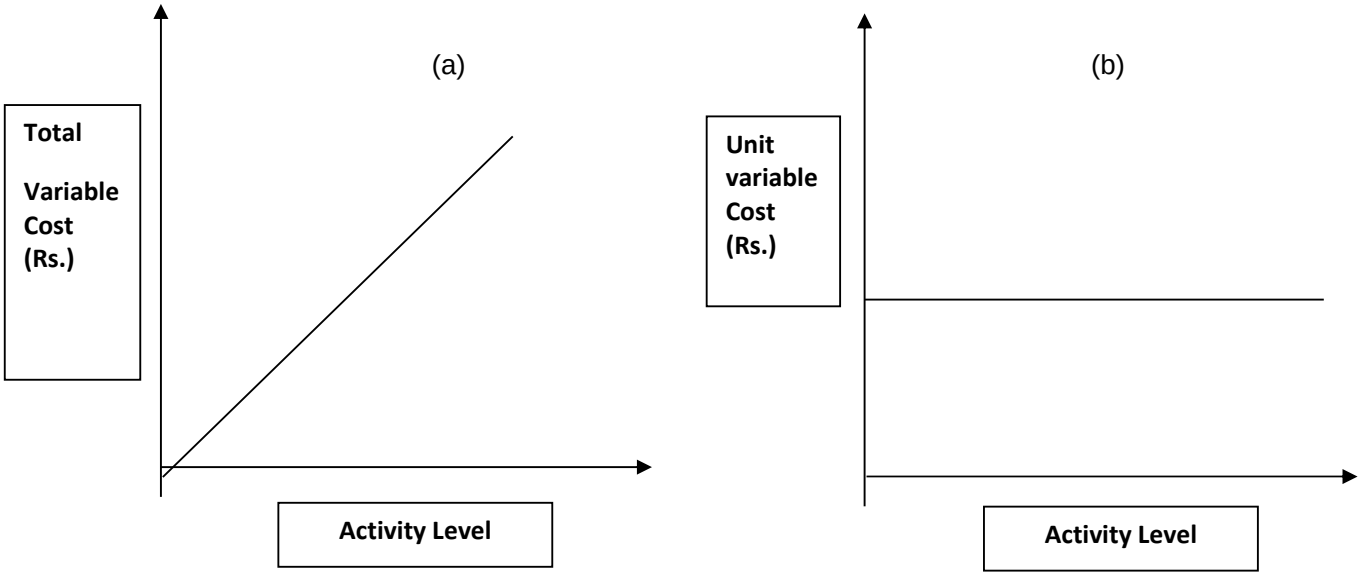

FIGURE 2.2 Variable Costs (a) total; (b) unit

(**Colin Drury** *Cost & Management Accounting 7th edition, pg:38)*

The characteristics of variable cost are:

1. Variability in total amount in direct proportion to the volume of output
2. Fixed amount per unit in the face of changing volume
3. Easy and reasonably accurate allocation and apportionment to departments
4. Controllable by functional managers

c) Semi-variable or semi-fixed costs: These costs are partly fixed and partly variable. A semi-variable cost has often a fixed element below which it will not fall at any level of output. The variable element in semi-variable costs changes either at a constant rate or in lumps. For example, introduction of an additional shift in the factory will require

additional supervisors and certain costs will increase in lumps. In the case of telephone, there is a minimum rent and after a specified number of calls, the changes are according to the number of calls made. Thus, there is no fixed pattern of behaviour of semi-variable cost.

3. Classification according to identifiability with cost units:-

Costs are classified into direct and indirect on the basis of their identifiability with cost units or jobs processes;

a) **Direct Costs:** Those costs that can be specifically and exclusively identified with a particular cost object.

b) **Indirect Costs:** In contrast, those costs which cannot be identified specifically and exclusively with a given cost object.

Example: Let us assume that our cost object is a product, or to be more specific a particular type of desk that is manufactured by an organization. In this situation the wood that is used to manufacture the desk can be exclusively and specifically identified with a particular desk and can thus be classified as a direct cost. Similarly, the wages of workers whose time can be traced to the specific desk are a direct cost. In contrast, the salaries of factory supervisors or the rent of the factory cannot be specifically and exclusively traced to a particular desk and these costs are therefore classified as indirect. More examples of indirect costs are repairs, depreciation, managerial salaries.

Sometimes, however, direct costs are treated as indirect because tracing costs directly to the cost object is not cost effective. For example, the nails used in manufacturing the desk can be identified specifically with the desk, but, because the cost is likely to be insignificant, the expense of tracing such items does not justify the possible benefits from calculating more accurate product costs.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 34)*

4. Classification according to Controllability:-

Costs can also be classified into controllable and uncontrollable.

a) **Controllable Costs:** is a ‘cost which can be controlled, typically by a cost, profit or investment centre manager’.

CIMA *official Terminology*

These are the cost which may be directly regulated at a given level of management authority.

b) **Uncontrollable Costs:** These are those costs which cannot be influenced by the action of a specified member of an enterprise.

Variable costs are generally controllable by **department heads**. For example, cost of raw material may be controlled by **purchasing** in larger quantities. In contrast, fixed costs are generally uncontrollable. For example, it is very difficult to control costs like factory rent, managerial salaries etc.

Two important points should be noted regarding this classification.

A cost which is not controllable by a junior manager might be controllable by a senior manager. For example, due to excessive overtime working there may be high direct labour costs in a department. The junior manager may feel obliged to continue with the overtime to meet production schedules, but his senior may be able to reduce costs by hiring extra full-time staff, thereby reducing the requirements for overtime.

(**CIMA** *performance Management 3rd edition, pg: 413)*

A cost which is not controllable by a manager in one department may be controllable by a manager in another department. For example, an increase in material costs may be caused by buying at higher prices than expected (controllable by purchasing department) or by excessive wastage (controllable by production department) or by a faulty machine producing rejects (controllable by the maintenance department).

(**CIMA** *performance Management 3rd edition, pg: 413)*

5. Classification on the basis of Time:-

a) **Historical Costs:** These are the costs which are ascertained after these have been incurred. Historical costs are thus nothing but actual costs. These costs are not available until after the completion of the manufacturing operations.

b) **Pre-determined costs:** These are future costs which are ascertained in advance of production on the basis of the specification of all the factors affecting cost.

6. Classification by departments:-

An organization can be divided into two main departments. Manufacturing departments, which directly engage in the process of production of goods and services and Service departments, which indirectly help the production department in providing services to facilitate production process.

7. Budgeted Cost and standard Costs:-

These are predetermined total costs or unit costs of good and service used for control purpose.

8. For analytical process:-

Management decisions involve a selection between alternative courses of action and costs play a very prominent role in decision-making. For analytical process, costs are classified as under:

a) Differential or Incremental Costs: Differential cost is the increase or decrease in total cost which results from an alternative course of action. It is ascertained by subtracting the cost of one alternative from the cost of another alternative. The alternative choice may arise because of change in method of production, changes in sales volume, change in product mix, make or buy decisions, accept or reject order.

Example: Current manufacturing cost of XYZ Co. is Rs.100,000. Due to expansion operations, costs increase by 25%. So this incremental cost of Rs.(100,000*.25 = 25000) is the differential or incremental cost.

b) Imputed Costs: These are hypothetical costs which are specifically computed for the purpose of decision making. Interest on capital is a common type of imputed cost. The failure to consider imputed interest cost may result in an erroneous decision. For example, project A requires a capital investment of Rs. 50,000 and project B Rs.40,000. Both the projects are expected to yield Rs. 10,000 as additional profit. Obviously, these two projects are not equally desirable since project B requires less investment and thus should be preferred.

c) Opportunity Costs: 'The value of a benefit sacrificed when one course of action is chosen, in preference to an alternative. The opportunity cost is represented by the foregone potential benefit from the best rejected course of action'.

CIMA *official Terminology*

Example: Assume a company owns a building which has been fully depreciated in the books of accounts. Yet, it has a rental value of Rs.5000 per annum. Now, if the company is considering the use of this building in a special project a change in lieu of rent of 5000 (opportunity cost) should be included in evaluating the desirability of the project despite the fact that books of accounts show it at nil value. Opportunity cost is a pure decision-making cost and is not entered in the books of accounts.

c) Replacement Cost: This is the cost at which there could be purchased an asset identical to that which is being replaced. In simple words, replacement cost is the current market cost of replacing an asset. When the management considers the replacement of an asset, it has to keep in mind its replacement cost and not the cost at which it was purchased earlier.

d) Sunk Cost: A sunk cost is **'cost that has been irreversibly incurred or committed and cannot therefore be considered relevant to a decision. Sunk cost costs may also be deemed irrecoverable costs**'.

CIMA *official Terminology*

Example: An example of a sunk cost could be **development costs** already incurred. Suppose that a company has spent Rs.250,000 in developing a new service for customers, but the marketing department's most recent findings are that the service might not gain customer acceptance and could be a commercial failure. The decision whether or not abandon the development of the new service would have to be taken, but the Rs. 250,000 spent so far should be ignored by the decision makers because it is a sunk cost.

(**CIMA** *performance Management 3rd edition, pg: 12)*

e) **Out-of-pocket Costs:** Out-of-pocket costs represent cash payments to be incurred (such as rent, wages) as against costs which do not require cash outlay (such as depreciation). This is frequently used by business concerns as an aid in making decisions pertaining to price fixation during depression, make or buy decisions, etc.

f) **Future Costs:** No decision can change what has already happened. The past is history and decisions made now can affect only what will happen in the future. Thus, the only relevant costs for decision- making are pre-determined or future costs. But, it is the historical costs which generally provide a basis for computing future costs.

g) **Discretionary Cost:** A **discretionary cost** is a cost whose amount, within a particular time period, is **determined by**, and can be altered by, the budget holder. **Discretionary fixed costs**, such as advertising and research and development costs, are incurred as a result of a top management decision, but could be **raised or lowered at fairly short notice** (irrespective of the actual volume of production and sales).

(**CIMA** *performance Management 3rd edition, Pg: 413)*

h) **Committed Cost:** A committed cost is a **future cash outflow** that will be **incurred any way**, **whatever decision is taken now** about alternative opportunities. Committed costs may exist because of contracts already entered into by the organization, which it cannot now avoid.

(**CIMA** *performance Management 3rd edition, Pg: 32)*

Question No.1

The following information has been taken from the accounting records of Klear-Seal Company for the year 2012

Selling expenses……	$140,000
Raw materials inventory, January 1……	90,000
Raw materials inventory, December 31……..	60,000
Utilities, factory……	36,000
Direct labor cost……..	150,000
Depreciation, factory……..	162,000
Purchases of raw materials……	750,000
Sales……	2,500,000
Insurance, factory……..	40,000
Supplies, factory……	15,000
Administrative Expenses	270,000
Indirect labor……	300,000
Maintenance, factory……..	87,000
Work in process inventory, January 1……	180,000
Work in process inventory, December 31……..	100,000
Finished goods inventory, January 1……	260,000
Finished goods inventory, December 31……	210,000

Management wants these data organized in a better format so that financial statements can be prepared for the year.

Required:

1. Prepare a schedule of cost of goods manufactured.
2. Compute the cost of goods sold.
3. Using data as needed from (1) and (2) above, prepare an income statement.

SOLUTION – "Klear-Seal Company"

(1).

Klear-Seal Company
Schedule of Cost of Goods Manufactured
For the year ended December 31, 2012

		$
Direct materials:		
Raw material inventory, Jan 1	90,000	
Add: purchases of raw material	750,000	
Raw material available for use	840,000	
Less: raw material inventory, Dec 31	(60,000)	
Raw material used		780,000
Direct labor		150,000
Manufacturing overhead:		
Indirect labor	300,000	
Supplies, factory	15,000	
Utilities, factory	36,000	
Insurance, factory	40,000	
Depreciation, factory	162,000	
Maintenance, factory	87,000	
Total manufacturing overhead		640,000
Total manufacturing costs		1,570,000
Add: work in process inventory, Jan 1		180,000
Less: work in process inventory, Dec 31		(100,000)
Cost of Goods Manufactured		1,650,000

(2).

Klear-Seal Company
Schedule of Cost of Goods Sold
For the year ended December 31, 2012

	$
Finished goods inventory, Jan 1	260,000
Add: cost of goods manufactured	1,650,000
Goods available for use	1,910,000
Less: finished goods inventory, Dec 31	(210,000)
Cost of Goods Sold	1,700,000

(3).

Klear-Seal Company
Income Statement
For the year ended December 31, 2012

		$
Sales		2,500,000
Less: cost of goods sold		(1,700,000)
Gross margin		800,000
Less: selling& admin costs		
Selling exp.	140,000	
Admin exp.	270,000	
Total selling& admin costs		(410,000)
Net operating income		390,000

Question No.2

The records of the Deltex Ltd., show the following information for the quarter ended September 30, 2012

	Rs.
Material purchased	1,946,700
Direct labor	2,125,800
Factory overhead	764,000
Selling& Distribution expenses	516,000
General and administrative expenses	461,000
Sales (12400 Videos)	6,364,000

STOCKS	**1st oct 2011**	**30th September 2012**	
	Rs	Rs	
Raw materials	268,000	167,000	
Finished goods (100 Videos)	43,000	200	Videos
No unfinished work on hand			

Required:

1. The cost of goods manufactured.
2. The number of units manufactured
3. The value of closing finished goods inventory
4. The cost of goods sold
5. The unit cost of Videos manufactured
6. An income statement for the period
7. The gross profit per unit sold
8. The net profit per unit sold
9. The ratio of gross profit to sales
10. The profit to sales percentage

SOLUTION: "Deltex Company"

(6).

Deltex Company

Income Statement

For the Year ended June 30, 2012

		Rs.
Sales		6,364,000
Cost of sales		
Opening stock raw material	268,000	
Add: purchases	1,946,700	
	2,214,700	
Less: closing stock raw material	167,000	
Cost of material used		2,047,700
Direct labor		2,125,800
Prime cost		4,173,500
Factory overheads		764,000
Cost of Goods Manufactured		4,937,500
Add: opening finished goods		43,000

Cost of goods available for sales			4,980,500
Less: closing finished goods (200*395)			79,000
Cost of Goods Sold			4,901,500
Gross profit			1,462,500
Less: selling& distribution expenses		516,000	
general& admin expenses		461,000	
Expenses			977,000
Net Profit			485,500

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(1). Cost of Goods Manufactured

Cost of Goods Manufactured = Rs. 4,397,500

(2). Units Manufactured

Units manufactured = Sales units + Closing finished goods - Opening finished goods

Units manufactured = 12400+200-100

Units manufactured = 12,500 units

(3). Value of Finished Goods

Value of finished goods = Cost of goods manufactured per unit*Closing finished goods

Cost of goods manufactured per unit = Cost of goods manufactured/ Number of units

= 4397500/ 12500 = Rs. 395

Value of finished goods = 395*200

Value of finished goods = Rs. 79,000

(4). Cost of Goods Sold

Cost of goods sold = Rs. 4,901,500

(5). Unit cost of videos manufactured

Unit cost of videos manufactured = Rs. 395

(6). Income Statement at 1st

(7). Gross profit per unit sold

Gross profit per unit sold = Gross profit/ Sales units

Gross profit per unit sold = 1462500/ 12400

Gross profit per unit sold = Rs. 117.94

(8). Net profit per unit sold

Net profit per unit sold = Net profit/ Sales units

Net profit per unit sold = 485500/ 12400

Net profit per unit sold = Rs. 39.15

(9). Ratio of Gross profit to Sales

Ratio of gross profit to sales = (Gross profit/ Sales) * 100

Ratio of gross profit to sales = (1462500/ 6364000) * 100

Ratio of gross profit to sales = 22.98%

(10). Ratio of Net profit to Sales

Ratio of net profit to sales = (Net profit/ Sales) * 100

Ratio of net profit to sales = (485500/ 6364000) * 100

Ratio of net profit to sales = 7.63%

Costing Methods:

There are two basic types of systems that companies can adopt-job costing and process costing systems.

Job Order Costing:

Job costing relates to a costing system that is required in organizations where each unit or batch of output of a product or service is unique. This creates the need for the cost of each unit to be calculated separately. The term 'job' thus relates to each unique unit or batch of outpu the nature of job which determines the department through which it is to be processed.

Job costing is applied to such activities as printing work, motor car repair, machine tools, general engineering, and audit firms.

Process Costing: Process costing relates to those situations where masses of identical units are produced and it is unnecessary to assign costs to individual units of output. An input of material passes through a number of processes before it reaches to finished goods store room. The output of one process may become the input of other process.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 43)*

Industries where process costing is applied:

- Furniture Industry
- Meat Industry
- Chemical Industry
- Oil refinery
- Steel industries

Operating Costing: Operating costing method is applied in those organizations which provide services and are not engaged in manufacturing process. The cost of providing a service is termed as "operating cost". In many manufacturing companies, operating costing is used in certain departments which renders services, e.g. internal transport, power house, personnel department etc.

TRANSPORT COSTING

Objects:

The main objects of transport costing are:

1. To fix the rates of carriage of goods or passengers on the basis of operating costs
2. To decide the hire charges where vehicles are given on hire

3. To determine what should be charged against departments or others, using a service
4. To compare the cost of using own motor vehicles and that of using alternate forms of transport
5. To compare the cost of maintaining one vehicle with another or one group of vehicles with another group

Determination of Number of Cost Units

The cost unit in passenger transport is usually a passenger kilometer and in goods transport it is a ton-kilometer. The calculation of the total number of cost units is illustrated below:

Illustration 2.1 Firstflight Transport Co. runs four lorries between two towns which are 50 kms Apart. The seating capacity of each bus is 50 passengers and actual passengers carried are 80% of the seating capacity. All the 4 buses run on 25 days in the month and each bus makes one round trip per day.

Passengers Kilometers =

No. of Lorries		**Distance**		**Capacity Of each Lorry**		**Actual Capacity Utilized**		**Round trip**		**No. of Days**
4	x	50	x	50	x	80%	x	2	x	25

= 4,000,000 passenger kilometers

Collection of Data:

Most of the details required for transport costing are obtained from log book. A log book is maintained for each vehicle to record details of trips, running time, capacity, mileage, etc on daily basis. These details also enable the management to avoid idleness of vehicles, to prevent waste of the capacity and to guard against unnecessary duplication of trips.

Compilation of costs:

Costs are classified and accumulated under the following heads:

Standing Charges

Garage rent

License fees and taxes

Insurance

Drivers' wages

Depreciation

Administrative Costs

Interest on capital

Standing or fixed Charges: These are constant costs and are incurred irrespective of the basis of mileage run. Such costs, therefore, should not be allocated to specific journeys on the basis of mileage. Some of these costs are direct or traceable fixed costs and can be allocated to specific vehicles. Other such costs are suitably apportioned to each vehicle.

Opinions differ as to whether depreciation is to be regarded as a fixed cost or a variable cost. It is thus sometimes regarded as a variable or running cost and sometimes as a fixed cost. Interest on capital might also be included in fixed charges.

Running or variable charges: Petrol/diesel oil, lubricating oil, Tyres and tubes, repairs and maintenance, drivers' wages. These costs vary more or less in direct proportion to mileage and so a cost per unit may be computed. Wages of drivers, conductors and cleaners are sometimes regarded as running or variable costs if payment is according to distance or trips.

The above two types of costs are compiled periodically in an operating cost sheet.

Quotations while preparing quotations, then in addition to cost figures, certain non-cost factors like strength of competition possibly to return loads, likelihood of repeat business, etc. must also be considered even though these are outside the sphere of cost accounting. An example of compilation of a typical quotation is given below:

Illustration 2.2

A vehicle costs **Rs. 650,000** and its life is estimated at 8 years, after which its residual value is estimated at **Rs. 200,000**. Standing charges per annum are estimated at following figures: Insurance **Rs. 6500**, **License Rs. 8000**, and Administration overheads **Rs. 350,000**.

Fuel costs **Rs. 400 per gallon** and based on an estimated kilometers of **30,000** per year the cost of lubricants is **Rs. 12000**. The estimated consumption of fuel is **20 miles per gallon**. A set of tyres costs **Rs. 20,000** and their expected mileage is **16000**. The driver is paid **Rs. 50 per week of 44 hours** and is entitled to a fortnight's paid holiday per annum. The company's contribution towards national Insurance Scheme is **Rs. 1000 per week**. For each night spent away from home, the driver is paid a subsistence allowance of **Rs.1000**. It is estimated that the vehicle will run **220 days per annum** and depreciation is regarded as a running cost. Repairs over the life of the vehicle are estimated at **Rs. 150,000**. (a) Compute figures which may be used as a basis for quoting, if the company **adds 10%** to the total cost for profit.

Prepare a **quotation** for a journey of **100 miles and return**, assuming no return load and a total time of two days.

2.2.2 Costing Techniques:

There are two basic types of systems that companies can adopt-job costing and process costing systems.

1. Absorption costing
2. Marginal Costing
3. Budgetary control

4. Standard Costing

5. Relevant Costing

6. Responsibility Accounting

Marginal Costing: 'The costing method in which variable costs are charged to cost units and fixed costs of the period are written off against the aggregate contribution. Its special value is in recognizing cost behavior, and hence assisting in decision-making'.

(**CIMA** *official Terminology)*

Absorption Costing: 'A method of costing that, in addition to direct costs, assigns all, or a proportion of, production overhead costs to cost units by means of one or a number of overhead absorption rates'.

(**CIMA** *official Terminology)*

Budgetary Control: 'is the comparison of actual results with budgeted results'. It is carried out through a Master Budget devolved to responsibility centers, allowing continuous monitoring of actual results versus budget, either to secure by individual action the budget objectives or to provide a basis for budget revision.'

(**CIMA** *official Terminology)*

In other words, individual managers are held responsible for investigating differences between budgeted and actual results, and are then expected to take corrective action or amend the plan in the light of actual events.

(**CIMA** *performance Management 3rd edition, pg: 402)*

Standard Costing: 'is a pre-determined cost of manufacturing a single unit or a number of product units during a specific period in the immediate future'

(**Matz Usry** *Cost Accounting 7th edition, pg: 544)*

It is the planned cost of a product under current and/or anticipated operating condition.

A standard cost has two components: a standard and a cost. A standard is like a norm and whatever is considered normal can generally be accepted as standard.

Example: If a score of 72 is a standard for a golf course, a golfer's score is judged on the basis of this standard.

Relevant Costing: 'The costs which should be used for **decision-making** and are often referred to as **relevant costs**'

'Costs appropriate to a specific management decision. These are represented by future cash flows whose magnitude will vary depending upon the outcome of the management decision made'.

(**CIMA** *official Terminology)*

Responsibility Accounting: 'is a system of accounting that segregates costs and revenues into areas of personal responsibility in order to monitor and assess the performance of each part of an organization'.

(**CIMA** *official Terminology)*

2.5 Not-for-profit organizations:-

Some organizations are set up with a prime objective which is not related to making profits. Examples are NGO's, charities. These organizations exist to pursue non-financial aims, such as providing a service to the community. However, there will be financial constraints which limit what any organization can do.

1) A not-for-profit organization needs finance to pay for its operations, and the major financial constraint is the amount of funds that it can obtain from its 'donors' (its customers)

2) Having obtained funds, a not-for-profit organization will use the funds to help its 'clients', for example by alleviating suffering. It performance is judged how it uses its funds on the following three grounds:

    a) **Economically-** that is not spending Rs.2 when the same thing can be bought for Re.1

    b) **Efficiently-** getting the best use out of what the money is spent on.

    c) **Effectively-**spending funds so as to achieve the organization's objectives

(**CIMA** *performance Management 3rd edition, Pg: 456)*

High-low method: The high-low method consists of selecting the periods of highest and lowest activity levels and comparing the changes in costs that result from the two levels. This approach is illustrated in the following example:

Example

The monthly recordings for output and maintenance costs for the past 12 months have been examined and the following information has been extracted for the lowest and highest output levels:

The non-variable (fixed) cost can be estimated at any level of activity (assuming a constant unit variable cost) by subtracting the variable cost portion from the total cost. At an activity level of 5000 units the total cost is Rs. 22000 and the total variable cost is Rs. 10,000 (5000 units @ Rs.2 per unit). The balance of Rs. 12000 is therefore assumed to represent the non-variable cost. The cost function is therefore:

Y = Rs. 12000 + (Rs.2)(x)

The method is illustrated in Figure, with points A & B representing the lowest and highest output levels, and TC1 and TC2 representing the total cost for each of these levels. The other crosses represent past cost observations for other output levels. The straight (blue)

line joining the observations for the lowest and highest activity levels represent the costs that would be estimated for each activity level when the high-low method is used.

From this illustration, we come to know that the method ignores all cost observations other than the observations for the lowest and highest activity levels. Unfortunately, cost observations at the extreme ranges of activity levels are not always typical of normal operating conditions, and therefore may reflect abnormal rather than normal cost relationships. **Figure 23.2** indicates how the method can give inaccurate cost estimates when they are obtained by observing only the highest and lowest output levels. It would obviously be more appropriate to incorporate all of the available observations into the cost estimate, rather than to use only two extreme observations.

Illustration: Georgia Woods, Inc., manufactures furniture to customers' specifications and uses a job order cost system. A predetermined overhead rate is used in applying manufacturing overhead to individual jobs. In department One, overhead is applied on the basis of machine-hours, and in Department Two, on the basis of direct labor hours. At the beginning of the current year, management made the following budget estimates to assist in determining the overhead application rate:

	Department One	**Department Two**
Direct labor cost ……..	Rs. 30,000,000	Rs. 22,500,000
Direct labor hours …….. ……..	20,000	15,000
Manufacturing overhead ……Rs.	42,000,000	33,750,000
Machine hours …….	12000	7500

Production of a batch of custom furniture ordered by City Furniture (job no.58) was started early in the year and completed three weeks later on January 29. The records for this job show the following cost information:

	Department One	**Department Two**
Job order for City Furniture (job no. 58):		
Direct materials cost …….	1,010,000	760,000
Direct labor cost ……...	1,650,000	1,110,000
Direct labor hours …….	1100	740
Machine-hours …….	750	500

Selected additional information for January is given below:

	Department One	**Department Two**
Direct labor hours-month of January …….	1,600	1,200
Machine hours – month of January ….....	1,100	600
Manufacturing overhead incurred in January…	3,901,000	2,654,000

a) Compute the predetermined overhead rate for each department.

b) What is the total cost of the furniture produced for City Furniture?

c) Prepare the entries required to record the sale (on account) of the furniture to City Furniture. The sales price of the order was Rs. 14,700,000.

d) Determine the over-or under-applied overhead for each department at the end of January.

Question No.1

Midstate University is trying to decide whether to allow 100 more students into the university. Tuition is $5,000 per year. The controller has determined the following schedule of costs to educate students:

Number of Students	Total Costs
4,000	$30,000,000
4,100	30,300,000
4,200	30,600.000
4,300	30,900,000

The current enrollment is 4,200 students. The president of the university has calculated the cost per student in the following manner: $30,600,000 / 4,200 students = $7,286 per student. The president was wondering why the university should accept more students if the tuition is only $5,000.

a. What is wrong with the president's calculation?
b. What are the fixed and variable costs of operating the university?

SOLUTION :1

	Number of Students	Total Cost ($)
Minimum	4,000	30,000,000
Maximum	4,300	30,900,000
Difference	300	900,000

Thus, our total cost per student becomes: 900,000/ 300 = $3,000

If we consider the total cost per student as Variable cost and the Tuition fee as selling price, our contribution per student becomes

Contribution per student $2,000

(5,000 - 3,000)

Also if total cost per student is considered as variable cost, the fixed cost can be derived out as follows:

	Number of Students	Total Cost ($)	Variable cost ($3000 per student)	Fixed cost (Total - Variable)
Minimum	4,000	30,000,000	12,000,000	18,000,000
Maximum	4,300	30,900,000	12,900,000	18,000,000
Difference	300	900,000	900,000	

This means that we are maintaining the same $18,000,000 fixed cost, while retaining $2,000 margin per new student enrolled, therefore, 100 more students should be enrolled as far as it gives benefit with subject to the persistent fixed costs.

Question No. 2

The Small Bike Company is the idea of Charles Johnson. Charles has designed a portable bicycle that can be disassembled easily and placed in a suitcase. He is thinking about implementing the idea and going into production. Charles estimates that the fixed costs of producing between 1,000 and 3,000 portable bicycles will be $50,000 annually. In addition, the variable cost per portable bicycle is estimated to be $40 per bicycle. Charles could outsource the suitcase production, which would reduce the fixed costs to $40,000 annually and the variable costs to $35 per bicycle. If the company makes less than 2,000 portable bicycles, there would be excess capacity that could be used to make 1,000 regular bicycles. There would be no additional fixed costs and the variable costs would be $60 per regular bicycle. There is no other use of the space.

a. Charles would like to make $60,000 annually on his venture. If Charles makes and sells 3,000 portable bicycles (with the suitcase), what price should Charles charge for each portable bicycle?
b. If Charles decides to charge $80 per portable bicycle while making the suitcase, what as the break-even number of portable bicycles?
c. If Charles makes 2,500 portable bicycles, should he consider buying the suitcases from an outside supplier if the supplier's price per suitcase is $10?
d. If Charles only makes and sells 2,000 portable bicycles because of limited demand, what is the minimum price that he should consider in selling 1,000 regular bicycles built with the excess capacity?

Solution:2

a. Profit =(Price per unit – Variable cost per unit) (Number of units) – Fixed cost
$60,000 = (Price per unit) - $40)(3,000) - $50,000
Price per unit = $76.67

b. Break – even quantity = Fixed cost/(Price per unit – Variable cost per unit) Break – even Quantity = $50,000/($80 - $40) = 1,250 portable bicycles

c. Avoidable costs if the suitcase is not made in-house

Reduction in fixed costs ($50,000 - $40,000)	$10,000
Reduction in variable costs (2,500 units)($40-$35)	7,500
Total Avoidable costs	$17,500
Cost of purchasing suitcases ($10)(2,500)	**$25,000**

Therefore, the suitcases should be made in-house.

d. Because the regular bicycles do not add to the fixed costs, the variable cost per unit establishes the lower boundary for pricing the regular bicycles. As long as the price is greater than the variable cost, the company has a positive contribution margin from the regular bicycles.

Question No. 3

In year 2000, the G.P. Co. Produced a machine that sold for Rs. 6,000 of which Rs. 4,500 represented cost of goods sold and Rs. 400 represented selling and administrative expenses. The cost of goods sold comprised of 50% material costs, 30% labor cost and 20% factory overhead. During the year, numbers of machines sold were 2000. During year 2001, an increase of 20% in the cost of material and an increase of 25% in the cost of labor are anticipated. The company plans to raise the selling price to Rs. 7,000 per unit, with a resulting decrease of 40% in the number of units to be sold.

Required:

a) A Projected profit and loss account for the year 2001 indicating the new cost per unit Assume that material and labor cost will still equal 80% of the cost of the goods sold for the year 2001 and selling and administrative expenses are still Rs.400 per unit.
b) After the statement required in (a) was prepared, it was ascertained that the 20% factory overheads in Year 2000 consisted of Rs. 1,000,000 fixed expenses and Rs.800,000 variable expenses. The decrease in the number of units to be sold in Year 2001 does not influence fixed expenses. Prepare a revised profit& loss account for Year 2001 disregarding the 80% relationship of material and labor cost to cost of goods.

SOLUTION: 3

(a). New Profit& Loss Account

		Rs.
Sales price per unit		7,000.00
Less: Cost of Goods Sold		
Material cost [2,250 + (2,250*20%)]	2,700.00	
Labor cost [1,350 + (1,350*25%)]	1,687.50	
F. O/H [(2,700+1,688.8)/80%)*20%]	1,096.88	5,484.38
Gross profit per unit		1,515.63
Less: Selling expenses		400.00
Net profit		1,115.63

Working:

	Rs.
Cost of Goods Sold	4,500.00
Material cost (50% of COGS)	2,250.00
Labor cost (30% of COGS)	1,350.00
F. O/H	900.00
	4,500.00

(b). Profit & Loss Account

		Rs.
Sales (7,000*1,200)		8,400,000.00
Less: Cost of Goods Sold		
Material cost (2,700*1,200)	3,240,000.00	
Labor cost (1,687.50*1,200)	2,025,000.00	
F. O/H - Variable [(800,000/2,000)*1,200]	480,000.00	
Fixed	1,000,000.00	6,745,000.00
Gross profit per unit		1,655,000.00
Less: Selling expenses (1,200*40%)		480.00
Net profit		1,654,520.00

Working:

New sales units [2000*(1-40%)]	1,200.00

CHAPTER

3

COSTING METHODS

Costing Methods:

There are two basic types of systems that companies can adopt-job costing and process costing systems.

Job Order Costing:

Job costing relates to a costing system that is required in organizations where each unit or batch of output of a product or service is unique. This creates the need for the cost of each unit to be calculated separately. The term 'job' thus relates to each unique unit or batch of output.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 43)*

The special features of production using job costing are:

a) Production is against customer's orders and not for stocks.

b) Each job has its own characteristics and requires special attention

c) The flow of production is not uniform from one department to another. It is the nature of job which determines the department through which it is to be processed.

Job costing is applied to such activities as printing work, motor car repair, machine tools, general engineering, and audit firms.

Process Costing: Process costing relates to those situations where masses of identical units are produced and it is unnecessary to assign costs to individual units of output. An input of material passes through a number of processes before it reaches to finished goods store room. The output of one process may become the input of other process.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 43)*

Industries where process costing is applied:

- Furniture Industry
- Meat Industry
- Chemical Industry
- Oil refinery
- Steel industries
- Dairy industries
- Brewery

Characteristics of Process Costing:

1. Production of unit cannot be separately identified in process costing whereas in job order or batch costing the production unit retain its identity. Unit cost has to be based on the average cost of the process.

2. The completed unit (output) of one process becomes the input of the next process unless it reaches to final process and then to finished goods.

3. In the course of processing, several different main products (joint products) and by products may arise.

4. The physical quantity of output of a process may be less than the input of quantity. This can be due to the nature of process evaporation or reaction etc.

5. For cost purposes, each process constitutes a cost centre and the cost per unit is arrived at by dividing total cost of the cost centre by the number of units of output.

Comparison of Process Costing and Job order costing:

Point of difference	Process Costing	Job Order Costing
Products	Identical all are same	Specific, identified separately
Production	Continuous for stock	As and when required
Customer	General Public	Specific
Design, quality	Standardised substitutes are available	According to customer specifications and requirements
Operation	Through various processes a product moves from one department to another	Usually site based, work normally remain stationary
Input / Output	Output of one process becomes the input of other process	Job started ,completed and handed over to customer
Losses	Normal loss/abnormal loss and gains arise	Hardly a loss arise
By Products, Joint products	Different products from the same process	No by or joint products arise
Work in process	A complicated procedure to value the work-in-process	Easy to determine the value of work-in-process
Reports	Process account, supported by production, cost and evaluation statement	Job Cost Sheet
Profit	Calculated for the Co.	For each job

Operating Costing: Operating costing method is applied in those organizations which provide services and are not engaged in manufacturing process. The cost of providing a service is termed as “operating cost”. In many manufacturing companies, operating costing is used in certain departments which renders services, e.g. internal transport, power house, personnel department etc.

Industries where process costing is applied:

1. Road transport companies
2. Railways
3. Airways
4. Shipping Companies
5. Electricity companies
6. Steam service

7. Hospitals
8. Cinemas
9. Canteens
10. Hotels
11. School & Colleges
12. Local authority
13. Personnel department in a factory

Characteristics of Operative Costing:

The following characteristics are usually found in industries where operating costing is used:

a) Services rendered to customers are of unique type.

b) A large proportion of the total capital is invested in fixed assets and comparatively less working capital is required.

c) The distinction between fixed cost and variable cost is of particular importance because the economies and scale of operations considerably affect the cost per unit of service rendered. For example, fixed cost per passenger will be lower if buses in a transport company run capacity packed.

Cost Unit:

The selection of a suitable cost unit (unit of service) may sometimes prove difficult. The cost units may be of the following two types:

Simple Cost Unit: A few examples are given below:

Undertaking	Cost Unit
Transport	Per Km; or per passenger; or per ton luggage carried
School or college	Per Student
Hospital	Per bed
Canteen	per cup of tea; per meal

Composite Cost Unit: In this type more than one unit are combined together. Examples are:

Undertaking	*Cost unit*
Transport	Per-passenger-km; or Per–ton-km
Hospital	Per bed per day
Cinema	Per seat per show
Electricity	Per kilowatt hour

The costing procedure in some of the undertakings where this method of costing isused is detailed below:

TRANSPORT COSTING

Objects:

The main objects of transport costing are:

1. To fix the rates of carriage of goods or passengers on the basis of operating costs
2. To decide the hire charges where vehicles are given on hire
3. To determine what should be charged against departments or others, using a service
4. To compare the cost of using own motor vehicles and that of using alternate forms of transport
5. To compare the cost of maintaining one vehicle with another or one group of vehicles with another group

Determination of Number of Cost Units

The cost unit in passenger transport is usually a passenger kilometer and in goods transport it is a ton-kilometer. The calculation of the total number of cost units is illustrated below:

Illustration 2.1 Firstflight Transport Co. runs four lorries between two towns which are 50 kms Apart. The seating capacity of each bus is 50 passengers and actual passengers carried are 80% of the seating capacity. All the 4 buses run on 25 days in the month and each bus makes one round trip per day.

Passengers Kilometers =

No. of Lorries		**Distance**		**Capacity Of each Lorry**		**Actual Capacity Utilized**		**Round trip**		**No. of Days**
4	x	50	x	50	x	80%	x	2	x	25

= 4,000,000 passenger kilometers

Collection of Data:

Most of the details required for transport costing are obtained from log book. A log book is maintained for each vehicle to record details of trips, running time, capacity, mileage, etc on daily basis. These details also enable the management to avoid idleness of vehicles, to prevent waste of the capacity and to guard against unnecessary duplication of trips.

Compilation of costs:

Costs are classified and accumulated under the following heads:

Standing Charges

Garage rent
License fees and taxes
Insurance
Drivers' wages
Depreciation
Administrative Costs
Interest on capital

Standing or fixed Charges: These are constant costs and are incurred irrespective of the basis of mileage run. Such costs, therefore, should not be allocated to specific journeys on the basis of mileage. Some of these costs are direct or traceable fixed costs and can be allocated to specific vehicles. Other such costs are suitably apportioned to each vehicle.
Opinions differ as to whether depreciation is to be regarded as a fixed cost or a variable cost. It is thus sometimes regarded as a variable or running cost and sometimes as a fixed cost. Interest on capital might also be included in fixed charges.

Running or variable charges: Petrol/diesel oil, lubricating oil, Tyres and tubes, repairs and maintenance, drivers' wages. These costs vary more or less in direct proportion to mileage and so a cost per unit may be computed. Wages of drivers, conductors and cleaners are sometimes regarded as running or variable costs if payment is based on distance covered or trips made.

Job Order Costing Vs. Process Costing

Job Order Costing	**Process Costing**
• Products identified separately	• Products identical
• Production as needed	• Production continuous for stock
• Specific Customer	• Customer general public
• Design & Quality as per requirement	• Standardized substitutes are available
• Job started, completed and handed over to customer	• Output of one process becomes the input of other
• Losses hardly arise	• Normal loss/abnormal loss

Operating Costing

Used in Service oriented organizations like:

- Road transport companies
- Railways
- Airways
- Shipping Companies
- Electricity companies
- Steam service
- Hospitals
- Cinemas
- Canteens
- Hotels
- School & Colleges
- Local authority
- Personnel department in a factory

Operating Costing

Characteristics:

- Unique Services
- Large proportion invested in Fixed assets and comparatively less working capital
- Distinction between fixed cost and variable cost important because economies and scale of operations affect the cost per unit of service rendered

Operating Costing

The selection of a suitable cost unit (unit of service) may sometimes prove difficult. The cost units may be of the following two types:

- Simple Cost Unit
- Composite Cost Unit

Operating Costing

Simple Cost Unit

Undertaking	*Cost Unit*
Transport	*Per Kilometer; or*
School or College	*Per passenger*
Hospital	*Per student*
Canteen	*Per bed*
	Per cup of tea;
	Per meal

Operating Costing

Composite Cost Unit

Undertaking	*Cost Unit*
Transport	*Per passenger-km*
School or College	*Per-ton-km*
Hospital	*Per bed per day*
Canteen	*Per seat per show*

Transport Costing objects:

- Fixing Carriage rates (goods or passengers)
- Deciding the hire charges of vehicle.

Question No. 1

Slater Company manufactures products to customer specifications; a job-order cost system is used to accumulate costs in the company's plant. On July 1, 2008 the start of Slater Company's fiscal year, inventory balances were as follows:

	Rs.
Raw materials……..	25,000
Work in process……..	10,000
Finished goods……..	40,000

The company applies overhead cost to jobs on the basis of machine-hours of operating time. For the fiscal year starting July 1, 2008, it was estimated that the plant would operate 45,000 machine-hours and incur Rs. 270,000 in manufacturing overhead cost. During the year, the following transactions were completed:

a. Raw materials purchased on account, Rs. 275,000
b. Raw materials requisitioned for use in production, Rs. 280,000 (materials costing Rs. 220,000 were chargeable directly to jobs; the remaining materials were indirect)
c. Costs for employee services were incurred as follows:

	Rs.
Direct labor……..	180,000
Indirect labor……..	72,000
Sales commissions……..	63,000
Administrative salaries……..	90,000

d. Prepaid insurance expired during the year, Rs. 18,000 (Rs. 13,000 of this amount related to factory operations, and the remainder to selling and administrative activities).
e. Utility costs incurred in the factory, Rs. 57,000
f. Advertising costs incurred, Rs. 140,000
g. Depreciation recorded on equipment, Rs. 100,000. (Some Rs. 88,000 of this amount was on equipment used in factory operations; the remaining Rs. 12,000 was on equipment used in selling and administrative activities).
h. Manufacturing overhead cost was applied to production, Rs. ? . (The company recorded 50,000 machine-hours of operating time during the year).
i. Goods costing Rs. 675,000 to manufacture were transferred into the finished goods warehouse.
j. Sales (all on account) to customers during the year totaled Rs. 1,250,000. These goods had cost Rs. 700,000 to manufacture.

Required:

1. Prepare journal entries to record the transactions for the year.
2. Prepare T-accounts for inventories, Manufacturing Overhead, and Cost of Goods Sold. Post relevant data from your journal entries to these T-accounts. Compute an ending balance in each account.
3. Is Manufacturing Overhead underapplied or overapplied for the year? Prepare a journal entry to close any balance in the Manufacturing Overhead account to Cost of Goods Sold.
4. Prepare an income statement for the year. (Do not prepare a schedule of cost of goods manufactured; all of the information needed for the income statement is available in the journal entries and T-accounts you have prepared).

Part-1

	General Journal			
(a).	Raw materials	275,000		
	Accounts payable		275,000	
(b).	Work in process	220,000		
	Manufacturing overhead	60,000		
	Raw materials		280,000	
(c).	Work in process	180,000		
	Manufacturing overhead-indirect labor	72,000		
	Sales commission	63,000		
	Administrative salaries	90,000		
	Salaries& wages payable		405,000	
(d).	Manufacturing overhead	13,000		
	Insurance expense	5,000		
	Prepaid insurance		18,000	
(e).	Manufacturing overhead	57,000		
	Accounts payable		57,000	
(f).	Advertising expense	140,000		
	Accounts payable		140,000	
(g).	Manufacturing overhead	88,000		
	Depreciation expense	12,000		
	Accumulated depreciation		100,000	
(h).	Work in process	300,000		**(W-1)**
	Manufacturing overhead		300,000	

(i).	Finished goods	675,000	
	Work in process		675,000
(j).	Accounts receivable	1,250,000	
	Sales		1,250,000
	Cost of goods sold	700,000	
	Finished goods		700,000

Working:

W-1 Manufacturing overhead cost

To find out the manufacturing cost, first we have to determine the amount of Predetermined Overhead Rate:

Estimated manufacturing overhead	270,000	
Estimated machine hours	45,000	
Predetermined overhead rate	6	Rs. per M/hr

(Est. manufacturing O/H / Est. machine hrs)

Based on the 50,000 machine hours actually worked during the year, the company would have applied the overhead cost to production, as follows:

Overhead cost to be applied at production	300,000	Rs.

50000machine hrs*6

Part-2

Accounts Receivable

(j)	1,250,000		
Bal.	1,250,000		

Prepaid Insurance

		(d)	18,000
		Bal.	18,000

Accumulated Depreciation

		(g)	100,000
		Bal.	100,000

Sales

		(j)	1,250,000
		Bal.	1,250,000

Administrative Salary Expense

(c)	90,000		
Bal.	90,000		

Raw Materials

Bal.	25,000	(b).	280,000
(a).	275000		
	300,000		280,000
Bal.	20,000		

Work in Process

Bal.	10,000	(i).	675,000
(b).	220,000		
(c).	180,000		
(h).	300,000		
	710,000		675,000
Bal.	35,000		

Finished Goods

Bal.	40,000	(j)	700,000
(i).	675,000		
Bal.	15,000		

Manufacturing Overhead

(b)	60,000	(h)	300,000
(c)	72,000		
(d)	13,000		
(e)	57,000		
(g)	88,000		
	290,000		300,000
		Bal.	10,000

Commission Expense

		(c)	63,000
		Bal.	63,000

Cost of Goods Sold

(j)	700,000		
Bal.	700,000		

Accounts Payable

		(a)	275,000
		(e)	57,000
		(f).	140,000
		Bal.	472,000

Salaries& Wages Payable

		(c).	405,000
		Bal.	405,000

Advertising Expense

(f).	140,000		
Bal.	140,000		

Insurance Expense

(d).	5,000		
Bal.	5,000		

Depreciation Expense

(g).	12,000		
Bal.	12,000		

Part-3 Manufacturing overhead is overapplied for the year. The entry to close it out to Cost of Goods Sold, would be:

Manufacturing Overhead	10,000	
Cost of Goods Sold		10,000

Part-4

Slater Company
Income Statement
For the Year ended June 30, 2008

	Rs.	
Sales		1,250,000
Less: COGS (700,000 - 30,000)		690,000
Gross profit		560,000
Less: selling& admin expenses:		
Commission exp.	63,000	
Administrative salaries exp.	90,000	
Advertising exp.	140,000	
Depreciation exp.	12,000	
Insurance exp.	5,000	310,000
Net Income		250,000

Question No.2

Tele Tech Corporation manufactures two different fax machines for the business market. Cost estimates for the two models for the current year are as follows:

	Basic System	Advanced System
Direct material……..	$400	$800
Direct labor (20hours at $15 per hour)……..	300	300
Manufacturing overhead*……..	400	400
Total……	$1,100	$1,500

*The predetermined overhead rate is $20 per direct labor hour

Each model of fax machine requires 20 hours of direct labor. The basic system requires 5 hours in department A and 15 hours in department B. The advanced system requires 15 hours in department A and 5 hours in department B. The overhead costs budgeted in these two production departments are as follows:

	Department A	Department B
Variable cost……	$16 per direct-labor hour	$4 per direct-labor hour
Fixed cost……	$200,000	$200,000

The firm's management expects to operate at a level of 20,000 direct-labor hours in each production department during the current year.

Required:

1. Show how the company's predetermined overhead rate was determined.
2. If the firm prices each model of fax machines at 10 percent over its cost, what will be the price of each model?
3. Suppose the company were to use departmental predetermined overhead rates. Calculate the rate for each of the two production departments.
4. Compute the product cost of each model using the departmental overhead rates calculated in requirement (3).
5. Compute the price to be charged for each model, assuming the company continues to price each product at 10 percent above cost. Use the revised product costs calculated in requirement (4).

SOLUTION: 2

(1). Predetermined overhead rate:

Budgeted manufacturing overhead:

Department A:	**$**
Variable (20000*$16)	320,000
Fixed (200000)	200,000
	520,000
Department B:	
Variable (20000*$4)	80,000
Fixed (200000)	200,000
	280,000
Total budgeted M. O/H	800,000

Total budgeted labor hours:

Basic system	20,000
Advance system	20,000
Total budgeted labor hours	40,000

Predetermined overhead rate (Total budgeted M.O/H / Total budgeted labor hrs)	20.00	per labor hour

(2). Price of each model: (10% over cost)

	Basic System	**Advanced System**
Total manufacturing costs	$1,100	$1,500
Profit margin (10% of cost)	110	150
Price (120% over cost)	$1,210	$1,650

(3). Departmental rates:	**Department A**	**Department B**	
Budgeted manufacturing overhead	$520,000	$280,000	
Budgeted direct labor hours	20,000	20,000	
Overhead rates (O/H / hours)	$26.00	$14.00	per direct labor hr.

(4). Product cost:	**Basic System**	**Advanced System**
Direct material	$400	$800
Direct labor	300	300
Manufacturing overhead:		
Department A	130	390
Department B	210	70
Product cost	$1,040	$1,560

(5). Price of each model: (10% over cost)

	Basic System	Advanced System
Total manufacturing costs	$1,040	$1,560
Profit margin (10% of cost)	104	156
Price (120% over cost)	$1,144	$1,716

Question No. 3

A factory with three departments has a single production overhead absorption rate expressed as a percentage of direct wages cost. It has been suggested that departmental overhead absorption rates would result in more accurate job costs. Set out below are in budgeted and actual data for the previous period, together with the information relating to job No. 657

		Wage	Labor	Machine time	Overhead
		Rs. thousands	thousands of hours	thousands of hours	Rs. thousands
Budget:					
Department:					
	A	25	10	40	120
	B	100	50	10	30
	C	25	25	-	75
Total		150	85	50	225
Actual:					
Department:					
	A	30	12	45	130
	B	80	45	14	23
	C	30	30	-	80
Total		140	87	59	233

During this period, job No.657 incurred the actual costs and actual times in the departments shown below:

		Direct Material	Direct wages	Direct labor	Machine time
		Rs.	Rs.	hours	hours
Department:					
	A	1,200	1,000	20	40
	B	600	600	40	10
	C	100	100	10	-

After adding production overhead to prime cost, one-third is added to production cost for gross profit. That assumes that a reasonable profit is earned after deducting administration, selling and distribution costs.

Required:

(a) Calculate the current overhead absorption rate
(b) Using the rate obtained in (a) above, calculate the production overhead charged to job number 657 and state the production cost and expected gross profit on this job.
(c) (i). Comment on the suggestion that the departmental overhead absorption rates would result in more accurate job cost; and
(ii). Compute rates, briefly explaining your reason for each rate.

SOLUTION: 3

(a). Current overhead absorption rate = (Total overhead cost/ Direct wage cost)*100
Current overhead absorption rate = (225000/ 150000)*100
Current overhead absorption rate = 150% of direct wage cost

(b). Production overhead charged to job no. 657 = 150% * Total Direct wage cost
Production overhead charged to job no. 657 = 150% * (1000+600+100)
Production overhead charged to job no. 657 = 2,550 Rs.

	(Rs. in thousands)
Production cost:	
Direct material (1200 + 600 + 100)	1,900
Direct wages (1000 + 600 + 100)	1,700
Overheads	2,550
Total production cost	6,150
Expected Profit:	
1/3rd of Total production cost (1/3* 6150)	2,050
Expected Profit	2,050

(c). (i) Single overhead absorption rate for every department is not appropriate due to the fact that each department has its own characteristics, department A may b mechanized while B may be labor intensive, and overhead incurrence will differ in each department. It is therefore necessary to use departmental overheads absorption date. This will lead better absorption of overheads and minimum under or over absorption of overheads.

(ii) The overhead absorption rate for each of the Department, on the basis of direct labor hours, machine hours and direct wages (whichever is important for the respective department; on the basis of the highest amount; using budgeted data.

	Basis for Overhead rate	col.1 **Respective base hours**	col.2 **Budgeted overhead cost**	col.3 = (col.2/ col.1) **Departmental Overhead Absorption Rates**
		in thousands	in thousands Rs.	
Department:				
A	Machine hours	40	120	3 per machine hour
B	Direct labor hours	50	30	0.6 per direct labor hour
C	Direct labor hours	25	75	3 per direct labor hour

The overhead rate for Department B and Department C, can also be expressed as a %age of Direct wage cost, i.e. 60% and 300% of direct wage cost respectively

Question No. 4

Georgia Woods, Inc. manufactures furniture to customers' specifications and uses a job order cost system. A predetermined overhead rate is used in applying manufacturing overhead to individual jobs. In Department One, overhead is applied on the basis of machine-hours, and in Department Two, on the basis of direct labor hours. At the beginning of the current year, management made the following budget estimate to assist in determining the overhead application rate:

	Department One	Department Two
Direct labor cost……	$300,000	$225,000
Direct labor hours……	20,000	15,000
Manufacturing overhead……	$420,000	$337,500
Machine-hours……	12,000	7,500

Production of a batch of custom furniture ordered by City Furniture (job no. 58) was started early in the year and completed three weeks later on January 29. The records of this job show the following cost information:

	Department One	Department Two
Job order for City Furniture (job no. 58):		
Direct materials cost……	$300,000	$225,000
Direct labor cost……	20,000	15,000
Direct labor hours……	$420,000	$337,500
Machine-hours……	12,000	7,500

Selected additional information for January is given below:

	Department One	Department Two
Direct labor hours – month of January……	1,600	1,200
Machine hours – month of January……	1,100	600
Manufacturing overhead incurred in January……..	$39,010	$26,540

Required:

(a). Compute the predetermined overhead rate for each department
(b). What is the total cost of the furniture produced for City Furniture?
(c). Prepare the entries required to record the sale (on account) of the furniture to City Furniture. The sales price of the order was $147,000
(d). Determine the over-or under-applied overhead for each department at the end of January.

SOLUTION: 4

(a). Predetermined overhead rate

Predetermined overhead rate = Estimated manufacturing overhead/ Base hours

Department One - (machine hours)

	Rs.	
Predetermined overhead rate =	420000/ 12000	
Predetermined overhead rate =	35.00	per machine hour

Department Two - (direct labor hours)

	Rs.	
Predetermined overhead rate =	337500/ 15000	
Predetermined overhead rate =	22.5	per machine hour

(b).

	Department One	Department Two	Total
Direct materials cost	10,100	7,600	17,700
Direct labor cost	16,500	11,100	27,600
Prime cost	26,600	18,700	45,300
Manufacturing overhead	26,250	16,650	42,900
Total cost of production	52,850	35,350	88,200

Working:

Manufacturing overhead:

Manufacturing overhead = Predetermined overhead rate*Base hours for Job. 58

	Department One	Department Two
Actual M.O/H	26,250	16,650

(c). Journal Entries:

Accounts receivable	147,000	
Sales		147,000
Cost of goods sold	88,200	
Finished goods inventory		88,200

(d). Over or underapplied overhead:

	Department One	Department Two	Total
Actual overhead incurred	39,010	26,540	65,550
Applied overhead	38,500	13,500	52,000
(Actual hours*Predetermined rate)			
	510	13,040	13,550
	(U)	(O)	(U)

Question No. 5

Scholastic Brass Corporation manufactures brass musical instruments for use by high school students. The company uses a normal costing system, in which manufacturing overhead is applied on the basis of direct-labor hours. The company's budget for the current year included the following predictions.

Budgeted total manufacturing overhead…….	$426,300
Budgeted total direct-labor hours…….	20,300

During March, the firm worked on the following two production jobs:

Job number T81, consisting of 76 trombones

Job number C40, consisting of 110 cornets

The events of March are described as follows:

a. One thousand square feet of rolled brass sheet metal was purchased on account for $5,000.
b. Four hundred pounds of brass tubing was purchased on account for $4,000.
c. The following requisitions were submitted on March 5:

Requisition number 112:250 square feet of brass sheet metal at $5 per square foot (for job number T81)

Requisition number 113:1,000 pounds of brass tubing, at $10 per pound (for job number C40)

Requisition number 114:10 gallons of valve lubricant, at $10 per gallon

All brass used in production is treated as direct material. Valve lubrication is an indirect material.

d. An analysis of labor time cards revealed the following labor usage for March.

Direct labor: Job number T81, 800 hours at $20 per hour

Direct labor: Job number C40, 900 hours at $20 per hour

Indirect labor: General factory cleanup, $4,000

Indirect labor: Factory supervisory salaries, $9,000

e. Depreciation of factory building and equipment during March amounted to $12,000.
f. Rent paid in cash for warehouse space used during March was $1,200.
g. Utility costs incurred during March amounted to $2,100. The invoices for these costs were received, but the bills were not paid in March.
h. March property taxes on the factory were paid in cash, $2,400.
i. The insurance cost covering factory operations for the month of March was $3,100. The insurance policy had been prepaid.

j. The costs of salaries and fringe benefits for sales and administrative personnel paid in cash during March amounted to $8,000.
k. Depreciation on administrative office equipment and space amounted to $4,000.
l. Other selling and administrative expenses paid in cash during March amounted to $1,000.
m. Job number T81 was completed on March 20.
n. Half of the trombones in job number T81 were sold on account during March for $700 each.

The March 1 balances in selected accounts are as follows:

Cash……..	$10,000
Accounts receivable……..	21,000
Prepaid insurance……..	5,000
Raw-material inventory……..	149,000
Manufacturing supplies inventory……..	500
Work-in-process inventory……..	91,000
Finished-goods inventory……..	220,000
Accumulated depreciation: buildings& equipment……..	102,000
Accounts payable……..	13,000
Wages payable……..	8,000

Required:

1. Calculate the company's predetermined overhead rate for the year.
2. Prepare journal entries to record the events of March.
3. Set up T-accounts, and post the journal entries made in requirement (2).
4. Calculate the overapplied or underapplied overhead for March. Prepare a journal entry to close this balance into Cost of Goods Sold.
5. Prepare a schedule of cost of goods manufactured for March.
6. Prepare a schedule of cost of goods sold for March.
7. Prepare an income statement for March.

SOLUTION: 5

1 **Predetermined overhead rate**

Estimated manufacturing overhead	$426,300	
Estimated machine hours	20,300	
Predetermined overhead rate	$21	per direct labor hour
(Est. manufacturing O/H / Est. machine hrs)		

2

	General Journal			
			$	
(a).	Raw materials		5,000	
	Accounts payable			5,000
(b).	Raw materials		4,000	
	Accounts payable			4,000
(c).	Work in process		11,250	
	Raw materials	W-1		11,250
	Manufacturing overhead – supplies inventory		100	
	Indirect material	W-2		100
(d).	Work in process-direct labor		34,000	
	Manufacturing overhead-indirect labor		13,000	
	Wages payable	W-3		47,000
	Work in process		35,700	
	Manufacturing overhead applied			35,700
	(applied O/H = 1700hrs * 21 = $35,700)			
(e).	Manufacturing overhead		12,000	
	Accumulated depreciation-factory			12,000
(f).	Manufacturing overhead-rent exp.		1,200	
	Cash			1,200
(g).	Manufacturing overhead		2,100	
	Accounts payable			2,100
(h).	Manufacturing overhead-tax exp.		2,400	
	Cash			2,400
(i).	Manufacturing overhead-insurance exp.		3,100	
	Prepaid insurance			3,100
(j).	Selling& admin exp.		8,000	
	Cash			8,000
(k).	Selling& admin exp.		4,000	
	Accumulated depreciation-admin equip			4,000
(l).	Selling& admin exp.		1,000	
	Cash			1,000
(m).	Finished goods-Job T81	W-4	34,050	
	Work in process-Job T81			34,050
(n).	Accounts receivable		26,600	
	Sales - Job T81	W-5		26,600
	Cost of goods sold	W-6	17,025	
	Finished goods - Job T81			17,025

Working:

W-1	**Direct material cost:**	**$**
	Brass sheet metal cost (250sq-ft*$5)	1,250
	Brass tubing cost (1000pounds*$10)	10,000
	Total direct material costs	11,250
W-2	**In-direct material cost:**	
	Valve lubricant cost (10gallons*$10)	100
	Total in-direct material costs	100
W-3	**Wages payable:**	
	Work in process-direct labor (800*$20 + 900*$20)	34,000
	Manufacturing overhead-indirect labor (4000+9000)	13,000
	Wages payable	47,000
W-4	**Cost of Job T81:**	
	Direct material - Brass sheet metal cost (250sq-ft*$5)	1,250
	Direct labor – Cost (800*$20)	16,000
	Manufacturing overhead applied on DL hrs (800*$21)	16,800
	Total manufacturing cost of Job T81	34,050
W-5	**Sales - JobT81:**	
	Sales units (half of trombones*price per unit) (76/2 * $700)	26,600
W-6	**Cost of goods sold - Job T81:**	
	Cost of goods sold:	
	Sales units (76/ 2)	38
	Cost per unit (34050/ 76)*(38)	17,025

3 T – Accounts

Cash

Bal.	10,000	(f).	1,200
		(h).	2,400
		(j).	8,000
		(l).	1,000
	10,000		12,600
		Bal.	2,600

Accounts receivable

Bal.	21,000		
(n).	26,600		
Bal.	47,600		

Raw material inventory

Bal.	149,000	(c).	11,250

Sales

		(n).	26,600
		Bal.	26,600

Prepaid insurance

Bal.	5,000	(i).	3,100
Bal.	1,900		

(a).	5,000		
(b).	4,000		
Bal.	146,750		

Manufacturing supplies inventory

Bal.	500		
	100		
Bal.	600		

Work-in-process inventory

Bal.	91,000	(m).	34,050
(c).	11,250		
(d).	34,000		
(d).	35,700		
Bal.	137,900		

Finished-goods inventory

Bal.	220,000	(n).	17,025
(m).	34,050		
Bal.	237,025		

Accumulated dep.: Build& equip.

		Bal.	102,000
		(e).	12,000
		(k).	4,000
		Bal.	118,000

Accounts payable

		Bal.	13,000
		(a).	5,000
		(b).	4,000
		(g).	2,100
		Bal.	24,100

Wages payable

		Bal.	8,000
		(d).	47,000
		Bal.	55,000

Selling& admin exp.

(j).	8,000		
(k).	4,000		
(l).	1,000		
Bal.	13,000		

Manufacturing overhead

(c).	100	(d).	35,700
(d).	13,000		
(e).	12,000		
(f).	1,200		
(g).	2,100		
(h).	2,400		
(i).	3,100		
	33,900		35,700
		Bal.	1,800

Cost of goods sold

(n).	17,025		
Bal.	17,025		

4 Overapplied/ Underapplied Overhead

Manufacturing overhead- actual (T-account balance)	33,900	
Manufacturing overhead - applied (T-account balance)	35,700	
Overapplied manufacturing overhead	1,800	**over-applied**

Manufacturing overhead	1,800	
Cost of goods sold		1,800

5

Scholastic Brass Corporation
Cost of Goods Manufactured
For the Year ended March 31, xxxx

		$
Direct material:		
Raw material inventory, March 1	149,000	
Add: purchases of raw material	9,000	
Raw material available for use	158,000	
Less: raw material inventory, March 31	(146,750)	
Raw material used during March		11,250
Direct labor		34,000
Manufacturing overhead:		
Indirect material	100	
Indirect labor	13,000	
Accumulated depreciation – factory	12,000	
Rent expense	1,200	
Utilities	2,100	
Property taxes	2,400	
Insurance exp.	3,100	
Total actual manufacturing overhead	33,900	
Add: overapplied overhead	1,800	
Overhead applied to work in process		35,700
Total manufacturing costs		80,950
Add: work in process inventory, March 1		91,000
		171,950
Less: work in process inventory, March 31		(137,900)
Cost of Goods Manufactured		34,050

6

Scholastic Brass Corporation
Cost of Goods Sold
For the Year ended March 31, xxxx

	$
Finished goods inventory, March 1	220,000
Add: cost of goods manufactured	34,050
Goods available for use	254,050
Less: finished goods inventory, March 31	(237,025)
Cost of Goods Sold	17,025

7

Scholastic Brass Corporation
Income Statement
For the Year ended March 31, xxxx

		$
Sales		26,600
Less: COGS (17025 - 1800)		15,225
Gross profit		11,375
Less: selling& admin expenses:		
Salaries& fringe benefits costs	8,000	
Depreciation on admin office equipment	4,000	

Other selling& admin expenses	1,000	(13,000)
Net Income		(1,625)

JOB COST RECORD

Job Number T81 Description Trombones
Date Started March 5 Date Completed March 20
Number of Units Completed 76

Direct Material

Date	Requisition Number	Quantity	Unit Price	Cost
5-Mar	112	250	$5.00	$1,250

Direct Labor

Date	Time Card Number	Hours	Rate	Cost
3/8 to 3/12	3-08 thorugh 3-12	$800.00	$20.00	$16,000

Manufacturing Overhead

Date	Cost Driver (Activity Based)	Quantity	Application Rate	Cost
3/8 to 3/12	Direct labor hours	$800.00	$21.00	$16,800

Cost Summary

Cost Item	Amount
Total direct material	$1,250
Total direct labor	16,000
Total manufacturing overhead	16,800
Total cost	$34,050
Unit cost	$448.03

Shipping Summary

Date	Units Shipped	Units Remaining in Inventory	Cost Balance
March	38	38	$17,025

Question: 6

The national Oil Company buys crude vegetable oil. The refining of this oil results in four products A, B, C, which are liquid and D which is Heavy Grease. Joint Costs in 19XX total Rs.97,600 (Rs. 27,600 for crude oil plus Rs. 70,000 conversion costs). The out put Sales of the four products in 19xx were as follows.

PRODUCT	OUTPUT	SALES	SEPARABLE PROCESSING COSTS
	Gallons	Rs.	Rs.
A	500,000	115,000	30,000
B	10,000	10,000	6,000
C	5,000	4,000	-
D	9,000	30,000	1,000

REQUIRED:

(a) Assume that the estimated net realizable method of allocating joint costs is used. What is the gross margin for Products A, B, C & D?

(b) The company has been tempted to sell at split of directly to other processors. In this case sales per gallon would have been: A = Rs. 0.15 B = Rs. 0.50 C = Rs. 0.80. D = Rs. 3.00. What would the gross Margin have been for each product assuming that sales value at split off method of allocating joint costs is used.

(c) The company expects to operate at the same level of production and sales in the year. Could the company increase the gross margin by altering it processing decisions?. If so, what would be the expected overall gross margin? Which Products should be further processed and which should be sold at split off? Assume that all costs incurred after split off are variable.

Solution No. 6

(a)

	1 Sales	2 Separable Processing Cost	3 NRV	4 Allocation of Joint Cost	5(2+4) Total Cost	6(1-5) Gross Margin
A	115,000	30,000	85,000	68,000	98,000	17,000
B	10,000	6,000	4,000	3,200	9,200	800
C	4,000	-	4,000	3,200	3,200	800
D	30,000	1,000	29,000	23,200	24,200	5,800
	159,000	**37,000**	**122,000**	**97,600**	**134,600**	**24,400**

(b)

	Sales	Sale at Split off	Allocation Of Joint Cost	Separable Processing Cost	Total Cost	Gross Margin
A	115,000	75,000	65,946	30,000	95,946	19,054
B	10,000	5,000	4,396	6,000	10,396	(396)
C	4,000	4,000	3,517	-	3,517	483
D	30,000	27,000	23,741	1,000	24,741	5,259
	159,000	**111,000**	**97,600**	**37,000**	**134,600**	**24,400**

(c)

	Final S.P/Unit	Split off S.P/Unit	Differential Price	Separable Incremental Cost / Unit	Benefit (Loss)
A	0.23	0.15	0.08	0.06	0.02
B	1.00	0.50	0.50	0.60	(0.10)
C	0.80	0.80	-	-	-
D	3.33	3.00	0.33	0.11	0.22

A & D should be processed further, while B & C should be sold off at split of point.

EXPECTED OVERALL GROSS MARGIN

SALES

A	After Process	115,000	
B	At Split off	5,000	
C	At Split off	4,000	
D	After process	30,000	154,000
JOINT COSTS		97,600	
PROCESSING COST			
A	500,000 Gallons	30,000	
B	9,000 Gallons	1,000	128,600
	Gross Margin		25,400

Note: In case of product C is selling at split off point. No further Processing

Question No. 7

A vehicle costs **Rs. 650,000** and its life is estimated at **5** years, after which its residual value is estimated at Rs. **200,000**. Standing charges per annum are estimated at following figures: Insurance **Rs. 65000**, License **Rs. 13000**, and Administration overheads **Rs. 350,000**.

Fuel costs **Rs. 400** per gallon and based on an estimated kilometers of **30,000** per year the cost of lubricants is **Rs. 12000**. The estimated consumption of fuel is **20 miles** per gallon. A set of tyre costs **Rs. 26,000** and their expected mileage is **10000**. The driver is paid **Rs. 5000 per week of 44 hours** and is entitled to a fortnight's paid holiday per annum. The company's contribution towards national Insurance Scheme is **Rs. 1000 per week**. It is estimated that the vehicle will run **250 days per annum** and depreciation is regarded as a running cost. Repairs over the life of the vehicle are estimated at **Rs. 150,000**. (a) Compute figures which may be used as a basis for quoting, if the company adds **10%** to the total cost for profit. (b) Prepare a quotation for a journey of **100 Km and return**, assuming no return load and a total time of two days.

Solution: 7

Operating Cost Sheet

Standing Charges per Annum	**Rs.**
Insurance	**65,000**
License	**13,000**
Administration Overheads	**350,000**
Driver's wages, (52+2) weeks	
@ Rs.5000 (to include holiday relief)	**270,000**
Other costs, 52 weeks @ Rs.1000 (Con	
tribution to NHIF)	**52,000**
	750,000
Kilometers covered per annum	**30,000**
(A) Standing charges per km	**25**

Running Charges per kilometre	Rs.	
Depreciation (650,000-200000)/(5*30,000)		3.00
Fuel (400 / 20)		20.00
Tyres (26000 / 10,000)		2.60
Lubricants (12000 / 30,000)		0.40
Repairs (150000)/(5*30000)		1.00
(B) Running Cost per Kilometer		27.00
Total cost per kilometer (A + B)		52.00
Standing charged per day		
(750000 / 250)		3,000

Question No. 8

The Murphy Manufacturing Company manufactures a single product that is processed in five departments. The following cost data is available for Deptt. 3 for the month of July, 2013.

Opening work-in-process inventory:	
	Rs.
Cost transferred in from Deptt.	219,000
Deptt. 3 labor cost.	3,000

Current cost:

Cost transferred in during July form Deptt. 2	105,000
Deptt. 3 material cost during July	36,680
Deptt. 3 labor cost during July	42,800

Material used in Deptt. 3 are added to the product at the end of the Deptt. 3 process.

Deptt. 3 conversion costs are assumed to be incurred uniformly throughout the Deptt. 3 processes, manufacturing overhead is applied to product on the basis of 50 percent of labor costs.

The following represents production data for Deptt. 3 for the month of July, 2013.

Work-in-process (July 1)	18000 Units (1/3 completed)
Units transferred in during July from Deptt. 2.	111,000 units
Goods units completed during July	80,000
spoiled units	12,000
Work in process (July 31)	28,000 Units (3/4 completed)

Spoilage is detected by inspection upon completion of the product by Deptt. 3. Normal spoilage is considered to be 10% of the good output. Normal spoilage is considered a cost of the good units completed while abnormal spoilage is written off as a loss.

Units lost during processing are considered to be a normal occurrence unless the number of lost units exceeds. 5 percent of total units accounted for (total units accounted for is equal to the sum of good units completed plus spoiled units plus units in ending inventory accounted for; company accountants make no attempt to specifically determine or separately identify the cost of normal lost units.

Lost units in excess of 5 percent are considered abnormal. The cost of abnormal lost units is separately identified and written off as a loss. The company accountants follow the policy of assigning only transferred-in costs to abnormal lost units.

You are required:

Using FIFO method and consistent with the company's treatment of spoilage and lost units prepare a cost of Production Report for Deptt. 3.

Solution: 8

Quantity Schedule

Input		Output	
Opening Balance	18,000	Units transferred output from opening inventory	18,000
Transferred in	111,000	Units transferred out from current production	62,000
		Normal spoilage(10% of 80,000)	8,000
		Abnormal spoilage (12,000 - 8,000)	4,000
		Normal loss (80,000 + 12,000 + 28,000) x 5%	6,000
		Abnormal loss (Balancing Figure)	3,000
		Closing inventory	28,000
	129,000		129,000

Equivalent Production

	Transferred in	%	Material Added	$	Labor	%	Overhead	%
Units transferred out from opening inventory	--	--	18,000	100	12,000	2/3	12,000	2/3
Units transferred from current production	62,000	--	62,000	100	62,000	100	62,000	100
Normal spoilage		--	8,000	100	8,000	100	8,000	100
Abnormal spoilage		--	4,000	100	4,000	100	4,000	100
Normal loss		--	--	--	--	--	--	--
Abnormal loss		--	--	--	--	--	--	--
Closing inventory			--	--	21,000	¾	21,000	3/4
			92,000		107,000		107,000	

	Transferred in (Rs.)	Material added (Rs.)	Labor (Rs.)	Overhead (Rs.)	Total (Rs.)
Transferred in	105,000	--	--	--	105,000
Costs added	--	36,800	42,800	21,400	101,000
	105,000	36,800	42,800	21,400	206,000
Cost Per Unit (W-1)	1.00	0.40	0.40	0.20	2.00

$$(W\text{-}1)= \frac{\text{Rs. } 105{,}000}{105{,}000} = \text{Rs.}1.00 \quad \text{(input 111,000 – normal loss 6,000)}$$

$$= \frac{\text{Rs.}36{,}800}{92{,}000} = \text{Rs.}0.40$$

$$= \frac{\text{Rs. } 42{,}800}{107{,}000} = \text{Rs.}0.40$$

$$= \frac{\text{Rs. } 21{,}400}{107{,}000} = \text{Rs.}0.20$$

Cost accounted for Statement

	Transferred in (units)	Material 1 (Rs.)	Material added (Rs.)	Labor (Rs.)	Overhead (Rs.)	Total (Rs.)
Units transferred out form opening inventory	--		7,200	4,800	2,400	14,400
Units transferred from current production	62,000		24,800	24,800	12,400	124,000
Normal spoilage	8,000		3,200	3,200	1,600	16,000
Abnormal spoilage	4,000		1,600	1,600	800	8,000
Abnormal loss	3,000					3,000
Closing inventory	28,000	28,000	--	8,400	4,200	40,600
	105,000		36,800	42,800	21,400	206,000

Process account

Particulars	Units	Rs.	Particulars	Units	Rs.
Balance B/F	18,000	23,500	Finished goods	80,000	177,900
Transferred in Material	111,000	105,000	Normal spoilage	8,000	--
Labor		36,800	Abnormal spoilage	4,000	8,000
Overheads		42,800	Normal loss	6,000	--
		21,400	Abnormal loss	3,000	3,000
			Balance C/F	28,000	40,600
	129,000	229,000		129,000	229,500

Cost of Good output 80,000 units

		Rs.
Opening WIP	18,000 Units	23,500
Cost added		14,400
		37,900
Current production	62,000 x 2	124,000
Normal spoilage		16,000
		177,900

Question No. 9

M Pty produces ‘Biotinct’ in a lengthy distillation and cooling process. Base materials are introduced at the start of this process, and further chemicals are added when it is 80% complete. Each kilogram of base materials produces 1 kilogram of Biotinct.

Data for October are:

Opening work in process:	40 kg of base materials, 25% processed	
Cost of opening work in process	Base materials	$1,550
	Processing	$720
Costs incurred in October:	Base materials (80 kg)	$3,400
Conversion costs $6,864	Further chemicals	$7,200
Closing work in process:	50kg of base materials, 90% processed	
Finished output:	65 kg of Biotinct	

Under normal conditions there are no losses of base materials in this process. However, in October 5kg of partially complete Biotinct were spoiled immediately after the further chemicals had been added. The 5kg of spoiled Biotinct were not processed to finished goods stage and were sold for a total of $200.

Required:

Using the FIFO method, prepare the process account for October.

Solution: 9

(a) Calculation of equivalent units (EU)

BM = base materials; FC = further chemicals; CC = conversion costs; WIP = work in process

	BM	FC	CC
Opening work in process	-40	-	-10
Finished	65	65	65
Abnormal loss	5	5	4
Closing work in process	50	50	45
TOTAL	80	120	104
October's costs	$3,400	$7,200	$6,864
Cost per EU	$42·50	$60·00	$66·00

Calculation of costs

	BM	FC	CC	Total
	$	$	$	$
Opening WIP (40kg)	1,550·00	-	720·00	
Completion	-	2,400·00	1,980·00	
Total cost	1,550·00	2,400·00	2,700·00	6,650·00
Started and completed (25kg)	1,062·50	1,500·00	1,650·00	4,212·50
Abnormal loss (5kg)	212·50	300·00	264·00	776·50
Closing WIP (50kg)	2,125·00	3,000·00	2,970·00	8,095·00
TOTAL COST	4,950·00	7,200·00	7,584·00	19,734·00

Process account for October

	kg	$		kg	$
Opening inventory	40	2,270·00	Transfer to finished goods	65	10,862·50
Base materials	80	3,400·00	Abnormal loss	5	776·50
Further chemicals		7,200·00	Closing inventory	50	8,095·00
Conversion costs		6,864·00			
	120	19,734·00		120	19,734·00

Question No. 10

ZP Plc operator two subsidiaries X and Y, X is component manufacturing subsidiary and Y is an assembly and final product subsidiary. Both subsidiaries produce one type of output only. Subsidiary Y needs one component from subsidiary X for every unit of Product W produced. Subsidiary X transfers to Subsidiary Y all of the components needed to produce Product W. Subsidiary X also sell components o the external market.

The following budgeted information is available for each subsidiary:

	X	Y
Market price per component	$800	
Market price per unit of W		$1,200
Production costs per component	$600	
Assembly costs per unit of W		$400
Non production fixed costs	$1-5m	$1-3m
External demand	10,000 units	12,000 units
Capacity	22,000 units	
Taxation rates	25%	30%

The production cost per component is 60% variable.

The fixed production costs are absorbed based on budgeted output.

X sets a transfer price at marginal cost plus 70%.

Calculate the post tax profit generated by each subsidiary.

Solution No. 10

	X	Y
	$	$
Sales	88,000,000	
10, 000x $800	7,344,000	
12,000 x $612		14,400,000
12,000 x $1,200		
Cost		
22,000 x $1,012		-12,144,000
Fixed Costs		
Production 22,000 x $240		
Non production	-1,500.00	
Profit	644,000	956,000
Tax	-161,000	-286,800
Profit after tax	483,000	669,200

X	Y

Question No. 11
JP manufactures two joint products X and Y, and a by-product Z, in a single continuous process. The following information is available for period 3:

Raw materials input	20,000 litres
Raw material costs	$52,000
Conversion costs	$56,000
Outputs	10,000 litres of X, selling price $8 per litre
	8,000 litres of Y, selling price $6 per litre
	2,000 litres of Z, selling price $1 per litre

Process costs are apportioned on a sales value basis. There was no opening and closing inventory of raw materials. The revenue from the by-product is used to reduce the process costs.

What was the cost per litre of joint product X?
A $5·889
B $6·523
C $6·625
D $6·646

Solution: 11
The answer is C

$52,000 + $56,000 - $2,000 = $106,000

Sales Value			Cost
X	$80,000	62.50%	$66,250
Y	$48,000	37.50%	$39,750
	$128,000		$106,000

$66,250/10,000 = $6·625

CHAPTER

4

ACTIVITY BASED COSTING (ABC)

The aim of the previous chapter was to provide you with an understanding of the various costing methods and techniques. Amongst these techniques, one of the most important and widely applicable internationally is **Activity Based Costing (ABC).** The aim of this chapter is to provide you with a conceptual understanding of ABC.

Our focus will be an organization's *existing* products or services. There is also a need to manage *future* activities to ensure that only profitable products and services are launched.

1. The need for a cost accumulation system in generating relevant cost information for Decision-Making

There are three main reasons why a cost accumulation system is required to generate relevant cost information for decision-making. They are:

1. Many indirect costs are relevant for decision-making;
2. An attention-directing information system is required that periodically identifies those potentially unprofitable products that require more detailed special studies;
3. Product decisions are not independent.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 238)*

2. Types of Cost Systems:-

Costing systems can vary in terms of which costs are assigned to cost objects and their level of sophistication. Typically, cost systems are classified as follows:

1. Direct costing systems;
2. Traditional absorption costing systems;
3. Activity-based costing systems

Direct costing systems only assign direct costs to cost objects. Because they do not assign indirect costs to cost objects they report contributions to indirect costs. Periodic profitability analysis would thus be used to highlight negative or low contribution products. The disadvantage of direct costing systems is that systems are not in place to measure and assign indirect costs to cost objects. Direct costing systems can only be recommended where indirect costs are a low proportion of an organization's total costs.

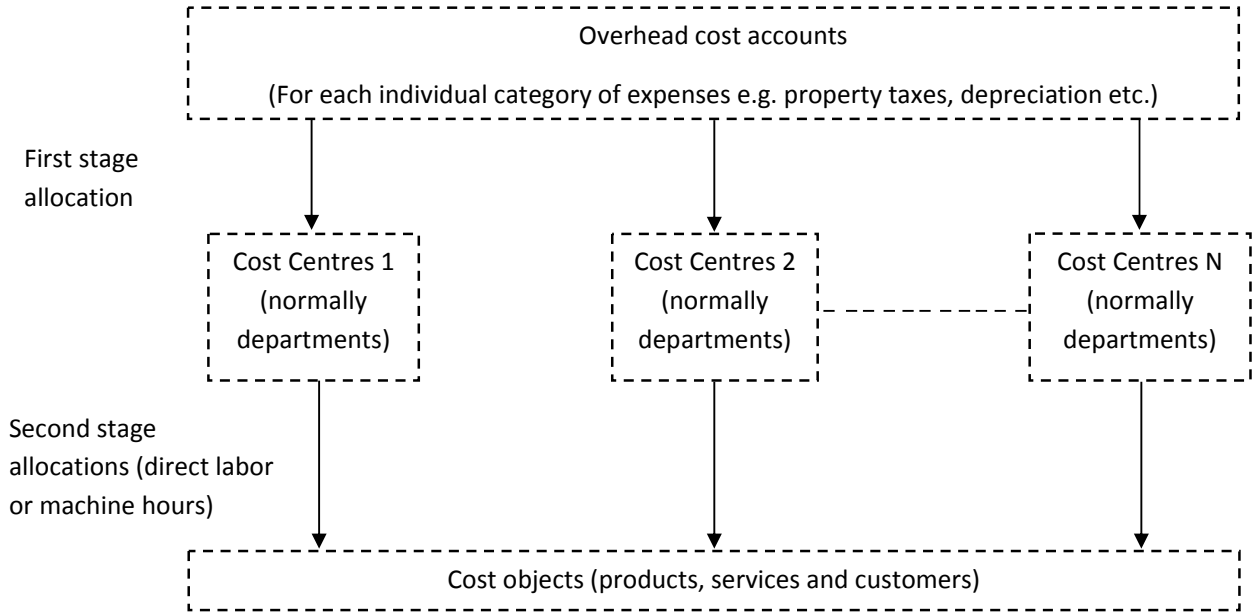
Both traditional and ABC systems assign indirect costs to cost objects.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 239)*

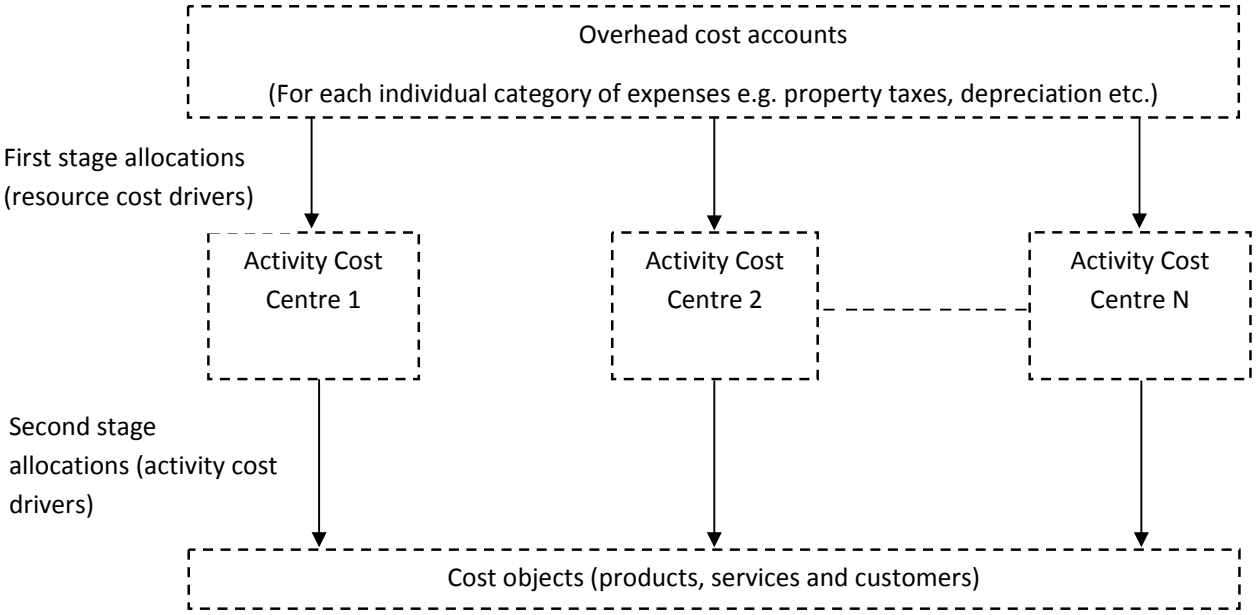
3. A comparison of Traditional & ABC Systems:

The following figure illustrates the major differences between traditional costing and ABC systems.

a) Traditional costing system



b) Activity-based costing systems



(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 241)*

4. The Emergence of ABC systems:

During the 1980's the limitations of traditional product costing systems began to be widely publicized. These systems were designed decades ago when most companies manufactured narrow range of products and direct labour and materials were the dominant factory costs. Overhead costs were relatively small, and the distortions arising from inappropriate overhead allocations were not significant. Information processing costs were high, and it was therefore difficult to justify more sophisticated overhead allocation methods.

Today, companies produce a wide range of products; direct labour represents only a small fraction of total costs, and overhead costs are of considerable importance. Simplistic overhead allocations using a declining direct labour base cannot be justified, particularly when information processing costs are no longer a barrier to introducing more sophisticated cost systems. Furthermore, the intense global competition of the 1980's has made decision errors due to poor cost information more probable and more costly.

During the 1980s a few firms in the USA and Europe implemented ABC type systems. In a series of articles based on observations of innovative ABC type systems Cooper and Kaplan conceptualized the ideas underpinning these systems and coined the term ABC. These articles were first published in 1988. They generated a considerable amount of publicity and consultants began to market and implement ABC systems before the end of the decade. In a survey of UK companies Innes and Mitchell (1991) reported that approximately 10 per cent of the surveyed companies had implemented, or were in the process of implementing ABC.

(**Colin Drury** *Cost & Management Accounting 7th edition, pg: 242)*

5. Activity based costing (ABC):-

'An approach to the costing and monitoring of activities that involves tracing resource consumption and costing final outputs. Resources are assigned to activities and activities to cost objects based on consumption estimates. The latter use **cost drivers** to attach activity costs to outputs'.

(**CIMA** Official Terminology)

Cost drivers and cost pools:

A cost Driver is 'factor influencing the level of cost. Often used in the context of ABC to denote the factor which links activity resource consumption to product outputs, for example, the number of purchase orders would be a cost driver for procurement cost.'

(**CIMA** Official Terminology)

Examples of cost drivers

Support department costs	Possible cost driver
Set-up Costs	Number of production runs
Production scheduling	No. Of production runs
Material handling	Number of production runs
Inspection costs	Number of inspections or inspection hours
Raw materials inventory handling etc	Number of purchase orders delivered
Despatch costs	Number of customer orders delivered
After-Sales Service	Number of complaints

All of the costs associated with a particular cost driver (for example production runs) would be grouped into **cost pools**.

In order to understand how ABC operates in detail we need to look at two types of cost driver.

A Resource Cost Driver is a measure of the quantity of resources consumed by an activity. It is used to assign the cost of the resource to an activity or cost pool.

An Activity Cost Driver is a measure of the frequency and intensity of demand placed on activities by cost objects. It is used to assign activity costs to cost objects.

An **example** of a **resource cost driver** is **area,** which can be used to assign office occupancy cost to purchasing, the accounts department and so on.

An **example** of an **activity cost driver** is **number of customer orders,** the number of orders measuring the consumption of order entry activities by each customer.

(**CIMA** *performance Management 3rd edition, pg: 278 & 279)*

Stages in ABC Calculations:

Step 1: **Group overheads into cost pools,** according to how they are driven. This involves gathering overheads that are caused by the **same activity** into one group and is done by means of **resource cost drivers.**

Step 2: **Identify the cost drivers** for each activity (that is, what causes the activity to be incurred).

Step 3: **Calculate a cost per unit of cost driver.** This is done in a similar way to the calculation of traditional overhead absorption rates.

Cost driver rate= Total cost of activity/ Cost driver

Step 4: Absorb activity costs into production based on the usage of cost drivers – for example, rate per production set-up multiplied by number of production set-ups. The **cost driver rate** can be used to **cost products,** as in traditional absorption costing, but it can also cost **other cost objects** such as **customers** or groups of customers.

(**CIMA** *performance Management 3rd edition, pg: 279)*

6. The merits and demerits of activity based costing:-

Merits:

a) Once the necessary information has been obtained, it is similar to traditional absorption costing. Therefore, this method is simple.
b) Multiple cost drivers make this method more recognizable.
c) This method is concerned with all overhead costs.
d) This method helps with cost reduction.
e) ABC can be used in conjunction with **Customer profitability analysis (CPA).**
f) This method can be used by **service and retail organizations.**

Demerits:

a) Activity based costing has some serious flaws and concern is now growing that ABC is seen by many as a panacea for management accounting ills, despite the fact that its suitability for all environments remains unproven.

b) The cost of obtaining and interpreting the new information may be considerable. ABC should not be introduced unless it can provide additional information.

c) Some arbitrary **cost apportionment** may still be required at the cost pooling stage for items like rent, rates and building depreciation.

d) Many overheads relate neither to volume nor to complexity. The ability of a single cost driver to fully explain the cost behaviour of all items is questionable.

e) There will have to be a **trade off between accuracy, the number of cost drivers and complexity.**

f) ABC tends to **burden low-volume (new) products.** Some people have questioned the fundamental assumption that activities cause cost, they that there may be no clear **cause of cost.**

Question:1

K makes many products, one of which is Product Z. K is considering adopting an activity-based costing approach for setting its budget, in place of the current practice of absorbing overheads using direct labour hours. The main budget categories and cost driver details for the whole company for October are set out below, excluding direct material costs:

Budget category	*£*	*Cost driver details*
Direct labour	128,000	8,000 direct labour hours
Set-up costs	22,000	88 set-ups each month
Quality testing costs*	34,000	40 tests each month
Other overhead costs	32,000	absorbed by direct labour hours
Other overhead costs	32,000	absorbed by direct labour hours

* A quality test is performed after every 75 units produced

The following data for Product Z is provided:

Direct materials	budgeted cost of £21·50 per unit
Direct labour	budgeted at 0·3 hours per unit
Batch size	30 units
Set-ups	2 set-ups per batch
Budgeted volume for October	150 units

a. Calculate the budgeted unit cost of product Z for October assuming that a direct labour based absorption method was used for all overheads.
b. Calculate the budgeted unit cost of product Z for October using an activity-based costing approach.

Solution:1

a.

Total overhead cost	£88,000
Direct labour hours	8,000
Absorption rate	£11 per direct labour hour

Budgeted unit cost for product Z for October is:

	£
Direct materials	21·50
Direct labour 0·3 x £16	4·80
Overhead costs 0·3 x £11	3·30
Total unit cost	29·60

a.

Cost driver rates are needed

Set-ups £22,000/88 =	£250 per set-up
Quality tests £34,000/40 =	£850 per test
Other overheads £32,000/8,000 =	£4 per direct labour hour
(note this is not a true cost driver)	

b.

Activity-based cost of product Z

	£
Direct materials	21·50
Direct labour	4·80
Set-up costs 2 x £250/30	16·67
Quality tests £850/75	11·33
Other overhead costs 0.3 ã £4	1.20
Total activity-based costs for October	55·50

An alternative approach to these calculations would be:
Set-up costs = [(150 / 30) x 2 x £250]/150 = £16·67
Quality costs = (2 x £850) / 150 = £11·33

Question 2

F plc supplies pharmaceutical drugs to drug stores. Although the company makes a satisfactory return, the directors are concerned that some orders are profitable and others are not. The management has decided to investigate a new budgeting system using activity based costing principles to ensure that all orders they accept are making a profit.

Each customer order is charged as follows. Customers are charged the list price of the drugs ordered plus a charge for selling and distribution costs (overheads). A profit margin is also added, but that does not form part of this analysis.

Currently F plc uses a simple absorption rate to absorb these overheads. The rate is calculated based on the budgeted annual selling and distribution costs and the budgeted annual total list price of the drugs ordered. An analysis of customers has revealed that many customers place frequent small orders with each order requesting a variety of drugs. The management of F plc has examined more carefully the nature of its selling and distribution costs, and the following data have been prepared for the budget for next year:

Total list price of drugs supplied	£8m	
Number of customer orders	8,000	
Selling and Distribution Costs	***£000***	***Cost driver***
Invoice processing	280	See Note 2
Packing	220	Size of package see Note 3
Delivery	180	Number of deliveries – see Note 4
Other overheads	200	Number of orders
Total overheads	880	

Notes:

1. Each order will be shipped in one package and will result in one delivery to the customer and one invoice (an order never results in more than one delivery).
2. Each invoice has a different line for each drug ordered. There are 28,000 invoice lines each year. It is estimated that 25% of invoice processing costs are related to the number of invoices, and 75% are related to the number of invoice lines.
3. Packing costs are £32 for a large package, and £25 for a small package.
4. The delivery vehicles are always filled to capacity for each journey. The delivery vehicles can carry either 6 large packages or 12 small packages (or appropriate combinations of large and small packages). It is estimated that there will be 1,000 delivery journeys each year, and the total delivery mileage that is specific to particular customers is estimated at 350,000 miles each year. £40,000 of delivery costs are related to loading the delivery vehicles, and the remainder of these costs are related to specific delivery distance to customers.

The management has asked for two typical orders to be costed using next year's budget data, using the current method, and the proposed activity-based costing approach. Details of two typical orders are shown below:

	Order A	*Order B*
Lines on invoice	2	8
Package size	Small	large
Specific delivery distance	8 miles	40 miles
List price of drugs supplied	£1,200	£900

Required:

(a) Calculate the charge for selling and distribution overheads for Order A and Order B using:

(i) the current system; and
(ii) the activity-based costing approach.

(b) Write a report to the management of F plc in which you

(i) assess the strengths and weaknesses of the proposed activity-based costing approach for F plc; and
(ii) recommend actions that the management of F plc might consider in the light of the data produced using the activity-based-costing approach.

Solution#2

(a)

(i) Current system

£880,000 / £8m = 11% of list price of drugs supplied
Thus Order A will have a charge of £1,200 x 0·11 = £132
Order B will have a charge of £900 x 0·11 = £99

(ii) Proposed system

Cost driver rates

Invoice costs	
Charge per invoice= £70,000 / 8,000 =	£8·75 per invoice
Charge per invoice line = £210,000 / 28,000 =	£7·50 per line
Delivery costs	
Charge per delivery trip = £40,000 / 1,000 =	£40 per trip
So for large package = £40 / 6 =	£6·67
For small package = £40 / 12 =	£3·33
Charge per delivery mile = £140,000 / 350,000 =	£0·40 per mile
Other overheads allocated by orders (this is not a genuine cost driver)	
£200,000 / 8,000 =	£25 per order

Overhead costs	*Order A*	*£*	*Order B*	*£*
Invoice costs	1 x £8·75 =	8·75	1 x £8·75=	8·75
	2 x £7·50 =	15·00	£7·50 =	60·00
Packing		25·00		32·00
Delivery	1 x £3·33 =	3·33	1 x £6·67 =	6·67
	8 x £0·40 =	3·20	40 x £0·40 =	16·00
Other overhead costs		25·00		25·00
Total charge for overheads		80·28		**148·42**

(b)

Report to the Management of F plc on the Implications of Implementing an Activity-Based Costing Approach.
From A.Candidate
Date May

This report covers two issues: (i) an assessment of the strengths and weaknesses of the proposed activity-based costing approach, and (ii) recommendations for action the Management of F plc might take.

i. All budgeting systems have strengths and weaknesses, and these are in part related to the specific circumstances of the company. For F the following are relevant.

Strengths include:

- Better understanding of the cost structure and what is driving costs.
- Ability to set prices that relate to the actual resources consumed, which should result in few or no loss-making orders being accepted.
- Highlights where costs are being incurred which should lead to action to reduce activities that have high costs.
- Prices could be defended if challenged by customers.
- Out-sourcing decisions can be analysed more easily.

Weaknesses might include:

- The costs may exceed benefits.
- The activity data is still very aggregated and may not be detailed enough to reveal important cost behaviour, for example the high cost of the longest distance category might be distorted by some very long deliveries.
- There are still arbitrary elements in the ABC system, particularly other overhead costs which means care must be taken with the data.

(ii) The following recommendations could be made to the directors of F plc.

The present policy is cost based. This approach is simple and relatively cheap to operate. However, such a policy is unlikely to be optimal, and will only be viable where the company is able to sell all its output. Thus, assuming that price is not closely linked to demand, a pricing policy that does no more than simply recover overheads and produce a profit may be deemed satisfactory. In this case, although the current charge for overheads is simple and cheap to calculate, it does not reflect the actual costs incurred by each order.

The new activity-based costing (ABC) system produces a measure of cost that better reflects the resources that have been used. This new ABC system produces very different costs to the previous system. However, the new costing system used, although a very simple version of ABC, is probably too complex for a pricing system.

As the first step in a review it would be instructive to check whether some orders are actually losing money. The activity-based cost analysis indicates that orders with many different products and those delivered over a long distance are expensive, in comparison with orders for a larger volume of few products with shorter delivery distances.

F will need to develop a pricing structure that would enable some of the key cost drivers to be reflected in the prices charged, and to let customers know the charge in advance.

Another possible strategy would be to stop accepting long distance orders by imposing a distance limit. It might be possible to out-source long distance deliveries, possibly along with a high charge for the long distance band in the charging table, as mentioned above.

The costs based on the number of items on the invoice become very high when multiple products are ordered. This needs careful review. Would better systems using newer technology reduce these invoice costs – this is highly likely.

Question:3

K makes many products, one of which is Product Z. K is considering adopting an activity-based costing approach for setting its budget, in place of the current practice of absorbing overheads using direct labor hours. The main budget categories and cost driver details for the whole company for October are set out below, excluding direct material costs:

Budget category	*£*	*Dost driver details*
Direct labor	128,000	8,000 direct labor hours
Set-up-costs	22,000	88 set-ups each month
Quality testing costs*	34,000	40 tests each month
Other overheads costs	32,000	Absorbed by direct labor hours

*A quality test is performed after every 75 units produced

The following data for Product Z is provided:

Direct materials	Budgeted cost of £21.50 per unit
Direct labor	Budgeted at 0.3 hours per unit
Batch size	30 units
Set-ups	2 set-ups per batch
Budgeted volume for October	150 units

a. Calculate the budgeted unit cost of product Z for October assuming that a direct labor based absorption method was used for all overheads.
b. Calculate the budgeted unit cost of product Z for October using and activity-based costing approach.
c. Explain in less than 50 words, why the costs absorbed by a product using an activity-based costing approach could be higher than those absorbed if a traditional labor-based absorption system were used, and identify two implications of this for management

Answer:3

a.

Total overhead cost	£88,000
Direct labour hours	8,000
Absorption rate	£11 per direct labour hour

Budgeted unit cost for product Z for October is:

	£
Direct materials	21·50
Direct labour 0·3 x £16	4·80
Overhead costs 0·3 x £11	3·30
Total unit cost	29·60

b. Cost driver rates are needed

Set-ups £22,000/88 =	£250 per set-up
Quality tests £34,000/40 =	£850 per test
Other overheads £32,000/8,000 =	£4 per direct labour hour
(note this is not a true cost driver)	

Activity-based cost of product Z

	£
Direct materials	21·50
Direct labour	4·80
Set-up costs 2 x £250/30	16·67
Quality tests £850/75	11·33
Other overhead costs 0·3 x £4	1·20
Total activity-based costs for October	55·50

An alternative approach to these calculations would be:
Set-up costs = [(150 / 30) x 2 x £250]/150 = £16·67
Quality costs = (2 x £850) / 150 = £11·33

C.

Costs under ABC could be higher where: there is production complexity not represented in direct labour hours; small batch sizes; or high levels of non-manufacturing activity. This may lead management to: increase batch sizes, simplify processes to reduce activities, or review pricing if this is not in line with ABC costs.

Question 4:

F plc supplies pharmaceutical drugs to drug stores. Although the company makes a satisfactory return, the directors are concerned that some orders are profitable and others are not. The management has decided to investigate a new budgeting system using activity based costing principles to ensure that all orders they accept are making a profit.

Each customer order is charged as follows. Customers are charged the list price of the drugs ordered plus a charge for selling and distribution costs (overheads). A profit margin is also added, but that does not form part of this analysis.

Currently F plc uses a simple absorption rate to absorb these overheads. The rate is calculated based on the budgeted annual selling and distribution costs and the budgeted annual total list price of the drugs ordered.

An analysis of customers has revealed that many customers place frequent small orders with each order requesting a variety of drugs. The management of F plc has examined more carefully the nature of its selling and distribution costs, and the following data have been prepared for the budget for next year:

Total list price of drugs supplied	£8m	
Number of customer orders	8,000	
Selling and Distribution Costs	£000	Cost driver
Invoice processing	280	See Note 2
Packing	220	Size of package – see Note 3
Delivery	180	Number of deliveries – see Note 4
Other overheads	200	Number of orders
Total overheads	880	

Notes:

1. Each order will be shipped in one package and will result in one delivery to the customer and one invoice (an order never results in more than one delivery).

2. Each invoice has a different line for each drug ordered. There are 28,000 invoice lines each year. It is estimated that 25% of invoice processing costs are related to the number of invoices, and 75% are related to the number of invoice lines.

3. Packing costs are £32 for a large package, and £25 for a small package.

4. The delivery vehicles are always filled to capacity for each journey. The delivery vehicles can carry either 6 large packages or 12 small packages (or appropriate combinations of large and small packages). It is estimated that there will be 1,000 delivery journeys each year, and the total delivery mileage that is specific to particular customers is estimated at 350,000 miles each year. £40,000 of delivery costs are related to loading the delivery vehicles and the remainder of these costs are related to specific delivery distance to customers.

The management has asked for two typical orders to be costed using next year's budget data, using the current method, and the proposed activity-based costing approach. Details of two typical orders are shown below:

	Order A	Order B
Lines on invoice	2	8
Package size	small	Large
Specific delivery distance	8 miles	40 miles
List price of drugs supplied	£1,200	£900

Required:

(a) Calculate the charge for selling and distribution overheads for Order A and Order B using:

(i) the current system; and
(ii) the activity-based costing approach.

(b) Write a report to the management of F plc in which you

(i) assess the strengths and weaknesses of the proposed activity-based costing approach for F plc; and
(ii) recommend actions that the management of F plc might consider in the light of the data produced using the activity-based-costing approach.

Answer 4:

(a)

(i) Current system

£880,000 / £8m = 11% of list price of drugs supplied
Thus Order A will have a charge of £1,200 x 0·11 = £132
Order B will have a charge of £900 x 0·11 = £99

(i) Proposed system
Cost driver rates

Invoice costs	
Charge per invoice= £70,000 / 8,000 =	£8·75 per invoice
Charge per invoice line = £210,000 / 28,000 =	£7·50 per line
Delivery costs	
Charge per delivery trip = £40,000 / 1,000 =	£40 per trip
So for large package = £40 / 6 =	£6·67
For small package = £40 / 12 =	£3·33
Charge per delivery mile = £140,000 / 350,000 =	£0·40 per mile
Other overheads allocated by orders (this is not a genuine cost driver)	
£200,000 / 8,000 =	£25 per order

Overhead costs	Order A	£	Order B	£
Invoice costs	1 x £8·75 =	8·75	1 x £8·75 =	8·75
	2 x £7·50 =	15·00	8 x £7·50 =	60·00
Packing		25·00		32·00
Delivery	1 x £3·33 =	3·33	1 x £6·67 =	6·67
	8 x £0·40 =	3·20	40 x £0·40 =	16·00
Other overhead costs		25·00		25·00
Total charge for overheads		80·28		148·42

(b)

Report to the Management of F plc on the Implications of Implementing an Activity-Based

Costing Approach.

From A. Candidate
Date May
This report covers two issues: (i) an assessment of the strengths and weaknesses of the proposed activity-based costing approach, and (ii) recommendations for action the Management of F plc might take.

(i) All budgeting systems have strengths and weaknesses, and these are in part related to the specific circumstances of the company. For F the following are relevant.

Strengths include:

- Better understanding of the cost structure and what is driving costs.
- Ability to set prices that relate to the actual resources consumed, which should result in few or no loss-making orders being accepted.
- Highlights where costs are being incurred which should lead to action to reduce activities that have high costs.
- Prices could be defended if challenged by customers.
- Out-sourcing decisions can be analysed more easily.

Weaknesses might include:

- The costs may exceed benefits.
- The activity data is still very aggregated and may not be detailed enough to reveal important cost behaviour, for example the high cost of the longest distance category might be distorted by some very long deliveries.
- There are still arbitrary elements in the ABC system, particularly other overhead costs which means care must be taken with the data.

(ii) The following recommendations could be made to the directors of F plc.

The present policy is cost based. This approach is simple and relatively cheap to operate.

However, such a policy is unlikely to be optimal, and will only be viable where the company able to sell all its output. Thus, assuming that price is not closely linked to demand, a pricing policy that does no more than simply recover overheads and produce a profit may be deemed satisfactory. In this case, although the current charge for overheads is simple and cheap to calculate, it does not reflect the actual costs incurred by each order.

The new activity-based costing (ABC) system produces a measure of cost that better reflects the resources that have been used. This new ABC system produces very different costs to the previous system. However, the new costing system used, although a very simple version of ABC, is probably too complex for a pricing system.

As the first step in a review it would be instructive to check whether some orders are actually losing money. The activity-based cost analysis indicates that orders with many different products and those delivered over a long distance are expensive, in comparison with orders for a larger volume of few products with shorter delivery distances.

F will need to develop a pricing structure that would enable some of the key cost drivers to be reflected in the prices charged, and to let customers know the charge in advance.

Another possible strategy would be to stop accepting long distance orders by imposing a distance limit. It might be possible to out-source long distance deliveries, possibly along with a high charge for the long distance band in the charging table, as mentioned above.

The costs based on the number of items on the invoice become very high when multiple products are ordered. This needs careful review. Would better systems using newer technology reduce these invoice costs – this is highly likely.

CHAPTER

5

COSTING TECHNIQUES I – ABSORPTION COSTING & MARGINAL COSTING

5.1 MARGINAL COSTING - DIRECT COSTING

Marginal costing is a costing technique which charges the product with only those costs that vary directly with volume of production. Only the prime cost plus variable Factory Overhead are used to value closing stock and determines the cost of goods sold.

Variable or direct costs such as direct material, direct labor, and variable factory overhead are examples of costs chargeable to production.

Fixed costs like depreciation, rent, insurance etc, are excluded. Further exclude salaries of the executives and managerial staff, supervisors, foremen and office and sales employees. Marginal costing is a useful technique for studying the effects of changes in 'volume and type of output in a multi-product business. It is an accounting technique which determines the marginal cost by distinguishing between fixed and variable costs. The primary purpose of marginal costing is to provide information to management on the effects on costs and revenues of changes in the volume and type of output in the short-run.

The contribution approach highlights the behavior of costs and classifies them accordingly, by identifying variable costs and fixed costs.

Work in progress and finished goods valued at their marginal costs:

The marginal cost of sales is deducted from sales revenue to give the contribution. Fixed costs for the period are deducted from the contribution to give the profit for the period. Marginal costing is not a method of costing on the lines of job or process costing, but is a special technique which presents management with information enabling it to measure the profitability of an undertaking by considering the behavior of costs. Marginal' costing may be used in conjunction with other costing methods like job or process costing OJ; with other techniques such as standard costing or budgetary control.

The **CIMA London** has defined marginal cost as **"the amount at any given volume of output by which aggregate costs are changed, if volume of output is increased or decreased by one unit"**. In simple words, marginal cost is the additional cost of producing additional units. An important point is that marginal cost per unit remains unchanged irrespective of the level of activity.

Marginal costing is defined by **CIMA London** as the "**ascertainment of marginal cost, by differentiating between fixed and variable costs, and of the effect on profit of changes in volume or type of output"**.

(**CIMA** Official Terminology)

5.2 CHARACTERISTICS OF MARGINAL COSTING

The essential characteristics of marginal costing technique are as follows:

1. **Segregation of costs into fixed and variable elements**. In marginal costing all cost are segregated into fixed and variable elements and there is no third category of costs.
2. **Marginal costs as product costs.** Only marginal (variable) costs are charged to products.
3. **Fixed costs as period costs.** Fixed costs are treated as period costs and rare charged to costing Profit and Loss Account of the period in which they are incurred.
4. **Valuation of inventory.** The work-in-progress and finished stocks are valued at marginal cost only.
5. **Contribution.** Contribution is the difference between sales value and marginal cost of sales. The relative profitability of products or departments is based on a study of contributions made by each of the products or departments.
6. **Pricing.** In marginal costing, prices are based on marginal cost plus contribution.

(**ICMA** *Practice Manual* Part IV & Final)

5.3 Marginal Costing Vs. Absorption Costing:

Points of difference		ABSORPTION COSTS i. fixed overhead absorbed ii. by product	Marginal cost i. fixed overhead expensed by ii. period
1.	Classification of fixed and variable overheads may be difficult and some times	Since classification is unnecessary problems do not arise.	Difficult with semi-fixed / semi variable cost, need to be separated.

	somewhat arbitrary		
2.	Stock valuation	Include full production costs on the arguments that these have been necessarily incurred	Include variable costs only accords with the argument that the additional cost of the stock is limited to its variable costs.
3.	Profit	If stock holdings increase to accord with operation during period higher valuation of stock higher profit	The prudence principle results in lower stock valuation, lower profit.
4.	Use of costs for purpose	Will have full costs as the pricing of products	If fixed overheads are not included in production costs prices quoted might be too low.
5.	Recovery of fixed overhead	Problem of determining activity level for the absorption of fixed overhead use of normal activity with recovery variance being treated as period	Activity problem does not arise as fixed overheads expensed as a period expense to which they relate.
6.	Fixed cost may not be controllable at product or department level	Allocation my cause danger of trying to control the uncontrollable	Only controllable cost are include in product costs at centre level.
7.	Overhead costs	Prices based on product cost will be more volatile.	Pricing variable is closely related to variable costs.
8.	Other techniques	Fits in well with standard absorption costing	Pricing variability is closely related to variable costs.
9.	Contribution	Has to be calculated separately to ensure good decision	Already computed to help in decision making
10.	Tax	Recommended by accounting standards	Not recommended by standards

5.3 Reconciling Profit Figures:

5.3.1 Reconciling the profit figures given by the two methods

The difference in profits reported using marginal costing and absorption costing is due to the different inventory valuation methods used.

a) Inventory levels increase during the period

Absorption costing will report the higher profit. Some of the fixed production overhead incurred during the period will be carried forward in closing inventory (which reduces cost of sales) to be set against sales revenue in the following period instead of being written off in full against profit in the period concerned.

b) Inventory levels decrease during the period

Absorption costing will report the lower profit. As well as the fixed overhead incurred, fixed production overhead which had been carried forward in opening inventory is released and is also included in cost of*)*

Advantages:

1. The calculation of contribution to sales *(c/s* Ratio) helps management to decide which products are most profitable and therefore to which products priority should be given. The combination of a high *c/s* ratio and a high volume of sales is the key to profitability.
2. The contribution margin guides management to decide whether a product should be dropped or a particular department closed.
3. The contribution approach can be used to evaluate proposed price reductions, advertising campaigns. The effect or price reductions or additional expenditure can be compared with the contribution general on additional sales.
4. Cost Volume profit analysis can be carried out to calculate the number of units to be sold to achieve certain level of profit.
5. The contribution approach helps to provide the information required to determine the most profitable use of existing resources.
6. The contributions approach helps managers determine the minimum price which should be charged for products.
7. The contribution is a key measure of profitability, because it is the difference between sales proceeds and variable costs,
8. Marginal costing reports are more easily understood by management.
9. Clerical cost is lower under marginal costing because the method is simpler and does not require involved allocations of fixed costs.
10. The computation of product costs is simpler and more reliable under direct costing because only variable costs should be, identified with production. Fixed costs are the expenses of maintaining productive capacity and such expenses occur with the passage of time and not with the utilization of the facilities.

Disadvantages:

1. Separation of costs into fixed and variable costs might be difficult, especially when such costs are semi- variable in nature.
2. Long-range pricing of products require additional separate computation to allocate fixed overhead.
3. The pricing of inventories by marginal costing method is not acceptable for tax purposes.
4. Direct costing is not generally accepted under international accounting standards in preparation of financial statement.

5. Profits determined by direct costing are not true and proper because of the exclusion of fixed production costs which are a part of total production cost and inventory. Production would not be possible without plant facilities, etc. To disregard these fixed costs violates the general principle of matching costs with revenues.

The elimination of fixed costs from inventory results in a lower figure and consequent reduction of reported working capital for financial analysis purposes. The decrease in working capital may also weaken the borrowing position.

Relevant Range:

When a breakeven chart is constructed, assumptions are made about the level of fixed costs, the selling price and variable costs. 'In practice these assumptions will only be valid within a limited range of output and this is known as the relevant range. It will be the range of likely output levels within which these assumptions will still hold true.

Product Costs and Period Costs:

This is another name of variable cost, and fixed costs. The variable costs vary with the volume" of production and therefore treated as product cost while fixed costs do not vary with volume of production and therefore treated as period cost. The product costs increase in total with increase in volume of production, but remain constant per unit in short-run while the period costs remain

constant in total but increase/ decrease with change in volume of production; but the period costs increase/decrease per unit. Another important aspect of product cost is that it is not necessarily the variable cost should vary exactly in the same proportion as the volume of production. Usually direct material, direct labor, direct expenses and only variable factory overheads are treated as product costs; all fixed overheads depreciation, rent and insurance will be treated as period cost. Wages of certain factory employees such as maintenance crew, guards etc. are also considered as period costs.

Limiting Factor:

The activities of every organization are limited by some factors like sales, material, labor force, production facilities; otherwise it would expand its activities to an infinite extent. The factor which effectively limits the activities of a particular business is known as the limiting factor/key factor. If there is more than one limiting factor it will be necessary to use an operation research techniques like a linear programming to determine the optimal plan. We should compare contribution to key factor ratio, the highest contribution/key factor ratio must be selected to maximize contribution.

Profit volume Ratio or Contribution to sales Ratio – P/V Ratio or C/S Ratio
It is also known as contribution to sales ratio (c/s ratio). Contribution, i.e. sales - variable cost, divided by sales revenues gives the c/s ratio. It indicates the amount available to cover fixed cost and profit. If the contribution is equal to fixed cost i.e. breakeven point.

$$\text{C/S ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

This relationship will always remain the same as long as the variable cost per unit and the sales price per unit do not change.

5.4 Break-Even & Cost-Volume Profit Analysis:

Break-even analysis indicates the point at which the company neither makes a profit nor suffers a loss. *Cost-volume-profit analysis,* is integrally related to break-even analysis, is concerned with determining the optimal level and mix of output to be produced with available resources.

5.4.1 The Nature of Break-even analysis

Break-even analysis determines at what level cost and revenue are in equilibrium. The *break-even point,* obtained directly by mathematical computation is usually presented in graphic form because it not only shows management the point at which neither a profit nor a loss occurs, but also indicates the possibilities associated with changes in costs or sales. Thus a *break-even chart* can be defined as a graphic analysis of the relationship of costs and sales to profit. Break-even analysis is generally accomplished with the aid of a break-even chart because it is a compact, readable reporting device.

Data for break-even analysis cannot be taken directly from the conventional or full-cost income statement. The form of the statement and the manner in which data are presented do not permit a convenient and practical analysis for planning, policy making, and profit determination. Therefore, each expense shown in the conventional income statement must be analyzed to determine its fixed and variable portions. Of the three classes of expenses – fixed, semi-variable, and variable – the semi-variable expenses must be separated into their fixed and variable components. The fixed portion is stated as a total figure; the variable portion as a rate or a percent

5.4.2 Break-even analysis- Introduction (Knowledge brought forward)

Break-Even analysis or **Cost-Volume-Profit Analysis (CVP)** is 'The study of the effects on future profit of changes in fixed cost, variable cost, sales price, quantity and mix'.

(**CIMA** Official Terminology)

Contribution per unit = unit selling price – unit variable costs

Profit = (Sales volume x contribution per unit) – fixed costs

Break-even point = activity level at which there is neither profit nor loss

$$= \frac{\text{total fixed costs}}{}$$

Contribution per unit

Contribution/Sales(C/S) ratio=profit/volume (P/V) ratio = (contribution/sales) * 100%

Margin of Safety: (M.O.S)

The margin of safety is a selected sales figure less breakeven sales. The margin of safety is a cushion against sales decreases. The greater the margin, the greater the security. The margin of safety figure is determined by subtracting breakeven sales from a selected sales figure. The margin of safety figure is determined by subtracting breakeven sales form a selected sales figure.

Sales Rs. 100,000

Breakeven point Rs. 80,000

MOS = 100,000 – 80,000 = 20,000/100,000 x 100 = 20%

a. The assumptions underlying breakeven analysis
1. The behavior of costs and revenue has been correctly estimated and is linear over the relevant range.
2. Variable costs vary directly and proportionately with the level of output.
3. Fixed costs remain constant over wide ranges of output.
4. Selling prices remain unchanged whatever the level of sales
5. Semi-variable cost can be identified and re-classified into their fixed and variable elements.
6. Efficiency and productivity remain unchanged.
7. The analysis relates to one product only or to a constant mix of products
8. constant.
9. Volume is the only factor that affects costs. This is of course, a simplification, but one that is necessary for a graphical presentation.
10. Sales price, variable costs and fixed costs will change over a period of time.
11. The fixed costs which are included in the analysis are those which can be identified with the particular products. No attempt should be made to apportion the costs between products.

The main difference between the accountant's breakeven chart and that of the economist is the assumption of linearity.

The accountant assumes a constant variable cost per unit whereas the economist assumes a variable cost per unit which changes with the level of production. The accountant assumes a constant sales price which does not vary with the level of sales, but the economist assumes that price reduction may be necessary to increase the volume of sale.

The Cost-volume/Profit chart attempts to determine the effect. That a change in volume, cost, price and product mix have on profit. The cost-volume profit chart can serve multipurpose analysis while breakeven chart assist to caution that the sales should not be allowed to reduce from a certain level if company wants to avoid losses. One major problem of cost-volume project analysis is that it ignores profitability in relation to capital employed in the business.

Application of Break-even analysis:

Some of the important uses of break-even analysis are:

1. Determination of the break-even point.
2. Determination of the selling price which will give the desired profit.

3. Fixation of the sales volume to earn a desired profit or return on capital employed.
4. Determination of the costs and revenue at different levels of output.
5. Determination of the most profitable sales mix.
6. Determination of comparative profitability of each profit line.
7. Impact of increase or decrease in fixed and variable costs on profits.
8. Comparison of profitability of various firms.
9. Aid in management decision making e.g. in makes or buy decisions, discontinuance of a product lime, acceptance of special job, etc.

Limitations of Break-even Analysis:

Although break even analysis is an invaluable tool of management, there are some limitations from which the technique suffers. These limitations of break-even analysis arise from certain assumptions on which the analysis is based and which are, in effect, not lure. The assumptions of break-even analysis are as under:

1. The assumption that all cost can be clearly separated into fixed and variable components is not possible to achieve accurately in practice, resulting in inaccurate break even ab / kysis.
2. The assumption that variable cost per unit remains and that given a straight line chart is also not ways a. In practice many of the variable costs do not observe this tendency. Most of the variable costs, not doubt, in practice many of the variable costs do not observe this tendency. Most of the variable costs, no doubt, more in sympathy with the volume of production but not necessarily in direct proportion to the volume.
3. Similarly the assumption that fixed cost remains constant is also unrealistic. Fixed costs are constant only within a limited range of output and tend to increase by a sudden jump when additional plant and machinery is introduced.
4. The assumption regarding selling prices remaining unchanged as volume changes is also not true. In practice, selling prices do not remain fixed and changed in prices affects demand. Any increase in output can be sold only by effecting a reduction in selling price which would affect the sales line.

5.5 Linear Programming:

Previously, we saw how to determine the profit-maximizing allocation of resources when an organization is faced with just one resource constraint. When there is **more than one resource constraint,** the technique of **linear programming** can be used. This technique can be applied to problems with the following features.

1. There is a single objective, which is to maximize or minimize the value of a certain function. The common objective is usually to maximize contribution or minimize cost.
2. There are several constraints, typically scarce resources that limit the value of the objective function.

(**CIMA** *performance Management 3rd edition, pg: 111)*

5.5.1 A definition of linear programming:

Linear Programming is 'The use of a series of linear equations to construct a mathematical model. The objective is to obtain an optimal solution to a complex operational problem, which may involve the production of a number of products in an environment in which there are many constraints'.

(**CIMA** Official Terminology)

5.5.2 Techniques of linear programming:

There are two linear programming techniques. The graphical method is used for problems involving two products. The Simplex method is used if the problem involves more than two products.

Example: WX Ltd

The following example will be used throughout the chapter to illustrate the graphical method of linear programming.

WX Ltd manufactures two products, A and B. Both products pass through two production departments, mixing and shaping. The organization's objective is to maximize contribution to fixed costs.

Product A is sold for Rs. 150 whereas product B is priced at Rs. 200. There is unlimited demand for product A but demand for B is limited to 13,000 units per annum. The machine hours available in each department are restricted to 2,400 per annum. Other relevant data are as follows.

Machine hours required					Mixing Hrs.	Shaping Hrs.
Product A					0.06	0.04
Product B					0.08	0.12
Variable cost per unit						Rs.
Product A						130
Product B						170

Solving the problem using the graphical method:

1. The steps in the graphical method are as follows.
2. Define variables
3. Establish objective function
4. Establish constraints
5. Draw a graph of the constraints
6. Establish the feasible region
7. Determine the optimal product mix.

Machine hours required					Mixing Hrs.	Shaping Hrs.
Product A					0.06	0.04
Product B					0.08	0.12
Variable cost per unit						Rs.
Product A						130
Product B						170

Step#1:

Define variables

What are the **quantities that WX can vary?** Obviously not the number of machine hours or the demand for product B. The only things which it can vary are the **number of units of each type of products**

Solving the problem using the graphical method:

8. The steps in the graphical method are as follows.
9. Define variables
10. Establish objective function
11. Establish constraints
12. Draw a graph of the constraints
13. Establish the feasible region
14. Determine the optimal product mix.

Step#1:

Define variables

What are the **quantities that WX can vary?** Obviously not the number of machine hours or the demand for product B. The only things which it can vary are the **number of units of each type of product produced.** It is those numbers which the company has to determine in such a way as to obtain the maximum possible profit. The variables (which are usually products being produced) will therefore be as follows.

Let x = number of units of product A produced.

Let y = number of units of product B produced.

Step#2:

Establish objective function

The **Objective Function** is a quantified statement of the aim of a resource allocation decision.

The **objective of the company is to maximize contribution** and so the **objective function to be maximized** is as follows.

Contribution (C) = 20X + 30Y

Step#3:

Establish constraints

A **Constraint** is 'An activity, resource or policy that limits the ability to achieve objectives'.

(**CIMA** Official Terminology)

The **value of the objective function** (the maximum contribution achievable from producing products A and B) is **limited by the constraints** facing WX, however. To incorporate this into the problem we need to **translate the constraints into inequalities involving the variables** defined in Step 1. An inequality is an equation taking the form 'greater than or equal to' or 'less than or equal to'.

Marginal Costing

Question#1

Mr. K. Shah manufactures suitcases in a small factory in Lahore's Industrial Area. His total labor force is only 20 people. Mr. Kazim is employed as an accounts clerk in charge of maintaining the financial records of the factory. At the end of 2012 the summarized the factory's transactions for the year as follows:-

	Rs.
(a) Raw Materials:	
January 1	80,000
Purchases	460,000
December 31	40,000
(b) Factory Lease Payments:	
Outstanding January 1	20,000
Payments	140,000
(c) Water and Electricity (Note 1)	
Outstanding January 1	4,000
Payments	18,000
Outstanding December 31	6,000

Note (1) includes standing charges of Rs.10,000 per annum

(d) Production costs:	
Total factory wages (Note 2)	359,000
Machinery depreciation	80,000

Note (2) Factory wages included Rs. 19,000 of overtime premium which were chargeable as management expenses to encourage better production planning.

(e) General manager's car running expenses:	
Petrol	76,000
Maintenance and Depreciation	24,000
(f) Selling and administration salaries	120,000

(g) Production in the year was 20,000 suitcases

(h) Sales in the year were 19,000 suitcases

(i) Selling price averaged at Rs.67 per suitcase

(j) Selling expenses included Rs.30,000 for advertisement and a sales commission of Rs.5 per suitcase.

A partially qualified accountant hired by Mr. Shah to prepare his final accounts on the basis of the above information calculated at Mr. Shah's Profit for the year amounted to only 2,000. Dissatisfied with the outcome, Mr. Shah gave the same information to his nephew, a second year B.Com. student at Punjab University. The latter calculated that Mr. Shah's results for the year showed a loss of Rs.8,500.

Mr. Shah totally dismayed as to whether accounting is really a profession comes to you with the two differing results together with the clerk's summary for your guidance.

Required:

(i). Assuming that both the accountant and the student were correct on basis of their individual assumptions, show Mr. Shah how each one of them arrived at his profit or loss figure.
(ii). Reconcile their two results for Mr. Shah.
(iii). Explain to Mr. Shah of the two costing approaches you favor and why

Solution

Question#1:"Mr. K Shah"

(i). Mr. K Shah

Income Statement (Absorption Costing)

	Rs.		
Sales (19,000*67/-)			1,273,000
Cost of sales:			
Raw material used		500,000	
Factory wages		340,000	
Factory overhead	120,000		
Water& electricity			
Fixed 10,000	20,000		
Depreciation	80,000	220,000	
		1,060,000	
Closing stock [(1,060,000/ 20,000)*1,000]		53,000	1,007,000
			266,000
Selling and administration expenses:			
Advertisement	30,000		
Sales commission	95,000		
Sales and admin expense	120,000		
Overtime	19,000		264,000
Profit for the year			2,000

(It is assumed that G.M. expenses are personal expenses)

Mr. K Shah

Income Statement (Variable Costing)

	Rs.		
Sales (19,000*67/-)			1,273,000
Cost of sales:			
Raw material used		500,000	
Factory wages (direct)		340,000	
Variable factory overheads		10,000	
		850,000	
Less: Closing stock [(1,060,000/ 20,000)*1,000]		42,500	807,500
Gross margin			465,500
Other variable expenses:			
Sales men commission		95,000	

Overtime	19,000	114,000
Contribution		351,500
Fixed expenses:		
Water expense	10,000	
Advertisement	30,000	
Salaries	120,000	
Factory depreciation	80,000	
Lease	120,000	360,000
Net decrease in profit		(8,500)

(ii). Difference in profit:

Profit as per absorption costing	2,000
Loss as per marginal costing	(8,500)
Decrease in profit	10,500

Accounted for:

Closing stock as per Absorption costing	53,000
Closing stock as per Direct costing	42,500
Net decrease in profit	(10,500)

(iii). Marginal costing is recommended because of its, usefulness of planning and control purposes. It provides better information for decision making

Question No. 2:

Meezan Company Ltd. are the manufacturers of grass cutting machines, which they have been selling for Rs. 800 per unit for a number of years. The selling price is now under review, and the following information is available on costs and likely demand:

The standard variable cost of manufacture is Rs. 500 per unit and a cost variance analysis for the last 20 months shows the following trend and that the same is likely to continue in the future:

10 months—10% adverse variance of standard variable cost occurred during the period.

6 months—No variance of standard variable cost.

4 months—5% favourable variance occurred in standard variable cost.

Monthly data:

Fixed cost have been Rs. 250 per unit on an average sales level of 20,000 units, but these costs are expected to rise in the future and the following estimates have been made for the total fixed cost:

	Rs.
Optimistic estimate (Probability 0.3)	4,100,000
Most likely estimate (Probability 0.5)	4,250,000
Pessimistic estimate (Probability 0.2)	4,500,000

The demand at the two new prices under consideration is as follows:

Estimated demand at	**selling prices/unit**	
***Selling* price/unit**	**Rs. 850**	**Rs. 900**
Optimistic (Probability 0.2)	21,000 Units	19,000 Units
Most likely (Probability 0.5)	19,000 Units	17,500 Units
Pessimistic (Probability 0.3)	16,500 Units	15,500 Units

It is assumed that all estimates and probabilities are independent.

Required:

(a) Advise the management, whether they should change the selling 6 price, and if so, the price you would recommend based on the information given above.

(b) Calculate the expected profit at your recommended price and **5** resulting margin of safety, expressed as a percentage of expected sales.

(c) Critically comment on the method of analysis you have used to **3** deal with the probabilities given in the question.

(d) Describe briefly, how computer assistance might improve the 3 analysis.

Answer No.2:

a. Meezan Co. Ltd.

Note: For each selling price there are three possible outcomes for sales demand, unit variable costs and fixed costs. As a result there are 27 possible outcomes, and in order to present probability distribution for two possible selling prices, it would be necessary to compute profit for 54 outcomes therefore the expected value approach has to be used.

Variable Cost	**Rs.**	**Fixed Cost**	**Rs.**
(Rs. 500 + 10%) x 10/20 =	275	Rs. 4,100,000 x 0.3 =	1,230,000
Rs. 500 _____ x 6/20 =	150	Rs. 4,250,000 x 0.5 =	2,125,000
(Rs. 500 – 5%) x 4/20 =	95	Rs. 4,500,000 x 0.2 =	900,000
	520		**4,255,000**

Selling Price Rs. 850	**Units**	**Selling Price Rs. 900**	**Units**
21,000 units x 0.2 =	4,200	19,000 units x 0.2 =	3,800
19,000 units x 0.5 =	9,500	17,500 units x 0.5 =	8,750
16,500 units x 0.3 =	4,950	15,500 units x 0.3 =	4,650
	18,650		**17,200**

Expected contribution:

Rs. 850 selling price = (Rs. 850 – Rs. 520) x 18,650

= Rs. 6,154,500 ---------- (i)

Rs. 900 selling price = (Rs. 900 – 520) x 17,200

= Rs. 6,536,000 ---------- (ii)

The existing selling price = Rs. 800/unit

If demand continues at 20,000 units

Then total contribution = (Rs. 800 – Rs. 520) x 20,000 units

= Rs. 5,600,000 ---------- (iii)

Therefore using the expected value approach, a selling price of Rs. 900 per unit is recommended.

b. Expected profit = Rs. 6,536,000 – Rs. 4,255,000 (Fixed cost)
= Rs. 2,281,000

Break-even point:

= Fixed Cost/Contribution for unit

$= \text{Rs.}\frac{4,255,000}{380}$

= 11,197 units

Margin of safety = Expected demand – BE sales value

= 17,200 – 11,197 = 6,003 units

% Margin of safety = 6,003/17,200

= 34.9%

It should be noted that the most pessimistic estimate is above the break-even point.

a.

- An expected value approach has been used.
- Basing the decision safety on expected value means that the risk has been ignored.
- The range of possible outcomes has not been considered.
- The decision should be based on a comparison of the probability distribution for proposed selling prices.

b.

- Computer assistance would enable a more complex analysis to be under take. Particularly, different. Scenario could be considered based on different contribution of assumptions regarding variable cost fixed, cost, selling price and demand.
- Using computer would also enable Mono Carlo Simulation to be used for more complex decisions.

Question:3

Mars Transportation company has appointed a management accountant. First assignment given to her is to analyze company's cost-volume-profit relationship. The company's summarized income statement for the last year is as under:

	Total	Per Trip	% to sales
Revenue 2,000 Trip	15,000,000	7,500	100
Less: Variable cost	9,000,000	4,500	60
Contribution margin	6,000,000	3,000	40
Less: Fixed cost	3,000,000		20
Net operating income	3,000,000		20

According to the agreement with local government at least one trip a day is mandatory. (one year = 360 days)

Required:

a. Existing break-even in trips and amount.
b. Number of trips needs to be completed to achieve a profit target or Rs. 5,000,000.
c. For next year, the company is planning to purchase a computerized booking system having cost of Rs. 1,000,000. Company will save 3% of variable cost and Rs. 400,000 of fixed cost after installation of new system. Calculate break-even in percentage and amount after installing the new system.

Answer:3

(a) Existing break-even in trips and amount:

Fixed Cost	**Rupees**
Fixed Cost	3,000,000
Mandatory trips (360 x 4,500)	1,620,000
Total Fixed Cost	4,620,000

$$\text{Break-even (Rs.)} = \frac{\text{Fixed Cost}}{\text{CM\%}} = \frac{4{,}620{,}000}{40\%} = 11{,}550{,}000$$

$$\text{Break-even (Trips)} = \frac{\text{Fixed Cost}}{\text{CM per trip}} = \frac{4{,}620{,}000}{3{,}000} = 1{,}540$$

(b) Trips need to be completed to achieve profit target:

	Profit	**=**	**CM per unit x Nos. of trips – fixed cost**		
OR	5,000,000	=	3,000 x Nos. of trips – 4,620,000		
OR	5,000,000	+	4,620,000	=	3,000 x Nos. of trips
	9,620,000	+	3,000	=	Nos. of trips
	Nos. if trips	=	**3,207**		

	Rupees
Revenue	24,050,000
Less: Variable Cost	14,430,000
Contribution Margin	9,620,000
Less: Fixed Cost	4,620,000
Net operating income	5,000,000

(c) Breakeven in Percentage and Amount After New System:

	Rupees
Variable Cost per trip	4,500
Less: 3% saving	135
Variable Cost per trip	4,365
Fixed Cost	4,620,000
Less: Saving	400,000
	4,220,000

CM Per trip = 7,500 – 4,365

= 3,135

Break-even % = **41.80%**

$$\text{Break-even (Rs.)} = \frac{\text{Fixed Cost}}{\text{CM\%}} = \frac{4,220,000}{41.80\%} = 10,095,694$$

$$\text{Break-even (Trips)} = \frac{\text{Fixed Cost}}{\text{CM per trip}} = \frac{4,220,000}{3,135} = 1,346$$

Question: 4

As the first management accountant employed by a manufacturer of power tools have been asked to a supply financial results by product line to help in marketing decision making.

	Rs. (000)	*Rs. (000)*
Sales		1,200
Cost of good sold:	500	
Materials	300	
Production Expenses	150	
Marketing costs	100	
		1,050
Net Profit		**150**

A statistical analysis of the figures show the following variable element in the costs:

	%age
Materials	90
Wages	80
Production Expenses	60
Marketing Costs	70

Below is given, as percentages, the apportionment of the sales and the variable elements of the costs among the five products manufactured.

	PRODUCT					
	A	B	C	D	E	Total
Sales	30	15	7	28	20	100
Materials	40	20	10	20	10	100
Wages	15	25	10	25	25	100
Production Expenses	30	10	10	30	20	100
Marketing Costs	10	30	20	30	10	100

From the information given you are required to:

(a)

i. Prepare a statement for the year showing contribution by products:
ii. Comment on these contributions:

(b)

i. The breakeven sales value.

ii The order of sales preference for additional orders to maximize contribution as a percentage of sales:

iii. A revised mix of the Rs. 1,200,000 sales to maximize contribution assuming that existing sales by products can only be varied 10% either up or down;

iv. A product mix to maximize contribution if manpower availability were reduced by 10% but the product mix could be varied by up to 20% and

v. The percentage commission which could be offered to an over seas agent on an order of Rs. 30,000 worth each of products A,C and E obtain a 20% contribution on the total sales value.

Answer: 4

(i)

ANALYSIS OF OVERALL PERFORMANCE

	Rs. (000)	Rs. (000)
Sales		1,200
Variable cost of goods sold		
Materials	450	
Wages	240	
Production Expenses	90	
Marketing costs	70	
		850
Contribution		350
Fixed Costs		200
Net Profit		**150**

PRODUCT LINE ANALYSIS

	A	B	C	D	E	Total
Sales	360	180	84	336	240	1,200
Materials	180	90	45	90	45	450
Wages	36	60	24	60	60	240
Production Expenses	27	9	9	27	18	90
Marketing Costs	7	21	14	21	7	70
	250	180	92	198	110	850
CONTRIBUTION	110		(8)	138	110	350
	30.55%		(19.52%)	41.07%	45.83%	29.16%

(a)

(ii) Three of the product line make a contribution to fixed costs and to profit. The other two do not although individual products within product lines may do so. Product lines B and C should not therefore be line. It is also possible that B and C are recently introduced product lines.

For those product lines making contribution, contribution/sales percentages are:

A	30.56%
D	41.07%
E	45.83%

(b)

(i) Assuming a constant mix of sales, average contribution sales is

350 / 1,200 =29.16% Breakeven sales

Is therefore:

200 / 29.16% = Rs. **685.714**

(ii) Preference order is E,D,A,B,C

(iii) Assumption: As in 9iv) , variation is up to = 10%

	Min Sales	Distribution of Balance	Total	
	Rs.	Rs.	Rs.	
A	324.00	4.80	328.80	
B	162.00		162.00	
C	75.60		75.60	
D	302.40	67.20	369.60	(Max)
E	216.00	48.00	264.00	(Max)
	1,080.00	**120.00**	**1,200.00**	

(iv) CONTRIBUTION / WAGES

	A	D	E
	110	138	110
	36	60	60
	306%	230%	183%
	1	2	3

Ranking

	Min Sales	Wages Used	Distribution Of balance	Total Wages	Sales	
	Rs.	Rs.	Rs.	Rs.	Rs.	
A	288.00	28.80	14.40	43.20	432.00	(max)
B	144.00	48.00		48.00	144.00	
C	67.20	19.20		19.20	67.20	
D	268.80	48.00	9.60	57.60	322.56	
E	192.00	48.00		48.00	192.00	
	960.00	192.00	24.00	216.00	1,157.76	

216.00=90% of 240.00

(v)

	A	C	E	Rs.
Sales	30.00	30.00	30.00	90.00
C/Sales	30.56%	(9.52%)	45.83%	
	9.17	(2.86)	13.75	20.06
20% contribution				18.00
Available for commission				2.06

%age commission 2.06 / 90 =2.29%

Question:5

RJ produces and sells two high performance motor cars: Car X and Car Y. The company operates a standard absorption costing system. The company's budgeted operating statement for the year ending 30 June 2008 and supporting information is given below:

Operating statement year ending 30 June 2008

	Car X	Car Y	Total
	$000	$000	$000
Sales	52,500	105,000	157,500
Production cost of sales	40,000	82,250	122,250
Gross profit	12,500	22,750	35,250
Administration costs			
Variable	6,300	12,600	18,900
Fixed	7,000	9,000	16,000
Profit/(loss)	(800)	1,150	350

The production cost of sales for each car was calculated using the following values:

	Car X		Car Y	
	Units	$000	Units	$000
Opening inventory	200	8,000	250	11,750
Production	1,100	44,000	1,600	75,200
Closing inventory	300	12,000	100	4,700
Cost of sales	1,000	40,000	1,750	82,250

Production costs

The production costs are made up of direct materials, direct labour, and fixed production overhead. The fixed production overhead is general production overhead (it is not product specific). The total budgeted fixed production overhead is $35,000,000 and is absorbed using a machine hour rate. It takes 200 machine hours to produce one Car X and 300 machine hours to produce one Car Y.

Administration costs

The fixed administration costs include the costs of specific marketing campaigns: $2,000,000 for Car X and $4,000,000 for Car Y.

Required:

(a) Produce the budgeted operating statement in a marginal costing format.

(b) Reconcile the total budgeted absorption costing profit with the total budgeted marginal costing profit as shown in the statement you produced in part (a).

The company is considering changing to an activity based costing system. The company has analysed the budgeted fixed production overheads and found that the costs for various activities are as follows:

	$000
Machining costs	7,000
Set up costs	12,000
Quality	7,020

inspections	
Stores receiving	3,480
Stores issues	5,500
	35,000

The analysis also revealed the following information:

	Car X	Car Y
Budgeted production (number of cars)	1,100	1,600
Cars per production run	10	40
Inspections per production run	20	80
Number of component deliveries during the year	492	900
Number of component deliveries during the year	4,000	7,000

Required:

(a) Calculate the budgeted production cost of one Car X and one Car Y using the activity based costing information provided above.

(b) Prepare a report to the Production Director of RJ which explains the potential benefits of using activity based budgeting for performance evaluation.

Answer :5

(a) Total production cost:

Car X = $40,000 (standard unit cost from the table showing information for the cost of sales)

Car Y = $47,000

Fixed production overhead = $35,000,000
Budgeted machine hours = (1,100 x 200) + (1,600 x 300) = 700,000 machine hours
Fixed production overhead a bsorption rate = $35,000,000/700,000 = $50 per machine hour.

	Car X	Car Y

	$ per car	$ per car
Total production cost	40,000	47,000
Fixed overhead absorbed	10,000	15,000
Variable production cost per car	30,000	32,000

Marginal costing operating statement – year ending 30 June 2008

	Car X	Car Y	Total
	$000	$000	$000
Sales	52,500	105,000	157,500
Variable production costs	30,000	56,000	86,000
Variable administration costs	6,300	12,600	18,900
Contribution	16,200	36,400	52,600
Specific fixed costs			
Marketing	2,000	4,000	6,000
Contribution to general fixed costs	14,200	32,400	46,600
General fixed costs			
Production			35,000
Administration			10,000
Profit			1,600

(b) The difference in the profit figures will be caused by the fixed production overheads that are absorbed into closing inventories. Changes in inventory levels will determine the amount of fixed production overheads that are 'moved' into the next accounting period and not charged in this period. If inventory levels increase, the absorption costing profit will be higher than the profit calculated using marginal costing.

	Car X	Car Y
Opening inventory (units)	200	250
Closing inventory (units)	300	100
Change in inventory (units)	+100	-150
Marginal profit will be lower	lower	higher

higher		
Fixed production overhead per car	$10,000	$15000
Total difference in profits $1,000,000	$1,000,000	$2,250,000

Reconciliation

	$000
Absorption costing profit	350
Car X: inventory impact	(1,000)
Car Y: inventory impact	2,250
Marginal costing profit	1,600

(c)

Activity	Cost Driver	Calculation of driver	Drivers
Machining costs	Machine hours	700,000	700,000
Set up costs	No. of production runs	(1,100/10) + (1,600/40)	150
Quality inspections	No. of inspections	(110 x 20) + (40 x 80)	5,400
Stores receiving	No. of deliveries	492 + 900	1,392
Stores issues	No. of issues	4,000 + 7,000	11,000

Activity	$000	Driver	Cost per driver
Machining costs	7,000	700,000	$10 per machine hour
Set up costs	12,000	150	$80,000 per set up
Quality inspections	7,020	5,400	$1,300 per inspection
Stores receiving	3,480	1,392	$2,500 per delivery
Stores issues	5,500	11,000	$500 per issue

	Car X		Car Y	
	Driver	$000	Driver	$000
Machine costs	220,000	2,200	480,000	4,800
Set up costs	1102,200	8,800	40	3,200

Quality inspections	492	2860	3,200	4,160
Stores receiving	4,000	1,230	900	2,250
Stores issues		2,000	7,000	3,500
Total overhead		17,090		17,910
Direct costs		33,000		51,200
Total production costs		50,090		69,110
Cars produced		1,100		1,600
Cost per car		**$45,536**		**$43,194**

(d)

Report

To: Production Director
From: Management Accountant
Date: 22 May 2007

Subject: Activity Based Budgeting – Performance Evaluation

As you are aware we are considering the implementation of an activity based costing system and moving away from the traditional absorption costing system which we currently operate.

There are many potential benefits associated with implementing activity based budgeting (ABB) for performance evaluation. Please find below an outline of some of the benefits that can be achieved from ABB.

Preparing budgets using a traditional absorption costing approach involves presenting costs under functional headings, that is, costs are presented in a manner that emphasises their nature. The weakness of this approach is that it gives little indication of the link between the level of activity of the department and the cost incurred. In contrast, activity based budgeting provides a clear framework for understanding the link between costs and the level of activity. This would allow us to evaluate performance based on the activity that drives the cost.

The modern business environment has a high proportion of costs that are indirect and the only meaningful way of attributing these costs to individual products is to find the root cause of such costs, that is, what activity is driving these costs. The traditional absorption costing approach does not provide this level of detail as costs under this system are attributed to individual products using a volume related measure. For our company this is machine hours which results in an arbitrary product cost. This makes it difficult to hold individual managers accountable for variances that arise. Whereas with an activity based costing approach responsibility can be broken down and assigned accordingly and individual managers can provide input into the budgeting process and subsequently be held responsible for the variances arising.

There is greater transparency with an ABB system due to the level of detail behind the costs.
The traditional absorption costing approach combines all of the overheads together using a machine hour basis to calculate an overhead absorption rate and uses this rate to attribute overheads to products. ABB will drill down in much more detail examining the cost and the driver of such costs and calculates a cost driver rate which will be used to assign overheads to products. Therefore ABB has greater transparency than absorption costing and allows for much more detailed information on overhead consumption and so on. This then lends itself to better performance evaluation.

I would like to conclude that the traditional absorption costing approach to product costing does not enable us to provide a satisfactory explanation for the behaviour of costs. In contrast ABB will provide such details which will allow us to have better cost control, improved performance evaluation and greater manager accountability.

If you require any further information please do not hesitate to contact me.

Linear Programming

GRAPHICAL METHOD

Machines	Hours	Hours required	Hours required	Maximum Units	Maximum Units
		X	Y	X	Y
A	120	2	5	60	24
B	80	4	2	20	40

Objective to maximize Contribution RS 3X+RS 4Y

Constraints 2X+5Y≤120

4X+2Y≤80

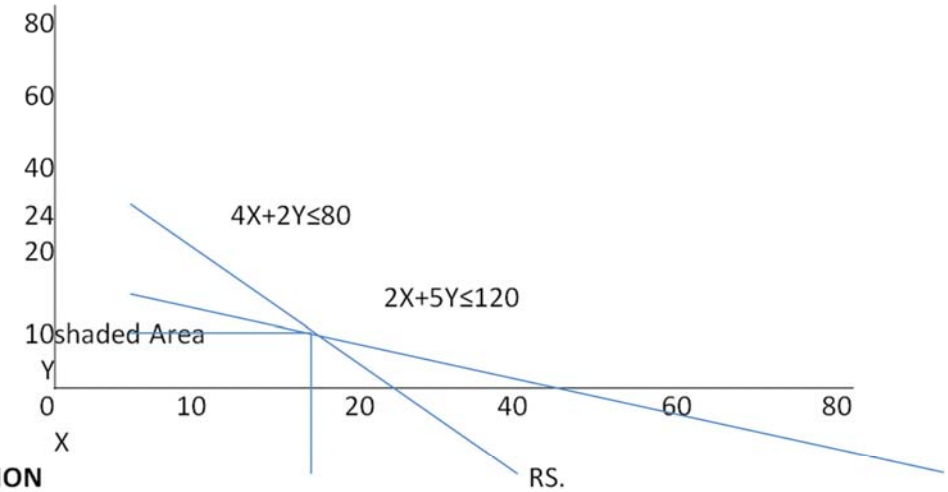
Where X>0

Y≤24 A Y≤40B

Where Y>0

X≤60A X≤20B

GRAPHICAL REPRESENTATION



MAX CONTRIBUTION		RS.
CONTRIBUTION X	10 x 3=	30
CONTRIBUTION Y	20 x 4=	80
	TOTAL	**110**
LOWEST CONTRIBUTION		RS.
IF ONLY X IS PRODUCED	20X 3=	60
IF ONLY X IS PRODUCED	24X 4=	96

ALGEBRAIC METHOD

Equation No : 1 $2x+5Y= 120$

Equation No : 2 $4X+2Y=80$

Multiply Eq 1 with **2.**

Equation No : 3 $4X+10Y=240$

Then Deduct Eq. 2 From Eq 3

$8Y= 160$

$Y= 20$

FIND VALUE OF X $2X+5(20)=120$

$2X=20$

$X= 10$

SHADOW PRICE

Assume 20 Hours of Machine A can be Acquired so What price can we afford to pay ?

Equation No : 1 2x+5Y= 140

Equation No : 2 4X+2Y=80

Multiply Eq 1 with Eq 2

Equation No : 3 4X+2Y=280

Then Deduct Eq. 2 From Eq 3

8Y= 200

Y= 25

FIND VALUE OF X 2X+5(25)=140

2X=15

X= 7.5

MAX CONTRIBUTION RS.

CONTRIBUTION X	7.5x 3=	22.5
CONTRIBUTION Y	25 x 4=	100
	TOTAL	**122.5**

EXCESS CONTRIBUTION RS.

122.5-110= 12.5

EXTRA HOURS 20 Hours

Rate per Hour RS .625

CONCLUSIONS

IF WE WANT TO ACQUIRE EXTRA 20 HOURS OF MACHINE A , THE MAXIMUM PRICE PER HOUR WE CAN AFFORD TO PAY RS. 0.625 PER HOUR.

CHAPTER

6

THE BUDGETING PROCESS

In the previous six chapters we have considered how management accounting can assist managers in making decisions. The action 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 inter-related aspects of decisions-making. If they fail to do this, there is danger that managers may each make decisions that they believe in the best interest 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 action for future periods. These detailed plans are usually referred as budgets.

Our objective in this chapter 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 the desired future and effective ways of bringing it about. A distinction is normally made between short-term planning (budgeting) and long-range planning, alternatively known as strategic or corporate planning. How long-range planning is 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 the considerable extent determined by the quality of firm's long-range planning efforts.

6.1 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 outlined in Figure 6.1 will be used to illustrate the role of long-term and short-term planning within the overall planning and control process. 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 the 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 (2005) distinguished 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 a very general terms the broad purpose and reasons for an organization's existence, the nature of the business(es) it is in and the customers its seeks to serve and satisfy. It is a visionary projection of the central and overriding concepts on which the organization is based. Objectives tend to be more specific and represent desired states or results to be achieved.

Stage 2: Identify potential strategies

The next stage shown in figure 6.1 is to identify a range of possible courses of action (or strategies) that might enable the company's objective to be achieved.

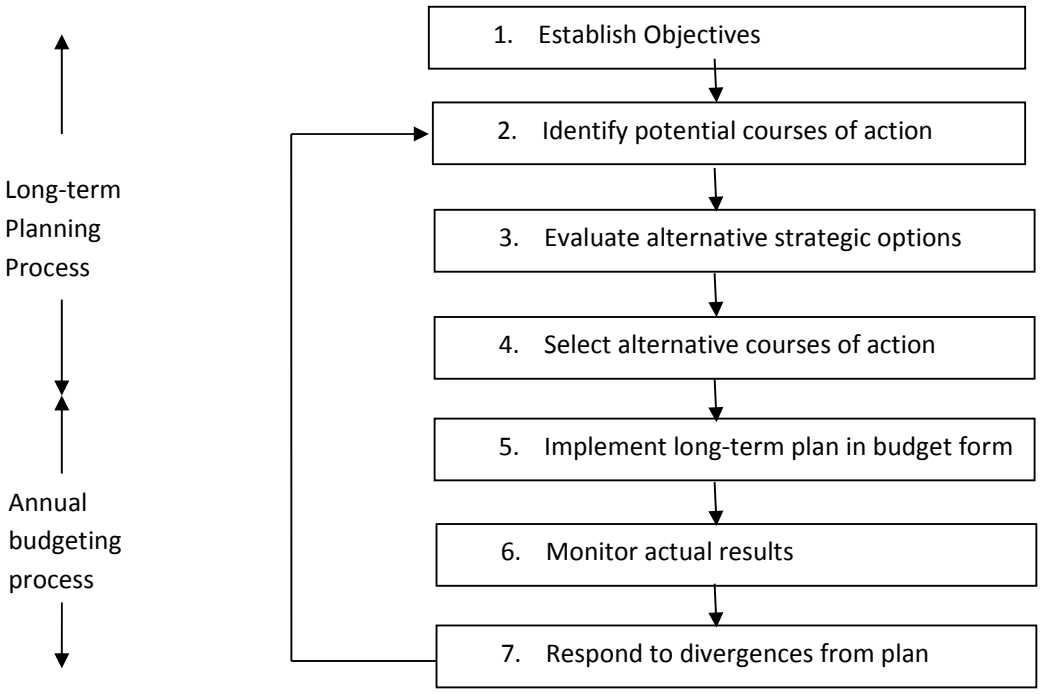


Figure 6.1 The role of long- and short-term planning within the planning, decision-making and control process

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.

Porter 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

   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'.

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.

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?

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 plan should be created to implement the strategies. 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 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. 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 divergencies from planned outcomes

The final stages in the decision-making, planning and control process outlined in **figure 6.1** 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.

6.2 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.

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.

Question:1

Salman is considering to set up a business offering mobile service of shoe repairing in the commercial area using the car parks of the shopping centres and offers an as-you- wait shoe repair service from his van. He has visited the major employers in the area and having reached agreements with a number of large local businesses and having carried out surveys of his potential customers, he has arrived at the following estimates for his first 3 months of business:

- He will start the business by investing Rs. 120,000 of his own money in March 2013 and, in that month; he will purchase a second-hand van at a cost of Rs. 90,000 and various machinery for Rs. 30,000. Also in March, he will buy inventories of materials at a cost of Rs. 38,500. The van would then be painted to advertise his business, at a cost of Rs. 7,000, payable in April 2013.
- He will commence business in April 2013 and expects sales to be as follows:

	Rupees
April 2013	13,000
May 2013	15,000
June 2013	18,000

Materials needed for the repairs would cost 30% of the sales price of each repair, giving a margin of 70% and materials would be regularly replaced to maintain inventories at a constant level.

- Fuel expense will be Rs.800 per month from April 2013 onwards and motor insurance for the year to 31 March 2014 will be Rs. 7,500, payable in April 2013.
- All sales will be for cash and all purchases, including the purchase of opening inventories, will be on one month's credit.
- Salman will draw Rs. 5,000 per month for his personal expenditures from April 2013.
- Running bank financing will be available if required, at 10%. Cash requirement at the end of month will be Rs.5,000 and extra cash will be used to payoff financing. Assume financing will be taken at the start of month and interest will be paid in July 2013.

Required:

i. What is the purpose of purpose of preparing a cash budget? Give four reasons.
ii. Prepare a cash budget for Salman for four months ended June 30, 2013.
iii. Furnish details of outstanding payments, if any.

Answer: 1

(b) (i) Reasons for purpose of preparing a cash budget:

There are several reasons for preparing a cash budget including the following:

1. To predict the cash balance over the period of the budget.
2. To arrange an appropriate overdraft facility with the bank.
3. To plan uses for any anticipated cash surpluses.
4. To plan the timing of expenditure.

(b) (ii) & (iii) Cash Budget for March to June 2013 Rupees

Receipt	**March 13**	**April 13**	**May 13**	**June 13**	**Total**
Capital	120,000				120,000
Cash Sales		13,000	15,000	18,000	46,000
Total	**120,000**	**13,000**	**15,000**	**18,000**	**166,000**
Payments					
Van	90,000				90,000
Machinery	30,000				30,000
Van-Painting		7,000			7,000
Purchase-Opening Inventory		38,500			38,500
Purchase-Replacement Inventory			3,900	4,500	8,400
Petrol		800	800	800	2,400
Motor Insurance		7,500			7,500
Drawings		5,000	5,000	5,000	15,000
	120,000	**58,800**	**9,700**	**10,300**	**198,800**
Months surplus/ deficit		(45,800)	5,300	7,700	
Opening balance		5,000	5,000	5,000	
Net surplus/ (deficit)	-	(40,800)	10,300	12,700	
Closing balance required	5,000	5,000	5,000	5,000	
Financing/ (repayment) during month	**5,000**	**45,800**	**(5,300)**	**(7,700)**	
Cumulative Financing	5,000	45,800	40,500	32,800	
Interest	**41.67**	**381.67**	**337.50**	**273.33**	

Question: 2

ABC Ltd., produces helmets for bike riders. The most recent statement of financial position of the company is as under:

ABC Ltd.
Statement of Financial Position as at June 30,2012

Assets		Rs. '000'	Liabilities and Owners Equity	Rs. '000'
Current assets			Current liabilities:	
Bank		16,600	Trade payable	24,000
Receivable		40,000	Tax payable	9,000
Inventory		78,000	Dividends payables	15,600
		134,600		**48,600**
Non-current assets:			Owners equity:	
Buildings	48,800		Ordinary shares (Rs. 10 per share)	40,000
Less: Accumulated dep.	8,800	40,000	Retained earnings	136,000
Plant and machinery	75,800			
Less: accumulated dep.	25,800	50,000		
		90,000		**176,000**
Total		**224,600**		**224,600**

During the year ended June 30, 2012, the sales revenue save Rs. 480 million. In order to exploit the market conditions due to recent changes in government legislation, forecast and assumptions for the next year have been prepared by the directors. However, forecast income statement and statement of financial position are yet to be prepared as per their following forecast and assumptions:

- Sales for the forthcoming year will be 25% higher than the previous year. Sales are expected to be spread evenly over the year.
- The gross profit margin is expected to be 30% of sales.
- To enhance production, new machinery costing Rs. 114 million will be required at the beginning of the year. A long-term loan will be arranged immediately to finance the purchase of new machinery. At the end of the year, the long-term debt to equity ratio is planned to be 1:2.
- The average collection period of receivables will be three times that of previous years and the average payment period for creditors will be one and half (1 ½) months.
- The value of inventory at the end of the year will be Rs. 36 million lower than beginning inventory.
- Depreciation charge for buildings and plant and machinery are calculated using the reducing balance method and will be 5% and 20% respectively. Other expenses including interest on loan for the period will be Rs. 109.2 million. There will be no prepayments or accruals at eh end of the year.
- Dividends will be declared at the end of the year and the dividend payout ratios will be 50% in line with pervious years. The tax rate will be 35% of net profits before taxation. The dividend and tax will be paid after the year end.

Required:

Forecast income statement for the year ended June 30, 2013 and a statement of financial position as at June 30, 2013 (show all of your working in legible writing).

Answer:2

ABC Ltd.
Forecast Income Statement
for the year ended 30 June,2013

		Rs. '000'
Revenue (Rs. 480 m x 125)		600,000
Cost of sales (70%)		420,000
Gross profit (30%)		180,000
Expenses		
Depreciation of buildings (5% of Rs. 40 m)	109,200	
Depreciation of plant and machinery (20% of Rs. (50 m + 114 m)	2,000	
Profit before taxation	32,800	144,000
Taxation		36,000
Dividend (50%)		12,600
Retained		23,400
		11,700
		11,700

Forecast Statement of Financial Position
as at 30 June,2013

Assets		**Rs. '000'**	**Liabilities and Owners Equity**	**Rs. '000'**
Current assets:			Current liabilities:	
Receivable (w-1)		150,000	Bank overdraft (w-4)	7,350
			Trade payable (w-2)	48,000
Inventory (78-36)		42,000		
		192,000	Tax payable	12,600
Non-current assets:			Dividends payable	11,700
Freehold buildings	46,800			79,650
Less accumulated dep.	10,800		Long term loan (w-3)	93,850
		38,000		
Plant and machinery	189,800		Owner equity:	
Less accumulated dep.	58,600	131,200		
			Ordinary shares @ Rs. 1 per share	40,000
			Retained earnings (136 + 11.7)	147,700
		169,200		187,700

Total	361,200	Total	361,200

Workings:

W-1: Trade Receivables:

Average debt collection period in current year	**(40 + 480) x 12 month**	**1 month**
Average debt collection period in next year	3 times one month	3 month
Trade receivables as at 30 June 2013	(3 + 12) x Rs. 600 m Rs.	150 million

W-2: Trade Payables:

Purchase in the year	**Closing inventory + cost of sales – opening inventory**	
Purchase in the year	Rs. 42m (reduction in inventory levels) + Rs. 420m – Rs. 78m	384
Trade payables at June 30, 2013	(1.5 + 12) x Rs. 384 million	48

Question No. 3

A garment manufacturing company is facing cash flow problem and is planning to avail a running finance facility on need basis. Following are the monthly sales forecasts and estimation of material and labour costs:

Rs. '000'

Month	Sales Forecasts	Material and Labour Costs
November 2010	360	160
December 2010	360	180
January 2011	720	252
February 2011	1,080	1,764
March 2011	1,440	612
April 2011	720	468
May 2011	720	324
June 2011	180	80
July 2011	360	120

Collection estimates of marketing department are as follows:

- within the month of sale - 10%
- in the month following the sale - 75%
- in the second month following the sale - 15%

Payments of material and labour are made during the following month in which these costs have been incurred.

Administrative salaries will amount to approximately Rs.60,000 per month.

Monthly lease payments under short-term lease contract will be Rs.20,000.

A progressive payment of Rs.400,000 must be paid in April 2011 for new equipment.

Other monthly and periodical estimations:

- Miscellaneous expenses Rs.6,000.
- Depreciation charges of Rs.40,000 upto March 2011 and Rs.44,000 from April, 2011.
- Advance Income Tax of Rs.50,000 due in the month of March and June, 2011.

Cash and bank balances on January 01, 2011 will be Rs.140,000 and same will be required to maintain throughout the period.

Required:

(a) Prepare a monthly cash budget for first 6 months of 2011, in a columnar format.

(b) Offer your comments and suggestions on borrowing and/ or short term deposits for the company.

Answer No. 3

Cash Budgeted 2011

Collections	Sales	Rs. 000 Jan.	Feb.	March	April	May	June
Nov.	360	54	-	-	-	-	-
Dec.	360	270	54	-	-	-	-
Jan.	720	72	540	108	-	-	-
Feb.	1080		108	810	162	-	-
March	1440			144	1080	216	-
April	720				72	540	108
May	720					72	540
June	180						18
Total collections		396	702	1062	1314	828	666

	Jan.	Feb.	March	April	May	June
Disbursements	180					
Material and labour		252	1764	612	468	324
Administrative Salary	60	60	60	60	60	60
New equipment		-	-	400	-	-
Misc. Expense		6	6	6	6	6
Lease	20	20	20	20	20	20
Advanced income tax			50			50
Total payments	260	338	1900	1098	554	460
Surplus (Deficit) for the month	130	364	(838)	216	274	206
Opening balance	140	270	634)	(204)	12	286
Closing balance	270	634	(204)	12	286	492

Question No. 4

a. Explain, giving examples, how budgets can be used for feedback control and feed forward control.
b. Briefly explain three reasons why budgetary planning and control might be inappropriate in a rapidly changing business environment.
c. Briefly explain Just-in-Time (JIT) and two major requirements for the successful operation of a JIT system.

Answer:4 (a)

Feedback control relates to information about past events. Actual results should be compared to planned or budgeted results as part of the control mechanism. Variance analysis is a good example of feedback control. The feedback should be used to revise future actions as appropriate and to learn from budgeting or operational errors.

Feed forward control is a system where deviations from a plan are anticipated and corrective action is taken in advance. An example is a cash flow projection which for example can highlight in advance any shortages of cash and therefore action can be taken before the event to avoid any problems this may bring.

Answer (b)

Budgets are often thought of as being bureaucratic and time consuming to produce. Consequently they are not updated on a regular basis and therefore in a dynamic environment budgets can quickly become out of date.

Budgets are often seen as constraints on responsiveness and as such stifle the ability of managers to react rapidly to change.

Budgets replicate vertical command and control structures and reinforce departmental barriers. Such rigid structures may not suit the organization culture of companies operating in a rapidly changing environment.

Budgets have been criticized for being too inward looking and as such they pay little attention to the external environment. This is even more inappropriate if the environment is changing rapidly.

Answer to (c)

JIT is a commitment to continuous improvement and the pursuit of excellence in the design and operation of the production management system. Under this system, production and resource acquisition is pulled through the system by customer demand and therefore the JIT production system must be able to respond quickly to customer demand and resources are only acquired when needed. In order to be able to operate in this manner, an organization must achieve excellence in all areas of management.

Operating on a JIT basis with low inventories requires excellence in:

- Production scheduling
- Supplier relations
- Plant maintenance
- Information systems
- Quality controls
- Customer relations.

Candidates were required to explain two requirements. For example:

Production scheduling

Under JIT it is thought that only the actual production time adds value to the product and that all other activities (inspection, move and storage times) do not add value but they do add cost. JIT aims to reduce and eliminate non-value adding activities.

Supplier relations

Under a JIT system a company would move towards having fewer suppliers and would build long term relationships with them. The ability to work with the minimum level of inventory will be dependent on having a guaranteed supply of quality resources. Consequently the selection of suppliers will tend not to be based on price alone.

Question:5

RF Ltd is a new company which plans to manufacture a specialist electrical component. The company founders will invest £16,250 on the first day of operations, that is, Month 1. They will also transfer fixed capital assets to the company.

The following information is available:

Sales

The forecast sales for the first four months are as follows:

Month	Number of components
1	1,500
2	1,750
3	2,000
4	2,100

The selling price has been set at £10 per component in the first four months.

Sales receipts

Time of payment	% of customers
Month of sale	20*
One month later	45
Two months later	25
Three months later	5

The balance represents anticipated bad debts.
*A 2% discount is given to customers for payment received in the month of sale.

Production

There will be no opening inventory of finished goods in Month 1 but after that it will be policy for the closing inventory to be equal to 20% of the following month's forecast sales.

Variable production cost

The variable production cost is expected to be £6·40 per component.

	£
Direct materials	1·90
Direct wages	3·30
Variable production overheads	1·20
Total variable cost	6·40

Notes:

Direct materials: 100% of the materials required for production will be purchased in the month of production. No inventory of materials will be held. Direct materials will be paid for in the month following purchase.

Direct wages will be paid in the month in which production occurs.

Variable production overheads: 60% will be paid in the month in which production occurs and the remainder will be paid one month later.

Fixed overhead costs
Fixed overhead costs are estimated at £75,000 per annum and are expected to be incurred in equal amounts each month. 60% of the fixed overhead costs will be paid in the month in which they are incurred and 30% in the following month. The balance represents depreciation of fixed assets.

Calculations are to be made to the nearest £1.

Ignore VAT and Tax.

Required:

(a) Prepare a cash budget for each of the first three months and in total.

(b) There is some uncertainty about the direct material cost. It is thought that the direct material cost per component could range between £1·50 and £2·20. Calculate the budgeted total net cash flow for the three month period if the cost of the direct material is:

(i) £1.50 per component; or
(ii) £2.20 per component.

Answer: 5

(a)

Cash Budget

	Month 1	Month 2	Month 3
	£	£	£
Sales receipts	2,940	10,180	15,545
Capital injection	16,250		
Total receipts	**19,190**	**10,180**	**15,545**
Outflow			
Materials	0	3,515	3,420
Labour	6,105	5,940	6,666
Variable overhead	1,332	2,184	2,318
Fixed overhead	3,750	5,625	5,625
Total outflow	**11,187**	**17,264**	**18,029**
Inflow-Outflow	8,003	(7,084)	(2,484)
Bal b/fwd	0	8,003	919
Bal c/fwd	8,003	919	(1,565)

Working

Sales receipts	**1**	**2**	**3**
Sales units	1,500	1,750	2,000
	£	£	£
Selling price	10	10	10

Sales	15,000	17,500	20,000	
Paid in month – 20%	3,000	3,500	4,000	
Discount paid in month 2%	-60	-70	-80	
45% in the following month		6,750	7,875	
25% in 3rd month			3,750	
Receipts	**2,940**	**10,180**	**15,545**	
Production	**1**	**2**	**3**	**4**
	units	units	units	units
Required by sales	1,500	1,750	2,000	2,100
Opening inventory		(350)	(400)	
	1,500	1,400	1,600	
Closing inventory	350	400	420	
Production	1,850	1,800	2,020	
Material price	£1.90	£1.90	£1.90	
Material cost	£3,515	£3,420	£3,838	
Payment		**£3,515**	**£3,420**	
Labour				
Production units	1,850	1,800	2,020	
Rate per unit	£3.30	£3.30	£3.30	
Payment	£6,105	£5,940	£6,666	
Variable Overhead				
Production units	1,850	1,800	2,020	
Rate per units	£1.20	£1.20	£1.20	
Variable overhead cost	£2,220	£2,160	£2,424	
Payment	£	£	£	
60% in month	1,332	1,296	1,454	
40% in following month		888	864	
Payment	1,332	2,184	2,318	
Fixed overhead	6,250	6,250	6,250	
Payment				
60% in month	3,750	3,750	3,750	
30% in following month		1,875	1,875	
Payment	**3,750**	**5,625**	**5,625**	

(b)(i)

	Month 1	Month 2	Month 3
£1.50			
£1.50-£1.90	£0.40	£0.40	£0.40
Production units	1,850	1,800	2,020
Saving	£740	£720	£808
Saving		£740	£720
Total cash benefit	£1,460		
Current cash flow at £1.90	£(1,565)		
Revised cash flow at £1.50	**£(105)**		

(ii)

	Month 1	Month 2	Month 3
£2.20			
£2.20-£1.90	£0.30	£0.30	£0.30
Production units	1,850	1,800	2,020
Additional cost	£555	£540	£606
Payment		£555	£540
Total additional payment	£1,095		
Current cash flow at £1.90	£(1,565)		
Revised cash flow at £2.20	**£(2,660)**		

Question:6

Assuming that the budgeted production of Product W was 7,700 units and that the following actual results were incurred for labour and overheads in the year:

Actual production	7,250 units
Actual overheads	
Variable	£185,000
Fixed	£105,000
Actual labour costs	
Skilled-£16.25 per hour	£568,750
Semi-skilled-£8 per hour	£332,400

Prepare a flexiable budget statement for X Plc showing the total variance that have accurred for the above four costs only.

a. X Plc currently uses uncremental budgeting. Explain how Zero Based Budgeting could overcome the problems that might be faced as a result of the continued use of the current system.

b. Explain how rolling budgets are used and why they would be suitable for X Plc.

Answer:6 (a):

Operating Statement

	Fixed Budget	Flexed Budget	Actual	Flaxible Budget Variance
Activity	7,700	7,250	7,250	
Overheads	£	£	£	£
Variable	168,000	158,182	185,000	26,818 adverse
Fixed	112,000	112,000	105,000	7,000 favouable
Labour				
Skilled	462,000	435,000	568,750	133,750 adverse
Semi-skilled	415,800	391,500	332,400	59,100 favouable
	1,157,800	**1,096,682**	**1,191,150**	**94,468 adverse**

Answer (b)

Incremental budgeting builds in any inefficiency contained in the previous year's budget as it simply takes the previous year's budget or actual results and adjusts for anticipated changes. Incremental budgeting does not encourage building the budget from zero and justifying each item of cost. It also does not allow for the changing nature of the business environment as it is inward looking.
ZBB does require each cost element to be specifically justified, as though the activities to which the budget relates were being undertaken for the first time, thereby avoiding the problems encountered with incremental budgeting.

CHAPTER

7

Standard Costing

Standard Costing

- *ICMA* Standard Cost is a unit concept. It can be defined as “an estimated cost of a cost unit, prepared in advance of production or supply, correlating a technical specification of materials and labor to the prices and wages ratio estimated for a selected period of time, with the addition of an apportionment of the overheads expenses estimated for the same period within a prescribed set of working conditions”.
- *CIMA* Standard Costing can be defined as “the preparation of standard costs and their use to clarify the financial results of a business, particularly by the measurement of variations of actual costs from standard costs and the analysis of the causes of the variations for the purposes of maintaining maximum efficiency by executive action.

Standard Hour (*CIMA*):

“The quantity of work achievable at a standard performance, expected in terms of a standard unit of work in a standard period of time.”

Types of Standards:

1. Basic Standards out-dated not used for budget preparation
2. Ideal Standards attained under most suitable conditions- Allowance for normal inefficiency is not provided for.
3. Expected Standards or currently attainable due allowances for normal wastages – tight but attainable

Budget Vs. Standard (Similarities)

Comparison Of budget and Standards

Budgets and standards are not same thing. They are setup for different purposes.

Similarities: Following are certain fundamental principles which are common to both standard and budget.

1. They are both prepared prior to given period of times as a plan to be pursued during that period i.e. established of program targets.
2. Comparison of actual with plan
3. The analysis of significant deviation of cause
4. Departmental heads may be made accountable for the performance of their departments which is monitored by either Budgetary Control or standard cost reporting.

Budget Vs. Standard (Differences)

Budget

1. Budgeted cost is the predetermined cost of producing a number of units i.e. it is a total concept..
2. Budget can be set for all functions.
3. The budgets emphasize the cost targets that should not be exceeded .
4. The purpose of budget is to forecast requirements in terms of manpower, finance, production, sales etc, to attain given objective
5. In budgets if the actual cost is less then budgeted cost, it is accepted as good performance as the variance is not normally investigated.

Standard

1. Standard cost is a predetermined cost of a cost unit.
2. Standard costs are normally set only for the manufacturing function.
3. Standards emphasize the cost to be anticipated under expected working exceeded conditions.
4. The purpose of standard cost is to determine what individual costs might be with in a prescribed set of working conditions
5. Any significant variation from standards, whether favorable or unfavorable is analyzed, investigated and reported so that corrective action may be taken.

Standards Setting

Standard Material	**Per Kg**	**Standard Labor**	**Rs. Per hour**
Purchase price/ Per kg	3.6	Basic Rate	10
Freight	0.44	10% tax	1
Receiving and handling	0.05	30% fringe benefit	3
Less discount	(0.09)		
Total cost	4	Total cost	14

Material Qty per unit	**Kg**	**Standard per unit**	**Hours**
Bill of material	2.7	Basic labor time	1.9
Allowance for wastage	0.2	Allowance for break	0.1
Allowance for rejects	0.1	Allowance for cleanup	0.3
		Allowance for rejects	0.2
Total	3	Total	2.5

Standard material cost per unit of output = 4 kg x 3 = 12

Standard labor cost per unit 2.5 hours x Rs. 14 = 35

Sources of variances:

Joel S. Demacki (information analyst) mentions five sources of production cost variances:

1. Random fluctuations under Efficient operations .
2. Prediction Error

3. Planning Error
4. Errors in accumulating cost data.
5. Operating error

Significance of Cost Variances

1. Size of variance
    i. Rupees amount
    ii. Percentage of standard
2. Recurring variances
3. Trends
4. Controllability
5. Favorable variances
6. Costs and benefits of investigation

Advantages of Standard Costing

1. Effective cost control: The most important advantage of standard costing is that it facilitates the control of cost. Control is exercised by comparing actual performance with standards and taking corrective actions.

2. Help in Planning: Establishing standards is a very useful exercise in business planning in business planning. Which instills in the management a habit of thinking in advance.

3. Provides incentives: The standard provides incentives and motivate to work with greater effort. This increases efficiency and productivity.

4. Fixing prices and formulating policies: Standard costs are a valuable aid to management in determining prices and formulating production policies.

5. Facilitates Coordination : While establishing standards, the performance of different departments such as production, sales, purchase etc. is taken into account. Thus through the working of standard cost system, co-ordination of various functions is achieved.

6. Facilitates delegation of authority: Delegation of authority and fixing responsibility for performance may be identified with the persons concerned.

7. Cost Reduction: By fixing standards, certain inefficiencies are reduced, such as material wastage, idle time, lost machine hours etc.

8. Valuation of Stocks: Standard costing simplifies the valuation of stock because the stock is valued at standard cost.

9. Management Exception: Reporting of variance is based on the principle of management by exception. Only variances beyond a predetermined limit may be considered by the management for corrective action. This also reduces the cost of preparing reports.

10. Economical and Simple: Standard costing simplifies the valuation of stock because the stock is valued at standard cost.

Disadvantages of standard costing

Standard Costing may suffer from certain disadvantages:

1. The system may not be appropriate to every business.
2. The staff may not be capable of operating the system.
3. A business may not be able to keep standards up-to date. In other words, a business may not revise standards to keep pace with the frequent changes in manufacturing conditions.
4. Inaccurate and unreliable standards cause misleading results and thus may not enjoy the confidence of the users of the system.
5. Operation of the standard costing system is a costly affair and small firms cannot afford it.
6. Standard costing is expensive and unsuitable in job order industries manufacturing non-standardized products.
7. Revision of Standard is very expensive.

Variance analysis

- Definition
- The evaluation of performance by means of variances, whose timely reporting should maximize the opportunity for management action.

Investigation of variances

- The benefits of investigation a variance should never exceed the cost of investigation.
- Factors to look for:
- Size
- Controllable/ uncontrollable
- Interrelationships
- The type of standard
- One time/over a period of time
- Set a tolerance limit

Usefulness of variances

- Variance analysis is intended to draw management attention to the existence of likely problems and opportunities.
- The purpose of the analysis is to analyze the total variance into elements, so that the causes of the differences are revealed.

- To establish responsibility and to take corrective action.

Question: 1

(a) A company uses variance analysis to monitor the performance of the team of workers which assembles Product M. Details of the budgeted and actual performance of the team for last period were as follows:

	Budget	***Actual***
Output of product M	600 units	680 units
Wage rate	£30 per hour	£32 per hour
Labour hours	900 hours	1,070 hours

It has now been established that the standard wage rate should have been £31·20 per hour.

a. Calculate the labour rate planning variance and calculate the operational labour efficiency variance.

b. Explain the major benefit of analyzing variances into planning and operational components.

c. Briefly explain three limitations of standard costing in the modern business environment.

d. Briefly explain three factors that should be considered before deciding to investigate a variance.

Answer: 1

Difference in standard wage rate = £1·20 per hour

Planning variance	(standard hours for actual output) x difference in wage rate
	680 x (900/600) x £1·20
	1,020 x £1·20
	£1,224 Adverse
Operational efficiency variance	(standard hours for actual output – actual hours) x revised wage rate
	(1,020 - 1,070) x £31·20
	50 x £31·20
	£1,560 Adverse

(ii) The major benefit of analysing the variances into planning and operational components is that the revised standard should provide a realistic standard against which to measure performance. Any variances should then be a result of operational management efficiencies and inefficiencies and not faulty planning.

Answer 1 *(b)*

The main limitations of standard costing in the modern business environment are as follows:

The business environment in the past was more stable whereas the modern business environment is more dynamic and subject to change. As a result if a business environment is continuously changing standard costing is not a suitable method because standards cannot be established for a reasonable period of time.

- The focus of the modern business environment is on improving quality and customer care whereas the environment in the past was focused on minimizing cost.
- The life cycle of products in the modern business environment is shorter and therefore standards become quickly out of date.
- The increase in automation in the modern business environment has resulted in less emphasis on labour cost variances.

Answer 1 *(c)*

- The benefit of investigating a variance should never exceed the cost of investigation. However this can be difficult to ascertain and therefore a manager should decide to investigate a variance based on the following:

  Size

  Criteria will be laid down which state that variances which are of a certain amount or percentage will be investigated. This is an extremely simple method to apply but the cut off values can be subjective.

  Controllable / Uncontrollable

  There is little point in investigating a variance if it is uncontrollable. The cost in this situation would outweigh the benefits of investigation since there would be no benefit obtained.

  Interrelationships

  An adverse variance in one part of the business may result in a favourable variance elsewhere.

  These interdependencies must be considered when deciding on investigation. For example a favourable labour rate variance may result in an adverse efficiency variance where less skilled workers are employed, costing less, as a result the workers take longer to do the job and an adverse efficiency variance arises.

If a company sets an ideal standard this will usually lead to adverse variances. The manager will need to decide at what size of adverse variance an investigation should take place on such variances.

Question: 2

Dynamic manufacturers Ltd. produces a single product whose standard cost is as shown below:

	Standard Unit Cost
	Rs.
Raw materials (5 kg. @ Rs. 20 per Kg.)	100
Labor (4 hours @ Rs. 5)	20
Variable overheads (Rs. 3 per direct labor hour)	12
Fixed overheads (Rs. 6 per direct labor hour)	24
Standard Unit Cost	156

The standard selling price is Rs. 200 per unit and total marketing and administration expenses (Rs. 10 per unit)Which are all basically fixed amount to Rs. 500,000 p.a.

N.B. The Overheads are allocated on the basis of budgeted production of 50,000 units p.a.

During the year the company produced 40,000 units and the following results were achieved:

	Rs. (000)	Rs. (000)
Sales		84,000
Cost of sales:		
Direct materials (208,000 Kg)	4,368	
Labor (152,000 hours)	988	
Variable overheads	456	
Fixed overheads	1,250	7,062
Gross margin		1,338
Less: Selling and Admn. Exp.		450
Profit for the year		888

Required:

a. A detailed cost variance analysis.

b. Reconciliation of budgeted profit with realized profit.

c. Criticisms against the traditional variance analysis as a tool for planning and control and suggestions advanced for its improvement.

Answer: 2

a. A detailed cost variance analysis.

Sales Price Variance

Actual Units sold x (St. Sp – Act Sp)
40,000 x (200 – 210) = 400,000 (F)

Sales Volume Profit Variance

Actual Units sold – Budgeted Units sold) x St. S Profit per Unit
40,000 x (200 – 210) = 400,000 (F)
(40,000 – 50,000) x 34 = 340,000 (A)
Sales Price = 300
Less: Total Cost = 166

Standard Profit = 34

Material Price Variance:

Actual Quantity x (Standard price – Actual price)
208,000 Kgs x (Rs. 20 –Rs. 21) = Rs. 208,000 (A)

Material usage Variance

Actual Material Usage – St. Usage) *St. price
(208,000 Kgs – 200,000 Kgs) x Rs. 20 –Rs. 160,000 (A)

Labor Rate Variance

Actual hours worked x (St. Rate – Actual Rate)
(152,000 hrs x (5 – 6.50) = Rs. 228,000 (A)

Labor Efficiency Variance

Actual labor hrs – St. labor hours) x St. Rate
(152,000 hrs – 160,000 hrs) x Rs. 5 = 40,000 (F)

Variable Overhead Spending Variance

Actual V.O.H	Rs. 456.000
Absorbed Volt (152,000 x 3)	Rs. 456.000
	Nil

Variable Overhead Efficiency Variance:

Absorbed V.O.H	Rs. 456,000
Standard V.O.H at actual output 40,000 units x Rs. 12	Rs. 480,000
Variable O.H. Efficiency Variance	(F) 24,000

Fixed overhead Efficiency – Productivity Variance:

(Absorbed F.OH – St. F. O.H at capacity attained)
(912,000 – 960,000) = Rs. 48,000 (F)
152,000 * 6 – 912,000

40,000 *24 = 960,000

Fixed Factory Overhead Capacity Variance

Budgeted Fixed O.H – Absorbed Fixed O.H
(1,200,000 – 912,000 = Rs. 288,000 (A)

Selling and Administration Expenses Spending Variance

(Actual S/A Exp. – Budgeted S/A Exp.)
(450,000 – 500,000) = 50,000 (F)

Selling and Administration Expenses Efficiency Variance

(Budgeted S/A Exp. – Absorbed S/A Exp.)
(500,000 – 400,000) = 100,000 (A)
40,000 * 10 = 400,000

Dynamic Manufactureres Limited						
Operating Statement						
Reconciliation of Budgeted Profit with Realized Profit						
					Rs.	
Budgeted Profit (50,000 x 34)					1,700,000	
Sales Price Variance			400,000	(F)		
Sales Volume Variance			340,000	(A)	60,000	(F)
					1,760,000	
Cost Variance	(F)		(A)			
Material Price Variance			208,000			
Material Usage Variance			160,000			
Labor Rate Variance			228,000			
Labor Efficiency Variance	40,000					
Variable O.H Spending Variance						
Variable O.H Efficiency Variance	24,000					
Fixed O.H Spending Variance			50,000			
Fixed O.H Capacity Variance			288,000			
Fixed O.H Efficiency Variance	48,000					
Selling & Admn. Exp. Variance	50,000					
Selling & Admn. Exp.						
Efficiency Variance			100,000			
	162,000		1,034,000		872,000	(A)
Actual net Profit					888,000	

c. Criticism Against Traditional Variance:

Traditional Variance Analysis fails to detect.

1. An implementation Deviation is a human or mechanical failure to achieve a specific obtainable action.
2. A prediction deviation an error in predicting a parameter value in the decision model.
3. A measurement deviation is an error in measuring the actual cost of operating a process.
4. Trading – off certain variance.

Suggestions:

1. To Calculate planning and operating variance.
2. To investigate variance which justify on cost and benefit criteria.
3. To feedback and review.

Question:3

D Limited manufactures and sells musical instruments, and uses a standard cost system. The budget for production and sale of one particular drum for April was 600 units at a selling price of £72 each. When the sales director reviewed the results for April in the light of the market conditions that had been experienced during the month, she believed that D Limited should have sold 600 units of this drum at a price of £82 each. The actual sales achieved were 600 units at £86 per unit.

Calculate the following variances for this particular drum for April:

(a) Selling price planning variance
(b) Selling price operating variance

Answer:3

A - Original plan	600 x £72 = £43,200
B - Revised ex post plan	600 x £82 = £49,200
C - Actual results	600 x £86 = £51,600

Selling price planning variance is B – A = £6,000 Fav
Selling price operating variance is C – B = £2,400 Fav
(Total variance is C – A = £8,400 Fav to check)

Question:4

A company has a process in which the standard mix for producing 9 litres of output is as follows:

	$
4.0 litres of D at $ per litre	36·00
3·5 litres of E at $5 per litre	17·50
2·5 litres of F at $2 per litre	5·00
	58·50

A standard loss of 10% of inputs is expected to occur. The actual inputs for the latest period were:

	$
4,300 litres of D at $9·00 per litre	38,700
3,600 litres of E at $5·50 per litre	19,800
2,100 litres of F at $2·20 per litre	4,620
	63,120

Actual output for this period was 9,100 litres.

You are required to calculate

(a) The total materials mix variance
(b) The total materials yield variance

Answer:4

	Actual usage in standard proportions	$	
D =	4,000 litres at $9 per litre	36,000	
E=	3,500 litres at $5 per litre	17,500	
F=	2,500 litres at $2 per litre	5,000	
		58,500	(1)
	Actual usage in actual proportions		
D=	4,300 litres at $9 per litre	38,700	
E=	3,600 litres at $5 per litre	18,000	
F=	2,100 litres at $2 per litre	4,200	
	10,000	60,900	(2)

Mix variance is (1) – (2) = $2,400 Adverse

Yield variance

Standard cost of 1 litre is $58.50 / 9 =	$6·50
Expected output is 10,000 x 90% =	9,000 litres
Actual output =	9,100 litres
Yield variance is (9,100 – 9,000) x $6.50 =	$650 Fav

s

Question:5

PP Ltd operators a standard absorption costing system. The following information has been extracted from the standard cost card for one of its products.

Budgeted production	1,500 units
Direct material cost: 7 kg x £ 4.10	140,000

Actual results for the period were as follow:

Production	1,600 units
Direct material (purchased and used): 12,00 kg	£52,200

It has subsequently been noted that due to a change in economic conditions the best price that the material could have been purchased for was £4.50 per kg during the period.

(i) Calculate the material price planning variance.
(ii) Calculate the operational material usage variance.

Answer:5

	£per kg	
Planning variance		
Rate standard	4.10	
Cost standard	4.50	
	0.40	x 11,200=£4,480 Adverse

	Kg	
Usage variance		
Standard 7 x 1,600	11,200	
Actual	12,000	
	800	x £4.50 = £3,600 Adverse

Question:6

Q plc uses standard costing. The details for April were as follows:

Budgeted output	15,000	units
Budgeted labour hours	60,000	hours
Budgeted labour cost	£540,000	
Actual output	14,650	units
Actual labour hours paid	61,500	hours
Productive labour hours	56,000	hours
Actual labour cost	£522,750	

Calculate the idle time variance for April.

Answer:6

Labour standard for 1 unit is 4 hours *£9 per hour

Idle time variance = (61,500 – 56,000) *£9

= 5,500 *£9

= £49,500 adverse

Question:7

Q plc uses standard costing. The details for April were as follows:

Budgeted output	15,000	units
Budgeted labour hours	60,000	hours
Budgeted labour cost	£540,000	
Actual output	14,650	units
Actual labour hours paid	61,500	hours
Productive labour hours	56,000	hours
Actual labour cost	£522,750	

Calculate the labour efficiency variance for April.

Efficiency variance = (std hour for actual output – actual hours)* std rate

= [(14,650*4) – 56,000]*£9

= (58,600 – 56,000)* £9

= £23,400 favorable

Question:8

A company uses variance analysis to monitor the performance of the team of workers which assembles Product M. Details of the budgeted and actual performance of the team for last period were as follows:

	Budget	*Actual*
Output of product M	600 units	680 units
Wage rate	£30 per hour	£32 per hour
Labour hours	900 hours	1,070 hours

It has now been established that the standard wage rate should have been £31·20 per hour.

(i) Calculate the labour rate planning variance and calculate the operational labour efficiency variance.

(ii) Explain the major benefit of analyzing variances into planning and operational components.

(a) Briefly explain three limitations of standard costing in the modern business environment.

(b) Briefly explain three factors that should be considered before deciding to investigate a variance.

(c) G Group consists of several autonomous divisions. Two of the divisions supply components and services to other divisions within the group as well as to external clients. The management of G Group is considering the introduction of a bonus scheme for managers that will be based on the profit generated by each division.

Briefly explain the factors that should be considered by the management of G Group when designing the bonus scheme for divisional managers.

Answer:8*(a)*

(i) Difference in standard wage rate = £1·20 per hour

Planning variance	(standard hours for actual output) x difference in wage rate 680 x (900/600) x £1·20 1,020 x £1·20 **£1,224 Adverse**
Operational efficiency Variance	(standard hours for actual output – actual hours) x revised wage rate (1,020 - 1,070) x £31·20 50 x £31·20 **£1,560 Adverse**

(ii) The major benefit of analysing the variances into planning and operational components is that the revised standard should provide a realistic standard against which to measure performance. Any variances should then be a result of operational management efficiencies and inefficiencies and not faulty planning.

Answer *(b)*

The main limitations of standard costing in the modern business environment are as follows:

- The business environment in the past was more stable whereas the modern business environment is more dynamic and subject to change. As a result if a business environment is continuously changing standard costing is not a suitable method because standards cannot be established for a reasonable period of time.
- The focus of the modern business environment is on improving quality and customer care whereas the environment in the past was focused on minimizing cost.
- The life cycle of products in the modern business environment is shorter and therefore standards become quickly out of date.
- The increase in automation in the modern business environment has resulted in less emphasis on labour cost variances.

Answer *(c)*

The benefit of investigating a variance should never exceed the cost of investigation. However this can be difficult to ascertain and therefore a manager should decide to investigate a variance based on the following:

Size

Criteria will be laid down which state that variances which are of a certain amount or percentage will be investigated. This is an extremely simple method to apply but the cut off values can be subjective.

Controllable / Uncontrollable

There is little point in investigating a variance if it is uncontrollable. The cost in this situation would outweigh the benefits of investigation since there would be no benefit obtained.

Interrelationships

An adverse variance in one part of the business may result in a favourable variance lsewhere.

These interdependencies must be considered when deciding on investigation. For example a favourable labour rate variance may result in an adverse efficiency variance where less skilled workers are employed, costing less, as a result the workers take longer to do the job and an adverse efficiency variance arises.

Type of standard

If a company sets an ideal standard this will usually lead to adverse variances. The manager will need to decide at what size of adverse variance an investigation should take place on such variances.

Answer to *(d)*

Firstly G Group must consider the transfer pricing system. The system must provide information that motivates divisional managers to make good economic decisions not just for themselves but for the company as a whole. It should also provide information that is useful for evaluating the managerial and economic performance of the divisions and should ensure that divisional autonomy is not undermined.

If there is unlimited demand for the output of the two divisions in the market then the transfer price should equal the market price less any savings as a result of internal transfer. This then allows the divisions to report a profit on the transfers and will not cause any issue for the calculation of the bonus.

However, if there is a limit on the amount that can be sold on the external market then the divisions would be transferring at marginal cost as there is no opportunity cost. In this case they will simply cover the marginal cost and have no contribution towards fixed costs or profit. This will mean that if the bonus is awarded on profit the divisional manager will not receive a bonus despite the fact that they have made internal supplies.

Therefore the company must ensure that in order for decisions to remain goal congruent the bonus scheme must allow for internal transfers that impact on the divisions' ability to earn bonuses.

- Other areas to consider when implementing a bonus scheme include:
- It should be clearly understood by all personnel involved;
- There should be no delay between the awarding of the bonus and the subsequent payment of the bonus;
- It should motivate the personnel;
- It should not cause sub-optimal behaviour;
- Controllable and uncontrollable costs and revenues should be identified separately.

CHAPTER

8

Decision Making

The Decision-Making Process

1. Clarify the Decision Problem
2. Specify the Criterion
3. Identify the Alternatives
4. Develop a Decision Model
5. Collect the Data
6. Make a Decision

Cost Classification for Decision Making

Management decisions involve a selection between alternative courses of action and costs play a very prominent role in decision-making. For analytical process, costs are classified as under:

a) Differential or Incremental Costs: Differential cost is the increase or decrease in total cost which results from an alternative course of action. It is ascertained by subtracting the cost of one alternative from the cost of another alternative. The alternative choice may arise because of change in method of production, changes in sales volume, change in product mix, make or buy decisions, accept or reject order.

Example: Current manufacturing cost of XYZ Co. is Rs.100,000. Due to expansion operations, costs increase by 25%. So this incremental cost of Rs.(100,000*.25 = 25000) is the differential or incremental cost.

b) Imputed Costs: These are hypothetical costs which are specifically computed for the purpose of decision making. Interest on capital is a common type of imputed cost. The failure to consider imputed interest cost may result in an erroneous decision. For example, project A requires a capital investment of Rs. 50,000 and project B Rs.40,000. Both the projects are expected to yield Rs. 10,000 as additional profit. Obviously, these two projects are not equally desirable since project B requires less investment and thus should be preferred.

c) Opportunity Costs: 'The value of a benefit sacrificed when one course of action is chosen, in preference to an alternative. The opportunity cost is represented by the foregone potential benefit from the best rejected course of action'.

CIMA *official Terminology*

Example: Assume a company owns a building which has been fully depreciated in the books of accounts. Yet, it has a rental value of Rs.5000 per annum. Now, if the company is considering the use of this building in a special project a change in lieu of rent of 5000 (opportunity cost) should be included in evaluating the desirability of the project despite the fact that books of accounts show it at nil value. Opportunity cost is a pure decision-making cost and is not entered in the books of accounts.

c) Replacement Cost: This is the cost at which there could be purchased an asset identical to that which is being replaced. In simple words, replacement cost is the current market cost of replacing an asset. When the management considers the replacement of an asset, it has to keep in mind its replacement cost and not the cost at which it was purchased earlier.

d) Sunk Cost: A sunk cost is **'cost that has been irreversibly incurred or committed and cannot therefore be considered relevant to a decision. Sunk cost costs may also be deemed irrecoverable costs**'.

CIMA *official Terminology*

Example: An example of a sunk cost could be **development costs** already incurred. Suppose that a company has spent Rs.250,000 in developing a new service for customers, but the marketing department's most recent findings are that the service might not gain customer acceptance and could be a commercial failure. The decision whether or not abandon the development of the new service would have to be taken, but the Rs. 250,000 spent so far should be ignored by the decision makers because it is a sunk cost.

(**CIMA** *performance Management 3rd edition, pg: 12)*

e) **Out-of-pocket Costs:** Out-of-pocket costs represent cash payments to be incurred (such as rent, wages) as against costs which do not require cash outlay (such as depreciation). This is frequently used by business concerns as an aid in making decisions pertaining to price fixation during depression, make or buy decisions, etc.

f) **Future Costs:** No decision can change what has already happened. The past is history and decisions made now can affect only what will happen in the future. Thus, the only relevant costs for decision- making are pre-determined or future costs. But, it is the historical costs which generally provide a basis for computing future costs.

g) **Discretionary Cost:** A **discretionary cost** is a cost whose amount, within a particular time period, is **determined by**, and can be altered by, the budget holder. **Discretionary fixed costs**, such as advertising and research and development costs, are incurred as a result of a top management decision, but could be **raised or lowered at fairly short notice** (irrespective of the actual volume of production and sales).

(**CIMA** *performance Management 3rd edition, Pg: 413)*

h) **Committed Cost:** A committed cost is a **future cash outflow** that will be **incurred any way**, **whatever decision is taken now** about alternative opportunities. Committed costs may exist because of contracts already entered into by the organization, which it cannot now avoid.

(**CIMA** *performance Management 3rd edition, Pg: 32)*

Question: 1

Miami Industries received an order for a piece of special machinery from Jay Company. Just as Miami completed the machine, Jay Company declared bankruptcy, defaulted on the order, and forfeited the 10 percent deposit paid on the selling price of $72,500.

Miami's manufacturing manager identified the costs already incurred in the production of the special machinery for Jay Company as follows:

	$	
Direct material…….……		16,600
Direct labor……..…….		21,400
Manufacturing overhead applied……..……		
Variable……..……..	10,700	
Fixed……..……	5,350	16,050
Fixed selling and administrative costs……..…..		5,405
Total……..…		59,455

Another company, Kaytell Corporation, will buy the special machinery if it is reworked to Kaytell's specifications. Miami Industries offered to sell the reworked machinery to Kaytell as a special order for $68,400. Kaytell agreed to pay the price when it takes delivery in two months. The additional identifiable costs to rework the machinery to Kaytell's specifications are as follows:

	$
Direct material……..……	6,200
Direct labor……..…….	4,200
Total……..…	10,400

A second alternative available to Miami's management is to convert the special machinery to the standard model, which sells for $62,500. The additional identifiable costs for this conversion are as follows:

	$
Direct material……	2,850
Direct labor……	3,300
Total……	6,150

A third alternative for Miami Industries is to sell the machine as is for a price of $52,000. However, the potential buyer of the unmodified machines does not want it for 60 days. This buyer has offered a $7,000 down payment, with the remainder due upon delivery.

The following additional information is available regarding Miami's operations:

- The sales commission rate on sales of standard models is 2 percent, while the rate on special orders is 3 percent.
- Normal credit terms for sales of standard models are 2/10, net/30. This means that a customer receives a 2 percent discount if payment is made within 10 days, and payment is due no later than 30 days after billing. Most customers take the 2 percent discount. Credit terms for a special order are negotiated with the customer.
- The allocation rates for manufacturing overhead and fixed selling and administrative costs are as follows:

Manufacturing costs:	
Variable……..……	50% of direct-labor cost
Fixed……..…	25% of direct-labor cost
Fixed selling and administrative costs……..	10% of the total of direct-material, direct labor, and manufacturing overhead costs

- Normal time required for rework is one month

Required:

1. Determine the dollar contribution each of the three alternatives will add to Miami Industries' before-tax profit
2. If Kaytell makes Miami Industries a counteroffer, what is the lowest price Miami should accept for the reworked machinery from Kaytell? Explain your answer.
3. Discuss the influence fixed manufacturing-overhead cost should have on the sale price quoted by Miami Industries for special orders.

Solution: 1

1

	Sell to Kaytell as a Special Order	Convert to Standard Model	Sell as Special Order as it is
	$		
Sales price	68,400	62,500	52,000
Less: cash discount	-	1,250	-
Net price	68,400	61,250	52,000
Additional manufacturing costs:			
Direct material	6,200	2,850	-
Direct labor	4,200	3,300	-
Variable manufacturing overhead	2,100	1,650	-
Total additional manufacturing costs	12,500	7,800	-
Commissions	2,052	1,250	1,560
Total costs and expenses	14,552	9,050	1,560
Net contribution	53,848	52,200	50,440

2

	$	
Contribution from sale to Kaytell	53,848	
Contribution from next best alternative: sell as standard model	52,200	
Difference in contribution	1,648	
Percentage of sales price received net of commission on special order: (100% - 3%)	97%	
Acceptable reduction in sales price from Kaytell (1,648/ 97%)	1,699	(rounded)
Original price quote to Kaytell	68,400	
Acceptable reduction	1,699	
Minimum acceptable price from Kaytell	66,701	
Proof: Suppose Kaytell pays a price of $66,701		
Sales price	66,701	
Less: Sales commission (3%)	2,001	
	64,700	
Less: Additional manufacturing costs	12,500	
Contribution with reduced price to Kaytell	52,200	

Therefore, at a price of $66,701 to Kaytell, Miami Industries' management would be indifferent between selling the machine to Kaytell and converting it to a standard model. At any price quote from Kaytell below $66,701, Miami Industries' would prefer to convert the machine to a standard model.

3 Fixed manufacturing overhead should have no influence on the sales price quote by Miami Industries for special orders. Management should accept special orders whenever the firm is operating substantially below capacity. Including below the breakeven point, whenever the marginal revenue from the order exceeds the marginal cost. Normally, this would mean that the order should be accepted as long as the sales price of the order exceeds the variable production costs. The special order will result in a positive contribution toward fixed costs. the fixed manufacturing overhead is not considered in pricing, because it will be incurred whether the order is accepted or not.

Question: 2

(Pricing a Special Order; International)

Badger Valve and Fitting Company, located in southern Wisconsin, manufactures a variety of industrial valves and pipe fittings that are sold to customers in nearby states. Currently, the company is operating at about 70 percent capacity and is earning a satisfactory return on investment. Management has been approached by Glasgow Industries Ltd. of Scotland with an offer to buy 120,000 units of valve. Glasgow Industries manufactures a valve that is almost identical to Badger's pressure valve. Glasgow needs the 120,000 valves over the next four months to meet commitments to its regular customers. Glasgow is prepared to pay $19 for each of the valves. Badger's total product cost, based on current attainable standards, for the pressure valve is $20, calculated as follows:

	$
Direct material……	5.00
Direct labor……..……	6.00
Manufacturing overhead……..	9.00
Total product cost…….	20.00

Manufacturing overhead is applied to production at the rate of $18 per standard direct-labor hour. This overhead rate is made up of the following components:

	$
Variable manufacturing overhead……	6.00
Fixed manufacturing overhead (traceable)……	8.00
Fixed manufacturing overhead (allocated)……	4.00
Applied manufacturing overhead rate……	18.00

Additional costs incurred in connection with sales of the pressure valve include sales commissions of 5 percent of $ 1.00 per unit. However, the company and freight expense of $1.00 per unit. However, the company does not pay sales commission on special orders that come directly to management. In determining selling prices, Badger adds a 40 percent markup to total product cost. This provides a $28 suggested selling price for the pressure valve. The Marketing Department, however, set the current selling price at $27 in order to maintain market share. Production management believes that it can handle the Glasgow Industries order without disrupting its scheduled production. The order would, however, require additional fixed factory overhead of $12,000 per month in the form of supervision and clerical costs. If management

accepts the order, 30,000 pressure valves will be manufactured and shipped to Glasgow Industries each month for the next four months. Glasgow's management has agreed to the shipping charges for the valves.

Required:

1. Determine how many direct-labor hours would be required each month to fulfill the Glasgow Industries order.
2. Prepare an analysis showing the impact of accepting the Glasgow Industries order.
3. Calculate the minimum unit price that Badger Valve and Fitting Company's management could accept for the Glasgow Industries order without reducing net income.
4. Identify the factors, other than price, that Badger's management should consider before accepting the Glasgow Industries order.

Solution: 2

1 The manufacturing overhead rate is $18.00 per standard direct-labor hour, and the standard product cost includes $9.00 of manufacturing overhead per pressure valve. Accordingly, the standard direct-labor hour per finished valve is 1/2 hour ($9.00/ $18.00). Therefore, 30,000 units per month would require 15,000 direct-labor hours.

2 The analysis of accepting the Glasgow Industries' order of 120,000 units is as follows:

	Per unit	Totals for 120,000 units
	$	
Incremental revenue	19.00	2,280,000
Incremental costs:		
Variable costs:		
Direct material	5.00	600,000
Direct labor	6.00	720,000
Variable overhead	3.00	360,000
Total variable costs	14.00	1,680,000
Fixed overhead:		
Supervisory and clerical costs (4 months @ 12,000)		48,000
Total incremental costs		1,728,000
Total incremental profit		552,000

The following costs are irrelevant to the analysis:

- Shipping
- Sales commission
- Fixed manufacturing overhead (both traceable and allocated)

3 The minimum unit price that Badger Valve and Fitting Company could accept without reducing net income must cover the variable unit cost plus the additional fixed costs.

Variable unit cost:		
Direct material	5.00	
Direct labor	6.00	
Variable overhead	3.00	14.00
Additional fixed cost (48,000* / 120,000)		0.40
Minimum unit price		14.40

* Additional fixed cost = 4 months*12,000 per month = 48,000

4 Badger's management should consider the following factors before accepting the Glasgow Industries order:

- The effect of the special order on Badger's sales at regular prices.
- The possibility of future sales to Glasgow Industries and the effects of participating in the international marketplace
- The company's relevant range of activity and whether or not the special order will cause volume to exceed this range.
- The effect on machinery or the scheduled maintenance of equipment.
- Other possible production orders that could come in and require the capacity allocated to the Glasgow job.

Question No. 3:

Brown Ltd. is a company that has in stock some materials of type XY that cost Rs. 75,000 but these materials are now obsolete and have a scrap value of only Rs. 21,000. Other than selling the material for scrap, there are only two alternative uses for them.

Alternative 1: Convert the obsolete materials into a specialized product, which would require the following additional work and materials:

Material A	600 units
Material B	1.000 units
Direct labour:	
5.000 hours unskilled	
5.000 hours semi-skilled	
5.000 hours highly skilled	Total 15.000
Extra selling and delivery expenses	Rs. 27.000
Extra advertising expenses	Rs. 18.000

The conversion would produce 900 units of saleable products, and these could be sold for Rs. 300 per unit.

Material A is already in stock and is widely used within the firm. Although present stocks together with orders already planned will be sufficient to facilitate normal activity, any extra material used by adopting this alternative will necessitate such materials being replaced immediately. Material B is also in stock, but it is unlikely that any additional supplies can be obtained for some considerable time because of an industrial dispute. At the present time material B is normally used in the production of product Z, which sells at Rs. 390 per unit and incurs total variable cost (excluding material B) of Rs. 210 per unit. Each unit of product Z uses four units of Material B.

The details of materials A and B are as follows:

	Material A (Rupees)	**Material B (Rupees)**
Acquisition cost at time of purchase	100 per unit	10 per unit
Net realizable value	85 per unit	18 per unit
Replacement cost	90 per unit	–

Alternative 2: Adapting the obsolete materials for use as a substitute for a sub-assembly that is regularly used in the firm.

Details of the extra work and materials required are as follows:

Material C	1,000 units
Direct labour:	
4,000 hours unskilled	
1,000 hours semi-skilled	
4,000 hours highly skilled	Total 9,000

1,200 units of the sub-assembly are regularly used per quarter at a cost of Rs. 900 per unit. The adaption of material XY would reduce the quantity of the sub-assembly purchased from outside the firm to 900 units for the next quarter only. However, since the volume of purchases would be

reduced, some discount would be lost, and the price of those purchased from outside would increase to Rs. 1,050 per unit for the quarter.

Material C is not available externally, but is manufactured by Brown Ltd. The 1,000 units required would be available from stocks, but would be produced as extra production. The standard cost per unit of material C would be as follows

	(Rupees
Direct labour, 6 hours unskilled labour	18
Raw materials	13
Variable overhead, 6 hours at Re. 1	6
Fixed overhead, 6 hours at Rs. 3	18
	55

The wage rates and overhead recovery rates for Brown Ltd. are:

Variable overhead	Re. 1 per direct labour
Fixed overhead	Rs. 3 per direct labour
Unskilled-labour	Rs. 3 per direct labour
Unskilled-labour	Rs. 4 per direct labour
Highly skilled labour	Rs. 5 per direct labour

The unskilled labour is employed on a casual basis, and sufficient labour can be acquired to exactly meet the production requirements. Semi-skilled labour is part of the permanent labour force, but the company has temporary excess supply of this type of labour at the present time. Highly skilled labour is in short supply and cannot be increased significantly in the short term; this labour is presently engaged in meeting the demand for product L, which requires 4 hours of highly skilled labour. The contribution from the sale of one unit of product L is Rs. 24.

Required:

Prepare and present cost information, advising whether the stocks of 20 material XY should be sold, converted into a specialized product (alternative 1) or adapted for use as a substitute for a sub-assembly (alternative 2).

Solution No.3:

Alternative 1: Conversion vs immediate sale

		Rs.	Rs.	Rs.
1	Sale revenue (900 units)			270,000
	Less: Relevant costs:			
2	Material XY opportunity cost		21,000	
3	Material A (600 units at Rs. 90)		54,000	
4	Material B (1000 units at Rs. 45)		45,000	
5	Direct Labour:			
	Un Skilled (5000 hrs at Rs. 3)	15,000		
	Semi Skilled	-		
	Highly Skilled 5,000 x (5+6) = 55,000	55,000	70,000	
6	Variable overhead (15,000 hrs x Rs.1)		15,000	
7	Selling & delivery expenses		27,000	
	Advertising		18,000	
8	Fixed overhead		NIL	250,000
	Excess of relevant revenues			20,000

Alternative 2: Adaption versus immediate sale

3		Rs.	Rs.	Rs.
9	Saving on purchase of sub-assembly			
	Normal spending (1,200 units x Rs. 900)		1,080,000	
	Revisal spending (900 units x Rs. 1050)		945,000	135,000
	Less: Relevant Cost			
2	Material XY opportunity Cost		21,000	
10	Material C (1,000units x Rs37)		37,000	
5	Direct labour			
	Un skilled(4,000hrsxRs14)	12,000		
	Sami skilled	Nil		
	Skilled(4,000hrsxRs11)	44,000	56,000	
6	Variable overhead		9,000	
8	Fixed Overhead		NIL	123,000
	Net relevant Savings			12,000

Notes:

1. There will be additional sales revenue of Rs270,000 if alternative 1 is chosen.
2. Acceptance of either alternative 1or 2 will mean a loss of revenue of Rs21,000 from the obsolete material XY. This is an opportunity, Cost, which must be covered which ever alternative is chosen. The original purchase cost of Rs 75,000 for material XY is a sale cost and is irrelevant.

3. Acceptance of alternative 1 will mean that material A must be replaced at an additional cost of Rs. 54,000.
4. Acceptance of alternative 1 will mean that material B will be diverted from the production of product Z. The excess of relevant revenues over relevant over relevant cost for product Z is Rs 180,and each unit of product Z use four units of materials. The lost contribution (excluding the cost of materials B which is incurred for both alternatives) will therefore be Rs. 45for each unit of materials B that is used the converting the raw material into a specialized product.
5. Unskilled labour can be matched exactly to the company's production requirements. The acceptance of either alternative 1or 2 will cause the company to incur additional unskilled labour that is used. It is assumed that the semi-skilled labour would be retained and that these would be sufficient excess supply for either alternative at no extra cost to the company. In these circumstances semi-skilled labour will not be relevant cost skilled labour is in short supply and can only be obtained by reducing production of product L, resulting in a lost contribution of Rs.24 or Rs.6 per hour of skilled labour .We have already established that the relevant cost of labour that is the short supply in the hourly labour cost plus the lost contribution per hour, so the relevant labour cost here will be Rs.11 per hour
6. It is assumed that for each direct labour hour of input variable over heads will increased by Rs.1. As each alternative uses additional direct labour hrs, variable overheads will increase giving a relevant cost of Rs. 1 per direct labour hr.
7. As advertising, selling and distribution expenses will be different it alternative 1 is chosen, these costs are clearly relevant 1 is chosen, these cost are clearly relevant to the decision.
8. The company's fixed overheads will remain the same whichever alternative, is chosen and so fixed overheads are not a relevant cost for either alternative.
9. The Cost of purchasing the sub-assembly will be reduced by Rs135,000, if the second alternative is chosen, and so these savings are relevant to the decision.

The company will incur additional variable cost of Rs. 37 for each unit of material C that is manufactured, so the fixed overheads for material C are not a relevant cost.

Question No. 4:

Following is the budgeted room occupancy of Hotel Shaheen for the next financial year.

	Average %
July—September	90
October—December	55
January—March	45
April—June	60

Revenue for the year is estimated at Rs. 150 million, which is generated from the following three profit centres

Profit Centre	%
Accommodation	45
Restaurant/catering	35
Snacks bar	20
Total	100

Note: The accommodation revenue is earned from several different categories of guests each of which pay a different rate per room.

The three profit centres have the following gross margin percentage:

	Accommodation		Restaurant/Cater		Snacks Bar %	
Revenue		100		100		100
Wages	20		30		15	
Cost of sales	–		40		50	
Direct costs	10	30	10	80	5	70
Gross margin		**70**		**20**		**30**

Fixed costs for the year are estimated at Rs. 28,250,000. Capital employed is Rs. 350 million. In order to improve the return on capital employed, the management have following two propositions under consideration:

1. To offer special two nights package at a reduced price of Rs. 1,250 per night. It is expected that those availing the/offer would spend an amount equal to 40% of the accommodation charge in the restaurant (catering), and 20% in the snacks bar.
2. To increase prices. Management feels that there will be no drop in volume of sales if restaurant (catering) prices are increased by 10% and snacks bar prices by 5%. Accommodation prices will also have to be increased.

Required:

(a) Calculate the budgeted return on capital employed (ROCE) before tax.

(b) Calculate

(i) How many two-nights packages would need to be sold each week in the three off-peak quarters to improve the return on capital employed,(ROCE) by a further 4% above the percentage, calculated in (a) above.

(ii) By what percentage the price of accommodation would need to be increased to achieve the desired increase in ROCE calculated in [b (i)] above.

Solution: 4

HOTEL SHAHEN

a. Budgeted Rate of return on capital employee.

	Sales		Gross profit value
	(Rs.'000)	(%)	(Rs. '000)
Accommodation 45%	67,500	70	47,250
Catering (Resp.) 35%	52,500	20	10,500
Snacks bar 20%	30,000	30	9,000
	150,000	100	66,750
Less Fixed Costs			28,250
Profit before tax			38,500

$$\text{ROCE} = \frac{38{,}500}{350{,}000} = 11\% \text{ ---} (a)$$

b. (i) Required additional profit

= 4% x 350,000,000 = Rs 14,000,000

Contribution per 2 night package:

		Sales	GP% Margin	Contribution (Rs.)
Accommodation	(2 x 1,250)	2,500	70	1,750
Catering	(40% x 2,500)	1,000	20	200
Snacks bar	(20 x 2.500)	500	30	150
				2,100

Number of 2 night-packages required to provide contribution of Rs. 14.0 million.
= 14,000,000% 2,100 = 6,667

Number of package per week in three off-peak quarters is (Oct/Dec, Jan/March + April/June)

@ 13 weeks for quarter = 6,667/39 = 171 -------- (b)(i)

b. (ii) Required additional contribution

		Rs. '000
Less: Contribution arising from overseas the selling prices		14,000
Catering (Restaurant)	= 10% of Rs. 52,500,000	5,250
Snacks bar	= 5% of Rs. 30,000,000	1,500
Required additional contribution from accommodation		7,250

$$\text{Accommodation Prices} = (\text{Rs.'000})\ \frac{7{,}250}{67{,}500} \times 100 = 10.74\% \text{ ----} (\text{b})(\text{ii})$$

In order to increase the derived ROCE, accommodation prices would have to be increased by 10.74% (it is irrelevant that the demand would not be offered by the increase).

Question:5

Paragon Laboratories manufactures medicated drips that are sold to hospitals through a network of independent sales agents located at Karachi and Islamabad. These sales agents sell a variety of products to hospitals in addition to Paragon's medicated drips. The sales agents are currently paid 18% commission on sales, and this commission rate was used when Paragon's management prepared the following budgeted income statement for the coming year:

Paragon Corporation
Budgeted Income Statement

Particulars	Rs.	Rs.
Sales		150,000,000
Cost of goods sold:		
Variable	87,000,000	
Fixed	14,000,000	101,000,000
Gross profit		49,000,000
Selling and administration expenses:		
Commission	27,000,000	
Fixed advertising expenses	4,000,000	
Fixed administrative expenses	16,000,000	47,000,000
Net Profit		2,000,000

Since the completion of the above statement, Paragon's management has learned that the independent sales agents are demanding an increase in the commission rate to 20% of sales for the coming year.

This would be the third increase in commission demanded by the independent sales agents in five (5) years. As a result, Paragon's management has decided to investigate the possibility of hiring its own sales staff to replace the independent sales agents. Paragon's CFO estimates that the company will have to hire eight sales persons to cover the current market, and the annual payroll cost of these prospective employees will be around Rs.3,500,000, including fringe benefits. The sales persons will also be paid commission of 10% of sales. Travelling and entertainment expenses are expected to be total of Rs.2,000,000 for the year. The company will also have to hire a sales manager and support staff, whose salaries and fringe benefits will come to Rs.1,000,000 per year. To make up for the promotions that the independent sales agents had been running on behalf of Paragon, management believes that the company's budget for fixed advertising expenses should be increased by Rs.2,500,000.

Required:

i. Assuming sales of Rs.150,000,000 prepare income statement showing budgeted contribution for the coming year for each of the following alternatives:
   (A) The independent sales agents. commission rate remains unchanged at 18%.
   (B) The independent sales agents. commission rate increases to 20%.
   (C) The company employs its own sales force.

ii. Calculate Paragon Corporations break-even point in sales rupees, for the coming year assuming the following:
   (A) The independent sales agents. commission rate remains unchanged at 18%.
   (B) The independent sales agents. commission rate increases to 20%.
   (C) The company employs its own sales force.

iii. Refer to your answer to (i) B above. If the company employs its own sales force, what volume of sales would be necessary to generate the net income the company would realize if sales are Rs.150,000,000 and the company continues to sell through agents (at a 20% commission rate)?

iv. Determine the volume of sales at which net income would be equal regardless of whether Paragon Corporation sells through agents (at a 20% commission rate) or employs its own sales force.

Answer:5

The contribution format income statement (in thousands of rupees) for the three alternatives is:

	18% Commission	20% Commission	Own Sales Force	
Sales	150,000	150,000	150,000	
Less: Variables expenses:				
Var. COGS	87,000	87,000	87,000	
Commission	27,000	30,000	15,000	
Total variable exp.	114,000	117,000	102,000	
Contribution margin	36,000	33,000	48,000	
Less: Fixed expenses				
Fixed COGS	14,000	14,000	14,000	
Fixed advertising exp.	4,000	4,000	6,500	(W-1)
Fixed marketing staff exp.			6,500	
Fixed administrative exp.	16,000	16,000	16,000	(W-1)
Total fixed exp.	34,000	34,000	43,000	
Net operating income	2,000	(1,000)	5,000	

Working:

W-1 Fixed advertising and marketing exp. (if own sales force)

Fixed advertising expense	
Fixed advertising expense	4,000
Additional cost	2,500
Total	6,500

Fixed marketing staff exp.	
Payroll cost	3,500
Traveling & entertainment exp.	2,000
Fringe benefits	1,000
	6,500

ii. Given the data above, the break-even point can be determined using total fixed expenses and the CM ratios as follows:

	18% Commission	20% Commission	Own Sales Force
		Rs. '000'	
Sales	150,000	150,000	150,000
Contribution margin	36,000	33,000	48,000
Contribution margin ratio (Contribution margin / Sales)	24%	22%	32%
Fixed expenses	34,000	34,000	43,000
Break-even point in sales (Rs.) (Fixed exp. / Contribution margin ratio)	141,667	154,545	134,375
B.E. in total Rs.	141,666,667	154,545,455	134,375,000

iii. Rupees sales to attain the target profit:

Fixed expense	43,000,000
Target profit	(1,000,000)
CM ratio	32%
Rupees sales to attain target profit	131,250,000
(Fixed expense + Target profit) / CM ratio	

iv. let x = total sales Revenue

Net operating income with company's sales force:

0.32 x = Rs. 43,000,000

Net operating income with 20% commission;

0.22 x = Rs. 34,000,000

The two net operating incomes are equal, when:

0.32 x – Rs. 43,000,000 = 0.22 x – Rs. 34,000,000

0.10 x = Rs. 9,000,000

x = Rs. 9,000,000/0.10

x = Rs. 9,000,000

Thus, at a sales level of Rs. 90,000,000, either plan will yield the same net operating income. This is verified below (in thousand of rupees):

	20% Commission		Own Sale Force	
		Rs. '000'		
Sales	90,000	100%	90,000	100%
Total variable expenses	70,000	78%	61,200	68%
Contribution margin	19,800	22%	28,800	32%
Total fixed expenses	34,000		43,000	
Net operating income (loss)	(14,200)		(14,200)	

Question:6

a.

Texfab Textiles has received an offer from local Power Generation firm to provide breakdown free power supply for longer term. The equipment and installations of transmission line would cost Rs. 5,000,000. Management believes that the power supply would provide substantial annual reductions in costs, as shown below:

	Rupees
Electricity cost	695,000
Power breakdown cost	555,000

The new power system would require considerable maintenance work to keep it in proper adjustment. The company engineers estimate that maintenance cost would increase by Rs. 16,000 per annum if new system operates. The transmission system needs an overhaul at the end of every 2 years amounting to Rs. 200,000 per overhaul.

The contract period would be 10 years with salvage value (of installations) of Rs. 70,000.
After 10 years company will be able to purchase a new power generation system from an international supplier amounting to Rs. 30 million.
Texfab Textiles requires a rate of return before tax of at least 18% on investment and uses straight-line deprecation method.

Required:

i. Should Texfab Textiles accept the offer or not? Ignore taxation.
ii. Should Texfab Textiles accept the offer or not, if taxation rate is 35%? (Support your answers with proper working)

b.

Metro has a cost of capital of 10% and is considering a project with the following 'most likely' cash flow:

Year	Purchase	Running cost	Revenue
0	(14,500)	-	-
1	-	(5,000)	12,000
2	-	(7,000)	16,000

Required:

i. Explain sensitivity analysis
ii. Calculate the change in the level of expected costs to attain breakeven

Answer:6

(b) (i) Sensitivity Analysis:

Sensitivity analysis is method of analyzing the effect of change of any variable in an investment (capital expenditure) appraisal decision enabling to assess the responsiveness of project's NPV with the changes in the variables that are used to calculate the NPV.

(ii) Sensitivity of the Project:

Year	Discount Factor at 10%	PV of Cost	PV of Running Costs	PV of Revenue	PV of Net Revenue Flow
0	1.000	(14,500)	-	-	(14,500)
1	0.9091	-	(4,545)	10,909	6,364
2	0.8264	-	(5,785)	13,223	7,438
		(14,500)	(10,331)	24,132	(698)

The PV of cost can decrease by Rs. 698 or PV of revenue can increase by Rs. 698 before project breaks even.

Question No. 7:

Kemia Industries Ltd., has its home office in Lahore with three factories situated at Shaikhupora, Sialkot and Faisalabad. The operations at Sialkot have been unprofitable for a number of years. The leasehold of Sialkot will also expire by the end of current year. In view of the continued losses the management has decided to close down the said factory rather than lease again. The factory's plant and machinery can be sold at a price higher than the written down value and the surplus funds will be sufficient to coverall termination costs. The projected profitability of the factories for the years are as under:

				Rs. in million
	Shaikhupor	**Sialkot**	**Faisalaba**	**Total**
Sales	6,000	1,500	4,500	12,000
Variable costs	3,300	1,125	2,925	7,350
Fixed costs:	2,700	325	1,575	4,650
Factory	1,200	450	600	2,250
Selling and admin	750	75	225	1,050
Home office expenses	375	225	375	975
Profit and loss	375	(375)	375	375

The company, however, would like to continue to serve the customers now being served by Sialkot factory, if it could do so economically. Accordingly following proposals were put forward for consideration based on a selling price of Rs. 37,500 per unit:

Proposals:

(a) Close down Sialkot factory and expand the operations of the Faisalabad factory for which capacity is existed there. This proposal will involve the following changes:

- Sales revenue of Faisalabad factory will increase by 25%.
- The factory fixed cost of Faisalabad factory will increase by 10%.
- Fixed selling and administrative costs of the said factory will increase by 5%.
- Variable distribution costs of the additional output will increase by Rs.600 per unit.

(b) Close down Sialkot factory and expand the operations of the Shaikhupora factory subject to the following changes in the result of Shaikhupora factory:

- Sales revenue will increase by Rs.1,200 million.
- Factory fixed costs will increase by 20%.
- Fixed selling and administrative costs will increase by 10%.
- Variable distribution costs in respect of the additional units will increase by Rs. 750 per unit.

(c) Close down Sialkot factory and enter into a long-term contract with an independent manufacturer to serve the customers of Sialkot factory. The manufacturer will pay the royalty of Rs. 750 per unit to the company. In that event the sales of the area served by the Sialkot factory will fall by 25%.

(d) Close down Sialkot factory and discontinue serving the present customers of the area. Required:

Required:

Evaluate each of the above proposals and advise the management for the action to be taken in the interest of improving profitability of the company.

Answer No. 7:

Rs. in million

Proposal (a)	Present Shaikhupora	Present Faisalabad	Additional Faisalabad	Total Faisalabad	Group Total
Sales units	160,000	120,000	30,000	150,000	310,000
Sales	6,000.00	4,500.00	1,125.00	5,625.00	11,625.00
Variable cost	3,300.00	2,925.00	731.25	3,656.25	9,956.25
Variable distribution cost	-	-	18.00	18.00	18.00
Contribution Margin	2,700.00	1,575.00	375.75	1,950.75	4,650.75
Fixed cost:				-	-
Factory	1,200.00	600.00	60.00	660.00	1,860.00
Selling and Admin	750.00	225.00	11.25	236.25	986.25
Home office Share	375	375.00	225.00	600.00	975.00
Profit (Loss)	**375.00**	**375.00**	**79.50**	**454.50**	**829.50**

OR

Proposal (b)	Present Shaikhupora	Present Faisalabad	Additional Faisalabad	Total Faisalabad	Group Total
Sales units	120,000	160,000	32,000	192,000	312,000
Sales	4,500.00	6,000.00	1,200.00	7,200.00	11,700.00
Variable cost	2,925.00	3,300.00	660.00	3,960.00	6,885.00
Variable distribution cost			24.00	24.00	24.00
Contribution Margin	1,575.00	2,700.00	516.00	3,216.00	4,791.00
Fixed cost:				-	-
Factory	600.00	1,200.00	240.00	1,440.00	2,040.00
Selling and Admin	225.00	750.00	75.00	825.00	1,050.00
Home office Share	375.00	375.00	225.00	600.00	975.00
Profit (Loss)	**375.00**	**375.00**	**(24.00)**	**351.00**	**726.00**

OR

Proposal (c)	Present Shaikhupora	Present Faisalabad	Sialkot	Group Total
Sales units	160,000	120,000	30,000	310,000
Sales	6,000.00	4,500.00	22.50*	10,522.50
Variable cost	3,300.00	2,925.00	–	6,225.00
Variable distribution cost	–	–	–	–
Contribution Margin	2,700.00	1,575.00	22.50	4,297.50
Fixed cost:				–
Factory	1,200.00	600.00	–	1,800.00

Selling and Admin	750.00	225.00	–	975.00
Home office Share	375.00	375.00	225.00	975.00
Profit (Loss)	**375.00**	**375.00**	**(202.50)**	**547.50**
*Royalty		**OR**		

Proposal (d)	Present Shaikhupora	Present Faisalabad	Sialkot	Group Total
Sales units	160,000	120,000		
Sales	6,000.00	4,500.00		280,000
Variable cost	3,300.00	2,925.00		10,500.00
Variable distribution cost	–	–		–
Contribution Margin	2,700.00	1,575.00		4,275.00
Fixed cost:				–
Factory	1,200.00	600.00	–	1,800.00
Selling and Admin	750.00	225.00	–	975.00
Home office Share	375.00	375.00	225.00	975.00
Profit (Loss)	**375.00**	**375.00**	**(225.00)**	**525.00**

OR

	Profitability (Rs. in million)	Ranked
Proposal (a)	829.50	1
Proposal (b)	726.00	2
Proposal (c)	547.50	3
Proposal (d)	525.00	4
Present	375.00	5

All proposals are more profitable than present situations.

However, Proposal (a) is best and give increased revenue of Rs. 454.50 million.

CHAPTER

9

Capital Budgeting

Capital Budgeting

What is capital budgeting?

- Analysis of potential projects.
- Long-term decisions; involve large expenditures.
- Very important to firm's future.

Cap Budgeting Evaluation Methods

- Payback
- Discounted Payback
- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Modified Internal Rate of Return (MIRR)
- Profitability Index (PI)
- Equivalent Annual Annuity (EAA)
- Replacement Chain

Steps in Capital Budgeting

- Estimate cash flows (inflows & outflows).
- Assess risk of cash flows.
- Determine appropriate discount rate (r = WACC) for project.
- Evaluate cash flows. (Find NPV or IRR etc.)
- Make Accept/Reject Decision

Capital Budgeting Project Categories

1. Replacement to continue profitable operations
2. Replacement to reduce costs
3. Expansion of existing products or markets
4. Expansion into new products/markets
5. Contraction decisions
6. Safety and/or environmental projects
7. Mergers
8. Other

Independent versus Mutually Exclusive Projects

- Projects are:
  - independent, if the cash flows of one are unaffected by the acceptance of the other.
  - mutually exclusive, if the cash flows of one can be adversely impacted by the acceptance of the other.

Normal vs. Nonnormal Cash Flows

- Normal Cash Flow Project:

- Cost (negative CF) followed by a series of positive cash inflows.
- One change of signs.

- Non normal Cash Flow Project:

  - Two or more changes of signs.
  - Most common: Cost (negative CF), then string of positive CFs, then cost to close project.
  - For example, nuclear power plant or strip mine.

The key stages in the capital investment decision-making process are identifying investment opportunities, screening investment proposals, analysing and evaluating investment proposal, approving investment proposals, and implementing, monitoring and reviewing investments.

Identifying investment opportunities

Investment opportunities or proposals could arise from analysis of strategic choices, analysis of the business environment, research and development, or legal requirements. The key requirement is that investment proposals should support the achievement of organisation objectives.

Screening investment proposals

In the real world, capital markets are imperfect, so it is usual for companies to be restricted in the amount of finance available for capital investment. Companies therefore need to choose between competing investment proposals and select those with the best strategic fit and the most appropriate use of economic resources.

Analysing and evaluating investment proposals

Candidate and evaluating investment proposals need to be analysed in depth and evaluated to determine which offer the most attractive opportunities to achieve organisational objectives, for example to increase shareholder wealth. This is the stage where investment appraisal plays a key role, including for example which investment proposals have the highest net present value.

Approving investment proposals

The most suitable investment proposal are passed to the relevant level of authority for consideration and approval. Very large proposal may require approval by the board of directors, while smaller proposals may be approved at divisional level, and so on. Once approval has been given, implementation can begin.

Implementing, monitoring and reviewing investments

The time required to implement the investment proposal or project will depend on its size and complexity, and is likely to be several months. Following implementation, the investment project must be monitored to ensure that the expected result are being achieved and the performance is as expected. The whole of the investment decision-making process should also be reviewed in order to facilities organisational learning and to improve future investment decisions.

Capital Rationing

- Capital rationing occurs when a company chooses not to fund all positive NPV projects.
- The company typically sets an upper limit on the total amount of capital expenditures that it will make in the upcoming year.

- **Reason:** Companies want to avoid the direct costs (i.e., flotation costs) and the indirect costs of issuing new capital.
- **Solution:** Increase the cost of capital by enough to reflect all of these costs, and then accept all projects that still have a positive NPV with the higher cost of capital.
- **Reason:** Companies don't have enough managerial, marketing, or engineering staff to implement all positive NPV projects.
- **Solution:** Use linear programming to maximize NPV subject to not exceeding the constraints on staffing.
- **Reason:** Companies believe that the project's managers forecast unreasonably high cash flow estimates, so companies "filter" out the worst projects by limiting the total amount of projects that can be accepted.
- **Solution:** Implement a post-audit process and tie the managers' compensation to the subsequent performance of the project.

The following principles should be applied when identifying cost that are relevant to a period.

Relevant cost are future cost:

A relevant cost is a future cost arising as a direct consequence of a decision. A cost which has been incurred in the past is therefore, totally irrelevant to any decision that is being made now. Such past cost are called 'sun cost'.

In paradise Ltd. Projects, the £1.5 million spend preparing the land for construction is a sunk cost, as is the £2 million down payment to construction firm. These costs should therefore be excluded when calculating the net present value of the project.

Relevant costs are cash flows:

Only those future cost which are in the form of cash should be included. This is because relevant costing works on the assumption that profit earn cash.

Therefore, costs which do not reflect cash spending should be ignored for the purpose decision-making. This mean that the depreciation charges of £1.5 million should be ignored in the decision for paradise Ltd.

Relevant costs are incremental cost

A relevant costs is the increase in costs which results from making a particular decision. Any costs or benefits arising as a result of a past decision should be ignored.

Opportunity costs:

An opportunity cost is the value of a benefit foregone as a result of choosing a particular course of action. Such a cost will always be a relevant cost.

Other non-relevant costs:

Certain other cost will be irrelevant to decision-making, such as 'committed costs'. A committed cost is a future cash outflow that will be incurred anyway, regardless of what decision will now be taken. The £3 million restaurant costs represent such committed costs, and these will therefore be ignored for the decision-making process.

The interest costs of £2.5 million per annum are also ignored. This is not because they do not meet the above criteria, but because they are taken into account in the discounting process. If these cots were included as relevant they would be double counted.

d) Advantages and disadvantage of IRR

Advantage includes:

1. It takes into account the time value of money, which is good basis for decision-making.
2. Results are expressed as a simple percentage, and are more easily understood than some other methods.
3. It indicates how sensitive decisions are to a change in interest rates.

Disadvantages include:

1. Project with unconventional cash flows can have either negative or multiple IRR. This can be confusing to the user.
2. IRR can be confused with ARR or ROCE, since all methods give answers in percentage terms. Hence, a cash-based method can be confused with a profit-based method.
3. It may give conflicting recommendations to NPV.
4. Some managers are unfamiliar with the IRR were required..

(e) The stages for project appraisal

i. Initial investigation of the proposal

Firstly, a decision must be made as to whether the project is technically feasible and commercially viable. This involves assessing the risks and deciding whether the project is in line with the company's long-term strategic objectives.

ii. Detailed evaluation

A detailed investigation will take place in order to examine the projected cash flows of the project. Sensitivity analysis is performed and sources of finance will be considered.

iii. Authorisation

For significant project authorisation must be sought form the companies seniors management and board of director. This will only take place one such persons are satisfied that are detailed evaluation has been carry out that the project will contribute to profitability and that the project is consistent with the company strategy.

iv. Implementation

At the stage responsibility for the project is assigned to a Project manager or other responsible person. The resources will be made valuable for implementation and specific target will be set.

v. Project monitoring now the project has started, process must be monitored and senior management must be kept informed of process. Cost and benefits may have to be re-assessed in unforeseen events occur.

vi. Post-completion audit and the end of the project, an audit will be carry out that lessons can be learned to help future project planning.

- It is useful for companies that are short of cash and need to recoup initial investment quickly
- It is sometimes argued to be way of spotting high risk projects, in that projects that need a long time to payback could fail as market conditions change over time.

However payback is subject to a number of disadvantages

- We have no objective way of telling what is an acceptable payback
- It is a relative measure and it is therefore difficult to make comparisons between projects of different sizes (for example id a two year payback on a £1,000 investment better than a three year payback on a £1,000,000 investment?)
- It ignores the time value of money, this concept will be explained in the next paragraph.

Net present value is generally recognised as the best investment appraisal technique because

- Like payback it is cash flow based
- It takes into account the time value of money. Most of us, given the choice, would prefer to receive £1 now rather than £1 in one year's time. This is due to factors such as interest that could be earned on the money, risk associated with future receipts, inflation and our preference for current consumption. Net present value ,by applying discount factors to future cash flows. Allows for the time value of money. Payback in it simplest form does not.
- Net present value is an absolute measure, it tells us the increase in our wealth to be expected from investing in the project because of this comparisons between projects are straightforward.

Net present value does however have some disadvantages

- Like all investment appraisal techniques it is only as good as the cash flow available.
- It requires a discount rate from which to calculate present values, in practice finding this discount rate can be problematic.
- It is more difficult for non practitioners to understand.

On balance I believe that net present value is the superior technique and I would recommended it. However there is no reason why we cannot calculate both measure for proposed projects. Please contact me if you wish to discuss this matter further.

LEASE VS LOAN

- TYPES OF LEASES
- OPERATING
- FINANCING
- WET lease
- BALLOON
- HOW TO CALCULATE THE INSATMENT
- IS THE FIRST INSALMENT IN ADVANCE?
- OR IN ARREARS END OF THE YEAR

DETERMINATION OF INSALTMENT

- COST OF ASSET/PVIFA OF YEAR 4 AT AFTER TAX COST OF CAPITAL +1 (when payment is in advance) in case the lease term is 5 years
- COST OF ASSET/PVIFA OF 5 YEARS(if the payment is in arrears)

Net Work Analysis

- Net work analysis is a generic term for a family of related techniques developed to aid management to plan and control projects.
- A quantitative technique used in project control.
- The events and activities making up the whole project are represented in the form of a diagram. Event is presented by a small circle (a node) and an activity by an arrow.

PERT(Project Evaluation & Review Technique)

- A specification of all activities, events and activities and constraints relating to a project, from which a network is drawn, providing a model of the way the project should proceed.

Slack / Float Time

- The time available for an activity over and above that required for its completion.

PERT

- These techniques show inter-relationship of various jobs or tasks which make up the overall project and clearly identify the critical path of the project. They can provide planning and control information on the time, cost and hour aspects of a project – large and complex projects.
- A complete net work should have only one point of entry – a start event and only one exit – a finish event.
- Networks proceed from left to right.

Dummy activity

- An activity which does not consume time or resources. It is represented on a network by dotted arrow. ……

Network analysis Introduction

- Network analysis is the general name given to certain specific techniques which can be used for the planning, management and control of projects.

- One definition of a project:

"A project is a temporary endeavor undertaken to create a "unique" product or service"

Project

- *"A project is a series of activities directed to accomplishment of a desired objective."*

Plan your work first…..then work your plan

History

CPM was developed by Du Pont and the emphasis was on the trade-off between the cost of the project and its overall completion time (e.g. for certain activities it may be possible to decrease their completion times by spending more money - how does this affect the overall completion time of the project?)

PERT was developed by the US Navy for the planning and control of the Polaris missile program and the emphasis was on completing the program in the shortest possible time. In addition PERT had the ability to cope with uncertain activity completion times (e.g. for a particular activity the most likely completion time is 4 weeks but it could be anywhere between 3 weeks and 8 weeks).

CPM - Critical Path Method

- Definition: In **CPM** activities are shown as a network of precedence relationships using activity-on-node network construction
    - Single estimate of activity time
    - Deterministic activity times

USED IN : Production management - for the jobs of repetitive in nature where the activity time estimates can be predicted with considerable certainty due to the existence of past experience.

PERT - Project Evaluation & Review Techniques

- Definition: In PERT activities are shown as a network of precedence relationships using activity-on-arrow network construction
    - Multiple time estimates
    - Probabilistic activity times

USED IN : Project management - for non-repetitive jobs (research and development work), where the time and cost estimates tend to be quite uncertain. This technique uses probabilistic time estimates.

Benefits of CPM/PERT

- Useful at many stages of project management
- Mathematically simple
- Give critical path and slack time
- Provide project documentation
- Useful in monitoring costs

Question: 1

PV Co is evaluating an investment proposal to manufacture Product W33, which has performed well in test marketing trials conducted recently by the company's research and development division. The following information relating to this investment proposal has now been prepared.

Initial Investment	Rs. 2 million
Selling price (current price terms)	Rs. 20 per unit
Expected selling price inflation	3% per year
Variable operating costs (current price terms)	Rs. 8 per unit
Fixed operating costs (current price terms)	Rs. 170,000 per year
Expected operating cost inflation	4% per year

The research and development division has prepared the following demand forecast as a result of its test marketing trials. The forecast reflects expected technological change and its effects on the anticipated life-cycle of Product W33.

Year	**1**	**2**	**3**	**4**
Demand (units)	60,000	70,000	120,000	45,000

It is expected that all units of Product W33 produced will be sold, in line with the company's policy of keeping no inventory of finished goods. No terminal value or machinery scrap value is expected at the end of four years, when production of Product W33 is planned to end. For investment appraisal purposes, PV Co uses a nominal (money) discount rate of 10% per year and a target return on capital employed of 30% per year. Ignore taxation.

Required:

(a) Calculate the following values for the investment proposal:

(i) net present value;
(ii) internal rate of return;
(iii) return on capital employed (accounting rate of return) based on average investment; and
(iv) discount payback period.

(b) Discount your finding in each section of (b) above and advise whether the investment proposal is financially acceptable.

Solution: 1

a. (i) Calculate of NPV

Year	**0**	**1**	**2**	**3**
	Rs.	**Rs.**	**Rs.**	**Rs.**
Investment	(2,000,000)			
Income		1,236,000	1,485,400	2,622,000
Operating costs		676,000	789,372	1,271,227
Net cash flow	2,000,000	560,000	696,028	1,350,773
Discount at 10%	1.000	0.909	0.826	0.751
Present value	(2,000,000)	509,040	574,919	1,014,430
Net present value	Rs. 366,722			
Workings				
Calculation of income				
Year		**1**	**2**	**3**
Inflated selling price (Rs./unit)		20.60	21.22	21.85
Demand (unit/year)		60,000	70,000	120,000
Income (Rs./year)		1,236,000	1,485,400	2,622,000

Calculation of operating costs				
Year	**1**	**2**	**3**	**4**
Inflated variable cost (Rs./unit)	8.32	8.65	9.00	9.36
Demand (units/year)	60,000	70,000	120,000	45,000
Variable costs (Rs./year)	499,200	605,500	1,080,000	421,200
Fixed costs (Rs./year)	176,800	183,872	191,227	198,876
Inflated costs (Rs./year)	676,000	789,372	1,271,227	620,076

(ii) Calculation of internal rate of return

Year	0	1	2	3	4
	Rs.	Rs.	Rs.	Rs.	Rs.
Net cash flow	(2,000,000)	560,000	696,028	1,350,773	392
Discount at 20%	1.000	0.833	0.694	0.579	0.482
Present value	2,000,000	466,480	483,043	728,098	189,365
Net present value	(Rs. 79,014)				

Internal rate of return = 10+((20-10)×366,722)/(366,722+79,014)=10+8.2=18.2%

(iii) Calculate of return on capital employed

Total cash inflow = 560,000 + 696,028 + 1,350,773 + 392,874 = Rs. 2,999,675

Total depreciation and initial investment are same, as there is no scrap value

Total account profit = 2,999,675 - 2,000,000 = Rs. 999,675

Average annaul accounting profit = 999,675/4 = Rs. 249,919

Average investment = 2,000,000/2 = Rs. 1,000,000

Return on capital employed = 100 x 249,919/1,000,000 = 25%

Calculate of discount payback

Year	0	1	2	3	4
	Rs.	Rs.	Rs.	Rs.	Rs.
PV of cash flows	(2,000,000)	509,040	574,919	1,014,430	268,333
Cumulative PV	(2,000,000)	(1,490,960)	(916,041)	98,389	366,722

Discounted payback period = 2 + (916,041/1,014,430) = 2 + 0.9 = 2.9 years

(b) The investment proposal has a positive net present value (NPV) of Rs. 366,722 and is therefore financially acceptable. The result of the other investment appraisal methods do not alter this financial acceptability as NPV decision rule will always offer the correct investment advice.

The internal rate of return (IRR) method also recommends accepting the investment proposal since the IRR of 18.02% is greater than the 10% return required by PV Co. if the advise offered by the IRR method differed from that offer by the NPV method, the advise offer by the NPV method would be preferred.

The calculated return on capital employed of 25% is less than the target return of 30%, but as indicated earlier, the investment proposal is financially acceptable as it has a positive NPV. The reason why PV Co. has a target return on capital employed of 30% should be investigated. This may be an out-of-date hurdle rate that has not been updated for changed economic circumstance.

The discounted payback period of 2.9 year is significant proportion of the forecast life of the investment proposal of four years, a time period which the information provided suggest is limited by technological change. The sensitivity of the investment proposal to changes in demand and life-cycle should be analysed, since an earlier onset of technological obsolescence may have a significant impact on its financial acceptability.

Question: 2

Detail of two machines under consideration is:

Machine	**A**	**B**
Initial Cost	Rs. 50,000	Rs. 90,000
Life-years	4	7
Salvage value at the end of		
Machine A - 4 years	Rs. 5000	
Machine B- 7 years		7000
Annual running cost	10000	8000

- Both machines fulfill the same function and have equal capacities.
- The appropriate discount rate is 10%.

Required:

- Recommend which machine should be purchased and justify your recommendation.
- What should be the initial cost of Machine B, to make the both machines of equal financial attractiveness.

Solution: 2

One of the machines is necessary, and both machines are assumed to be equally effective at polishing. Such a machine will be required for an indefinite period, which we can assume could exceed the useful lives of either machine. Both machines will presumably have to be replaced at the end of their lives. Therefore it can be assumed that an annual equivalent value or cost is essential to a choice between the two machines.

The calculations of the AEVs are as follows

Note:

Since this example is concerned mainly with costs, outflows are shown as positive, inflows as negative.

Machine A

Year	Cash flows (£)	Disc. Factor	PV (£)
0	50,000	1.000	50,000
1-4	10,000	3.170	31,700
4	(5,000)	0.683	(3,415)
		NPV = 78,285	
Cumulative discount factor for years 1 – 4 = 3.170			
AEV = £78,285/3.170 = £24,696			

Machine B

Year	Cash flows (£)	Disc. Factor	PV (£)
0	90,000	1.000	90,000
1-7	8,000	4.868	38,944
4	(7,000)	0.513	(3,591)
		NPV = 125,353	
Cumulative discount factor for years 1 – 7 = 4.868			
AEV = £125,353/4.868 = £ 25,750			

Summary

	£
AEV machine A	24,696

AEV machine B	25,750
AEV machine B > machine A:	1,054

Since the AEV of machine A is less than that for machine B by an annual equivalent value of £ 1,054, machine A should be purchased, if cost is the only factor relevant to the decision.

- *What should the initial cost of machine B be, to make the two machines of equal financial attractiveness?*

The AEV of machine B would have to decrease (by £1,054) to £24,696. Multiply this by the cumulative discount factor for years 1-7 (i.e.4.868), which gives £120,220.

This is £5,133 (£125,353 - £120,220) less than the present NPV. Since the PVs of the running costs and salvage value will not alter, then only the initial cost (discount factor of 1) will alter.

Hence the initial cost of machine B will have to decrease by £5,133 to make both machine of equal financial attractiveness.

This can be proved by recalculation of the figures for machine B:

Year		**Cash flows (£)**	**Disc. Factor**	**PV (£)**
0	Revised initial cost	84,867	1.000	84,867
1-7	Annual running costs	8,000	4.868	38,944
4	Salvage value	(7,000)	0.513	(3,591)
			NPV = 120,220	
Cumulative discount factor for years 1 – 7 = 4.868				
AEV = £120,220/4.868 = £ 24,696				
Which is the same as for machine A.				

Question: 3

A company with a cost of capital 14% is trying to determine the optimal replacement cycle for the computer used by its Research department. The following information is relevant to the decision.

The cost of each laptop is Rs.24000. Maintenance cost are payable at the and of full each year of ownership, but not in the year of replacement e.g. if the computer owned for 2 years, then maintenance cost is payable at the end of year 1.

Interval between Replacement (years)	Trade in value Rs.	Maintenance Cost Rs.
1	12000	Zero
2	8000	750 (payable at end of Y1)
3	3000	1500 (payable at end of Y2)

Required:

1) Ignoring taxation, calculate equivalent annual cost of the three replacement cycles and recommend which should be adopted?

2) What other factors should the company take into account when determining the optimal cycle .

Solution: 3

		Replace in 1 year		Replace in 2 years		Replace in 3 years		
	Year	Cash Flow	NPV	Cash Flow	NPV	Cash Flow	NPV	PVIF 14%
	0	-24000	-24000	-24000	-24000	-24000	-24000	1
	1	12000	10524	-750	-658	-750	-658	0.877
	2			8000	6152	-1500	-1154	0.769
	3					5000	3375	0.675
			-13476		-18506		-22437	
		PVIFA at 1	0.877		1.647		2.322	
		AEV	-15366		-11236.2		-9663	
	The computer should be replaced after every three years.							

Question: 4

- Panther plc. Has a **cost of capital of 18%** per annum. It is the Board policy of expansion from internal resources only and will not have recourse to the market. The retention of profits generated an investment fund of **Rs. 2,500,000** and the following projects are under consideration:

(Rs. in thousands)

Projects	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Life (In years)	**5**	**4**	**4**	**3**	**5**	**3**	**5**	**6**
Required Investment (Rs.)	**900**	**500**	**1200**	**2000**	**800**	**1000**	**750**	**1250**
Annual Cash Flow(Rs.)	**341**	**208**	**481**	**949**	**262**	**452**	**224**	**304**
IRR	**26%**	**24%**	**22%**	**20%**	**19%**	**17%**	**15%**	**12%**

Required:

How should the available fund be invested?

Solution: 4

Calculation of Net Present Value:

Project	Life	Annual Cash Inflow	PV Factor at 18%	PV of Cash Inflow	Initial Outflow	NPV
A	5	341	3.127	1066.31	900	166.31
B	4	208	2.690	559.52	500	59.52
C	4	481	2.690	1293.89	1200	93.89
D	3	949	2.174	2063.13	2000	63.13
E	5	262	3.127	819.27	800	19.27
F	3	452	2.174	982.65	1000	-17.35
G	5	224	3.127	700.45	750	-49.55
H	6	304	3.498	1063.39	1250	-186.61

Projects F,G and H show a negative NPV and can therefore be rejected straight away as not being worthwhile.

Project	NPV		Initial Outlay		PI	Ranking
A	166.31	÷	900	=	18.48%	I
B	59.52	÷	500	=	11.90%	II
C	93.89	÷	1200	=	7.82%	III
D	63.13	÷	2000	=	3.16%	IV
E	19.27	÷	800	=	2.41%	V

Projects	Initial Cost	NPV
A	900	166.31
C	1200	93.89
	2100	260.20
Unused Fund	400	
	2500	

- Available fund should be invested in projects A and C to maximize **NPV Rs. 260.20 thousand**. However, because the problem of indivisibility of fund amounting to Rs. **400,000** remain unused and invested at **18%**.
- A SINGLE IRR WILL RESULT ONLY WHEN THE CASH FLOW FOLLOW THE MORMAL PATTERN OF AN INITIAL OUT-FLOW FOLLOWED BY A SERIES OF INFOLWS OVER THE YEARS.
- WHERE THE CASH FLOW SIGNS CANGE BETWEEN POSITIVE AND NEGATIVE A NUMBER OF TIMES OVER THE YEARS, IT IS LIKELY THAT A NUMBER OF REAL SOLUTIONS MAY EXIST.

IRRS

YEAR	PVIF 6%	CASH FLOW	PV
0	1	-3910	-3910
1	.943	-10,000	-9434
2	.890	40,000	35600
3	.840	-26510	-22258
	NPV		-2

YEAR	PVFI 30%	CASH FLOW	PV
0	1	-3910	-3910
1	0.769	-10,000	-7692
2	0.592	40,000	23668
3	0.455	-26,510	-12067
	NPV		-1

- The discount rates 5-30 % NPV is positive AND SO IF THE COST OF CAPITAL IN THIS RANGE,THE PROJECT SHOULD BE ACCEPTED

MIRR

- Assumptions
- All interim inflows are invested out side
- At the IRR of the project.
- Another criticism of IRR is that it cannot cope with variations in the cost of capital over the life the project.
- To overcome the shortcomings of IRR the MIRR is calculated

Year	cflo	pvif 10%	reinvestment
1	1280	1.331	1704
2	1280	1.210	1549
3	40	1.100	44
4	40	1.000	40
TERMINAL VALUE			3337

- Year 0 outflow =2000 /
- Year 4 inflow=3337=0.599
- In the table for year 4 0.599=13.5%

Question: 5

The Unity Mill is planning the installation of some new looms, a task which will also require various structural alterations to its building. A PERT – cost analysis is to be used in controlling the project. The installation task has been subdivided into activities. Three estimates of the likely duration time of each activity have been made. The expected duration time of each activity can be calculated as the weighted average of the three estimates, the weights being one of the optimistic estimate, four for the most likely estimate, and one for the pessimistic estimate. The estimates are:

Time estimates (in days)

Activity	Optimistic	Most Likely	Pessimistic
0 – 1	6	16	26
1 – 2	4	10	28
2 – 3	2	7	18
2 – 4	22	30	50
3 – 4 *	0	0	0
3 – 6	8	20	44
4 – 6	8	10	24
1 – 5	1	4	19
5 – 6	8	10	12

* Activity 3 –4 is a dummy activity

Required

Set out the activities as a network and show the critical path, calculating the expected completion time and the slack at each event in the network.

Solution: 5

Activity	Estimates (in days)		Expected time (in days)	
	Time (a)	(m)	(b)	te = $\frac{a+4m+b}{6}$
0 – 1	6	16	26	16
1 – 2	4	10	28	12
2 – 3	2	7	18	8
2 – 4	22	30	50	32
3 – 4	0	0	0	0
3 – 6	8	20	44	22
4 – 6	8	10	24	12
1 – 5	1	4	19	6
5 – 6	8	10	12	10

a = Optimistic Time
m = Most likely Time
b = Pessimistic

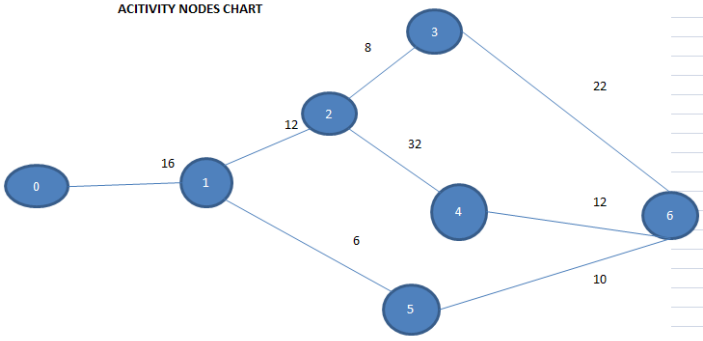
- Critical Path = 0 - 1 - 2 - 4 – 6
- Because at this Path Earliest and Latest time of each event is equal
  16+12+32+12=72 days
- Expected Completion Time = 72 days
- Slacks Events

Event	Earliest Time (E)	Latest Time (L)	Slack (L-E)
0	0	0	0
1	16	16	0
2	28	28	0
3	36	50	14
4	60	60	0
5	22	62	40
6	72	72	0

CRITICAL PATH ANALYSIS

The Largest Path Through the Network is Known as the Critical Path

ACITIVITY NODES CHART



ACTIVITY	TO	TM	TP	TE
0-1	6	16	26	16
1-2	4	10	28	12
2-3	2	7	18	8
2-4	22	30	50	32
3-4	0	0	0	0
3-6	8	20	44	22
4-6	8	10	24	12
1-5	1	4	19	6
5-6	8	10	12	10

SLACK PATH		
	0156	32
	01236	58
	01246	72 CRTICAL PATH

SLACK / FLOAT TIME

The Time available for an activity over and above that is required for its Completion

CHAPTER

10

RESPONSIBILITY ACCOUNTING

RESPONSIBILITY ACCOUNTING

RESPONSIBILITY CENTERS

- A responsibility center is the point in an organization where the control over revenue or expense is located, e.g. division, department or a single machine.
- A responsibility center may be divided into three categories
  - cost
  - profit
  - investment

Introduction of Responsibility Accounting

- The establishment of responsibility with the help of accounting records is called as Responsibility Accounting. R.A.is a system that concentrates to establishes responsibility of a particular cost center and accumulates cost of it to facility.
- Pre-requisite of successful Responsibility Accounting Systems are:
  1. Support of Management.
  2. Support and understanding of supervision i.e. the system must be fully and thoroughly explained.
  3. Accurate acceptable data. One should know it and must be consulted in presence of some targets.
  4. give them job satisfaction.
- A progressive management climate. Responsibility is a means of developing and motivating executives and supervisors through self discipline.
  5. Classification of management levels, functional divisionalisation and departmentalization.
  6. Controllable and uncontrollable costs, variable and fixed costs.
  7. Organization chart – who is responsible for what to whom he is answerable.
  8. Cost and benefit analysis.
  9. Social responsibilities.
- There ways of controlling Business Activities:
  1. By establishing administrative control, within a formal organization structure Budgetary Control.
  2. By building up a team spirit so that subordinates are motivated as a group.
  3. By encouraging the motivation of individuals, through the design of jobs which

Benefits of Responsibility Accounting

1. Tying-in of accounting records and cost control system helps in controlling costs.
2. Analysis of cost of production and related units of production and services rendered.
3. Using a variable basis of allocating cost to various cost centers.
4. Responsibility Accounting provides a moral check upon the supervisor to be alert for controlling expenses.
5. Managers' moral and job satisfaction are higher because of their participation in decision making.
6. Decisions are taken collectively and with mutual understanding at right time.
7. Autonomy of given to managers to let them work independently in the best interest of their department but keeping over all objectives of the company in forefront all the time.

Return on Investment

Return on investment is the ratio of income to the investment used to generate the income.

$$\text{ROI} = \frac{\text{Net Income}}{\text{Investment}}$$

Return on Investment

Pepsi Company reports the following

Net Income $ 30,000

Sales $ 500,000

Investment $ 200,000

Let's calculate ROI.

Return on Investment

$$\text{ROI} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Investment}}$$

$$\text{ROI} = \frac{\$30{,}000}{\$500{,}000} \times \frac{\$500{,}000}{\$200{,}000}$$

ROI = 6% x 2.5 = 15%

Improving ROI

- Pepsi Company's manager was able to increase sales to $600,000 which increased net income to $42,000.
- There was no change in investment.

Let's calculate the new ROI.

Improving ROI

$$\text{ROI} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Investment}}$$

$$\text{ROI} = \frac{\$42{,}000}{\$600{,}000} \times \frac{\$600{,}000}{\$200{,}000}$$

ROI = 7% x 3 = 21%

Pepsi Company increased ROI from 15% to 21%.

ROI - A Major Drawback

- As division manager at Pepsi Company, your compensation package includes a salary plus bonus based on your division's ROI -- the higher your ROI, the bigger your bonus.
- The company requires an ROI of 20% on all new investments -- your division has been producing an ROI of 30%.
- You have an opportunity to invest in a new project that will produce an ROI of 25%.

As division manager would you invest in this project?

Residual Income:

- Pepsi Company has an opportunity to invest $100,000 in a project that will earn $25,000.
- Pepsi Company has a 20 percent desired ROI and a 30 percent ROI on existing business.

Let's calculate residual income.

Profit	25,000	
Desired return	20,000	100,000X.20=20,000
Residual income	5,000,	

Question #1

Division Y has reported annual operating profits of £40.2 million. This was after charging £6 million for the full cost of launching a new product that is expected to last three years. Division Y has a risk adjusted cost of capital of 11% and is paying interest on a substantial bank loan at 8%. He historical cost of the assets in Division Y, as shown on its balance sheet, is £100 million, and the replacement cost has been estimated at £172 million.

Answer:

Adjustments needed are:

For launch costs – spread over 3 years; and

Need to use replacement cost of net assets.

So EVA = (£40.2 million + £4 million) – (£172 million ā 11%) = £25.28 million.

Question # 2

A division is considering the purchase of a new machine which costs $1,500,000 and is expected to generate cost savings of $450,000 a year. The asset is expected to have a useful life of five years with no residual value. Depreciation is charged on a straight line basis. Divisional performance is evaluated on Residual Income (RI). The division's cost of capital is 10%.

Calculate for this machine for each of the five years:

(i) The Residual Income (RI);

(ii) The Return on Investment (ROI).

Note: When calculating performance measures the division always uses capital values as at the start of the year.

Solution # 2:

	Year 1($)	Year 2($)	Year 3($)	Year 4($)	Year 5($)
Cost savings	450,000	450,000	450,000	45,000	450,000
Depreciation	300,000	300,000	300,000	300,000	300,000
Profit	150,000	150,000	150,000	150,000	150,000
Cost of capital	150,000	120,000	90,000	60,000	30,000
RI	Nil	30,000	60,000	90,000	120,000
ROI	10%	12.50%	16.70%	25%	50%
Capital value	1·5	12	0.9	0.6	0.3

Solution:

Return = £320,000 + £200,000 + £100,000 + £70,000 = £690,000

Investment = £3·64 million + £0·42 million - £0·37 million = £3·69 million

[(690,000 ÷ 3,690,000) × 100] = 18·7%

Question # 3

ZP Plc operator two subsidiaries X and Y, X is component manufacturing subsidiary and Y is an assembly and final product subsidiary. Both subsidiaries produce one type of output only. Subsidiary Y needs one component from subsidiary X for every unit of Product W produced. Subsidiary X transfers to Subsidiary Y all of the components needed to produce Product W. Subsidiary X also sell components o the external market.

The following budgeted information is available for each subsidiary:

	X	Y
Market price per component	$800	
Market price per unit of W		$1,200
Production costs per component	$600	
Assembly costs per unit of W		$400
Non production fixed costs	$1-5m	$1-3m
External demand	10,000 units	12,000 units
Capacity	22,000 units	
Taxation rates	25%	30%

The production cost per component is 60% variable. The fixed production costs are absorbed based on budgeted output.

X sets a transfer price at marginal cost plus 70%.

Calculate the post tax profit generated by each subsidiary.

Solution # 3:

	X	Y
	$	$
Sales	88,000,000	
10, 000x $800	7,344,000	
12,000 x $612		14,400,000
12,000 x $1,200		
Cost		
22,000 x $1,012		-12,144,000
Fixed Costs		
Production 22,000 x $240		
Non production	-1,500.00	
Profit	644,000	956,000
Tax	-161,000	-286,800
Profit after tax	483,000	669,200

Question # 4

Division L has reported a net profit after tax of £8.6m for the year ended 30 April 2006.

Included in the costs used to calculate this profit are the following items:

Interest payable of £2.3m;

Development costs of £6.3m for a new product that was launched in May 2005, and is expected to have a life of three years;

Is expected to have a life of three years;

Advertising expenses of £1.6m that relate to the re-launch of a product in June 2006.

The net assets invested in Division L are £30m.

The cost of capital for Division L is 13% per year.

Calculate the Economic Value Added® for Division L for the year ended 30 April 2006.

Solution # 4:

	£m	£m
Net profit after tax		8.6
Add		
Interest	2.3	
Development costs	6.3	
Advertising	1.6	10.2
		18.8
Less 1/3 development costs		2.1
		16.7
Less capital charge: 30*13%		3.9
EVA		12.8

Question # 5

(i) Briefly explain the main features of Economic Value Added (EVA®) as it would be used to assess the performance of divisions.

(ii) Briefly explain how the use of EVA® to assess divisional performance might affect the behavior of divisional senior executives.

Solution # 5:

EVA® attempts to modify accounting operating profit to become closer to an economic concept of income. To do this many of the accounting conventions and adjustments are altered, for example:

Goodwill will be amortized over its effective life

- R&D expenditure will be written off over its useful life
- Depreciation will model the decline in asset values
- Assets will be valued at current cost not historical cost

After this adjusted profit has been calculated, an interest rate charge is deducted to produce the EVA®. The interest rate used in EVA® is usually complex and it is usually based on the Capital Asset Pricing Model. All the above features require systems to be implemented so that the required data can be produced quickly and with minimum cost. For example, to compute EVA® a separate depreciation calculation and separate records of assets are needed. The objective of EVA® is to better measure the true economic performance of a division.

Solution:

It is argued that meeting an EVA® target will usually require managers to act in the best interests of the firm. In particular, EVA® is said to encourage long term decision making,

rather than decisions that maximize short-run profits. EVA® proponents argue that it has strong motivational advantages because maximising EVA® will maximise shareholder value. Providing incentives for managers and workers to maximise value creation for shareholders has been recognised as a significant problem for decades; this claim for EVA® has made it popular.

The adjustments that are made to accounting profit to derive EVA® are designed to minimize any benefit that managers can obtain by manipulating accounting numbers. So, for example, there would be little gain to short run profit from failing to invest in new machinery, and at least part of the cost of advertising would be deferred until the benefits arose.

Some companies set EVA® targets and rewards are paid if these targets are reached. The adjustments to operating profit remove some of the accounting choices that can be used to manipulate profit, and so EVA® provides an incentive to produce more shareholder value.

Question # 6

Y and Z are two divisions of a large company that operate in similar markets. The divisions are treated as investment centres and every month they each prepare an operating statement to be submitted to the parent company. Operating statements for these two divisions for October are shown below:

Operating Statements for October

	Y	Z
	£000	£000
Sales revenue	900	555
Less variable costs	345	312
Contribution	555	243
Less controllable fixed costs	95	42
(includes depreciation on divisional assets)		
Controllable income	460	201
Less apportioned central costs	338	180
Net income before tax	122	21
Total divisional net assets	£9·76m	£1·26m

The company currently has a target return on capital of 12% per annum. However, the company believes its cost of capital is likely to rise and is considering increasing the target

return on capital. At present the performance of each division and the divisional management are assessed primarily on the basis of Return on Investment (ROI).

Required:

- Calculate the annualised Return on Investment (ROI) for divisions Y and Z, and discuss the relative performance of the two divisions using the ROI data and other information given above.
- Calculate the annualised Residual Income (RI) for divisions Y and Z, and explain the implications of this information for the evaluation of the divisions' performance.
- Briefly discuss the strengths and weaknesses of ROI and RI as methods of assessing the performance of divisions. Explain two further methods of assessment of divisional performance that could be used in addition to ROI or RI.

a.

ROI	Y	Z
	£m	£m
Monthly net income	0·122	0·021
Annualised net income	1·464	0·252
Divisional net assets	9·76	1·26
ROI	15%	20%

The following comments can be made regarding the relative performance of the two divisions: On pure ROI division Z is performing better than division Y;

- Division Y is earning a larger absolute amount by more than five times, and is exceeding the target return on capital, thus Y is increasing the wealth of the company more than Z, but this is not reflected in the ROI figures;
- The availability of capital and other projects are critical to the assessment of relative performance. If there is (virtually) unlimited availability of capital then any division earning more than the target rate of return is increasing the company's wealth and both divisions are making a positive contribution. If division Z could repeat its performance by adding similar projects, then it should be allocated more funds as its rate of return is higher;
- If there is a chance that the target rate of return will have to be raised, then division Y is at greater risk as its actual return is much closer to the current target;
- Controllable income return on sales is 51% (460 / 900) for division Y and 36% (201/555) for division Z. This indicates that the operations of division Y are producing income at a higher rate per £ of sales than division Z;
- The controllable income return on net assets is 57% for division Y and 191% for division Z. Thus division Z is earning its income with much less use of divisional net assets – it could be argued that it is being more efficient;

- The net income figures are being strongly influenced by the apportionment of central costs. More needs to be known about the basis of the apportionment before a more definite evaluation can be made.

b.

RI	Y	Z
	£m	£m
Annualised net income	1·464	0·252
Interest charge at 12% of Divisional	1·171	0·151
Net Assets		
Residual Income	0·293	0·101

The following points could be made regarding the performance of the two divisions in the light of the RI calculations:

- If capital is freely available then the higher RI indicates the division that is contributing most to the company as a whole. Thus division Y is contributing more. This is the opposite conclusion to that indicated by ROI;
- The comments above concerning availability of capital and projects also apply;
- Overall the issue is that Y earns more income, but Z earns its income at a better rate.

c.

Strengths and weaknesses of ROI and RI can include:

- ROI gives a percentage result that is often considered to have intuitive appeal;
- ROI as a percentage is said to make comparison easier;
- ROI does not require a cost of capital to be specified;
- ROI has significant behavioral consequences that appear to make optimal decision making less likely;
- Maximizing RI leads to maximizing company wealth in most cases;
- Both ROI and RI can be affected by the age of assets and the method of asset valuation, resulting in a similar performance by two companies showing different values for ROI and RI if the assets are valued on a different basis.
- Different interest rates can be used in the calculation of RI for each division, to reflect the different risk characteristics of each division.
- Other methods of assessment that could be used alongside either ROI or RI include:
- Economic Value Added® which is an adaption of RI;
- Balanced scorecards and other non-financial measures of divisional performance;
- Controllable profit, or other pure profit measures;
- Cash generated.

Question #7

(a) For each division suggest, with reasons, the behavioural consequences that might arise as a result of the current policy for the structure and performance evaluation of the divisions.

(b) The senior management of C plc has requested a review of the cost-plus transfer pricing policy that is currently used. Suggest with reasons, an appropriate transfer pricing policy that could be used for transfers from PD to TD, indicating any problems that may arise as a consequence of the policy you suggest.

Answer # 7(a)

- The senior management of C plc states that the three divisions should see themselves as independent businesses as far as possible. However, the primary issue is that they are highly related and dependent on each other.
- The WD sells approximately two-thirds of its output to the PD. Thus the profits of WD and PD depend crucially on the cost-plus transfer price. Further, with only one third of output being sold to external customers, these internal transfers will significantly affect the ROI measure that is used to assess performance. This may lead to a variety of behavioural problems, including:
- Attempts to manipulate internal pricing procedures, particularly by increasing costs;
- Attempts to manipulate internal pricing procedures, particularly by increasing costs;
- Lack of effort and incentive to control costs;
- Lack of effort in selling to external customers as the consequences may be small in relation to internal transfers;
- Short-term decisions may be made at the expense of long run profits.
- PD must sell all its output to the TD and buy all its timber from WD. Thus the problems mentioned for WD apply even more so to PD. It has little control over its business activities and thus cannot really be considered an independent business. The additional behavioural consequences for PD include:
- The major emphasis for PD should be quality and technical efficiency. Control through ROI is likely to divert attention away from this at best, and at worst may conflict with this aim. For example not replacing machinery because it would worsen ROI.
- PD needs to work very closely with WD and TD and being structured as a separate profit centre may inhibit this (maybe a cost centre would be more appropriate?)
- TD sells to the final market, and thus its sales revenue is not unduly affected by the structure of C. Its major costs are determined by internal transfers, so its ROI is not a good measure of performance, just as for the other two divisions. Other behavioural consequences include:

- Problems with motivation if the transfer costs from PD mean that overall profit and ROI is low.
- Frustration if the management of TD believes it could substantially increase sales and ROI by having a wider product range.

Question # 8

The annual operating statement for a company is shown below:

	£000
Sales revenue	800
Less variable costs	390
Contribution	410
Less fixed costs	90
Less depreciation	20
Net income	300
Assets	£ 6.75m

The cost of capital is 13% per annum.

Solution # 8

The return on investment (ROI) for the company is closest to

A 4·44%

B 4·74%

C 5·77%

D 6·07%

Solution:

ROI 300,000 / 6,750,000 x 100 = 4·44%

Question # 9

A company has reported annual operating profits for the year of £89·2m after charging £9·6m for the full development costs of a new product that is expected to last for the current year and two further years. The cost of capital is 13% per annum. The balance sheet for the company shows fixed assets with a historical cost of £120m. A note to the balance sheet estimates that the replacement cost of these fixed assets at the beginning of the year is £168m. The assets have been depreciated at 20% per year.

The company has a working capital of £27·2m.

Ignore the effects of taxation.

The Economic Value Added® (EVA) of the company is closest to

A £64·16m

B £70·56m

C £83·36m

D £100·96m

Solution # 9:

	£m
Profit	89.20
Add	
Current depreciation (120 x 20%)	24.00
Development costs (9·60 x 2/3)	6.40
Less	
Replacement depreciation (168 x 20%)	33.60
Adjusted profit	86.00
Less cost of capital charge (Working 1)	21.84
EVA	64.16
Working 1	
Cost of capital charge	134.4
Fixed assets (168 – 33·6)	27.2
Working capital	6.4
Development costs	168.0 x 13% = 21.84

Question # 10

- (Calculate Weighted Average Cost of Capital for EVA)

- Golden Gate construction Associates, a real estate developer and building contractor is San Francisco, has two sources of long-term capital: debt and equity. The cost to Golden Gate of issuing debt is the after-tax cost of the interest payments on the debt, taking into account the fact that the interest payments are tax deductible.

- The cost of Golden Gate's equity capital is the investment opportunity rate of Golden Gate's investors, that is, the rate they could earn on investments of similar risk to that of investing in Golden Gate Construction Associates

- The interest rate on Golden Gate's $60 million of long-term debt is 10 percent, and the company's tax rate is 40 percent. The cost of Golden Gate's equity capital is 15 percent. Moreover, the market value (and book value) of Golden Gate's equity is $90 million.

Required:

Calculate Golden Gate Construction Associates' weighted-average cost of capital

Answer 10

WACC = **((60*(10%(1 - 0.4)) + 90*15%) / (60+90))*100**

WACC = 11.40%

OR

		Weight	**Cost**	**WACC**
Debt	60	40%	6%	2.40%
Equity	90	60%	15%	9.00%
	150			11.40%

Question # 11

- (Economic Value Added (EVA); Continuation of Preceding Exercise)
- Refer to the data in the preceding exercise for Golden Gate Construction Associates. The company has two divisions: the real estate division and the construction division. The division's total assets, current liabilities, and before-tax operating income for the most recent year are as follows:

Division	Total Assets	Current Liabilities ($)	Before-tax Operating Income
Real estate	100,000,000	6,000,000	20,000,000
Construction	60,000,000	4,000,000	18,000,000

Required:

Calculate the economic value added (EVA) for each of Golden Gate Construction Associates' divisions.

Answer: 11

EVA = After tax operating income - [(Total assets - Current liabilities)*WACC]

		Real Estate	**Construction**
Profit before tax		20,000,000	18,000,000
Tax (40%)		(8,000,000)	(7,200,000)
Profit after tax	**(a)**	$12,000,000	$10,800,000
Net assets		94,000,000	56,000,000

		(100,000,000 - 6,000,000)	(60,000,000 - 4,000,000)
WACC	11.40%		
Expected return	**(b)**	$10,716,000	$6,384,000
EVA	**(a - b)**	$1,284,000	$4,416,000

Question # 12

- **(Improving ROI)**
- The following data pertain to British Isles Aggregates Company, a producer of sand, gravel, and cement, for the year just ended.

	£
Sales revenue	2,000,000
Cost of goods sold	1,100,000
Operating expenses	800,000
Average invested capital	1,000,000

£ denotes the British Pound Sterling, the national monetary unit of

Required:

Compute the company's sales margin, capital turnover, and ROI.

If the sales and average invested capital remain the same during the next year, to what level would total expenses have to be reduced in order to improve the firm's ROI to 15 percent?

Assume expenses are reduced, as calculated in requirement (2). Compute the firm's new sales margin. Show how the new sales margin and the old capital turnover together result in a new ROI of 15 percent.

Answer: 12

(1). Sales margin = (Income/ Sales revenue) *100

Sales margin = (100000/ 2000000)*100

Sales margin = 5%

Capital turnover = Sales revenue/ Average invested capital

Capital turnover = 2000000/ 1000000

Capital turnover = 2 times

Return On Investment= (Income/ Average invested capital) *100

Return On Investment= (100000/ 1000000)*100

Return On Investment= 10%

Return On Investment= Sales margin* Capital turnover

Return On Investment= 5% * 2

Return On Investment= 10%

Working:

Sales revenue	$2,000,000
Less: COGS	(1,100,000)
Gross Profit	900,000
Less: Operating exp.	(800,000)
Net Income	$100,000

(2). Desired return on capital invested is 15%, i.e. 1,000,000*15% = 150,000

Therefore, the Net Income should be amounting 150,000, if sales remain the same.

Sales revenue	$2,000,000
Less: COGS	(1,100,000)
Gross Profit	900,000
Less: Operating exp.	(750,000)
Net Income	$150,000

The operating expenses are to be reduced by 800,000 - 750,000 = $50,000

Working:

Gross profit - Operating exp. = Net income

i.e.	Operating exp. =	Gross Profit - Net income
	Operating exp. =	900000 - 150000
	Operating exp. =	$750,000

(3).	New sales margin =	(New Income/ Sales revenue) *100
	New sales margin =	(150000/ 2000000)*100
	New sales margin =	7.5%

ROI = New sales margin*Old capital turnover

ROI = 7.5% * 2

ROI = 15%

Note: If Sales and Capital Invested remaining the same, the Capital Turnover will also remain the same

Economic Value Added

The principle objective of financial management is to maximize shareholders wealth. This raises two questions:

- How can we measure whether shareholders value is being created or destroyed?
- Which performance appraisal targets ensure that managers act in such a way as to generate shareholders value?
- Cash is Preferable to Profit: Cash flows have a higher correlation with shareholders wealth than profit.
- Exceeding the Cost of Capital: The return must be sufficient to cover not the cost of debt but also the cost of equity.
- Managing both Long & Short-term Perspective: Investors are increasingly looking at long-term value. When valuing a company's shares, the stock market places a value on the Company's future potential, not just the current profit level.

EVA ALTERNATES

- To survive in today's corporate world the imperative for the companies to create value for all stakeholders, not least of which is the shareholder
- The concept of economic profit, of which one of the best known variant is the economic value added
- Economic Profit recognizes that the one major cost that the conventional profit & loss account does not take into account is the cost of capital used in generating profit

- ✓ Economic Profit = NOPAT – (Invested capital x Cost of Capital)
- ✓ EP = Rs. 1m – (Rs. 10m x 5%) = Rs. 0.5m

- Alternate Approach 1: Discounted Cash Flow (DCF) & Net Present Value (NPV)

Most of us will be familiar with the NPV approach to project appraisal. This method involves the following steps:

1) Determine the relevant, incremental cash flows for the project
2) Discount the cash flows using an appropriate rate that reflects the risk of the project
3) Accept the project if the NPV > 0

- Alternate Approach 2: Shareholder Value Analysis (SVA)
- The SVA approach described by Alfred Rappaport, is a variation of the DCF methodology in that it values the whole enterprise not just individual projects. Central to the approach are seven value drivers;
  - ✓ Sales growth
  - ✓ Operating Profit Margin
  - ✓ tax rate
  - ✓ Incremental working capital investment (IWCI)
  - ✓ Fixed Capital Investment to support current activity level (replacement fixed capital investment (RFCI) to support future growth incremental fixed capital investment (IFCI))
  - ✓ Cost of Capital
  - ✓ Competitive advantage period OR value growth duration during which the firm is expected to generate superior returns in excess of its cost of capital

- The SVA Method involves the following step:
- Estimate the free cash flows within the advantage period by reference to the value drivers
- Discount these cash flows using either a company-wise weighted average cost of capital (WACC) or separate business unit discount rates
- Add to the result the present value of the firm at the end of the forecast period
- This is known as the ‘ residual value ‘ , and is usually calculated by discounting simplified cash flows (e.g Zero or constant growth) beyond the competitive advantage period
- Add the market value of non -trade or non- operational assets to the result to get the corporate value that belongs to all investor
- The value of Equity is then determined by deducting the value of debt

Question **13**:

You have been asked to value a potential acquisition . The following info regarding the target is available :

- ✓ Current sales – Rs 10 Million per annum
- ✓ Competitive advantage period – 5 years
- ✓ Value driver information

Year	**1**	**2**	**3**	**4**	**5**	**Beyond**
Sales Growth (%)	8	5	7	6	5	0
Operating Profit Margin (%)	20	20	17	15	12	10
tax Rate (%)	30	30	30	30	30	30
IFCI (%)	2	3	5	4	2	0
IWCI (%)	10	10	12	8	5	0
Cost of Capital (%)	14	14	14	14	14	14

- ✓ Depreciation - Rs. 5m pa
- ✓ Market value of short-term investments is Rs.10m
- ✓ Market value of debt is Rs.15m
- ✓ Operating Capital Rs.3m
- ✓ Value the business using SVA

Note: IFCI & IWCI are given as percentages of the moment in sales from the period of the next

Answer: 13

Rs. In Million	**1**	**2**	**3**	**4**	**5**	**6 onwards**
Sales	10.80	11.34	12.13	12.86	13.50	13.78
Operating Profit	2.16	2.27	2.06	1.93	1.62	1.38
Tax	(0.65)	(0.68)	(0.62)	(0.58)	(0.49)	(0.41)
Profit after tax	1.51	1.59	1.44	1.35	1.13	0.97
Depreciation	5	5	5	5	5	5
Operating cash flow	6.5 1	6.59	6.44	6.35	6.13	5.97
RFCI (Note)	(5)	(5)	(5)	(5)	(5)	(5)

IFCI	(0.02)	(0.02)	(0.04)	(0.03)	(0.01)	0
IWCI	(0.08)	(0.05)	(0.09)	(0.06)	(0.03)	0
Free Cash flows	1.41	1.52	1.31	1.26	1.09	0.97
Discount factor 14%	0.877	0.769	0.675	0.592	0.519	3.707
PV	1.24	1.17	0.88	0.75	0.57	3.60

PV of free CFs Within the Competitive advantage period	**4.61 million**
PV of residual value	3.60 million
Plus: MV of non trade investments	10.00 million
Corporate Value	18.21 million
Less MV of Debt	15.00 million
MV of equity	3.21 million

(W) DF = 0.519 X 1/0.14 = 3.707

Note: without further details, RFCI is often equated to the annual depreciation charge

- Alternate Approach 3: Economic Value Added (EVA^{TM})

EVA^{TM} is the residual income that remains after net operating profit after tax (NOPAT) has been reduced by additional charge, this charge is based on the return investors can be expected to require, given the amount of the capital they have tied up in the business. Note that interest charges are not deducted to arrive at NOPAT, as financing costs are incorporated into the capital charge. Therefore we have:

EVA^{TM} = NOPAT – Capital Charge

= NOPAT – (Capital Charge x Cost of Capital)

It is therefore =very clear if profits are sufficient to cover the cost of capital. This link can be made more explicit by rewriting EVA^{TM}, using the 'spread method' as:

EVA^{TM} = (ROI – Cost of Capital) x Capital, where ROI = NOPAT/capital

- Example 2: Using the same information as in Example 1, calculate the EVA^{TM} for each year

- Solution: In this example, a more complex calculation must be made to obtain the capital figure as depreciation must be deducted from the running total, and any further investment (IWCL, RFCI, IFCI) added:

Rs. In Million	**1**	**2**	**3**	**4**	**5**	**6 onwards**
Capital b/f	3	3	3.17	3.3	3.39	3.43
RFCI	5	5	5	5	5	5
Depreciation	(5)	(5)	(5)	(5)	(5)	(5)
IFCI	0.02	0.02	0.04	0.03	0.01	0
IWCI	0.08	0.05	0.09	0.06	0.03	0
Capital c/f	3	3.17	3.3	3.39	3.43	3.43

The profit after tax figures obtained in Example 1 can then be used to calculate the EVA™

Profit after Tax	1.51	1.59	1.44	1.35	1.13	0.97
Cost of Capital	(0.42)	(0.43)	(0.44)	(0.46)	(0.47)	(0.48)
EVA™	1.09	1.16	1.00	0.89	0.66	0.49

- NOTE: Cost of Capital has been calculated using the capital B/F figures making the cost of capital so visible to managers should result in being more careful when choosing to invest further funds, and exercising greater control over working capital investment
- Proponents of EVA™ argue that it also supports the NPV approach investment appraisal. To see this, the Present Value of future EVA™ figures can be calculated, given the market value added (MVA) to the business. To calculate the value of Equity, this needs to be added to the opening capital and then adjustments made for non –trade assets and debt, as for SVA.

Question 14:

Using the EVA™ figures calculated in Question13, calculate the market value of equity for the acquisition:

Solution:14

EVA™	1.09	1.16	1.00	0.89	0.66	0.49
Discount Factor (at 14%)	0.877	0.769	0.675	0.592	0.519	3.707
PV	0.96	0.89	0.68	0.53	0.34	1.82

Rs. m

MVA	5.22	
Plus: Operating Capital	3.00	
Plus: MV of investments	10.00	
Less: MV of debt	(15.00)	
MV of Equity	3.22	(same as SVA approach, subject to rounding)

Economic Value Added

- The main problem with EVA™, however, is danger that managers with short-term horizon will reject activities that have negative EVA™ in the first year, even though these activities will deliver positive MVA over the longer term. The adjustments to capital described below, such as capitalizing research expenditure, should reduce such behavior cannot not eliminate it completely.
- The most common adjustments include:
  - ✓ Replacing conventional depreciation with an estimate of the 'economic depreciation'. Economic depreciation measures true fall in the value of the assets each year through wear & tear obsolescence. Although depreciation would not normally be charged in calculating discounted cash-flow, in this case economic depreciation must be recovered from a company's cash flow.
  - ✓ Reversing out advertising costs from NOPAT and adding them to the capital figure instead. This is seen because advertising is seen as market-building investment. A small charge of advertising may remain in the profit & loss account to reflect the economic depreciation of the capitalized value
  - ✓ In a similar way, research & development costs may be transferred from being expenses to becoming part of capital
  - ✓ Adjusting the tax charge to exclude the tax relief on interest payments made

- Alternate Approach 4: Cash-flow Return on Investment (CFROI)

  Cash-flow return on investment (CFROI) is a product of Boston Consulting Group (BCG) and HOLT Value Associated.

  CFROI is the long-term internal rate of return of the firm, defined in a similar way to the more familiar IRR. The matter has the following steps:

1. Convert profitability data into inflation-adjusted gross cash-flows available to all capital owners of the firm. The approach works with real cash-flow rather than nominal flows, hence the need for inflation adjustments.
2. Calculate the implied investment based on real gross assets, again inflation-adjusted where necessary. Intangibles, such as goodwill, are normally excluded here.

3. Calculate the finite economic life of depreciating assets and the residual value of non-depreciating assets, such as land and working capital.
4. BCG then calculates CFROI as the internal rate of return that equates the present value of the future cash-flows with the estimate of the current value of gross investment.

Conclusions:

Shareholders value is a constant priority in many board rooms. The need for a wealth metric and a performance metric has generated a range of solutions, but with mixed success. Ultimately users choose the method best suit to their solution. CFROI is growing in use by potential investors, SVA is often chosen for corporate planning decision, but EVA™ appears to offer the simplest and most consistent overall solution.

TRANSFER PRICING

Question # 1

- Explain briefly what is meant by Transfer price and how it is fixed.

Solution # 1:

Cost Based Transfer Price:

The simplest form of transfer price calculation is a cost based one, where the Transfer Pricing is simply taken to be the cost to the transferor. A transfer pricing based purely on cost is the only appropriate whenever profit responsibility is centralized and each division is operated on a cost-centre basis. It would be not appropriate to a profit-centre structure because the cost which is used as the transfer pricing will not contain any element of profit into cost figure. It is, of course, possible to adapt the technique for profit centres by incorporating an element of profit into cost figure. This profit element could be a lump sum per unit or it could be a percentage of cost in order to provide a contribution towards fixed costs and profit.

Actual Cost:

Sending goods and services to other divisions at actual cost incurred by the producing division. The use of actual cost insulates the transferor from any production inefficiencies by passing them on to the transferee. The inefficiencies of the transferor then become a cost to the transferee and the transferor is still guaranteed his profit margin. In fact, where the margin added to the actual cost for transfer pricing purposes is a percentage of the cost, the transferor is actually encouraged to become less efficient and increase his production cost and so his contribution.

Standard Cost:

A more widely used basis for the calculation of transfer prices is the standard cost of production. As with the use of actual cost, the standard cost data is available but this method is superior that it does not suffer from many of the disadvantages experienced under the actual cost method. The use of standard cost for pricing transfers ensures that the transferor is not able to pass on any production inefficiencies to the transferee. He is thus encouraged to improve his efficiency, as any benefits resulting from such an improvement will be affected by any inefficiency. It also means that any under utilization of the capacity by the transferor will affect his own performance assessment and not that of the transferee as before.

Market Price Based Transfers:

Some Transfer Pricing system adopts the external market price as being the transfer price. This policy is well suited to profit centre structure but it does not require a readily

accessible external market to exist for each item being transferred. The transfer pricing is set by external market forces. Which means that accounting profit is a comparatively fair representation of division performance and that meaningful comparison of divisional results with those of external companies can be made?

Dual Pricing Techniques”

This is a technique used mainly in America, whereby the transacting divisions adopt different prices for the same transaction. For example, the transferor may be credited with the external market price for all transactions with the other divisions but the transferee may only be charge with the marginal cost of production of the goods. This is, of course an internal mechanism only and the prices which are adopted for each party are still subject to any previous comments made about each type of transfer Pricing system.. the technique has one major advantage on single-price systems. It enables the organization to achieve goal congruence more easily by setting prices individually for both parties, so motivating them both to act in best interests of the organization and at the same time to charge prices which will be competitive for each unit and so enable fair performance assessment.

Negotiating transfer pricing:

In this type of transfer pricing system the transfer price is determined solely as a result of negotiation between the divisional mangers concerned. Very often they will adopt one of the previous techniques as a base and negotiate the actual transfer price from this starting point.

Question: 2

Regins Engineering Company produces Thermostat Switches in its production facilities located at Landhi and Korangi. Landhi Division assembles the unit for which guage is manufactured by the Korangi Division.

Landhi Division has the capacity to produce 350,000 units per year. It can sell 100,000 units in the open market at Rs. 450 each or 150,000 units @ Rs. 400. Korangi Division has regular customer for 200,000 units who are ready to pay Rs. 900 per unit. With extra efforts it can sell 250,000 units at Rs. 850.

Landhi Division's variable cost is Rs. 350 per unit and Korangi's Rs. 200 per unit excluding the transfer price which the Landhi Division Manger wants to charge at Rs. 450 whereas the Korangi division manager is ready to pay Rs. 350.

Required:

Advise management in fixing the inter-division transfer price and determining the volume to be produced and sold by the two divisions to achieve maximum profit for the Company.

Answer: 2

Landi Division's profitability at different transfer prices and operating levels:

	Transfer Price = Rs.450		Transfer Price = Rs. 350	
Sales in units	200,000	250,000	200,000	250,000
Sales Revenue (Rs. `000`)	90,000	112,500	70,000	87,500
Variable Cost @ Rs. 35/unit)	70,000	87,500	70,000	87,500
Contribution Margin	20,000	25,000	-	-

Korangi Division's profitability at different transfer prices and operating levels.

	Transfer Price = Rs.450		Transfer Price = Rs. 350	
Sales in units	200,000	250,000	200,000	250,000
Sales Revenue (Rs. `000`)	180,000	212,500	180,000	212,500
Variable Cost:				
Transferred from Landhi Div.	90,000	112,500	70,000	87,500
Korangi Div's Cost	40,000	50,000	40,000	50,000
Contribution Margin	50,000	50,000	70,000	75,000
Total Contribution Margin	70,000	75,000	70,000	75,000

Recommendations:

a. Volume to be produced and sold should be 250,000 units as it provides higher contribution margin.

b. The transfer price should be Rs. 450/ units as it will satisfy Landhi Division's manager without effecting overall contribution margin of the company.

Question # 3

WX has two divisions, Y and Z. The following budgeted information is available.

Division Y manufactures motors and budgets to transfer 60,000 motors to Division Z and to sell 40,000 motors to external customers.

Division Z assembles food mixers and uses one motor for each food mixer produced. The standard cost information per motor for Division Y is as follows:

	£
Direct materials	70
Direct labour	20
Variable production overhead	10
Fixed production overhead	40
Fixed selling and administration overhead	10
Total standard cost	150

In order to set the external selling price the company uses a 33·33% mark up on total standard cost.

(i) Calculate the budgeted profit/(loss) for Division Y if the transfer price is set at marginal cost.

(ii) Calculate the budgeted profit/(loss) for Division Y if the transfer price is set at the total production cost.

Solution # 3:

(i) Budgeted loss – marginal cost transfer price

Sales		***£000***
Internal	60,000 x £100	6,000
External	40,000 x (£150 x 1·3333)	8,000
		14,000
Variable cost	100,000 x £100	10,000
Contribution		4,000
Fixed costs		
Production	100,000 x £40	4,000
Administration	100,000 x £10	1,000
Loss		(1,000)

Solution:

(ii) Budgeted profit – absorption cost transfer price

Sales		*£000*
Internal	60,000 x £140	8,400
External	40,000 x (£150 x 1·3333)	8,000
		16,400
Variable cost	100,000 x £100	10,000
Contribution		6,400
Fixed costs		
Production	100,000 x £40	4,000
Administration	100,000 x £10	1,000
profit		1,400

Question # 4

Division P produces plastic mouldings, all of which are used as components by Division Q. The cost schedule for one type of moulding – item 103 – is shown below.

Direct material cost per unit	£3·00
Direct labour cost per unit	£4·00
Variable overhead cost per unit	£2·00

Fixed production overhead costs each year	£120,000
Annual demand from Division Q is expected to be	20,000 units

Two methods of transfer pricing are being considered:

(i) Full production cost plus 40%
(ii) A two-part tariff with a fixed fee of £200,000 each year

Calculate transfer price per unit of item 103 transferred to Division Q using both of the transfer pricing methods listed above.

	£
Variable cost	9
Fixed cost = 120,000/20,000=	6
Full cost	15
puls 40%	6
Total cost plus	21

Two-part tariff requires only variable cost of £9 for additional transfers

Question 3 The DIN group has two divisions, X and Y. Each division produces only one type of product: X produce a component(C) and Y produces a finished product (FP).Each FP needs one C. it is the Current policy of the group for C to be transferred to Division Y at the marginal cost of £10 per component and that Y must buy all the components it need from X.

The markets for the component and the finished product are competitive and price sensitive. Component C is produced by many other companies but it is thought that the external demand for the next year could increase to 1,000 units more than the volume shows in the current budget for Division X.

Budgeted data, taken from the DIN Group internal information System, for the divisions for the next year is as follows:

Division X

(3,000 of which are transferred to Division Y)

(Only 2,000 of which can be currently satisfies)

Income Statement

Sales	£ 70,000
Cost of sales	
Variable costs	£ 50,000
Contribution	£ 20,000
Fixed costs (controllable)	£ 15,000

Profit	£ 5,000
Production/Sales (units)	5,000
External demand (units)	3,000
Capacity (units)	5,000
External market price per unit	£ 20
Balance sheet extract	
Capital employed	£ 60,000
Other information	
Cost of capital charge	10%

Division Y

Income Statement	
Sales	£ 270,000
Cost of sales	
Variable costs	£ 114,000
Contribution	£ 156,000
Fixed costs (controllable)	£100,000
Profit	£ 56,000
Production/Sales (units)	3,000
Capacity (units)	7,000
Market price per unit	£90
Balance sheet extract	
Capital employed	£ 60,000
Other information	
Cost of capital charge	10%

Four Measure are used to evaluate the performance of the division managers. Based on the data above: the budgeted performance measures for the two divisions are as follows:

	Division X	Division Y
Residual income	(£ 1,000)	£45,000
Return on capital employed	8.33%	50.91%
Operating profit margin	7.14%	20.74%
Asset turnover	1.17%	2.46

Current policy:

It is the current policy of the group C to the transfer to division Y at the marginal cost of £10 per component and that Y. Must by all the components that it needs form X.

Proposed Policy:

DIN group is thinking of giving the divisional managers the freedom to set their on transfer price and to buy the components from external suppliers but there are concern about problems that could arise by granting such autonomy.

Required:

(a) If the price of the components is set by the manager of division X at the current market price (£20 per component), recalculate the budgeted performance measure for each division.

(b) Discuss the changes to the performance measures of the division that would arise as are result of altering the transfer price to per components.

(c) (i) Explain the problem that could arise for each of division mangers and for DIN Group as whole as a result of giving full autonomy to the division managers.

(ii) Discuss how the problem you have explained could be resolved without resorting to the policy of imposed transfer prices.

Solution: 4

a. Income Statements

	Division X	Division Y
	£	£
Sales	100,000	270,000
Variable costs	50,000	144,000
Contribution	50,000	126,000
Fixed costs	15,000	100,000
Profit	35,000	26,000
Profit	35,000	26,000
Less cost of capital charge	6,000	11,000
Residual income	29,000	15,000
Return on capital employed	58.33%	23.64%
Operating profit margin	35.00%	9.63%
Asset turnover	1.69	2.46

b.

	Division X	Division X	Division Y	Division Y
	Current Transfer price is Marginal cost	Transfer Price is Market Price	Current Transfer price is Marginal cost	Transfer Price is Market Price
Residual Income	-£1,000	£29,000	£45,000	£15,000
Return on capital employed	8.33%	58.33%	50.91%	23.64%
Operating Profit Margin	7.14%	35.00%	20.74%	9.63%
Asset Turnover	1.17	1.67	2.46	2.46

The residual income for division X has increase by £30k and for division Y it has decrease by £30k. This is due to the transfer Price being the set at the market price. Division X' s revenue has increase by £10 per component transferred (3,000 transferred - £30,000) and division Y's marginal cost has increased by £10 per computer received (3,000received- £30,000).

The ROCE for Division X has increased to 58.33%. That is; by seven times as the operating profit has increased seven fold (£5k to £35k). Division Y's ROCE has decreased from 50.91% to23.64%, that is, by approximately 54% because profit has reduced by54% that is from £56k to £26k.

The operating profit margin for Division X has incased by approximately 43%.For Division Y the operating profit margin has decreased by approximately 54% due ton profit decreasing by approximately 54% and the sales remaining the same.

The asset turnover ratio for Division X has increased to 1.67 due to an extra £30k sales being generated in relation to the same capital employed .Whereas for Division Y, the asset turnover ratio has remained unchanged as there has been n change to the turnover generated in relation to the capital employed.

Therefore in all the above cases Division X's performance has improved whereas Division Y' performance has deteriorated with the exception of the asset turnover ratio which remains unchanged. The manger of Division X ill be happy to set a transfer price equal to market price Division Y will not willing to pay the market price due to the impact on performance. Division Y will either wish to negotiate a lower transfer price or alternatively source the component externally at perhaps a more competitive price.

If DIN Group relaxes the imposed transfer pricing system and the divisional managers of X and Y negotiate the transfer price equal to the market price and the manager of Division Y will wish to retain the current transfer price equal to marginal cost, due to the impact on the performance ratios. This will mean that Division Y will either need to negotiate a lower transfer price with Division X or alternatively source the component externally at perhaps a more competitive price.

If the managers of Division X and Division Y negotiate a transfer price it should be acceptable to both divisions since both managers have been responsible for the negotiations. However, there are disadvantages to the use of negotiated transfer price:

- The negotiations may be protracted and time consuming;
- The managers may find it impossible to reach agreement and then central autonomy to divisions;
- The managers may not be negotiating from an equal basis, that is, one may be more experienced than another an achieve a better result. This could lead to poor motivation and behavioural problems.

If negotiations fail and DIN Group do not intervene then Division Y may source the component externally. If the components are sourced externally this will result in spare capacity of 2,000 components for Division X as there is only an external market for an additional 1,000 components. Assuming Division X's fixed costs remain constant and they cannot use the spare capacity to generate further profits for the group then this will have a negative impact on the overall profit for the DIN Group.

(c) One of the main problems identified in C(i) is that Division X will want to set a transfer price equal to the market place and that the manager of Division Y will wish to retain the current transfer price equal to marginal cost, due to the impact on performance ratios. A recommended resolution to the problem could be a two-part tariff or dual pricing transfer pricing system. A two-part tariff works where the transfer is at marginal cost and a fixed fee is credited to Division X to compensate them for the lost additional contribution and the subsequence reduction in the performance ratios. Alternatively a dual pricing system could be used where the transfer is recorded in Division Y at marginal cost and in

Division X at market price and the discrepancy between the two prices is recorded in an autonomous and DIN Group to protect group profits. The Group could continue to measure performance based on the four key ratios and still motivate the divisional managers to improve their performance.

The other issues identified when managers are negotiating a transfer price, that is, negotiating becoming protected and time consuming, difficulty in reaching an agreement and the possibility that one manager may be more skilled than another in such negotiating , could be overcome by head office appointing an arbitrator to assists the managers in arriving at a fair transfer price.

If the divisional mangers fail to negotiate a transfer price then central management will have to intervene to avoid a reduction in group profit if Division Y sources the component externally.

Aims of transfer price;

Promote goal congruence

Motivates managers

Facilitates performance evaluation

Retain divisional autonomy

Ensure optimal allocation of resources

PRICING DECISIONS

OBJECTIVES

The following factors to be considered while pricing the goods and services.

1. To understand the factors which may be considered in pricing?
2. To know the theoretical economic background to pricing.
3. To be able to use different calculations to find the optimal pricing.
4. To understand the limitations of classical theory.
5. To be able to use cost-plus pricing.
6. To know the differences between full cost pricing, rate of marginal pricing.

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 prices used for internal transfers between division and department of the same organizations.

The Pricing 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 or implicitly in a pricing decision are the following:

The firm's objective (s)

Is the firm profit or revenue maximized or is it pursuing satisfying objectives?

The market in which the firm operates

Perfect or imperfect competition or oligopolistic or monopolistic conditions?

The demand for the firm's product

Are the quantities known which are expected to be sold at various prices?

The elasticity of demand for the product

Is the demand elastic or inelastic?

The cost structure of the firm and the products

What are the expected future marginal costs, fixed costs?

The competition

What is the extent and nature of the competition?

The product

What is the stage in the product life cycle?

The relative position of the firm

Is the firm dominant enough to be a price maker or is it a price taker?

Level of activity

Will the firm be working at full or below capacity? What is the position of competitors?

Government restrictions or legislation

Are there regulations or laws government prices?

Inflation

Is inflation rising, falling, high, and low?

The availability of substitutes

Is the product clearly differentiated or 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.

PRICING IN PRACTICE

Like many other of problem the pricing decision suffers from the lack of accurate and relevant Information. This Is particularly so In relation to demand Information and many firms Incur consideration costs In an attempt to discover likely demand and how demand will vary with changes In price Its elasticity. Ways In which this Is done Include: surveys, market research, econometric analysis, test marketing, simulation models, representative's feedback and other such methods.

However difficult the task may be, it is Important to try to establish some form of information on demand because it Is a crucial element. Pricing Is not simply a cost based decision which has been a traditional view and accounts for the frequent use of some form of cost plus system.

Pricing is always an important decision although the frequency of such decisions and the level at which they are taken varies from firm to firm. For example, the price for a car would be a decision taken at Board level in a car manufactures and, even in inflationary conditions, would only be infrequently altered. On the other hand, in a jobbing engineering company making a variety of items -to order, pricing decisions are frequent and likely to be delegated to a relatively low level in the organization.

It is in such organizations that pricing formulae and prescribed market ups are found In this way senior management attempt to control pricing policy whilst at the same time avoiding the detailed, day to day work of setting individual prices.

Cost plus Pricing System

Empirical studies have shown that firms frequently employ some form of formula based on cost 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 system 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 markup, say 20%, to arrive at a selling price. The total cost includes all the variable 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 costs 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 assigning fixed costs to products which there is not.

Alternations in selling prices affect the volume of sales which In turn affect the unit fixed costs which raises the possibility of future 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 many be related to risk and rates of stock turnover (e.g. higher for Jewelers then 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 to each product regardless of changes **i**n 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 prices must be sufficiently high to recover all costs, both fixed and variable, together with a reasonable rate of profit otherwise the survival of the firm will be in jeopardy.

Rate of Return Pricing

Where an organisation used the concept of return on capital employed,

= Profit / Capital Employed

as a measure of performance, management may wish to know what selling price would be necessary to achieves a given 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:

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

For example, assume that the target rate of retune on capital employed is 18%, the amount of capital employed is **R**s. 1.5m and the estimated annual total costs are Rs. 2.25m, what is the required mark up on cost:

Markup = 1.5 x 18% / 2.25 = 12%

Notes:

a. The ratio capital employed: Total Annual Costs is known as the capital turnover ratio.

Return on capital employed (ROCE)

The method of calculating a mark-up does have the advantage of relating pricing 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 farther element of arbitrariness is that in order to make the calculation in 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.

Using Cost plus Systems

A number of criticisms can be leveled at cost plus system particularly when they are used in a mechanical fashion.

a. The systems do not take demand explicitly into account and assume that prices are solely cost related.

b. Where the systems are incorporated in routine decision making there is the tendency to base the costs on past cost levels rather than consider what the costs will be in the future.

c. Cost plus systems tend to ignore the inherent arbitrations of fixed cost allocation and absorption procedures and the apportionment of capital employed in a multi· product organization.

d. Cost plus is long run pricing concept which lacks flexibility in dealing with short run pricing where the interaction of volume,. Price and profit are all important.

Frequently, of course, cost plus system are used in more flexible fashion and the notional cost plus profit is the starting point in a pricing decisions. Management may vary the mark up percentage by some intuitive consideration of demand, competition, capacity and other relevant matters. Thus adjusting the price to suit current circumstance.

Question # 1:

Modern Electronics Ltd is a manufacturing undertaking engaged in production of a highly sophisticated electronic product Zeta. Their factory has been lying closed. The manufactures claim that the industry failed due to import of similar product from Korea and Singapore at dumping price.

The Government took notice of the situation and carried out investigations. Thereafter authorities imposed a ban on import of this item altogether. This enabled the industry to operate at full capacity to produce and market 10,000 units of Zeta.

Relevant data collected is reproduced below:

Balance Sheet Positions

The company has authorized Capital of Rs. 1,000,000. Issued a paid up capital amounted to Rs. 500,000. Long-term loan amounted to Rs. 100,000 and current liabilities to Rs. 33,000. The fixed assets consisting of land, plant and machinery and vehicle amounted to Rs. 370,000 and current assets to Rs. 263,000.

OPERATING COSTS Rs.

(i)	Material Used	
	a. imported	2,000,000
	b. Local Materials	1,400,000
(ii)	Direct Labor	1,630,000
(iii)	Manufacturing overheads: Variable	1,500,000
	Fixed: Depreciation	2,90,000
(iv)	Administrative Expenses.	8,10,000
(v)	Selling Expenses	1,040,000

There were no opening and closing inventories of raw material work in process and finished goods.

Required:

From the above details:

a. Prepare a statement of Cost to make and sell Zeta.

b. Work out the ex-factory price of each unit of Zeta on the following basis:

(i) 20% mark-up on Cost.
(ii) 20% return on Capital.
(iii) 20% return on Capital employed.

Answer # 1 (a)

Demand of Zeta (10,000 units)	Rs.		Rs.
Issued Capital	500,000	Current assets	263,000
Long term loan	100,000	Fixed assets	370,000
Current Liabilities	33,000		
	633,000		633,00

Demand of Zeta (10,000 units)	Rs.		Rs.
Issued Capital	500,000	Current assets	263,000
Long term loan	100,000	Fixed assets	370,000
Current Liabilities	33,000		
	633,000		633,00

Operating Costs	Rs.	Rs.

Admin	810000	
Selling	1,400,000	
		1,850,000
Total cost to make and sell		8,670,000

Answer (b)

Operating	Cost		
i.	Cost		Rs. 8,670,000
	Add 20% mark up		1,734,000
			10,404,000
	Total Units		10,000
	Unit price		Rs. 1,040.40
Cost			8,670,000
	Return on Capital	(500,000 x 20%)	100,000
			8,770,000
	Total Units		10,000
	Unit price		Rs. 877
Cost			8,670,000
	Return on Capital employed (600,000 x 20%)		120,000
			8,790,000
	Total Units		10,000
	Unit price		Rs. 879

Question # 2

	EXE	WYE	Stores	Maintenance	Admin
Material (Rs. In Millions)	1.8	0.7	0.1	0.1	
General Overheads	1.440	1.080	0.540	0.180	.360
Other Variable	0.8	0.5	0.1	0.2	0.2
Departmental usage (%)					
Maintenance	50	25	25		
Administration	40	30	20	10	
Stores	60	40			
Floor space (sq m)					
	640	480	240	80	160

Required:

Working may be Rs. 000 with unit price **.**

a. Calculate the budgeted selling unit of EXE and WYE based on the mark up.

b. Discuss how the company may reach of the following independent which represents additional business opportunities.

(i) an enquiry form an overseas for 3000 units only of WYE price of Rs. 35 per unit is offered.

(ii) and enquiry for 50,000 units of WYE to be supplied in full a regular intervals during the forthcoming year at t a price which is equivalent to full cost plus 10%.

In both cases support your discus calculations and comment on any as or matters on which you would see clarification.

Assume current production product EXE is 150.000 units and product wye is 70,000 units

Answer:2

a. Computation of full costs and budgeted cost-plus selling price

	EXE	**SYE**	**Stores**	**Maintenance**	**Admin**
	Rs.	Rs.	Rs.	Rs.	Rs.
Material (Rs. In Millions)	1.800	0.700	0.100	0.100	
Other factory	0.800	0.500	0.100	0.200	0.200
Gen factory	1.440	1.080	0.540	0.180	0.360
					0.560
Admin reallocation	0.224	0.168	0.112	0.056	(0.560)
				0.536	
Maintenance reallocation	0.268	0.134	0.134	(0.536)	
			0.986		
Stores	0.592	0.394	(.986)		
	5.124	2.976			
Volume	150,000	70,000			
	Rs.	Rs.			
Full cost (unit)	34.16	42.51			
Mark up (25%)	8.54	10.63			
Price	42.70	53.14			

Answer:2

b. (i) The incremental costs for the order consist of the variable costs. The calculation of the unit variable cost is as follows:

	EXE	**SYE**	**Stores**	**Maintenance**	**Admin**
	Rs.	Rs.	Rs.	Rs.	Rs.
Material	1.800	0.700	0.100	0.100	
Other variable	0.800	0.500	0.100	0.200	0.200
Admin	0.080	0.060	0.040	0.020	(0.200)
				0.320	
Maintenance	0.160	0.080	0.080	(0.320)	
			0.320		
Stores	0.192	0.128	(0.320)		
	3.032	1.168			
Volume	150,000	70,000			
	Rs.	Rs.			
Variable cost	20.21	20.97			

The proposed selling price exceeds the incremental cost and provides a contribution towards fixed costs and profits of Rs. 14.03 (Rs. 35 – Rs. 20.97) per unit thus giving a total contribution of Rs. 42 090. Given that the company has spare capacity no lost business will be involved and it appears that the order is a one-off short-term special order. Therefore the order is acceptable provided it does not have an impact on the selling price in the existing market or utilize capacity that has alternative uses. Given that the markets are segregated the former would appear to be an unlikely event. However, if the order were to generate further regular business the longer-term cost considerations should be taken into account in determining an acceptable long-run price.

ii. The proposed selling price is Rs. 46.76 (full cost of Rs. 42.51 plus 10%). This will generate a contribution of Rs. 25.79 (Rs. 46.76- Rs. 20.97) per unit. Un-utilized capacity is 30 000 units but the order is for 50 000 units. Therefore the order can only be met by reducing existing business by 20000 units. The financial evaluation is as follows:

Increase in contribution from existing business (50,000 units at a contribution of Rs. 25.79)	Rs. 1289500
Lost contribution from existing business (20,000 units at a contribution of (Rs. 53.14 – Rs. 20.97))	643,400
Net increase in contribution	646,100

Before accepting the order the longer term implications should be considered. The inability to meet the full demand from existing customers may result in a significant reduction in customer goodwill and the lost contribution from future sales to these customers may exceed the short-term gain of Rs. 646 100. Also the above analysis has not considered the alternative use of the un-utilized capacity of 30,000 units. If the cost savings from reducing the capacity exceed Rs. 646,100 for the period under consideration the order will not be worthwhile. The order will also result in the company operating at full capacity and it is possible that the cost structure may change if the company is operating outside its normal production range.

If the company does not rely on customer repeat orders and customer goodwill it is unlikely to be affected and the order would appear to be profitable. It is important, however, that long-term considerations are taken into account when evaluating the order. In particular, consideration should be given to the negotiation of a longer-term contract on both price and volume.

Question # 3

FP sells and repairs photocopiers. The company has operated for many years with two departments, the Sales Department and the Service Department, but the departments had no autonomy. The company is now thinking of restructuring so that the two departments will become profit centres.

The Sales Department

This department sells new photocopiers. The department sells 2,000 copies per year. Included in the selling price is £60 for a one year guarantee. All customers pay this fee. This means that during the first year of ownership if the photocopier needs to be repaired then the repair costs are not charged to the customer. On average 500 photocopiers per year need to be repaired under the guarantee. The repair work is carried out by the Service Department who, under the proposed changes, would charge the Sales Department for doing the repairs. It is estimated that on average the repairs will take 3 hours each and that the charge by the Service Department will be £136,500 for the 500 repairs.

The Service Department

This department has two sources of work: the work needed to satisfy the guarantees for the Sales Department and repair work for external customers. Customers are charged at full cost plus 40%. The details of the budget for the next year for the Service Department revealed standard costs of:

Parts	at cost

Labour	£15 per hour
Variable overheads	£10 per labour hour
Fixed overheads	£22 per labour hour

The calculation of these standards is based on the estimated maximum market demand and includes the expected 500 repairs for the Sales Department. The average cost of the parts needed for a repair is £54. This means that the charge to the Sales Department for the repair work, including the 40% mark-up, will be £136,500.

Proposed Change

It has now been suggested that FP should be structured so that the two departments become profit centres and that the managers of the Departments are given autonomy. The individual salaries of the managers would be linked to the profits of their respective departments.

Budgets have been produced for each department on the assumption that the Service Department will repair 500 photocopiers for the Sales Department and that the transfer price for this work will be calculated in the same way as the price charged to external customers.

However the manager of the Sales Department has now stated that he intends to have the repairs done by another company, RS, because they have offered to carry out the work for a fixed fee of £180 per repair and this is less than the price that the Sales Department would charge.

Required:

a. Calculate the individual profits of the Sales Department and the Service Department, and of FP as a whole from the guarantee scheme if:

(i) The repairs are carried out by the Service Department and are charged at full cost plus 40%;

(ii) The repairs are carried out by the Service department and are charged at marginal cost;

(iii) The repairs are carried out by RS.

b.

(i) Explain, with reasons, why a ‘full cost plus’ transfer pricing model may not be appropriate for FP.

(ii) Comment on other issues that the managers of FP should consider if they decide to allow RS to carry out the repairs.

(iii) Briefly explain the advantages and disadvantages of structuring the departments as profit centres.

Solution # 3:

	£ per repair	£ total repair
Parts	54	
Labour	45	
Variable overhead	30	
Marginal cost	129	64,500
Fixed overhead	66	33,000
Total cost	195	97,500
Mark-up	78	39,000
Selling Price	273	136,500

Transfers at 40% mark-up

	Sales	Services	FP
	£	£	£
Sales	120,000	136,500	120,000
Costs	136,500	97,500	97,500
Profit	(16,500)	39,000	22,500

Transfers at marginal cost

	Sales	Services	FP
	£	£	£
Sales	120,000	64,500	120,000
Costs	64,500	97,500	97,500
Profit (Loss)	55,500	(33,000)	22,500

b.

i. Full cost plus may not be appropriate:

- Are the fixed costs committed?
- Why is the quote by RS lower than the cost of the Service department?
- Full cost would build in any inefficiency in the Services Department.
- Full cost would lead to implied poor performance by the Sales Department,
- Full cost would lead to implied poor performance by the Sales Department. The performance measures and reward system would lead to a sub-optimal decision by the manager of the Sales Department.

ii. Issues to consider include:

- The quality of the repairs by Rs;
- Is the offer by RS a short term offer? Would the price rise in the longer term?
- Why are the costs of the Service Department higher than the price charges by RS?
- Are the fixed costs avoidable?
- Can the Service Department find other work to take up the capacity released if RS do the guarantee repairs?

Pricing Methods

Question #4

- A ltd make one product. the fixed cost per week is Rs.8000 and variable cost is Rs.30.
- The selling price is Rs.70 and units demanded 300 per week. The sales manager estimates that each successive Rs.10 increase 0r decrease in price will reduce or increase the demand by 100 units weekly proportionately.
- Required: calculate optimal sale price.

Answer #4

Units	100	200	300	350	400
Sale Price	90	80	70	65	60
V. Cost	30	30	30	30	30
Unit Contribution	60	50	40	35	30
Contribution	6,000	10,000	12,000	12,250	12,000
Fixed Cost	8,000	8,000	8,000	8,000	8,000
Profit (Loss)	(2,000)	2,000	4,000	4,250	4,000

The optimal price is Rs. 65 profit is Rs.4250.

Question #5

A music co. is about to launch a new album, which has a short selling life. The market survey has produced the following results.

Price Rs.	44	40	36	34	32
Demand (Units)	2,000	5,000	10,000	15,000	25,000

Plant capacity to produce is 15000 units:

The fixed cost is Rs. 500,000 and variable cost is Rs. 28 per unit;

Required:

Calculate optimal price.

Factors to be considered in pricing in this case

Answer #5

Price Rs.	44	40	36	34	32
V. Cost 2	28	28	28	28	28
Contribution / Unit	16	12	8	6	4
Sales Units (000)	20	50	100	150	250
Total Contribution (Rs. 000)	320	600	800	900	1,000
Fixed cost (Rs. 000)	500	500	500	500	500
Profit (Loss)	(180)	100	300	400	500

- The optimal price is Rs.34
- The capacity is limited to 150,000 units

FACTORS TO BE CONSIDERED

- Anticipated market demand
- Competing products in the market
- Cost 0f production of the product
- Inflation rate
- Firm objectives profit maximization
- The stage in the product life cycle
- The level of activity the firm is operating
- Government legislation or restrictions
- The availability of the substitutes

Question # 6

A music co. is about to launch a new album, which has a short selling life. The market survey has produced the following results.

Plant capacity to produce is 15000 units:

The fixed cost is Rs. 500,000 and variable cost is Rs. 28 per unit;

Required

Calculate optimal price.

Factors to be considered in pricing in this case

Answer #6

The optimal price is Rs.34

The capacity is limited to 150,000 units

FACTORS TO BE CONSIDERED

- Anticipated market demand
- Competing products in the market
- Cost 0f production of the product
- Inflation rate
- Firm objectives profit maximization
- The stage in the product life cycle
- The level of activity the firm is operating
- Government legislation or restrictions
- The availability of the substitutes

Question # 7

A Ltd received an enquiry from B Ltd for supply of 100 units.

LAST YEAR DATA IS AS FOLLOWS:

	Rs.
Material Opening	70,000
Purchases	720,000
Labor	240,000
Overheads	270,000
Material Closing	100,000

CONTINUED

- FINISHED GOODS OP(20units) Rs.160,000
- FINISHED GOODS CL(30 units)
- SELL,DIST EXP(10% of selling price)
- GEN.ADMN EXP(5% of selling price)
- SALES(140 UNITS) Rs.1,600,000
- The units to be quoted for are of uniform quality and make. However material and labour will increase by 20% and 25% per unit and overheads will decrease by 20% per units

Required:

Calculate the price to be quoted to achieve the same % of profit on sales as was realized last year.

Answer # 7

- No of units produced:140+30-20 =150
- Material cost:70000+720000-100000=690000
- Material cost per unit=690000/150=4600
- Labour cost per unit =240000/150=1600
- 0verheads per unit =270000/150=1800
- Gross profit=1600000-1200000=400000
- Gross profit % of sale=400000/1600000=25%
- Net profit % on sales=25%-(10%+5%)=10%

Continued:

- New cost per unit;
- Material=4600*1.2= Rs. 5520
- Lobour =1600*1.25= Rs. 2000
- Overheads=1800*.8= Rs. 1440
- Total manufacturing cost per unit= Rs. 8960 which is equal to 75% of sale price therefore price to be quoted will be 8960/.75=11946.67 per unit.

Continued

- Sales 100*11946.67 = Rs. 1194,667
- Production cost=100*8960 = 896,000
- Gross profit = 298,667

- Selling exp:10%*1194667 = 119,467
- Admn exp: 5%*1194667 = 59,733
- Profit = 119,467
- The quote should be Rs. 1,200,000.

Question No 8:

Al-Karam Company's budget for the year 2007-08 includes the following items for its five divisions:

Divisions	Operating Income (Rs. million)	Divisional Assets (Rs. million)
1. Data entry network solutions	1,650	5,160
2. Computers (Hardware's)	125	1,250
3. Office appliances	205	940
4. Cell phones	100	625
5. Software programmes	60	1,250
	2,140	9,225

The manager of each division is paid a salary plus commission related to return on investment *(i.e.,* operating income divided by divisional assets). The company uses 12% required rate of return for new investments in all the divisions.

The company's management is concerned about the commission element of the divisional managers' emoluments.

The divisions have recently submitted their investment proposals for the forthcoming year's budget. These investment proposals are based on discounted cash flow with positive NPV using 12% required rate of return.

Following is the expected increase in operating income and divisional assets during the year 2007-08 as submitted by the divisions:

	Year 2007-08	
	Increase in operating income (Rs. million)	Increase in Assets (Rs. million)
Data entry network solutions	375	1,565
Computers (Hardware's)	80	625
Office appliances	120	625
Cell phones	30	155
Software programmes	45	315
	Total: 650	3,285

Required:

(a) How do the divisional investment proposals effect their ROI?

Calculate the divisional ROI on the following assumptions:

(i) Before the proposed investment,

(ii) Of the proposed investment, and

(iii) The combined investment (original investment and proposed investment).

(iv) Comment on the results thereof.

(b) How will the adoption of proposed investment affect the residual income of respective divisions? Calculate the residual income by divisions under three assumptions as mentioned/given in (a-i, ii & iii) above. Also comment on the results.

DISCOUNT TABLE

PRESENT VALUE OF RUPEE 1						Present value of Ordinary Annuity of Rupee 1	
Period(s)	**10%**	**12%**	**14%**	**16%**	**18%**	**Period(s)**	**16%**
1	0.9091	0.8929	0.8772	0.8621	0.8475	1	0.8621
2	0.8264	0.7972	0.7695	0.7432	0.7182	2	1.6052
3	0.7513	0.7118	0.6750	0.6407	0.6086	3	2.2459
4	0.6830	0.6355	0.5921	0.5523	0.5158	4	2.7982
5	0.6209	0.5674	0.5194	0.4761	0.4371	5	3.2743
6	0.5645	0.5066	0.4556	0.4104	0.3704	6	3.6847
7	0.5132	0.4523	0.3996	0.3538	0.3139	7	4.0386
8	0.4665	0.4039	0.3506	0.3050	0.2660	8	. 4.3436

Answer No.8:

AL-Karam Company

Note: Division are reported by their sequence number as given in the question.

a. Divisional return on investment = Existing ---------- (i)

	DENW	Comp.	Alt. Ap.	Cell	Software
Investments	5,160	I,250	940	625	1,250
Returns	1,650	125	205	100	60
*Return on investment	32%	10%	22%	16%	5%
Return on proposed investment					
Proposed investment	1,565	625	625	155	315
Proposed return	375	80	120	30	45
Return on investment	24%	13%	19%	19%	14%

*Rounded to nearest whole %age.

Return on investment incorporating proposed investment.

	1	2	3	4	5
	Rupees Million				
Existing investment	5,160	I,250	940	625	1,250
Proposed investment	1,565	625	625	155	315
	6,725	1,875	1,565	780	1,565
Earning after propose investment	2,025	205	325	130	105
*Return on investment	30%	11%	21%	17%	7%

*Rounded to nearest it whole%

Comments: The divisions dealing with Computer hard ware (s no.2) and software programmes (s no. 5) are below the required rate of 12% at the moments however according to proposals for 2007/2008 they are the above the required rate of return at the Combined return on the average for their two products have improved by1 and 2% respectively. The proposal should therefore be accepted the linkage of divisional manager composition package with uniform rate of return be demoralizing for some divisional managers. Motivation and Challenge factor should be have enhanced and in over to do so the peak age should be ravine.

b. Divisional residual income:

	1	2	3	4	5	
	(Rupees in Millions)					
Existing	5,160	I,250	940	625	1,250	
Existing earnings	1,650	125	205	100	60	
Required return at 12%	619	150	113	75	150	
Residual income (less)	1,031	(25)	92	25	(90)	------- (i)
Residual income of proposed investment						
Proposed Earnings	375	80	120	30	45	
Required return	188	75	75	19	38	
Residual income	187	5	45	11	7	------- (ii)
Combined residual income/loss above (i) + (ii)	1,218	(20)	137	36	(83)	------- (iii)

Comments:

The proposed investments after surplus residual income for each division, of the proposals for 2007/2008 are accepted the residual income of all the divisions will improve. Hence the proposals should be accepted.

CHAPTER

11

WORKING CAPITAL MANAGEMENT

WORKING CAPITAL MANAGEMENT

- Working Capital, Definition
- Float

Payment and Collection Instruments

- Short-Term Investing
- Short-Term Borrowing

Working Capital

- Working Capital – All the items in the short term part of the balance sheet e.g. cash, short term debt, investments, inventory, debtors (receivables), payables (creditors) etc
- Net Working Capital is the difference between Current Assets and Current Liabilities
- Cash Management, Liquidity Management Interconnected terms.

CORPORATE DEFINITION OF CASH MANAGEMENT

The effective planning, monitoring and management of liquid / near liquid resources including:

- Day-to-day cash control
- Money at the bank
- Receipts
- Payments
- S-T investments and borrowings

WORKING CAPITAL

DEFINITION OF LIQUIDITY

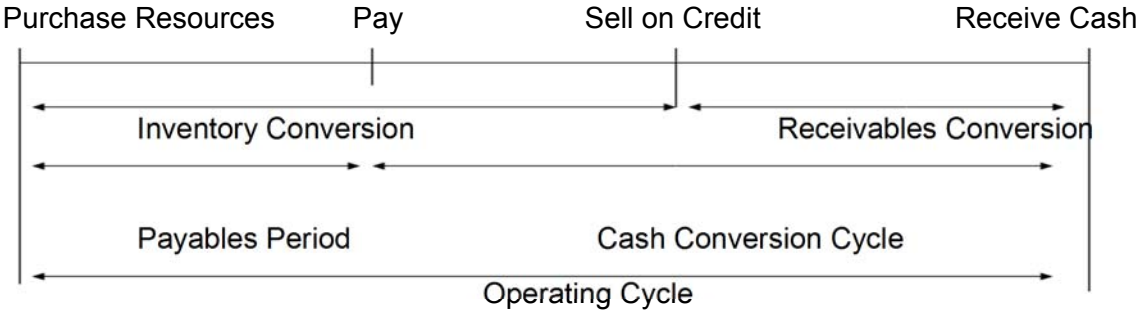
Having sufficient funds available to meet all foreseen and unforeseen obligations

- Liquidity has costs
- Cash is unproductive
- Spread between borrowing and deposit rates and between long and short term rates

NEED FOR LIQUIDITY

- Day to day transactions
- Precautionary balances
- Compensating balances
- Obtaining discounts
- Acid tests
- Favourable opportunities
- Overall avoiding bankruptcy!

Operating Cycle



From: Fundamentals of Contemporary Financial Management, 2nd ed, by Moyer, McGuigan and Rao

The Various Cycles

- Inventory Conversion

$$\frac{\text{Inventory}}{\text{Cost of Goods Sold}} \times 365$$

- Payables Conversion

$$\frac{\text{Payables/Creditors}}{\text{Cost of Goods Sold}} \times 365$$

- Receivables Conversion

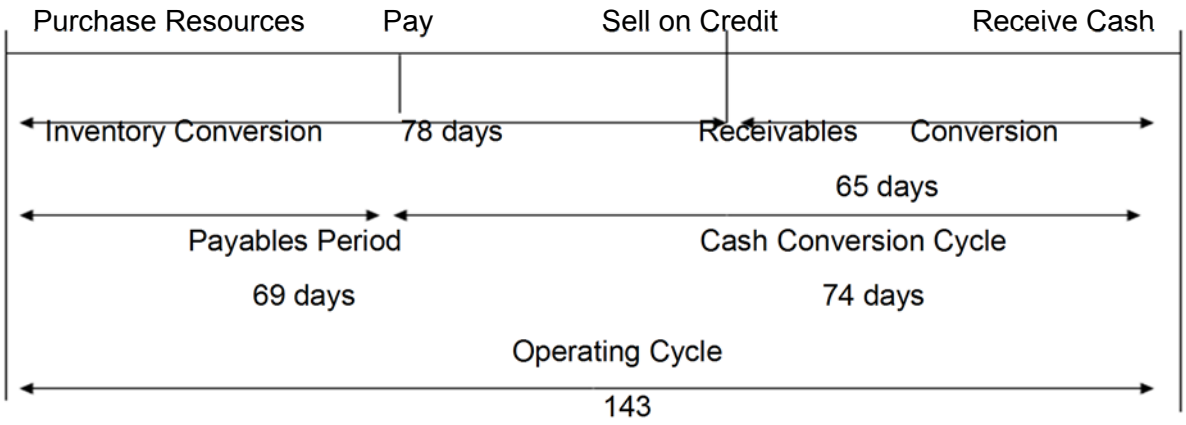
$$\frac{\text{Receivables/Debtors}}{\text{Turnover}} \times 365$$

Balance Sheet Short Term Items

Current assets		
Inventories	1,910	1,903
Trade and other receivables	1,713	1,625
Current tax assets	13	-
Other financial assets	43	78
Cash and short term assets	733	917
	4,412	4,523
Current liabilities		
Short term borrowings	355	555
Trade and other payables	1,690	1,735
Current tax liabilities	121	44
Other financial liabilities	119	13
Short term provisions	82	130
	1,367	2,477

Turnover	9,577
Cost of goods sold	8,943

Operating Cycle



Cash Conversion

- We need to consider control in all areas of working capital to maximise return, reduce cost.
- Some areas are not controlled by the Finance Function – Stock/inventory
- Some areas have shared control – payables and receivables
- Some areas are controlled by the Finance Function – short term borrowing and investment

Float

- Any delay in the process of converting materials and labour to receipt of payment involves cost, float cost.
- Similarly, any delay in making payments will also give rise to float but this time to our advantage
- What is float?

The time lost between a payer making a payment and a beneficiary receiving value

- Cost of Float

principle amount due x no of days x cost of funds

360 or 365

WHY DOES FLOAT OCCUR?

- Deliberately
- Inefficiency
- Logistical situations
- Compensation mechanism

Controlling Float

We need to look at controlling / influencing float in three areas

* Ourselves
* Our Customers
* Our Banks

HOW TO REDUCE/CONTROL FLOAT

- Your Own Actions
- Change own systems
- Educate customers
- Include costs in prices
- Negotiate with bank

RECEIVABLES AND PAYABLES MANAGEMENT

- Good receivables and payables management aids in:
- Cash flow forecasting
- Long-term funding and investment decisions
- Reduced risk of bad debts
- Stronger liquidity
- Stronger balance sheet ratios

RECEIVABLES IMPACT

Important because of costs arising from

- Float
- Bad debts
- Management time
- Legal fees
- Impact on analysts and creditors

RECEIVABLES MANAGEMENT

- Clear instructions
- Method of payment
- Documentation
- Account structures
- Terms of Trade

Controlling Float

- Payment Methods

Payment methods are important because of

- Cost
- Risk
- Value Dating
- Finality

RECEIVABLES MANAGEMENT

- Penalties
- Post dated cheques
- Legal process
- Internal process
- Stop supply

But do not forget Relationship

PAYABLES

Critical questions:

- What is due?
- When is it due?
- Where the payment should be sent?
- How should the payment be sent?
- Are there funds to cover the payment?
- Is the payment properly authorized?

PAYABLES MANAGEMENT

The flip side of the coin

So

- Hang on to it
- Consider float versus control
- Account structures
- Discounts

But do not forget *Relationship*

SHORT-TERM INVESTING

The Decision Process

- How much do I have to invest per currency?
- How long do I have to invest it?
- Where are the funds located?
- What is my appetite for risk?

INVESTMENT GUIDELINES

What are the company's policies regarding?

- Currency exposure and hedging
- Banks used and limits
- Investment instruments and limits
- Use of automated sweep accounts
- Bank / investment ratings

FACTORS IN CHOOSING INVESTMENTS

- The need to make an adequate return
- The need to take into account areas of risk
  - ✓ Credit risk
  - ✓ Interest rate risk
  - ✓ Capital risk
  - ✓ Market risk
- The need to consider liquidity

HOW RATES ARE QUOTED

- At a discount: Instrument issued at less than 100%
- Coupon: Specific interest payments made at specific times
- Yield to redemption: Interest payments over the lifetime of the instrument and principal repaid may be greater or less than 100%

SHORT-TERM INVESTMENTS

- Commercial paper (CP)
- Banker's acceptances (BAs)
- Repurchase agreements
- Certificates of deposit (CDs)
- Money market funds

- Treasury instruments (bills, notes, bonds)

SHORT-TERM BORROWING

The Decision Process

- How much needs to be financed and in what currency?
- How long does the deficit need to be financed?
- Where does it need it be financed?
- What is the maximum level of funding needed?

FACTORS AFFECTING BORROWING

These factors affect both amounts available and cost

- Financial strength of the company
- Key covenants
- Industry
- Available guarantee or security
- Company's ability to repay on time from bank's perspective

SHORT-TERM FUNDING INSTRUMENTS

Internal short-term funding

- Least expensive source of funding
- Cross-border and cross-currency intra-group financing can be difficult

External short-term funding

- Can act as a built-in hedge if sourced in the same currency
- Can be inexpensive to borrow local currency in the currency center

FACTORS IN CHOOSING FUNDING INSTRUMENTS

- All-in borrowing cost
- Security required
- Terms & conditions
- Tax & balance sheet aspects

FACTORS IN CHOOSING FUNDING

- Are all-in borrowing costs being offered?
- Does the bank require security?
- What are the terms and conditions?
- Is interest able to be offset on tax returns?

OTHER SOURCES OF FUNDING

- Factoring
- Invoice discounting
- Trade bills
- Acceptance credits

Financing Of Working Capital

The financing of the components working capital is not always undertaken on a completely maturity matched basis. That is, whilst working capital is regarded as net current assets that arguably should be funded by short term source of finance, this is not always the case for two reasons. First, by construction, net current assets are funded by long term sources of finance to the extent that all short-term sources of finance have been exhausted. This can be demonstrated from a characterization of a typical balance sheet:

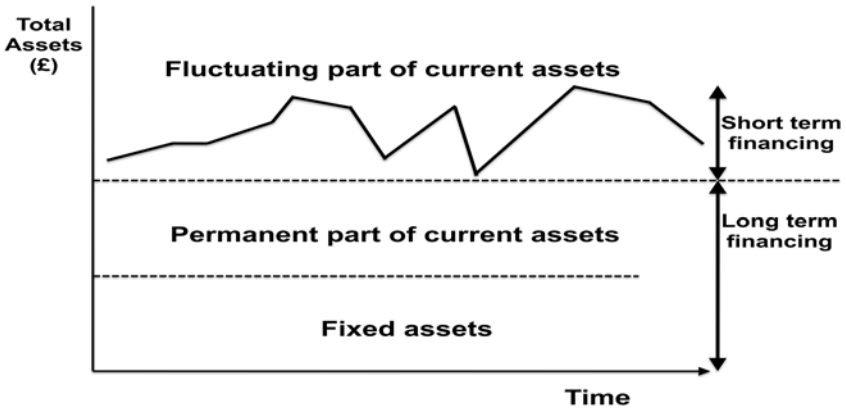
Fixed Assets + Net Current Assets - Long-Term Loans = Capital and Reserves

By simply re-arranging, we see that:

Net Current Assets = Capital and Reserves + Long-Term Loans – Fixed Assets

That is, net current assets are funded by long-term sources of finance not otherwise tied-up in fixed assets. These amounts will vary-day to day because the components of working capital vary from day to day. However, to the extent that there exists positive net current assets, then adequate long-term financing needs have to be considered.

Second, the liabilities component of working capital (trade creditors and bank overdrafts) represent sources of' finance. As such, they are normally regarded as short term sources of finance. In reality, for many business there is likely to be a core of current assets that will always need funding whilst the components of current assets will change on a day to day basis, their level – to an extent ñ will remain predictable. It is this predictable component that enables managers to utilize longer term sources of finance in the knowledge that the finance will always be required. The distinction is often made between fluctuating current assets and permanent current assets. To the extent that current assets are permanent, then they are more efficiently financed by longer-term sources. This will help avoid the higher interest cost (implicit or explicit) in shorter-term sources of finance. The distinction between fluctuating and permanent current assets is illustrated in the following diagram that indicates the relationship between asset variability and funding maturity.


Total Assets (£)
Fluctuating part of current assets
Short term financing
Permanent part of current assets
Long term financing
Fixed assets
Time

Question: 1

All Weather Windows Co manufactures and fits windows for domestic customer. The company needs to forecast its working capital requirement for the year ahead. The following figures are available:

Sales revenue	$7,600,000
Cost as percentage of sales revenue	
Raw materials	22%
Direct labour	18%
Variable production overheads	7%
Apportioned fixed production overheads	12%
Other costs	5%
Working capital statistics	
Average raw material holding period	6 weeks
Average work-in-progress (WIP) holding period	3 weeks
Average finished goods holding period	5 weeks
Average trade receivable's collection period	2.5 weeks
Average trade payables' payment period on:	
Raw materials	8 weeks
Direct labour	2 weeks
Variable production overheads	4 weeks
Fixed production overheads	6 weeks
Other costs	3 weeks

Other relevant information

1. All finished goods inventory and WIP values include raw materials, direct labour, variable production overheads and apportioned fixed production overhead costs.
2. Assume WIP is 80% complete as to materials; 75% complete as to direct labour; 50% complete as to variable production overheads and fixed production overheads.
3. Assume there are 52 weeks in one year.
4. Assume that production and sales volume are the same.
5. All working should be in $'000, to the nearest $'000.

Required:

Calculate the estimated average working capital required by All Weather Windows Co for the year, showing all necessary workings.

Answer: 1

All Weather Windows

(a) Working capital requirements

		$'000	$'000
Sales revenue for the year:		7,600	
Raw material costs			
$7,600,000 x 22%		1,672	
Direct labour costs			
$7,600,000 x 18%		1,368	
Variable production overheads			
$7,600,000 x 7%		532	
Variable production overheads			
$7,600,000 x 12%		912	
Other costs			
$7,600,000 x 5%		380	
		4,864	
Current Assets:			
Inventory		$'000	$'000
Raw materials	6/52 x $1.672m		193
W-I-P			
Materials	3/52 x $1.672m x 80%	77	
Direct labor	3/52 x $1.368m x 75%	59	
Variable and fixed production overheads	3/52 x ($532k + 912k) x 50%	42	
			178
Finished good			
Materials and direct labor	5/52 x ($1.672m + $1.368m)	292	
Variable and fixed production overheads	5/52 x ($532k + $912k)	139	
			432
Total inventory value			802
Trade receivables	2.5/52 x$7,600,000		365
Total value of current assets			1,167

Current Liabilities			
Accounts payable		$'000	$'000
Materials	8/52 x $1.672m	(257)	
Labor	2/52 x $1.368m	(53)	
Variable production overheads	4/52 x $532k	(41)	
Fixed production overhead	6/52 x $912k	(105)	
Other costs	3/52 x $380k	(22)	
Total value of current liabilities			(478)
Working Capital required			689

Question: 2

Extracts of recent accounts for Best plc, a manufacturer of sportswear, are given below.

	£'000	
Year ended 31/12	2011	2012
Sales	5,000	6,000
Cost of sales	2,000	3,000
Purchase	1,000	1,300
Stocks:		
Raw materials	164	205
Work in progress	88	118
Finished goods	170	280
Debtors	1,233	1,740
Creditors	122	110

Notes

1. Work in progress is estimated to be 40% complete.
2. Figures for stocks, debtors and creditors represent average balance
3. Sales and production are spread evenly over the year.

Required:

(a) Calculate the length (in days) of the cash operating cycle (sometimes known as the working capital cycle) for Best plc for the years 2011 and 2012.

(b) Explain what the length of the cash operating cycle means and comment on the implications of any changes in the length of the operating cycle between 2001 and 2002 for Best plc.

(c) In an attempt to reduce the length of time customers take to settle bills Best is considering introducing a settlement discount of 2% for payment made within 30 days.

assuming that customers who will take discount currently pay on average in 100 days, estimate the annual percentage

(d) Suggest five other methods Best may use to prompt earlier settlement from overdue debtors.

Answers: 2. (a): Cash Operating Cycle

	Days	
	2011	**2012**
Raw material holding period	59.86	57.56
Production period	40.15	35.89
Finished goods holding period	31.03	34.07
Debtor days	90.01	105.85
Creditor days	(40.88)	(30.88)
Cash operating cycle	180.17	202.49
	180 days	202 days

Workings

	2011	**2012**
Raw material holding period	164/1,000 x 365 = 59.86	205/1,.00 x 365 = 57.56
Production period	88/(2,000 x 0.4) x 365=40.15	118/(3,000 x 0.4) x 365=35.89
Finished goods holding period	170/2,000 x 365 = 31.03	280/3,000 x 365 = 34.07
Debtor days	1,233/5,000 x 365 = 90.01	1,740/6,000 x 365 = 105.85
Creditor days	112/1,000 x 365 = 40.88	110/1,300 x 365 = 30.88

(b) Explanation and Comment

Length of the cash measures the interval between a company paying cash at the start of its operations (normally for raw materials in a manufacturing business) and receiving cash from customers.

Implications of any changes

For Best plc the cycle appears to have lengthened. This has several implications:

- The amount of money tied up in working capital will increase; this will be detrimental to Best's cash flow.
- The finance cost of working capital will increase.

Longer stock holding periods for finished goods may result I more stock losses due to damage, deterioration, obsolescence,

- theft etc
- Longer credit given to customers may result in more bad debts as long credit periods give more time for things to go wrong.

On the other hand there could be some good new associated with the longer cycle.

- Higher stock levels and longer credit periods may attract ore customers and increase sales and profits
- Quicker settlement of creditors may gain settlement discounts, or better service from suppliers.

(c) In simple interest terms the discount costs

2/98 x 365/70 = 10.6%

in compound (APR) terms it costs

$(1 + 2/98)^{365/70} – 1 = 11.1\%$

Question: 3

On 1st July 2012, the CFO of Decent Fabrics Ltd., wishes to know the working capital requirement for the current year to arrange the short-term financing. The following information is available:

i. Issued and paid-up capital Rs. 4,000,000.

ii. 10% TFCs Rs. 1,000,000.

iii. Fixed assets valued at RS.2, 500,000 on 30th June 2012. The depreciation for the current year is Rs. 250,000.

iv. Production during the previous year was 4,000 units. It is planned that this level of activity should be increased by 50% during the current year.

v. The expected ratios of cost to selling price are - raw materials 60%, direct wages 10%, and overheads 20%.

vi. Raw materials are expected to remain in stores for an average of two months before these are issued for production.

vii. Each unit of production is expected to be in process for one month

viii. Finished goods will stay in warehouse for approximately three months

ix. The suppliers grant credit for two months from the date of delivery of raw materials

Required:

a. Calculate the working capital requirement for the current year.

b. Prepare the forecast income statement and balance sheet for 2012- 13.

Answer 3.(a):

Decent Fabrics Ltd.

Forecast Working Capital

Current Assets	**Rs.**	**Rs.**
Cash in hand	100,000	
Raw Material	600,000	
Work-in-progress	450,000	
Finished Goods	1,350,000	Alternatively
Accounts receivable	1,350,000	1,500,000
	3,850,000	4,000,000
Less: current Liabilities: Accounts Payable	600,000	600,000
Net Working Capital	3,250,000	3,400,000

Workings:

			Rupees
Raw Materials:			
2 Months consumption (3,600,000 x 2/12)		600,000	
Work in Process (1 month's production):			
Raw Material (Rs. 3,600,000/12)	300,000		
Direct Wages (600,000/12)	50,000		
Overheads (1,200,000 /12)	100,000		
		450,000	
Finished goods 5,400,000 x 3/12)		1,350,000	
			Alternatively
Accounts receivable (3 months cost of sale) (5,400,000 x 3/12)		1,350,000	1,500,000 (6,000,000 x 3/12
Accounts payable (2 months consumptions of raw material) (3,600,000 x 2/12)		600,000	

Answer 3.(b) i:

Decent Fabrics Ltd.

Forecast Income Statement

For the year ended 30th June 2013

Sales 6,000 units @ Rs. 1,000			1,200,000
Less: Cost of Sales:			
Raw Material (6,000 x 600)		3,600,000	
Direct Wages (6,000 x 100)		600,000	
Overheads (6,000 x 200)		1,200,000	5,400,000
Gross Profit			600,000
Selling and administrative expenses			300,000
EBIT			300,000
Less: Interest on TFCs			100,000
Net Profit			200,000

Answer 3 (b) ii:

Decent Fabrics Ltd.

Forecast Balance Sheet

As on 30th June , 2013

Liabilities and owners Equity	Rs.	Rs.	Assets	Rs.	Rs.
Accounts payable		600,000	Current Assets		
10% TFC		1,000,000	Cash in hand		100,000
Owners equity			Accounts Receivable		1,500,000
Share Capital	4,000,000		Raw Material		600,000
			Work-in-process		450,000
Retained earnings (Balance figure)	450,000				
Profit for the year	200,000	4,650,000	Finished goods		1,350,000
			Fixed assets	2,500,000	
			Less: depreciation	250,000	2,225,000
Total		6,250,000	Total		6,250,000

Question: 4

A Ltd is a retailer of real wood flooring. It buys and sells 20,000 packs of flooring each year from its supplier B Ltd.

The real wood flooring from Strong Ltd costs £35 per pack. There is an order processing charge of £150 per order irrespective of the quantity of packs ordered, and B Ltd takes 10 days to deliver the wood flooring. The average cost of holding one pack of real wood flooring for one year is £9.

A new supplier of real wood flooring C Ltd, has offered A Ltd wood flooring on slightly different term. C Ltd guarantees that its wood will never arrive damaged since it uses special packaging designed for maximum protection. It charges £34.95 per pack for the flooring . There is an order processing charge of £160 per order irrespective of the quantity of packs ordered, and CLtd takes 7 days to deliver the goods. The average cot of holding one pack of C Ltd's real wood flooring for one year is £12. this is because the special packaging takes additional storage space.

The economic order quantity, which will minimize costs, is:

$$EOQ = \sqrt{\frac{2CoD}{Ch}}$$

Where Co = the cost of placing one order

D = the annual demand in unit

Ch = the cost of holding one unit per annum

Required:

(a) Calculate and conclude whether it is worth accepting the offer by ordering 2,000 packs at a time from Fake Ltd.

(b) Outline three non-financial factors that should be taken into account when deciding whether to change suppliers from Strong Ltd to Fake Ltd.

Answer: 4

(a) Current supplier

EOQ

$$EOQ = \sqrt{\frac{2CoD}{Ch}}$$

Where: Co = the cost of placing one order

D = the annual demand in unit

Ch = the cost of holding one unit per annum

$$EOQ = \sqrt{\frac{2 \times 150 \times 20{,}000}{9}}$$

= 816

(i) **Total cost:**

Holding cost: average stock x unit holding cost

= (816 ÷ 2) x £9 = £3,672

Ordering cost = number of order x £150

Number of order = annual demand ÷ EOQ

= 20,000 ÷ 816

= 24.5

Therefore ordering cost = £3,675 per annum

Purchase cost = 20,000 x £35

= 700,000

Total cost for one year = £3,672 + £3,675 + £700,000

= £707,347

b. New supplier

i. **EOQ**

$$EOQ = \sqrt{\frac{2 \times 160 \times 20{,}000}{12}}$$

= 730

ii. **Total cost**

Holding cost: average stock x unit holding cost

= (730 ÷ 2) x £12 = £4,380

Ordering cost = number of orders x £160

Number of orders = annual demand ÷ EOQ

= 20,000 ÷ 730

= 27.4

Therefore ordering cost = £ 4,384 per annum

Purchase cost = 20,000 x £34.95 = £699,000

Total cost for one year = £4,380 + £4,384 + £699,000

= £707,764

(c) **Discount**

Holding cost = (2,000 ÷ 2) x £12 = £12,000

Ordering cost = (2,000 ÷ 2,000) x £160

= £1,600

Purchase cost = £699,000 x 99%

= £692,010

Total cost for one year = £12,000 + £1,6000 + £692,010

= <u>£705,610</u>

The discount means that it is worth changing suppliers.

(d) **Non-financial factors**

- Quality of C Ltd's wood. This may not be as good as B Ltd's wood, although it should be as there is very difference in price. The new wood should be closely inspected to ensure that it is of the same thickness as the current wood.
- Reliability of C Ltd. appears to have a shorter lead time for orders (seven days instead of 10 days) both they are not able to send stock consistently on time, A Ltd may end up running out of stock. This could mean customers go elsewhere, leading to lost revenue for the company.
- Packaging of C Ltd's wood. C Ltd's packaging needs to look attractive; otherwise customers will not buy if the addition, it needs to protect the wood well, as the guarantee claims.
- Range. There are many different types of wood, e.g. beech, maple and oak. A Ltd needs to ensure that all currently stocked types of wood are on offer from the new supplier.
- Returns policy. C Ltd appears to offer a guarantee that the wood will arrive undamaged but A Ltd may still need make returns. C Ltd's policy would need to be understood and the extent to which they are contactable to deal problems would be relevant.

Question: 5

Tostao plc is a manufacturer and distributor of a popular child's toy, the Rivelino.

It sells 66,000 Rivelinos per year but demand is very seasonal with 50% of annual sales occurring in December and the remainder being spread evenly over the rest of the year. At present Tostao plc manufactures a constant 5,500 toys per month and builds up stocks of finished goods which are used to meet the high demand in December. By the end of December finished goods stocks are zero.

The major raw material for the Rivelino is plastic which Tostao plc buys from a local supplier. Each Rivelino uses 1 kilogram of plastic costing £2 per kilogram. A material order is placed once a year for delivery of 66,000 kilograms of plastic at the beginning of January.

There is a delivery charge of £2,000 per order and Tostao plc estimates that it costs £0.50 to store a kilogram of plastic for a year.

Tostao plc is currently looking for ways to reduce its overdraft and the bank manager has suggested that it reviews its stock management policies.

Required:

(a) Calculate the total annual holding, ordering and purchase cost for plastic under Tostao plc's current raw material stock policy.

(b) Calculate the economic order quantity for plastic assuming Tostao plc continues to manufacture 5,500 Rivelinos per month.

The economic order quantity equation may be defined as:

$$EOQ = \sqrt{\frac{2\,Co\,D}{Ch}}$$

Where Co = the cost of placing an order

D = annual demand

Ch = the cost of holding one unit for one year

(c) The supplier of plastic finds it very convenient to deliver once per year and has indicated that it would be prepared to offer Tostao plc a bulk order discount if it continued to buy in lots of 66,000 kilograms.

Calculate the minimum discount (to the nearest percentage point) required to persuade Tostao plc to continue to order once per year.

(d) Explain the just-in-time approach to stock control and discuss the advantages and disadvantages to Tostao plc of adopting a just-in-time approach to its production of Rivelinos and raw material purchasing.

Answer:5

	£
Current annual costs	
Ordering cost	
Number of order x cost per order	2,000
1 x £2,000	
Holding cost	
Average stock x holding cost per annum	16,500
66,000 kg/2 x £0.50	
Purchase cost	
Kg purchased x price per kg	132,000
66,000 kg x £2 per kg	£150,00

(b) **Economic order quantity**

Co = £2,000

Ch = £0.50

D = 66,000 kg

$$EOQ = \sqrt{\frac{2 \times 2{,}000 \times 66{,}000}{£0.50}} = 22{,}978\ kg$$

(c)	£	
Minimum discount		
Revised annual costs		
Ordering cost		
Number of order x cost per order	5,745	
66,000/22,978 x £2,000		
Holding cost		
Average stock x holding cost per annum		
22,978 kg/2 x £0.50	5,745	
Purchase cost		
Kg purchased x price per kg	132,000	
	143,490	
Current annual cost {from (a)}	150,500	
Saving from new policy	£7,010	

Using EOQ would generate saving of £7,010 per annum. To persuade Tostao plc to remain with its existing policy the supplier would need to offer a discount of £7,010/£132,000 = 5.0%

(d) Just – in - (JIT) approach to stock to control

JIT approach to control involves manufacturing the finished product at the last possible moment before it is required by customers and arranging delivery of raw materials at the possible moment when they are required to the production line.

Advantages or disadvantages of adopting (JIT) approach

- (JIT) approach to the production Rivelinos would substantially reduce finished goods stock holding costs. At present Tosta pick is stockpiling finished products from January onwards. Under the (JIT) the toys required for December sales would be made in December , substantially reducing holding costs.
- (JIT) would also lead to low raw material stocks, again giving substantial saving in holding costs.

Disadvantages:

- **Adaption**

Of a (JIT) system would mean that production levels in December would need to be much higher then other months. This would involved an increase in the work force and possibly and extension to factory capacity for this one month. This may be not be possible or costs affective.

- (JIT) would involve more frequent deliveries of raw material and a close working relationship with suppliers. The supplier has already indicated reluctance to deliver more frequently and raw material cost may rise.
- Quality of raw material and manufacturing becomes absolutely vital under a (JIT) system as there are no safety-stock to fall back on. Any failures could lead to delayed delivery to customer and the potential for lost business.

d. Many possibilities exist including

- Interest charges for late settlement
- Reminder letters
- Telephone calls
- Debt collection agencies
- Visits to the customer by credit control staff
- Legal action on overdue accounts

Question: 6

In your organization uses 1,000 packets of paper each year of 48 working weeks. The variable costs of placing an order; progressing delivery and payment have been estimated at RS.12 per order.

Storage and interest costs have been estimated at RS.O.50 per packet per annum based on the average annual stock.

The price from the usual supplier is Rs. 7.50 per packet for any quantity
The usual supplier requires four weeks between order and delivery.

A potential supplier has offered the following schedule of prices and quantities:

Rs. 7.25 per packet for a minimum quantity of 500 at any one time.
Rs. 7.00 per packet for a minimum quantity of 750 at any one time.
Rs. 6.94 per packet for a minimum quantity of 1,000 at any one time.

If more than 450 packets are received at the same time an additional fixed storage cost of Rs. 250 will be payable for the use of additional space for the year. Assume certainty. of demand, lead time and costs.

You are required to:

(a) Calculate and state the EQO from the existing supplier.

(b) Calculate and state the stock level at which the orders will be placed;

(c) Calculate and state the total minimum cost for the year from the existing supplier;

(d) Calculate and state the total minimum cost if you change to the new supplier.

Answer: 6

(a) $$E.O.Q = \sqrt{\frac{2 \times Annual\ Requirement \times Ordering\ Cost}{Carrying\ Cost}}$$

$$= \sqrt{\frac{2 \times 1000 \times Rs.12}{Rs.0.50}} = 219\ packets$$

(b) Re-order level = Usage during lead time + Safety Stock

= Weekly usage x lead time in weeks + Safety Stock = 1000/48 x 4 + 0

Re-order level = 83 Packets.

Assuming certainty of delivery within four weeks i.e. Zero Safety Stock

(c) No. of orders = 1000/219 = 4.567 i.e. 5 orders

Purchase Price Rs. 1000 x Rs. 7.50 = 7,500

Carrying Cost = Average Inv. X per unit C.C. = 219/2 x 0.50 = Rs. 54.75

Ordering Cost = No. of order x per order cost = 4.56 x Rs. 12 = 54.80

Total Cost of existing supplier = Rs. 7,609.55

(d)

Option-I	Purchase Price = Rs. 7.25 per packet		
	EOQ = 500 Packets		
Cost of Packet	(1000 x Rs. 7.25)	=	Rs. 7,250
Carrying Cost	(500/2 x Rs. 0.50)	=	375
Ordering Cost	(1000/500 x Rs. 12)	=	24
Total Cost		=	Rs. 7,649

Option-III Purchase Price = Rs. 6.94 per packet

EOQ = 1,000 Packets.

No. of Orders = 1000/1000 = 1 order.

Cost of Packet	(1000 x Rs. 6.94)	=	Rs. 6,940
Carrying Cost	(1,000/2 x 0.50) + Rs. 250		500
Ordering Cost	(1000/1000 x Rs. 12)		12
Total Cost		=	Rs. 7,452

Thus, the minimum total annual cost is Rs. 7,452 with an order quantity of 1,000 Packet.

Question 7:

Waset Co is a waste management company, with one sole shareholder / director, Mr. Trusty. It collects two types of waste from business – recyclable waste and confidential waste. Since companies have increasingly become aware of both the need for recycling and the need to protect confidential information, Waste co's client base has expanded rapidly over the last two years.

As the business has expanded Mr. Trusty has had less time available to focus on credit control. This ahs resulted in a steady deterioration in accounts receivable collection and a rapid increase in Mr. Trusty's overdraft, despite high profits. Mr. Trusty's bank has now refused to extend his overdraft any further and has suggested that he either employ a credit controller or factor his accounts receivable.

The following information is available:

1. Credit sales for the year ending 30 November 2007 were $ 2,550,000 and average accounts receivable days were 60. Sales are expected to increase by 25% over the next year.
2. If Mr. Trusty employs a good credit controller, the cost to the business will be $47,000. it is anticipated that the accounts receivable days can then be reduced to 40 days.
3. A local factoring organization has offer a facto the company's accounts receivable on the following terms.
    i. An advance of 80% of the value sales invoices (which Mr. Trusty would fully utilize.
    ii. An estimated reduction in accounts receivable days to 35 days.
    iii. An annual administration fee of 1.3% of turnover.
    iv. Interest charge on advances of 12% per annum.
4. Current overdraft rates are 10% per annum.
5. Assume there are 365 days in a year.

Required:

a. Explain the meaning of 'debt factoring' (accounts receivable factoring) to Mr. Trusty, distinguishing between 'with recourse' and 'without recourse' agreements.

b. Explain how debt factoring is different form 'invoice discounting'.

c. Calculate whether it is financially beneficial for Waste Co to factor its accounts receivables for the next year, as compared to employing a credit controller.

d. State four roles that a credit controller may plan.

Answer 7:

a. Debt factoring:

'Debt factoring' is a service provided by factors whereby the factor collects accounts receivable on behalf of their client and
often invoices their client's customers as well. The factor also advances, to its client, a proportion of the money it is due to
collect (typically about 80% is advanced.)

Mr. Trusty would find the service useful because he could both receive cash early and also delegate the administration of his invoicing, accounting and accounts receivable collection work.

There are two types of factoring agreements: 'with recourse' and 'without recourse' agreements. With the first of these agreements, although the factor advances monies, the risk of non-payment of accounts receivable balances stays with the client. If a balance is not recovered, the factor has 'recourse' to their client for the money. If the agreement is 'without recourse' the factor bears the risk of non-payment.

Debt factoring has to be paid for, usually as a percentage of the amounts advanced and as a percentage of turnovers. Agreements without recourse to the client obviously cost more. Mr. Trusty would have to compare the cost to those of employing an individual to do his invoicing and obtaining insurance against unpaid accounts receivable balances. In addition, there may be some stigma attached to debt factoring as clients sometimes assume that a business using a factor must be in financial difficulty.

b. Difference from Invoice discounting

Invoice discounting is a service whereby a provider (often a factoring company) purchases invoices from a client at a discount. In this case, they are merely advancing cash, rather than providing an accounts receivable collection service. For this reason,
there is no administration fee payable (like there is for factoring), making invoice discounting a cheaper option.

c. Whether to factor accounts receivables

Cost of factoring

New sales level = $2,550,000 x 125%	$3,187,500
Accounts receivable reduced to 35 days:	
$3,187,500 x 35/365	$305,651
	$
80% advanced by factor at 12%:	
$305,651 x 80% x 12%	29,342
$20% still financed by overdraft:	
$305,651 x 20% x 10%	6,113
Admin fee: $ 3m187m500 x 1.3%	41,438

	76,893

Cost of not factoring but employing, staff accounts receivable reduced to 40 days:

$3,187,500 x 40/365	$349,315
	$
Overdraft cost	
$349,315 x 10%	34,932
Credit controller costs	47,000
	81,932

b. Roles of a credit controller

May include some/all of the following:

- Updating the sales ledger
- Dealing with customers' queries
- Assessing creditworthiness of new customers
- Establishing / updating payment terms for customers
- Regular review of the sales ledger
- Pursuing overdue accounts receivable balances
- Providing references for customers

Question: 8

(a) XYZ Ltd. requires advice on its debt collection policy. Should the current policy be discarded in favour of option 1 or option 2?

	Current Policy	Option 1	Option 2
Expenditure on debt collection per annum	Rs. 240,000	Rs.300, 000	Rs.400, 000
Bad debts losses (% of sales)	3%	2%	1 %
Average collection period	2 months	1 ½ months	1 month

Current sales are Rs. 4.8 million per annum and the variable cost of sales is 90% of sales value. The company requires a 15% return on its investment.

(b) XYZ ltd. is considering a change of credit policy which will result in a slowing down in the average collection period from one month to two months. The relaxation in credit standards is expected to produce an increase in sales in each year amounting ton 25% of the current sales volume.

- Sales price per unit Rs.10, variable cost per unit Rs.8.50, current sales per annum Rs.2.4 million. The required rate of return on investment is 20%.
- Assuming that the 25% increase in sales would result in additional stocks of Rs.100, 000 and additional creditors of Rs.20, 000.
- Required: advise the company on whether or not to extend the credit period to customers if :
- All customers take the longer period 0f 2 months.
- Existing customers do not change their payment habits, only new customers take a full 2 months credit.

Answer: 8 (a)

Recommendation:

The company should discard the current policy in favour of option I

	Current Policy	Option I	Option II
	Rs.000	Rs.000	Rs.000
Current sales	4,800	4,800	4,800
Less variable cost of sales 90%	4,320	4,320	4,320
Contribution	480	480	480
Less:			
Debt collection expenditure	240	300	400
Bad debts 3%	144		
2%		96	
1%			48
Carrying Costs			
Rs. 4,800 x (2/12) x 0.15	120		
Rs. 4,800 x (1.5/12) x 0.15		90	
Rs. 4,800 x (1/12) x 0.15			60
	504	486	508
Profit (loss) before taxes	(24)	(6)	(28)

Answer: 8(b)

XYZ Ltd.

	Current Situation	Situation	Rs.'000 Situation
	Rs.	A Rs.	B Rs.
Sales (Rs. 1.25 x 2400,000)	2,400	3,000	3,000
Less: Variable cost 85%	2,080	2,550	2,550
Contribution	360	450	450
Carrying costs	40	100	60
Cost of addition working capital			
Rs. (80,000 x 20%)		16	16
Total Cost	40	116	76
Profit before taxes	320	334	374

Carrying Cost

(i) Rs. 2400 x (1 /12) x 20% = 40

(ii) Rs. 3000 x (2/12) x 20% = 100

(iii) Rs. 2400 x (1 /12) x 20% = 40

(3,000 - 2,400) = 600 x (2 / 12) x 20% = 20

60

Plan B has an advantage of Rs. 19,440 *over* plan A which is very nominal compared with period of credit 45 days to 60 days. Before we decide to relax credit policy a detail study is required of all other factors relevant to credit policy, reliability of estimates etc.

Note:

Credit cost can be calculated by using cost rather Sales.

Question: 9

ABC Company is attempting to evaluate whether it should ease collection efforts, the firm sells 72,000 units per year at an average price of Rs.32 each. Bad debt expenses are 1 percent of sales and collection expenditures are Rs. 60,000. The average collection period is 40 days, and the variable cost per unit is Rs. 28.

By easing the collection efforts, ABC Company expects to save Rs. 40,000 per year in collection expenses. Bad debts will increase to 2% of sales, and the average collection period will increase to 58 days. Sales will increase by 1000 units per year. If the firm has a required rate of return on equal risk investments of 24 percent, what recommendation would you give the firm?

Use your analysis to justify you answer.

Answer: 9

			Current Situation		**Relax Policy**
		Rs.	**Rs.**	**Rs.**	**Rs.**
Sales			32		32
Variable cost			28		28
Contribution	(a)		4		4
Total contribution	(a x sales)		288,00		292,000
Bad debts (W -1)		23,040		46,720	
Collection charges		60,000		20,000	
Credit cost:					
72,000 x Rs. 32 = Rs. 2,304,000 x 40/360 x 24%		61,440	144,480		
73,000 x Rs. 32 x 58/360 x 24%				90,325	157,045
Profit			143,520		134,955

'(W-1) Current situation - 72,000 x Rs. 32 = Rs. 2,304,000 x 1% = Rs. 23,040

Relax policy - 73,000 x Rs. 32 = Rs. 2,336,000 x 2% = Rs. 46,720
Recommendation:

The credit policy should not be relaxed as it increase the cost of Bad Debts as well as credit cost, although there is saving of Rs. 40,000 in collection expenditure. an overall decrease of Rs. 8,565 in profit does not justify the relaxation in the credit policy.

Question: 10

Noor Ltd., is considering to raise working capital of Rs. 400,000 either by a commercial bank loan, secured by accounts receivable, or factoring accounts receivable. Noor Ltd: s bank has agreed to lend the firm 80% of its average monthly accounts receivable of RS.500,000 at an annual interest rate of 12%. The bank loan is in the form of a series of 30-day loans. The loan would be discounted, and a 15% compensating balance would also be required. Noor Ltd., can arrange from another commercial bank any shortfall in working capital up to RS.75,000 @ 15% annual interest payable in arrear.

A factor has agreed to purchase Noor Ltd.s 84% accounts receivable. The 16% of receivables would be held in a reserve account. The factor would charge Rs. 1,500 processing fee and 3% factoring commission on the invoice amount each month. The factor would also charge interest @ 10% on accounts receivable purchased. The factoring commission, processing fee and monthly interest payment would be deducted from the accounts receivable purchased on monthly basis. If Noor Ltd., chooses the factoring arrangement, it can eliminate its credit department and reduce operating expenses by Rs. 8,000 per month. In addition, bad debt losses of 2% of the monthly receivables will also be avoided.

Required:

i. Compute the annual cost associated with each financing arrangement.

ii. Discuss some considerations other than cost that may influence management's decision between factoring and bank loan.

Answer: 10

Annual Cost of financing:

Shortfall of working capital in case of commercial bank loan:

		Rupees
Amount of loan	(0.80) (500,000)	400,000
Interest	(0.12/12)(400,000)	(4,000)
Compensating balance	(0.15) (400,000)	(60,000)
Amount received		336,000
Working capital required		400,000
Shortfall in working capital		64,000

Annual cost of commercial bank loan:

		Rupees
Interest expense	(0.12)(400,000)	48,000
Credit department	(8,000)(12)	96,000
Bad debts	(0.02)(500,000)(12)	120,000
Interest on short fall in working capital	Rs. 64,000 x 0.15	9,600
Total annuals costs		273,600

The cost of the credit department and bad debts expenses will be incurred if a bank loan is used, but these costs will be avoided if the company accepts the factoring arrangement.

Amount received form factor:

		Rupees
Amount loaned	(0.84) (500,000)	420,000
Commission	(0.03)(500,000)	(15,000)
Prepaid interest	(0.10/12) (420,000)	(3,500)
Process fee		(1,500)
Amount received		400,000

Annual cost of factoring:

		Rupees
Annual commission	(15,000)(12)	180,000
Annual interest	(0.10)(420,000)	42,000
Processing fee	(1,500)(12)	18,000
Total annual costs		240,000

The factoring costs are slightly lower by Rs. 33,600 (Rs. 273,600 – Rs. 240,000) than the cost of the bank loan, and the factor is willing to advance a significantly greater amount. On the other hand, the elimination of the credit department could reduce the firm's options in the future.

Question: 11

Special Gift Supplies pIc is a wholesale distributor of a variety of imported goods to a range of retail outlets. The company specializes in supplying ornaments, small works of art, high value furnishings (rugs. etc.) and other items that the chief buyer for the 'company feels would have a market in the UK. In seeking to improve working capital management, the financial controller has gathered the following information:

	Months
Average period for which items held stock	3.5
Average debtors' collection period	2.5
Average creditors payment period	2.0

Required:

(a) Calculate Special Gift Supplies' funding requirement for working capital measured in terms of months.

(b) In looking to reduce the working capital funding;

(c) Requirement, the financial controller of special Gift Supplies is considering factoring credit sales. The company's annual turnover is £2·5m of which 90% are credit sales. Bad debts are typically 3% of credit sales. The offer from the factor is conditional on the following:

1. The factor will take over the sales ledger of Special Gift Supplies completely.
2. 80% of the value of credit sales will be advanced immediately (as soon as sales are made to the customer) to Special Gift Supplies, the remaining 20% will be paid to the company one month later. The factor charges 15% per annum on credit sales for advancing funds in the manner suggested. The factor is normally able to reduce the debtor's collection period to one month.
3. The factor offers a 'no recourse' facility whereby they take on the responsibility for dealing with bad debts. The factor is normally able to reduce bad debts to 2% of credit sales.
4. A charge for factoring services of 4% of credit sales will be made.
5. A one-off payment of £25,000 is payable to the factor.

The salary of the Sales Ledger Administrator (£12,500) would be saved under the proposals and overhead costs of the credit control department, amounting to £2,000 per annum, would have to be reallocated. Special Gift Supplies' cost of overdraft finance is 12% per annum. Special Gift Supplies pays its sales force on a commission only basis. The cost of this is 5% of credit sales and is payable immediately the sales are made. There is no intention to alter this arrangement under the factoring proposals.

Required:

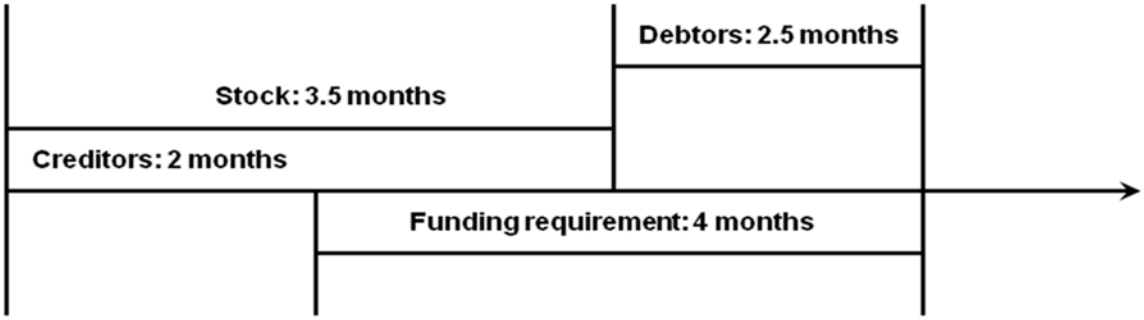
Evaluate tile proposal to factor the sales ledger by comparing Special Gift Supplies' existing debtor collection cost with those that would result from using the factor (assuming that the factor can reduce the debtor's collection period to one month).

Answer: 11

(a) The funding requirement for working capital is the sum of:

	Months
Stock holding period	3.5
Debtors collection period	2.5
Creditors payment period	(2.0)
Working capital funding period	4.0

Diagrammatically, the funding requirement may be represented as:



(b) Annual sales £2.5m

Credit sales: £2.5m x 90% = £2.25m

Factor will advance 80% of £2.25m = £1·80. This is not adjusted for bad debts since the agreement is without recourse.

Assuming sale are evenly spread, the factor will pay (2.25 - 1.8)/12 = £37,500 each month, in arrears by one month.

Factor service charge is 4% x £2.25m = £90,000

Commission charges payable to the sale force are ignored in the following calculations since they are common to both. The allocated overheads are also irrelevant for the evaluation. The factor's better record with bad debts is not part of the evaluation of the proposal in terms of the benefits to Special Gift Supplies.

PAYABLE MANAGEMENT

Question 1:

ABC limited meets its Short-term fund requirements by stretching its account payable and borrowing from a finance company. at the close of June 30, 2006, the requirements of fund included maximum Rs. 40,000 fro finance company, attracting markup @ 24% per annum. The remaining fund requirement was met through accounts payable stretching. It has remained a matter of practice that 30%of funds requirement in accounts payable are normal payables and do not attract any charges, however, balance stretched payables are charged @ 30% per annum.

One of the leading insurance company has offered financing of Rs. 80,000 @ 18% per annum per for 5 years term. ABC Limited, in order to determine its advantages and to avoid expansive accounts payable stretching cost wanted to evaluate the proposal based on its requirements of funds under following conditions:

Existing position:	**£**
Credit control salary	12,500
Bad debts 3% x £2.25m =	67,500
Annual funding costs for debtors: (2.5/12) x 12% x £2.25m =	66,250
	136,250

Factor's offer:		**£**
Factor finance charge:	£2.25m x 80% x 15% x (1/12) =	22,500
Unfactored funding costs at Special Gift Supplies cost of capital:		
£2.25m x 20% x 12% x (1/12) =		4,500
Factor service charge: 4% x £2.25m		90,000
One off payment funding costs at Special Gift Supplies cost of capital:		
£25,000 x 12%		3,000
Hence it is worthwhile to factor the debt		120,000

		Rupees
Boom period	Funds' requirement	160,000
Normal Period	Funds' requirement	120,000
Recession period	Funds' requirement	90,000

Required:

Prepare a comparative evaluation sheet for above proposals and give your recommendations. **(Prepare and present all necessary workings).**

Answer 1:

Cost of funds under current conditions

	(Rupees)		
	Boom	**Normal**	**Recession**
Funds requirements	160,000	120,000	90,000
Normal payable with no charge	48,000	36,000	27,000
Finance Co loan	40,000	40,000	40,000
Total	88,000	76,000	67,000
Stretches payable	72,000	44,000	23,000

Cost of Funds P.A				
Finance Co @ 24%		9,600	9,600	9,600
Stretched payable @ 30%	(a)	21,600	13,200	6,900
Total Cost		**31,200**	**22,800**	**16,500**
Cost of Funds under Insurance co. Finance				
Funds requirement		160,000	120,000	90,000
Term loan insurance co.		80,000	80,000	80,000
Normal payable		48,000	36,000	10,000
		128,000	116,000	90,000
Borrowing from Finance Co @ 24%		**32,000**	**4,000**	**Nil**

There is no need of stretching A/P

Cost of Funds P.A				
Cost of Funds P.A				
Cost of term loan @ 18% x 80,000		14,400	14,400	14,400
Cost of Finance Co @24% x 32,000		7,680	960	--
Total Cost	(b)	22,080	15,360	14,400
Savings under Ins. Finance	(a-b)	9,120	7,440	2,100

Financing from Insurance Co. would he advantageous

CASH MANAGEMENT

Question: 1

The following information has been extracted from the books of XYZ Limited: Annual interest rate 12% Fixed cost per transaction Rs. 500 Total cash required Rs. 1,200,000

Required:

(i) Calculate the target (optimum) cash balance using the Baumol model

(ii) What are the opportunity costs of holding cash, the trading cost (transaction cost) and the total cost?

(iii) What would be the total annual cash requirement if the target cash balance is Rs.75,000?

Answer:1

Ecq=√2*conversion cost*demand for cash/opportunity cost(in decimal form)

√2x500x1,200,000/.12 = Rs. 100,000

The average cash balance will be Rs. 100,000/2=Rs. 50,000 no of transaction will be 12

Transaction cost 12x500=Rs. 6000 and opportunity cost t Rs. 50,000X.12%=Rs.6000

Average cash balance Rs. 75,000/2=Rs. 37500 the opportunity cost=Rs.37, 500X.12%=Rs. 4,500

No transactions will be 4500/500=9

The annual requirement Rs. 75,000x9=675,000

Baumol model

ECQ=√ 2 X 30 X Rs. 1,500,000 /.08

=Rs. 33541 received each time the cash is replenished

There will 45 conversions during the year

Average cash balance will be Rs. 33,541/2=Rs.16, 770

Cost of conversion =45x30=Rs.1, 350

Opportunity cost=Rs.16, 770x.08=Rs.1, 342

Total cost=Rs.2, 692

A - 3

ABC Ltd

Cash Flow Statement

For the Year Ended, 2004.

Cash Flow From Operating Activities:	**Rs.**	
Profit (1)	11,698	
Add: Depreciation (4) (5),(6),(7)	44,531	
Profit on Sale of plant	(4,000)	
Lose on Sale of Vehicle	1,345	
Decrease in Creditors	(16,523)	
Decrease in Stock	9,915	
Decrease in Debtors	(4,954)	
Tax paid	(16,170)	
		23,842
Cash Flow From Investing Activities:		
Plant (4)	(23,000)	
Motor Vehicle (5)	(16,418)	
Office Equipment (7)	(4,602)	
Land & Building (6)	(100,000)	
Sale of Plant (4)	11,000	
Sale of Vehicle (5)	2,800	
		(130,220)
Cash Flow From Financing Activities:		
Ordinary share capital	100,000	
Premium	30,000	
Bonds	68,260	
Redeemable capital	(101,000)	
Dividend paid	(10,000)	
		07,260
Net Cash for the year		(19,128)
Opening Balance		18,612
Closing Balance		(516)

Question: 2

Danial Shaikh recently leased space in a shopping mall and opened a new business, Danial Toys Shop. Business has been good, but Danial has frequently run out of cash. This has necessitated late payment on certain orders, which, in turn, is beginning to cause a problem with suppliers. Danial plans to borrow from the bank to have cash ready as needed, but first he needs a forecast of just how much he must borrow. Accordingly, he asked you to prepare a cash budget for the critical period around Eid-ul-fiter, when needs will be especially high.

Sales are made on a cash basis only. Danial's purchases must be paid for during the following month. Danial pays himself a salary of Rs. 9,600 per month, and the rent is RS.4,000 per month. In addition, he must make a tax payment of Rs.24,000 in October. The current cash on hand (on October 1) is RS.800 (DanialI does not want to keep more cash in hand to avoid the chances of robbery), but Danial has agreed to maintain an average bank balance of Rs. 12,000 - this is his target cash balance including cash in hand.

The estimated sales and purchases for October, November and December are shown below. Purchases during September amounted to Rs. 280,000.

		Rupees
	Sales	Purchases
October	320,000	80,000
November	80,000	80,000
December	120,000	80,000

Required:

i. Prepare a cash budget for the months of October, November and December.

ii. Now, suppose Danial were to start selling on credit from October 1, giving customers 30 days to pay. All customers accept these terms. All other facts in the scenario are unchanged. What would the Danial's loan requirements be at the end of October in this case?

Answer: 2

(i) Cash budget for October, November and December:

	October	November	December
			Rs.
Collection and Purchases:			
Sales	320,000	80,000	120,000
Purchases	80,000	80,000	80,000
Payment	*280,000	80,000	80,000
*September purchases = 280,000			
Receipt from sales	320,000	80,000	120,000
Payments for:			
Purchases	280,000	80,000	80,000
Salaries	9,600	9,600	9,600
Rent	4,000	4,000	4,000
Taxes	24,000	-	-
Total Payments	317,600	93,600	93,600
Cash surplus / (deficit)	2,400	(13,600)	26,400

			Rs.
Cash Surplus or Loan Requirements:			
Cash at start of month	800	3,200	(10,400)
Cumulative cash	3,200	(10,400)	16,000
Target cash balance	12,000	12,000	12,000
Cumulative surplus cash or total loans to maintain Rs. 12,000 target cash balance	(8,800)	(22,400)	4,000

ii.

If Danial began selling on credit on October 1, then it would have zero receipts during October, down from Rs. 320,000

Thus, it would have to borrow an additional Rs. 320,000, so its loans outstanding by October 31 would be Rs. 328,800

The loan requirement would build gradually during the month. We could trace the effects of the changed credit policy on out into November and December, but here it would probably be best to simply construct a new cash budget.

Fraud – a deliberate misrepresentation of facts with intent of deceiving someone.

Employee fraud:

Dishonest acts performed against the company by its employees.

Theft of assets, charging lower sale price to favored customers, receiving "kickbacks" from suppliers, overstating hours worked, padding expense amounts and embezzlement. Embezzlement is a theft of assets which is concealed by falsification of the accounting records.

Management Fraud:

Refers to deliberate misrepresentation made by top management of a business to persons outside of the Business organization.

The issuance of Fraudulent Financial Statements intended to mislead investors and creditors.

It is impossible to eradicate the threat of fraud, but there are several steps that employers can take to minimize this very real risk.

Fraud has rarely been out of the headlines this year, as millions have been lost as a result of the activities of a small criminal element. It's tempting to think that it'll always happen to someone else, but fraud can strike anywhere and at any time. According to recent surveys by PwC and Ernst & young on fraud affecting major companies.

Eighty-two per cent of the worst frauds were committed by employees, almost one-third of whom were in management posts.

There are huge difficulties in measuring fraud. It is difficult to identify, it's often hard to distinguish from simple poor record-keeping and it regularly goes unreported.

Any fraud prevention and control model should achieve the following main objectives:

- deterrence;
- prevention
- disruption
- Facilitation of civil or criminal proceedings.

No system is completely watertight, but the losses can be minimized if a problem is detected at a sufficiently early stage.

Creating the right environment is the key to success. You organization's stance on ethical issues will underpin its approach to fraud and should be made clear in a code of business conduct emphasizing the norms and values expected in daily activity.

The threat of fraud will always exist. It will never be possible to eliminate the danger since many fraudsters are sufficiently determined to beat the systems put in place to stop them. Every organization will fall victims to fraud at some time or other, but those with and effective strategy are much less likely to suffer significant losses as a result that those without one. It has been said that there are three criteria that need to be met to reduce the risk of fraud: good ethics; good people and good systems.

Internal control

- The environment in which companies conduct their business continues to change dramatically. Economic factors, advances in technology, and increasing global competition are just a few examples of these changes. With each new development, management is faced with greater challenges to control costs, manage liquidity, and achieve a competitive advantage.
- Internal Control is a process effected by an entity's board of directors, management, and other personnel- designed to provide reasonable assurance regarding the achievement of objectives in the following three categories: effectiveness and efficiency of operations, reliability of financial reporting, and compliance with laws and regulations
- Five interrelated components of an effective internal control:
- Control environment sets the tone of an organization, influencing the control consciousness of its people. It is the foundation for all other components of internal control providing discipline and structures.
- Risk assessment is the entities identification and analysis of relevant risk to the achievement of its objectives, forming a basis for determining how the risk should be managed.
- Control activities are the policies and procedures that help ensure that management directives are carried out.
- Information and communications systems support the identification, culture, and exchange of information in a form and time frame that enable people to carry out their responsibilities.
- Monitoring is a process that assesses the quality of internal control performance over time.

Internal control

Internal Control consists of the plan of organization and all related methods and measures adopted within a business to:

1. Safe guard its assets from employee theft, robbery and unauthorized use.

2. Enhance the accuracy and reliability of its accounting records by reducing the risk of errors (unintentional mistakes) and irregularities (International mistakes and misrepresentations in the accounting process.

Internal Control over Cash Receipts.

Cash receipts may result from a variety of sources: cash sales; collections on account from customers: the receipt of interest, rents and dividends:

Investments by owners bank loans: and proceeds from the sale of noncurrent assets. Internal control principles apply to cash receipts transactions as follows:

Principle	**Application to Cash Receipts**
Establishment of responsibility	Only designated personnel such as cashier and each cashier department personnel should be authorized to handle or have access to cash receipts.
Segregation of duties	Different individuals should be assigned the duties of receiving cash, recording cash receipts transaction, and having custody of cash.
Documentation procedures	Documents should include remittance advices for mail receipts, cash register tapes for over-the counter receipts, and deposit slip/s fro bank deposits
Physical, mechanical, and electronic controls	Cash should be stored in company safes and ban vaults, and access to storage areas should be limited to authorized personnel; cash registers should be used in executing over-the-counter receipts.

Principle	Application to Cash Receipts
Independent internal verification	Daily cash counts of register receipt and receipts deposited in the bank should be made by the treasurer's office.
Other controls	All personnel who handle cash receipts should be bonded and required to take vacations; cash should be deposited in the bank in total daily.

1. Control is most effective when only one person is responsible for a given task.
2. When one individual is responsible for all the related activities the potential for errors and fraud is increased.
3. When on employee maintains the record of the asset that should be on hand and a different employee has physical custody of the assets, the custodian of the asset in not likely to convert the asset to personal use.
4. Documents should be pre-numbered and all documents should be accounted for.
5. Source documents for accounting entries should be promptly forwarded to accounting to help ensure timely recording of the transaction and event.

Other Control:

1. Bonding of employees who handle cash
2. Rotating employee's duties and requiring employees to take vocations.

Cash is the one asset that is readily convertible into any other type of assets; it is easily concealed & transferred and it is highly desired.

Cash consists of Coins, Currency notes, Cheques, money orders and Money in hand or on deposits. Postage Stamps (Prepaid Expense) & Post dated cheques (Receivables are not cash

16 STEPS FRAUD PREVENTION PLAN

1. Consider fraud risk as an integral part of your overall corporate risk management strategy.
2. Develop an integrated strategy for both fraud prevention and control.
3. Develop and "ownership structure" form the top to the bottom of the organization.
4. Introduce a fraud policy statement.
5. Introduce an ethics policy statement.
6. Activity promote these policies through the organization.
7. Establish a control environment.
8. Establish sound operational control procedures.
9. Introduce a fraud education, training and awareness program
10. Introduce a fraud response plan as integral part of the organization's contingency plans.

11. Introduce a Whistle-blowing policy.
12. Introduce a “reporting hotline”
13. Constantly review all anti-fraud policies and procedures.
14. Constantly monitor adherence to controls and procedures.
15. Establish a “learn from experience” group.
16. Develop appropriate information and communication systems.

THE CASH FLOW STATEMENT

Question: 1 –

The summarized balance sheets of Allied Limited as at December 2012 and 20013 are as follows:

	2012	2013
	Rs.'000'	
Paid up share capital	150,000	100,000
Share premium	35,000	15,000
Profit and Loss Account	36,000	11,500
Debentures	30,000	70,000
Deferred Taxation	18,000	11,000
Creditors	48,000	34,000
Bank Overdraft	-	14,000
Corporation tax payable	15,000	10,500
Proposed Dividends	20,000	10,000
Depreciation on plant and machinery	54,000	45,000
Depreciation on fixtures and fittings	15,000	13,000
	421,000	**334,000**
Free hold property at cost	130,000	110,000
Plant and machinery at cost	151,000	120,000
Fixtures and fittings at cost	29,000	24,000
Stock	51,000	37,000
Debtors	44,000	42,800
Government stock	4,600	-
Cash at Bank	11,400	200
	421,000	**334,000**

Additional Information:

1. There has been no disposal of freehold property in the year
2. The machine tool which had cost of Rs.8 million (in respect of which Rs.6m depreciation had been provided) was sold for Rs.3m, and fixtures which had a cost of Rs.5m (in respect of which Rs.2m depreciation had been provided) was sold for Rs.1m. Profits and losses on those transactions had been dealt through the profit and loss account.
3. The corporation tax liability in respect of the year ended 31 December 2013, amounting to Rs.8m, had been paid during the year.

The profit and loss account charges in respect of tax were: corporation tax Rs.12.5m; deferred tax Rs.9.5m.

4. The premium paid on redemption of debentures was Rs.2m, which has been written off to the profit and loss account.
5. The proposed dividend for 2012 had been paid during the year.
6. Interest received during the year was Rs.450,000. Interest expense for the year charged in profit and loss account was Rs.6.4m. Accrued interest of Rs.440,000 is included in creditors at December 31, 2012 (nil at December 31, 2013).

Required:

Prepare a cash flow statement for the year ended 31 December 2013 as per IAS-7

Solution :1

Cash Flow Statement

Allied Limited

For the year ended December 31,2013

	Rs.
Cash flow from Operating Activities	
EBIT	72,950
Depreciation on machinery	15,000
Depreciation on fixture	4,000
Interest received	450
Interest paid	(5,960)
Tax paid	(8,000)
Working capital changes:	
Increase in A/R	(1,200)
Increase in inventory	(14,000)
Increase in A/P	13,560
Cash inflow from Operating Activities	76,800
Cash flow from Investing Activities	
Purchase of property	(20,000)
Sale of machinery	3,000
Sale of fixture	1,000
Purchase of fixture	(10,000)
Gov. stock purchase	(4,600)
Purchase of machinery	(39,000)
Cash outflow from Investing Activities	(69,600)
Cash flow from Financing Activities	
Redemption of debentures	(42,000)
Dividend paid	(10,000)
Bank OD	(14,000)
Share issue at premium	70,000
Cash inflow from Financing Activities	4,000

Net increase in cash and cash equivalents	11,200
Cash and cash equivalent at beginning	200
Cash and cash equivalent at ending	11,400

Working:

Profit& Loss Account			
Deferred tax	9,500	Opening bal.	11,500
Corporation tax	12,500	Interest received	450
Premium on debt	2,000	Gain on sale of machine	1,000
Dividend	20,000	Deferred tax	2,500
Interest	6,400	EBIT	72,950
Loss on sale of fixtures	2,000		
Closing bal.	36,000		
	88,400		88,400

Dividend			
Dividend paid	10,000	Opening bal.	10,000
Closing bal.	20,000	Profit& loss A/C	20,000
	30,000		30,000

Creditors			
Closing bal.	47,560	Opening bal.	34,000
		Bal.	13,560
	47,560		47,560

Dep. Plant& Machinery			
Disposal	6,000	Opening bal.	45,000
Closing bal.	54,000	Profit& loss A/C	15,000
	60,000		60,000

Fixture			
Opening bal.	24,000	Disposal	5,000
Purchases	10,000	Closing bal.	29,000
	34,000		34,000

Disposal of Fixtures			
Cost	5,000	Depreciation	2,000
		Cash	1,000
		Loss	2,000
	5,000		5,000

Tax			
Tax paid	8,000	Opening deferred tax	11,000
	2,500	Opening corporation tax	10,500
Closing deferred tax	15,000	P&L deferred tax	9,500
Closing corporation tax	18,000	P&L corporation tax	12,500
	43,500		43,500

Interest			
Interest paid	5,960	Profit& Loss A/C	6,400
Bal.	440		
	6,400		6,400

Plant& Machinery			
Opening bal.	120,000	Disposal	8,000
Purchases	39,000	Closing bal.	151,000
	159,000		159,000

Disposal of Plant& Machinery			
Cost	8,000	Depreciation	6,000
Gain	1,000	Cash	3,000
	9,000		9,000

Dep. Fixture			
Disposal	2,000	Opening bal.	13,000
Closing bal.	15,000	Profit& Loss A/C	4,000
	17,000		17,000

A CASE STUDY

INTEGRATED FINANCIAL AND MANAGERIAL ACCOUNTING

Raziuddin has recently returned home after spending some time overseas working for a multinational company. Whilst abroad he made regular remittances to his bank. The balance on his account stands at Rs.2,000,000 and he intends to use this sum to start a business. In the course of his travels he was very impressed by the quality and price of bamboo furniture obtainable in the Far East, and he reached the conclusion that these items would find a ready market in Pakistan. He has found a reliable supplier and plans to start trading on 1st July 2013.

Raziuddin provides you with the following information:

1. He has made arrangements to lease the premises where the furniture will be deposited until it is sold. The ten year lease involves a total outlay of Rs. 1500,000 which he will pay full at the end of June 2013. In the same month Raziuddin expect to acquire a van costing Rs.300,000 in which to transport the furniture. The van will last four years and then be valueless.
2. He will take delivery of his first consignment of stock on 1st July 2013 at a cost of Rs.600,000. further consignments of furniture, costing Rs.450,000 each, will be received at two monthly intervals commencing August 2013 payment for purchases of stock will be made in the month following delivery.
3. Raziuddin will advertise his furniture in trade catalogues and this will cost him Rs.15, 000 per month commencing July 2013.
4. Sales will be made at cost plus a markup of 100%. He estimates that sales will take place as follows:

July 2013	Zero
August- September 2013	Rs.200, 000 per month
October 2013 onward:	Rs.500, 000 per month

   Payment will be received in the month following sale.
5. Rates will amount to Rs.60, 000 per year, payable in half yearly installments on 1st April and 1st October. However, an initial payment of Rs.15,000 will be made on 1st July for the three months July- September 2013.Other operating expenses of Rs.20,000 will be paid each month; commencing July Raziuddin will make monthly drawings of Rs.70,000 also commencing July.

Required:

1. A cash budget for the twelve month to 30 June 2014 showing the cash surplus or deficit at the end of each month.
2. Cash account, sales account, purchase account, accounts payable and accounts receivable account, closing stock account, prepaid Rents, operating Expense account, depreciation expense, amortization expense, drawings accounts, capital accounts.
3. An estimated Profit and Loss for the year ended 30th June 2014.

4. A projected balance sheet as at 30 June 2014.
5. A cash flow statement for the year 30th June 2014
6. An assessment of Raziuddin proposal.

Solution: Req. 1

RAZIUDDIN
ESTIMATED STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS
FOR THE YEAR ENDED

ITEM	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Cash Balance--Beginning	2,000,000	80,000	(625,000)	(530,000)	(915,000)	(520,000)	(575,000)	(180,000)	(235,000)	160,000	75,000	470,000
Add: Cash Receipts			200,000	200,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Total Cash Available	2,000,000	80,000	(425,000)	(330,000)	(415,000)	(20,000)	(75,000)	320,000	265,000	660,000	575,000	970,000
Less: Cash Disbursements												
Lease Premises	1,500,000											
Van	300,000											
Stock		600,000		450,000		450,000		450,000		450,000		450,000
Advertisement	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Rates	15,000			30,000						30,000		
Expenses	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Drawings	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Total Disbursements	1,920,000	705,000	105,000	585,000	105,000	555,000	105,000	555,000	105,000	585,000	105,000	555,000
Cash Surplus/(Deficit)	80,000	(625,000)	(530,000)	(915,000)	(520,000)	(575,000)	(180,000)	(235,000)	160,000	75,000	470,000	415,000

Req. 2 :

SALES ACCOUNT

	AUG	200,000
	SEP	200,000
4,900,000	OCT-JUNE(500000*9)	4,500,000
4,900,000		4,900,000
	BAL B/d	4,900,000

PURCHASE ACCOUNT

600,000		
450,000		
450,000		
450,000		
450,000		
450,000		
450,000	BAL c/d	3,300,000
3,300,000		3,300,000
3,300,000		

SALES ACCOUNT

	AUG	200,000
	SEP	200,000
4,900,000	OCT-JUNE(500000*9)	4,500,000
4,900,000		4,900,000
	BAL B/d	4,900,000

PURCHASE ACCOUNT

600,000		
450,000		
450,000		
450,000		
450,000		
450,000		
450,000	BAL c/d	3,300,000
3,300,000		3,300,000
3,300,000		

CAPITAL ACCOUNT

DRAWINGS	840,000	OPENING BAL	2,000,000
		PROFIT	1,070,000
BAL C/d	2,230,000		
	3,070,000		3,070,000
		BAL B/d	2,230,000

STOCK ACCOUNT

PURCHASE	3,300,000	SALES	2,450,000
		BAL c/d	850,000
	3,300,000		3,300,000
	850,000		

PREPAID RATES ACCOUNT

RENT	15,000		
		BAL c/d	15,000
	15,000		15,000
	15,000		

DRAWINGS ACCOUNT			
CASH(7000 *12)	840,000		
		BAL c/d	840,000
	840,000		840,000
	840,000		

LEASE PREMISES ACCOUNT			
CASH	1,500,000	AMORTIZATION	150,000
		BAL c/d	1,350,000
	1,500,000		1,500,000
	1,350,000		

RATES ACCOUNT			
CASH	15,000	PROFIT & LOSS A/C	60,000
CASH	30,000	PREPAID EXPENCE	15,000
CASH	30,000		
	75,000		75,000

OPERATING EXPENSE ACCOUNT			
CASH	240,000	PROFIT & LOSS A/C	240,000
	240,000		240,000

Req. 3

RAZIUDDIN

ESTIMATED PROFIT AND LOSS STATEMENT

FOR THE YEAR ENDED 30th June 1914

	Rs.	Rs.
Sales		4,900,000
Less: Cost of Goods sold		
Purchases	3,300,000	
Closing stock	(850,000)	(2,450,000)
Gross Profit		2,450,000
Less: Operating Expenses		
Lease Amortization	150,000	
Depreciation Expense-- Van	75,000	
Advertising Expense	180,000	
Rates	60,000	
Total operating expenses	240,000	(705,000)
Net Profit		1,745,000

Req. 4

RAZIUDDIN

ESTIMATED BALANCE SHEET AS ON 3oth June 2014

ASSETS				LIABILITIES AND CAPITAL		
CURRENT ASSETS		Rs.	Rs.	**CURRENT LIABILITIES**		Rs.
Inventories		850,000		Accounts payable		450,000
Accounts Receivables		500,000		**OWNER'S EQUITY**		
Cash at bank		415,000		Capital	2,000,000	
Prepaid rates		15,000	1,780,000	Add: Profit	1,745,000	
FIXED ASSETS					3,745,000	
Van	300,000			Less: Drawings	(840,000)	2,905,000
Less: Accumulated Depreciation	(75,000)	225,000				
Lease Property	1,500,000					
Less: Amortization	(150,000)	1,350,000	1,575,000			
Total Assets			3,355,000	Total liabilities and owner's equity		3,355,000

Req. 5

RAZIUDDIN
CASH FLOW STATEMENT
FOR THE YEAR ENDED

	Rs.	Rs.
CASH FLOWS FROM OPERATING ACTIVITIES		
Net Profit	1,745,000	
Depreciation	75,000	
Amortization	150,000	
Prepayments	(15,000)	
Increase in Accounts receivables	(500,000)	
Increase in inventories	(850,000)	
increase in accounts payables	450,000	
CASH INFLOWS FROM OPERATING ACTIVITIES		1,055,000

CASH FLOWS FROM INVESTING ACTIVITIES

Purchase of Van	300,000	
Purchase of premises	1,500,000	
CASH OUTFLOWS FROM INVESTING ACTIVITIES		(1,800,000)

CASH FLOWS FROM FINANCING ACTIVITIES

Capital	2,000,000	
Drawings	(840,000)	
CASH INFLOWS FROM FINANCING ACTIVITIES		1,160,000
NET CASH INFLOW FOR THE YEAR		415,000

WORKINGS

LEASE AMORTIZATION

1500000/10	150,000

DEPRICIATION

VAN

300000/4	75000 PER YEAR

MARKETING EXP

15000*12	180,000

PURCHASE

JULY	600,000
AUG	450,000
OCT	450,000
DEC	450,000
FEB	450,000
APRIL	450,000
JUNE	450,000
	3,300,000

SALES

AUG-SEP

OCT- JUNE = Rs. 500000 * 9

RATES

PREPAYMENTS

5000*3 =15000

OPERATING EXP

20000 * 12 =240000

DRAWINGS

70000 *12 = 840000

COST

=Rs. 400000 *.50	200,000
=45000000 *.50	2,250,000
4,900,000	2,450,000

Req. 6

RAZIUDDIN

EVALUATION OF PROPOSAL

PROFITABILITY RATIOS

1. **ROI**
   PROFIT /CAPITAL * 100
   =1745000/2000000 *100 = 87.25%

2. **PROFIT MARGIN**
   PROFIT/SALES *100
   = 1745000/490000 *100 =35.61%

LIQUIDITY RATIOS

1. **CURRENT RATIO**
   CURRENT ASSETS/CURRENT LIABILITIES
   = 1780000/450000 = 3.95

2. **QUICK RATIO**
   LIQUID ASSETS/ CURRENT LIABILITES
   = 930000/450000 = 2.06

WORKING CAPITAL CYCLE

1	*INVENTORY AGE*	INVENTORY /COGS *365 DAYS	***DAYS***
	(STOCK HOLDING PERIOD)		
		=850000/2450000 *365	127
2	*RECEIVABLE AGE*		
	(COLLECTION PERIOD)	RECEIVABLE /SALES*365 DAYS	
		=500000/4900000 *365	37
		OPERATING CYCLE	164
3	*PAYABLE AGE*		
	(PAYMENT PERIOD)	PAYABLES/PURCHASES *365 DAYS	
		= 450000/3300000 *365	(50)
		WORKING CAPITAL CYCLE	114

The proposal is worthwhile if we look profitability, liquidity, assets efficiency ratio.

An Assessment of Raziuddin's Proposal

The projected balance sheet along with estimated cash flows and accounting ratios apparently suggest that Raziuddin has found out a very profitable project.

At the same time he should once again reconfirm the availability of market for his imported furniture.

Although the projected financial information strongly suggests for a " go ahead" with this project, Raziuddin should also consider non-financial factors like Pakistan's security situation.

CHAPTER

12

EMERGING ISSUES IN MANAGERIAL ACCOUNTING

Activity Based Management

Emerging issues in management accounting

- To compete successfully in today's highly competitive global environment, companies have made customer satisfaction an overriding priority. They have also adopted new management approaches, changed their manufacturing systems and invested in new technologies. The increasing competition has squeezed the margins and more attention is required to be paid to the various aspects of cost management.

Management accounting – strategic management accounting

- It is not only management accounting but it should be strategic management accounting.
- CIMA defines ''A form of management in which emphasis is placed on information which relates the factors external to the firm, as well as non-financial information and internally generated information.''

Role of management accountant

- A good management accountant must be a business advisor and not just policeman. He or she must understand organisation's strategy, help to solve problems, and function as an effective member of cross-functional team.
- The presence of genetic, nanotechnology and robotics, the powerful 21st century innovations entail new challenges for the management accountant in the future.
- He has to address not only real concerns but also the perceived concerns,, described to include timeliness and trust worthiness
- Management accountant will be fully participating members of the management team, playing a pivotal role in achievement of business objectives by expertise and diversified knowledge.

Management audit

- A systematic assessment of methods and policies of an organisation's management in the administration and the use of resources, tactical and strategic planning and employee organisational improvement.
- The objectives of management audit are:
    1. Establish the current level of effectiveness.
    2. Suggest improvements.
    3. Lay down standards for future performance
- He does not appraise individual performance, but may critically evaluate the senior executives as a management team.

Activity-based management

Initially companies switched from traditional absorption costing to ABC in order to produce more accurate cost information for products. The managers in some of these companies were surprised by the information revealed, because it gave them a different perspective of the build-up

of costs. This led them to adjust their pricing policies and to develop different product strategies, as they found that previously high volume, long production run products had been over-costed and low volume, short production run products under-costed. (Total absorption costing averages batch costs, such as set-up, over all products rather than relating them to the batch.)

To summarise, ABC is particularly needed by organization for product costing where:

- production overheads are high in relation to direct costs;
- there is a great diversity in the product range;
- products use very different amounts of the overhead resources;
- consumption of overhead resources primarily driven by volume.

But if ABC is only considered to be a more detailed and accurate overhead absorption costing system many organization may decide to do with it. Many organizations use a sophisticated 'full cost' absorption method and so they have not found it necessary to change to an ABC system.

In the organization overhead are usually charged to auxiliary cost centres as well as main cost centers. The auxiliary cost centres are in turn charged to the main cost centres. From the main cost centres the overheads are charged to product.

This is not dissimilar to a full traditional absorption costing system use in the Pakistan which uses service or indirect cost Centres (such a maintenance) that are than charged in their turn to the direct cost centres. Advocate of using ABC for accurate overhead apportionment usually compare the ABC technique with the most basic traditional absorption costing system where one blanket overhead rate is applied. The then argue that ABC provides more accurate results which, under those circumstances, it is bound to do. Using a blanket rate is not normal even in the UK and so the benefit of ABC will not be as great as they make out. Indeed there may b no benefit at all as far as product costing is concerned.

However, organization that have switched to ABC have found other benefit that fall under the heading of activity-based management (ABM), and it is in this area that the real benefit of ABC often lies. It produces another way of viewing the organization and is like looking at organization from and other perspective.

CIMA's Official Technology defines ABM as a 'system of management which uses activity-based cost information for a variety of purposes including cost reduction, cost modeling and customer profitability analysis'. ABM uses the basic information provided by an ABC analysis to help managers to ensure that customer needs are satisfied with the minimum use of organizational resources.

ABM measures the effectiveness of key activities by identifying how activity cost can be reduced and value to customers can be increased. It also focuses management's attention on key value-adding activity, key customer and key products in order to maintain or increase competitive advantage.

There are three main benefits that will discuss in detail in the following sections:

- Cost management activities.
- The ability to cost objects other than products, for example, customers.
- Strategic activity management.

ABC information can be used in an ABM system to assist strategic decisions, such as:

- Whether to continue with a particular activity.
- The effect on cost structure of change in strategy, e.g. from mass production to smaller lots.
- How changes in activities and components affect the suppliers and the value chain.

The value chain is simply a large activity map for the organization and its position in the industry chain. The chart in Figure 10.3 is a modified version of Porter's generic value chain. It consists of the main activities both primary (which should add value) and support (potentially non-value-adding unless they aid the primary activities to created more value-added). The organization's value chain can be linked with other organization's value chains to from an industry value chain.

Problems with implementing ABC

Much has been written in academic journals of the benefits of using ABC and ABM. The majority of organizations still do not use either. Why, if the majority of academics consider it to be so useful, do practitioners not employ ABC? The obvious reason is that they do not agree on its usefulness or cot effectiveness in terms of costs and benefits. For ABC to be effective an accurate system is required with as many as 50 different activities identified and costs attributed to them. This requires considerable time and effort.

A certain amount of research has focused on the problems of implementing the system. These have suggested reasons why some organizations have pilot schemes that are then not proceeded with. Friedman and Lyne (1999) provide some clues as to why it has not been taken up with more enthusiasm from case study research they carried out. Some reasons they draw attention to are:

- Where it was devised for a single project that was not taken up the system got dropped as well. As communication between business units in large organization is often not very good, the work was not developed further by other units.
- Finance department opposed its implementation. Often finance staffs appear less than dynamic and unable to perceive the needs of the production staff.
- General ledger information too poor to provide reliable ABC information. The resulting figures would have been no better than traditional absorption methods.

Of course, if organizations do not have reliable ABC information then they also forgo the cost management advantages of an ABM system. Since ABC provides the basic building blocks of activities, without ABC there can be no ABM.

In he first analyses, the cost driver rates do not give an accurate reflection of the resource consumption implications of performing particular activities, as they contain an arbitrary allocation of factory management costs. The second analysis provides costs driver rates that do reflect truly the long-run costs of performing particular activities. This information may be useful to management in identifying cost reduction opportunities, as well as for product costing purposes.

Tool of the trade

Stephanie Gourdie,

- Get the support of senior management.
- Recognise that ABM requires a major investment in time and resources
- Know what ABM can achieve and what information you want from the system
- Decide which model to use
- Choose the model approach that emphasises the operational understanding of all activities in the business
- Involve people in the field
- Transfer ownership of cost management from the accounts department to the department and processes where costs are incurred
- Don't underestimate the need to manage the change process
- Link ABM to corporate objectives in the form of increased product profitability and added value for customers.

Since professors Robin Cooper and Robert Kaplan codified and developed activity-based costing (ABC)[1], many organizations have implemented it, but few are using it for cost management. The original emphasis of ABC was on developing more accurate product costs. It was based on the principle that resource-consuming activities caused costs, not volume of products, as assumed by traditional cost-allocation methods. Overhead costs were allocated and traced back to activities that consumed resources, such as purchasing, set-ups and material handling.

A cost driver was then selected for each activity centre. The choice of drive was based on two things: it had to measure the resources a product used for a particular set of activities; and it had to be linked to the changes of costs in the activity centre (a cause-effect relationship).

Cost drivers can include the number of purchase orders, material movements or set-up hours. The overhead rate for each activity was worked out by dividing the activity cost by the capacity of the cost driver. The costs of products were determined by multiplying the number of the cost driver of the activity used by the product, by the overhead rate for that activity, for all activities used by that product.

ABC system could then be applied to cost management. This was labelled activity-based management (ABM), defined by Don Hansen and Maryanne Mowen[2] as 'a system-wide, integrated approach that focuses management's attention on activities with the objective of improving customer value and the profit achieved by providing this value'.

The progress to ABM involved a shift in focus from the original ABC system – producing information on activity-based product costs – to producing information to improve management of processes. The idea is to analyse the activities that make up a company's processes and the cost drivers of those activities, then question why the activities are being carried out and how well they are being performed. ABM provides the activity information and the cost of inefficient activities, and quantifies the benefits of continuous improvements.

Companies can then improve operations by reengineering (complete redesign of processes), redesigning plant layouts, using common parts, outsourcing or strengthening supplier and customer relationships and developing alternative product designs.

ABM required a major investment in time and resources. Apart from the cost of the software, staff had to be taken away from their existing jobs and trained to set up and use the ABM system.

- Activity-based costing can also be used to identify activities that would benefit from process improvements. Indeed, this is the most widely cited benefit of activity-based costing is often called activity-based management.
- Basically, activity-based management involves focusing on activities to eliminate waste, decrease processing time, and reduce defects.
- Activity-based management is used in organizations as diverse as manufacturing companies, hospitals, and organization involves in storing, collecting and moving information, there is obviously a great deal of room for eliminating waste.

A B M

- ABM as a system of management which uses activity based information for variety of purposes including, cost reduction, cost modeling, and customer profitability analysis.
- ABM uses the basic information provided by ABC analysis to help managers to ensure that customer needs are satisfied with the use of minimum organisation resources .ABM measures the effectiveness of key activities by identifying how costs can be reduce and value to customer can increased.

It also focuses management's attention on key value added activities, key customers and key products in order to maintain or increase competitive advantage.

INTERFACING: ABM showed that more than 25% of human resources were not adding value.

Cost Control		**Cost Reduction**
(i)	This process undertakes the competitive analysis of actual results with established norms.	T his process finding new ways or methods.
(ii)	Under this process, the variances are appraised and reported and necessary course of action will be taken to revise norms, standards etc.	Under this process necessary steps are taken for further modification in the method.
(iii)	It starts from established cost standards and attempts to keep the cost of operation of a process in line with those standards.	It challenges the standards forth-with and attempts to reduce cost on a continuous basis.
(iv)	The main stress is on the present and past behavior of cost.	The emphasis is partly on the present cost and largely on future cost.

(v)	It has limited applicability to those items of cost for which standards have already been set. The items for which standards are set mainly relate to productive operations.	It is universally applicable. It should be applied to every area of the business. It does not depend on standards, though target amounts may be set.
(vi)	It attempts to achieve the best possible results at the least cost under given condition.	Under this no condition is considered to be permanent where a change will secure a lowest cost figure.
(vii)	Cost control is a preventive function. Costs are optimized before they are incurred.	Cost reduction is a corrective function. It operates even when efficient cost control system exists. There is room for reduction in the achieved cost.
(viii)	Cost control sometimes lacks dynamic approach.	It is continuous process of analysis by various methods of all the factors affecting costs, efforts and functions in an organization. The main aim is to have continuous economy in costs.

Conclusion

- ABC involves indentifying major activities that take place in the organization, assigning costs to cost pools/cost centers for each activity, determining cost drivers for each major activity and finally assigning activity costs to products.
- ABM is a method of management decision –making that use the ABC information to improve customer satisfaction and profitability. Decision about pricing and product mix, reduction of costs and improvement of processes and products designs.

LEARNING CURVE

The nature of the learning curve

Learning curve. The mathematical expression of the phenomenon that, when complex and labour-intensive procedures are repeated, unit labour times tend to decrease at a constant rate. The learning curve models mathematically this reduction in unit production time.

The reorganization of the so-called learning curve phenomenon stems from the experience of air craft manufactures, such as Boeing, during the Second World War. They observed that the time taken to assemble an individual aircraft declined as the number of aircraft assembled increased: as workers gained experience of the process, their proficiency, and hence speed of working, increased. The 'learning' gained on the assembly of one plane was translated into the faster assembly of the next. The actual time taken by the assembly workers was monitored, and it was discovered that the rate at which the learning took place was I.

The learning curve

In practice, it is often found that the resources required to produce given amount of a product tend to decline as output accumulates. It costs more to produce that first unit of a product than it does to produce the one thousandth unit. Various factors contribute to this relating to labour, material and overheads costs. One significant element in this is the learning curve effect.

The learning curve relates to the observed tendency for workers to become more adept at a task the more times they perform it

Benefits of learning curve

Improved capacity planning, improved costing, change in product / process design

It was found that the cumulative average time per unit decreased by a fixed percentage each time the cumulative production doubled. In the aircraft industry, the percentage by which the cumulative average time per unit declined was typically 80 percent. For other industries, other rates may be appropriate. Further, the unit of measurement may more sensibly be taken as a batch of product, rather than as an individual unit. This does not, of course, affect the underlying principle.

Let us take as an example a learning rate of 90 percent. In this case, if the first batch of a product is produced in 100 hours, the cumulative average time taken produce two batches (a doubling of the cumulative production) would be 90 hours, giving a total production time of 2 x 90 = 180 hours. The actual time taken to produce the second batch (the batch being the unit of measuring in this case) would thus be 80 hours, the cumulative.

Total time taken to produce two batches – 180 hours – less the time taken to produce the first batch – 100 hours. As a doubling of cumulative production is required, in order to observe the benefit of learning in the form of reduced average labour hours per unit of cumulative production, it will be appreciated that the effects of the learning rate on labour time will become much less significant as production increases.

The learning percentage is usually somewhere between 70 percent and 85 percent. The more complicated the product the steeper the learning curve will be. For example, research on

Japanese motorbikes found that the small 50cc bikes had a learning curve of 88 percent, the 50-125cc bikes, one of 80 percent and the 250cc bikes, one of 76 percent.

Table 1 illustrates how a 90 percent learning curve works, as units are doubled from 1 to 2, to 4, to 8.

In constructing Table 1, it was assumed that we already knew the learning rate that applied to this particular situation. However, it must be appreciated that, in the real world, this rate can only be established by observation. Records must be kept of the number of units/batches produced and the associated time taken, in order to construct the table.

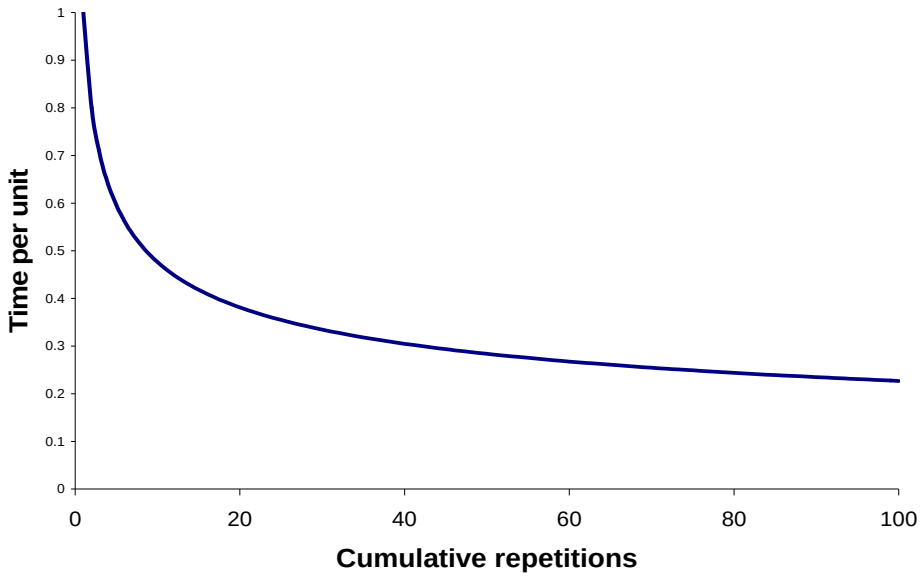
Cumulative average time learning rate: 0.90		
Batches	**Cumulative average time per batch (hours)**	**Cumulative total (hours)**
1	100.00	100
2	90.00	180
4	81.00	324
8	72.90	583
16	65.61	1,050
32	59.05	1,890
64	53.14	3,401
128	47.8.	6,122
256	43.05	11,021
512	38.74	19,835

Uses of the learning curve

(i) In circumstances where the learning curve is likely to operate, that is, in complex assembly operations, knowledge of the rate of learning can help in price setting.

(ii) When setting budgets, the effects of the learning curve should be taken into account. Standard cost should reflect the point that has been reached on the learning curve, so that those set on the basis of the ‘steady state’

(iii) The learning curve has been found to be particularly useful in determining the likely costs to be incurred in fulfilling government contracts. This provides a rational basis for price negotiation and cost control.



Learning Curve Formula

$Y = ax^b$

Y = Cumulative Average Time Taken Per Unit
a = Time Taken for the First Unit
x = Trial Number of Units
b = Index for Learning

<u>80% Learning Curve</u>

Where,

b = The Log of Learning / Log of 2
= Log 0.80/Log 2 = - 0.969/0.3010 = - 0.32193

If learning is 90% then
= Log 0.90/Log 2 = -0.0458/0.3010 = -0.152

If learning is 85% then
Log 85% = -0.0706/0.3010 = -0.2345

<u>Index</u>

80% = - 0.3219
90% = - 0.152
85% = - 0.2345

A number of points about learning curves must be stressed:

(i) Learning curves chart the reduction in time per units as experience is gained; they do not measure a reduction in cost per se. However, if hourly wages are constant, the labor cost per unit will decline as a result of the learning curve phenomenon.

(ii) In addition to direct labor costs, only those costs that are directly related to direct labor time, that is, any overheads that vary directly with those hours can be expected to decline as a result of the learning curve.

(iii) Learning is likely to be greatest in complex assembly environments, of which aircraft assembly is a prime example. If labor is working in a machine-paced environment, there in terms of direct labor time cannot exist. However, the experience that plant managers gain in scheduling work in such an environment may result in a reduction in the direct labor hours required for a given level of production.

(iv) The learning rate, which is a function of worker's learning, is not something which can be positively as a cost-reduction technique

(v) Learning is often assumed to be automatic and just volume related, but it is not that simple, learning is not a matter of law, it is achieved by focusing attention on,, striving for ,improved performance

(vi) Two organizations with identical staff and resources would not necessarily achieve the same amount of learning, as management's attitude and organization culture create learning.

Question: 1

- Amir ltd. finds that new production is affected by an 80% learning curve. The company has just completed 5,000 units at 10,000 hours, per unit hours required 2.
- The costs of producing 5,000 units were as:
- Direct material 5,000 units @ RS.20 per unit, Direct labor 10,000hours @ Rs. 8 per unit variable overheads 10,000 hours @ Rs 2 per unit

Question: 1 cont:

- The company has just received an order for another 5,000 units. Management wants to add a 50% markup to the cost of material, labor and overheads.
- Required:
- Compute the price to be charged to the order.

Answer: 1

- Under 80% learning curve, if the output is doubled the time required to produce one unit will reduce to 80%. Therefore for each unit will require 2 hours X 80% =1.6 hours.
- The total hours for 10,000 units will be 10,000 units X1.6 hour =16,000 hours therefore for the order of 5,000 units will be the difference of 16,000- 10,000 =6,000 hours

Answer: 1 cont:

- Cost of order:
- Material 5000 units X Rs. 20 Rs.100,000
- Labor 6000 hours X Rs. 8 Rs. 48,000
- Variable overheads 6000 hoursXRS.2 Rs.12000

Total cost Rs.160, 000

Markup 50% of total cost	Rs. 80,000
The price to be charged	Rs.240.000

Question: 2

Find out the time taken to produce 12^{th} units if the learning curve is 85%;

Unit	85%	Per unit	Cumulative
1.	1.0000	10	10
2.	0.8500	8.5	26.23
3.	0.7729	7.73	33.45
4.	0.7225	7.23	33.45
5.	0.6857	6.86	40.31
6.	0.6570	6.57	46.88
7.	0.6337	6.34	53.22
9.	.5974	5.97	65.33
10.	.5828	5.83	76.86
11.	.5699	5.70	76.86
12.	.5584	5.58	82.44

Solution:2

12^{th} unit require 5.58 hours and total 12 units will require 82.44 hours.

using equation=b=in(.85)/ln(2)=-.234

T12=10(12)-0234=5.58 hours

Question: 3

Champion Limited a renowned name in office furniture, as a result of its diversification strategy, has just planned to produce a state of the art fishing boats. The cost and sales price of the first fishing boat to be produced has been estimated as follows:

	Rs.
Materials	25,000
Labour (800 hours x Rs. 25 per hour)	20,000
Overhead (150% of labour cost)	30,000
	75,000
Profit mark-up (20%)	15,000
Sales price	90,000

It has been decided to sell all the fishing boats at full cost plus 20%. An 80% learning curve is expected to apply to the production work. Only one customer is interested in buying the fishing boat so far, but he thinks Rs. 90,000 is too high a price to pay and raises a few queries. You, as management accountant, is required to answer the following questions of the customer:

(a) If he paid Rs. 90,000 for the first fishing boat, what price would he have to pay later for a second fishing boat?

(b) Could Champions Limited quote the same unit price for two boats, if the customer ordered two boats at the same time?

(c) If the customer bought two fishing boats now at one price, what would be the price per unit for a third and fourth boat, provided that he ordered them both together later on?

(d) Could Champion Limited quote a single unit price for the following numbers of boats, if they were all ordered now?

  (i) Four boats

  (ii) Eight boats

Required:

Assuming there are no other prospective customers for the fishing boat, how would the questions are to be answered?

Answer: 3

Number of Boats		Cumulative average time per Boat	Total time for all Boats	Incremental time for additional Boats	
		Hours	Hours	Hours	
1		800.0	800.0		
2	(x 80%)	640.0 (x 2)	1,280.0	(1,280 – 800)	480.0
4	(x 80%)	512.0 (x 4)	2,048.0	(2,048 – 1,280)	768.0
8	(x 80%)	409.0 (x 8)	3,276.8	(3,276.8 – 2,048)	1,228.8

(a) Separate piece for a second Boat:

	Rs.
Materials	25,000
Labour (480 hrs x Rs. 25)	12,000
Overhead (150% of labour cost)	18,000
Total cost	55,000
Profit (20%)	11,000
Sales price	66,000

(b) A single price for the first two Boats:

	Rs.
Materials cost for two Boats	50,000
Labour (1,280 hrs x Rs. 25)	32,000
Overhead (150% of labour cost)	48,000
Total cost for two Boats	130,000
Profit (20%)	26,000
Total sales price for two Boats	156,000
Price per Boat (+ 2)	78,000

(c) A price for the third and fourth Boats:

	Rs.
Materials cost for two Boats	50,000
Labour (768 hrs x Rs. 25)	19,200
Overhead (150% of labour cost)	28,800
Total cost	98,000
Profit (20%)	19,600
Total sales price for two Boats	117,600
Price per Boat (+ 2)	58,800

(d) A price for the first four Boats together and for the first eight Boats together:

		First four Boats		First eight Boats
		Rs.		Rs.
Materials		100,000		200,000
Labour	(2 048 hrs)	51 200	(3 276.8 hrs)	81,920
Overhead	(150% of labour cost)	76,800	(150% of labor cost)	122,880
Total cost		228,000		404,800
Profit (20%)		45,600		80,960
Total sales amount		273,600		485,760
Boats sold		4		8
Price per Boat		68,400		60,720

LIFE CYCLE COSTING

Life cycle costing can apply to products, services, customers, projects or assets and, as its name implies, it costs the cost object over its projected life. The aim is to adopt a policy which will maximize the return over the cost object's total life. To a certain extent capital budgeting attempts to do this but often a project's complete life is not casted as a cut-off time is used. For example, any inflows after year 5 or 10 are ignored because they are assumed to be too uncertain or insignificant. More importantly, normal capital budgeting techniques simply project expected costs and revenues in order to make an assessment of profitability in advance of the project. They do not attempt to maximize profit by minimizing costs and maximizing revenues over the life cycle by applying planning and control techniques.

This deliberate attempt to maximize profitability is the key to life cycle costing. Projecting costs and revenues over the cost object's life span runs counter to traditional accounting, which chops up costs and revenue into time periods - a month, a year, etc. This prevents consideration of the total profitability of an individual product or service and does not allow the total picture to be seen. If a snapshot is taken on one particular day, an organization will have a number of different projects, products, customers, etc., all of which have different life spans.

Products life cycle costs are incurred for products and services right from design stage through development to product launch, production and sales and eventual withdrawal of product from the market. Life cycle costing estimates and accumulates costs over a product’s entire life cycle

The importance of life cycle costing lies in the consideration of the whole life cycle. When viewed as a whole cost reduction and minimization opportunities as well as revenue extension opportunities will present themselves. These are unlikely to be found when management is focusing on maximizing profit on a period-by-period basis. The old adage, time is money, still holds true. The management of time is particularly important in life cycle costing if profit is to be maximized. An increase in time during the development stage causes an increase in cost or a decrease in revenue, which in turn causes a reduction in profit. Time is often the causal factor of a reduction in profit whereas an increase in costs is merely the effect or result of an increase in time.

All products have a life cycle chart that looks something like In reality the time span may be only a few months or years, as in the case of novelty products and toys, or it may last for more than 100 years, as in the case of products such as binoculars and marmite. Figure 12.10 shows a product that has a research and development stage prior to the commencement of production in year 4 when revenues begin to be generated. Losses are incurred initially, followed by a profit that gradually tapers off once the product enters its maturity stage.

A product that has several different life cycles; the original life cycle has been extended because the organization found new uses for the product. One of the classic examples of this is the manufacture of nylon, which was developed just before the Second World War. Its first use was in parachutes for the armed forces, its next use was in ladies' stockings, and this was followed by car tyres, carpets and clothes.

Target Costing

- TARGET COSTING is actually working backwards to find out the target cost, which a firm should be able to achieve.
- First stage is to determine the target price
- Second stage is determine profit margin
- Final stage the target profit margin is deducted from target selling price to determine the target cost.

Target costing

- If the estimated actual cost exceeds the target cost, investigate the ways and means of cost reduction.
- Target costing is used where the prices are controlled by the government, in consumer goods manufacturing where competition is severe.
- The major advantage of target costing is that it is deployed during a product's design and planning stage. Value engineering techniques are highly useful in implementing target costing.

Question: 1

a) Costing systems attempt to explain how products consume resources but do not indicate the joint benefits of having multiple products.

Requirements:

Explain the statement above and discuss

i. How the addition of a new product to the product range may affect the 'cost' of existing products'

ii. The consequences, in terms of total profitability, of decisions to increase / decrease the product range.

Question: 1 cont:

b. Telemat is a company that manufactures mobile phones. This market is extremely volatile and competitive and achieving adequate product profitability is extremely important. Telmat is a mature company that has been producing electronic equipment for many years and has all the costing systems in place that one would expect in such a company. These include a comprehensive overhead absorption system, annual budgets and monthly variance reports and the balanced scorecard for performance measurement.

The company is considering introducing:

(i) Target costing; and
(ii) Life cycle costing systems.

Requirement:

Discuss the advantage (or otherwise) that this specific company is likely to gain from these two systems.

Answer: 1

a. There are a variety of different costing systems and they all attempt, to a greater or lesser extent, to inform management on the way in which products consume resources. For example, marginal costing relates only variable costs to products. Throughput accounting is a similar technique that focuses on how products use scarce resources. ABC is probably the technique which endeavors to provide the most accurate results by relating costs to activities/resources.

i. The effect of the addition of a new product on the 'cost' of existing products

The total cost of some types of activity/resource depends on the number of batches put through production. Such activities include, for example, machine set up. If long production runs are used, set-up costs will be less than if many short production runs are used. The same applies to the number of different products manufactured. If only one product is made set-up costs will not be incurred. Two products create the cost and three increase it, and so on. Thus, some resource costs will increase if a company manufactures multiple products. On the other hand, there are a number of benefits from manufacturing a number of products that need to be considered. They are:

- An additional product may help smooth out production peaks and trough caused by economic or seasonal fluctuations.
- Distribution and marketing channels can be used more fully bringing down the cost per unit'
- If a company making a range of products creates a brand name, it can be used to launch a new product more cheaply than if the new product more cheaply than if the new product was made by a single product company set up for the purpose.

ii. The effect on total profit if the product range is increased / decreased

All costs (production, distribution, research, marketing and so on) must be considered when making decisions on whether or not to expand the product range Some companies focus on production costs and so, as a consequence, could over look cost education benefits gained on the marketing side if another product is added. A full product range is almost always an advantage on the marketing side. For example, a brand name for a range of products creates joint benefits for that range of products. The effect of brand names is difficult to measure and could be ignored if only 'hard' costs and benefits are included when making a decision.

Sometimes a full product range is necessary to attract customers - such as a company supplying plumbing pipes and joints, and so on. If one product is withdrawn, because the costing system shows it to be unprofitable, customers may switch to another supplier and the organization's overall profit may go down as a result.

b. The modern business environment tends to be an unstable one and is rapidly changing in terms of customer requirements, economic factors, technology, and so on. Telmat is in a particularly unstable business because technology is changing rapidly as digital telephones take over and text messaging develops. Both target costing and life cycle costing are systems

which should help the company cope with this. These systems should help Telmat to compete in terms of cost and product development in the competitive telecommunications market.

Their specific advantages are as follows:

i. Target Costing

Target costing may replace, and is often compared with, traditional standard costing / variance analysis which has long been in place in the West. Telmat may wish to replace standard costing/variance analysis with target costing for cost control and reduction for the following reasons:

- It puts pressure on cost- it can be used as a cost reduction technique unlike standard costing and can incorporate a learning effect. This is likely to be important in the manufacture of phones.
- Traditional standards may be too rigid for cost control and reduction purposes for a company such as Telmat as they usually need to be set for a year at a time. Target costing is more flexible and targets can change/reduce from month to month.
- It considers the market and the price customers are prepared to pay'- so it forces an organisation to be outward rather than inward looking. Telmat needs to consider the final customer as well as the system supplier. (Standard costing tends to focus on internal costs.)
- It should motivate staff if used correctly and help break down any artificial functional barriers as it involves staff at all levels and in most functions and forces them to communicate
- It leads towards the use of other techniques, such as value analysis and value engineering, which should simplify production methods and reduce cost. This is particularly important in an industry with short product life cycles.

ii. Life cycle costing

- The life cycle of Telmat’s products is likely to be short because of changing technology; therefore it is vital that the products begin to generate profits quickly. Estimating life cycle costs and revenues will highlight this.
- Research and development costs are like' to be quite high and must be recovered in a short period.
- Many Telmat's costs are likely to be 'locked in' during the design stage, say 80-90 per cent, so it is important to control costs initially in order to maximize the profit over the product's life.
- It focuses on the time as well as money. Time to market is often a key factor in generating profit. It is often more important to measure time than money/cost. It may be vital for Telmat to bring new products to market quickly and on time in order to achieve a profit.
- Monitoring of costs and benefits over the life cycle helps to stop a project early if events have changed or not turned out as planned.
- It presents a different perspective that could be advantageous to Telmat as it is not tied to periodic reporting.

Because of the above it would be advantageous for the company to adopt both of these techniques.

Target Costing

- Target costing originated in Japan in the 1960.
- Target costing is an activity which aimed at reducing the life-cycle costs of new products, while ensuring quality, reliability, and other customer requirements, by examining all possible ideas for cost reduction at the product planning, research and development, and the prototyping phases of production.
- It is a part of a comprehensive strategic profit management system.

Question: 2(a)

A company operates a throughput accounting system. The details of product A per unit are:

Selling price	£24.99
Material cost	£8.87
Conversion costs	£12.27
Time on bottleneck resource	6.5 minutes

Calculate contribution per hour for Product A:

Question: 2(b)

A company produces two products, A and B, which pass through two production processes, J and K. The time taken to make each product in each process is:

	Product A	**Product B**
Process **J**	6.5 minutes	9 minutes
Process K	22 minutes	15 minutes

The company operates a 16-hour day and the processes have an average downtime each day of:

Process **J**	2.5 hours
Process **K**	2 hours

Answer: 2 (a):

SP – Material Cost / Bottleneck resources

= (24.99 – 8.87) / 6.5 x 60

= 148.8 per hrs.

Answer: (b):

	Product A	**Product B**
Throughput of J per day	13.5 hours x 60/6.5 = 124.62	13.5 hours x 60/9 = 90
Throughput of K per day	14 hours x 60/22 = 38.18	14 hours x 60/15 = 56

So process K is the bottleneck for both products

Contribution per hour of product A = £87.50 – 15.00 = £72.50 x 60 ÷ 22 = £197.73

Contribution per hour of product B = £72.50 – 15.00 = £57.50 x 60 ÷ 15 = £230.00

Processing product B will give the larger contribution per day = 56 units

Question: 3

The selling price of product Z is set at £250 for each unit and sales for the coming year are expected to be 500 units.

If the company requires a return of 15% in the coming year on its investment of £250,000 in product Z, the target cost for each for the coming year is;

Answer: 3

Sales revenue 500 units @ £250	125,000
Return on investment required 15% x £250,000	37,500
Total cost allowed	87,500
Target cost per unit	£175

Question: 4

(a) Define the term “throughput time “

(b) a company keeps careful track of time relating to orders and their production. During the month 0f May 2012, the f0llowing times were recorded to each order:

- Wait time,17 days. inspection time 0.5 days, move time 0.5 days, process time. 2 days, queue time 5 days.
- Compute: Throughput time, manufacturing cycle efficiency, % of non value added time, delivery cycle time.

Answer: 4

- Throughput time is the average amount of time required to convert the raw material into finished goods ready to be shipped to the customers.
- Throughput time=inspection time+ move time+ process time+ queue time;.0.5+0.5+2+5=8 days
- Manufacturing cycle efficiency=2/8*100= 25%
- % of non value added time=100% -25% =75%
- Delivery cycle time=wait time+ throughput time=17+8= 25 days

The costs and revenue for each unit of each product are:

	Product A	**Product B**
	£	£
Direct Materials	15.00	15.00
Direct Labour	17.00	12.00
Variable overhead	8.00	6.00
Fixed costs	8.0	6.00
Total cost	48.00	39.00
Selling price	87.50	72.50

Sales demand restricts the output of A and B to 40 and 60 unit a day, respectively. Calculate the daily production plan would maximise the throughput contribution.

PULL SYSTEM JUST-IN-TIME (JIT)

Pull systems

Just–in-time (JIT)

Organizations in the West have traditionally used a ‘push’ production flow system. This system has the following stages:

1. Buy raw material and put them into stock.
2. Produce a production schedule based on sales forecasts.
3. Withdraw goods from stock and make products according to the production schedule.
4. Put completed units into finished goods store.
5. Sell from finished goods store when customers request products.

Toyota develops a different system known as just-in-time (JIT). This system is not a ‘push’ system but a ‘pull’ system. A product is not ‘made’ until the customer requests it and components are not made until they are required by the next production stage. In a full JIT system virtually no Stock is held, that is no raw material stock and no finished goods stock is held, but there will be a small amount of work-in-progress, say one-tenth of a day’s production. The system works by the customer triggering the final stage of production, the assembly. As the product is assembled components are used and this in turn triggers the component stage of production and a small amount o work-in-progress is made ready for the next product. So the cycle goes on unit the final trigger requests more raw material from the supplier.

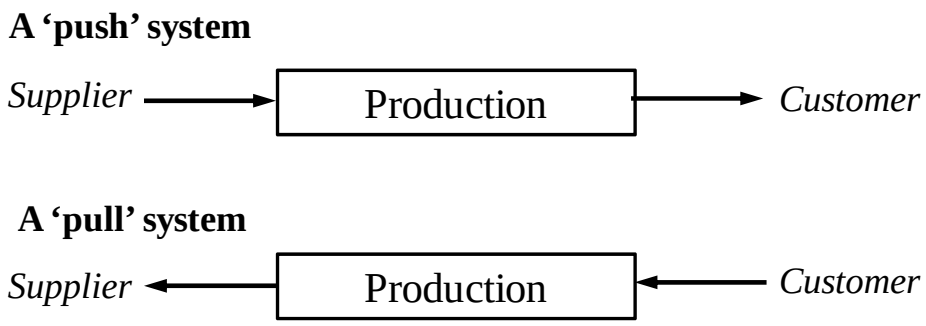
If a JIT system is to work satisfactorily suppliers must deliver several times a day and do when the raw material arrives it may go straight into the factory and be used immediately. This means that the production lead-time (i.e. the time from raw materials entering production to the finished goods emerging) should equal the processing time. In many Western organization in the past it took several months to make a product from start to finish, despite the fact that if worked on continuously it could be

made in, say, two days. The difference in time is largely due to work-in-progress waiting to be used in the next process. For example, Morgan cars made just nine cars a week in the mid-1980s but each car took several months to make from start to finish.

JIT requires the following:

- The labour force must be versatile so that they can perform any job within reason to keep production flowing as required.
- Production processes must be grouped by product line rather than by function in order to eliminate stock movements between workstations and to speed flow.
- A simple, infallible information system. Originally the Japanese used a system based on cards which were called kanbans. There would be a small container of components (WIP)

- JIT is a system whose objective is to produce or procure products or components as they are required.



Pull and push systems

between each workstation with a kanban resting on top. When the container was taken for use by the following workstation the car would be taken off and left behind. This would act as a trigger for the previous workstation no produce another container of that component. Nowadays computer systems are likely to be used instead of cards but the basic simplicity of the system should not change.

Operation of just in time- low inventories requires excellence in :

- Production scheduling
- Supplier relations
- Plant maintenance
- Information system
- Quality control
- Customer relations

Backflush accounting

Traditional cost accounting system tracks the sequence of raw material and components moving through the production systems, and as a consequence is called 'sequential tracking system'. As JIT is an entirely different system it requires its own cost accounting system. The absence of stocks makes choices about stock valuation systems unnecessary and the rapid conversion of direct material into cost of goods sold simplifies the cost accounting system. The approach is known as backflush accounting.

Backflush accounting delays the recording of costs until after the events have taken place, then standard costs are used to work backwards to 'flush' out the manufacturing costs. There are two events that trigger the records kept in most back flush accounting systems:

- The first is the purchase of raw materials. In a true JIT system where absolutely no raw material stock is held, even this trigger is not relevant and raw materials are 'flushed' when the second trigger is activated.
- The second trigger is either the transfer of goods to finished goods stock or, in a true JIT system, the sale of goods.

System 1			
A small stock of raw materials is held but no funished goods stock			
		Dr	**Cr**
		£	**£**
1	Raw material are purchase - £3,200		
	Stock control	3,200	
	Creditors control		3,200
2	Conversion costs are incurred - £3,000		
	Conversion cost control	3,000	
	Individual a/cs		3,000
3	Goods sold - £6,000 worth at standard cost		
	Cost of goods sold	6,000	
	Stock control		2,900
	Conversion costs allocated		3,100
4	Under-or over-allocation of conversion costs		
	Conversion costs allocated	3,100	
	Cost of goods sold		100
	Conversion costs control		3,000

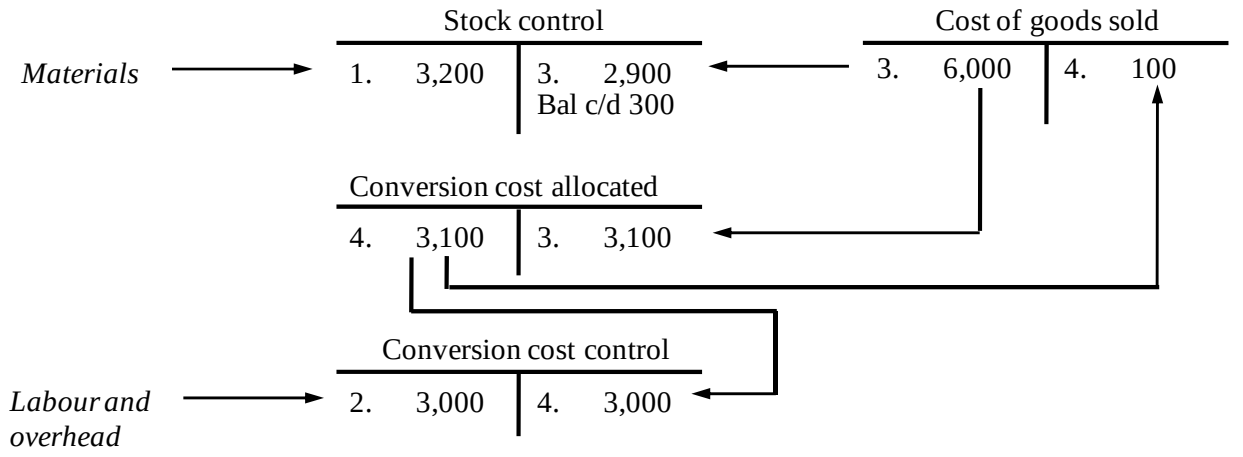
System 2

No raw material stock is held but some finished goods stock is held

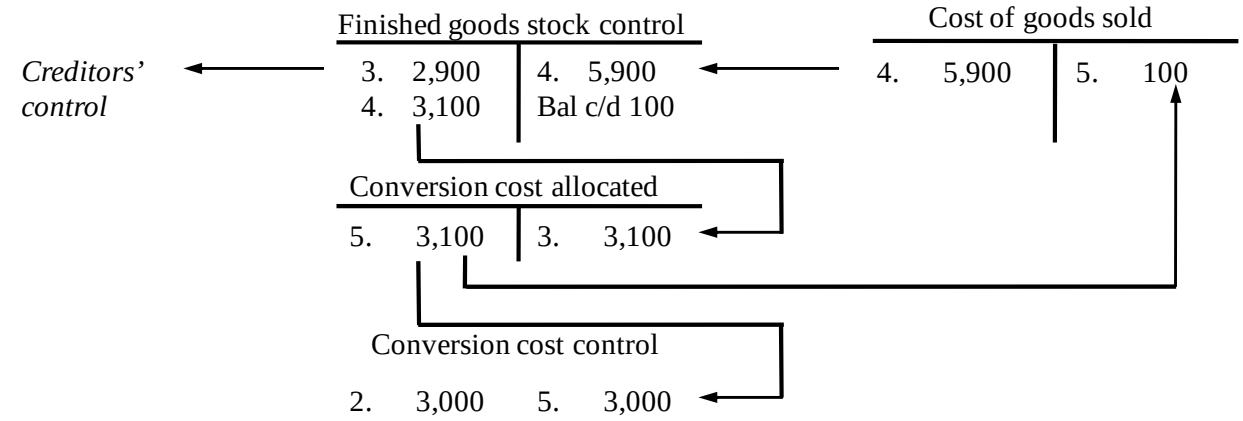
The figure are the same as for system 1, but the transfer to finished goods is assumed to be £6,000 and the cost of goods sold is £5,900 leaving a finished goods stock of £100.

		Dr	Cr
		£	£
1	Raw material are purchase - no entry		
2	Conversion costs are incurred - £3,000		
	Conversion cost control	3,000	
	Individual a/cs		3,000
	Conversion cost control	3,000	
3	Finished goods units produced £6,000		3,000
	Finished goods control	6000	
	Creditor control		2900
	Conversion costs allocated		3,100
4	Finished goods sold £5,900		
	Cost of goods sold	5,900	
	Finished goods control		5,900
5	Under-or over-allocation of conversion costs		
	Conversion costs allocated	3,100	
	Cost of goods sold		100
	Conversion costs control		3000

This is the system used by Toyota in its UK factory. In true Japanese style it manipulates employees to behave in a certain way. First, employees must concentrate on achieving sales because cost of sales is the trigger – nothing gets recorded until the sale is made. Second, there is no benefit in producing goods for stock. In traditional systems, which have a finished goods stock, managers can increase profit by producing more goods than are sold in a period because an increase in finished goods stock reduces the cost of sales in traditional financial accounts.



Ledger accounts for system 1



Ledger accounts for system 2

The model just described may be altered to cope with work-in-progress in the system by using a raw and in progress account (RIP) in place of the stock control account. All other entries remain the same.

The backflush accounting model cannot be used by all organizations. It can only be used where a JIT-type system is in operation. Where it is used it does have advantages. The traditional system is time consuming and expensive to operate, as it requires a considerable amount of documentation, such as material requisitions and time sheets to support it in order to maintain the WIP records and job cards. If a company operates with low stock levels the benefits of operating the traditional costing system are few. By introducing a backflush system a considerable amount of clerical time is saved.

From the backflush accounting examples it can be seen that JIT eliminates direct labour as a cost category. Instead labour is treated as an indirect cost and is included in conversion cost with the overheads. This is because production is only required when demand requires it and so production labour will be paid regardless of activity. All indirect costs are treated as a fixed period expense. With JIT, failed or rework must be almost eliminated if the system is to work and so no accounts for this will exist in backflush accounting whereas they are required in traditional systems.

The backflush accounting model does not conform to the accepted financial accounting procedures for external reporting in the UK. This is because work-in-progress is treated as an asset in the financial accounts and in backflush accounting it is not shown to exist although in practice a small amount does. This can be countered by claiming, quite rightly, immateriality. If only one-tenth of lone day's production is held in work-in-progress then it is immaterial. It can also be claimed that it is immaterial if the work-in-progress does not change from one period to the next as opening and closing stock will cancel each other out.

Backflush accounting can be criticised because of the lack of information that it provides. Some argue, quite rightly, that in reality it is impossible to eliminate all stock as a truck arriving with raw material creates stock until it is moved to and used in production. If backflush accounting is used in a system where a substantial amount of stock is held, a physical stock-take will be needed, because the system does not record the quantity of stock. Instead, it is derived on paper by the difference between the standard cost of material in the goods sold and the amount of materials purchased. This must be checked by a physical stock-take from time to time.

THROUGHPUT ACCOUNTING

The theory of constraints (TOC)

A new type of management accounting system was needed once the new manufacturing philosophy was put into practice. The most widely recognised management accounting system developed for this purpose is known as throughput accounting (TA). The concept behind the system was first formulated and developed by Goldratt and Cox (1986) in the US in a book called the Goal. Goldratt (1990) developed the concept and eventually gave it the name the theory of constraints (TOC) by which name it is known today in the US. The theory was picked up and turned into an accounting system in the UK, where it had become known as throughput accounting (TA). Goldratt and Cox developed the technique to help managers improve the overall profitability of the firm. The theory focuses attention on constraints or bottlenecks within the organisation which hinder speedy production. The main concept is to maximise that rate of manufacturing output, that is, the throughput of the organisation. The idea behind TOC is that raw material should be turned into products that are immediately shipped to customer at the greatest possible speed, in a similar way to the JIT system.

The important concept behind TOC is that the production rate of the entire factory is set at the pace of the bottleneck – the constraining resources. Hence, in order to achieve the best results TOC emphasizes the importance of removing bottlenecks or, as they are called in the USA, binding constraints from the production process. If they cannot be removed they must be coped with in the best possible way so that they do not hinder production unduly.

This is usually = sales revenue – direct material cost.

(Labour costs tend to be partially fixed and are excluded normally. Direct material cost includes purchased components and material handling costs.)

- **Conversion costs**

These are all operating costs, excluding completely variable costs which are incurred in order to produce the product, that is, labour and overhead, including rent, utilities and relevant depreciation.

- **Investment**

Which include all stock, raw material, work-in-progress, finished goods, research and development costs, costs of equipment and buildings, etc.

The aim is to increase throughput contribution while decreasing conversion costs and investment costs. TOC is a short-term profit maximising technique that is very similar in approach to marginal costing. The only real difference is that the contribution may be more realistic in that all conversion costs are assumed to be fixed costs. Bottleneck decisions are in reality linear programming decision as TOC attempts to do the following:

Maximise throughput contribution (sales revenue – direct materials)

Subject to:

Production capacity (supply constraints)

Production demand (demand constraints)

TOC is quite widely used in the USA by companies such as Ford Electronics General Motors and Avery Dennison, some of which claim that it has revolutionized their business. It is also used by a number of UK companies, sometimes in the form of throughput accounting, discussed next.

Throughput accounting (TA)

In the UK, Galloway and Waldron (1988-89) developed throughput accounting from the theory of constraints. It is very similar in concept to TOC but it is an accounting-based technique whereas TOC is not. Eli Goldratt has always stressed the difference between the two systems. This may have been because he is not over-fond of cost accountants or their methods and at one time one of his sayings was that 'cost accounting is the number 1 enemy of productivity'. TA is an extreme version of variable costing as, like TOC, It treats only direct material as variable and all labour and overhead costs as fixed. It operates through a series of ratios and differs from all other management accounting systems because it emphasises throughput first, stock minimisation second and cost control third.

Through accounting's primary concern is the rate at which a business can generate profits. In order to monitor this it focuses on the return on the throughput through the bottleneck resource.

Its key measure is:

$$\text{Return per time period} = \frac{\text{Sales revenue} - \text{Material cost}}{\text{Time period}}$$

[Assuming material are the only totally variable costs, Bladerstone and Keef (1999)]

This ratio measures the value added by the organisation during a specific period of time, normally one hour. As time plays a crucial part in the ratio, manager's attention is automatically drawn to removing bottlenecks that might cause delay in the production process.

If one machine holds up production, because it is inefficient or has inadequate capacity, it is of little use to work the other machines at 100 percent efficiency as the parts produced will be destined for stock until such time as the bottleneck machine can process them. Eventually when parts are spilling from the storeroom or piled all over the factory floor the efficient machines will have to stop altogether for a time, in order to allow the Bottleneck machine to catch up. Therefore, there is nothing to be gained by measuring and encouraging the efficiency of machines that do not govern the overall flow of work. The same applies to the efficiency of production staff working in the non-bottleneck processes. In fact bonuses that are paid to encourage fast working are at best simply wasted and at worst result in increased storage costs. Furthermore, if worker are encouraged to work too quickly they are likely to produce more faulty goods and to waste materials. If the goods are destined for the storeroom, this increase in waste serves no purpose except to increase the average cost per unit.

A minor use of the return per time period ratio is to optimise production in the short term. Product return per time period ratio can be used in the same way as limiting factor ratios are used in order to plan how many units of each product should be made in order to maximise profit. The limiting factor is the first factor that prevents a manufacturing company expanding production towards

infinity, and the ratio is contribution/limiting factor. The products are ranked according to this ratio; that is according to their use of the limiting factor, the one with the highest contribution per key or limiting factor being the best financially. In TA the key or limiting factor is the bottleneck. The return per time period ratio can be modified and used in a similar way to the P/V ratio. The amended ratio for ranking products is:

$$\text{Product return per minute} = \frac{\text{Sale price} - \text{Material costs}}{\text{Minutes on key/ bottleneck resource}}$$

This is illustrated in detail in the following example.

Question:1

A company produces two products, A and B, the production costs of which are shown below:

	A		**B**
	£		**£**
Direct material cost	10		10
Direct labour cost	5		9
Variable overhead	5		9
Fixed overhead	5		9
Total product cost	25		37

Fixed overhead is absorbed on the basis of direct labour cost.

The product passes through two processes, Y and Z, with associated labour costs of £10 per direct labour hour in each. The direct labour associated with the two products for these processes is shown below:

Process	Time taken	
	Product A	Product B
Y	10 minutes	39 minutes
Z	20 minutes	15 minutes

Selling prices are set by the market. The current market price for A is £65 and that for B, £52. At these prices, the market will absorb as many units of A and B as the company units of A and B as the company can produce. The ability of the company to produce A and B is limited by the capacity to process the products through Y and Z. The company operates a two-shift system, giving 16 working hours per day. Process Z is a single-process line and 2 hours in each shift will be downtime. Process Y can process to units simultaneously, although this doubles the requirement for direct labour. Process Y can operate for the full 16 working hours each day.

Requirement:

What production plan should the company follow in order to maximise profits?

Answer: 1

In order to find the profit maximising solution in any problem, the constraints which prevent the profit from being infinite must be identified; the greater the number of constraints, the more difficult the problem is to solve. In the simplest case, where there is only one binding constraint, the profit maximising solution is found by maximising the contribution per unit of the scarce resource, that is, the binding constraint. Linear programming may be used to solve the problem where more than one constraint is binding for some, but not all, feasible solutions. Where the number of products is limited to two, and such constraints are relatively few in number, the problem can easily be expressed graphically to reveal the profit maximising solution, and/or the problem can be expressed in the form of a set of simultaneous equations, as the number of potentially binding constraints increase, the use of a computer becomes the only feasible way to solve the necessary number of simultaneous equations.

In this question, the only constraint is the company's ability to process the product. The total daily processing time for processes Y and Z are:

Maximum process time Y = 2 x 16 hours x 60 mins = 1,920 minutes

Maximum process time Z = 12 hours x 60 mins = 720 minutes

So the maximum number that could be produced of each of the two products is:

	Product A		Product B	
	Maximum units		Maximum units	
Y	$\frac{1,920}{10}$	=192	$\frac{1,920}{39}$	= 49.23
Z	$\frac{720}{20}$	= 36	$\frac{720}{15}$	= 48

In the case of both products, the maximum number of units which can be produced in process Y exceed the number that can be produced in process Z, and thus the capacity of process Y is not a binding constraint. The problem therefore becomes one of deciding how to allocate the scarce production capacity of process Z in such a way as to maximise profit.

Traditional approach – maximising the contribution per minute in process Z

Contribution of A = £65 (selling price)- £20 (variable cost)= £45

Contribution of B = £52 (selling price)- £28 (variable cost)= £24

Contribution of A per minute in process Z = £45 ÷ 20= £2.25

Contribution of B per minute in process Z = £24 ÷ 15= £1.60

The profit maximising solution is therefore to produce the maximum possible number of units of A, 36, giving a contribution of £45 × 36= £1,620.

Through approach – maximising throughput per minute in bottleneck resource Z

Throughput of A = £65 (selling price) - £10 (material cost) = £55

Throughput of B = £52 (selling price) - £10 (material cost) = £42

Contribution of A per minute in process Z = £55 ÷ 20= £2.75

Contribution of B per minute in process Z = £42 ÷ 15= £2.80

The profit maximising solution is therefore to produce the maximum number of units of B, 48, giving a throughput of

£42 × 48 = £2, 0, 16.

It is clear that, given the different solutions, the two approaches cannot both lead to profit maximization which technique is correct depends on the variability are otherwise of labour and variable overheads, which in turn depends on the time for horizon of the decision. This type of profit maximization technique is a short-term one and in two day's world labour cost is likely to be fixed in the short-term and so it can be argued that TA provides the more correct solution. Variable overhead would need to be analysed to access their variability.

Marginal costing rose to popularity in the 1930s when labour costs were usually variable as the workforce was usually paid on a piece-rate basis. Since then text books, at least, have always assume that labour is a variable cost in the short-term. All that happened with TA is that it tends to recognise the present reality, which is that most cost excluding material is now fixed in the short-term. The marginal costing approach should of course be modified to accommodate this, as it requires only variable cost to be used to calculate contribution. If only material costs are variable then only those cost should be use in the calculation of contribution. Thus there should be no difference between the two systems in this respect.

Throughput cost control and effectiveness measures

Although the measure of return per period is a valuable measure for speeding up the flow of work and eliminating bottlenecks it ignores the costs involved in running the factory.

There is little to be gained if throughput and, therefore, revenue are increased marginally but in order to achieve this labour and overhead costs increase considerably. The throughput accounting ratio measures this:

$$\text{TA ratio} = \frac{\text{Value added per time period}}{\text{Conversion cost per time period}}$$

$$\text{i.e} \quad \frac{\text{(Sales – materials) per time}}{\text{(Labour + overhead) per time period}}$$

This ratio will obviously be greater than for a profitable company and the aim will be to increase it to an acceptably high level. If a product has a ratio of less than one the organisation loses money every time it is produced.

Traditional efficiency measures such as standard costing variances and labour ratios can no longer be used with TA because traditional efficiency cannot be encouraged. (The labour force must not be encouraged to work to produce for stock.) a process efficiency ratio of throughput/cost can still be used.

Effectiveness is, however, the more important measure:

$$\text{Current effectiveness ratio} = \frac{\text{Standard minutes of throughput achieved}}{\text{Minutes available}}$$

This measures effectiveness and compares it to a current standard.

Traditional variances can also be misleading in a throughput environment. For example, if overtime was worked at the bottleneck to increase throughput an adverse labour rate variance would arise. Generally adverse variances are considered bad. However, in a throughput environment this would be good and would increase profits as long as the extra labour cost was less than the increase in value added. (See the Garrett Automotive case below.)

TA's aim, like JIT, must always be to minimise production time taken and so all non-value added elements in the production lead time need to be eliminated or minimised so that process time approaches the lead time.

Lead time = Set-up time + waiting time + process time + inspection time + move time

Difference between throughput accountng and traditional product cost systems

Throughput accounting	**Traditional product costing**
Value is added when an item is sold	Value is added when an item is produced
Schedule adherence and meeting delivery	Full utilisationof labour and machine
dates are the key to working effectively	timeis the key to working efficiently
Variance ananlysis only investigates why the	Variance analysis investigates whether
scheduled mix was not produced	standards were achieved
Labour an traditionally defined variable overhead	Labour and traditionally defined variable
are not normally treated as variable costs	overhead are treated as variable costs
Stock is valued in the P&L and balance	Stock is valued in the P&L and balance sheet
sheet at material cost only (i.e. variable cost)	at total produciton cost

Question: 2

- A company can produce many types of product but is currently restricted by the number of labours available on a particular machine. At present this limitation is set at 12,000 hours per annum. One type of product requires materials costing RS. 5 which are then converted in to final product which sells for RS.12. Each unit of this product takes 45 minutes to produce on the machine. The conversion costs for the factory are estimated to be RS.144,000 per annum.
- REQUIRED: calculate the throughput accounting ratios for this product and state the significance of the result.

Answer: 2

- Return per factory hour=sale price-material cost/Total time on key resource;
- RS.12-5/45minutes= RS..o15555*60= RS.9.33
- Cost per factory hour= total factory cost/ total time on the key resource=RS144,000/12,000= Rs.12 per hour.
- Throughput accounting ratio= return per factory hour/ cost pr factory hour= RS.9.33/12= 0.78. Since the TA ratio is less than 1, the product should not be produced.

Question: 2 backflush costing

- Company X produces a single product with the following standard cost per unit:
- Material cost Rs.10 and conversion cost Rs.12 total cost is Rs.22.
- The company operates a backflush costing system with a raw material stock control account. Details for the current month are:
- Opening stock Rs.500, purchases Rs.4, 600, conversion cost Rs. 5,200, cost of goods sold at standard cost Rs. 8,998. Find the closing stock.

Answer: 2 backflush costing

- Material cost of goods sold
- Rs.8,998X Rs,10 /Rs.22= Rs. 4,090
- Closing stock = Rs. 500 + Rs. 4,600 – Rs.4,090= Rs. 1,010.

ADVANCE MANUFACTURING TECHNIQUES (AMT)

Computer aided manufacturing

- CAM is use of computer systems to plan, manage, and control manufacturing operations.
- It involves the use of computers in all phases of manufacturing -a process known as knowledge based machining. High quality at low cost can be achieved.
- Benefits: Better process control, better quality, efficiency, total control

Flexible manufacturing systems

- FMS are systems integrated, computer-controlled production systems, capable of producing any range of parts and switching quickly and economically between them.
- FMS are simple systems with low levels of automation that offer great flexibility through a skilled workforce working in teams.

Enterprise resource planning

- ERP systems are accounting oriented information systems which aid in indentifying and planning the enterprise wide resources needed to procure, make, account for and deliver customer orders
- ERP systems are complex computer systems. Usually comprehensive databases, to provide plans for every aspects of a business.

Question: 1

The new manufacturing environment is characterized by more flexibility, a readiness to meet customers' requirements, smaller batches, continuous improvements and an emphasis on quality. In such circumstances, traditional management accounting performance measures are, at best, irrelevant and, at worst, misleading.

Requirements:

a) Discuss the above statement, citing specific examples to support or refute the views expressed.

b) Explain in what ways management accountants can adapt the services they provide to the new environment.

Answer: 1

a) The traditional management accounting performance measures are best suited to a stable environment, which is programmable. These measures include budgetary control and standard costing which relies upon the ability to be able to predict the future with some accuracy. Standards are frequently set based upon past performance, the assumption being that the past is a good predictor of the future. With the increase in competition in world markets and the ever-increasing rate of change of technology the manufacturing environment has had to become more flexible in order to meet customer needs. Rather than being able to have long batch runs of the same product the emphasis is on small batches and constant product innovation and a requirement to improve and monitor quality.

Traditional management accounting techniques to monitor performance, such as standard costing, are unable to provide the information required because of the need to constantly revise standards. The move to more mechanized and computerized processes has also made the traditional labor variances obsolete because of the insignificant proportion of direct labor in total product cost. Taking the specific example of small batch manufacture, traditional standard costing spreads the set-up costs across the batch so that each item within the batch has a share. With small batch manufacture this cost becomes a much larger proportion of total cost. The traditional costing system also lays little emphasis on the cost of quality and hence the system is not able to provide the information required by management to control this important aspect of modern manufacture. It is therefore true to say that traditional management accounting performance measures are at best irrelevant and at worst misleading in the new manufacturing environment.

b. There are a number of ways management accounting can adapt to the new environment. Traditional standard costing systems can be modified to allow for the flexibility required. If the industrial engineering schemes are mechanized so that standard times can be calculated for each batch these can be multiplied by the standard cost rate to give the standard cost against which actual costs can be measured. The standard cost rate would not have labor as a separate part, but would consider it as part of variable overhead.

An alternative is to move to a system of actual costing using statistical control charts to monitor costs. This is where a confidence interval is set about the mean and any deviations outside this are investigated.

In both standard and actual costing the move away from labor as the cost driver has meant that other bases of charging costs to products have had to be found. Although such methods have been used for many years, particularly in the metals industry, it has been recently formalized into activity-based costing.

Non-financial performance measures are also being developed to complement or replace the traditional measures. This is particularly true in the area of quality where control is essential for long-term survival.

Material requirements planning

- MRP 1 is a system that converts a production schedule into a listing of materials and components required to meet that schedule so that adequate levels are maintained and items are available when needed.
- MRP 11 manufacturing resource planning: An expansion of MRP 1 to give a broader approach than MRP 1 to the planning and scheduling of resources, embracing areas such as finance, logistics, engineering and marketing.

Question: 2

ST plc is a medium-sized engineering company using advanced technology. It has just implemented an integrated enterprise resource planning (ERP) system in place of an old MRP (manufacturing resource planning) system.

Discuss the changes that are likely to be seen after the implementation of the ERP system in

i. the budget-setting process; and

ii. the budgetary control process

Answer: 2

i. ERPS are integrated IT systems that include all aspects of the operations of a company and the financial accounting system. ERPS may affect the budget setting process in the following ways:

- They are complex planning systems that will show the financial consequences of operational plans, and thus they can significantly improve efficiency in the budget-setting process;
- It is much easier with ERPS to conduct sensitivity analysis and budgets can be flexed with more precision;
- Some complex budget relationships are expensive to model and change, but this cost is reduced with effective ERPS;
- Some have argued that the budget-setting process almost disappears with an effective ERPS as the budget figures are a natural consequence of the planning process.

ii. ERPS also has consequences for the budgetary control process, including:

iii. ERPS also has consequences for the budgetary control process, including:

- Actual data can be calculated and compared with budget data within very short time ; periods, in fact virtually in real-time with some systems. This can lead to intensification of the budgetary control process;
- Far less resources are needed to operate a budgetary control system, although vast resources may be needed to implement an ERPS;
- Accountants may play a much reduced role as much of the data required for budgetary control is automatically prepared by the ERPS that operational managers are using.

Kaizen Costing

- Kaizen is a Japanese term for making improvement in process through small incremental amounts, rather than through large innovations. It is applied in manufacturing stage.
- It gives impressive results if applied properly.
- It is a continuous process to find out ways and means to reduce losses during production process

Business Process Re-Engineering

- BPR involves examining business process and making substantial changes to how the organisation currently operates. It involves the re-design of how work is done through activities. The aim of business process re- engineering is to improve the key business processes in an organisation by simplification, cost reduction, improved quality and enhanced customer satisfaction.
- As a result of BPR, it is possible that existing processes and practices may be abandoned and completely new methods of performing business processes are used.

Balanced Score Card

- The BSC is a management system that enables organizations to clarify their vision and strategy and translate them into action.
- It provides feedback around both internal business processes and external outcomes in order to continuously improve strategic performance and results.
- The BSC suggests that we view the organisation from four perspectives, and to develop metrics, collect data and analyses it relative of these perspectives.

Four perspectives

- Financial perspective- To succeed financially, how we should appear to our shareholders.
- Customer perspective- To achieve our vision, how should we appear to our customers.
- Internal business process perspective- This allow the managers to know how well their business is running, and whether its products and services conform to customer requirements
- Learning and growth perspective- It includes employee training and corporate cultural attitude related to individuals and corporate self, improvements.

Supply Chain Management

- Supply chain is a series of customer- supplier link though which goods and services pass to a final customer. The primary focus is on the materials flow which is distinct from the processes carried out on them. SCM is concerned with the co-ordination of all the processes that enable products and services to be brought to the final customer and the right time, right cost and right quantity. Supply chains are usually mapped out in terms of links between organizations.

SCM CONT;

- The functions covered by SCM are:
- Purchasing information system
- Logistics marketing
- Distribution warehousing
- Operations production
- Procurement stores
- transportation

SCM CONT:

- It has lot of benefits; one may have control and monitoring of supply, quantity, scheduled quantity and all other issues pertaining to products. The approach also helps in shifting to JIT system. It also reduces the cycle time.
- As Japanese companies have achieved faster cycle times and higher quantity at a lower cost through having close relation with their suppliers. It also helps in raising capital turnover which ultimately helps in raising profit. On concentration on this system the company can reduce its vendors and supplies which will not only improve the quality but also give price advantage.

TOTAL QUALITY MANAGEMENT

INTRODUCTION TO TQM

What is 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.

"No doubt , humans are always deficient"

(Al-Quran)

The Three Quality Gurus

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

- 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 Gurus

- 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 perationalized. 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"

Features of TQM

1. Top priority is given to satisfying customers. The firm will be structured in a way to allow managers to facilitate this.
2. People are considered to be the route to success. Management is visible and accessible, and the decision making process is participative. There is only a short span of control.
3. Team working is encouraged to improve co-ordination through the organisation and the development of skills.
4. Change is embraced and the organisation is structured to allow change to happen.
5. The organisation pursues continuous improvement with the aim of eliminating all defects. Performance is measured against new benchmarks rather than against a historical standard.
6. The emphasis is on the prevention of problems rather than deduction by inspection.

Characteristics of TQM Leader

- Visible, Committed and Knowledgeable
- A Missionary Zeal
- Aggressive Targets
- Strong Drivers
- Communication of Values
- Organization
- Customers Contact

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

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.

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.

Three Views of quality Costs

- Quality costs are those incurred in excess of those that would have been incurred if the products 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 THE COST OF NON QUALITY

1: 10:100 Rule

“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 Failure

Quality Costs

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.

Appraisal

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

Quality Costs

Internal Failure

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

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

Remember 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.

"Actions are direct reflection of one's intentions" (Al-Quran)

Question: 1

A food manufacturing and packaging company started a quality improvement program in July 2008 after completing its first year of operation. Following are the summarized monthly operating results of its Total Quality Management (TQM) program for the first quarter of 2008 and 2009.

Rs. '000'

Cost			2008			2009
	July	August	Sept.	July	August	Sept.
Sales lost	984	806	662	489	421	384
Sales return	538	421	327	226	190	168
Rework	316	253	200	145	123	111
Scrap	352	290	238	178	154	140
Inspection	28	31	35	48	59	73
Testing	32	34	37	45	52	60
Training	262	287	318	422	510	607
Process engineering	44	49	55	77	97	122
Quality assurance	124	130	137	159	175	192
Customer complaint	78	69	60	50	45	43
	2,758	2,370	2,069	1,839	1,826	1,900

Required:

i. Prepare a Cost of Quality Report showing monthly and quarterly results of two years that classifies into the following:

- ❖ Prevention cost
- ❖ Appraisal cost
- ❖ Internal failure cost
- ❖ External failure cost
- ❖ Total cost

ii. Offer your comments on above quality report.

Answer: 1 (i)

Cost of Quality Report

i. Preventation Cost

			2008			2009
	July	August	Sept.	July	August	Sept.
Training	262	287	318	422	510	607
Process engineering	44	49	55	77	97	122
Quality Assurance	124	130	137	159	175	192
TOTAL COST	430	466	510	658	782	921
% OF TQC	15.59%	19.66%	24.65%	35.78%	42.83%	48.47%
ii. **Appraisal Cost**						
Inspection	28	31	35	48	59	73
Testing	32	34	37	45	52	60
Total cost	60	65	72	93	111	133
% of TQC	2.18%	2.74%	3.48%	5.06%	6.08%	7.00%

Cost of Quality Report

iii. Internal Failure cost

			2008			2009
	July	August	Sept.	July	August	Sept.
Sales Lost	984	806	662	489	421	384
Rework	316	253	200	145	123	111
Scrap	352	290	238	178	154	140
Total Cost	1,652	1,349	1,100	812	698	635
% of TQC	59.90%	56.92%	53.17%	44.15%	38.23%	33.42%
ii. **External Failure Cost**						
Sales Return	538	421	327	226	190	168
Customer complaint	78	69	60	50	45	43
TOTAL COST	616	490	387	276	235	211
% of TQC	22.34%	20.68%	18.70%	15.01%	12.87%	11.11%

Answer: (ii)

This report shows that internal failure and external failure causes most of the cost incurred by the company. Preventive cost is increasing as compared to last year, appraisal cost is also increasing, which require some corrective measures to be taken.

Internal failure cost and external failure cost through very high but reducing when compared with last year sales lost as well as sales returns are quite high, need drastic measures to curtail this cost:

Value analysis

- Definition
- “ a systematic inter-disciplinary examination of design and other factors affecting the cost of a product or service, in order to devise means of achieving the specified purpose most economically, at the required standard of quality and reliability”.
- The British Standards Institution
- Value analysis, therefore, attempts to reduce manufacturing cost of a product without reducing its quality, performance or value to the customer.
- Value engineering is a similar technique which is concerned with new product at a design stage before production commences.
- Value analysis is a form of cost reduction whereas value engineering is a form of cost avoidance.

The procedure

- Information
- Speculation
- Investigation and evaluation
- Recommendation
- Implementation
- The value analysis team must receive the co-operation of all members of the organisation, if it is successful.
- Value analysis is really cost system that evaluate each step in design, material, processes, and operations in order to manufacture of a product that performs all of its intended functions at the lowest cost.
- Value = (product function and performance) /product cost

LEAN ACCOUNTING

LEAN

A Business Strategy Not A Manufacturing Tactic Not A Cost Reduction Program

A Simple Example

Two Companies in Same Industry Using Same Equipment

Company A (Set Up Takes 1 Hour)

Company B (Set Up Takes 1 Minute)

- Who Has Lowest Cost?
- Who Can Provide Best Customer Service?

A Small Process Improvement Provides

Enormous Strategic Advantage

All Companies have similar processes

Manufacturing

- Develop new products
- Take orders
- Process orders
- Purchase materials
- Make products
- Payroll
- Ship product
- Close the books
- Accounts receivable
- Accounts payable
- Hire people

Service

- Develop new services
- Take orders
- Process applications
- Purchase supplies
- Provide services
- Payroll
- Ship product ?
- Close the books
- Accounts receivable
- Accounts payable
- Hire people

What Does It Take To Go to Lean Thinking?

It's a Culture Change That Requires Leadership…Because In The End It's All About People

Learn Lean Thinking

- "Lean is a personal journey as well as an institutional one"
  - ✓ Jones, Aguirre and Calderone
- "If the CEO doesn't know Lean and how to do it, you're not going to be successful at implementing it in that company"

Art Byrne

Have a "no lay-off' policy

"No one will lose their employment as a result of productivity gains"

Plan to answer the question:
"What's in it for me?"

Profit Sharing

CEO's Role - Summary

- Learn Lean Thinking
- Out Front - Hands On - Don't Delegate
- Lots of Leaps of Faith
- Change Metrics
- Create an Environment Where it's OK to Fail
- Provide Air Cover for early adopters
- Eliminate Concrete Heads
- Have a "no-layoff" policy
- Organize around Value Streams
- Profit Sharing

Obstacles To Lean Accounting

- Transaction focus
- Complex systems
- Absorption Accounting
- Emphasis on Variance Analysis
- No Timely Information
- Focus on Compliance vs. Improvement

CFO's Role

- Learn Lean by Doing Lean
- Change Metrics/Performance Measures
- Remove the Obstacles
- Understand the difference between Efficiency and Productivity

- Provide Information that non-accountants can actually use
- Avoid the two big “surprises”

Remove the Obstacles

- Commit to break with traditional systems
- Provide education in Lean Thinking
- Reduce clerical activities to free up time
- Reduce unnecessary reports to free up time
- Assign Accounting staff to Operating Teams
- Simplify Business Systems

The Standard Cost P&L

	This Year	Last Year
Net Sales	100,000	90,000
Cost of Sales:		
Standard Costs	48,000	45,000
Purch Price Var	(3,000)	10,000
Matl Usage Var	(2,000)	5,000
Labor Eff Var	7,000	(8,000)
Labor Rate Var	(2,000)	9,000
OH Volume Var	2,000	2,000
OH Spend Var	(2,000)	8,000
OH Eff Var	16,000	(17,000)
Total Cost of Sales	64,000	54,000
Gross Profit	36,000	36,000
Gross Profit %	36.0%	40.0%

USELESS MANAGEMENT INFORMATION

ACCOUNTING FOR THE ENVIRONMENT

"The air, the water and the soil are not a gift from out parents; they are a loan form our children"

"There is no polite way to say that business is destroying the world"

A number of issues have been brought to society's attention in the recent past including.

- Global Warming;
- Protection of the atmosphere e.g, ozone layer;
- Pollution e.g., aerial (acid rain), marine (sewage and industrial waste disposal);
- The use of sustainable resource energy from fossil fuels as opposed to renewable resources e.g., solar energy;
- Sustainable forest management;
- Risks associated with nuclear power and its storage and disposal.

It would appear vital that society globally tackles the deteriorating effect that our economies are having on our natural resources. With in the arena of debate the focus on 'sustainability', eco-justice and eco-balance have been promulgated.

THE ROLE OF ACCOUNTING RE THE ENVIRONMENT

The question must be asked as to whether the accounting profession can provide reports to management on the use and abuse of natural resources. Some would see accounting as have a wide area of responsibility while not standing separate for the wider society in which it operates.

The accounting profession with its preoccupation with quantification should not ignore the financial consequences of environmental aspects. The significance of environmental costs in any organization is normally significant e.g., energy consumption, material wastage, yield losses. Amocco calculated at one of their refineries that the environmental related costs were 22% of the total costs. Thus the accountant should pay attention to the organization's efficiency as regards these costs. Also, future green taxes, legislation and charges are likely to have financial consequences requiring to be reported upon. The role of management accountants in safeguarding the compliance to any such legislation is obvious.

It may be that environmental accounting may add value to the organization. On a short-term viewpoint the regard for the environmental management principles reduced its electricity bills by 6% and its gas bill by 5%. However environmental accounting should also have a long-term focus. It could be rued that investment (or the lack of) in environmental management accounting systems and research may be reflected the current market values as the market has a longer-term perspective.

However looking at the long-term environmental considerations may give rise to difficulties in measuring intangibles. There is a need to devise means of measuring related intangibles and areas of uncertainty. "The lack of reliable and accepted means of quantifying environmental costs for a company is no longer an excuse for their omission."

SPECIFIC AREAS FOR CONSIDERATION BY THE ACCOUNTING PROFESSION

Assessing the full and constituent extent of an organization's environmental costs may help in communicating their importance. As environmental costs become more visible the information provides catalyst for short and medium-term initiatives for ecological and cost improvement. When environmental issues are translated into money they are more likely to be included in various forms of decisions-making.

The products causing the environmental costs could be charges with the environmental costs directly rather than being seen as a general factory overhead, as is often the case at present. Including overhead costs in central pool can thus create subsidies for the products causing the environmental costs whilst penalizing other. This practice may also leas to sub-optimal decision making, as the product costs may be inaccurate. In order to arrive at fairer costs, Activity Based Costing (ABC) could be applied, with the environment being seen as a cost driver. Internal charges for environmental costs such as waste disposal could be introduced to motivate staff towards greater environmental effort.

A company could adopt a differential pricing policy where they provide certain products that are more environmentally harmful than others. Thus customers will have to pay more for these products, reflecting a social penalty. Currently environmental management accounting is disadvantaged as until society adopts a "polluter pays" policy, by penalizing for the abuse of the environment, these factors are unlikely to be included in the price.

Two specific areas where environmental costing has been used are the costing of waste and energy. It should be noted that effective waste and energy management may not only aid the outside environment but also the organization's profitability. To adequately review these areas there is a need for more detailed information regarding their magnitude. This would require sophisticated metering and detailed coding systems within the general ledger. The costing of waste requires recognition of the total and separate actual and potential costs of waste management. It may be useful to establish a recording and reporting system on the quantities of waste encountered by the organization. The costing of energy requires the implementation of a system to record both energy consumption and costs .This can be supported at corporate and department level by energy budgets and monitoring reports. Accounting for consumptions of energy units rather than costs has been found to be most effective. Splitting variances between price and volume variances for energy consumption may also be of benefit. This system could involve the recharging of waste management costs back to line managers and decision makers (thus forcing managers to take into account the effects of waste and its disposal).

INVESTMENT APPRAISAL

Project appraisals should consider all of the costs and benefits associated with a project and thus include environmental costs such as waste disposal, fines, insurance, clean up costs etc. an evaluation of the project's impact on the business reputation could also be made as well as the financial benefits of demonstrating environmental responsibility. However, if the environmental benefits / costs are seen as being extremely difficult to measure companies may be tempted to disregard the financial evaluation of the environmental elements. At the very least the environmental impact should be considered in the narrative section of a cost effectiveness study.

LIFE CYCLE ASSESSMENTS

Life cycle costing looks at the entire life of a product including the impact external to our organization. This should include the evaluation of the environmental burdens associated with a product or process across its entire life. At the outset of a product's life the life long energy, material usage and environmental releases should be quantified and the data used to assess the impact on the environment. Decisions can be taken at the design stage to climinate or reduce environmentally unfriendly impacts whilst also identifying opportunities for environmental improvements. There should thus be a requirement to provide information on the environmental costs that will assist in guiding product design and marketability. The environmental costs should be identifies, wherever possible avoided or at least minimized at the product development stage.

COMPLIANCE WITH REGULATIONS AND ACCOUNTING STANDARDS

Provision for environmental problems and their remediation is becoming increasingly common in company reporting. The inability to estimate these costs is no longer accepted as an excuse for their exclusion. Also, the accounting standards require the accrual/ provision for future costs incurred today including environmental liabilities.

It would appear obvious that the internal audit function has a role within environmental issues they should keep themselves informed of environmental issues and legislation. This will allow them to integrate key environmental and energy issues and policies into their work.

The auditor could:

- Consider relevant environmental laws and regulations;
- Understand the business being audited and its impact on the environment;
- Assess the entity's environmental risks and the adequacy of the controls
- Assess the need for disclosure
- Assess the level of compliance to company's environmental policies and procedures.

PERFORMANCE MEASUREMENT

Targets of various forms should be set regarding the environment, including budgets, standards and performance measures. Within these there is the typical control loop of setting targets, measuring actual performance, variance analysis reporting and corrective action. Non – financial indicators may be required for this exercise. Where business segments perform well in relation to their targets they should receive recognition e.g, employee bonus schemes could be utilized to promote environmental issues. Whilst public accountability on certain measures may be likely to increase (and already exists in certain countries e.g., the publication of an environmental performance report), this should be internalized into the management accounting reporting system.

To minimize the risks and costs of adverse publicity or the costs of environmental clean ups, many companies are establishing an environmental policy. Within this there is a challenge to management accountants, whose role should be to translate this policy into quantifiable objectives, and monitor the environmental impact of the organization's activities and decisions.

CONTEMPORARY ENVIRONMENTAL ACCOUNTING TECHNIQUES

The eco-balance systems and account

This consolidates traditional cost accounting and environmental management. They system attempts to consider the flow of production through process. This will equate the total inputs (e.g., including energy as a resource) into a process, with the total outputs (e.g., including wastage) into the next process or to storage. Thus wastage can be accounted for each process and then consolidated to form a report of the entire company's inflow / outflow position. The input consists of the amounts and values of raw and auxiliary materials, operating supplies, energy and water. The outputs may include main products, by products, solid waste, waste water, waste air, waste heat, and discharges to atmosphere and noise. This input/output model may help to:

- Review waste generation:
- Evaluate environmental problems at actual locations/ process:
- Arrive at solutions to the problems identified:
- Identify at each process leaks and excess use of energy and materials:
- Calculate efficiency and consumption in dictators;
- Set quantitative prevention and reduction targets.

ENVIRONMENTAL FINANCIAL STATEMENT

This report is aimed at focusing entirely on the organization's impact on the environment. It could take a number of forms, one example being a statement of the annual financial benefits and costs in relation to the environment.

SUSTAINABILITY COSTING

This would entail arriving at the notional cost that the company would need to spend to restore or avoid the environmental damage caused by activities. This would allow the company to calculate the company's environmentally sustainable profit.

Accounting information on the environment affecting other disciplines

The accountant may at times have to provide financial information to service other organizational drives and philosophies. This may also include environmental impact data.

The impact on the environment should be part of the organization's **TQM** ethos. Within this the organization as a whole is constantly seeking means of improvement across all processes and functions. An example of this could be the linking of environmentally friendly suggestions to an employee bonus scheme. It may be that bonus payments linked to energy savings may motivate staff towards being environmentally friendly.